



Europe Economics

# Opex and Commercial Revenues for H8 – Recommendations

March 2026

Europe Economics  
330 High Holborn  
London  
WC1V 7QH

[www.europe-economics.com](http://www.europe-economics.com)



York  
Aviation



Europe Economics makes use of artificial intelligence to enhance the value of the work that it does for clients. Europe Economics may have generated some parts of the text in this document with OpenAI's large-scale language-generation model. Upon generating draft language, Europe Economics reviews, edits, and revises the text.

Europe Economics is registered in England No. 03477100. Registered offices at Holborn Gate, 330 High Holborn, London WC1V 7QH.

Whilst every effort has been made to ensure the accuracy of the information/material contained in this document, Europe Economics assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information/analysis provided in the document and does not accept any liability whatsoever arising from any errors or omissions.

© Europe Economics. All rights reserved. Except for the quotation of short passages for the purpose of criticism or review, no part may be used or reproduced without permission.

# Contents

1	Introduction.....	1
	1.1 Purpose of the report and scope.....	1
	1.2 Summary of approach.....	1
	1.3 Roadmap.....	2
2	Efficient Baseline for 2024.....	4
	2.1 Scope adjustments to HAL’s 2024 outturns.....	4
	2.2 Our efficient 2024 baseline.....	6
	2.3 Data sources and approach.....	8
	2.4 Summary of findings by category – opex.....	8
	2.5 Summary of findings by category – commercial revenues.....	14
	2.6 Cross-check using top-down benchmarking evidence.....	18
	2.7 Triangulating the results.....	21
3	Roll-Forward to H8.....	22
	3.1 Approach.....	22
	3.2 Elasticities and volume assumptions.....	22
	3.3 Real Price Effects (RPEs).....	30
	3.4 Management stretch.....	36
	3.5 Frontier shift.....	39
	3.6 Overlays and other adjustments.....	40
4	Proposed allowances vs HAL’s Business Plan.....	48
	4.1 Key differences.....	48
	4.2 Per passenger comparisons.....	57
	4.3 Total level of stretch.....	66
5	Conclusions and Recommendations.....	69
	5.1 Final recommended opex and revenue profiles.....	69
	5.2 Limitations, caveats, key judgement calls.....	72
	Appendix I: Bottom-Up Benchmarking.....	74
	AI.1 H7 Outturn Assessment - Backward Look Analysis.....	74
	AI.2 Efficient Baseline.....	86
	AI.3 Opex.....	89
	AI.4 CommRev.....	144
	Annex A: Backward Look Opex.....	194
	Annex B: Backward Look CommRev.....	195

Appendix 2: Top-Down Benchmarking.....	196
A2.1 Modelling approach.....	196
A2.2 Model estimations.....	213
A2.3 HAL’s relative efficiency.....	227
Annex: Full set of efficiency results.....	234
Statement from Professor Maurizio Conti.....	239
Appendix 3: Elasticity Modelling.....	241
A3.1 Methodology.....	241
A3.2 Opex.....	242
A3.3 Commercial revenues.....	245
Appendix 4: Real Price Effects.....	248
A4.1 Approach to analysis.....	248
A4.2 Our assessment of RPEs.....	251
A4.3 Approach to addressing RPEs.....	282
A4.4 Conclusions.....	288
Appendix 5: Management Stretch Estimates.....	291
A5.1 Overview.....	291
A5.2 Approach.....	291
A5.3 Results.....	293
A5.4 Conclusion.....	296
Appendix 6: Regulatory Precedents on Frontier Shift.....	298



# 1 Introduction

## 1.1 Purpose of the report and scope

This report sets out our recommendations on the level of efficient operating expenditure (opex) and commercial revenues for Heathrow Airport Limited (HAL) for the Initial Proposals of the H8 price control period. The work has been undertaken in accordance with the CAA's requirements for external advice on these two regulatory building blocks.

The scope covers all components of HAL's opex and commercial revenue base that fall within the H8 price control, namely staff costs, utilities, maintenance, and facilities management costs and all non-aeronautical revenues such as retail, catering, property, surface access and rail. We also include commentary on the revenues CAA should assume from cargo and the recovery of some of the operational costs through other regulated charges (ORCs) during H8. The work identifies an efficient 2024 baseline and advises on the adjustments required to roll this baseline forward into H8, taking account of factors such as changes in passenger numbers or economy-wide productivity gains.

## 1.2 Summary of approach

Consistent with our remit, our assessment combines benchmarking HAL's performance to reach a view on a suitable 2024 baseline with further analysis to determine how best to roll that baseline forward into H8. This approach is applied at a granular level, assessing each line of operating expenditure and revenue as set out in the H8 data tables. We relied primarily on bottom-up benchmarking to determine the baseline, using top-down benchmarking as a cross-check. Our approach reflects the CAA's objective of broadening the evidence base for cost assessment and ensuring transparency and consistency across the regulatory building blocks.

We began by reviewing HAL's 2022–2024 cost and revenue outturns, drawing on the data submitted with HAL's H8 Business Plan and supplemented by additional information requests. We also gathered comparable information from peer airports in the UK and Europe at both the aggregate and, where possible (given the data HAL provided and what is available publicly), disaggregate level for further analysis. This included some proprietary data. In addition, we conducted site visits and discussions with HAL to understand operational drivers and contractual arrangements. These steps established the underlying evidence base for our subsequent benchmarking.

Using the assembled evidence, we benchmarked HAL's performance against appropriate peer airports. This included aggregate comparisons and more targeted bottom-up deep dives into material cost and revenue categories such as security staffing, facilities maintenance, and retail and catering. The benchmarking analysis provided the basis for determining an efficient 2024 baseline for opex and commercial revenues.

We then rolled the efficient 2024 baseline forward into the H8 period. This involved assessing:

- suitable elasticities to control for expected changes in passenger numbers and other relevant cost and revenue drivers,
- whether a real-price effect (RPE) adjustment is warranted, based on expected movements in specific input costs relative to CPI,
- the scope for frontier shift and management stretch to improve opex efficiency and commercial revenues over time, and
- other relevant overlays and adjustments that might be appropriate.

We applied a different approach for four categories of opex and commercial revenues. On the cost side, changes to the way future rateable values will be determined mean that 2024 outturns provide limited information on how these costs are likely to evolve during H8. For this category, we therefore used HAL's latest forecasts and applied a downward adjustment to reflect the truing-up that the CAA has indicated it plans to make given that some allowances provided in H7 for this cost category were ultimately not required.

On the revenue side, we used a different approach for three categories: terminal drop-off charges (TDOCs), bureau of change and cargo. These revenues may be linked to policy objectives beyond revenue maximisation, so a simple "optimisation in 2024 and roll-forward" approach may not be appropriate. For these three categories, we used bespoke bottom-up calculations to estimate appropriate H8 allowances, rather than using an efficient 2024 baseline as the starting point.

There are a few areas where our analysis to date has been limited. For example, our assessment of the scope for future productivity gains (frontier shift) is limited to looking at regulatory precedents to date and does not include any original analysis. This may warrant further consideration ahead of the Final Determination. We also have had minimal regard to possible second-order effects on opex or commercial revenues of changes in the service levels and resilience or investment plans during H8, recognising that frontier shift captures, also, the effects of past capital investment, and that most of the impacts on opex and commercial revenues of the capital investment HAL will incur in H8 will happen with a lag, meaning that we would expect such impacts to materialise, to a large extent, in H9 and beyond.

### 1.3 Roadmap

The remainder of this report is structured as follows:

- Chapter 2 describes our methodology and findings for the efficient baseline for 2024;
- Chapter 3 details our roll-forward model and specifies our methodology and findings on elasticities and volume assumptions, RPEs, management stretch, frontier shift, overlays and other adjustments;
- Chapter 4 contrasts our findings with HAL's Business Plans;
- Chapter 5 provides our conclusions and final recommendations.

We also include the following Appendices:

- Appendix 1 details the bottom-up benchmarking process;
- Appendix 2 provides the detailed overview of top-down benchmarking;
- Appendix 3 shows elasticity modelling;
- Appendix 4 details real price effects;

- Appendix 5 complements management stretch analysis;
- Appendix 6 complements frontier shift approach.

Some information in this report has been redacted.

# 2 Efficient Baseline for 2024

## 2.1 Scope adjustments to HAL's 2024 outturns

Our starting point for setting an efficient 2024 baseline is HAL's 2024 outturns, as set out in the Business Plan data tables.

However, we understand from HAL's data tables, Business Plan submission, and further clarifications received through the Question and Answer (Q&A) process, that two factors need to be considered to ensure we start from an appropriate baseline:

1. Removal of POD parking, which is not a regulated activity but POD opex and POD revenues are reported in HAL's 2024 outturns. This removal is consistent with the adjustment that HAL made to its 2024 baseline for the purpose of generating its H8 opex and commercial revenue proposals.
2. Regulatory treatment of noise and vortex costs for H8, which HAL proposes in its Business Plan submission to be treated as capex. The CAA has advised that it will retain the treatment of noise and vortex costs as opex. As HAL's 2024 outturns are inclusive of noise and vortex costs (£10.6 million, 2024 CPI), we do not make any adjustment to HAL's 2024 outturns on this regard. We note, though, that HAL removed noise and vortex from the 2024 baseline used as the basis to generate its H8 opex proposals, meaning that our 2024 starting position diverges from HAL's in this regard. For transparency, we have isolated noise and vortex in our 2024 scope-adjusted baseline as a standalone opex line, and removed the noise and vortex components from other opex components, using the information that HAL provided to us through Q&A.

The tables below show HAL's 2024 outturns, our scope-adjusted 2024 outturn and, for comparison, the 2024 baseline that HAL uses in its H8 estimates.

**Table 2.1: 2024 Opex Outturns and Baselines (£ millions, 2024 CPI)**

<b>Category</b>	<b>HAL 2024 outturns</b>	<b>POD removal</b>	<b>Noise and vortex removal</b>	<b>EE/YA scope-adjusted HAL 2024 outturn</b>	<b>HAL 2024 baseline for H8 proposals</b>
<b>Staff</b>					
<b>Security staff</b>	197			197	197
<b>Other staff costs</b>	288	-0.8	-0.4	287	287
<b>Maintenance, facilities management &amp; equipment</b>	240	-1.6		238	238
<b>Rent &amp; rates</b>	116	-0.02		116	116
<b>Utilities (excluding distribution contract)</b>	126	-0.1		126	126
<b>Electricity distribution contract</b>	33			33	33
<b>Insurance</b>	20			20	20
<b>Other opex</b>	566	-0.1	-10.2	556	556
<b>Noise and vortex</b>				11	
<b>Total opex</b>	<b>1586</b>	<b>-2.7</b>	<b>-10.6</b>	<b>1584</b>	<b>1572</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement. Note: security staff costs in 2024 excludes pension and capitalisation costs.

**Table 2.2: 2024 Commercial Revenue Outturns and Baselines (£ millions, 2024 CPI)**

Category	HAL 2024 outturns	POD removal	EE/YA scope-adjusted HAL 2024 outturn*
<b>Retail and catering (including bureaux)</b>	437		437
<b>Surface access &amp; car parking</b>	213	-9.8	203
<b>Terminal drop-off charge revenue</b>	53		53
<b>Service revenue (excl. surface access)</b>	70		70
<b>Rail</b>	118		118
<b>Property</b>	145		145
<b>Other commercial revenue</b>	7		7
<b>Cargo</b>	21		21
<b>Total revenue</b>	1064	-9.8	1054

\* Same as the 2024 baseline that HAL uses in estimating its H8 proposal  
Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

## 2.2 Our efficient 2024 baseline

As we explain in Appendix I, our proposed baseline level of total opex is 4.0 per cent lower than HAL’s 2024 baseline inclusive of noise and vortex (for comparability), while our baseline commercial revenues are 2.9 per cent higher than HAL’s 2024 baseline. Our adjustments equate to opex savings of £0.8 (2024 CPI) per passenger and additional commercial revenues per passenger of £0.4 (2024 CPI).

The efficient baselines represent our estimate of the efficient level of opex and commercial revenues that would have been achievable in 2024 had the airport not been constrained by short-term contractual or operational rigidities. These estimates are therefore not a direct measure of inefficiency in HAL’s 2024 outturns.

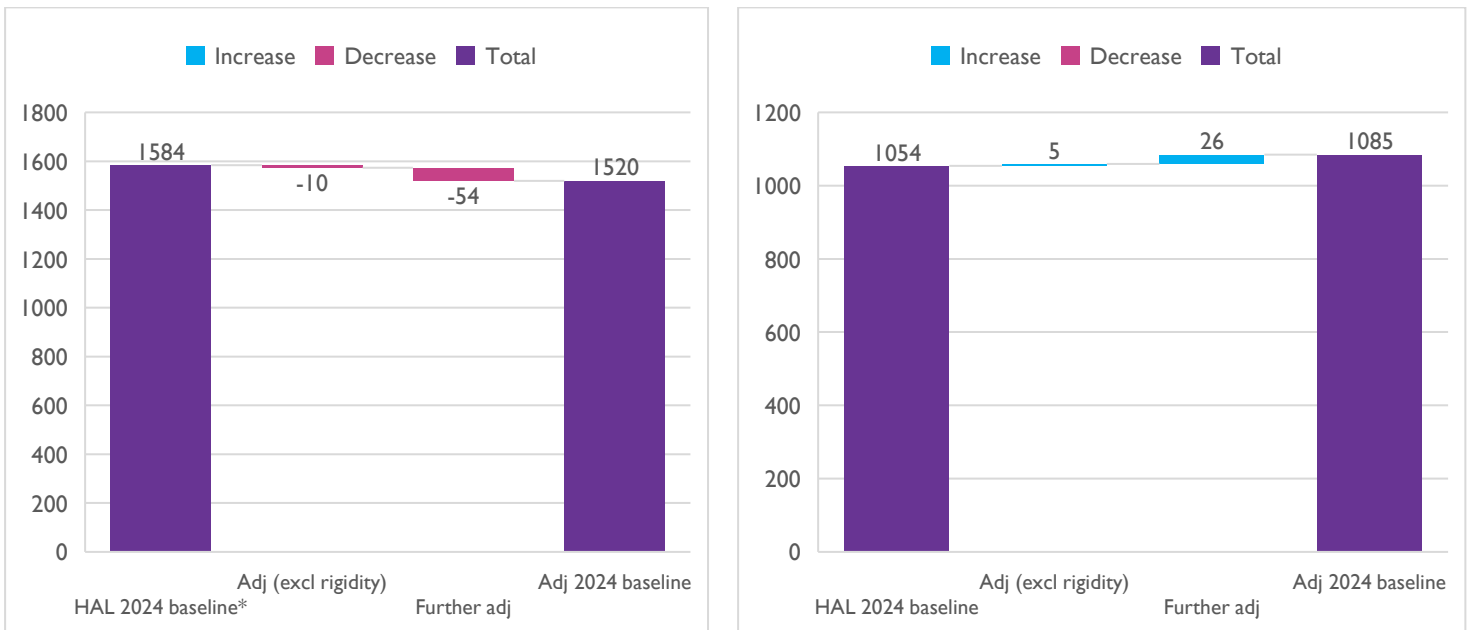
In some areas, HAL’s costs or revenues may compare unfavourably with peer benchmarks because the airport was locked into contracts that were reasonable at the time of signing but could not be re-priced annually without suppliers charging a premium for that flexibility. By the start of, or early into, the H8 regulatory period, most contracts will have come up for renewal, enabling HAL to secure terms more reflective of prevailing market conditions. For example, energy costs in 2024 varied significantly across firms because contract prices depended on the point in the market cycle at which they were last renegotiated; contracts such as HAL’s agreed during the height of the

Ukraine-war price spike were materially more expensive than those that could be secured today. For insurance, we have made an adjustment to the baseline in the opposite direction, accepting for now HAL’s premise that the premium paid in 2024 would no longer be possible because of tighter conditions in the relevant insurance market.

The same logic applies to operational changes that will only be fully implemented by H8, such as the roll-out of next-generation security screening equipment. The baseline therefore assesses the costs that would have been attainable in 2024 had such technology already been in place, even though those savings were not realisable at the time. Overall, the baseline is intended to represent what HAL’s opex and revenue would be at the start of H8 if passenger numbers were the same as in 2024 and there were no overlays, RPEs, general technological progress, or management stretch.

To illustrate the composition of these adjustments, we present waterfall charts showing the movement from HAL’s 2024 baseline to our proposed efficient baselines for both opex and commercial revenues. These charts separate the improvements that could reasonably have been achieved in 2024 (labelled as ‘adjustments excluding rigidity’) from those that reflect longer-run efficiencies that should be obtainable by H8 when short-run contractual or operational rigidities are not binding (labelled as ‘further adjustments’). The latter component is relatively more material in both our opex and commercial revenue assessments.

**Figure 2.1: Efficient 2024 baseline for opex (left) and commercial revenues (right) (£ millions, 2024 CPI)**



Source. HAL Business Plan data tables, Europe Economics/YAL judgement<sup>1</sup> \*Inclusive of noise and vortex costs.

<sup>1</sup> These totals are net of T5 Pod costs.

## 2.3 Data sources and approach

Our bottom-up assessment of an efficient 2024 baseline began with HAL's H8 Business Plan and the associated data tables submitted through the CAA process. These materials formed the core dataset for the analysis. We supplemented them with:

- targeted information requests to HAL where greater granularity was needed to undertake benchmarking or to understand the operational drivers of particular cost and revenue lines;
- market and airport benchmark data drawn from published sources, confidential comparator datasets and market intelligence; and
- third-party reports, such as Pragma's retail and catering analysis for HAL.

The assessment proceeded in stages. We first reviewed HAL's 2024 outturn costs and revenues against H7 performance to identify areas where results appeared unusual, had grown materially, or showed divergence from historical patterns. Using criteria such as materiality, volatility, the presence of significant contractual commitments, unexplained discrepancies during H7, and concerns raised by airlines, we then identified a set of categories for detailed "deep dives".

For each deep-dive area, we carried out bottom-up benchmarking against peer airports and, where relevant, HAL's own past performance. Depending on the category, this involved benchmarking subtotal cost or revenue lines, or benchmarking underlying operational components such as staffing intensity, processing rates, consumption levels, unit prices or space utilisation. For some cost and revenue categories, the granularity of data that HAL was able to provide limited the extent to which detailed benchmarking could be carried out. The choice of peers varied across benchmarks and was heavily influenced by data availability. Adjustments were made where possible to control for differences in scale, operating environment, service-level expectations and functional responsibilities.

Our final conclusions reflect judgement and not just a mechanistic series of adjustments to align HAL's 2024 costs or revenues with a best-in-class comparator. We are mindful that benchmarking at the disaggregated level must control for the fact that airports will differ in how they choose to allocate costs and revenues to different categories. Differences in the share of insourcing can complicate comparisons, particularly when looking at staff costs. Nonetheless, we have endeavoured to ensure our comparisons are reasonable and consider these differences.

Appendix I contains our bottom-up assessment. In the following subsections we provide an overview of our key findings and the associated rationale.

## 2.4 Summary of findings by category – opex

Our bottom-up assessment indicates that Heathrow's 2024 opex contains a modest but material efficiency gap, concentrated in labour-intensive areas such as security staffing and outsourced operational services (see the Table below). The efficient baseline (excluding rigidity) for 2024 is £1,574 million (2024 CPI), compared with HAL's 2024 baseline inclusive of noise and vortex of £1,584 million (2024 CPI), a reduction of £10 million (2024 CPI), as shown in Figure 2.1.<sup>2</sup> This largely relates to identified inefficiencies in the security process. Our baseline is adjusted down

---

<sup>2</sup> These totals are net of T5 Pod costs.

further to £1,520 million (2024 CPI), a further reduction of £50 million (2024 CPI), to account for short-term contractual or operational rigidities that we expect HAL to be able to eliminate in H8 (specifically, the scope for contract renewals and further efficiencies to be gained from the roll-out of CTix as algorithms improve and staff and passengers are familiar with the new process). This represents a total efficiency adjustment of 4.0 per cent to the baseline.

**Table 2.3: Summary table detailing the efficient opex baseline (£ millions, 2024 CPI).**

<b>Category</b>	<b>EE/YA scope- adjusted HAL 2024 outturn</b>	<b>Efficient baseline</b>	<b>Adjustment to outturn (%)</b>	<b>Rationale</b>
<b>Staff</b>				
<b>Security staff</b>	197	174	-11.9	5% inefficiency in existing practices vs benchmarks Scope for further 3.2% saving once CTix fully rolled out Part year VCP costs (8.3m) re-allocated to other opex to reflect full year effect of outsourcing
<b>Other staff costs</b>	287	272	-5.2	Scope for 3.8% savings in staffing costs and reflects full year effect of outsourcing trolley recovery
<b>Maintenance, facilities management &amp; equipment</b>	238	235	-1.1	Potential for efficiencies from consolidation of cleaning contracts
<b>Rent &amp; rates</b>	116	116	0.0	
<b>Utilities (excl. distribution contract)</b>	126	109	-13.2	Unit prices paid for electricity and gas in 2024 exceeded benchmarks by more than 15%
<b>Electricity distribution contract</b>	33	33	0.0	Long-term contract
<b>Insurance</b>	20	26	30.0	10% year on year increase in 2025, 26 and 27
<b>Other opex</b>	556	554	-0.3	Large savings expected on retendering for PRS (20%) and IT (10%) Addition of full year effect of VCP and trolley outsourcing
<b>Noise &amp; vortex</b>	11			
<b>Total opex</b>	1584	1520	-4.0	

Source: HAL Business Plan data tables, Europe Economics/YAL judgement. Note: security staff costs in 2024 excludes pension and capitalisation costs.

## 2.4.1 Security staffing

**Table 2.4: Summary table detailing the efficient security staff costs baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Reallocations	Adjustment to BoA operations	Adjustment for expected step change	EE/YA efficient 2024 baseline
<b>Security staff</b>	£197m	-£8m	-£9m	-£6m	<b>£174m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

Security remains one of the largest cost categories. HAL reported £197 million (2024 CPI) in 2024; after adjusting for reallocation of the outsourcing of Vehicle Control Posts (VCPs), this reduces to £189 million (2024 CPI). Our analysis suggests that Heathrow’s transition to CTix technology has improved throughput capacity, but that staffing deployment is still higher than at comparable airports. Benchmarking suggests Heathrow’s lane efficiency is up to 30 per cent below peers, but after accounting for service-level targets and site-specific constraints, the likely inefficiency is 5–10 per cent. Average salaries are also 4–7 per cent above London-adjusted market rates. Applying a 5 per cent (salary) adjustment in the round yields an efficient baseline of £179 million for 2024 (2024 CPI), down from £189 million (2024 CPI), to account for existing lane inefficiencies and higher wages. We consider a further 3.2 per cent reduction is appropriate to reflect the expected low end of likely savings from further process improvements from CTix adoption, bringing the efficient baseline down further to £174 million (2024 CPI).

## 2.4.2 Operational and non-operational staffing

**Table 2.5: Summary table detailing the efficient operational and non-operational staff costs baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Adjustment for outsourcing trolley recovery	Efficiency adjustment	EE/YA efficient 2024 baseline
<b>Operational and non-operational staff</b>	£287m	-£3m	-£12m	<b>£272m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

Across operational and non-operational staff groups, cost per full-time equivalent (FTE) has remained relatively stable since 2022, but Heathrow’s average cost per FTE remains higher than comparable UK airports even after adjusting for regional salary differences. Differences in outsourcing and insourcing complicate direct comparison, but there is some indication of marginal inefficiency in staffing costs. Our adjustment includes a 3.75 per cent efficiency saving, which we apply to all operational and non-staff operational costs (including those associated with noise and vortex), after adjusting down the costs to by £3m (2024 CPI) to reflect savings from the outsourcing of trolley recovery.

### 2.4.3 Facilities maintenance and cleaning

**Table 2.6: Summary table detailing the efficient facilities, maintenance and cleaning costs baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Efficiencies expected from cleaning contract	EE/YA efficient 2024 baseline
<b>Facilities maintenance and cleaning</b>	£238m	-£3m	<b>£235m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

HAL's facilities and maintenance real-terms costs per passenger in 2024 are 13 per cent lower than in 2014 and our independent benchmarking shows that it is on a par with other large airports such as Schiphol, Paris, Hong Kong, and Singapore. Although Heathrow's cleaning unit costs benchmark reasonably against large European airports, we consider that the potential for efficiency gains from the new Mitie contract are not yet fully realised. HAL has stated that consolidation to a single cleaning contract is expected to deliver five per cent efficiency gains. Our overall efficient baseline for facilities and maintenance costs is consequently £235 million (2024 CPI) down from £238 million (2024 CPI).

### 2.4.4 Utilities

**Table 2.7: Summary table detailing the efficient utilities costs baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Electricity efficiency savings	Gas efficiency savings	EE/YA efficient 2024 baseline
<b>Utilities</b>	£126m	-£16m	-£1m	<b>£109m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

Utility consumption levels per passenger were broadly consistent with or below peer airports, suggesting operational efficiency in energy and resource use. However, there is some evidence that the prices paid by HAL have deviated in recent years from economy-wide trends (around 16-17 per cent higher than the DESNZ index for large industrial users in 2024) which we believe largely relate to the timing when key utility contracts were signed. HAL was able to achieve close to standard pricing across its utilities pre-pandemic, and we assume will be able to do so in the future through new contractual negotiation. With contract renewals due early in H8, our baseline target for utilities is £109 million (2024 CPI), £17 million (2024 CPI) or 13.2 per cent lower than HAL's 2024 outturn owing to 15 per cent efficiency adjustment in electricity and 17 per cent efficiency adjustment in gas.

## 2.4.5 Other operational costs and general expenses

**Table 2.8: Summary table detailing other operational costs and general expenses baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Adjustment for outsourcing of VCP Security and Trolley Recovery	PRS efficiency savings	IT efficiency savings	EE/YA efficient 2024 baseline
<b>Other operational costs</b>	£566m	£10m	-£13m	-£8m	<b>£554m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement.

While other operational costs and general expenses are reported separately in the regulatory accounts, we have assessed them jointly to ensure we are comparing like-with-like across time as we are aware that several costs need to be recategorised to this category owing to outsourcing. Combined, they represent the largest non-staff category, totalling £566 million (2024 CPI), according to HAL's 2024 outturns. We are aware that outsourcing of VCP Security and trolley recovery means that we need to reallocate £10 million (2024 CPI) from staff costs to general expenses.

Many of the costs in this category relate to contracts, some relatively large. Associated contractual rigidities limit the scope for immediate savings that HAL might have achieved in 2024 had it been more efficient. But by H8, HAL will have had a chance to renew many of the contracts, so we have sought to reflect the findings from our benchmarking that some of the contracts, particularly PRS (Passenger Requiring Support), IT, and policing, appear high relative to benchmarks. We have consequently identified further adjustments to our baseline of 20 per cent from PRM and 10 per cent from IT. Appendix I details the benchmark evidence underpinning these adjustments.

## 2.4.6 Rent & rates, electricity distribution, insurance and noise and vortex

Our bottom-up benchmarking work did not look at rent and rates or the electricity distribution contract. The distribution contract extends beyond the end of H8, such that there is no scope for HAL to realise savings here. In contrast, the way that business rates will be assessed for airports is currently being overhauled such that reviewing 2024 outturns is of limited value.

We note that HAL has proposed an RPE of CPI+10 per cent for insurance and we have considered the analysis that it provided to justify this. We note that the argument put forward by HAL only justifies an increase up to 2028, not for the whole period. We have accounted for the price increase HAL faces in the coming years through a baseline adjustment rather than an RPE allowance. We have adjusted the insurance cost upwards to reflect HAL's expectation of 10% year on year increases over the next 3 years, however this was not an area where we undertook an in-depth bottom-up analysis.

Our bottom-up assessment did not benchmark noise and vortex as a discrete cost category. However, because noise and vortex-related expenditure in 2024 is captured across a number of underlying opex line items (for example, staff and other operating costs) rather than reported

separately, our review of 2024 outturns implicitly covered these costs within the wider baseline assessment.

## 2.5 Summary of findings by category – commercial revenues

Our bottom-up assessment indicates that Heathrow's 2024 commercial revenues show scope for some improvement, particularly in retail, catering, property and car parking (see Appendix I). We apply an adjustment of 0.5 per cent over HAL's scope-adjusted revenues to reflect immediate efficiencies that HAL might have been expected to achieve in 2024. After further adjustments to reflect opportunities that will become available before H8, primarily contract renewals and commercial strategy changes, the efficient baseline increases to £1,085 million (2024 CPI). This represents an upward adjustment of 2.9 per cent on HAL's scope-adjusted 2024 outturns.

**Table 2.9: Summary table detailing the efficient commercial revenues baseline (£ millions, 2024 CPI).**

<b>Category</b>	<b>EE/YA scope-adjusted HAL 2024 outturn</b>	<b>Efficient baseline</b>	<b>Adjustment to outturn (%)</b>	<b>Rationale</b>
<b>Retail and catering</b>	414	440	6.2	9.5% increase in catering revenues from better matching product mix to the change passenger profile 5.5% uplift in retail from improved product allocation, pricing, and tenant strategy 5% uplift in advertising revenues.
<b>Bureau of change</b>	23	23	0	
<b>Surface access &amp; car parking</b>	203	203	0	
<b>Terminal drop-off charge revenue</b>	53	53	0	
<b>Service revenue (excl. surface access)</b>	70	70	0.2	Scope for gains from more competitive fast-track pricing – 1% uplift added to fast-track services
<b>Rail</b>	118	121	3.0	Scope for gains from more competitive pricing of Heathrow Express-
<b>Property</b>	145	146	1.0	Scope to improve contract management and space management
<b>Other commercial revenue</b>	7	7	0	
<b>Cargo</b>	21	21	0	
<b>Total commercial revenue</b>	1054 (with cargo)	1085	2.9	

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

## 2.5.1 Retail and Catering

**Table 2.10: Summary table detailing retail and catering revenue baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Improved retail revenues	Improved catering revenues	Improved other retail (advertising) revenues	EE/YA efficient 2024 baseline
<b>Retail and catering (excluding bureau)</b>	£414m	£15m	£8m	£2m	<b>£440m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

Retail and catering (excluding bureau of change) together account for over one-third of Heathrow’s commercial revenues. Although HAL continues to achieve high revenue per passenger in this area, our analysis shows that its performance has lagged other comparable airports post-pandemic, even allowing for the Brexit related effects and loss of VAT free shopping. Our analysis identifies that HAL’s product mix and pricing has remained too focused on premium passengers, while the post-pandemic traffic recovery was driven increasingly by price-sensitive outbound leisure travellers. HAL’s slow adaptation to this changing demand profile has led to material underperformance in 2024, especially in catering.

For catering, benchmarking against airports such as Gatwick showed that Heathrow significantly under-achieved on spend per passenger in 2024. An upward adjustment of 9.5 per cent was applied, reflecting both opportunities to adapt product mix to the evolving passenger base, which resulted in an upward adjustment of £8m (2024 CPI) to HAL’s 2024 outturn.

Retail revenue performance per m<sup>2</sup> is comparatively strong, but benchmark analysis indicates scope for improvement in product allocation, pricing, and tenant strategy. We applied an adjustment of 5.5 per cent to HAL’s 2024 outturn to arrive at our baseline. This is at the bottom of the range of possible improvements that our benchmarking suggested might be possible (5.5–11.3 per cent), resulting in an upward adjustment of £15m (2024 CPI).

Advertising and other retail revenues remains high relative to peers (around £49 million in 2024), although it is still around 25 per cent below HAL’s 2019 levels. This is a steeper decline than at airports such as Schiphol and Dublin. Contractual constraints, with two key concessions both expiring in 2026, may have limited HAL’s ability in practice to do better than it did in 2024. However, given there is scope for these contracts to be re-tendered ahead of H8, we have proposed an uplift in this advertising revenue source of 5 per cent, resulting in an upward adjustment of £2m (2024 CPI).

No efficiency adjustments were made to other minor revenue lines, as available evidence did not indicate material inefficiency or underperformance.

## 2.5.2 Surface access and car parking

**Table 2.11: Summary table detailing surface access and car parking revenue baseline (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	EE/YA efficient 2024 baseline
Surface access and car parking	£203m	£203m

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

Car parking accounts for around 18 per cent of commercial revenues and exceeded the adjusted H7 determination by 10 per cent in 2024. Improved yield management contributed positively, and there is no clear evidence that HAL's pricing and inventory management is being operated sub-optimally, both in absolute terms and also when compared with other UK airport benchmarks.

No adjustments were applied to car-rental revenues due to limited evidence of inefficiency.

As such, our efficient baselines stand at £176 million for car parking and £27 million for car rental.

## 2.5.3 Service revenue (excluding surface access)

**Table 2.12: Summary table detailing service revenues excluding surface access (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Improved fast-track revenues	EE/YA efficient 2024 baseline
Service revenue	£70m	£0.2m	£70m

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

This category covers revenues from fast-track security queues, VIP and a category headed miscellaneous. It accounts for 6 per cent of total commercial revenue over the period.

The available evidence does not suggest that there was scope for HAL to earn significantly more. From the available benchmarking evidence, HAL appears to be setting high fast-track charges relative to peer airports. This relatively high Fast Track charge may be suppressing demand (noting that, for premium passengers, the cost is likely to be borne through ticket prices) and we propose a 1 per cent efficiency uplift on the basis that with more competitive pricing HAL could stimulate additional demand. This retains an efficient baseline of approximately £70 million for service revenues given that fast-track revenues are only a small part of this category with VIP services being the largest share.

## 2.5.4 Rail

**Table 2.13: Summary table detailing rail revenues (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Improved Heathrow Express Revenue	EE/YA efficient 2024 baseline
<b>Rail</b>	£118m	£4m	<b>£121m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

For rail revenues, HAL’s focus on maintaining Heathrow Express as a premium service has arguably limited its competitiveness against Elizabeth Line, resulting in market share erosion. Our benchmarking suggests that HAL may be pricing the service too high or at least underpromoting discounted fares, and that there may have been scope for modest additional revenues in 2024 through targeted discounted advance fares generating additional patronage. A 3 per cent uplift was applied to HAL’s 2024 outturn revenues, producing an efficient baseline of £121 million (2024 CPI).

## 2.5.5 Property

**Table 2.14: Summary table detailing property revenues (£ millions, 2024 CPI).**

(2024 CPI)	EE/YA scope adjusted HAL 2024 outturn	Improved revenues from non-guide price revenues	EE/YA efficient 2024 baseline
<b>Property</b>	£145m	£1m	<b>£146m</b>

Source: HAL Business Plan data tables, Europe Economics/YAL judgement

Property revenues were broadly in line with expectations during H7. However, benchmarking of non-terminal and non-guide-price rentals indicated scope to do better in terms of rental levels from non-terminal property not covered by the guide prices. A 2.5 per cent uplift was applied to non-guide-price property revenue. Consequently, an overall 1 per cent uplift was applied (benchmark range 0–5 per cent) to HAL’s 2024 outturn revenue, yielding an efficient property baseline of £146 million (2024 CPI).

## 2.5.6 Other commercial revenue, TDOC and cargo

We have used the 2024 outturns as our efficient baseline for these categories.

## 2.6 Cross-check using top-down benchmarking evidence

As a cross check on the findings from our bottom-up benchmarking, we also conducted top-down econometrics benchmarking exercise. Since the purpose with these models is to provide a top-down cross-check of the bottom-up benchmarking of opex and commercial revenues, those are the two relevant variables we attempt to model. We have not sought to estimate models that consider HAL’s relative efficiency at managing capital expenditure or its overall costs.

### 2.6.1 Data used

The work draws on the Jacobs Airport Performance Indicators dataset. This is a panel of airport-level operational and financial data, covering publication years 2012–2024 (based on underlying 2010–2022 information). It is compiled from publicly available annual reports, with adjustments made to try and standardise the data and allow consistent comparison across airports.

The dataset contains core operational metrics, passengers, cargo and mail, workload units (WLUs), air traffic movements (ATMs) and employee numbers, alongside financial indicators including aeronautical, commercial and other revenues, operating costs, financial assets, personnel costs, depreciation and total expenditure. All financial figures are reported in Special Drawing Rights (SDRs), using mid-year exchange rates, and have been converted to 2024 prices using the SDR deflator.

Jacobs applies adjustments to improve comparability, removing non-core or exceptional opex and revenue items where disclosed. For airports reported only at group level, Jacobs uses the group figures and flags them; accordingly, these cases remain usable and we tested whether a control would be appropriate to improve comparability with standalone airports. Coverage varies by airport and year, particularly outside Europe.

In addition, we supplemented the Jacobs dataset with publicly sourced variables for each airport-year, including geographical indicators (continent and country), GDP per capita, purchasing power parity (PPP), annual inflation, SDRs exchange rate, number of runways, total terminal surface area, hub status, and ownership model (public, private or public-private partnership). We also incorporated data CAA provided from OAG on premium passengers and the share of international passengers.

### 2.6.2 Approach

Our benchmarking relies on a pooled regression model that keeps differences between airports visible, which is crucial for assessing relative efficiency. This approach is broadly consistent with techniques used by other regulators when comparing performance across firms. We considered more sophisticated models, but these tend to remove the stable differences between airports that are needed for benchmarking. As a robustness check, we also estimated an alternative specification that allows for unobserved airport characteristics. Full details of the modelling choices are provided in the Appendix 2.

We developed the model in a structured way. We begin by identifying relevant explanatory variables from the literature and narrowing these to those available in our dataset. Each candidate variable is tested individually before moving to the pooled specification. We then assess whether systematic differences across airports, such as region, size, ownership, regulatory environment, infrastructure, seasonality or group structures, require explicit controls.

After defining the candidate set, we estimate the model on 2010–2019 data and use it to construct an efficiency frontier. The benchmark reflects upper-quartile performance rather than the sample average. Using this calibrated pre-COVID model, we assess each airport's position relative to the frontier in 2019 and apply the same model unchanged to 2022 to evaluate post-COVID performance.

### 2.6.3 Results

Our preferred benchmarking models rely on a small set of variables that explain most of the differences in airport operating costs and commercial revenues. Traffic volumes are the primary driver of variation, and we found that WLUs, rather than total passengers or aircraft movements, performed best as the main measure of scale. These are supplemented by factors such as local economic conditions, the size of the asset base and the mix of passengers using the airport. The table below lists the variables included in the preferred specifications. All variables enter the model with positive coefficients, meaning that higher values are associated with higher opex or commercial revenues, which is consistent with expectations about how airport activity influences costs and income.

**Table 2.15: Variables included in final model**

Opex model	Commercial revenue model	Rationale
WLUs	WLUs	Main scale driver of economic activity
GDP per capita	GDP per capita	Captures differences in local economic conditions
Fixed assets	Fixed assets	Controls for the size of the airport
Year dummies	Year dummies	Capture common macroeconomic shocks over time
Share of premium passengers	Share of premium passengers	Higher service requirements and important determinant of retail and revenue potential
Share of international passengers		Higher processing requirements

Source: Europe Economics judgement.

For opex, Heathrow ranks near the bottom of the comparator set. It is 39th of 43 airports in 2019, with a gap to the upper-quartile frontier of around 3 per cent, sliding down to 40th in 2022 with a wider gap of nearly 5 per cent, meaning that HAL's opex are 3-5 per cent higher than the frontier airport. The 2019 upper quartile frontier is defined by Amsterdam Schiphol Airport, which anchors the upper-quartile benchmark for that year meaning that 75% of the airports in the sample had an opex performance poorer than Amsterdam Schiphol in 2019.

For commercial revenues, Heathrow performs more strongly. It ranks 15th in 2019 and 17th in 2022, and sits marginally below the upper-quartile frontier in both years. The implied gap is slightly negative (−0.4 per cent in 2019 and −1.28 per cent in 2022), indicating revenues moderately lower than the benchmark given Heathrow's characteristics. The 2019 upper-quartile frontier is defined

by Auckland Airport, meaning that 75% of the airports in the sample had a commercial revenue performance poorer than Auckland in 2019.

**Table 2.16: HAL’s ranking and gap from frontier from preferred econometric model**

	Ranking		Gap to frontier	
	2019	2022	2019	2022
<b>Opex</b>	39 / 43	40 / 43	3.14%	4.92%
<b>Commercial revenues</b>	15 / 43	18 / 43	-0.46%	-1.28%

Source: HAL’s Business Plan / Europe Economics judgement.

## 2.7 Triangulating the results

As a sense check, we do not find that the results from the top-down econometric benchmarking warrant any revision to our bottom-up conclusions. For opex, the top-down model points to an efficiency gap of around 3 to 5 per cent. This is comparable to our proposed adjustment of 4.0 per cent, but above the adjustment implied by the bottom-up baseline before accounting for short-term contractual and operational rigidities. Taken together, the two approaches are therefore broadly consistent.

For commercial revenues, the econometric model indicates that HAL’s performance has weakened in recent years. Between 2019 and 2022, HAL’s performance moved from operating close to the estimated efficiency frontier to nearly 1.3 per cent below it. We do not have comparable data for 2024 (the base year for our bottom-up work) but given the trend our proposed 2.9 per cent uplift to HAL’s 2024 outturn revenues is consistent with the direction and scale of the underperformance indicated by the top-down modelling while using more up-to-date data.

Overall, the triangulation exercise provides reassurance that the bottom-up and top-down approaches point to similar conclusions and that the proposed adjustments to HAL’s opex and commercial revenue baselines are reasonable and proportionate.

# 3 Roll-Forward to H8

## 3.1 Approach

The efficient baselines set out in the preceding chapter provide an estimate of the efficient level of operating expenditure and commercial revenues that Heathrow could have achieved in the base year in the absence of business-as-usual inefficiencies and once short-term contractual rigidities are overcome through more favourable contract negotiations where we understand contracts will be up for negotiation in H8.

The next step is to roll these baselines forward to derive efficient cost and revenue allowances for each year of the H8 regulatory period. This requires projecting how the efficient baselines should evolve as passenger volumes change, as prices move differently across input categories above and beyond CPI (so called RPEs), and as technology and operating practices continue to develop (so called frontier shift, in opex). In addition, we apply a management stretch adjustment to commercial revenues to reflect improvements that are not captured within the volume-elasticity modelling framework.

This chapter describes the volume-elasticity assumptions used to scale the efficient baselines; the RPEs applied to individual cost and revenue categories; the frontier-shift adjustments reflecting expected productivity improvements; management stretch applied to commercial revenues to reflect unmodelled operational and commercial factors; and the rationale for any overlays or other adjustments included in the roll-forward. In developing our estimates, we have had regard to regulatory precedents, historical trends and modelling work. We have also applied judgement and had regard to the interactions between different components. For example, we have sought to ensure that any overlays are consistent with the thinking underlying our proposals on frontier shift, so as to avoid double counting while making sure that the 2027-2031 allowances reflect developments between 2024 and 2031 that may materially affect the level of opex or commercial revenues that HAL ought to be able to achieve.

In setting these roll-forward adjustments, the aim is not to forecast HAL's actual costs or revenues, but to estimate a trajectory that represents an efficient and realistic path for a well-run airport facing the conditions expected over the regulatory period.

## 3.2 Elasticities and volume assumptions

Our starting point for elasticity estimates was to estimate independent elasticity ranges using econometric analysis (see Appendix 3). In this regard, we use the same econometric approach as HAL proposed in its Business Plan, except where we found strong reasons to deviate. This approach was agreed with the CAA. We differ from HAL in the choice of the specific elasticity point estimate. The tables below set out the opex and commercial revenue elasticity estimates we have adopted and contrast them with those set out in HAL's Business Plan.

**Table 3.1: Opex elasticity assumptions**

Category	Drivers*	HAL's proposal	EE / YAL recommendation
Staff	Total pax	0.3	0.3
Utilities	Total pax	0.25	0.3
<b>Facilities and maintenance**</b>	Terminal area	0.35	1.0
Other opex	Total pax		0.25
Operational costs	Total pax	0.2	No elasticity assumed at this level of granularity
General expenses	Total pax	0.3	No elasticity assumed at this level of granularity
PRM	Total pax		0.25
Noise and vortex	Total pax		0.25 (same as other opex, the largest component)

Source: HAL Business Plan, Europe Economics/YAL judgement. \* Drivers are identical for HAL's proposal and our recommendations. \*\* because no change is expected in terminal area in H8, then the elasticity estimate does not have an impact on the level of allowed costs, hence using an elasticity of 1.0, instead of HAL's 0.35.

**Table 3.2: Commercial Revenue elasticity assumptions**

Category	Drivers*	HAL's proposal	EE / YAL recommendation
Retail and catering	Total pax	0.8	1.0
Service	Total pax	0.6	0.6
Rail			
Heathrow Express	HEX pax	1.0	1.0
Surface access and car parking	Parking and rental pax	1.0	1.0
Property**	Terminal area	0.5	0.5

Source: HAL Business Plan, Europe Economics/YAL judgement. \* Drivers are identical for HAL's proposal and our recommendations. \*\* Since terminal area is not expected to vary during H8, we have accepted HAL's estimate.

In deciding whether to vary the elasticities from HAL's proposal, we considered various sources of information: whether the proposed values are consistent with our bottom-up and top-down benchmarking work; looked at regulatory precedents (CAA H7 and the most recent Dublin airport determination); consideration of our own estimated elasticity ranges obtained through econometrics modelling; and applied reasoning from first principles to assess the plausibility of the implied relationships between drivers and costs and revenues. These different approaches do not

always point in the same direction. The process of arriving at the final estimates involved a degree of judgement when considering the evidence in the round.

**Table 3.3: Elasticities used in recent regulatory determinations**

Category	Drivers	CAA H7 estimate	IAA estimate for Dublin
Staff	Total pax	0.33	
	Security Total pax		0.88-0.89
	Non-security Total pax		0.1-0.77
	Operational Total pax	0.39	0.1
Utilities	Total pax	0.39	-
Facilities and maintenance	Terminal area	-	0.4
General expenses	Total pax	0.39	-
Retail and catering	Total pax	0.97	1.3
Bureaux	Total pax	0.97	1.3
Service	Total pax	0.8	1
Rail			-
	Heathrow Express HEx pax	1	-
Car rental and car parking	Parkin and rental pax	1	1
Property	Terminal area	0.52	1

Source: CAA H7 final proposal, IAA 2022 final determination

Our econometric work used annual data for HAL taken from the Business Plan data tables and broadly aligns with the approach that HAL took in estimating its own elasticities. The data we used do not always match exactly the annual data that HAL used when generating its elasticity estimates. HAL also reported elasticity estimates based on monthly data. Even though this increases the number of observations in the sample, we are not convinced that using monthly data materially improves the robustness of the results, since we suspect that accounting policies governing the allocation of costs and revenues to individual months will affect results. In particular, the timing of recognition for certain items is likely to reflect accounting conventions rather than underlying economic activity, which risks introducing noise rather than additional information.

When interpreting the elasticities estimated, a degree of caution is warranted. First, the number of annual observations is small (more so when Covid years are excluded from the analysis), limiting the statistical power of the estimates. Second, the estimates implicitly assume that HAL was operating on the efficiency frontier throughout the sample period (or tracking it perfectly). If this was not the case, the estimated elasticities may partly capture movements towards or away from the frontier rather than the true relationship between volumes and costs or revenues. Third, even if HAL was consistently efficient, the estimates may be picking up headwinds that affect where the

frontier itself is at different dates, e.g. the effect of changes in VAT rules on retail revenues, rather than just the impact of variations in the assumed driver. These factors suggest that econometric estimates based on HAL’s annual data should be interpreted as indicative rather than definitive evidence.

**Table 3.4: Econometric results**

Category	Driver	EE elasticity estimate range
Staff	Total pax	0.15-0.30
Utilities	Total pax	0.22-0.49
Other opex		
Operational costs	Total pax	0.13-0.27
General expenses	Total pax	0.57-0.69
<b>Total opex</b>	Total pax	0.19-0.23
Retail and catering	Total pax	0.61-0.83
Service	Total pax	0.34-0.54
Rail		
Heathrow Express	HEX pax	No econometrics
Surface access and car parking	Parking and rental pax	0.94-1.05
Property	Terminal area	No econometrics
<b>Total Commercial Revenue</b>	Total pax	0.56-0.66

Source: Europe Economics calculations

We also estimated elasticities for total opex and total commercial revenues using data from a variety of airports and not just HAL. This included inferring the elasticities implied by our top-down benchmarking models. However, several caveats apply. Two of these represent relatively strong assumptions inherent in using benchmarking models in this way. The first strong assumption is that the elasticity estimated for the average firm is representative of the elasticity at the efficiency frontier, an assumption that may not hold if airports differ systematically in their efficiency or cost structures. The second is that the elasticity with respect to passenger numbers does not vary with other airport characteristics, such as size, capacity constraints, traffic mix, or regulatory environment. In addition, there are two lesser caveats. Our models use WLUs rather than passenger numbers; this likely has little practical consequence given the high correlation between the two, but it remains a simplifying assumption. Finally, the estimated relationships are driven primarily by between-airport variation rather than within-airport variation over time, meaning that the results mainly reflect structural differences across airports rather than dynamic responses of individual airports to changing traffic levels. These considerations underscore the

need for caution when interpreting benchmarking-based elasticities as direct evidence on HAL's cost or revenue responsiveness.

The following sections provide more details on our thinking for individual line items. We focus on elasticities where the driver is passenger numbers (or a subset of passengers). As our model assumes no change in the terminal area at Heathrow airport through H8, we have not needed to conclude on the appropriate elasticity to adopt with respect to changes to terminal area (a potentially important driver for certain categories, such as facilities and maintenance opex).

### 3.2.1 Opex

Across all staff categories, we conclude that HAL's proposed elasticity of 0.3 is appropriate, as all sources of evidence are broadly consistent with this estimate. We therefore apply this elasticity to all staff categories – security, other operational staff and non-operational staff costs in aggregate.

For utilities, our econometric specifications produce estimates that are slightly higher than those presented in HAL's Business Plan. We nonetheless adopt an elasticity of 0.3 to remain close to HAL's value while reflecting the results of our econometric approach.

We adopt a single elasticity of 0.25 for other opex, rather than HAL's separate elasticities for operational costs (0.2) and general expenses (0.3). Our estimate falls within HAL's range and our econometric range, but groups the categories given concerns about comparability across time of the two series. As noted in our bottom-up benchmarking work, individual cost items tend to shift between the two categories over time. Such changes may distort any elasticities estimated at a more disaggregated level: we note that general expenses are more administrative in nature and would be expected to respond less to changing passenger numbers than other opex items, in contrast to the estimated elasticities reported in Table 3.4.

We retain the elasticity of 0.25 for PRM opex (which is a subsection of other opex), in line with the estimates from HAL's Business Plan, with no evidence suggesting any further adjustments to this number.

Our elasticity assumptions imply an overall opex elasticity of about 0.2 with respect to the effect of changes in passenger numbers on total opex. This is consistent with the total aggregate passenger elasticity we estimated, which lied within the range of 0.19-0.23.

### 3.2.2 Commercial Revenue

For retail and catering, we recommend an elasticity of 1.0. This differs to HAL's proposed elasticity of 0.8 and also from the estimates implied by our own econometric work. Our bottom-up assessment suggests that HAL's retail and catering relative performance has declined in recent years and there have been headwinds, both of which could explain why the estimated elasticity using outturn data is less than one. We are not persuaded that the headwinds will continue into H8, nor do we accept HAL's argument that at forecast passenger levels the assumed elasticity should be reduced materially because additional passengers will generate overcrowding that deters retail and catering spend by some passengers. For these reasons, we think that an elasticity of one is an appropriate first principle approximation.

For commercial revenues from services, which include VIP, fast-track, and other ancillary offerings, we agree that an elasticity of 0.6 with respect to total passenger numbers is a reasonable

assumption. We would expect the elasticity for VIP services alone to be very low, and given its share of revenues from services, HAL's estimate of 0.6 appears to be at the upper end of what would be appropriate.

We generally agree with the elasticities that HAL has proposed for rail and surface access revenues. We have used an elasticity of 1.0 with respect to Heathrow Express passengers for rail revenues, and with respect to car parking and rental passengers for surface access revenues that principally derive from car parking activity.

Our elasticity assumptions imply an overall commercial revenue elasticity of about 0.87 with respect to the effect of changes in passenger numbers on total commercial revenues. This is higher than the overall elasticity estimates from econometric modelling which suggested a range of 0.56-0.66 (excluding cargo). For the same reasons we have decided not to rely on the econometric estimates to determine the elasticity to use for retail and catering, we also reject the need to revisit our elasticity estimates because of the econometrics results for overall commercial revenues.

### 3.2.3 Volume drivers

Our estimates use the forecasts for passengers, and cargo and other traffic movements provided by CAA.

**Table 3.5: Traffic movements forecast**

Volume driver	Units	2024	2027	2028	2029	2030	2031
<b>Total pax</b>	Millions	83.9	85.9	86.7	87.7	88.6	89.4
<b>Non-pax ATMs</b>	Movements	4,452	4,073	3,884	3,714	3,560	3,418
<b>Cargo ATMs</b>	Movements	2,667	2,440	2,390	2,347	2,309	2,274
<b>Other non-pax ATMs</b>	Movements	1,785	1,633	1,494	1,367	1,251	1,144

Source: CAA traffic movements forecast

We have reviewed and generally accepted the mode shares for ground transport that HAL has proposed. They appear reasonable when looking at high-level splits, e.g. the share using rail, or the share using car parking. For the purposes of our modelling, three mode shares are particularly material: the share using HAL's car parking facilities, the share using Heathrow Express, and the share incurring TDOCs. For car parking, while we have some reservations about the proposed split between short-haul and long-haul parking over H8, the overall share attributed to car parking appears reasonable. For Heathrow Express, although our adjusted baseline assumes that HAL

reduces charges to attract additional volume, we have not adjusted HAL's proposed mode share, as doing so would risk double counting unless we simultaneously revised down the baseline.

**Table 3.6: Mode shares for ground transport**

Volume driver	Units	2024	2027	2028	2029	2030	2031
Parking/rental pax	%	30.7	30.5	30.5	30.5	30.5	30.5
HEx pax	%	4.8	4.5	4.5	4.5	4.5	4.5

Source: HAL Business Plan

### 3.2.4 Bureau of change

An expected decline in bureau de change revenues is treated differently by HAL and by us. HAL forecasts a reduction in bureau revenues over H8, reflecting lower usage of the service. In HAL's specification, this decline is captured through the RPE allowance, with an RPE of CPI-12.9% applied in each year. We do not consider this to be an appropriate use of an RPE, as the change reflects reduced demand rather than changes in underlying input prices. Instead, our model captures this effect through a volume adjustment, implemented as a 10 per cent annual reduction in the share of passengers using the service. The resulting difference in forecast outcomes is set out in the table below.

**Table 3.7: Deviation in bureau revenues with HAL BP (£ millions, 2024 CPI)**

Volume driver	2024	2027	2028	2029	2030	2031	H8 total
<b>HAL BP</b>	23.0	14.4	13.3	12.3	11.3	10.4	61.7
<b>EE/YA</b>	23.0	17.1	15.6	14.2	12.9	11.7	71.5

Source: HAL Business Plan, EE/YA analysis

### 3.2.5 Cargo revenues

For cargo revenues, our starting assumption is that average revenue per movement will move in line with the price cap. This assumption will break down if:

- HAL were to change the structure of its charges, rather than just pro-rating all the existing charges in line with the percentage change in the overall price cap, or
- The mix of aircraft was to change over time in a way that affects revenues collected, as may happen as fleets evolve and the share of aircraft in the higher noise bands (and therefore paying higher per movement charges, all else equal) falls over time.

Cargo revenues are forecast as the product of the average unit revenue per movement and the number of movements for cargo and other non-passenger ATMs separately. This approach captures differences in average unit revenues between cargo ATMs and other non-passenger ATMs. As the H8 price cap has not been determined, for the purposes of our report we have

assumed that the ATM yield for each category will be constant during H8, equal to the average revenue per movement in 2024.

**Table 3.8: Cargo revenue forecasts**

Component	Units	Price base & Index	2024	2027	2028	2029	2030	2031
<b>Cargo ATMs</b>	<i>number</i>		2667	2440	2390	2347	2309	2274
<b>Cargo ATM yield</b>	<i>£</i>	<i>2024 CPI Prices</i>	5339	5339	5339	5339	5339	5339
<b>Non-pax ATMs</b>	<i>number</i>		1785	1633	1494	1367	1251	1144
<b>Non-pax ATM yield</b>	<i>£</i>	<i>2024 CPI Prices</i>	4006	4006	4006	4006	4006	4006
<b>Cargo revenue</b>	<i>£ millions</i>	<i>2024 CPI Prices</i>	21.4	19.6	18.7	18.0	17.3	16.7

Source: CAA data and methodology.

### 3.2.6 TDOC

The table below sets out the bottom-up calculations used to determine the TDOC revenues included in our H8 model. We assume that the charge (in nominal terms) remains constant across H8 at £7 (including VAT), or from £5.83 (excluding VAT). If the objective were simply to forecast TDOC revenues under a revenue-maximising approach, we would expect prices to rise to a higher level. In practice, however, we understand that any changes are likely to be constrained by the need for HAL to obtain CAA approval and consult with stakeholders, which may mean that price adjustments take longer to implement.

**Table 3.9: TDOC revenue forecasts**

Component	Units	2024	2027	2028	2029	2030	2031
<b>TDOC pax</b>	<i>millions</i>		13.26	13.36	13.45	13.55	13.65
<b>Vehicle per pax</b>	<i>number</i>		0.71	0.71	0.71	0.71	0.71
<b>On time payment rate per vehicle</b>	<i>%</i>		96.5%	96.5%	96.5%	96.5%	96.5%
<b>TDOC tariff per vehicle (excl. VAT)</b>	<i>£</i>		5.83	5.83	5.83	5.83	5.83
<b>TDOC revenue, nominal</b>	<i>£ millions</i>		53.0	53.4	53.8	54.1	54.5
<b>Inflation scalar (2024 CPI = 1)</b>	<i>index</i>		1.08	1.10	1.13	1.15	1.17
<b>TDOC revenue, 2024 CPI</b>	<i>£ millions</i>	53.1	49.0	48.4	47.8	47.1	46.6

Source: HAL BP data, CAA data and methodology.

Our estimate of TDOC passengers is based on HAL's modal share forecasts and we adopt HAL's assumptions on vehicles per passenger (0.71) and the proportion of TDOC passengers who pay (96.5%). Taken together with the nominal charge and reported TDOC passenger volumes, these assumptions imply revenues for 2022 and 2023 that are broadly consistent with reported TDOC revenues in the business plan tables. However, they do not reconcile as closely in 2024 nor fully reflect our view of what revenue could be generated by a revenue-maximising operator in the baseline. As 2025 data becomes available, we propose reviewing the evidence underpinning these parameters.

### 3.3 Real Price Effects (RPEs)

#### 3.3.1 Approach

For opex and commercial revenues, we assess whether there are any material RPEs not captured by CPI indexation by applying an assessment framework comprising two criteria and a materiality test. The assessment criteria ask the following questions:

1. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?
2. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the price control period? There are two sub-questions for this criterion, only one of which needs to be passed for criterion 2 as a whole to be passed:
  - A. Is the expected value of the wedge between the input price and CPI materially different from zero?
  - B. Does the wedge between the input price and CPI exhibit high volatility over time?

We also consider the materiality of each cost and revenue category in our RPEs assessment. Based on regulatory precedents, we consider it disproportionate to grant an RPE allowance for cost or revenue categories that make up less than 5 per cent of opex / commercial revenues. For categories representing between 5 and 10 per cent of opex / commercial revenues, we consider that the evidence bar that needs to be met to grant an RPE allowance should be particularly high.

Where the analysis identifies that a cost or revenue item has a material RPE which is not adequately captured in CPI, we advise on the appropriate way to treat this RPE within the regulatory framework. Potential policy options are as follows:

1. Including a fixed ex-ante PRE allowance within price control allowances.
2. An annual ex post indexation mechanism, in which adjustments are made to allowed revenues in each year of H8 to take account of outturn values for relevant input price indices.
3. An ex-post true-up mechanism at the next review, in which a true-up is applied at the next review for differences between any ex-ante RPE allowance included with price control allowances and outturn values during H8 for relevant price indices.
4. Not applying any RPE allowance.

In selecting between these options, there is a policy choice to be made. Ex-post mechanisms are likely to be more accurate than only applying fixed ex-ante allowances but add significant complexity to the price control framework and are inconsistent with CAA regulatory precedent. If

CAA places most weight on simplicity and consistency with CAA precedent, it should use ex-ante allowances only. Alternatively, if CAA places most weight on accuracy, it should use ex-ante allowances and an ex-post true-up.

Our recommendations are based on our understanding that CAA is minded to put more weight on simplicity and consistency at this stage.

### 3.3.2 Opex

Based on our review of HAL's own RPE proposals for opex, we have identified the following five categories of inputs for the purpose of assessing RPEs:

- labour;
- electricity;
- insurance;
- RPI-linked contracts; and
- CPI-linked costs.

The table below summaries the results of applying our RPE assessment framework to opex.

**Table 3.10: Summary of RPE assessment for opex categories**

Cost Item	Labour	Electricity	Insurance	RPI-linked contracts	CPI-linked
<b>Share in opex (%)</b>	<b>38.7</b>	<b>6.5</b>	<b>1.2</b>	<b>2.1</b>	<b>51.4</b>
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Pass	Partial pass	Fail	NA	NA
2. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?	Pass	Partial pass	Fail	NA	NA
3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	Pass	Pass (for positive wedge if focus on historical data, or for negative wedge if focus on forecast data)	Pass	NA	NA
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass	Pass	Pass	NA	NA
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Pass if weight placed on pre-2009 data	Fail	Fail	NA	NA
<b>Overall</b>	<b>Pass</b>	<b>Partial pass</b>	<b>Fail</b>	<b>NA</b>	<b>NA</b>

The only cost categories where we find that an RPE is justified is labour and electricity, although in the latter case some scaling needs to be applied to reflect the fact that electricity prices are already partially captured within CPI indexation.

For labour, our recommendation is to set a fixed ex-ante allowance based on the most recent OBR average earnings forecast available. This is consistent with the approach taken by CAA at H7 and aligns with HAL's proposed approach for H8.

For electricity, there is considerable uncertainty around the appropriate RPE adjustment to apply. The latest available forecasts of retail electricity prices for industrial customers from DESNZ suggest negative electricity price inflation across the price control period.<sup>3</sup> Economic intuition would also suggest a negative RPE for electricity, given that the severe spike in recent years should

<sup>3</sup> We analyse the forecast prices for industrial customers rather than those for commercial and public sector customers because the latter will include many smaller electricity customers and hence will incorporate higher distribution charges than may be applicable to HAL.

unwind at some point. However, the DESNZ forecast dates from November 2023 and some of its forecasted prices have already been overtaken by outturn data. It is unlikely to be an accurate basis for an RPE allowance at this point and therefore it would not be appropriate to use the forecast directly to set HAL's allowance. The historical "wedge" between electricity price growth and CPI is between 4 and 6 per cent. Using this as the basis for a fixed ex-ante RPE allowance would be inappropriate given it is well above HAL's own RPE for electricity of CPI+ 1 per cent and contradicts the available forecast evidence. We note that DESNZ forecasts of wholesale electricity prices published in 2025 are also negative in real terms over the years of H8. While wholesale prices only account for around half of industrial customer electricity tariffs and therefore cannot be used to estimate a fixed ex ante allowance, they do provide further evidence that using the positive historical wedge as the basis for an ex-ante allowance is unlikely to be an accurate reflection of electricity price movements over H8. Given the current lack of a recent publicly available forecast and the inappropriate wedge implied by the historical electricity price data, as well as the fact that electricity is already partially captured by CPI, we have applied a zero RPE allowance to electricity for now. Nearer to the final determination, it may be appropriate to revisit this assumption and obtain a robust forecast of electricity prices for H8.

For RPI-linked contracts, the appropriate treatment is to allow indexation in line with the contractual terms, provided that the CAA has verified that three conditions are satisfied:

- the relevant contracts are indeed RPI-linked;
- the relevant contracts are not due to expire or be renegotiated during H8, such that HAL has no discretion to alter the basis of indexation;
- the contracts represented an efficient arrangement when they were entered into, or appropriate adjustments have been applied separately by the CAA to HAL's allowed revenues for any contracts deemed inefficient.

For insurance and CPI-linked costs, we recommend no RPE allowance is applied. We note that HAL have proposed an RPE of CPI+10 per cent for insurance and we have considered the analysis that it provided to justify this. We note that the argument put forward by HAL only justifies an increase up to 2028, not for the whole period. In our framework, insurance costs do not qualify for an RPE allowance because they are (significantly) below the 5 per cent materiality threshold, accounting for only 1.2 per cent of HAL's 2024 opex. We have accounted for the price increase HAL faces in the coming years through a baseline adjustment rather than an RPE allowance.

We have mapped our opex RPE recommendations for the input categories discussed above to the cost categories used by HAL in its Business Plan. Our RPE recommendations are set out in the table below.

**Table 3.1 I: Recommended RPE allowances for opex**

<b>Cost category</b>	<b>Recommended indexation</b>
<b>Staff</b>	OBR average earnings forecast
<b>Maintenance, facilities management &amp; equipment</b>	16 per cent Staff RPE, 84 per cent CPI*
<b>Utilities (excluding distribution contract)</b>	CPI
<b>Electricity distribution contract</b>	RPI
<b>Insurance</b>	CPI
<b>Other opex</b>	28 per cent Staff RPE, 72 per cent CPI, except for subcategories where HAL has informed us costs are linked to CPI or RPI.

\*We recommend no RPE for cleaning costs within maintenance because we understand that cleaning services are outsourced, and therefore we expect the contract to track general inflation.

### 3.3.3 Commercial revenue

We identify seven main categories for HAL’s commercial revenues:

- Retail and catering;
- Surface access and car parking;
- Heathrow Express;
- Property;
- Cargo;
- RPI-linked; and
- CPI-linked.

The table below summaries the results of applying our RPE assessment framework to commercial revenues. The only revenue category where we find that an RPE could potentially be justified is rail revenue from Heathrow Express.

**Table 3.12: Summary of RPE assessment for commercial revenue categories**

Cost Item	Retail and catering	Surface access and car parking	Heathrow Express	Property	Cargo	RPI-linked	CPI-linked
<b>Share in commercial revenues (per cent)</b>	41.1	25.0	8.9	13.6	2.0	2.2	7.2
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Pass	Pass	Partial pass	Pass	Fail	NA	NA
2. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?	Fail	Pass	Pass	Partial pass	Pass	NA	NA
1. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	NA	Fail	Pass	Fail	Fail	NA	NA
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	NA	Fail	Pass	Fail	Fail	NA	NA
B. Does the wedge between the input price and CPI exhibit high volatility over time?	NA	Fail	Fail	Fail	Fail	NA	NA
<b>Overall</b>	<b>Fail</b>	<b>Fail</b>	<b>Pass</b>	<b>Fail</b>	<b>Fail</b>	<b>NA</b>	<b>NA</b>

The only commercial revenue category identified as having a material RPE not adequately captured by CPI is Heathrow Express. The average historical wedge of passenger rail prices over CPI is 1.5 per cent. However, Heathrow Express is subject to competition from the Elizabeth Line for rail

passengers and our bottom-up analysis suggests that HAL is unlikely to be able to increase fare prices above CPI given the competition it faces. Therefore, we do not recommend an RPE applied to Heathrow Express revenues.

For RPI-linked commercial revenues, which includes the T5 Piccadilly Line revenue and track access revenue, we recommend allowing RPI indexation in line with contractual terms (in the case of T5 Piccadilly Line revenue) or the regulated charging methodology (in the case track access revenue), provided that the link to RPI will remain in force throughout H8.

For all other revenue categories, we recommend applying no RPE and using CPI indexation.

**Table 3.13: Recommended RPE allowances for commercial revenues**

Revenue category	Recommended indexation
Retail and catering	CPI
Surface access and car parking	CPI
Heathrow Express	CPI
Property	CPI
Cargo	CPI
RPI-linked (track access, T5 Piccadilly line)	RPI
CPI-linked (service revenues, other revenues)	CPI

### 3.4 Management stretch

We propose to apply management stretch of 1 per cent per year to car parking, other surface access and service revenue. We propose not to apply management stretch to any other categories of commercial revenue. The table below contrasts our recommendations with the management stretch proposed in HAL's Business Plan. We explain below the rationale for our recommendation and Appendix 5 details the underpinning analysis.

**Table 3.14: Recommended management stretch targets**

Category	HAL's proposal	EE / YAL recommendation
Retail & catering	Apply 1% per annum stretch	No stretch
Bureau	No stretch	No stretch
Car parking	Apply 1% per annum stretch*	Apply 1% per annum stretch
Other surface access	Apply 1% per annum stretch*	Apply 1% per annum stretch
Service revenue	Apply 1% per annum stretch	Apply 1% per annum stretch
Property	No stretch	No stretch
Track access	No stretch	No stretch
Heathrow Express	No stretch	No stretch

Source: Data from HAL. \*Applied to short stay car parking and car rental

Management stretch can be interpreted as the long-run trend improvement in commercial revenue performance that arises from factors not explicitly captured by the elasticity-volume modelling used to project HAL's commercial revenues. These unmodelled factors might include innovation, improved commercial strategy, growth in passenger incomes, or other drivers of

performance that are not directly included in the volume assumptions used in the commercial revenue forecast.

This conceptualisation of management stretch implies that it can be estimated by isolating any residual trend improvement in revenue growth that is not explained by the volume drivers used in our elasticity analysis. This can be done econometrically by estimating, for each commercial revenue category in turn, a time trend in a regression of HAL's historical commercial revenues on the relevant volume driver. Alternatively, it could be estimated by including a time trend in an equivalent regression of historical commercial revenues at comparator airports.

Our starting point for management stretch is to adopt the same figures as those proposed by HAL in its Business Plan, departing from them only where we identify strong reasons to do so. We therefore assess management stretch using the following two steps:

- Step 1: Econometric testing, for each category of commercial revenue, of whether there is statistical evidence to reject HAL's proposed figure for management stretch. In cases where HAL's figure for management stretch is not rejected, we recommend applying that figure in the roll-forward analysis.
- Step 2: For those categories where there is statistical evidence suggesting that HAL's figure should be rejected, we examine the trend coefficient in our econometric regression. If the trend is positive, then we can set management stretch on the basis of our estimated coefficient. On the other hand, if the trend is negative, then we propose no management stretch, given that management stretch is characterised as additional gains in commercial revenue.

The details of our econometric analysis are described in more detail in Appendix 5. Our analysis uses HAL's business-plan data as the primary source, covering all revenue categories for which consistent data and a defined volume driver are available:

- Retail and catering (including/excluding bureau)
- Bureau
- Surface access and car parking
- Service revenue (excluding surface access)
- Property
- Track access revenue
- Heathrow Express revenue

A cross-check was also performed using Jacobs data on comparator airports, although this was limited in scope due to data constraints.

A key feature of the approach is that the relationship between revenues and their volume driver is set by the agreed elasticity values in Section 3.2, which are imposed rather than estimated. This allows the scale effect to be removed in a way that is consistent with our elasticity assumptions. Any remaining systematic movement is captured by the time trend, which is used to test whether HAL's proposed management stretch assumptions are statistically supported by the data.

Alongside a specification which does not make any adjustment for the Covid pandemic, we run two additional specifications which adjust for Covid-affected years in two alternative ways – excluding 2020–22 or including a Covid dummy – to test whether the estimated trend is sensitive

to the treatment of the pandemic period. We place more weight on the specifications which adjust for Covid effects in arriving at our overall conclusions.

Table 3.15 reports the results of our analysis. For each revenue category, it first shows whether our econometric tests provide statistical evidence to reject HAL’s proposed management stretch assumption (focusing particularly on model specifications that adjust for Covid effects and using HAL data). For categories where HAL’s figure is rejected, it then shows whether the trend estimated in our econometric regression is positive or negative. On the basis of these results, the final column of the table presents our recommended figure for management stretch.

**Table 3.15: Summary of our analysis**

Category	HAL’s proposed management stretch (per annum)	Step 1: do statistical tests reject HAL’s proposal?	Step 2: if HAL’s proposal rejected, what direction is trend?	Recommended management stretch (per annum)
Retail & catering Bureau	1%	Yes	Negative	No stretch
Surface access & car parking	No stretch	Yes	Negative	No stretch
Service revenue	1% *	No	n/a	1%
Property <sup>#</sup>	1%	No	n/a	1%
Track access <sup>#</sup>	No stretch	Mixed	Negative	No stretch
Heathrow Express	No stretch	No	n/a	No stretch

Source: Data from HAL, Europe Economics analysis # We place low weight on results for property and track access revenue due to limited data points. \*Applied to short stay parking and car rental

In the case of retail and catering, HAL’s proposed 1 per cent management stretch is rejected in specifications that exclude or control for the Covid-affected period (using HAL data). Given that our econometric regression found a negative trend for this category, we recommend not applying any management stretch to retail and catering revenues.

For bureau revenues, HAL’s proposal of no management stretch is rejected across our model specifications. However, given that our models suggest a negative trend, we nonetheless recommend applying zero management stretch for this category.

By contrast, for surface access and car parking revenues, HAL’s proposed management stretch of 1 per cent per year is not rejected in any of the model specifications. This indicates that a 1 per cent underlying growth assumption is statistically consistent with the data for surface access and car parking. A similar result is observed for service revenue (excluding surface access), where HAL’s proposed 1 per cent management stretch is not rejected across all specifications.

For property revenue, the evidence is mixed: HAL’s proposal is rejected in only one specification, and we therefore place limited weight on this result. We also found a negative trend in our econometric regression. On this basis, we propose no management stretch for property revenue.

For track access revenue and Heathrow Express revenue, HAL’s proposed assumption of no management stretch is not rejected in any specification, suggesting that the data are consistent with no underlying growth once scale effects are removed.

### 3.5 Frontier shift

Most regulatory precedents over the last decade point to an assumption of 1 per cent for frontier shift, also known as ongoing efficiency. In Appendix 6 we include a table displaying regulatory precedents on frontier shift by Ofwat, Ofgem, the CAA and the Northern Ireland Utility Regulator. All these regulators have assumed frontier shift of 1 per cent for opex in their most recent determinations.

A notable exception is the CMA's recent provisional PR24 redetermination,<sup>4</sup> which broke with previous regulatory precedent on frontier shift. The CMA did not follow the established approach of setting frontier shift by analysing TFP growth in comparator sectors using EU KLEMS data. Instead, it treated the change in residuals over time in its cost models and Ofwat's cost models as a measure of historical productivity growth in the water sector. Since these changes in residuals clustered around zero, it concluded that water sector productivity growth has been in line with the low productivity growth observed in the UK economy in the post-crisis period. On this basis, it adopted a frontier shift figure of 0.7 per cent per annum, partway between the economy-wide productivity forecasts produced respectively by the Bank of England and the OBR.

We would not recommend that CAA just adopts the CMA precedent. First, the CMA's methodology is based on analysis of water sector productivity and hence is not automatically transferable to other regulated sectors. Second, CMA's findings are only provisional, and it is possible that it will modify its approach in its final determinations to address criticisms interested parties may make.

In the light of these considerations, we consider that regulatory precedents continue to support a figure of 1 per cent at the current point in time but note that it may be appropriate to revisit the issue once the CMA has published its final PR24 redeterminations.

**Table 3.16: Recommended frontier shift targets**

Category	HAL's proposal	EE / YAL recommendation
<b>Staff</b>	Apply 1.2% per annum shift	Apply 1.0% per annum shift*
<b>Maintenance, facilities management &amp; equipment</b>	Apply 1.2% per annum shift	Apply 1.0% per annum shift
<b>Rent &amp; rates</b>	No frontier shift	No frontier shift
<b>Utilities (excluding distribution contract)</b>	No frontier shift	No frontier shift
<b>Electricity distribution contract</b>	No frontier shift	No frontier shift
<b>Insurance</b>	Apply 1.2% per annum shift	Apply 1.0% per annum shift
<b>Other opex</b>	Apply 1.2% per annum shift	Apply 1.0% per annum shift

Source: HAL data tables, EE/ YAL analysis. \*Not applied to pensions.

<sup>4</sup> CMA (2025). Water PR24 References; Provisional Determinations Volume 1: Introduction, Background, Approach and prioritisation, Base costs – Chapters 1–4. [link] Pages 59-88.

### 3.6 Overlays and other adjustments

In this section, we discuss overlays and other adjustments to the base line that are not captured by volume adjustments, RPE adjustments, frontier shift and management stretch. For the purposes of this report, we have not sought to identify and quantify consequential implications for opex or commercial revenues during H8 of:

- Changes in the measures, targets and incentives used to influence the service standard and resilience that HAL is expected to achieve.
- Possible future capital projects which have not yet been approved (i.e. proposed projects that have not yet reached gateway stage G3).

The table below sets out the overlays we have included in our model. The subsequent material elaborates on our rationale.

**Table 3.17: Overview of overlays and other adjustments (£ millions, 2024 CPI)**

Cost item	2027	2028	2029	2030	2031	Total across H8
MSPC4 opex	8.3	8.3	8.3			25.0
PRM costs	2.0	2.6	2.6	3.2	3.2	13.4
Security staff efficiency adjustment	-2.8	-2.8	-2.8			-8.3
<b>Total opex overlays and adjustments</b>	<b>7.55</b>	<b>8.12</b>	<b>8.12</b>	<b>3.16</b>	<b>3.16</b>	<b>30.1</b>
<b>Total commercial revenue overlays and adjustments</b>	<b>-17.9</b>	<b>-18.7</b>	<b>-19.4</b>	<b>3.1</b>	<b>3.1</b>	<b>-49.8</b>

Source: HAL Business Plan, with Europe Economics/YAL judgement and CAA input.

#### 3.6.1 Overlays proposed in HAL's Business Plan

HAL proposed opex overlays totalling £255 million (2024 CPI) across six categories in its Business Plan. It subsequently indicated that it was no longer seeking an overlay adjustment for one of those categories, security enhanced outcomes (£21 million, 2024 CPI).

We have assessed the case for the other five categories, having regard to the three criteria that CAA has set out for determining whether an overlay is warranted:

- Need: whether there was an impact outside of Heathrow's control that affected its cost base and justifies the overlay.

- **Additionality:** whether the impact is clear and additional to what is already accounted for via volume growth, elasticities, other implemented overlays, or planned capex.
- **Efficiency:** is the size of the proposed overlay efficient and reasonable.

### **Opex overlays**

HAL's rationale for the overlays centred on what it described as structural upward pressures on costs. HAL argued that ageing technology assets, increasing reliance on SaaS and cloud-based systems, and the need for enhanced cyber security would materially raise IT and digital costs during H8. It also highlighted what it viewed as unavoidable cost growth associated with resilience, higher utilisation of airport infrastructure, and a continuing structural increase in PRM/PRS demand.

The table below sets out our conclusions. Based on that assessment, we have currently only made an overlay allowance for two of the categories (PRM and MSCP). For both, we propose an overlay that is slightly smaller than HAL has sought. While we acknowledge some of the other pressures that HAL has identified, we do not find the evidence sufficiently compelling to justify an upward adjustment to the efficient baseline, for the reasons set out below.

**Table 3.18: Assessment of proposed opex overlays in HAL’s Business Plan**

<b>Proposed overlay</b>	<b>HAL’s request (H8 total, 2024 CPI)</b>	<b>Need</b>	<b>Additionality</b>	<b>Efficiency</b>	<b>Our allowance (H8 total, 2024 CPI)</b>
<b>Technology</b>	90	Uncertain. Hinges on renewal of existing asset base not catching up with delays due to Covid	Unclear. The rationale offered suggests that there should be some offsetting implications for capex	Unclear. Limited information provided on how costs have been estimated. HAL’s technology costs already seem high vis-à-vis peers	0
<b>Resilience (operating at capacity)</b>	63	Uncertain. Hinges on renewal of existing asset base not catching up with delays due to Covid	The rationale for an uplift over 2024 baseline (as opposed to a 2020 baseline) is not convincing.	Unclear. Limited information on how costs have been estimated.	0
<b>PRM</b>	15	Established. Demographic trends suggest increasing demand for PRM	Yes (the elasticity calculations do not address the extra propensity for passengers to seek PRM services)	Controlling for differences in baseline PRM costs, the proposed overlay is reasonable	13.4
<b>Digital investment</b>	40	The case for cyber security costs as an impact outside HAL’s control seems persuasive, but need for remaining costs under this category not established.	Unclear. To the extent that the switch from outsourcing to insourcing is driving the estimate, it is not clear why the costs are additional.	HAL’s current IT costs already appear high vis-à-vis peers, and our baseline adjustment was modest	0
<b>MSCP4</b>	27	Clear rationale provided.	Clearly additional	Car parking component of the costs are broadly in line with costs forecast during capex consultation. We have	25.0

			adjusted the PRM share of the costs down in line with other PRM cost adjustments
<b>Security enhanced outcomes</b>	21	HAL removed this overlay, as per its representation made to the CAA in December 2025	0
<b>Total</b>	255		38.4

Source: HAL Business Plan and Europe Economics/YAL judgement

**Table 3.19: Assessment of proposed commercial overlays in HAL's Business Plan**

<b>Proposed overlay</b>	<b>HAL's request (H8 total, 2024 CPI)</b>	<b>Need</b>	<b>Additionality</b>	<b>Efficiency</b>	<b>Our allowance (H8 total, 2024 CPI)</b>
<b>MSCP4</b>	-49.8	Clear rationale provided.	Clearly additional	Accepted by airlines through the capex governance process.	-49.8
<b>Total</b>	-49.8				-49.8

Source: HAL Business Plan and Europe Economics/YAL judgement

In assessing HAL's proposed overlays, we are mindful that all of them would act in one direction on net operating costs (either increasing total opex or reducing commercial revenues). This creates a risk of asymmetry if only upward adjustments to HAL's net operating costs are considered. It is therefore important that any overlay is supported by clear, compelling evidence demonstrating that the additional costs are both necessary and efficient.

A general challenge in evaluating the overlays, particularly the three opex overlays we have rejected, is that they cannot readily be assessed in isolation.

- Some of the issues raised by HAL depend on wider regulatory or investment decisions. For instance, conclusions about asset-related resilience costs or increased maintenance requirements cannot be reached without reference to H8 capex allowances and the timing of planned investments.
- Where overlays relate to IT and technology, a key question is why these incremental costs would be incurred if they are not accompanied by offsetting benefits, such as cost savings, enhanced commercial revenues, or improvements in service quality and resilience.
- Several of the pressures HAL identifies are not unique to the airport but are faced by firms economy wide. To the extent these trends reflect general technological change or cost drift at the frontier, they should already be captured (explicitly or implicitly) within the frontier shift parameter, and additional overlays would be warranted only if a corresponding upward adjustment to frontier shift were made.

Against this backdrop, we find HAL's case for the technology maintenance and resilience overlays unpersuasive. The proposed growth in these areas is substantial, and HAL has previously scaled back elements of IT maintenance. We have not seen strong evidence that all the additional costs are genuinely incremental, nor that the expenditure represents an efficient level of activity. For the digital-investment overlay, we acknowledge that HAL has identified legitimate pressures on cybersecurity needs. However, its current IT cost base is already high relative to peers and our proposed baseline adjustment is not as aggressive as it might have been. On balance, we are not convinced by the need for an upward adjustment to the baseline we have proposed.

While we do not find the case for most of HAL's proposed overlays sufficiently compelling, we are minded to include an allowance for two categories: PRM/PRS and MSCP4, where the evidence indicates that additional costs are likely to arise during H8 and that these pressures meet the CAA's "need" and "additionality" criteria.

For PRM/PRS services, we accept HAL's view that the share of passengers requiring assistance is likely to continue rising over H8, reflecting demographic trends and observed historical growth. A volume-driven adjustment is therefore appropriate. Our approach is to align the incremental PRM costs with the efficient unit cost we have benchmarked for the existing PRM baseline. Since our analysis indicates that HAL's current PRM cost per assisted passenger is above the efficient level, our overlay is slightly lower than HAL sought in its Business Plan. Our approach ensures consistency between the treatment of the base and incremental PRM volumes.

**Table 3.20: Calculation of PRM overlay**

Component	Units	2024	2027	2028	2029	2030	2031	Total across H8
<b>PRM cost baseline</b>	<i>£ millions</i>	52.15						
<b>PRM mode share</b>	%	2.6%	2.7%	2.8%	2.8%	2.8%	2.8%	
<b>Mode share growth relative to 2024</b>	%		3.8%	4.9%	4.9%	6.1%	6.1%	
<b>PRM overlay</b>	<i>£ millions</i>		1.99	2.56	2.56	3.16	3.16	13.4

Sources: Europe Economics/YAL judgement (PRM cost baseline) and HAL Business Plan.

For MSCP4, we also accept that temporary arrangements will give rise to additional operating costs during the redevelopment period. HAL will need to operate a temporary substitute facility and provide bussing and related support services between the terminal and the interim car park. These costs are unavoidable during the transition and therefore qualify for an overlay. However, a material share of the MSCP4 cost proposal relates to PRM activities. To avoid overstating these incremental costs, we have applied the same proportional efficiency adjustment to this element of the MSCP overlay opex as for the standalone PRM overlay.

**Table 3.21: Calculation of MSCP4 overlay**

Input	Units	Price base & Index	2024	2027	2028	2029	2030	2031	Total across H8
<b>MSCP4 PRM component</b>	<i>£ millions</i>	2024 CPI Prices		3.33	3.33	3.33			10.0
<b>Other MSCP4 costs</b>	<i>£ millions</i>	2024 CPI Prices		5.67	5.67	5.67			17.0
<b>Baseline PRM efficiency adjustment</b>	%	2024 CPI Prices	-20%						
<b>Baseline adjusted PRM component</b>	<i>£ millions</i>	2024 CPI Prices		2.67	2.67	2.67			8.0
<b>MSCP4 overlay</b>	<i>£ millions</i>	2024 CPI Prices		8.33	8.33	8.33			25.0

Source: HAL Business Plan, with Europe Economics/YAL judgement and CAA input.

### Revenue overlays

HAL also proposed a commercial revenue overlay to reflect the expected loss of income from short stay parking and TDOC at Terminal 4 during the redevelopment of MSCP4, with a corresponding uplift in later years once the new car park is operational. This adjustment is driven by assumptions of an 80 per cent net fall in short stay parking revenue and an 80 per cent net

decline in TDOC revenues at T4 during the construction period, followed by incremental benefits to car parking revenues in 2030 to 2031 from the new facility. HAL indicated that the financial implications of the MSCP4 programme would be reviewed as part of the capex governance process with the airlines. While we have not seen this evidence, we understand that the airlines allowed the amount and, on that basis, have provisionally accepted the MSCP4 overlay as proposed. The net effect is to reduce overall commercial revenues by £50m during H8.

### 3.6.2 Other adjustments

In addition to some of HAL’s proposed overlays, we have identified one further adjustment that we consider necessary to ensure that expected structural changes during H8 are reflected. The table below summarises our adjustment.

**Table 3.22: Security staff adjustment**

Component	Units	2024	2027	2028	2029	2030	2031	Total across H8
<b>Security staff cost at baseline</b>	<i>£ millions (2024 CPI)</i>	173.6						
<b>Expected efficiency improvements during H8 (Share of baseline cost)</b>	%		1.6%	1.6%	1.6%	0%	0%	
<b>Security staff adjustment</b>	<i>£ millions (2024 CPI)</i>		-2.8	-2.8	-2.8	0	0	-8.3

Source: HAL Business Plan, with Europe Economics/YAL judgement and CAA input.

We apply an adjustment to security-staff costs to account for “learning-by-doing” effects associated with the transition to next-generation security standards as well as ongoing improvements expected from advanced detection algorithms. Evidence from comparator airports suggests that operational efficiencies are expected to emerge over time, as staff become more familiar with CTix equipment and associated processes as well as further improvements to automated detection. We therefore apply a 1.6 per cent annual efficiency improvement for the first five years following full roll-out. As two years of these savings are already embedded in our efficient baseline, only the remaining three years ongoing processing improvements are added as an overlay for H8. On balance, we are satisfied that this adjustment is necessary and additional to the savings captured by frontier shift.

### 3.6.3 Other regulated charges

For ORCs, the overarching principle has been to project revenues from these charges in a manner that is consistent with cost recovery. Our starting point is to adjust 2024 outturn costs by removing H7 fixed costs and rates and adjusting for under and over-recovery of these revenues in 2024 and 2023 respectively. This left us with £263 million as our estimate of the direct costs HAL incurred for ORCs in 2024.

We scaled this sum down by 4.3%, to reflect the difference in our efficient baseline opex and 2024 outturn opex after excluding business rates and TDOC-related expenditures (consistent with HAL approach of excluding business rates and TDOC-related expenditures). Applying this adjustment to the £263 million of direct ORC costs produces an efficient 2024 direct ORC cost estimate of £252 million.

Revenues from ORCs during H8 are assumed to change in line with changes in total opex (net of business rates and TDOC-related expenditures), subject to three further additions:

- the PRM overlay due to the expected increased propensity for people to use such services (as discussed in subsection 3.6.1)
- non-airline fixed costs of £9.91 million each year
- a share of rates equal to £1.35 million each year

The CAA shared with us the figures for non-airline fixed costs and the share of rates attributable to ORCs as part of its engagement with HAL. HAL revised its estimate of non-airline fixed costs to £8.05 million per annum (in 2020 CPI prices), which we have converted to 2024 CPI prices. The CAA has informed us that this is the most up-to-date estimate of non-airline fixed costs and that it represents a more reasonable assessment of non-airline ORC fixed costs than the original H7 estimate. We have therefore reflected this position for the H8 IPs.

An allocation of rates to ORCs has been calculated consistently with the assumption adopted for H7, expressed in 2024 CPI prices, based on information provided by HAL as part of its further clarification to the H8 Business Plan.

**Table 3.23: ORC cost forecasts**

Item	Units	2024	2027	2028	2029	2030	2031
<b>Total outturn direct costs</b>	£ millions	263.3					
<b>Baseline efficiency adjustment</b>	%	95.7					
<b>Efficient direct ORC costs</b>	£ millions	251.9					
<b>Total efficient opex (excl. rates and TDOC cost)</b>	£ millions	1403.3	1396.7	1388.5	1380.6	1368.4	1360.7
<b>Direct ORC cost share of forecast opex (excl. rates)</b>	%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%
<b>ORC direct costs</b>	£ millions		250.7	249.2	247.8	245.6	244.2
<b>ORC non-airline fixed costs</b>	£ millions		9.91	9.91	9.91	9.91	9.91
<b>Allocation of rates to ORCs</b>	£ millions		1.35	1.35	1.35	1.35	1.35
<b>PRM overlay</b>	£ millions		1.99	2.56	2.56	3.16	3.16
<b>Total ORC costs</b>	£ millions		<b>263.9</b>	<b>263.0</b>	<b>261.6</b>	<b>260.0</b>	<b>258.6</b>

Sources: HAL Business Plan data tables, CAA methodology and adjustment.

# 4 Proposed allowances vs HAL's Business Plan

## 4.1 Key differences

In a base traffic scenario, HAL's Business Plan sought an overall opex allowance during H8 of £8,431 million (2024 CPI) and projected commercial revenues of £5,347 million (2024 CPI). In contrast, our recommendations result in total throughout H8 of £7,862 million (2024 CPI) for opex and £5,544 million (2024 CPI) for commercial revenues. After accounting for the different passenger forecasts (we have used CAA's central passenger forecast rather than the forecast HAL used to put together its Business Plan), our recommendations imply HAL realising opex costs 6.7% lower than proposed in its Business Plan and commercial revenues 3.7% higher.

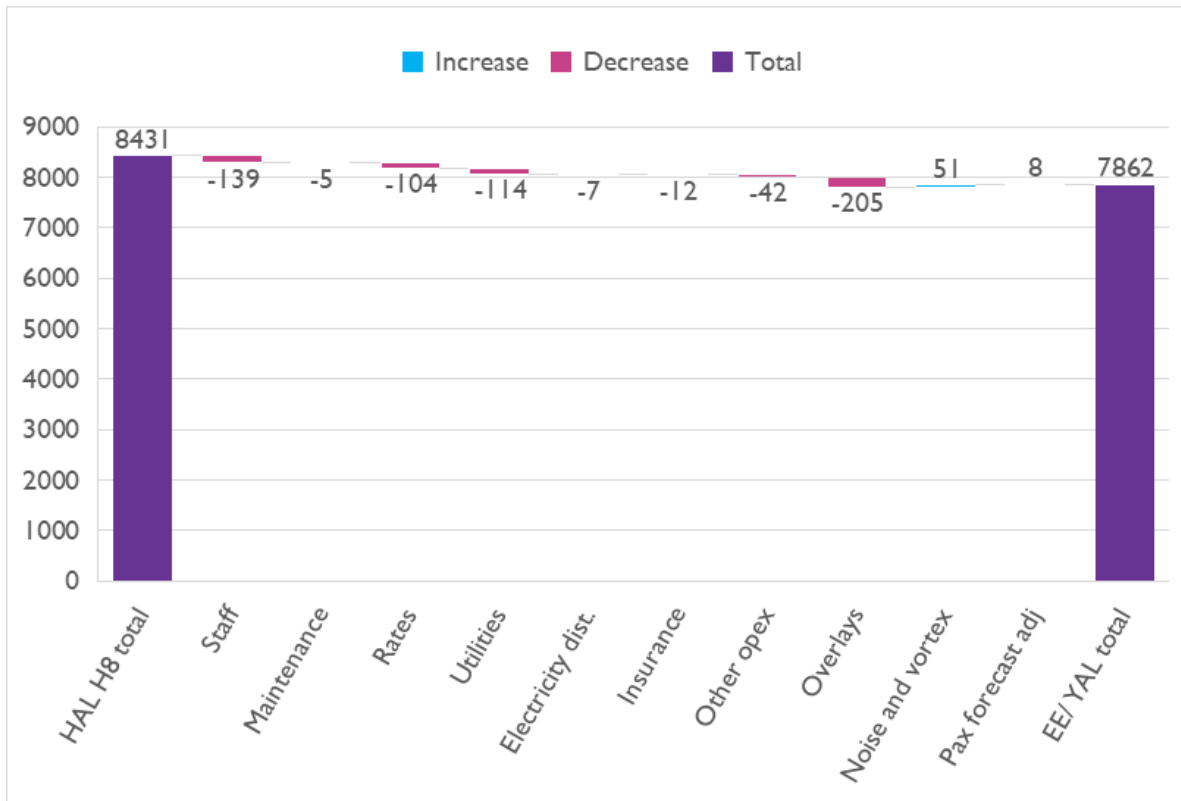
### 4.1.1 Opex

The waterfall chart below illustrates the movement from HAL's Business Plan estimate for opex to our recommendation. There are material downward adjustments arising from staff costs (-£139 million, 2024 CPI), utilities excluding electricity distribution (-£114 million, 2024 CPI), and disallowed overlays (-£205 million, 2024 CPI). These reductions reflect the efficiency opportunities identified through our benchmarking and the removal of certain costs not considered part of the efficient baseline.

All the preceding adjustments assume the same passenger numbers as in HAL's Business Plan.

The only material upward adjustments relate to the revised passenger forecast (£8 million, 2024 CPI), which increases certain volume-related cost items, and the inclusion of noise and vortex costs, which are not included within HAL forecasts.

**Figure 4.1: Deviation from HAL forecast across H8 for opex (£ millions, 2024 CPI).**



Source: HAL Business Plan data tables and Europe Economics/YAL judgement

Taken together, these adjustments result in a net reduction of £569 million (2024 CPI) relative to HAL’s plan, producing an efficient total of £7,862 million (2024 CPI) for the H8 period. The table below seeks to illustrate for each cost category what drives the difference between HAL’s H8 proposals and our proposals.

**Table 4.1: Deviation from HAL forecasts across H8 for opex categories (£ millions, 2024 CPI).**

<b>Category</b>	<b>HAL H8 proposals</b>	<b>EE/YA efficiency adjustment to 2024 baseline</b>	<b>Disallowed overlays</b>	<b>Business rates “logged up adjustment”</b>	<b>Roll forward</b>	<b>EE/YA H8 allowances</b>	<b>Level of stretch</b>
<b>Staff</b>							
<b>Security staff</b>	1,044	-117			-65	862	-17.4%
<b>Other staff costs</b>	1,302	-79			126	1348	3.6%
<b>Maintenance, facilities management &amp; equipment</b>	1,129	-21			16	1124	-0.4%
<b>Business rates</b>	1,071	0		-104	0	967	-9.7%
<b>Utilities</b>	668	-84			-30	554	-17.0%
<b>Electricity distribution contract</b>	181	0			-7	173	-4.1%
<b>Insurance</b>	134	30			-41	122	-8.9%
<b>Other opex</b>	2,668	-60			22	2630	-1.4%
<b>Overlays*</b>	235		-205		0	30	-87.2%
<b>Noise and vortex</b>	0	53			-2	51	
<b>Total opex</b>	<b>8,431</b>	<b>-279</b>	<b>-205</b>	<b>-104</b>	<b>19</b>	<b>7,862</b>	<b>-6.7%</b>

(\*) Excludes the HAL’s withdrawal of £21m for the security-enhanced outcomes overlay, which HAL said in its December-2025 representation to the CAA was no longer needed.

Source: HAL Business Plan data tables and Europe Economics/YAL judgement

Generally, HAL's Business Plan seeks more opex than we suggest allowing, which might be expected given the regulatory environment. The one exception is other staff costs. For this category, HAL's business plan projects costs to be much lower in 2025 than 2024. It is the timing of this step change (2025 rather than 2024) which explains why there is a large difference in the baseline and much of the difference in how costs are expected to evolve after 2024.

It also explains why for total opex we appear to have been more generous in how we expect costs to roll forward than HAL. Instead of positive £19m (2024 CPI) in the difference in roll forward, there would be a negative difference if we compared roll forward from 2025 onwards instead of 2024. More generally, adopting the parameters that HAL has proposed for rolling forward costs during H8 will generate higher opex forecast than we propose. The one exception is the proposed frontier shift, for which HAL has used 1,2 per cent. This is higher than the frontier shift we have used (1 per cent). It is also higher than HAL's consultants recommended from analysis of productivity trends and appears to reflect perceived scope for catch-up (whereas our proposed baseline adjustment has sought to move HAL to the frontier).

**Table 4.24.3: Summary across H8 for opex items (£ millions, 2024 CPI).**

Cost item	Cost category	2027	2028	2029	2030	2031
<b>Security staff</b>	<i>Staff</i>	174.3	173.2	172.3	171.6	170.9
<b>Operational staff – terminal-related</b>	<i>Staff</i>	25.9	25.8	25.6	25.5	25.4
<b>Operational staff – airfield-related</b>	<i>Staff</i>	20.4	20.3	20.2	20.1	20.0
<b>Operational staff – maintenance</b>	<i>Staff</i>	55.6	55.3	55.0	54.8	54.6
<b>Operational staff – other</b>	<i>Staff</i>	21.3	21.2	21.1	21.0	20.9
<b>Non-operational staff</b>	<i>Staff</i>	149.6	148.6	147.9	147.3	146.7
<b>Pensions and Capitalised Staff Costs</b>	<i>Staff</i>	0.0	0.0	0.0	0.0	0.0
<b>Baggage system maintenance</b>	<i>Maintenance, facilities management &amp; equipment</i>	81.6	80.8	80.0	79.2	78.5
<b>Other equipment maintenance</b>	<i>Maintenance, facilities management &amp; equipment</i>	76.5	75.7	75.0	74.2	73.5
<b>Stores &amp; equipment</b>	<i>Maintenance, facilities management &amp; equipment</i>	21.0	20.8	20.6	20.4	20.2
<b>Cleaning</b>	<i>Maintenance, facilities</i>	50.2	49.7	49.2	48.7	48.2

	<i>management &amp; equipment</i>					
<b>Business rates costs</b>	<i>Rent &amp; rates</i>	159.5	201.9	201.9	201.9	201.9
<b>Electricity</b>	<i>Utilities (excluding distribution contract)</i>	90.4	90.7	91.0	91.3	91.6
<b>Water and sewerage</b>	<i>Utilities (excluding distribution contract)</i>	5.1	5.2	5.2	5.2	5.2
<b>Gas</b>	<i>Utilities (excluding distribution contract)</i>	5.5	5.5	5.5	5.5	5.5
<b>Waste &amp; recycling</b>	<i>Utilities (excluding distribution contract)</i>	5.5	5.5	5.5	5.6	5.6
<b>Other utilities</b>	<i>Utilities (excluding distribution contract)</i>	3.6	3.6	3.6	3.6	3.6
<b>Electricity distribution contract</b>	<i>Electricity distribution contract</i>	34.2	34.4	34.7	34.8	35.0
<b>Insurance</b>	<i>Insurance</i>	24.9	24.6	24.4	24.1	23.9
<b>Air navigation service</b>	<i>Other opex</i>	45.7	45.4	45.0	44.7	44.4
<b>Police</b>	<i>Other opex</i>	40.9	40.6	40.3	40.0	39.7
<b>Rail expenditure</b>	<i>Other opex</i>	45.8	45.4	45.1	44.8	44.5
<b>Service quality rebate (MTI rebate)</b>	<i>Other opex</i>	15.1	15.0	14.9	14.8	14.7
<b>Intra group PRM costs</b>	<i>Other opex</i>	19.6	19.5	19.3	19.2	19.1
<b>Other operational costs</b>	<i>Other opex</i>	50.9	50.5	50.1	49.8	49.4
<b>IT &amp; computer services maintenance</b>	<i>Other opex</i>	40.0	39.7	39.5	39.2	38.9
<b>Rent costs</b>	<i>Other opex</i>	71.6	71.0	70.5	70.1	69.6
<b>Car parks</b>	<i>Other opex</i>	9.0	9.0	8.9	8.9	8.8
<b>CAA Airport Licence Fees</b>	<i>Other opex</i>	35.8	35.5	35.3	35.1	34.8
<b>Heathrow Helpers (Ethos Farm / Wilson James)</b>	<i>Other opex</i>	6.4	6.4	6.3	6.3	6.2
<b>Includes Heathrow</b>	<i>Other opex</i>	19.0	18.9	18.7	18.6	18.5
		26.3	26.1	26.0	25.8	25.7

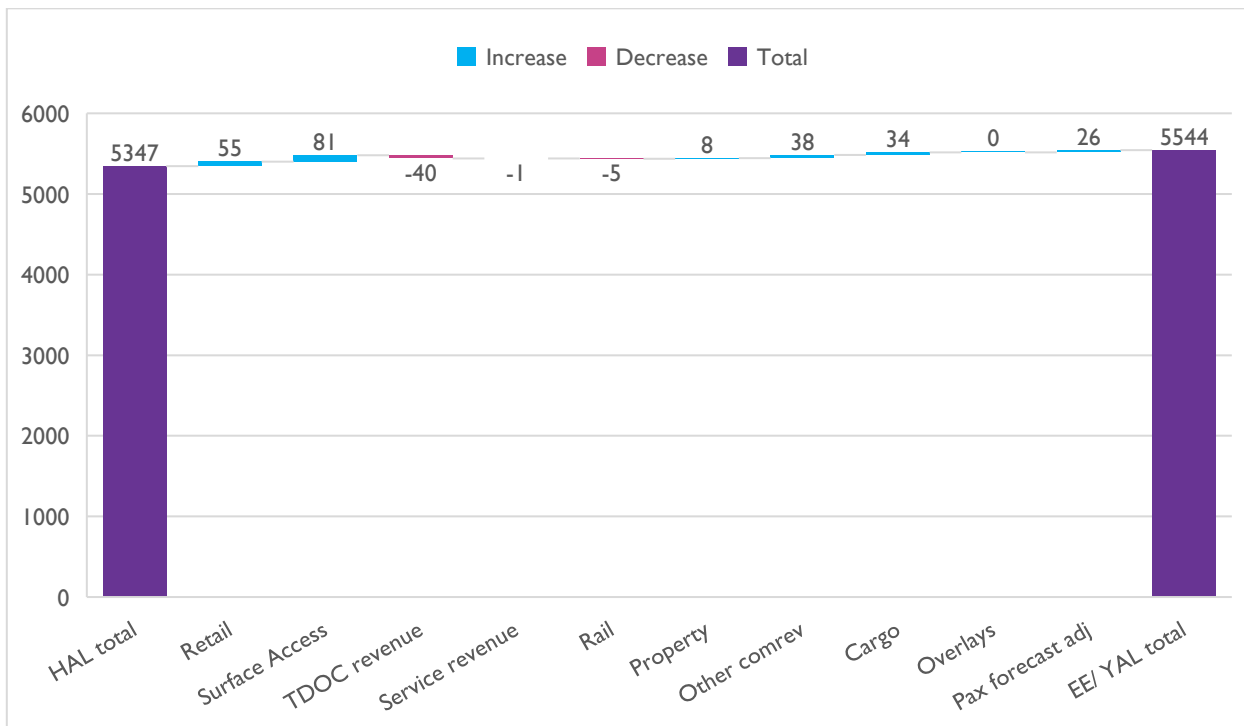
<b>Consolidation Centre (Bradford-Swissport) / HBS Security Contingency planning (3rd party security) Bussing (incl TransDev and Sustainable Travel Fund) General Expense, Consultancy, Advertising, design and marketing</b>	<i>Other opex</i>	31.3	31.1	30.9	30.7	30.4
<b>OPEX overlays</b>	<i>Other opex</i>	7.5	8.1	8.1	3.2	3.2
<b>Total OPEX</b>		1556.1	1590.3	1582.5	1570.2	1562.6

Source: HAL Business Plan data tables and Europe Economics/YAL judgement. The cost category Noise and Vortex does not appear in this table, as we do not have the information on which individual cost items such costs have been recorded by HAL, just the cost categories – staff (£2m) and other opex (£49m).

#### 4.1.2 Commercial revenues

The waterfall chart below shows the movement from HAL's projected commercial revenues of £5,347 million (2024 CPI) over H8 to our efficient estimate of £5,544 million (2024 CPI). The upward adjustments are driven by stronger revenue potential in several categories, most notably retail (+£55 million, 2024 CPI), surface access and car parking (+£81 million, 2024 CPI), and other commercial activities (+£38 million). Additional positive adjustments arise from property revenue (+£8 million) and cargo revenues (+£34 million).

**Figure 4.2: Deviation from HAL forecast across H8 for commercial revenue (£ millions, 2024 CPI).**



Source: HAL Business Plan data tables and Europe Economics/YAL judgement

All the preceding adjustments assume the same passenger numbers as in HAL’s Business Plan. Switching to the revised passenger forecast that CAA is proposing accounts for £26 million of the total uplift: this corresponds to a fall of about £0.06 per passenger as overall commercial revenues have an elasticity slightly less than one.

The largest upward adjustments are observed in retail, surface access and car parking, and other commercial revenues. For retail, a baseline adjustment of £129 million is applied, with the upward adjustment in the H8 allowance reduced by roll forward inputs; HAL includes a 1 per cent management stretch assumption, which is not reflected in our model, as set out in section 3.4.

For surface access and car parking, much of the difference can be attributed to falls in expected long-stay car parking revenues between 2025 and 2027 in HAL business plan. The timing of these adjustments mean that they are not captured in calculations of the difference in the 2024 baselines. While there are some difference in the roll-forward parameters – HAL applies no management stretch and no inflation to the long stay car parking component whereas our model applies CPI and a 1 per cent management stretch across all items within this category, as described in sections 3.3 and 3.4.

For other commercial revenues, HAL’s model assumes zero revenues throughout H8, whereas our model rolls forward the baseline value with no adjustment, no volume driver and no management stretch, but with RPI included as the RPE.

**Table 4.4: Deviation from HAL forecasts across H8 for commercial revenue categories (£ millions, 2024 CPI).**

(2024 CPI prices)	HAL H8 proposals	EE/YA efficiency adjustment to 2024 baseline	Disallowed overlays	Other adjustments	Pax forecasts, elasticities, MS, RPEs	EE/YA H8 allowances	Level of stretch
<b>Category</b>							
<b>Retail and catering</b>	2241	129			-72	2298	2.6%
<b>Bureau of change</b>	62	0			10	72	15.9%
<b>Surface access &amp; car parking</b>	1029	0			87	1116	8.4%
<b>Terminal drop-off charge revenue</b>	282			-38		244	-13.6%
<b>Service revenue (excl. surface access)</b>	376	1			0	376	0.1%
<b>Rail</b>	613	17			-20	611	-0.4%
<b>Property</b>	738	7			3	748	1.4%
<b>Other commercial revenue</b>	0	0			38	38	N/A
<b>Cargo</b>	56			34		90	61.6%
<b>Overlays</b>	-50		0		0	-50	0.0%
<b>Total revenue</b>	<b>5,347</b>	<b>155</b>	<b>0</b>	<b>-4</b>	<b>46</b>	<b>5,544</b>	<b>3.7%</b>

Source: HAL Business Plan data tables and Europe Economics/YAL judgement

Together, these category-level adjustments indicate that efficient commercial revenues in H8 are materially higher than HAL's plan, resulting in a total of £5,544 million across the period.

As with opex, in almost all cases our suggested targets for commercial revenues are more challenging than those set out in HAL's Business Plan. The exceptions are TDOC and rail revenues. For rail revenues, HAL projects marginally higher revenues, although the reason for this is unclear given that our model applies a positive baseline adjustment, an identical management stretch, the same volume driver inputs and marginally higher RPE assumptions.

**Table 4.5: Summary across H8 for commercial revenue items (£ millions, 2024 CPI).**

Revenue item	Revenue category	2027	2028	2029	2030	2031
<b>Catering</b>	<i>Retail and catering</i>	99.3	100.3	101.4	102.5	103.4
<b>Duty free - UK &amp; CI</b>	<i>Retail and catering</i>	4.1	4.2	4.2	4.3	4.3
<b>Duty free – Europe</b>	<i>Retail and catering</i>	32.5	32.8	33.2	33.6	33.9
<b>Duty free - Middle East</b>	<i>Retail and catering</i>	22.0	22.2	22.5	22.7	22.9
<b>Duty free – Africa</b>	<i>Retail and catering</i>	14.1	14.3	14.4	14.6	14.7
<b>Duty free - North America</b>	<i>Retail and catering</i>	29.0	29.2	29.6	29.9	30.2
<b>Duty free - Latin America</b>	<i>Retail and catering</i>	6.3	6.4	6.5	6.6	6.6
<b>Duty free - Asia/Pacific</b>	<i>Retail and catering</i>	32.6	33.0	33.3	33.7	34.0
<b>Duty free – Other</b>	<i>Retail and catering</i>	17.7	17.9	18.1	18.3	18.4
<b>Luxury retail</b>	<i>Retail and catering</i>	63.6	64.2	64.9	65.6	66.2
<b>Other retail</b>	<i>Retail and catering</i>	72.3	73.1	73.9	74.7	75.3
<b>Bureau of change revenue</b>	<i>Retail and catering</i>	17.1	15.6	14.2	12.9	11.7
<b>Other services</b>	<i>Retail and catering</i>	3.8	3.9	3.9	4.0	4.0
<b>Advertising revenue</b>	<i>Retail and catering</i>	52.7	53.3	53.9	54.4	54.9
<b>Car parking</b>	<i>Surface Access &amp; Car Parking</i>	184.8	188.8	193.1	197.4	201.4
<b>Other surface access</b>	<i>Surface Access &amp; Car Parking</i>	28.7	29.3	30.0	30.7	31.3
<b>Terminal drop-off charge revenue</b>	<i>Terminal drop-off charge revenue</i>	49.6	49.2	48.9	48.5	48.0

<b>Fast track services</b>	Service revenue (excl. surface access)	16.5	16.8	17.0	17.3	17.6
<b>VIP charges</b>	Service revenue (excl. surface access)	33.7	34.3	34.8	35.4	36.0
<b>Other service revenues</b>	Service revenue (excl. surface access)	22.6	23.0	23.4	23.8	24.1
<b>Track access revenue</b>	Rail	19.7	19.9	20.0	20.1	20.2
<b>Heathrow Express revenue</b>	Rail	94.9	96.0	97.3	98.4	99.5
<b>TS Piccadilly Line revenue</b>	Rail	4.9	4.9	4.9	5.0	5.0
<b>In-terminal offices</b>	Property	91.1	91.6	92.1	92.6	93.0
<b>CTA/ Perimeter</b>	Property	44.3	44.5	44.7	45.0	45.2
<b>Other</b>	Property	12.8	12.8	12.9	13.0	13.0
<b>Other revenue</b>	Other commercial revenue	7.6	7.6	7.7	7.7	7.7
<b>Cargo revenue</b>	Cargo revenue	19.6	18.7	18.0	17.3	16.7
<b>Comrev overlays</b>	Other commercial revenue	-17.9	-18.7	-19.4	3.1	3.1
<b>Total commercial revenue</b>		1080.2	1089.1	1099.5	1132.6	1142.2

Source: HAL Business Plan data tables and Europe Economics/YAL judgement

## 4.2 Per passenger comparisons

The following charts compare HAL's H8 Business Plan forecasts with our recommended trajectories for each major opex and commercial-revenue category, as well as the aggregate costs.

### 4.2.1 Opex

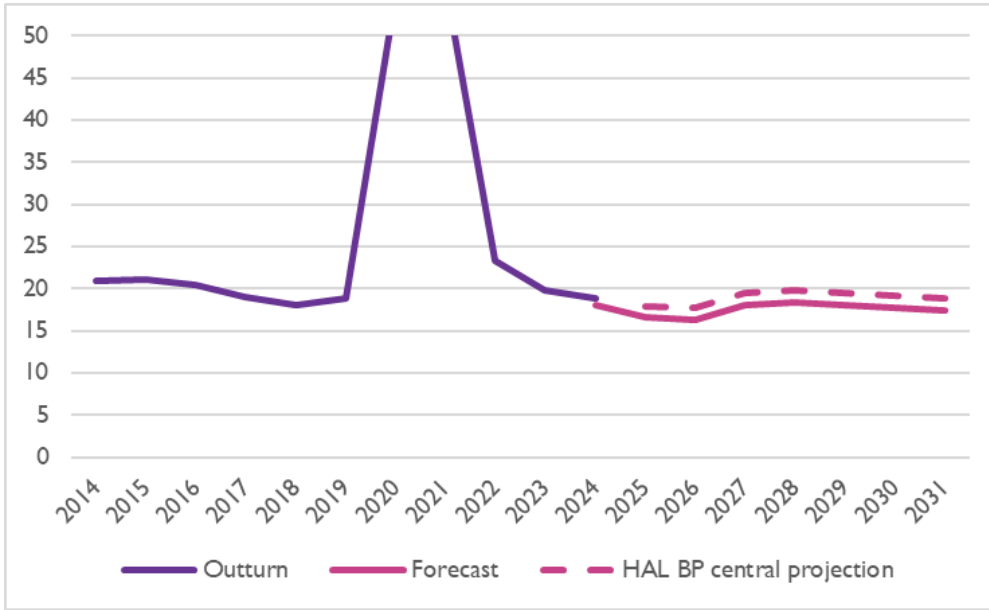
Taken in aggregate, our recommended opex projections imply real per-passenger cost levels that by 2031 are 7.1 per cent lower than in 2019. This is equivalent to cost savings of 0.6 per cent per annum, less than the frontier shift assumed by HAL or ourselves. Moreover, we note that the per passenger costs in 2027 and 2028 are higher than HAL achieved in 2018.

At the level of individual cost categories, the main exception to this aggregate picture is staff costs. Here, our projections indicate scope for HAL to achieve per-passenger costs lower than those observed pre-COVID. HAL's own Business Plan also points to some improvement in staff cost efficiency relative to historical outturns, although the savings implied by our projections are more pronounced. An important rationale for expecting savings in this area is the transition to CTix technology. Our proposals are more optimistic on the savings that can be realised in this area than HAL, with our estimates reflecting a perceived scope for catch-up to the current frontier and more learning-by-doing as all airport operators become more familiar with the new technology.

Against this backdrop, the comparison between our projections and HAL's Business Plan primarily reflects differences in starting points rather than materially different trajectories through H8. For

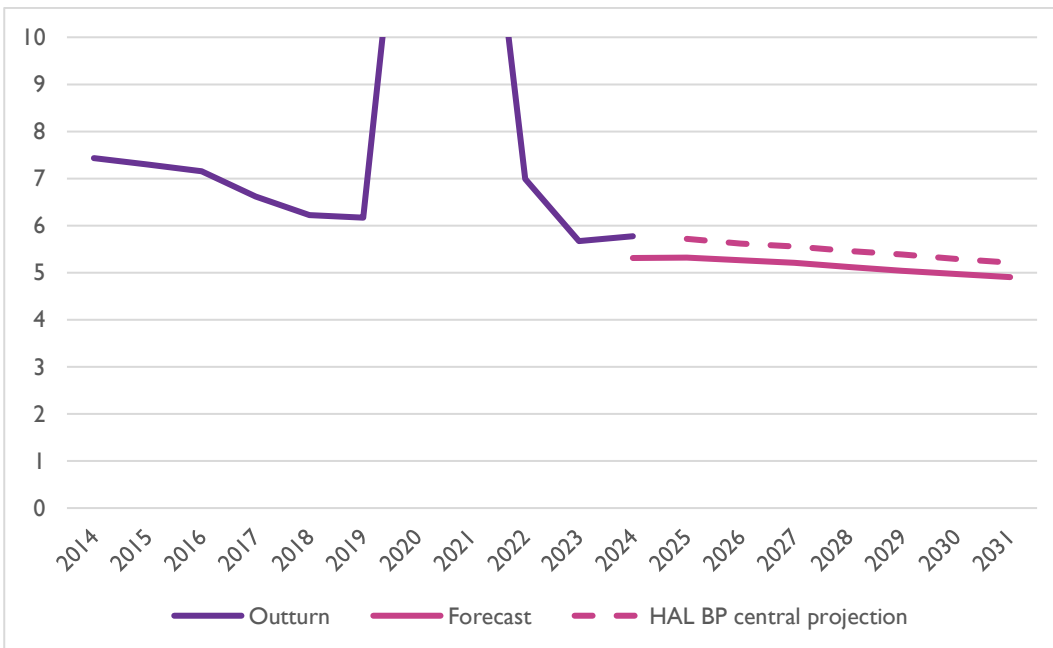
those opex categories where our recommended per-passenger allowances differ from HAL's, the divergence is already apparent at the start of H8 (2027). Over the remainder of the period, the two profiles tend to evolve in parallel, with no material widening of the gap. Our opex profile is not more demanding than HAL's because of progressively tightening efficiency assumptions over time, but on a more ambitious view of what the efficient baseline is entering H8 and, in some cases, a difference of opinion on what overlays should be permitted.

**Figure 4.3: Total opex forecast, per passenger (£)**



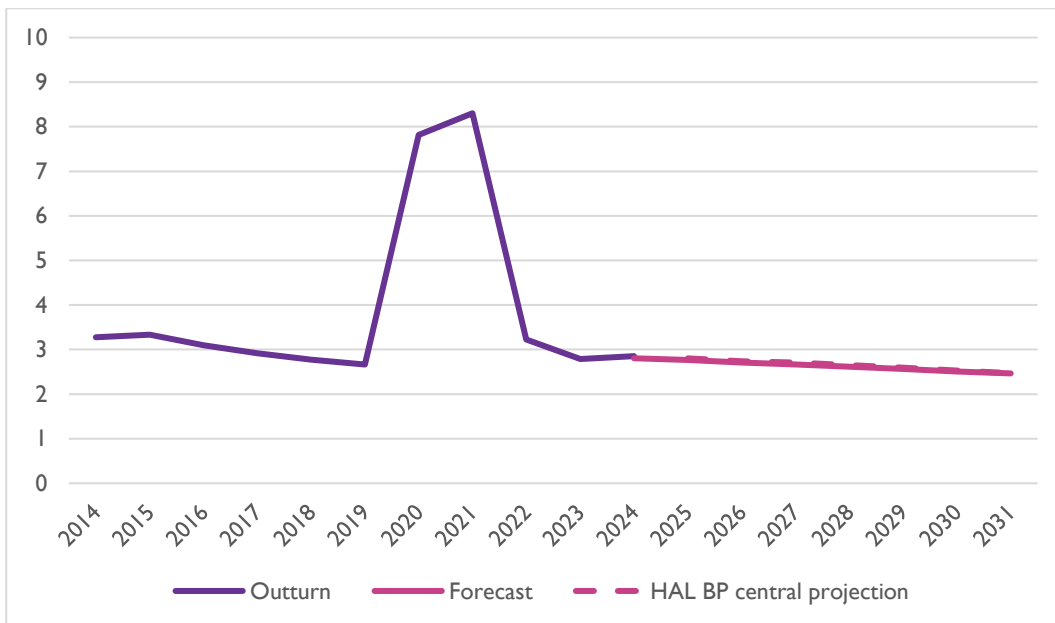
Note: Scale capped for clarity (2020: £54.7, 2021: £56.2).

**Figure 4.4: Staff cost forecast, per passenger (£)**

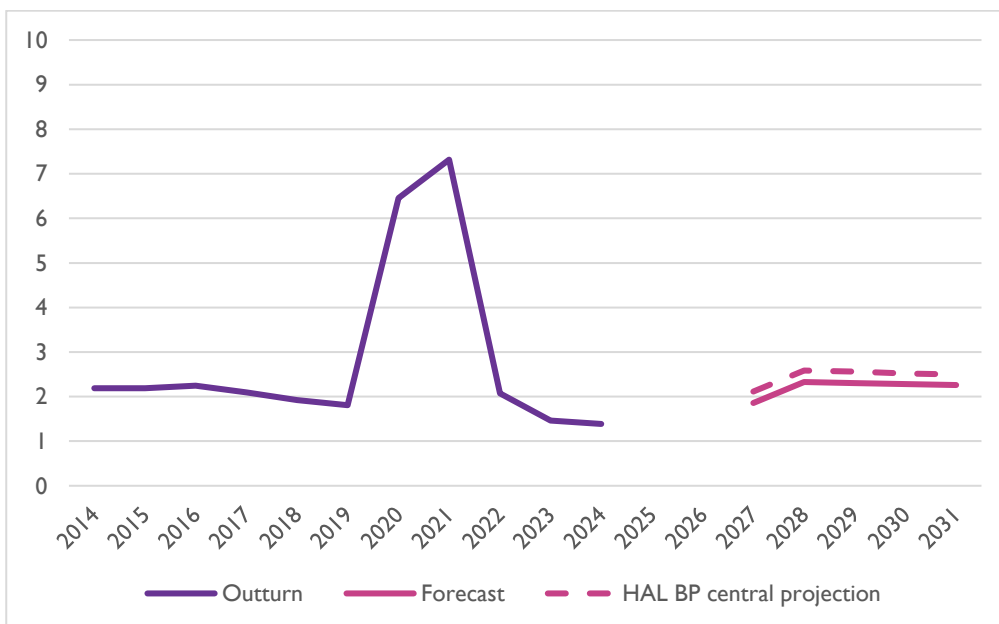


Note: Scale capped for clarity (2020: £16.9, 2021: £16.8).

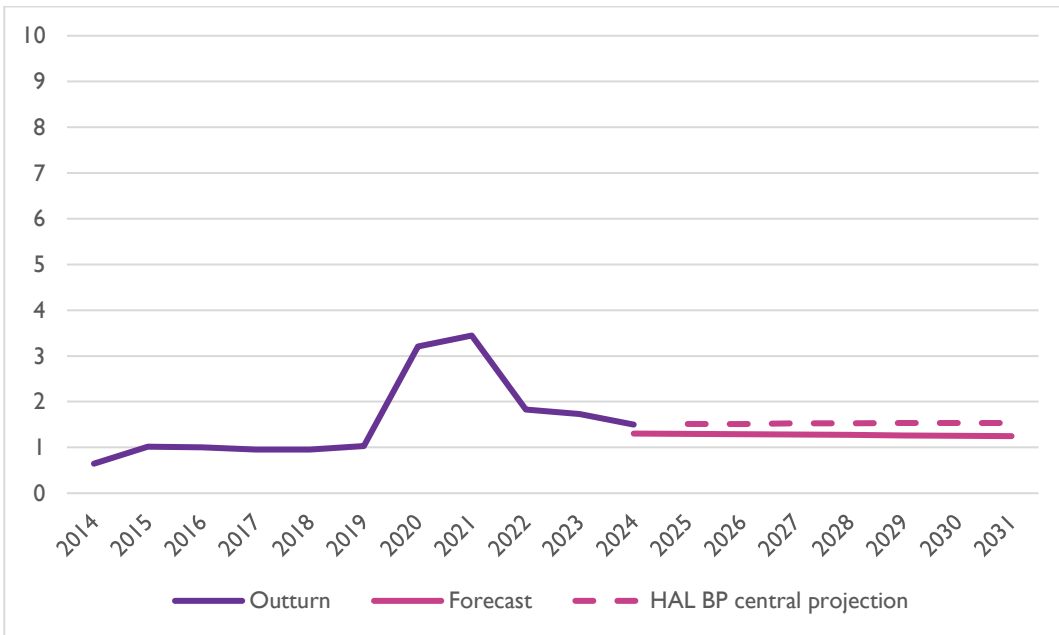
**Figure 4.5: Maintenance, facilities management & equipment costs forecast, per passenger (£)**



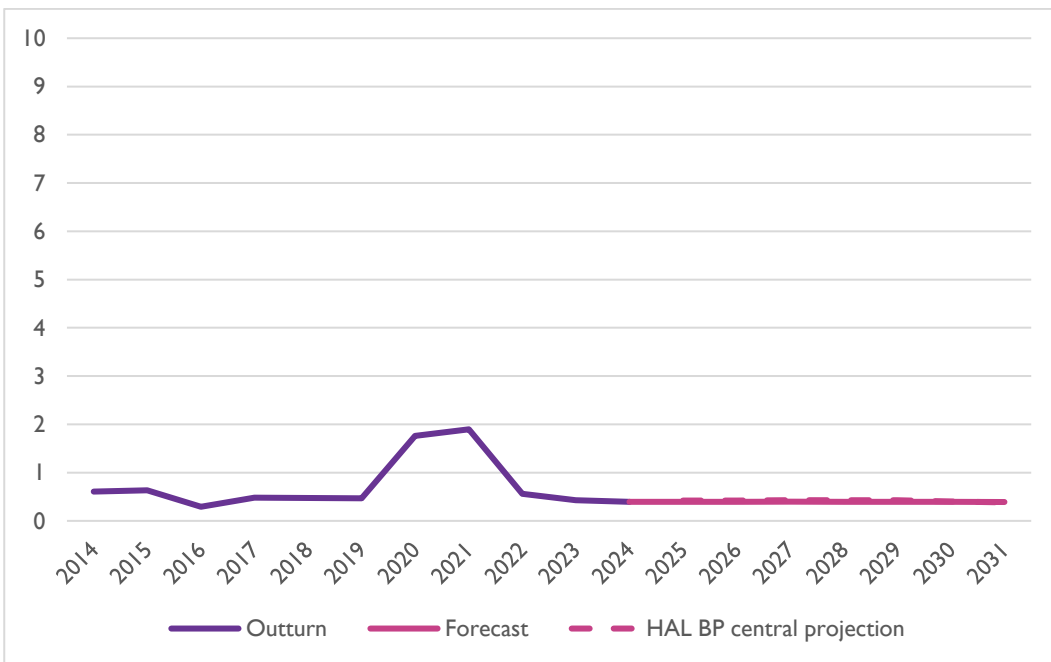
**Figure 4.6: Rent & rates costs forecast, per passenger (£)**



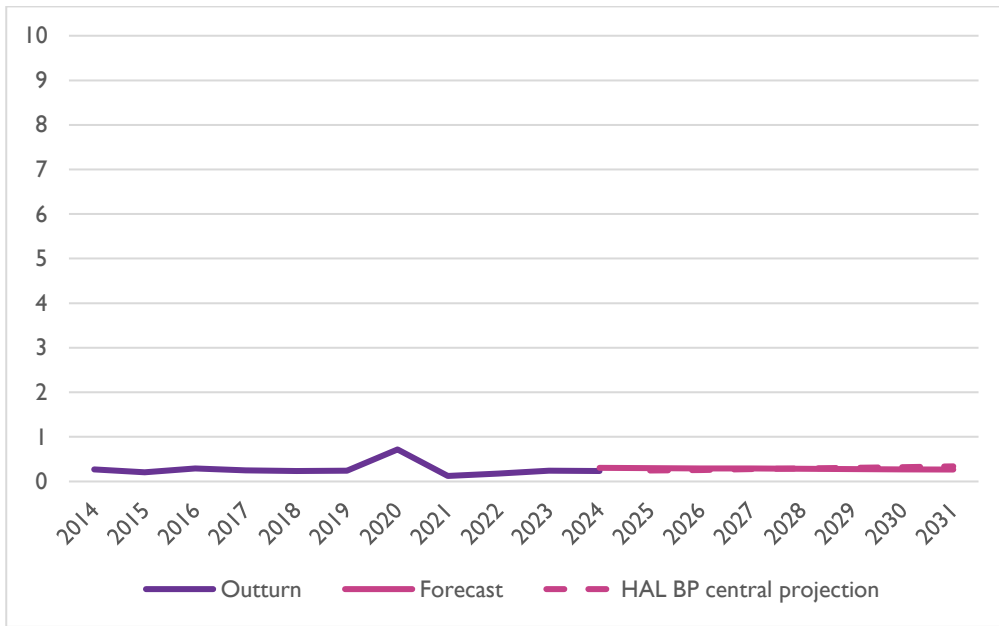
**Figure 4.7: Utilities (excluding distribution contract) costs forecast, per passenger (£)**



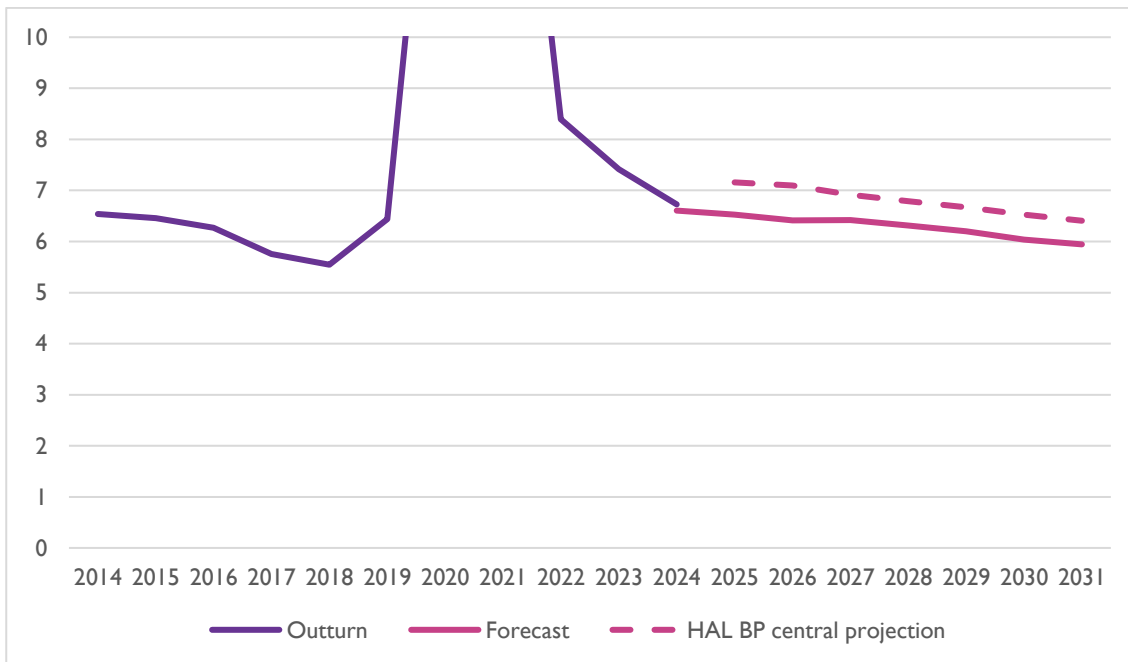
**Figure 4.8: Electricity distribution contract cost forecast, per passenger (£)**



**Figure 4.9: Insurance costs forecast, per passenger (£)**



**Figure 4.10: Other opex forecast, per passenger (£)**



Note: Scale capped for clarity (2020: £17.8, 2021: £18.4), includes opex overlays.

#### 4.2.2 Commercial revenues

For commercial revenues, both our recommendations and HAL’s Business Plan imply per-passenger revenues that remain below pre-COVID outturns. In that sense, neither set of projections is more demanding than historical performance at Heathrow.

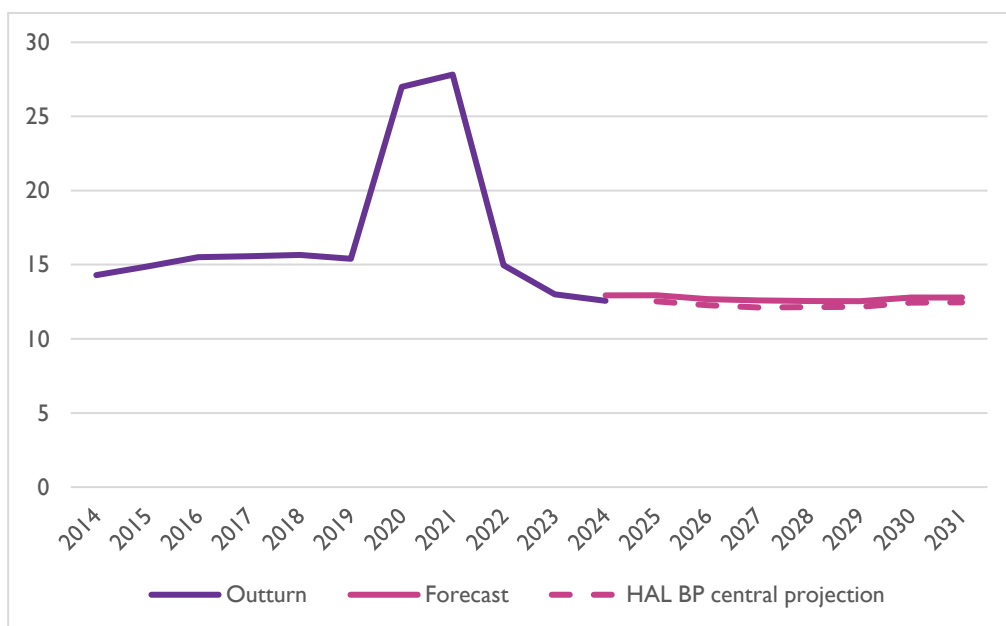
On a per-passenger basis, HAL’s trajectory also closes much of the gap with our forecast over the H8 period. This suggests that the key difference is the timing of when higher revenues are realised rather than whether they can be achieved at all. Our forecast revenues increase from £12.58 per

passenger (2024 CPI) in 2027 to £12.78 (2024 CPI) in 2031. HAL's forecast increases more materially, from £12.12 per passenger (2024 CPI) in 2027 to £12.46 (2024 CPI) in 2031, narrowing the gap from £0.46 to £0.32 per passenger (2024 CPI). This pattern is consistent with HAL assuming a more gradual improvement in commercial revenue performance through H8, whereas our recommendation embeds a higher efficient starting point from the beginning of the period.

Within this aggregate picture, the drivers of convergence and divergence differ by revenue line. For retail and catering, the two profiles converge over time, indicating broad alignment on what will be achievable in 2031. The principal difference is the mechanism: we apply an explicit baseline adjustment to 2024 outturns and roll this forward without an additional management stretch, whereas HAL applies a 1 per cent annual management stretch that largely closes the gap by the end of H8.

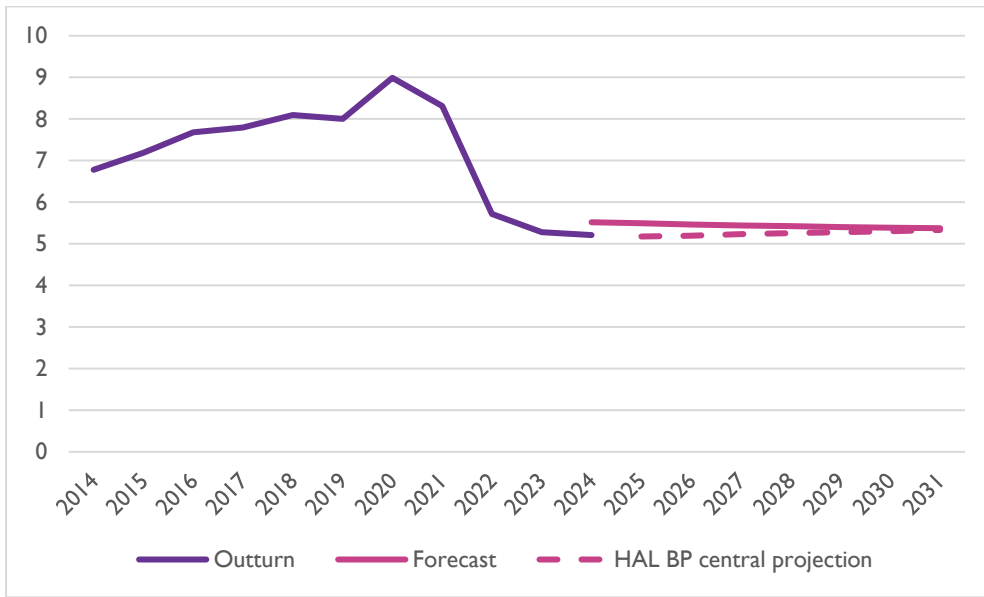
By contrast, for car parking and other surface access revenues, the trajectories diverge over H8 because we assume a higher management stretch (1 per cent across all categories) than HAL (1 per cent applied only to short stay car parking and car rental). As a result, the long-run difference between the profiles is driven more by roll-forward assumptions than by baseline adjustments.

**Figure 4.11: Total commercial revenue, per passenger (£)**

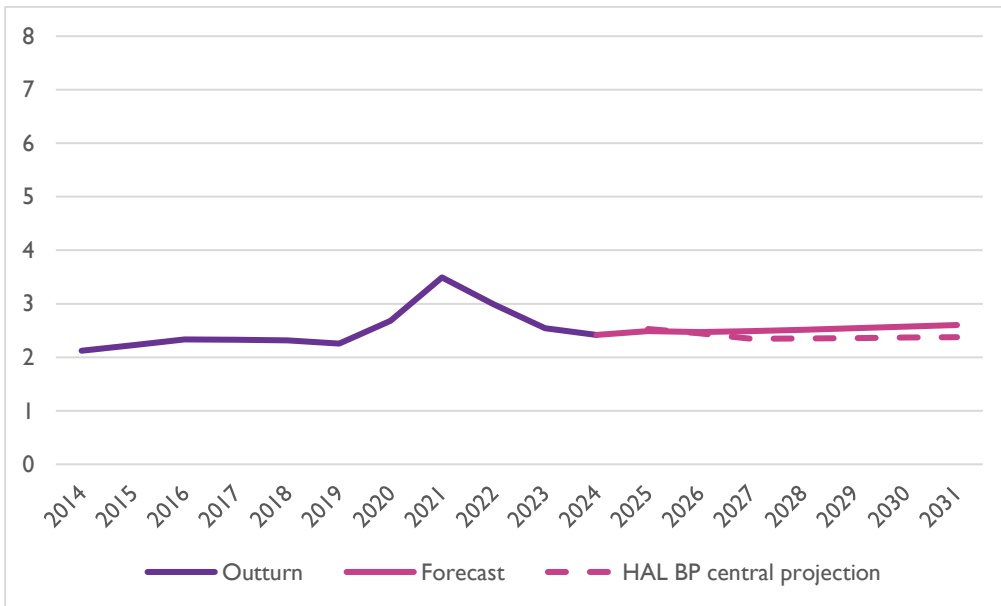


Source: Figs. 4.3–4.18; HAL BP data tables; Europe Economics/YAL judgement.

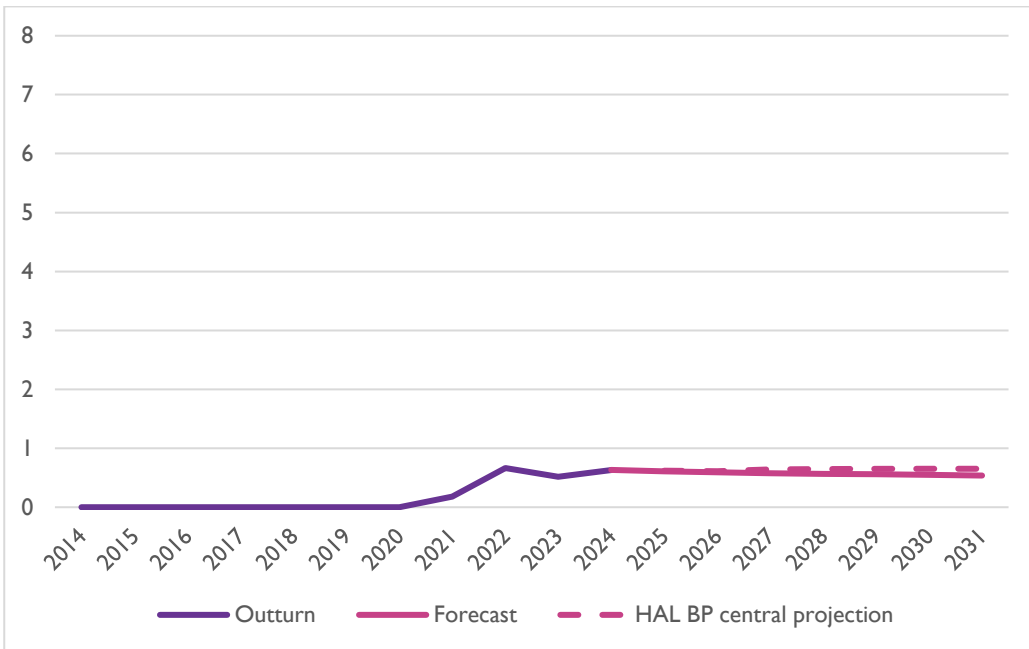
**Figure 4.12: Retail and catering revenue, per passenger (£)**



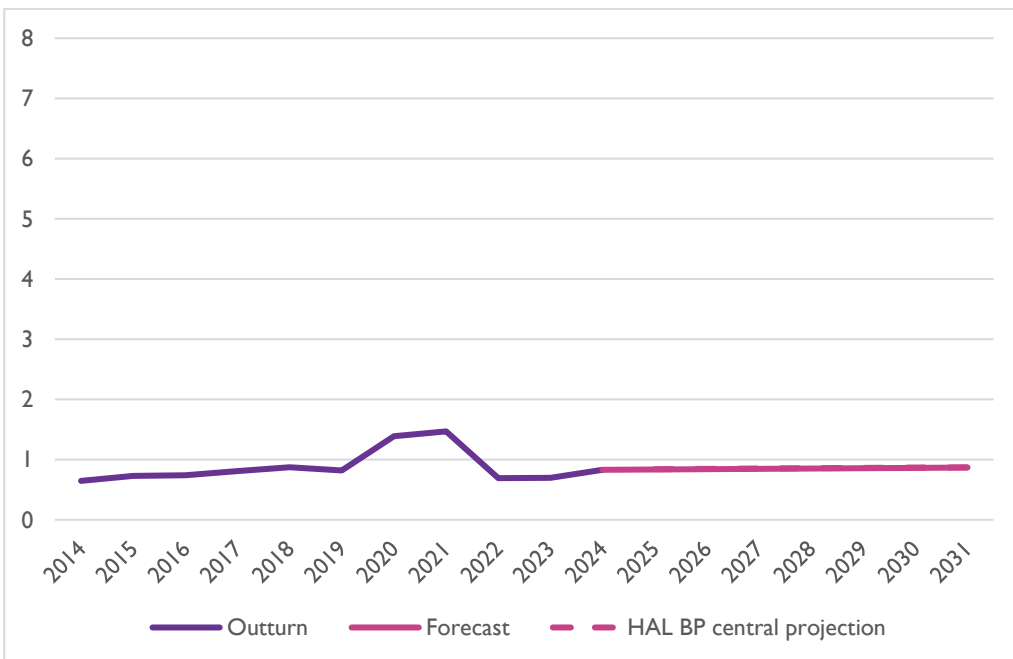
**Figure 4.13: Surface access and car parking revenue, per passenger (£)**



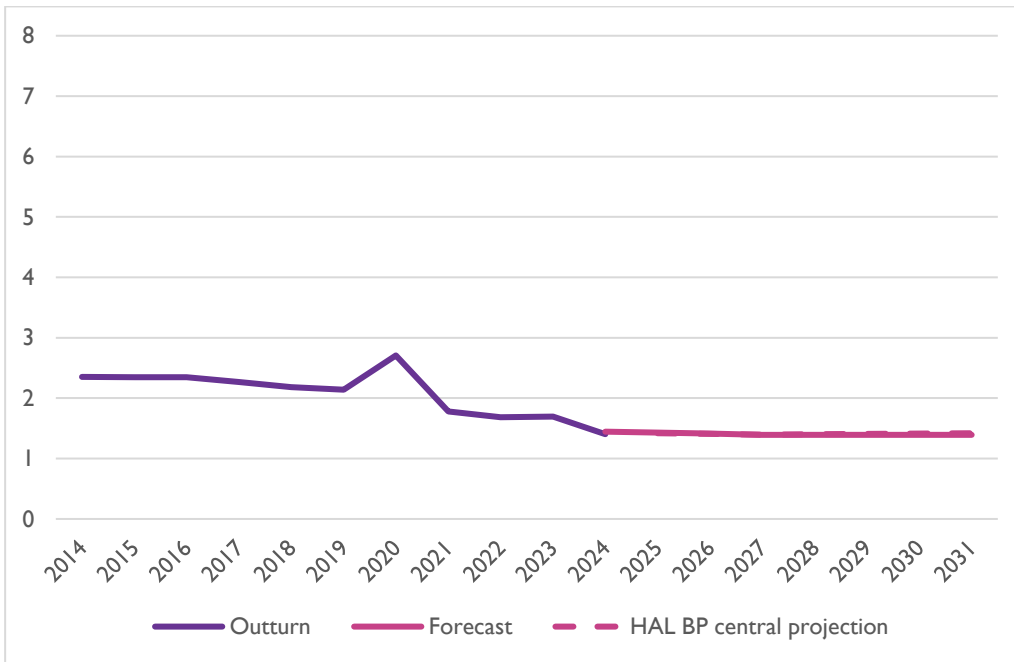
**Figure 4.14: Terminal drop-off charge revenue, per passenger (£)**



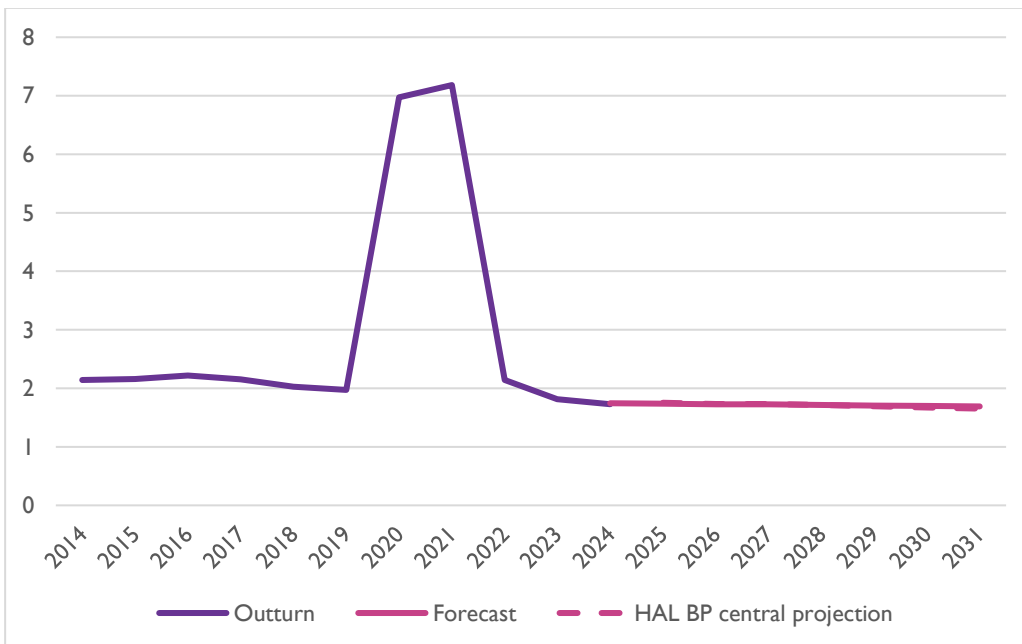
**Figure 4.15: Service revenue (excl. surface access), per passenger (£)**



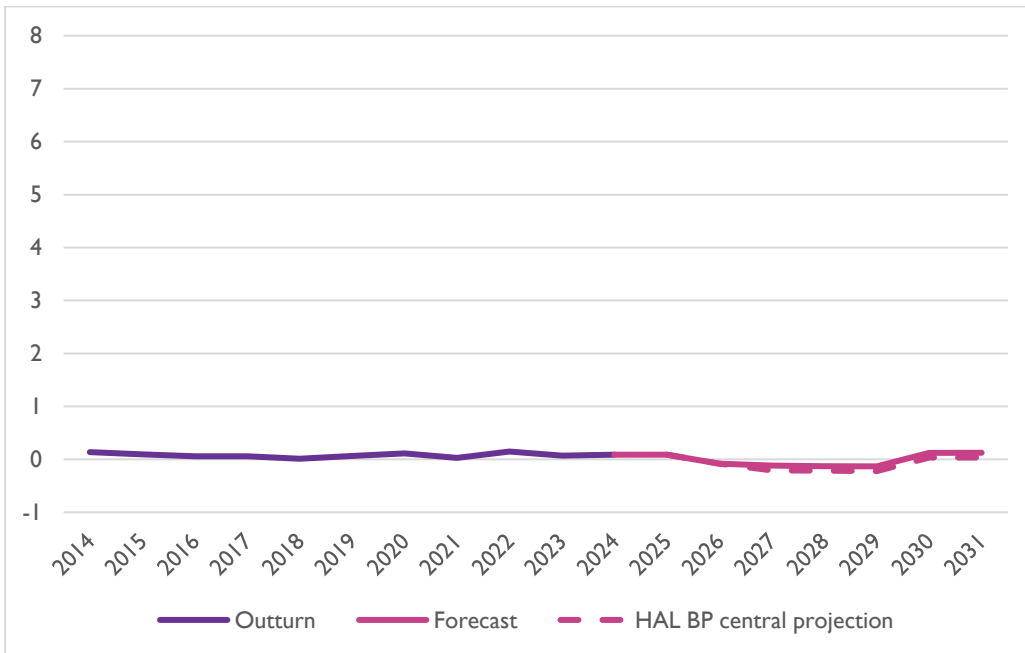
**Figure 4.16: Rail revenue, per passenger (£)**



**Figure 4.17: Property revenue, per passenger (£)**

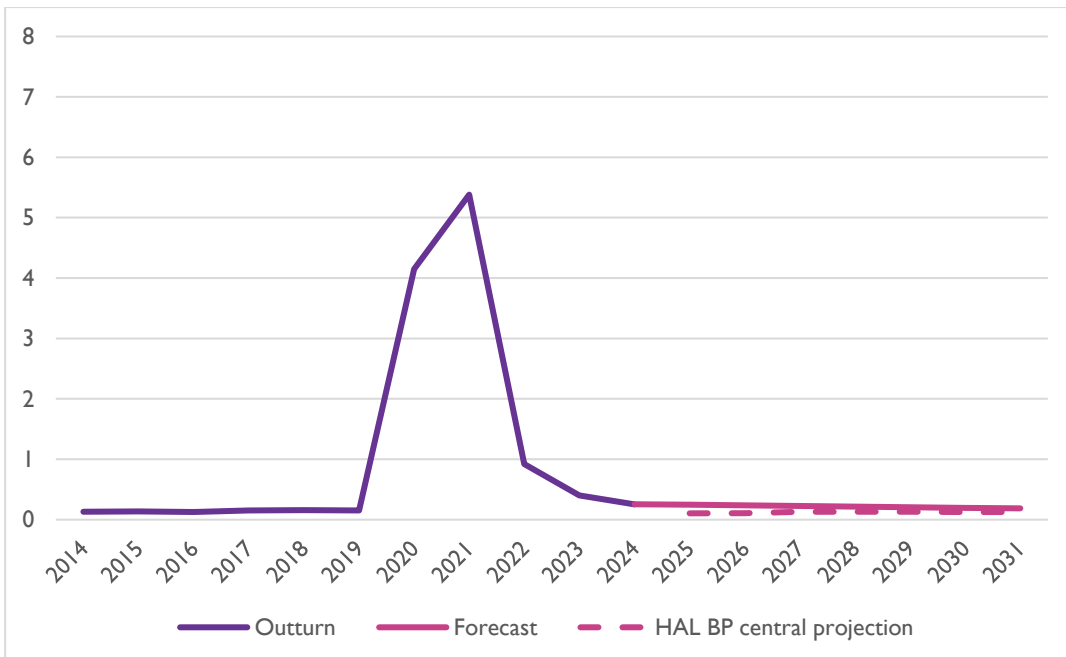


**Figure 4.18: Other commercial revenue, per passenger (£)**



Includes commercial revenue overlays.

**Figure 4.19: Cargo revenue, per passenger (£)**



Source: HAL Business Plan data tables and Europe Economics/YAL judgement

### 4.3 Total level of stretch

Our projections for H8 entail a lower opex allowance and a higher target for commercial revenues than those included in HAL’s Business Plan. We nevertheless believe that they are achievable.

In the case of opex, much of the difference in what we propose and HAL's H8 proposals is due to the allowance for business rates (for which there has been no judgement on HAL's efficiency) and overlays that HAL has sought and for which we have not been persuaded. If we exclude these differences, and also the fact that HAL's total does not include noise and vortex costs, then our proposal implies scope for HAL realising opex about 4.4 per cent lower than it has sought in its business plan for H8. This is not significantly different to the scope for improvements on 2024 outturns that we concluded were possible when determining a baseline adjustment.

**Table 4.6: Overall level of stretch across H8 for opex (£ millions, 2024 CPI).**

	HAL H8 proposals	EE/YA H8 proposals	EE/YA overall H8 level of stretch
Total opex	8,431	7,862	-6.7%
Business rates	1,071	967	
Overlays	235	30	
Noise and vortex	0	51	
<b>Total opex excl items above</b>	<b>7,125</b>	<b>6,813</b>	<b>-4.4%</b>

Source: HAL Business Plan data tables and Europe Economics/YAL judgement

Similarly, for commercial revenues we are recommending targets for commercial revenues that are 2.9 per cent higher than HAL has proposed in its business plan, after controlling for different allowances for bureaux de change and cargo revenues. Removing these same revenue lines from the 2024 baseline, this is similar to the 2.9 per cent improvement we concluded could have been achieved through our baseline adjustment.

**Table 4.7: Overall level of stretch across H8 for commercial revenues (£ millions, 2024 CPI).**

(2024, CPI)	HAL H8 proposals	EE/YA H8 proposals	EE/YA overall H8 level of stretch
<b>Total revenues</b>	5,347	5,544	<b>3.7%</b>
<b>Bureaux de change</b>	62	72	
<b>Cargo</b>	56	90	
<b>Total comrev excl items above</b>	<b>5,229</b>	<b>5,382</b>	<b>2.9%</b>

Source: HAL Business Plan data tables and Europe Economics/YAL judgement

#### 4.3.1 Other comments

Chapters 2 and 3 already set out where our base year adjustment and roll-forward assumptions align with or differ from HAL's. We have not included a detailed decomposition of how these

---

individual differences contribute to the overall difference between our recommendations and HAL's Business Plan. As illustrated in the charts above, in most cost categories, the gap between HAL's projections and our own is largely constant across the H8 period, indicating that the principal source of divergence is the adjustment we make to the 2024 baseline and different views on what overlays are warranted rather than differences in the roll-forward parameters themselves.

Moreover, some apparent discrepancies in the roll forward reflect differences in how similar underlying trends are presented rather than substantive disagreement. One extreme example is the treatment of bureaux-de-change revenues. HAL treats the decline in bureaux-de-change demand as a negative real-price effect, whereas we model it as a reduction in demand capturing the falling propensity of passengers to use the service. Both approaches recognise the same structural trend, and focusing narrowly on differing assumptions about RPEs would obscure this.

# 5 Conclusions and Recommendations

## 5.1 Final recommended opex and revenue profiles

Our recommended targets for opex and commercial revenues during H8 are set out in the table below. By 2031, we recommend targets for opex and commercial revenues of £1,563 million (2024 CPI) and £1,142 million (2024 CPI) respectively. This equates to £17.5 and £12.8 per passenger (2024 CPI), for a net operating cost per passenger of £4.7 (2024 CPI). Net operating costs in 2024 were £6.3 per passenger (2024 CPI).

**Table 5.1: Targets across opex categories (2024 to 2031, 2024 CPI).**

Cost category	Units	EE/YA adjusted 2024 baseline*	2027	2028	2029	2030	2031
<b>Staff</b>	£ millions (2024 CPI)	445.5	447.2	444.3	442.1	440.4	438.5
<b>Maintenance, facilities management &amp; equipment</b>	£ millions (2024 CPI)	235.4	229.2	226.9	224.7	222.5	220.4
<b>Rent &amp; rates</b>	£ millions (2024 CPI)	116.4	159.5	201.9	201.9	201.9	201.9
<b>Utilities (excluding distribution contract)</b>	£ millions (2024 CPI)	109.4	110.2	110.5	110.9	111.2	111.5
<b>Electricity distribution contract</b>	£ millions (2024 CPI)	33.1	34.2	34.4	34.7	34.8	35.0
<b>Insurance</b>	£ millions (2024 CPI)	25.6	24.9	24.6	24.4	24.1	23.9
<b>Other opex</b>	£ millions (2024 CPI)	554.2	551.1	547.6	543.8	535.2	531.4
<b>Total opex</b>	£ millions	1519.7	1556.1	1590.3	1582.5	1570.2	1562.6

Source: HAL BP data tables; Europe Economics/YAL judgement. \* 2024 baseline excludes the £2.65 million costs for POD parking.

**Table 5.2: Targets across commercial revenue categories (2024 to 2031).**

Revenue category	Units	EE/YA adjusted 2024 baseline	2027	2028	2029	2030	2031
<b>Retail and catering</b>	£ millions (2024 CPI)	463.0	467.4	470.4	474.0	477.5	480.5
<b>Surface Access &amp; Car Parking</b>	£ millions (2024 CPI)	202.9	213.5	218.2	223.1	228.0	232.7
<b>Terminal drop-off charge revenue</b>	£ millions (2024 CPI)	53.1	49.6	49.2	48.9	48.5	48.0
<b>Service revenue (excl. surface access)</b>	£ millions (2024 CPI)	69.7	72.9	74.0	75.3	76.5	77.7
<b>Rail</b>	£ millions (2024 CPI)	121.2	119.5	120.8	122.3	123.5	124.6
<b>Property</b>	£ millions (2024 CPI)	146.4	148.1	148.9	149.7	150.5	151.2
<b>New revenue streams</b>	£ millions (2024 CPI)	0.0	0.0	0.0	0.0	0.0	0.0
<b>Other commercial revenue</b>	£ millions (2024 CPI)	7.3	-10.3	-11.1	-11.7	10.8	10.8
<b>Cargo revenue</b>	£ millions (2024 CPI)	21.4	19.6	18.7	18.0	17.3	16.7
<b>Total commercial revenue</b>	£ millions (2024 CPI)	1085.1	1080.2	1089.1	1099.5	1132.6	1142.2

Source: HAL BP data tables; Europe Economics/YAL judgement.

### 5.1.1 Per passenger opex target in 2031

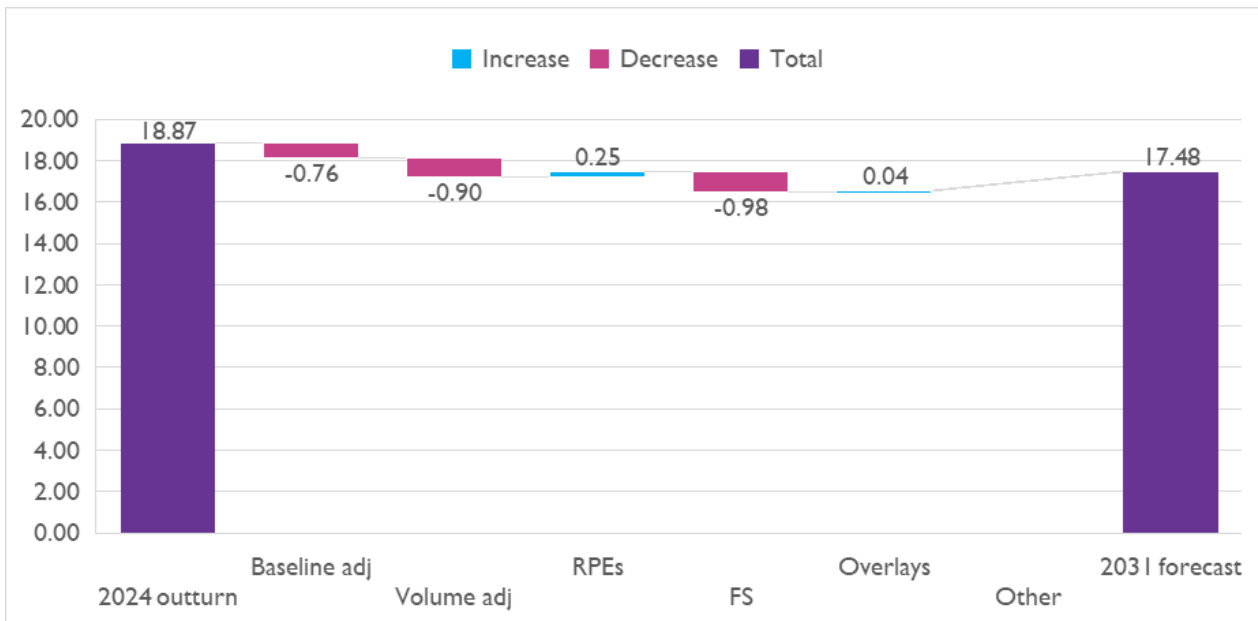
The waterfall chart shows how HAL's 2024 opex outturn of £18.9 per passenger (2024 CPI) transitions to our proposed efficient level of £17.5 per passenger (2024 CPI) by 2031. The largest downward adjustments arise from:

- the baseline efficiency correction (−£0.8 per passenger, 2024 CPI)

- volume effects (−£0.9 per passenger, 2024 CPI), reflecting the scale economies associated with higher passenger throughput over H8, and
- frontier-shift productivity improvement (−£1.0 per passenger, 2024 CPI).

RPEs are expected to slightly increase per passenger opex (+£0.25, 2024 CPI), while there are no material adjustments from overlays or other items. Taken together, these components result in a total reduction of £1.4 per passenger (2024 CPI) relative to the 2024 outturn, yielding an efficient 2031 opex level of £17.5 per passenger (2024 CPI).

**Figure 5.1: Per passenger change in total opex from HAL 2024 baseline to 2031 forecast (£, 2024 CPI)**



Source: HAL BP data tables; Europe Economics/YAL judgement.

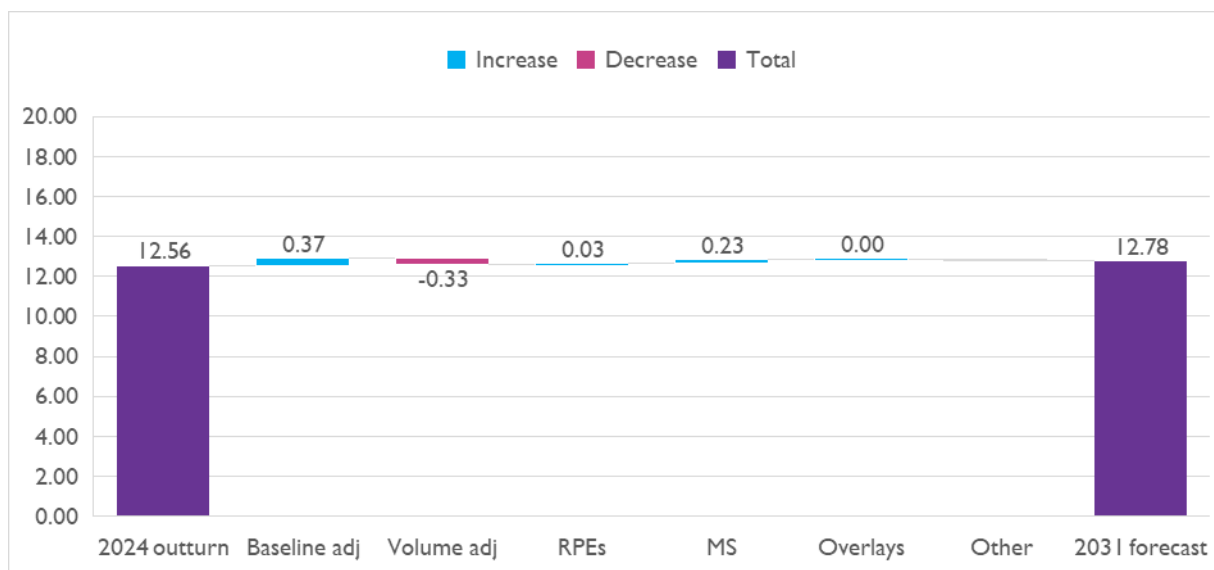
### 5.1.2 Per passenger commercial revenue target in 2031

The waterfall chart shows how HAL’s 2024 commercial revenue scope-adjusted outturn of £12.6 per passenger (2024 CPI) increases to our proposed efficient level of £12.8 per passenger (2024 CPI) by 2031. The largest upward adjustments arise from:

- the baseline correction (+£0.4 per passenger, 2024 CPI), reflecting the stronger revenue potential identified in our bottom-up benchmarking, and
- from management stretch (+£0.2, 2024 CPI).

RPEs contribute a further modest increase (+£0.03, 2024 CPI). The volume effect produces a downward adjustment (−£0.3, 2024 CPI) due to our elasticity assumptions. No material changes arise from overlays or other items. Overall, these components yield a net increase of £0.2 per passenger (2024 CPI) relative to the 2024 outturn, resulting in an efficient commercial-revenue level of £12.8 per passenger (2024 CPI) in 2031.

**Figure 5.2: Per passenger change in total commercial revenue from HAL 2024 baseline to 2031 forecast (£, 2024 CPI)**



Source: HAL BP data tables; Europe Economics/YAL judgement.

## 5.2 Limitations, caveats, key judgement calls

For the purposes of setting a price cap, point estimates are required for both efficient opex and commercial-revenue targets. However, any such estimates inevitably involve uncertainty. Our recommendations represent what we judge to be stretching but achievable targets for an efficiently run airport, recognising that neither HAL’s 2024 outturns nor an assumption of “best-in-class” performance across all categories at all dates provide an appropriate target.

Several limitations and areas requiring regulatory judgement should be noted. First, there are areas where further analysis is likely to be needed ahead of the Final Determination. Our work to date has not assessed

- the implications of HAL’s capex allowances or the timing of major investments during H8, which may affect both operating costs and commercial revenues;
- how changes in service-quality expectations or resilience standards might influence efficient operating levels;
- an appropriate frontier shift based on empirical estimates but instead relied on regulatory precedent, noting the uncertainty created by the CMA’s water sector PR24 redetermination draft decision on productivity growth.

All these areas may warrant revisiting as the regulatory framework for H8 is finalised.

Second, there are limitations in the data available for bottom-up benchmarking. In several areas HAL was unable to provide data at a level of granularity that would support direct comparison with peer airports, and public sources of disaggregated data are also limited. This constrains the precision with which bottom-up benchmarks can be constructed and increases reliance on judgement when comparing performance.

Third, elements of the modelling work rely on relatively short time series. This applies in particular to the estimation of elasticities and the assessment of management stretch, where the

---

available data from non-COVID-19 years span only a small number of years. The unusual and uneven recovery from COVID-19 further complicates the interpretation of trends, particularly where passenger mix, processing requirements or operating practices shifted materially during 2020–2022.

---

# Appendix 1: Bottom-Up Benchmarking

This appendix sets out a bottom-up analysis of HAL's operating efficiency in 2024. Our preliminary work in late 2024 and early 2025 concluded that there is limited granularity of data to enable a comprehensive benchmarking of HAL's Operational Costs (Opex) and Commercial Revenues (CommRev) at a detailed level. Hence, our approach to the assessment of an efficient 2024 baseline, to be used as the basis for rolling forward costs and revenues into H8, has necessarily combined:

- the use of benchmark information where it is available from both published and confidential sources;
- analysis of HAL's historic performance, based on the data tables provided with the Business Plan; and
- a more detailed assessment of the factors impacting on HAL's performance gleaned from on-site visits to key facilities, requests for information and more in-depth discussions with HAL on some key topics.

The approach has varied across the different focus areas dependent on the criticality of the cost or revenue stream and the level of detail in the information available. In general, where the data has enabled us to, we have sought to work from first principles in terms of assessing whether the costs or revenues in 2024 can be considered 'efficient'. However, we have also considered trends in the data by reference to external benchmarks but this has been independent of the assessments made at the time of the H7 Determination, i.e. we have made no explicit or implicit assumption regarding the previous Determination as a benchmark. Nonetheless, we have considered the extent to which costs or revenues have varied from those adopted in the H7 Determination in order to identify priority areas for more in-depth investigation as discussed in the next section.

Our approach has been to recommend efficiency related deductions to baseline Opex or uplifts to CommRev in 2024 in the first instance where clear inefficiencies can be identified. This is necessarily a somewhat conservative approach as there may be other areas of inefficiency that we have been unable to identify from the information and benchmarks available including in areas that were not subject to more in depth analysis. We also identify where further efficiencies may be possible, e.g. through contract renewal, and then propose further adjustments that could be realised by 2027 so as to form a baseline for the assessment of efficient Opex and CommRev for H8.

All costs or revenues reported in this Appendix are in 2024 CPI, unless otherwise stated.

## A1.1 H7 Outturn Assessment - Backward Look Analysis

The purpose of this initial assessment was to understand the drivers of HAL's cost base and commercial revenues so as to identify the areas of focus for more in depth analysis. We did this by carrying out a high level assessment of disaggregated sub-categories of HAL's performance on Opex and CommRev for 2022, 2023 and 2024 against CAA allowances in the H7 Determination, adjusted for actual passenger numbers and inflation in an 'Adjusted H7 Determination'. In addition

---

to CommRev and Opex, we have also included a backward look assessment of Cargo Income and Other Regulated Charges (ORCs).

The primary purpose of this assessment was to seek to understand the reasons for any difference in financial performance in terms of Opex and CommRev so as to inform the identification of cost or revenue items that would warrant more detailed analysis through bottom-up assessment of costs or revenues and benchmarking as we address this further in this report.

The assessment here has been based on outturn revenues and costs provided by HAL in the data tables supplemented by information in the Regulatory Accounts where this was necessary to understand any differences in how cost and revenue streams had been categorised over time. Where the categorisation of incomes and costs did not entirely match those adopted in the H7 Determination, a number of queries were referred back to HAL. Despite this, some inconsistencies could not be fully reconciled and, hence, the analysis below needs to be viewed with this in mind.

### A1.1.1 Methodology

We used the original Opex and CommRev model published with the H7 Determination<sup>5</sup> and updated it as far as possible for the actual drivers of Opex and CommRev for 2022, 2023 and 2024 to produce an 'Adjusted H7 Determination'. The intention has been to take into account variances in performance that derive from external factors, including the nature of traffic recovery from the effects of the Covid-19 pandemic and actual CPI inflation so as to isolate, as far as possible, genuine areas of under or over-performance by HAL.

The key parameters that we have adjusted were:

- Volume drivers – total passengers and passengers by travel region (e.g. UK, Europe, North America etc); and
- Price/Inflation drivers – CPI, RPI, Labour Rates.

The following drivers have not been updated, mainly due to a lack of available actuals data (at the time the analysis was undertaken in early 2025) for these three years:

- Volume drivers – Heathrow Express Passenger numbers, Parking/Rental Passengers, Utilised Terminal Area; and
- Price/Inflation Drivers – Insurance inflation, Utilities Inflation, other 'hybrid' inflation figures.

By using the original Determination model and replacing volume drivers and the impact of updated price effects (CPI etc), we have assumed that any other overlays and step-change efficiency assumptions that were included in the original model are, therefore, also included within the updated forecast<sup>6</sup>. Hence, the changes between the original Determination and Adjusted H7 Determination should simply reflect the adjusted volume and inflation drivers, subject to those real price effects that we have not been able to fully account for where hybrid or bespoke assumptions were made in the original Determination and that we have been unable to fully replicate. Table A1.1.1 shows the drivers that we were able to update and those that we could not on a consistent basis.

---

<sup>5</sup> [https://www.caa.co.uk/media/neyld1by/h7Opexcommercialrevenues\\_redacted.xlsx](https://www.caa.co.uk/media/neyld1by/h7Opexcommercialrevenues_redacted.xlsx)

<sup>6</sup> It was not part of our scope to audit the H7 model.

**Table AI.1.1: Adjustments to Drivers**

	<b>Updated</b>	<b>Not Updated</b>
<b>Volume Drivers</b>	Passenger Numbers (Total) Passenger Numbers (Regional Splits)	Parking/Rental Passenger Numbers <sup>7</sup> Utilised Terminal Area Heathrow Express Passengers
<b>Inflation/Price Drivers</b>	CPI RPI Labour Rates (OBR)	CPI/RPI Blended 'Hybrid' Rates Insurance Inflation Utilities Rates

Another outstanding issue is the fundamental one of consistency of Opex, in particular, and CommRev between individual cost category lines. The categorisation of some costs differs between those in the Determination model and the information that HAL provided. As far as possible we have tried to ensure that comparisons are on a like for like basis but some uncertainty remains particularly where there may have been changes in how costs are reported over time. For example, we discuss the implications of some known outsourcing of activities in 2024 later in this report.

Following clarifications from HAL, we made some reallocations to costs to ensure that the cost and revenue categories were as consistent as possible for the years 2021 to 2024. Although we received information on the drivers of surface access and rail costs for future years, the historic information did not enable us to replicate the full analysis of these revenue streams in the H7 Determination. We comment later on the implications of using HAL's most recent information provided in the data tables.

The key variances between the Adjusted H7 Determination and the Actual outturn costs and revenues are discussed further below after we have described the basis for the adjustments made.

### A1.1.2 Volume and inflation drivers

#### Passengers and Passenger Mix

The number of passengers handled at Heathrow has been higher than forecast in the Determination in both 2023 and 2024 as shown in Table AI.1.2.

**Table AI.1.2: Variance in Total Passenger Volumes**

	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
<b>Original Determination</b>	19.4	61.7	73.0	78.9
<b>Actual</b>	19.4	61.6	79.2	83.9

Source: CAA/HAL

Total passenger numbers reached 83.9 million in 2024 compared to 78.9 million projected in the H7 Determination. As a consequence, volume-related costs and revenues in the Adjusted H7 Determination are higher than originally forecast in absolute terms and we have used these higher costs to determine the extent to which HAL's actual costs and revenues have varied from those expected in the Determination.

<sup>7</sup> Some adjustments have been made where information is available in the data tables but this did not cover all surface access drivers.

We have also adjusted revenues from duty free sales in accordance with the variation in passengers by travel region (i.e. UK, Europe, North America etc) as such detail was used to build up retail revenues in the original Determination, although we noted some discrepancies in the categorisation between HAL and the CAA’s model<sup>8</sup>. The variances are shown in Table AI.1.3.

**Table AI.1.3: Variance in Market Mix (% of total passengers given in brackets)**

Passenger Traffic Region (m)	2022 Determination	2022 Actual	2023 Determination	2023 Actual	2024 Determination	2024 Actual
UK	4.8 (7.7%)	3.4 (5.4%)	4.3 (5.9%)	4.2 (5.4%)	4.1 (5.1%)	4.7 (5.6%)
EEA/Europe	26.1 (42.3%)	25.8 (41.8%)	29.4 (40.3%)	31.5 (39.8%)	31.7 (40.1%)	33.8 (40.3%)
Middle East	6.0 (9.7%)	7.0 (11.3%)	6.8 (9.4%)	8.0 (10.1%)	7.4 (9.4%)	8.5 (10.2%)
North America	14.1 (22.8%)	15.4 (25.0%)	18.0 (24.7%)	20.0 (25.2%)	19.1 (24.2%)	20.6 (24.6%)
Asia/Pacific	5.8 (9.3%)	5.6 (9.0%)	8.1 (11.0%)	9.8 (12.4%)	9.8 (12.4%)	10.8 (12.8%)
Other	5.0 (8.1%)	4.6 (7.5%)	6.4 (8.7%)	5.7 (7.1%)	6.9 (8.7%)	5.5 (6.6%)
<b>Total</b>	<b>61.7</b>	<b>61.6</b>	<b>73.0</b>	<b>79.2</b>	<b>78.9</b>	<b>83.9</b>

Source: CAA/HAL

Figures may not sum due to rounding

In 2022, the overall passenger volume was virtually identical to that assumed in the Determination but the mix of traffic varied, with faster recovery than expected in Middle East and North America markets and less dependence on the domestic market. This is material in terms of commercial revenues as there was recovery in the higher spending international markets, with lower domestic traffic than foreseen. By 2024, in overall terms, the geographic breakdown of passengers is similar to that assumed in the Determination, with only passengers from ‘Other’ regions lagging somewhat.

## Inflation

The main changes to the assumed inflation rates are shown in Table AI.1.4 below.

**Table 0.4: Comparative Inflation Rates**

CPI	2022	2023	2024	3 Year CAGR
<b>Determination</b>	9.1%	7.4%	0.6%	5.6%
<b>Actual</b>	9.1%	7.3%	2.5%	6.3%
RPI	2022	2023	2024	3 Year CAGR
<b>Determination</b>	11.6%	10.7%	1.5%	7.8%
<b>Actual</b>	11.6%	9.7%	3.6%	8.2%
Labour Rates (OBR)	2022	2023	2024	3 Year CAGR
<b>Determination</b>	5.9%	4.2%	1.7%	3.9%
<b>Actual</b>	8.2%	5.5%	5.2%	6.0%

Source: ONS/OBR

In 2023, actual CPI was marginally lower by 0.1%, and RPI by 1%, compared to those assumed in the Determination but labour rates were higher than had been forecast. In 2024, all three metrics

<sup>8</sup> CAA used EEA passengers as a category where HAL reports Europe passengers in total. The CAA included non-EEA passengers in Other along with Africa and Latin America so it is possible that there are some minor discrepancies in spending patterns.

had higher growth rates than forecast. The compound effect over the three years is materially higher inflation than was anticipated at the time of the H7 Determination.

As noted earlier, there are some inflation drivers that we have been unable to update as either the data is not available or the hybrid assumptions that drove the assumed inflation rate are not transparent in the CAA's model.

### A1.1.3 Adjusted H7 Determination

The net impact of the adjustments to the volume and inflation drivers is shown in Table A1.1.5 below. In summary:

- By 2024, the forecast CommRev in the Adjusted H7 Determination in nominal terms has risen by £72 million from £1,074 million to £1,145 million. About 78% of the increase is as a result of higher than anticipated traffic volumes.
- By 2024, the forecast Opex in the Adjusted H7 Determination in nominal terms has risen by £35 million from £1,436 million to £1,471 million. About 75% of the increase is as a result of higher than anticipated traffic volumes.

**Table 0.5: Adjusted Opex and CommRev compared to the H7 Determination (nominal prices)**

<b>Opex (£000)</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
<b>H7 Determination</b>	£1,281	£1,380	£1,436
<b>Adjusted H7 Determination</b>	£1,260	£1,399	£1,471
<b>CommRev (£000)</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
<b>H7 Determination</b>	£821	£980	£1,074
<b>Adjusted H7 Determination</b>	£819	£1,050	£1,145

For this assessment, we did not adjust Cargo Income or recovery of Opex through Other Regulated Charges (ORCs) for volume or price inflation. Both lines are largely 'overlay' amounts of revenue not directly related to differences in passenger volume and not directly considered further in our detailed bottom-up assessment.

### A1.1.4 Comparison between the Adjusted H7 Determination and HAL Actual Opex

The full comparison of all lines within Opex can be found in Annex A.

A summary of the variances between the Adjusted H7 Determination and HAL's Actual Opex is shown in Table A1.1.6 below. Note that a negative figure indicates higher Opex was actually incurred than in the Adjusted H7 Determination.

**Table 0.I.6: Differences in Opex – (Adjusted H7 Determination compared to Actual Opex in nominal terms)**

Opex	2022 (£m)	2023 (£m)	2024 (£m)	2022 (%)	2023 (%)	2024 (%)
Security Staff Costs	43	9	5	23%	5%	2%
Operational Staff Costs	-27	-27	-32	-34%	-29%	-32%
Non Operational Staff Costs	-24	-28	-28	-35%	-34%	-32%
Pensions	-5	5	5	-13%	12%	10%
Rail expenditure (staff)	0	0	0	-	-	-
Operational Costs & General Expenses	-61	-90	-53	-15%	-19%	-10%
Insurance	8	1	1	43%	3%	3%
Facilities Maintenance Costs	-6	-19	-36	-3%	-10%	-18%
Rates/Rent	17	29	30	13%	21%	20%
Utilities	3	-7	-5	3%	-6%	-4%
Distribution	2	1	-1	6%	3%	-3%
Covid Overlay	6	0	0	100%	-	-
<b>Total</b>	<b>-43</b>	<b>-126</b>	<b>-115</b>	<b>-3%</b>	<b>-9%</b>	<b>-8%</b>

Source: York Aviation

Actual Opex was £43 million (3%) higher (in nominal terms) in 2022 than might have been expected accounting for variations in traffic and inflation and was higher than the Adjusted H7 Determination expectations in 2023 and 2024 by £126 million (-9%) and £115 million (-8%) respectively, also in nominal terms. Some of the key variances are highlighted below:

- Security Staff Costs – one of the largest cost lines in the Regulatory Accounts - outturned much lower than the Adjusted H7 Determination in 2022 by £43 million (23%) in nominal terms but performed closer to expectations in 2023 and 2024, only 5% and 2% lower in each respective year. Although HAL has provided some manpower data, we are unable to comment any further over the impact of manpower changes on the variance as we do not have visibility of the manpower levels assumed as at the time of the Determination. HAL provided some additional commentary to explain the level of security costs as follows:
  - Additional costs relating to additional compliance and the re-introduction of the 100ml restrictions in 2024;
  - Longer security queues leading to increased payout to airlines as defined in its Measures, Targets and Incentives (MTI) scheme;
  - More staff needed due to congestion (longer dwell times); and
  - Wage growth exceeding the pace of inflation.

However, whilst these are all plausible explanations for cost increases in the security staff cost line, the principal reason for the outturn cost in Security being lower than expected in the Adjusted H7 Determination appears to be the outsourcing of the management of Vehicle Control Posts (VCPs) that took place in April 2024. We discuss this further below but, given the outsourcing, the comparison of costs above is not strictly like for like as adding back the VCP related staff cost saving made in 2024 would mean that Security Staff Costs would have been c.£11.7m (5.8%) higher in nominal terms at £213.7m compared to those expected based on our Adjusted H7 Determination (£202m). This presents a different picture compared to the small saving of 2% (nominal) in 2024 as the figures in Table A1.I.6 would appear to indicate.

---

Given that security staff costs account for 12% of Opex in 2024, coupled with the evident real cost increase, this is an area identified for more detailed analysis in terms of baseline efficiency.

- Operational Staff Costs – Actual costs have been consistently above expectations for the three years, ranging from £27-£32 million in nominal terms ahead of the Adjusted H7 Determination expectations. This equates to an adverse variance ranging from 29% to 34% over expectations. HAL provided the following explanations for the large adverse variance:
  - More frequent maintenance of safety critical infrastructure due to higher usage;
  - An incorrect roll forward of efficiencies, such as maintenance work avoided during the pandemic;
  - An ageing asset base;
  - Congestion – increased requirement for staff assisting passengers and wayfinding;
  - Wage growth exceeding the pace of inflation;

The HAL response also hints at no elasticity to passenger volumes being assumed in the H7 Determination as a reason for the adverse cost variance, but we deem this to be incorrect, as we understand that an elasticity of 0.4 (to passenger volumes) was used.

Furthermore, this area was also impacted by the outsourcing of trolley recovery in April 2024, as discussed further below. If the costs are added back into the staff line, this increases the Actual cost of Operational Staff by £6.9m in nominal terms, which further increases the adverse variance. Whilst HAL provided some plausible reasons for the adverse variance noted above, we cannot be certain that they explain all of the variance. For this reason, as well as it being one of the largest cost lines, this was identified as an area for more in depth analysis in terms of assessing an efficient baseline.

- Non-Operational Staff Costs – Similarly, Actual costs for Non-Operational Staff far exceeded expectations calculated from the Adjusted H7 Determination, rising from £24 million nominal in 2022 to £28 million nominal in 2024 – with the percentage variance changing marginally from 35% to 32% over expectations. It should be noted that the Regulatory Accounts also record Staff Costs related to rail as a separate line item and these appear to be part of Non-Operational Staff Costs as reported in the data tables.

HAL explained that it had built back capacity faster than expected and, accordingly, has seen an increase in staff to support the growth. We are not convinced that this satisfactorily explains the variance given that our Adjusted H7 Determination took into account the accelerated passenger volume growth. Therefore, this was identified as a cost area that required detailed bottom-up assessment.

Capitalised Staff Costs have not been identified separately in the Adjusted H7 Determination as we understand that the Non-Operational Staff Costs were shown net of the deduction in the H7 Determination. A figure for this deduction has been provided by HAL in the data tables and this is taken into account in our analysis of the efficient baseline.

- Other Operational Costs and General Expenses – The original H7 Determination showed Other Operation Costs, General Expenses, Service Overlay and Opex relating to Terminal

---

Drop Off Charges (TDOC) as separate cost lines. However, the actual costs received in the data tables do not separately identify the Service Overlay and TDOC charges, and the multitude of movements of Opex between Other Operational Costs and General Expenses over recent years renders an analysis of Opex of these individual costs lines as almost meaningless. So, for this reason, we have consolidated these four lines into one line in Table AI.1.6, as we assess the Opex at this level to provide a more meaningful variance to the Adjusted H7 Determination.

- Actual costs were consistently higher than those expected in the Adjusted H7 Determination, peaking at £90 million (19%) higher in nominal terms than expectations in 2023, but remaining significantly ahead of the Adjusted H7 Determination in 2024 at (10%) ahead of expectations. Inflation has not been updated in this line, as the H7 Determination used a CPI/RPI blend, which we have not been able to update as we do not know the proportions. However, whilst an update to the inflation number may reduce the variance slightly – perhaps in the order of £3 to £4 million in nominal terms - this does not explain the magnitude of the variance even allowing for increased costs in 2024 as a result of the outsourcing of VCPs and trolley recovery, which would account for only £20.07m of the increase in this cost line in nominal terms, as we discuss further later in the report.

HAL provided some explanations for the rise in costs, notably in the Other Operational Costs, including:

- Increased demand on policing and PRS operations (due to congestion) to maintain smooth and safe operations;
- Higher demand for mobility assistance reflecting a change in passenger mix;
- Multiple contracts which are driven by labour costs (e.g. bussing, PRS, cleaning, car park management) have experienced staff cost increases greater than inflation;
- Higher passenger volumes increasing car park usage and demand for bus services;
- The Determination assumed a roll forward of pandemic-related efficiencies, which was not possible for all efficiencies, and assumed an additional 1% efficiency on top.

We accept that the rise in labour costs over and above inflation may have driven the costs up in this category above the estimated level in the Adjusted H7 Determination and appreciate that not all efficiencies enjoyed during the pandemic can be rolled forward. However, given that the Adjusted H7 Determination already provides for additional ‘budgeted’ costs due to a rise in traffic, we do not accept the first and fourth points as reasons for the variance. Overall, the explanations provided do not satisfactorily explain all the cost difference sufficiently and so this item was identified as an area of focus in terms of establishing an efficient baseline.

- Facilities/Maintenance Costs – Actual costs were £19 million (10%) higher in nominal terms in 2023 and £36 million (18%) higher in nominal terms in 2024. HAL provided us with the following explanations:
  - No volume elasticity and a 1% efficiency per annum were assumed in the model;
  - The asset base is ageing and higher usage of systems, such as baggage systems, is requiring more frequent maintenance. HAL also claimed that it is behind on asset replacement capex.

- 
- Multiple contracts, driven by labour costs (e.g. maintenance), have experienced staff cost increases greater than inflation;
  - Increased cost of maintenance materials and spares, in some instances have risen above inflation;
  - More cleaning and maintenance due to increased footfall.

We accept that the lack of any assumed elasticity to passenger volume in the H7 Determination may have been unrealistic and that some wages and material costs have risen higher than inflation. However, it is more difficult to assess the issue of an aging asset base and any potential increase in maintenance Opex accordingly.

HAL also cited that no allowance was made in the H7 Determination for increased costs associated with mitigating disruption during asset replacement in a live environment. Whilst we are sympathetic to this as an issue in general, HAL gave no further detail as to what it was specifically referring to. Hence, we are unable to comment further as to whether this was a material factor in the level of overspend and whether we consider that such costs would or would not be implicitly baked into the cost baseline.

- Rent/Rates – Actual Costs ranged between £17 million (13%) in nominal terms and £30 million (20%) lower in nominal terms than the Adjusted H7 Determination. HAL provided no explanation for this favourable cost variance.
- Utilities – Actual costs were £7 million (6%) lower in nominal terms in 2022 but were £5 million (4%) higher in nominal terms than expectations in 2024. The unit costs for Utilities were not updated in our Adjusted H7 Determination and we explore further later in this report the extent to which these provide an explanation for the variance.

As the analysis shows, there are some large variations in costs at an individual line level, with the overall actual Opex being 8% higher than the Adjusted H7 Determination costs in 2024. HAL has provided additional explanation for many, but not all of the variances and, where it has provided some additional information and explanations, we are not convinced that they necessarily explain the actual level of variation once the Determination is adjusted for the change in passenger volume, inflation and labour costs.

During our analysis, it became clear that some costs have been reallocated between categories during H7, partially but not entirely due to outsourcing. Hence, line by line comparison with the original H7 Determination has not been straightforward and the consolidation of some cost lines has been made necessary to mitigate the issue of cost reallocation between categories by combining categories from the original Determination. However, our analysis has provided us with insight into areas of focus in terms of establishing an efficient baseline for H8.

#### A1.1.5 Comparison between the Adjusted H7 Determination and HAL Actual CommRev

The full comparison of all lines within CommRev for the Actual revenues compared to the Adjusted H7 Determination can be found in Annex B.

A summary of the variances between the Adjusted H7 Determination and the HAL Regulated Accounts actuals are shown in Table A1.1.7 below. In this case, a negative figure indicates lower Actual revenue compared to that expected in the Adjusted H7 Determination.

**Table 0.7: Differences in CommRev – (Adjusted H7 Determination compared to Actual CommRev in nominal terms)**

Commercial revenues	2022 (£m)	2023 (£m)	2024 (£m)	2022 (%)	2023 (%)	2024 (%)
Catering	1	4	2	2%	5%	2%
Retail	-30	-73	-89	-13%	-22%	-25%
Other Retail	-15	-25	-21	-32%	-40%	-30%
Bureaux	7	6	3	43%	30%	18%
Other Services	4	4	4	-	-	-
Car Parking	22	15	17	18%	10%	10%
Other Surface Access	3	-1	-3	14%	-2%	-8%
Service Revenue	-12	-13	-3	-24%	-20%	-4%
Terminal Drop Off	-6	-7	-3	-14%	-15%	-6%
Property	-11	1	6	-8%	1%	4%
Rail	-2	9	-23	-2%	8%	-16%
Other	6	3	6	431%	206%	333%
Total	-33	-76	-104	-4%	-7%	-9%

Source: York Aviation

Notwithstanding higher passenger volumes, the negative variance in overall CommRev actually achieved compared to the Adjusted H7 Determination increases over the period, suggesting a widening of HAL's underperformance in CommRev versus the Adjusted H7 Determination. In 2022, the Actual CommRev was £33 million (-4%) lower in nominal terms than the Adjusted H7 Determination expectations, but the gap widened to £104 million (-9%) in nominal terms by 2024. Some of the key variances are highlighted below:

- Catering - In contrast to non-F&B<sup>9</sup> retail, catering revenues have performed much more in line with expectations, although HAL has noted some variations between different categories of F&B outlet in our discussions.
- Retail – the shortfall in total income received, when compared to the Adjusted H7 Determination, increased from £30 million (-13%) in nominal terms in 2022 to £89 million (-25%) in nominal terms in 2024. This is by some distance the largest variance in CommRev. We asked HAL to provide some explanation for the scale of this variance and three main reasons were cited:
  - The ending of VAT-free sales airside was anticipated to reduce retail sales in the H7 Determination but the negative impact was underestimated;
  - The H7 model assumed retail prices, and hence HAL's income, to rise by CPI. Over recent years, CPI annual growth rates have been high, in part driven by high energy prices rises. However, the prices of goods and services in retail have risen at a rate slower than CPI, with a compound variance in CPI versus retail goods inflation estimated by HAL to be around 10%; and
  - The Determination also assumed a management stretch target of 1% per annum.

<sup>9</sup> Food and Beverage = Catering

---

HAL also explained that an increase in congestion as a result of more passengers using the airport is having a negative impact on retail expenditure. As seating becomes more scarce, customers are spending more time in F&B outlets due to the limited seating availability and, in addition, are less likely to give up their seats in the main lounge area to explore other retail outlets, which is having a consequential effect on Duty Free and Luxury retail in particular. HAL highlighted that such pressure on seating would not have been considered a factor at the time of the H7 Determination. Whilst the effect of this is difficult to quantify, we assess that this is a plausible contributory factor to the adverse revenue variances seen in retail and is something we have seen at other UK airports. However, to the extent that passenger volumes have only just recovered to pre-pandemic levels in 2024, it is unclear why there is a shortfall in passenger space within the terminals more generally over the period compared to the pre-pandemic position.

HAL also claimed that cost of living pressures may have reduced customer spending and it also highlighted that the current offer may not fully meet the needs of the current passenger mix, which has changed post-pandemic with more UK resident leisure passengers using Heathrow in particular. HAL mentioned that premium dining offers were underperforming, with passengers being more price sensitive than pre-pandemic and acknowledged that there were limited halal and kosher options available.

Although the responses provided by HAL are all plausible reasons that help to explain the negative variance, it was not clear that these explanations fully accounted for the variance so we identified this as an area for further consideration in terms of establishing the appropriate baseline for H8.

- Other Retail – the variance in monetary terms has remained fairly consistent, but the percentage difference ranging between -40% and -30% below the Adjusted H7 Determination is high. Whilst the revenue in this category is relatively small, HAL explained that the underperformance is a result of advertising revenue recovering slower than expected post-pandemic. In addition, HAL claimed that the elasticity of 1.0 to passenger growth used in the Determination was too high. Given that advertising revenues are as much a function of advertising space and less related to traffic, we assess that this explanation is plausible.
- Bureaux – whilst relatively small, i.e. actual income exceeded expectations by between £3m and £7m in nominal terms so the percentage variance is high. The overperformance is simply a function of the H7 Determination assuming a faster decline in this sector than has actually materialised. HAL advise that they expect a long-term decline in this sector as passengers move to electronic payments and currency cards, and, where they do exchange cash, make more effective use of online price comparisons from other outlets away from the airport.
- Car Parking – One of the largest income streams and which has significantly exceeded the Adjusted H7 Determination expectations based on the mode share assumptions used for H7 as shown in Table A1.1.7. Using updated data for car park usage from the data tables, would suggest an even higher variance in terms of car park income due to lower numbers of passengers parking with the variance increasing to £38 million in nominal terms in 2024. However, we are unclear what consequential adjustments we would need to make to other

---

surface access related revenues, our principal comparison remains based on the original mode share assumptions.

HAL advised that the higher income than in the H7 Determination was in part due to improved yield management within the car parks and that passenger modal share was not a significant contributory factor to the positive variance. Given the scale of this income stream, we have investigated further the efficient baseline revenue for 2024.

- Terminal Drop Off – On the original mode share assumptions, TDOC delivered lower revenue than expected in the Adjusted H7 Determination. HAL advised that the original Determination had assumed a higher overall modal share for TDOC and a higher number of transactions than had materialised but this does not appear to be consistent with the information provided in the data tables which show TDOC passengers in 2024 to be broadly in line with those in 2019 whereas the original H7 model forecasted a 7% fall. We have some concerns regarding whether the usage figures provided are entirely like for like.
- Rail Revenues – These outturned an adverse variance in 2024 of -£23 million (16%) in nominal terms. The revenue is largely driven by Heathrow Express (HEX) passenger volumes. HEX passengers are reported as lower than expected in the H7 Determination and so expected revenues are lower. Other elements of rail income (Track Access Charges and Piccadilly Line revenues) are not directly related to mode share or passenger volume. We have given further consideration to the efficient baseline revenue in 2024 in our more detailed analysis and, in particular, the recent introduction and impact of the Elizabeth Line to HAL's rail revenues.
- Property - Property revenues outturned broadly in line with Adjusted H7 Determination. Given that the principal driver, Utilised Terminal Area, has not changed, this would explain why there is little variation in the estimate.
- Service Revenue – This is a relatively small amount of revenue related primarily to Fast Track and VIP services. However, there has been a material adverse variance of to the Adjusted H7 Determination in 2022 and 2023, albeit the gap narrowed to £3 million (-4%) in nominal terms in 2024. It was considered that this warranted further consideration.

There are also small amounts of Other (Services) Revenue recorded which we understand related to intercompany payments and refunds from HMRC, which we have not investigated further.

#### Cargo Income and ORCs

We also looked at the historic performance of Cargo and ORC revenue. Neither the Cargo Income nor the ORC figures were adjusted for volume or price inflation, and so the comparison is to the original Determination. A summary of the variances between the Determination and the Actual revenue is shown in Table A1.1.8 below.

**Table 0.1.8: Cargo Income and ORCs discrepancies – (Determination minus Actuals in nominal terms)**

Comm Rev,	2022 (£m)	2023 (£m)	2024 (£m)	2022 (%)	2023 (%)	2024 (%)
Cargo Income	12	6	5	32%	26%	31%
ORCs	86	65	105	54%	37%	58%

Source: York Aviation

Note: a negative figure indicates lower revenue in the Regulated Actuals, i.e. that HAL underperformed versus the Determination expectations

Actual income in 2024 was provided by HAL. Cargo Income is higher than the Determination by £6 million (26%) in nominal terms in 2023 and by £5 million (31%) in nominal terms in 2024. This is likely to have been driven by a greater number of cargo flights than was anticipated in the Determination. The number of Cargo ATMs for 2024 appear to be close to the number of Cargo ATMs in 2019, so it appears that cargo income should be settling back to close to pre-Covid levels in real terms after the movement and income ‘boost’ during the pandemic.

ORC income is much higher than was anticipated in the Determination. HAL advised that some of the increased ORCs – which are largely driven by cost-recovery items such as PRS, Utility and Baggage Income – are based on increased operational costs driven by wage growth, inflation and increased movements, as well as the recovery of more fixed costs from 2024 onwards. However, whilst these all appear to be plausible reasons, we are unable to confirm whether they explain all of the variance due the ORCs being shown as an aggregate amount in the original Determination.

### A1.1.6 Summary

The backwards look indicated that there are large variances in the following categories and this formed the principal basis for determining the areas for more in depth analysis in terms of establishing an efficient baseline.:

- All staff costs;
- Other operational costs;
- Facilities maintenance costs.
- Retail revenue;
- Car parking revenue; and
- Rail revenue;

The backward look analysis also highlighted the importance of having clear visibility and consistency as to what costs and incomes are allocated to each line, to ensure that all analysis is meaningful and comparing like for like costs and incomes with explanations for changes.

## A1.2 Efficient Baseline

### A1.2.1 Identifying areas of focus

The backward look analysis informed our identification of the area of focus for more detailed bottom-up assessment, having regard to the extent to which HAL was able to provide evidence to

justify why its performance, adjusted for actual traffic<sup>10</sup>, had deviated from expectations<sup>11</sup>. We also took into account the significance of the cost or revenue line in terms of overall Opex or CommRev and comment from the airlines on areas where they have particular concerns. In Table A1.2.1 and Table A1.2.2 below, we consider each of the principal Opex or CommRev lines, based on the cost and revenue information provided in the data tables, against the following criteria:

- An Opex or CommRev line of significant size (c.5% of total);
- Areas of focus suggested by the airlines; and
- Where our analysis of H7 performance identified areas of discrepancy that were substantial and/or could not be adequately explained by HAL.

Ultimately, we have applied our professional judgement across the criteria identified for each category.

**Table A1.2.1: Opex Categories for Bottom-up Analysis**

Category	Large Cost Category	Proportion of Opex in 2024	Airline Priority	Backward Look Priority	Recommendation for Deeper Focus
Security Staff	<b>Yes</b>	<b>12%</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>
Other Operational Staff	<b>Yes</b>	<b>8%</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Non-Operational Staff	<b>Yes</b>	<b>10%</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Pensions and Capitalised Staff Costs	<b>No</b>	<b>0% net</b>	<b>No</b>	<b>No</b>	<b>No</b>
Other Operational Costs and General Expenses	<b>Yes</b>	<b>36%</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Insurance	<b>No</b>	<b>1%</b>	<b>No</b>	<b>No</b>	<b>No</b>
Facilities/Maintenance	<b>Yes</b>	<b>15%</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Rates	<b>Yes</b>	<b>7%</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
Utilities	<b>Yes</b>	<b>8%</b>	<b>No</b>	<b>No</b>	<b>Yes</b>
Distribution Contract	<b>No</b>	<b>2%</b>	<b>No</b>	<b>No</b>	<b>No</b>

Our areas proposed for more detailed assessment cover 89% of total Opex in 2024.

<sup>10</sup> 'Adjusted H7 Determination'

<sup>11</sup> Our assessment was based on data from the Regulatory Accounts for 2022 and 2023 and forecast outturn data provided by HAL in December 2024. We assessed that, in 2024, actual Opex was 4.2% higher than estimated in the H7 Determination correcting for passenger numbers and inflation. Actual CommRev in 2024 was 10% lower than estimated in the H7 Determination as adjusted. More recent data provided in HAL's data tables varies somewhat from the information used to make our comparison between the outturn and the Adjusted H7 Determination, particularly for total Opex. On the basis of the actuals for 2024 provided in the data tables, the exceedance in Opex in 2024 was of the order of 7.8% and the shortfall in CommRev 9.1%.

**Table A1.2.2: Commercial Revenues Categories for Bottom-Up Analysis**

CommRev	Large CommRev Category	Proportion of CommRev in 2024	Airline Priority	Backward Look Priority	Recommendation for Deeper Focus
Catering	Yes	9%	No	No	Yes
Retail	Yes	26%	No	Yes	Yes
Other Retail	Yes	5%	No	Yes	Yes
Bureaux	No	2%	No	Yes	No
Other Services	No	0%	No	No	No
Car Parking	Yes	18%	No	Yes	Yes
Other Surface Access	No	3%	No	No	No
Service Revenue	Yes	7%	No	Yes	Yes
Terminal Drop Off	Yes	5%	No	No	No
Property	Yes	14%	Yes	No	Yes
Rail	Yes	11%	No	Yes	Yes
Other CommRev	No	1%	No	No	No
Cargo	No	n.k.	No	Yes	Yes
Other Regulated Charges	Yes	n.k.	No	Yes	Yes

The areas identified for more detailed bottom-up analysis cover 90% of CommRev in 2024 excluding Cargo.

In general, we do not propose specific bottom up adjustments to other categories of Opex or CommRev for 2024 but have identified scope for some pro-rata adjustments, e.g. to Pensions and Capitalised Staff Costs to reflect other efficiency adjustments made, or made adjustments for the remainder of H7 that reflect information received from HAL, e.g. in relation to Insurance costs. These are addressed separately in the analysis below.

This report is largely silent on the issue of overlays, since the focus is on the baseline efficiency in 2024 and by the end of H7. The potential for step changes in efficiency through H8 are addressed elsewhere. One such area is Rates costs, where it is known that a new methodology for their calculation is being adopted by the Government, making the assessment of whether 2024 Rates costs are efficient redundant.

### A1.2.2 Data sources

Whilst we have relied on the information provided in the data tables accompanying HAL's Business Plan, it was always envisaged that more detailed information would be required to enable a robust analysis of HAL's 2024 Opex and CommRev. To that end, a number of more detailed meetings were held with HAL comprising:

- 29<sup>th</sup> January 2025 - Initial Site Visit and discussion of H7 performance;
- 18<sup>th</sup> June 2025 – 'Deep-dive' Commercial Revenue Site Visit;

- 
- 8/9<sup>th</sup> July 2025 – ‘Deep-dive’ Security Costs and Site Visit; and
  - 10<sup>th</sup> July 2025 – ‘Deep-dive’ Other Staff Costs (Teams meeting).

During these meetings, additional information was provided by HAL and we have also drawn on material contained within the H8 Business Plan. Whilst HAL has been helpful in responding to requests for additional information, the level of granularity in the data provided in the data tables and in the responses has not always been as detailed as we would have liked. In particular, we were unable to review relevant Opex and CommRev contracts and have relied on summaries of key contractual terms provided to the CAA in relation to Opex contracts and Retail/Catering contracts.

In terms of other data sources for benchmarking, a particular consideration has been the extent to which Heathrow differs from other airports, in terms of its traffic and passenger mix, and the nature of its operation relating, in large part, to its physical infrastructure. To the extent possible, we have used a combination of existing and published data for comparable airports, including but not limited to Jacobs Airport Performance Indicators, the ACI World Economics Report, published accounts for individual airports and data held on a confidential basis by York Aviation.

Ultimately, we have drawn on as many data sources as possible relating to each area for assessment to inform a judgement as to the efficient level of individual Opex or CommRev lines. Our approach to each topic has been to assemble as much detailed evidence as we could obtain from the above data sources to inform an assessment as to whether costs or revenues represent efficient outcomes in 2024. In so doing, we have identified factors to be considered in the assessment of future efficient costs or revenues discussed in the remainder of this Appendix. We set out under each of the key lines for investigation the information that we expected to use for each assessment and the information actually used.

## A1.3 Opex

### A1.3.1 Security Staff Costs

Security Staff Costs accounted for 12% of total Opex in 2024 and, although costs were reported as broadly in line with those expected in the Adjusted H7 Determination, these were identified as a major area of focus to ensure that the costs in 2024 represent an efficient baseline.

Consideration of this cost heading was divided into those costs related to passenger screening and the costs related to the operation of Vehicle Control Posts (VCPs) as they serve two different functions but it was also recognised that there could be synergies by combining the resources to allow some flexibility of deployment of staff across the two functions.

Table A1.3.I sets how we proposed to approach this task across the two components of Security Staff Costs. In addition, a detailed two-day site visit was undertaken to enable a more in depth understanding of security processes and the relationship to staff costs.

**Table AI.3.1: Security Staff Costs – Proposed Approach**

Opex	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/ Market Data	Historical Trend Analysis	Assess Staff Pay Rates	Assess Growth Rates
Security Staff - Passenger Screening	Yes	Yes	No	No	Yes	Yes
Security Staff - VCP	No	Yes	No	No	Yes	Yes

### VCP Costs

It became apparent during our site visit in July 2025 that HAL had outsourced the VCP function in May 2024 and that this function was now a contracted out cost under the Other Operational Costs heading, albeit management oversight of this function has been retained. HAL provided information that the cost reduction due to this change in 2024 was £[redacted], with the third party contract costing £[redacted], which represents an efficiency saving in overall Opex of £[redacted] and a reduction in security staff of [redacted] full time equivalents (FTEs). We understand that this is a full year effect, i.e. the actual in year saving in 2024 was 67% of this relating to the last 8 months of the year. On that basis, we have estimated that actual cost reduction in Security Staff costs for 2024 was £16.6 million, with an increase in Other Operational Costs of £12.8m in the year.

As discussed earlier, the consequence of this change is that our comparison of costs in Table AI.1.6 is not strictly like for like as adding back the VCP related staff cost saving made in 2024 would mean that Security Staff Costs would have been c.£[redacted] higher at £213.7m than expected based on our Adjusted H7 Determination (£202m), whereas we had previously indicated that there had been a small saving in Security Staff Costs. Conversely, the reported higher costs under Other Operational Costs were effectively overstated in our earlier comparison to the Determination reported in the section above, albeit costs were still higher than would have been expected under the Adjusted H7 Determination. We discuss this separately in a later section in this Appendix.

Based on the above, the ‘true’ full year Security Staff costs for 2024 post-outsourcing should be £188.8m, compared to £197.1m as reported in the data tables as the actual Security Staff Cost incurred, i.e. some 4.2% lower. This lower value forms the basis for our assessment of the 2024 baseline as it reflects the full year effect of outsourcing to be carried forward.

We have also considered whether this outsourcing may also have implications for the average salary in the Security function. The data tables report average cost per FTE<sup>12</sup> (in real 2024 prices £000s) of:

- 2021      £[redacted]
- 2022      £[redacted]

<sup>12</sup> Full Time Equivalent employee

- 
- 2023       £[redacted]
  - 2024       £[redacted]

We understand that the increase in costs in 2022 was a function of a £[redacted] incentive payment to staff to build back capability post-Covid and that the significantly lower net cost in 2021 reflected furlough payments from the Government scheme. Average salaries fell slightly in 2023 reflecting the recruitment of a large number of new security staff at the most junior grade level. The increase in 2024 is attributed by HAL to a 4% pay rise coupled with some grade progression, although the latter is not evident from the data presented, which suggests a 1.4% increase in average salary. Prima facie, this might suggest that employees in the outsourced VCP function were on slightly higher salaries, although dividing the saving of £[redacted] by the HAL's reported saving of [redacted] FTEs would suggest a lower average salary applicable in the outsourced function of £[redacted]. Hence, the reasons for the apparent discrepancy are not clear but may reflect the ongoing recruitment and training of new starters on lower salaries across the passenger processing function. As the basis for our analysis, we have assumed that £46.17 remains a representative average salary for the Security function post the outsourcing of VCPs.

### Passenger Screening

All UK airports (and those in the EU) with commercial passenger services are required to adopt Standard 3 (CTix) passenger screening equipment. Initially, the requirement was to complete the transition by June 2024 but the deadline was extended for larger airports, such as Heathrow, given supply chain issues. The new equipment, once fully functional, allows liquids and electrical items to remain in hand luggage for screening and so allows each security lane to process more passengers within a given time period, as well as improving customer services.

We understand that, at the end of 2023, Heathrow had only installed 2 CTix lanes out of 107. By mid-2024, this had risen to 17 out of 85; by the end of 2024, there were 41 out of 89 lanes converted and, by the end of July 2025, 68 out of 81 lanes. The expectation is that all lanes will be converted by the end of 2025. The lower number of lanes overall reflects the efficiency gain expected from being able to process more passengers through the new lanes than the ATix lanes they replace.

The conversion to Standard 3/CTix is intended to improve efficiency and should enable more passengers to be processed by fewer staff. It is recognised that there have been initial glitches in the implementation of this new equipment across Europe as the algorithms have not been working as originally expected and, until mid-2025, passengers were still being required to remove items from hand luggage. Hence, the benefits from this new equipment were not fully realised in 2024.

However, it is reasonable to expect these efficiencies to be fully realised by the start of H8. In the light of this, we have assessed efficiency on the basis of a fully functional CTix installation at Heathrow as the basis for a roll forward of costs in H8. It is also worth noting that there are expected to be further efficiency gains from new technology over the next few years and these will be a factor in considering the appropriate further productivity gains that can be achieved over H8. These are stated as a partial justification by HAL for its overarching productivity or frontier shift assumption of 1.2% stretch target for Opex within its H8 Business Plan.

We identified the following information as set out in Table A1.3.2 as required to enable us to carry out a detailed bottom-up assessment of the efficiency of the Passenger Screening function.

**Table AI.3.2: Security Staff Costs – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
HAL's stated forecast of passenger throughput in terms of / passengers per lane / hour specified for each screening facility.		✓	
Layout drawings of each screening facility that show clearly the number of security lanes, number of divest positions, length of lanes and numbers and type of passenger walk-through devices (metal detector / body scanner as well as queuing zones with associated footprint areas in m2).		✓	
Details of staffing numbers per lane during peak traffic periods and staff rosters more generally.		✓	
Actual and predicted hourly passenger volumes at each security screening facility.		✓	
Defined volume drivers, cost/inflation drivers, elasticities and associated volume and cost/inflation data.	✓		✓
Security staff costs, average pay rates and total manpower numbers – ideally FTE – if possible split between Passenger Screening and Vehicle Control Posts.	✓	✓	
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes, for example due to innovation, technology, legislation, sustainability reasons etc.	✓		
Security processing rates and staff pay rates for other airports.			✓

Our initial intention had been to assess the processing capability of each processing area individually and work up a resource plan reflecting efficient deployment of resources across the terminals and having regard to the balance between Standard 2 basic X-Ray lanes and how this compares to what HAL expect to achieve when new Standard 3 CTix lanes are fully operational but this would have required more detailed information than HAL was able to provide.

We have drawn on information provided by HAL in the data tables and subsequent clarification requests, which cover much of the information set out above but not critical roster information to enable a full build up of the total required complement of security staff to deliver an efficient passenger screening process across the airport on a fully bottom up basis. We have also taken into account other information available to us on the efficiency and costs of security processing at other airports for which we have detailed information to provide appropriate benchmarking.

### **Lane Processing Capability**

As we do not have sufficient information to work up an efficient resource plan from first principles, our approach has focussed on two measures of efficiency – lane throughput and average salaries.

Although the processing capability of conventional (ATix) lanes and CTix lanes differ, we have focussed on HAL's expected efficiency with its new CTix lanes as the appropriate efficiency

---

measure. This implicitly assumes that HAL's relative efficiency or inefficiency will be the same across both types of lanes in the 2024 baseline. However, as we are focussed on assessing an efficient baseline for the purpose of H8, the processing capability of the conventional (ATix) lanes is not relevant to the roll forward of costs beyond 2025 as CTix will be fully installed by the end of H7.

### Staffing Levels

During the site visit in July 2025, HAL explained its approach to determining the optimum balance between lane throughput and staffing. This is reproduced in Figure A1.3.1 below.

**Figure A1.3.1: HAL's assessment of Passenger Screening flow rate relative to Lane Staffing levels**

[redacted]

Source: HAL

In overall productivity terms, HAL considers that the level of staffing on a lane is optimised at 6 staff and an hourly throughput of 170 passengers per lane. Our on-site observations indicated that HAL was staffing to 13 staff per pair of lanes, i.e. 6.5 staff per lane and a target hourly lane throughput of 180 was indicated. We have taken this as reflective of HAL's actual staffing levels.

### Lane Configuration

A further consideration in relation to the achievable processing rate is the configuration of the security lanes with two key factors impacting achievable throughput:

- Lane length in terms of the number of positions for passengers to load their hand baggage onto trays for screening and the length of space for holding screened trays for subsequent hand search; and
- Number of body scanners, with optimum lane throughput achieved where there is more than one body scanner per lane.

The layout of Heathrow, especially in T5, limits lane length and also the ability to provide more than one body scanner per lane. At Heathrow, the length of lanes possible also limits the number of divest points to 3 or, at most 4, in all cases. This is a further limitation on throughput, albeit longer lanes and increased divest points usually require some additional staffing to maintain higher throughput rates and to some degree cancel each other out in terms of relative staffing efficiency.

HAL also explained a number of other key factors to be taken into consideration in terms of lane throughput rates, namely the number of trays required by each passenger, the extent to which images are rejected requiring searching and lane stoppages. These factors are not unique to Heathrow and, whilst Heathrow may have a higher proportion of passengers that do not speak English than other UK airports, their business/leisure passenger mix might suggest lower hand baggage to passenger ratios requiring fewer trays per passenger than elsewhere. On balance, we expect these to be largely neutral factors in terms of benchmarking processing rates at Heathrow compared to what is being achieved at other airports.

We have reviewed the layouts for each of Heathrow's security processing areas for departing passengers and also the areas for transfer passengers and relative to the declared hour passenger capacity of each terminal<sup>13</sup> and the proportion of transfer passengers<sup>14</sup>, the number of lanes

---

<sup>13</sup> Airport Coordination Ltd, Heathrow Scheduling Parameters, Winter 2025/6

<sup>14</sup> CAA Passenger Survey Q2 2025.

---

provided in the main passenger screening areas for departing passengers and this tends to confirm that the number of CTix lanes when complete is broadly designed to achieve c.180 passengers screened per hour, although there is some variation between individual terminals.

### Level of Service

A further consideration is the level of service that HAL is required to achieve in line with the MTI<sup>15</sup> scheme. The relevant service standards for central passenger search are passengers queuing for less than 5 minutes for 95% of the time and for less than 10 minutes for 99%<sup>16</sup>, which are generally higher than the level of service targets at other UK airports. Rebates are payable if these targets are not met.

HAL also receives bonus payments so long as the required queue target in any of the terminals is met for 97% of the time, with a maximum threshold of 99% of the time, and with a requirement also to meet a customer satisfaction target related to security.

It is clear that HAL is highly motivated to meet these targets with the result that:

- In 2024, no rebates were payable against the security passenger process and HAL earned bonuses of £1.809 million and £0.995 million respectively for central and transfer search respectively<sup>17</sup>.
- In the part year to July 2025, no rebates were payable against the security passenger process and HAL earned bonuses of £0.693 million and £1.745 million respectively for central and transfer search respectively.

It would appear that HAL is systematically over-delivering against the target set for security processing. Prima facie, this indicates some level of inefficiency as more passengers could have been handled with the same resource. We believe that this is, in large part, related to the rebate and bonus structure in place.

HAL also shared some data on queuing times attained. In particular, we were provided with data relating to the operation of the central search area in Terminal 2 during a busy late afternoon period coinciding with the time when we were able to observe the security process in operation. CTix equipment was fully in operation and staffing levels were c.6.5 staff members per operational lane, excluding management. During this period, the maximum queue time recorded was 2.21 minutes and the processing rate peaked at 184 passengers per hour equivalent. In other words, passenger queuing times were well within HAL's level of service target and this was consistent across the whole sample of queue time data provided to us by HAL<sup>18</sup>.

In practice, maximising the throughput of any facility requires a continuous queue to be in place so there are always passengers waiting to divest hand baggage. If there are gaps in the flow of passengers, by definition the number of passengers processed in an hour is less than optimum. It is normal to consider the hourly capacity of a security lane as the sum of the passengers that can be processed in the hour plus the acceptable queue, i.e. for the HAL's 180 minute throughput target to be true at a 5 minute allowable queue time, this would imply that a single lane would, in

---

<sup>15</sup> Measures, Targets and Incentives

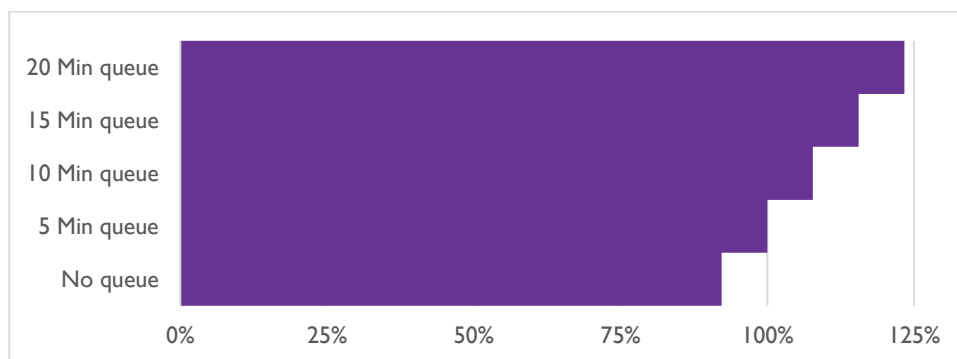
<sup>16</sup> The service level specified for transfer security areas is less than 10 minutes for 95% of the time to reflect the greater variability of passenger flow.

<sup>17</sup> Heathrow Performance Report December 2024.

<sup>18</sup> The queue time target was occasionally breached in the transfer areas based on the sample of data that HAL provided.

practice, be capable of processing 166 passengers in the hour with a queue of 14 passengers, meaning that a throughput of 180 could be planned for without breaching the queue target. The longer the acceptable queue time, the higher the assumed hourly capacity of a single security lane. This is material when we come to consider benchmarks below. The principle is illustrated in Figure A1.3.2 below, with a 5 minute target queue time set at 100%. Longer acceptable queue times increase the achievable capacity of each lane so reducing the number of lanes and associated staffing required to meet demand in a single hour.

**Figure A1.3.2: Relationship between Capacity of a Security Lane and Queue Time**



Source: York Aviation

However, it is a material consideration that Heathrow does not exhibit the same peaks and troughs of demand across the day as most other UK airports, where peak demand often only lasts for a single hour. Hence, it is legitimate to consider that, should a queue build up in a busy hour, the flow of passengers in the next hour may not enable this queue to be dissipated in the same way it would be for an airport with more pronounced peaks and troughs of demand. In essence, the need to sustain a high throughput of passengers over a few hours and still meet the target queue time would mean that a lower target capacity would need to be set for each lane to ensure that the queue time target was never exceeded. We take this into account in our assessment.

That said, HAL did provide evidence that the peaks and troughs of demand at each of the terminals do vary markedly and that they take account of these peaks and troughs to flexibly deploy security staff across the various terminals to optimise staffing to meet demand efficiently across the Airport as a whole. Based on what they told us, HAL does take steps to deploy its staff efficiently across the terminals but this does not compensate for what may be an embedded level of inefficiency in the number of lanes that it opens to meet passenger demand at any given time.

Our observations would suggest that HAL is protecting its queue time parameter to such an extent that it cannot optimise its use of available security lane capacity as the density of the queue means that there are insufficient passengers waiting to enable it to optimise throughput. In other words, it is opening more lanes, with more staff, than is strictly required to deliver the required passenger throughput within the defined service standard in any given hour.

### Benchmarks

York Aviation has access to information (some confidential) regarding staffing levels and target passenger processing rates through CTix screening across a number of other UK airports. The service standards, lane configurations and staffing levels vary across these airports and we have

---

based our assessment on the information available. The relative performance compared to Heathrow is shown in Table A1.3.3.

Our analysis would suggest that there is some embedded inefficiency in how HAL uses and staffs its security lanes. However, for the reasons noted above, comparing efficiency simply on the basis of meeting peak demand for a single hour at a time does overstate the position such that it would not be fair to say that Heathrow is between 13.3% and 40.4% inefficient in terms of the number of operational security staff required to process a given number of passengers not least as there is some uncertainty regarding the precise configuration for Airport 2.

**Table A1.3.3: Comparative Security Lane Capacity across selected UK airports**

	Target Hourly Capacity	Divest points	Staff per lane	Body Scanners per lane	Service level		1 hour peak			3 hour peak		
					Time (mins)	%	Capacity @ 5 min Queue	Pax per emp/ hour @ 5 min queue	LHR staff inefficiency	Capacity @ 5 min Queue	Pax per emp/ hour @ 5 min queue	LHR staff inefficiency
Heathrow	180	3-4	6.5	1	5	95%	180	27.7				
Airport 1	500	6	12.5	1.5	10	95%	465	37.2	25.5%	400	32	13.5%
Airport 2	350	?	7	?	10	95%	325	46.5	40.4%	280	40	30.8%
Airport 3	275	3-4	8	1	10	95%	256	31.9	13.3%	220	28	-0.6%
Airport 4	260	3	6	1	12	95%	235	39.1	29%	191	32	13.1%

Source: York Aviation

Given that Heathrow experiences longer sustained peaks of demand at each security area than other airports, it is reasonable to consider the lane capacity on the basis of ensuring that the queue over 3 hours did not exceed target. Adjusting for a 3 hour queue duration and excluding Airport 2 would suggest a range of operational staff inefficiency of 0%-13.5% at the single lane level.

We were told by HAL, that operational security officers account for [redacted] of the FTEs post-outsourcing of the VCP function as shown in Table AI.3.4 below:

**Table AI.3.4: Number of Security Employees by job category post-outsourcing of VCPs**

<b>Job description</b>	<b>Operations/Management</b>	<b>FTE</b>
Security Officer	Deployed operationally	[redacted]
Security Manager (Ops/People/Compliance)	Deployed operationally	[redacted]
Security Ops Manager	Deployed operationally	[redacted]
Other roles	Management functions	[redacted]
<b>Total</b>		<b>[redacted]</b>

Source: HAL

Assuming that there are no similar embedded inefficiencies in the number of management staff employed within the security function (for which we do not have the data to interrogate further), this would imply an overall staffing inefficiency in the range 0% to 12% with the current operation of the CTix lanes.

Furthermore, other airports are projecting further reductions in security staff numbers as the use of the new technology settles down and further screening efficiencies are achieved through automated screening algorithms and improved body scanning technology. This is projected in the range of 8%-36% reduction in staff required like for like over the next 4-5 years and, whilst this is not a factor in assessing the efficiency of HAL's performance in 2024, it is material to the position by the end of H7 when it would be expected that around 40% of these further efficiency improvements would have been realised.

#### Salaries and Total Security Staff Costs

York Aviation also has access to some data on security staff costs in 2024 for a limited number of UK airports. We have analysed these in terms of Security Staff Costs per mppa and average cost per security FTE as shown in Table AI.3.5.

**Table AI.3.5: Comparative Security Staff Costs (2024 CPI prices)**

	FTEs per mppa	Security Staff Cost per mppa	Security Staff Cost per FTE adjusted for regional salary difference <sup>19</sup>	Difference
<b>Heathrow</b>	[redacted]	£[redacted]	£[redacted]	
<b>Airport 1</b>	21.8	£777,368	£44,471	-4%
<b>Airport 4</b>	40.5	£1,216,905	£42,964	-7%

Source: HAL, York Aviation

Even allowing for higher salaries in London, the data from other airports would suggest that HAL may be paying some premium for security staff compared to salaries elsewhere in the UK as well as having more staff per mppa, although this is in part a reflection of the higher level of service mandated.

### Conclusion

In overall terms, there is evidence that HAL may not be delivering its passenger processing security as efficiently as it could be in terms of staff numbers and salaries.

In terms of staff numbers relative to passenger throughput, the inefficiency relative to the productivity achieved by other airports would appear to lie in a wide range of 0%-12% of Security Staff Costs. We believe that, in part, this inefficiency is due to over protecting the queue time target. In practice, we believe that the embedded inefficiency is likely to be at the lower end of this range when the nature of Heathrow operations and the pressure on maintaining service standards is fully taken into account.

Available benchmark data on staff costs would tend to confirm some level of inefficiency in terms of salary costs in the security function, which would potentially compound the overall cost inefficiency.

It is difficult to be precise about the level of inefficiency and what adjustment would be appropriate to the 2024 baseline Security Staff Costs but, prima facie, the level of inefficiency seems likely to be in the range of 5%-10% of the current cost base for this function when processing rates and salary costs are both accounted for. Our recommendation is to adopt 5% as an adjustment to the baseline 2024 Security Staff cost, i.e. a reduction of £9.44m, meaning that the baseline security cost for 2024 should be £179.36m after first having adjusted for outsourcing of VCP security part way through the year.

Allowing for further efficiency improvements, as familiarity with the CTix operation increases and algorithms improve, even at the lower end of the range anticipated of 8-36% by 2030 with 40% of this assumed to be achieved by 2027, this would amount to a further efficiency reduction in cost of 3.2% and reduce costs at 2024 traffic levels and prices to £173.6 m by the end of H7.

Our recommended adjustments to Security Staff Costs in the baseline are shown in Table AI.3.6.

<sup>19</sup> Using ONS data for regional average salary compared to London average salary 2024

**Table AI.3.6: Adjusted Efficient Baseline for Security Staff Costs**

£m	HAL 2024 Actual Costs	Efficiency Adjustment	Adjusted Baseline
Total Security Staff Costs	197.10		
After Adjustment for VCP Outsourcing	188.80	5%	179.36
Further Efficiencies from CTix familiarity during H7		3.2%	173.62

### A1.3.2 Other Operational and Non-Operational Staff Costs

Our initial assessment identified both Other Operational Staff Costs (excluding Security) and Non-Operational Staff Costs as areas for further in depth bottom up analysis, to assess whether their 2024 Opex could be considered as an efficient baseline. Other Operational Staff Costs represented 8% of total Opex and Non-Operational Staff Costs a further 10% and are, therefore, a significant part of the cost base. Compared to the Adjusted H7 Determination, we assessed that Other Operational Staff Costs were 32% higher than expected in 2024 and Non-Operational Staff Costs were also 32% higher than expected.

Although HAL provided reasons for these variances related to recovery post-pandemic and the increase in staffing required due to the higher passenger numbers, the sheer scale of the Other Staff Cost element of Opex meant that we considered a more detailed assessment should be undertaken.

Unlike passenger security, where specific processes are undertaken and a direct relationship with passenger volumes can be established, our approach has been principally to assess the number of staff and the average staff costs per FTE for reasonableness having regard to other airport benchmarks as there was insufficient information available to enable a more detailed assessment by individual function. Similar considerations apply to Non-Operational Staff Costs which, by definition, do not have a significant elasticity to traffic growth.

Table AI.3.7 sets out the broad approach that we proposed for assessing the efficiency of Staff Costs under these two categories.

**Table AI.3.7: Other Operational Staff Costs – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Other	Assess Growth Rates
Other Operational Staff Costs	No	Yes	No	No	Yes	Yes
Non-Operational Staff Costs	No	Yes	No	No	Yes	Yes

As indicated above, we had anticipated being able to analyse the number of staff and overall salary costs by function, e.g. terminal management, passenger services, airfield, maintenance etc and our

initial information requirements, that are set out in Table AI.3.8 below, sought to look at the historic relationship between FTEs in these functions and growth in activity.

**Table 4.8: Other Staff Costs – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Staff FTE numbers and pay costs split by function, in particular terminal related, airfield related and maintenance related	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data	✓		✓
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes, for example due to innovation, technology, legislation, sustainability reasons etc.	✓	✓	
Information on Operational Staff Costs from other airports.			✓

Some of the Opex and FTE data provided by HAL was broken down in the data tables to the following sub-categories as requested:

- Operational Staff:
  - Terminal-Related
  - Airfield-Related
  - Maintenance
  - Other
- Non Operational staff was only provided at a total level.

However, the full data for FTEs split by the above categories was only provided by HAL for 2021 onwards. Earlier data was provided at a more aggregated level, with the HAL advising that earlier data in the requested format was not available “*due to system migrations and several changes in organisational structure and cost allocation*”.

The splitting of the FTE and Opex to these relatively few categories, coupled with the provision of data split to this level only from 2021 onwards – a period impacted by pandemic recovery - has significantly restricted our ability to analyse and benchmark Other Staff Costs in any granularity to provide a definitive view as to whether the actual costs in 2024 represent an efficient baseline from which to build the H8 forecast as our approach has, in part, looked at historic trends at Heathrow given the limited availability of benchmark data at a granular level.

Given the limited dataset provided, both in terms of a limited breakdown by function and also the limited historical data, we assessed that both the Operational and Non-Operation Staff Costs should be considered together, albeit identifying the two categories separately within the analysis.

Historical Analysis

**Other Operational Staff Costs**

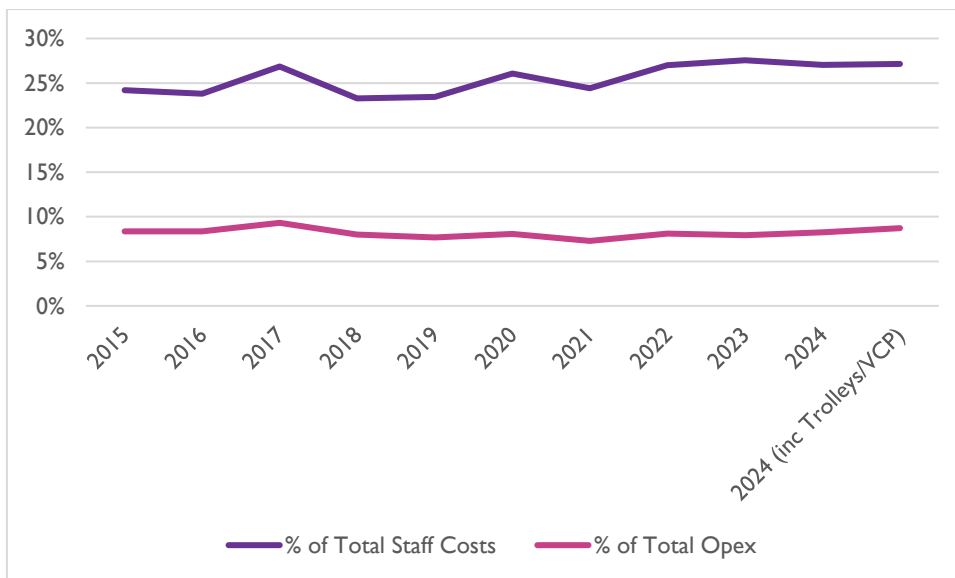
Information on Other Operational Staff Costs has been provided back to 2015, albeit not at the granular sub-category level. We have analysed historic trends since 2015 and have also adjusted 2024 to make it more comparable with previous years, as follows:

- Trolley handling was outsourced in 2024 to a third party. We have, therefore, added back the 2024 FTE and Opex of £6.9m (8 months) back into Other Operational Staff and Total Staff Costs for comparative purposes with previous years.
- Security control posts (VCPs) were outsourced in 2024 to a third party as noted in the previous section. We have, therefore, added back the 2024 FTE and Opex back into Total Staff Costs for comparative purposes on the same basis as set out above in relation to the adjustments to Security Staff Costs, i.e. we have added back £16.6m of cost.

Whilst we became aware of these two cases of functions being outsourced, we are unaware of whether there have been other step-change adjustments to the staffing complement over the historic period. Hence, there may be other cases of insourcing and outsourcing over the last decade that we have not be made aware of but which could also affect the trend over the last decade.

Figure A1.3.3 below shows that Other Operational Staff Costs have remained consistent as a proportion of Total Opex over the last 10 years, at c.8%-9%. As a proportion of Total Staff Costs, these costs have risen slightly over the decade but are similar to the outturn in 2017. In itself, this is not an indicator of efficiency but does suggest that there has not been any excessive increase into this category over the last decade, i.e. the relative level of efficiency is the same as for Opex as a whole.

**Figure A1.3.3: Operational Staff Costs (excluding Security) as a % of Staff Costs and Total Opex**



Source: HAL

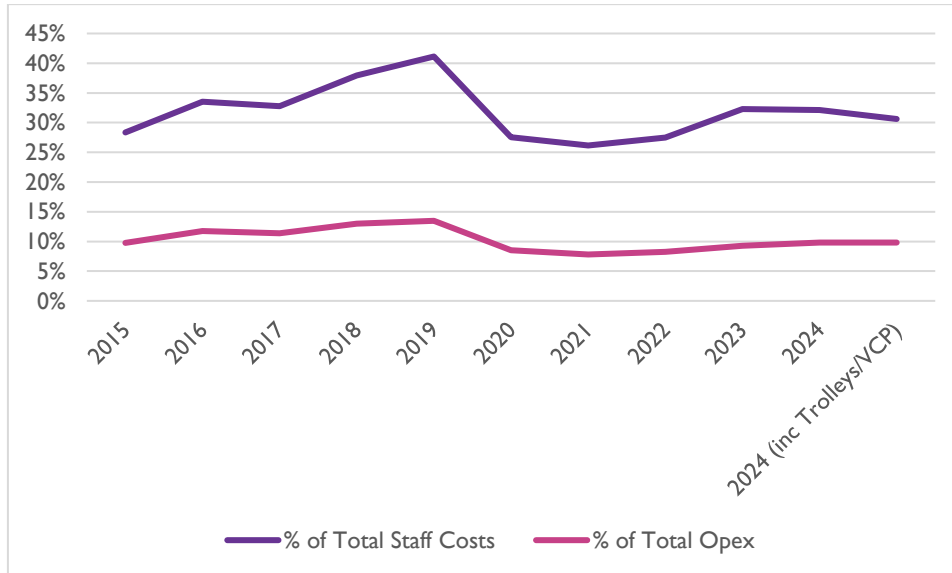
## Non-Operational Staff Costs

Non-Operational Staff Costs, both as a percentage of Total Opex and Total Staff Costs, rose in the years running up to the start of the pandemic in 2020. The last two years, 2023 and 2024, have remained broadly consistent as a percentage of Total Opex and Total Staff Costs respectively, as shown in Figure AI.3.4.

When the cost of trolley handling and VCPs are added back in, Non-Operational Staff Costs fall to 31% of total staff costs – lower than 2023 - and also the lowest it has been since 2015 (if Covid-affected years are excluded).

As with Other Operational Staff Costs, whilst this consistent performance is not an outright indicator of efficiency, it does appear to indicate that there has not been any excessive increase into this category over the last decade relative to overall Opex.

**Figure AI.3.4: Non-Operational Staff Costs as a % of Staff Costs and Total Opex**

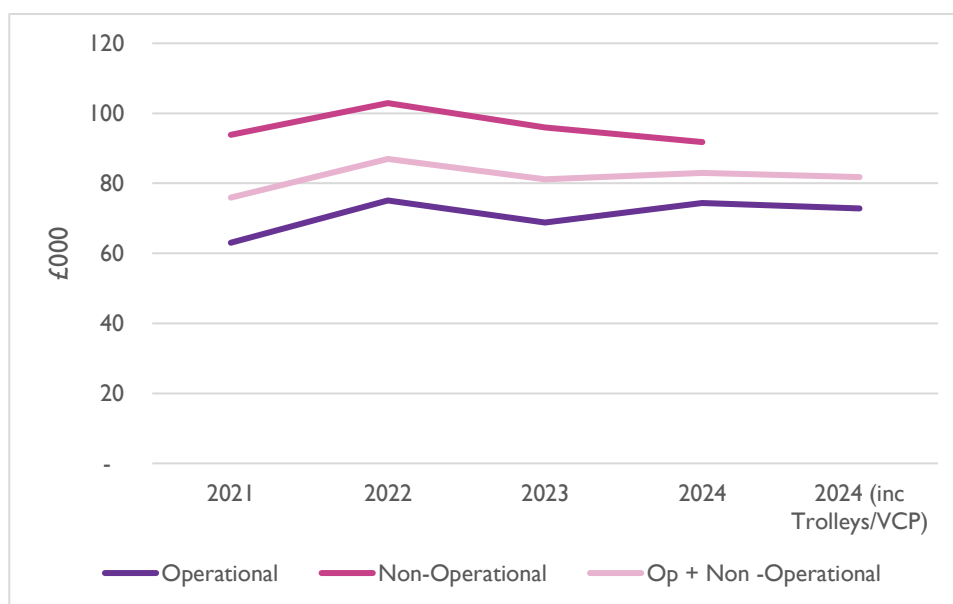


Source: HAL

## Staff Cost Per FTE

The average Staff Cost per FTE is shown in Figure A1.3.5 below. Based on the limited data available, Staff Costs per FTE in real terms rose sharply between 2021 and 2022 – by 19% in Operational functions and by 10% in Non-Operational functions. This was largely driven by the introduction of the Business Recovery Incentive Plan (BRIP), which is an initiative designed to reward staff for their contributions to Heathrow’s post-pandemic recovery.

**Figure A1.3.5: Staff Costs per FTE (2024 CPI prices)**



Source: HAL

We assess that 2021 unit costs are not representative of longer term trends as Heathrow was still affected by the pandemic, where staff numbers were significantly lower and furlough schemes were still active, and that average staff costs per FTE could be adversely or favourably affected by simple differences in staff mix (i.e. a change in the mix of higher versus lower paid staff) during this time.

Average staff costs amounted to £74k per FTE for Operational Staff in 2024. After adding back the impact of trolley outsourcing, costs per FTE drop from £74k to £73k. These are slightly higher than those seen in 2023 (£69k/FTE) but lower than in 2022, which included the BRIP incentive. We note that these costs are exclusive of pension costs.

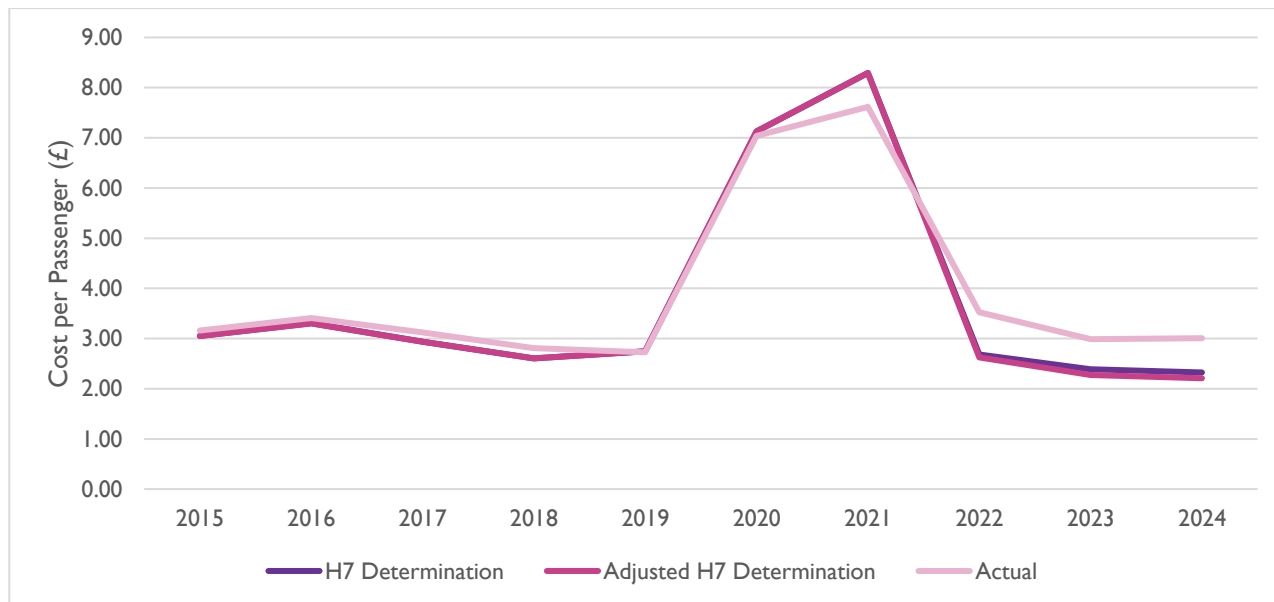
Average staff costs per FTE amounted to £92k per FTE for Non-Operational Staff in 2024. These are slightly lower than those achieved in 2023 (£96k/FTE) and in 2022, which included the BRIP incentive. We note that these costs are exclusive of pension costs. We do not have a more detailed split of the costs per FTE by department but assume that the drop in the average will be broadly driven by a change in the mix of higher and lower paid staff, rather than any fundamental changes in salary structures.

This limited set of data, whilst not enough to assess whether the costs are efficient, do at least provide a degree of evidence that staff costs have not escalated since 2022, this is despite the stated transition by HAL from the National Living Wage to the London Living Wage. It is not evident that this transition has led to an escalation in Staff Costs on a per FTE basis during H7.

## Cost per Passenger – Comparison of Actual Costs versus Determination and the Adjusted H7 Determination

Figure A1.3.6 below shows how the Actual Operational and Non-Operational Staff cost per passenger<sup>20</sup> has varied compared to the original assumptions as applied in the Adjusted H7 Determination.

**Figure A1.3.6: Operational and Non-Operational Staff Costs per Passenger (2024 CPI prices)**



Source: HAL, CAA

The original H7 Determination had forecast these costs in nominal terms to rise from £2.21 to £2.32, an increase of just 5%, but, when converted into real 2024 prices, the cost per passenger equates to a fall from £2.75 in 2019 down to £2.32 in 2024 - a drop of 15%. The Adjusted H7 Determination, accounting for the slightly larger traffic volumes in 2024 shows a fall from £2.75 to £2.21 – a drop of 20% due to more passengers at an elasticity of less than 1.

In our view, given that the actual passenger traffic only rose by 4% from 80.9 million in 2019 up to 83.9 million in 2024, the level of reduction in Staff cost per passenger of 20% indicated by the Adjusted H7 Determination of 20% cannot be explained solely by operating efficiency achievable through growth related economies of scale. Recognising that the H7 Determination took a view that Staff costs were excessive, our further analysis as set out below would suggest that the assumptions made at the time were slightly too aggressive.

That said, over the same period, the actual cost per passenger provided in the data tables shows a real increase (real 2024 prices) from £2.73 in 2019 to £3.01 in 2024 – an increase of 10% over the 5 year period. Given the small 4% increase in traffic between 2019 and 2024, we may have expected to have seen a small decrease in unit cost per passenger in real terms, rather than a 10% increase. The explanations for this increase provided by HAL included staff wage rises above inflation, extra staff costs incurred due to greater levels of congestion in the terminals, and higher maintenance costs post Covid. These all seem plausible but, to the extent that the unit cost per

<sup>20</sup> These costs are presented net of the deduction of capitalised Staff Costs.

---

passenger has risen by 10% when a small decrease may have been expected, this leads us to assess that there has been an element of inefficiency in this area.

We also assessed the two cost lines – both operational Staff and Non-Operational Staff Costs – separately and, whilst the figures differed slightly, the same broad trends were evident. Overall, we conclude that in both Staff cost areas, that there are signs of inefficiency but not to the extent suggested by the difference between Actual costs and the Adjusted H7 Determination might imply.

### Benchmarking

As a caveat to benchmarking staff costs across airports, the mix of insourcing versus outsourcing means a direct comparison will always be challenging at the Staff Cost level, whether disaggregated or not. Every airport has varying degrees of insourcing and outsourcing of specific Operational and Non-Operational functions, making like for like comparisons difficult, for various reasons:

- Total cost per passenger will be higher at heavily insourced airports;
- Cost per employee will vary due to different salary levels by function, and the mix of insourced versus outsourced functions will heavily affect the average staff cost per FTE.
- Regional differences in costs are significant – though we have attempted to normalise these where possible.

Changes in the insourcing and outsourcing of activities over time will affect historical trend analysis. We have attempted to normalise this for the known recent changes (i.e. outsourcing of trolley handling and VCPs), but there may be others that we do not know about.

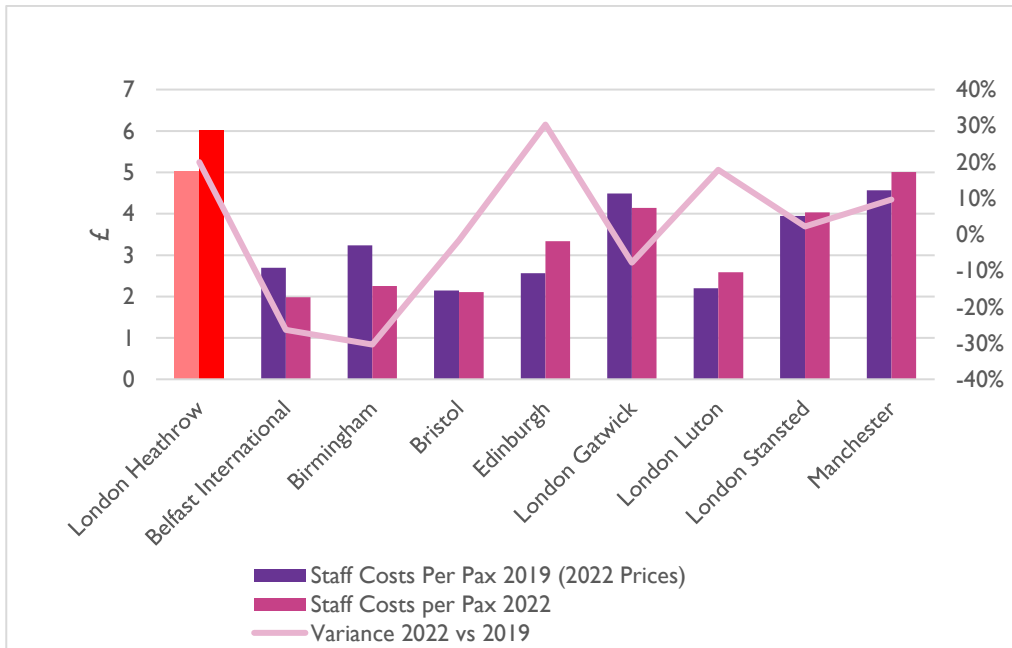
It is for this reason that top down benchmarking of Total Opex is also important to validate the overall bottom-up results.

### Total Staff Costs per Passenger

We have benchmarked HAL total costs per passenger and per FTE against a series of external benchmarks. Note that the data is only available for Total Staff Costs and, hence, includes security costs where airports perform the security function with their own staff. Data is also only available for the pre-pandemic period and 2022, which will have been pandemic affected at all airports.

Staff Costs per Passenger at Heathrow are higher than other UK airports, as shown in Figure AI.3.7 below. This, however, could in part be driven by a difference in the mix of insourcing versus outsourcing of operational activities as, where there is a high level of insourcing of functions, average staff costs per passenger will naturally be higher. In addition, these costs have not been adjusted for regional salary differences, and so the higher figures at Heathrow will in part be explained by higher average salaries in the London region than compared with the rest of the UK.

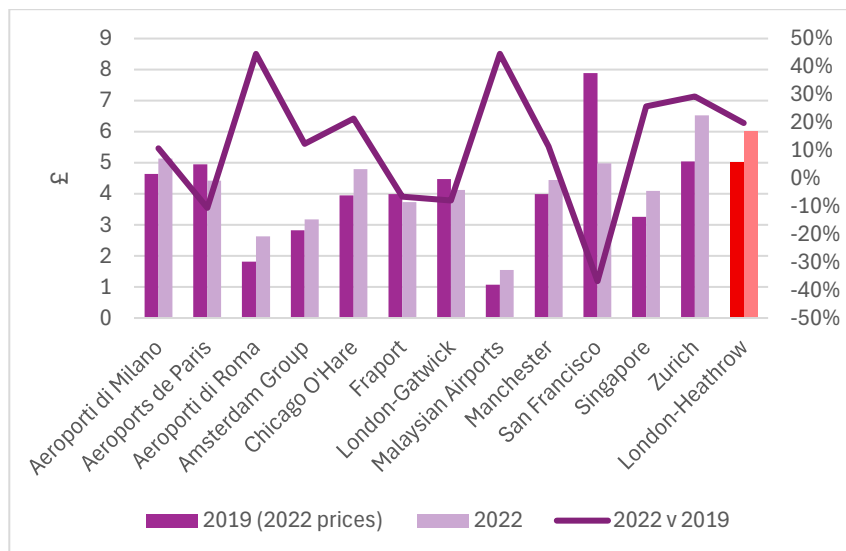
**Figure AI.3.7: Staff Costs per Passenger (2024 CPI prices)**



Source: Jacobs UK

Figure AI.3.8 shows comparisons at an international level. Unlike the comparison to other airports in the UK, although Staff Costs per Passenger at Heathrow are amongst the highest in the benchmark group of other major global airports, they are more in line with other major European airports such as Zurich, Milan Airports, Paris Airports and US airports such as San Francisco and Chicago O’Hare.

**Figure AI.3.8: Staff Costs per Passenger (2024 CPI prices)**

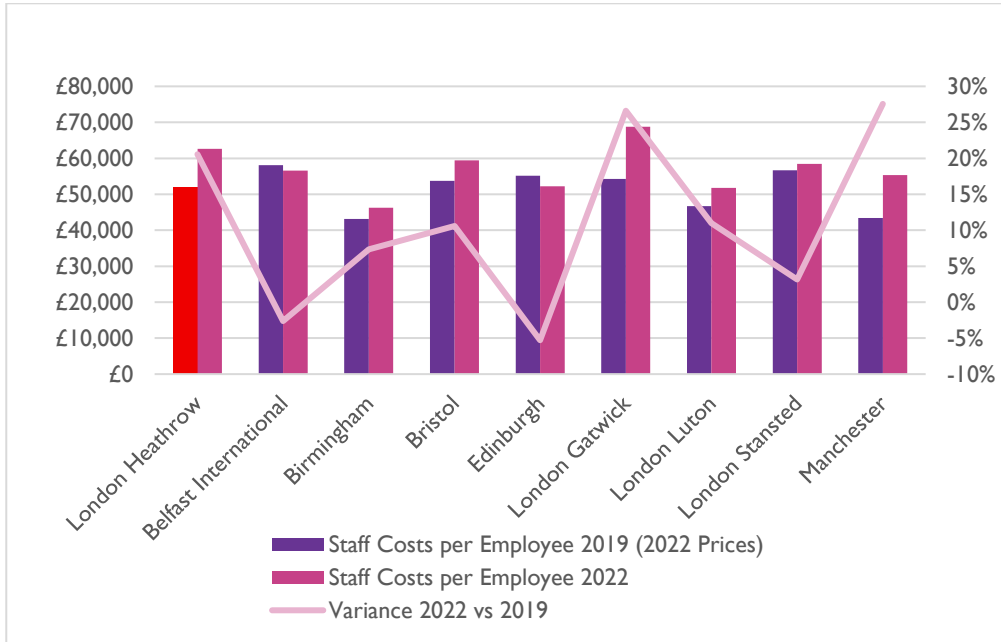


Source: Jacobs API

## Total Staff Costs per Employee

Whilst higher than the majority of the benchmark UK airports in 2022, Staff Costs per Employee at Heathrow are similar to those at Bristol and lower than those at Gatwick as shown in Figure AI.3.9. These costs have not been adjusted for regional salary differences.

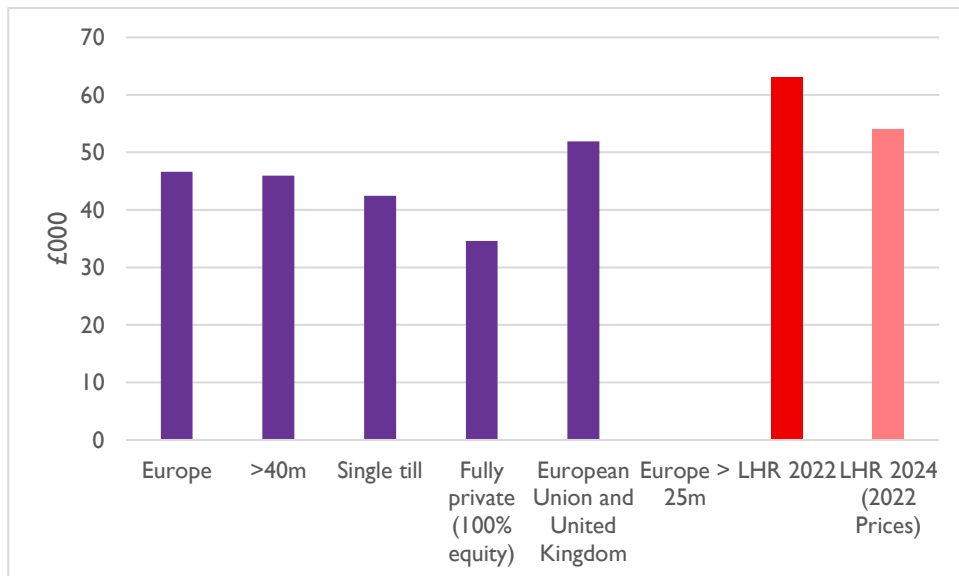
**Figure AI.3.9: Staff Costs per Employee (2022 Prices)**



Source: Jacobs UK

In Figure AI.3.10, we show a comparison across international airports by category using data sourced from ACI's World Economics Report<sup>21</sup>, Staff Costs per Employee for 2024 (but in 2022 prices) of £53.9k were 4% higher than the figure for the EU and UK Airports category.

**Figure AI.3.10: Staff Costs per Employee (2022 Prices)**



Source: ACI

<sup>21</sup> This does not report individual airport results.

## Specific Benchmark Data

We have used some confidential data available at a slightly more granular level to check the efficiency specifically of Operational and Non-Operational Staff Costs. Staff costs have been adjusted for regional salary differences.

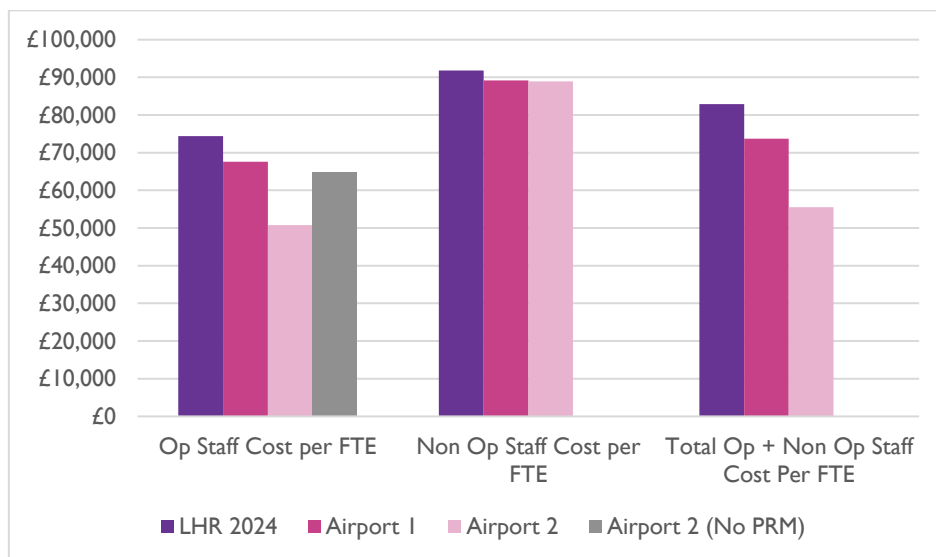
### Other Operational and Non-Operational Staff Costs per FTE

Even after adjusting for regional salary differences, Heathrow still has a higher average staff cost compared to two other UK airports for which we have information at this slightly more granular level as shown in Figure A1.3.11.

Average cost per FTE is, however, highly sensitive to the mix of staff groups within each cost category, i.e. the mix of outsourcing and insourcing. Different staffing functions in an airport operation can have wildly different salaries. For example, if PRM services – one of the lower average paid staffing categories - are removed from Airport 2, the average cost per FTE for Operational staff increases by £14k. Similarly, at LHR, if the trolley handling staff are added back into 2024, the average Operational Staff Cost per FTE reduces from £74k to £73k.

Non-Operational Staff Costs per FTE at HAL benchmark well versus the two other benchmark airports for which we have the data.

**Figure A1.3.11: Staff Costs per FTE (2024 CPI prices)**

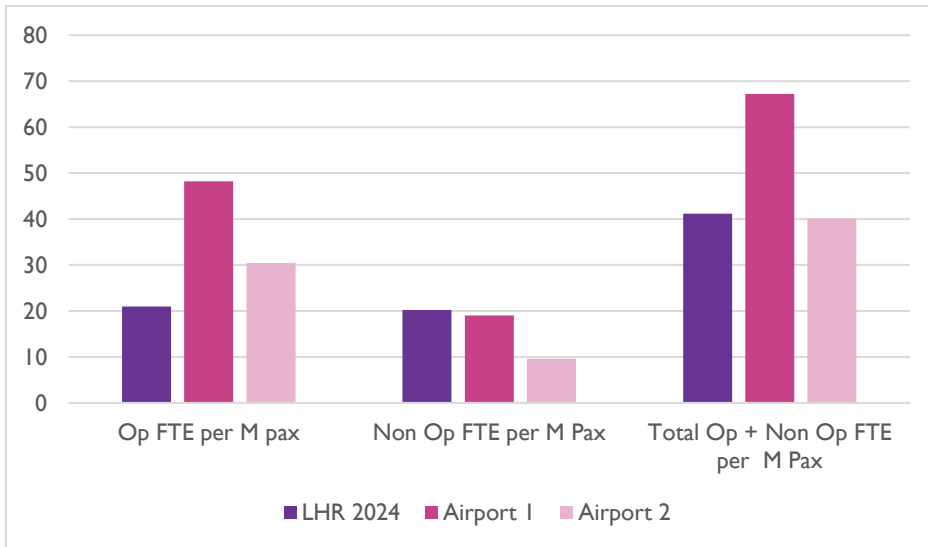


Source: HAL, York Analysis

### Other Operational and Non-Operational Staff FTE per Passenger

We consider staff costs per passenger in Figure A1.3.12. Airport 1 is heavily insourced which explains its significantly higher figure, but no judgement of efficiency can be made from this.

**Figure AI.3.12: Staff FTE per Million Passengers (2024 CPI prices)**



Source: HAL, York Analysis

### Costs as a % of Total Opex

As shown in Figure AI.3.13, HAL’s staff costs form a smaller proportion than those of smaller airports in the UK - at highly insourced Airport 1, almost half of Opex comes in the form of Staff Costs.

**Figure AI.3.13: Staff Costs as a % of Total Opex (2024 CPI prices)**



Source: HAL, York Analysis

### Conclusion

Ultimately, this area of Opex was considered for further bottom-up assessment partly due to the scale of cost but also as costs appeared to be significantly higher than expected in our Adjusted H7 Determination on a like for like basis.

However in considering whether other Staff Costs, both Operational and Non-Operational, represent an efficient baseline for 2024, we would observe that the previous H7 allowance was set

in a relatively arbitrary manner, whereby the costs in 2017, 2018 and 2019 were averaged, or ‘smoothed’, with the difference between the average and the 2019 outturn forming the proposed cost reduction. This methodology appears to have been implemented as a result of 2019 Opex being significantly higher than preceding years. However, this process would have ignored, and therefore not accounted for, any potentially legitimate Opex increases in that year. Therefore, it is possible that the original allowance in the H7 Determination may have been light in some areas and this may explain some of the overspend against the allowance that we have seen in H7.

It is important to note that, whilst we have been able to benchmark Staff Costs in relation to overall Opex and in terms of the cost per employee, we have not received sufficiently granular data to enable us to benchmark whether the levels of staffing by function are efficient.

Overall, whilst accepting the limitations to the analysis in this cost line and the legitimate reasons for variation, we assess the following:

- Unlike the assessment at H7, 2024 appears to be broadly in line with preceding years in relation to both costs as a proportion of total Staff Costs (including Security) and Total Opex and also in terms of Staff Costs per FTE.
- Staff costs per FTE for both Other Operational Staff and Non-Operational Staff are slightly higher than the other UK benchmark airports for which we have data but are close enough, within reason, to accept that regional wage differences and/or different patterns of insourcing and outsourcing at other airports could well account for any difference.
- Overall Staff Costs (including Security) at Heathrow do benchmark as high against other UK and overseas airports. However, the multitude of different variables involved, including the outsourcing/insourcing mix and regional differences in salaries as already mentioned, but also the layout of airports themselves, such as the number of terminals, the mix of airlines and the number of different products provided to customers. These can all hugely affect the costs makes it difficult to compare and, therefore, to categorically prove or disprove efficiency.

Prima facie, we therefore conclude that whilst there may be some marginal inefficiency in staff costs, there is no concrete evidence to prove cost inefficiency in Other Operational and non-Operational Staff Costs at a specific level. However, to the extent that there is inefficiency in total Opex, this would warrant a pro-rata downward adjustment. We have set this equivalent to the reduction in Non-Staff Opex derived from our bottom-up assessment below (3.75%). We have applied this reduction to Staff Costs, other than Security considered separately above, after adjustment for the outsourcing of Trolley Recovery.

A further adjustment of £0.8m was made to the adjusted baseline to remove the Non-Operational Staff Costs related to POD parking, reflecting the disallowance of capital costs and this activity no longer being part of the regulated till.

**Table AI.3.9: Adjusted Efficient Baseline for Other Operational and Non-Operational Staff Costs**

£m	HAL 2024 Actual Costs	Adjustment for Outsourcing of Trolley Recovery	Efficiency Adjustment	Adjusted Baseline
Operational Staff Costs	131.13	127.66	3.75%	122.87
Non-Operational Staff Costs	155.66		3.75%	149.82

Adjustment for POD parking		-0.8
<b>Total Operational and Non-Operational Staff Costs (excluding Security)</b>	<b>286.79</b>	<b>271.89</b>

HAL reports Pensions and Capitalised Staff costs separately. We have assumed that the deduction for Capitalised Staff costs reflects an efficient outcome as it will have been considered as part of the Capex approval process with the airlines. Pension costs, however, would be expected to reduce in line with efficiency savings in overall staff costs, which amount to 7.77% overall when Security Staff Costs are included. Applying this reduction to Pension Costs would result in a saving of £3.28m, which net of the Capitalised Staff Costs would result in a further Opex saving in the baseline of £2.32m. At this stage, this adjustment has not been applied.

### A1.3.3 Other Operational Costs and General Expenses

Other Operational Costs are generally those ‘external’ costs associated with services that HAL contracts to other companies, such as Police, Air Traffic Control Services (NATS), IT Services and for Passengers Requiring Support (PRS) services. Along with total people costs, this cost is the single largest cost line, representing 31% of total Opex in recorded in the data tables. General expenses are a compilation of central overhead costs, such as marketing, advertising commission, professional services, consultancy etc, amongst others. Whilst each component may be significantly smaller, the combined total of this cost line is 5% of the total Opex in 2024 based on the breakdown in the data tables.

We understand that over the last decade some categories of Opex costs have switched between Other Operational Costs and General Expenses. This has been confirmed by HAL. Hence, for these reasons, our analysis has combined both Other Operational Costs and General Expenses.

This aggregated grouping of costs outturned at £566m in 2024, equating to 36% of total Opex. Apart from Staff Costs, this is the line that airlines appear to have the most concern over, not least due to the lack of transparency as to the individual cost items - *"This category [Other Operational Costs] comprises nearly a quarter of total operating expenditure, yet it lacks any meaningful subdivision."* The airlines have been particularly concerned about the transparency of HAL's ability to achieve value for money on single supplier contracts such as NATS and UKPNS.

Our backward look assessment of these costs indicated that Actual Other Operational Costs/General Expenses combined were 19% and 10% higher than what was estimated in the Adjusted H7 Determination for 2023 and 2024 respectively. HAL attributed much of this increase in cost to higher passenger volumes, which were already adjusted for. The other reason for the increase was stated as new contracts being subject to higher than expected wage inflation, in part reflecting the move to the London Living Wage.

Table A1.3.10 sets out our broad proposed approach to these two sub-categories.

**Table A1.3.10: Other Operational Costs/General Expenses – Proposed Approach**

	<b>Bottom-up Build Up</b>	<b>Benchmark with Other Airports</b>	<b>Benchmark with Other Economic/ Market Data</b>	<b>Historical Trend Analysis</b>	<b>Assess Staff Pay Rates</b>	<b>Assess Growth Rates</b>
Other Operational Costs	No	Yes	No	No	No	Yes
General Expenses	No	No	No	Yes	No	Yes

We also set out the information that we would require to carry out a meaningful bottom-up assessment of the two sub-categories in Tables A1.3.11 and A1.3.12.

**Table A1.3.11: Other Operational Costs – Information Requirements**

<b>Information Requirement</b>	<b>Expected in HAL Business Plan</b>	<b>Targeted Discussions and Follow Up Information</b>	<b>Consultant Information</b>
Total Other Operational Costs.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data – Total level and split by contract.	✓	✓	✓
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes, for example due to innovation, technology, legislation, sustainability reasons etc.	✓	✓	
Benchmark contract costs from other airports.			✓

**Table A1.3.12: General Expenses – Information Requirements**

<b>Information Requirement</b>	<b>Expected in HAL Business plan</b>	<b>Targeted Discussions and Follow Up Information</b>	<b>Consultant Information</b>
Total General Expenses split by key components.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes. For example, due to innovation, technology, legislation, sustainability reasons etc.	✓	✓	
Comparative data from other airports to the extent available.			✓

For us to conduct the assessment of the Other Operational Costs, HAL provided information in the data tables for 16 different cost headings, including the specific costs for Police, Air Navigation

---

Services, IT and PRM/PRS – equating to about 41% of all Other Operational Costs and General Expenses combined. Ideally, we would have wanted to review the contracts for some of the main services but HAL was unable to provide these, other than summaries of key terms provided to the CAA. We understand that contracts for the majority of these services are expected to be retendered or renegotiated before the end of H8, representing 81% of these costs. Within this, we understand that around 1/3 of this will be retendered or renegotiated before the end of H7.

As noted earlier, it also became clear that some items previously grouped into General Expenses had been separated out and, hence, we had no certainty that the categorisation of what was in General Expenses had been consistent over time given the evident fluctuations in this category of expenditure as set out in the data tables. For this reason, we have not felt able to consider General Expenses as a separate defined category but have, instead, assessed Other Operational Costs and General Expenses together as one cost group.

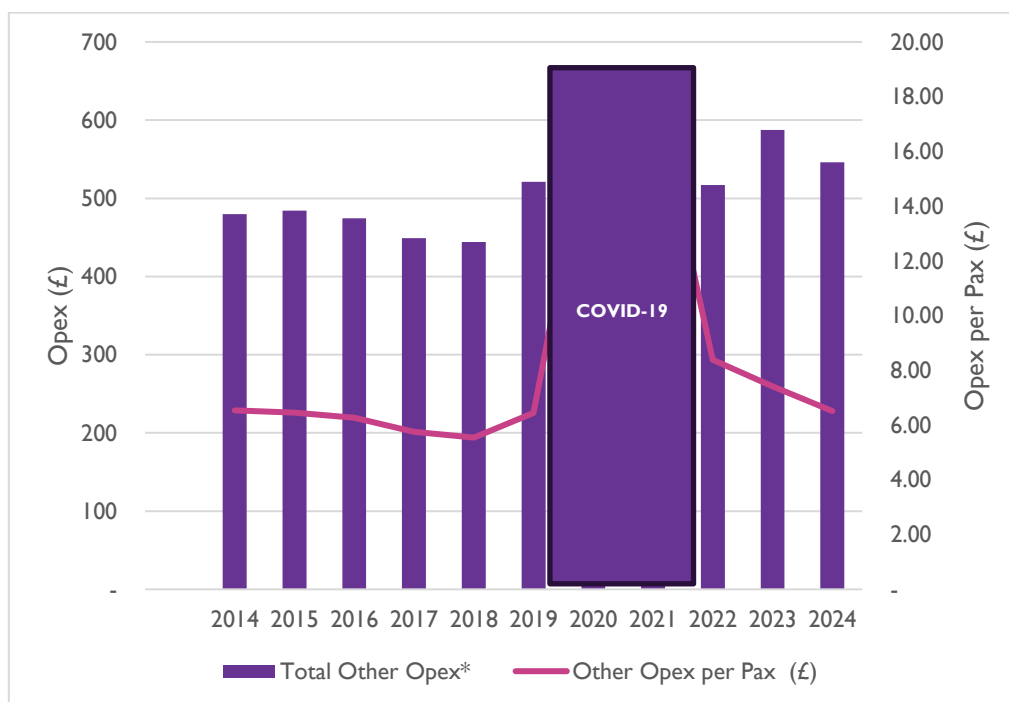
### Historical Analysis

From the data received from HAL, we have combined the Other Operational Costs and General Expenses to assess how these costs have changed over the last decade, both in absolute terms and on a per passenger basis.

Combined costs for 2024 totalled to £566.32m. However, as explained in the previous section on Staff Costs, two functions – trolley handling and the VCPs – were outsourced during 2024. We have, therefore, removed these costs c.£20.07m (8 months) combined from 2024 to facilitate a more like-for-like comparison with previous years, although it must be noted that any other switches between insourcing and outsourcing during this period will not have been accounted for. Although, as noted earlier, HAL told us that the outsourcing of the VCP operation resulted in an overall reduction in cost of £[redacted] on a full year basis, the same is not true of the trolley handling activity, which we were told resulted in a £[redacted] increase in cost on a full year basis. Hence, in relation to the latter contract, this latter decision does not appear to have resulted in an efficient outcome.

Figure A1.3.14 shows how costs increased post-pandemic from £517 to £588 between 2022 and 2023, primarily as passenger traffic rose from 62 to 79 million passengers. However, whilst passenger traffic continued to rise to 84 million in 2024, costs fell back to £546m in particular driven by a significant reduction in General Expenses (Consultancy, Advertising, Design and Marketing) of c.£40m in 2024. It should also be noted that the increase in costs in 2019 in large part reflected a transfer of the operation of the Heathrow Express (HEX) to Great Western Railway from August 2018, with some saving in direct staff costs.

**Figure AI.3.14: Other Operational Costs/General Expenses (2024 CPI prices)**



Source: HAL, York Analysis

\*Includes General Expenses, and 2024 adjusted for Trolley Handling and VCPs

If the Covid years are excluded, Other Operational Costs per passenger of £6.51 in 2024 remains broadly consistent with the years pre pandemic, in particular 2014, 2015, 2016 and 2019.

Whilst, in itself, this is not confirmation that Heathrow’s Other Operational Costs are efficient, it does suggest that it has not worsened its level of efficiency, and unlike the H7 assessment where 2019 was significantly higher than 2018 and 2017, there is little scope to ‘smooth’ the costs over the last three years.

### Individual Supplier Contracts

We had intended to review individual contracts but were not given access to them. Instead, we have had to rely on summary contract information provided by the CAA:

The top 13 contracts equate to 28% of Total Opex. The largest individual contracts in value in 2024 in Other Operational Costs are:

- Wilson James – PRM/PRS - £[redacted];
- National Air Traffic Services (NATS) – ANS - £[redacted]; and
- Metropolitan Police – Policing Services - £[redacted].

There are other areas of high expenditure but not covered by individual contracts:

- IT and Computer Services Maintenance - £[redacted];
- Rail expenditure - £[redacted] but offset by HEx revenue of £[redacted], although costs have been rising although revenue has been falling; and
- General Expenses - £[redacted].

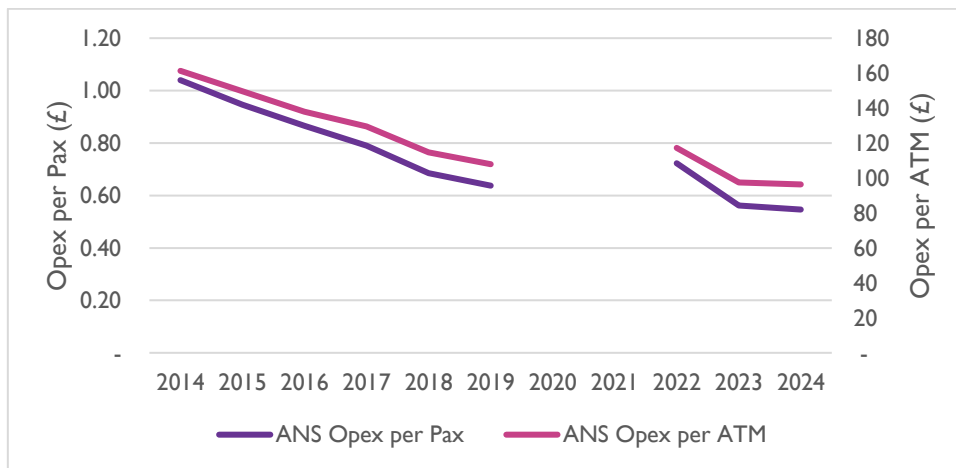
## Air Navigation Services (ANS)

The contract was renegotiated in 2019/20 and extended through to 2030. HAL told us that this resulted in a saving of c.£5.5m in 2020 compared to the original contract costs. We understand that the new contract is largely on a [redacted] basis [redacted] and represents a significant saving on the original contract costs. Ostensibly, this seems to be an efficient outcome.

ANS costs per passenger and per air transport movement (ATM) have reduced consistently over the last decade.

Figure A1.3.15 shows how ANS costs have trended over time. The gradual improvement on cost per passenger and cost per ATM over time is consistent with expectations of efficiency gains as volumes grow over time. Furthermore, as movements have not yet recovered to pre-Covid levels, the effect of the renegotiation on costs per unit of output is evident.

**Figure A1.3.15: HAL - Air Navigation Services – Opex (2024 CPI prices)**



Source: HAL, York Analysis, CAA

Figure A1.3.16 below shows how HAL's ANS costs benchmark against three airports in the UK for which we have data. It suggests that the LHR ANS costs are reasonable relative to these other airports. If regional salary differences are considered, the unit costs at LHR look even more favourable on a per passenger basis.

Going forward, the highly geared nature of the contract (c.90% of the contract is fixed) means that further traffic growth is likely to lead to further efficiency.

**Figure AI.3.16: HAL - Air Navigation Services – LHR vs UK Benchmarks (2024 CPI prices)**



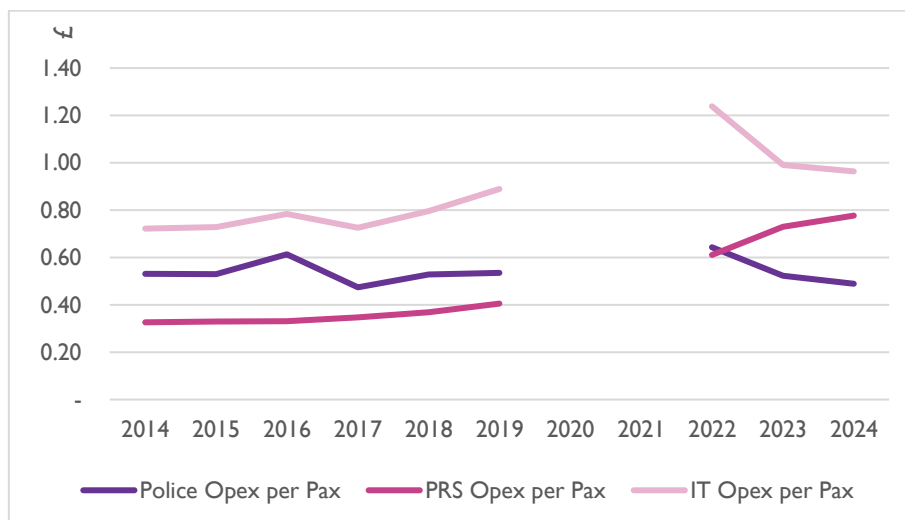
Source: HAL, York Analysis, CAA

### Police, PRS and IT

The only other ‘Other Opex’ contracts where we have discreet cost benchmarks are Police, Passengers Requiring Support (PRS) and IT.

Figure AI.3.17 shows how HAL’s costs per passenger in these three areas have performed over the last decade, excluding during the pandemic.

**Figure AI.3.17: HAL – Police, PRS and IT – Opex (2024 CPI prices)**



Source: HAL, York Analysis, CAA

This shows that:

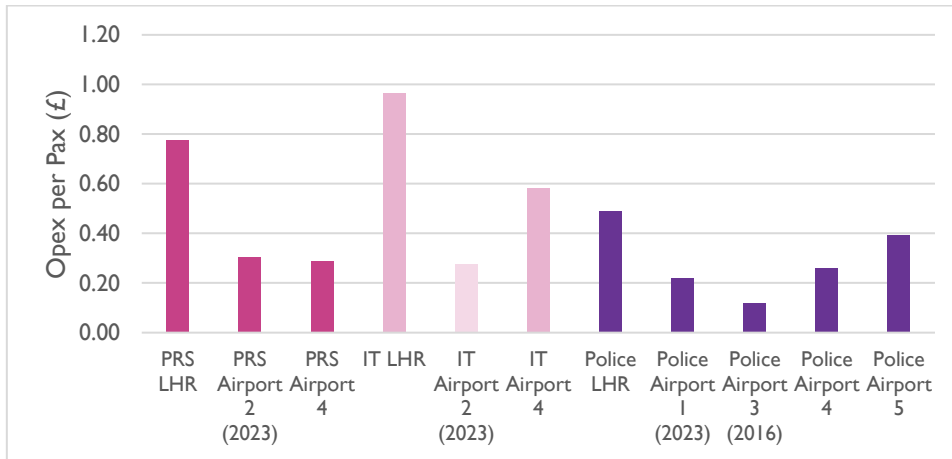
- Real Policing costs per passenger have remained broadly consistent over the decade, in fact outturning the second lowest unit cost of the decade in 2024 at 49 pence per passenger;
- Real PRS costs per passenger have increased significantly by 138% – likely driven mainly by the growth in proportion of passengers requesting assistance, although it is unclear whether this

explains all the growth. We note that other airports are reporting increased take up of such services; and

- Real IT costs per passenger have increased from £0.89 in 2019 to £0.96 in 2024, a small increase that is likely to be explained by above inflation staff pay growth, especially in the IT sector.

Figure A1.3.18 below shows how LHR unit costs for PRS, IT and Policing compare against benchmark UK and Irish airports for which we have data. These benchmarks have been adjusted for regional variations in salaries.

**Figure A1.3.18: HAL – Police, PRS and IT – LHR vs UK&I Benchmarks (2024 CPI prices)**



Source: HAL, York Analysis

HAL’s unit costs appear high when compared with these other airports for all three functional costs.

### PRS costs

PRS – On a per passenger basis, PRS costs at Heathrow appear high. It is a cost that is driven almost entirely in line with passenger volumes. Whilst we do appreciate that Heathrow is a more complex airport site than the benchmark airports in Figure A1.3.18, it is also true that the large size and passenger volume of the Airport, coupled with a consistent flow of passengers throughout the day and indeed the year, should support the achievement of some economies of scale relative to smaller airports. Hence, for that reason, we assess that PRS costs appear higher than we might have expected. It is worth noting also that PRS is a pass-through cost and so any changes would offset against higher or lower ORCs.

Further information disclosed by HAL in relation to the additional costs associated with its proposed Opex overlay for additional PRM costs which suggests that the cost per passenger is expected to fall in real from £29.7 in 2024 to £28.3 in 2030 but then there is a step change in 2031 to £22.50, a fall of over 20%. We assume that this relates to the anticipated reletting of the contract, but this also provides a strong indication that the current cost per passenger is above the efficient level by an equivalent amount.

### IT costs

We do appreciate that Heathrow is a larger, more complex site with multiple terminals and probably many more, larger and more complex IT systems to manage than other, smaller airports. However, there are also significantly more passengers at the Airport so we would still expect

---

some efficiencies to be gained, and therefore IT costs per passenger to be more in line with smaller benchmark airports. Nonetheless, some caution must be placed here in terms of comparability. IT functions are typically split between airport staff, who may perform some IT activities, and outsourced IT expertise to perform other functions in this field. The mix between the two can, of course, vary. As the degree of IT insourcing at the two other airports is unknown for which we have benchmark data, we cannot categorically state how LHR compares directly with the other two airports, although given the difference in unit costs shown in Figure A1.3.18, we do assess that there may be some level of inefficiency in the current levels of cost contracted out and suggest that, based on benchmarks, these should be reduced by 10% in our H8 baseline.

### Police costs

Heathrow again has the highest unit costs per passenger. However, the complexity of Heathrow, coupled with its status as a significant national asset and greater potential security risk, means that we understand that there may be reasons to why the cost per passenger is higher at Heathrow.

### Conclusion

Whilst overall cost per passenger in Other Operational Costs has remained broadly the same in real terms when compared to 10 years ago, there are some areas within this category where we assess them to have scope for improvement.

Where we have been able to review individual contract costs, our broad conclusions are:

- Wilson James – PRS - £[redacted] – unit costs have increased over time as we understand that the uptake of PRS services grows and unit costs are higher than UK regional benchmarks. Whilst the cost of this service is recovered through ORCs, it is clear that HAL expects these costs to reduce on a per passenger basis when the contract is retendered. We consider that this justifies a reduction in baseline costs in this area of 20% to reflect an efficient allowance.
- National Air Traffic Services (NATS) – ATC - £[redacted] – unit costs have reduced over time and benchmark well against UK regional airports. The contract with NATS is predominantly on a fixed fee basis, so any further passenger growth will lead to a further reduction in unit costs per passenger. Based on the evidence we have seen, and the benchmarking with other UK airports, we see no clear potential for a reduction in targeted Opex in ATC.
- Metropolitan Police – Policing Services - £[redacted] – unit costs have remained generally static over time, but benchmark high against UK regional airports. We recognise that Heathrow is a vastly more complex airport than other UK airports and recognise that security threat levels may be higher for Heathrow so justifying higher costs, although we have no specific evidence to verify that this is a factor in the contractual costs. However, we recognise that this is not a service that can be tendered and so relies on HAL's negotiation with the Metropolitan Police. Hence, it is not obvious that savings in this contract area could realistically be achieved.
- In addition to individual contracts in ATS, PRM and Policing, IT unit costs – currently covering a multitude of suppliers - are significantly higher than UK regional airport benchmarks. Whilst we recognise that IT services are difficult to benchmark because such services are often a combination of insourced and outsourced activities, we assess that this is one area where HAL may be tasked with a reduction in Opex.

Overall, we conclude that there may be scope for some improvement in Other Operational Costs through retendering in future but, with limited evidence, it is not possible to be specific other than

in the areas identified above relating to PRM costs and IT. There is also clear evidence that outsourcing trolley handling was an inefficient outcome in terms of cost and we have stripped out this £[redacted] inefficiency.

Taking into account the evidence from HAL that PRS costs per passenger are expected to be able to fall substantially on retendering and the clearly identified inefficiency in IT costs, we have reduced these by 20% and 10% respectively, we have assessed that the efficient baseline by the end of H7 should be a further 3.75% lower overall by the end of H7. This reduces the total Other Operational costs from £576.35 (adjusted for the full year effect of VCP and trolley outsourcing before the inefficiency adjustment) to £554.73.

A further adjustment of £0.5m was made to the adjusted baseline to remove the Other Operational Costs related to POD parking, reflecting the disallowance of capital costs and this activity no longer being part of the regulated till.

We summarise our adjustments to the efficient baseline for Other Operational Costs in Table A1.3.13 below.

**Table A1.3.13: Adjusted Efficient Baseline for Other Operational and Non-Operational Staff Costs**

£m	HAL 2024 Actual Costs	Adjustment for Outsourcing of VCP Security and Trolley Recovery (less £[redacted] for inefficiency)	Efficiency Adjustment	Adjusted Baseline
<b>Other Operational Costs</b>	<b>566.32</b>	<b>575.85</b>		<b>554.23</b>
Of which				
PRS	65.19		20%	52.15
IT Costs	80.85		10%	72.77
Adjustment for POD parking				-0.5

#### A1.3.4 Facilities/Maintenance

Facilities/Maintenance Costs are generally those ‘external’ costs associated with services that HAL contracts to other companies to cover key support functions of maintenance, baggage, and cleaning. This cost equated to 15% of Opex in 2024 and, as such, is a significant cost line. Our backward look assessment of these costs in the data tables for Facilities/Maintenance Costs were 18% higher in 2024 than what was estimated in the Adjusted H7 Determination. Again, HAL attributed much of the increase in cost to higher than expected recovery of passenger numbers but also cited other cost pressures and the difficulty that it had in meeting a CAA 1% efficiency target. On this basis, we considered this was a cost line that required a test for efficiency.

Table A1.3.14 sets out our proposed approach and the information we sought for assessment is set out in Table A1.3.15.

**Table A1.3.14: Facilities/Maintenance – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Assess Staff Pay Rates	Assess Growth Rates
Facilities/Maintenance	No	Yes	No	No	No	Yes

**Table A1.3.15: Facilities/Maintenance – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total Facilities/Maintenance Costs	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data – Total level and split by contract.	✓	✓	✓
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes, for example due to innovation, technology, legislation, sustainability reasons etc.	✓	✓	
Information on facilities and maintenance costs at other airports.			✓

Whilst the cost information was provided in some detail, e.g. separately for baggage system maintenance, cleaning etc., in the data tables, information was not provided to the same level of detail in terms of the cost drivers, with these costs being projected forward by HAL based on overall utilised terminal floor area. We have also considered the extent to which passenger volumes may drive costs in this area.

Ideally, we would have wanted to review the main contracts under this category of Opex but we received only a summary of contractual information from the CAA. We have sought to benchmark these costs as far as possible against other airports where we have information at this level of granularity (on a confidential basis). However, some care is needed with comparisons on this basis as services, such as maintenance or cleaning, are often split between airport staff and contracted in services. Therefore, the overall cost of the provision of a service such as maintenance is not easily comparable.

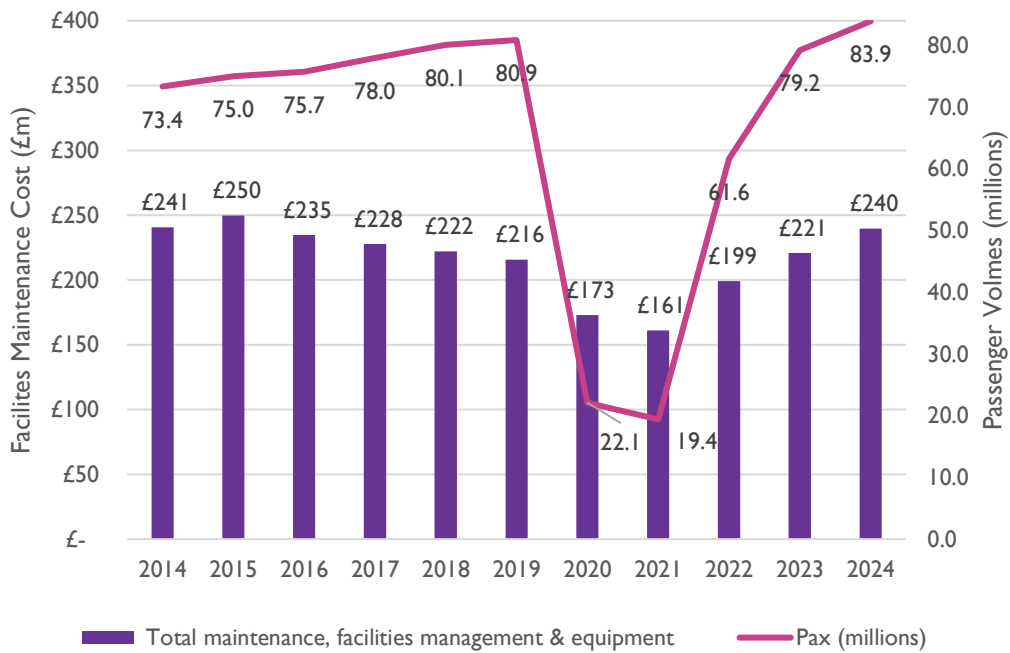
We have drawn on information provided by HAL in the data tables, alongside other information on facilities maintenance cost at other airports.

#### Historical Analysis

Figure A1.3.19 shows HAL’s total Facilities/Maintenance Costs in comparison to passenger volumes in real terms. Between 2014-2019, Facilities/Maintenance Costs showed a gradual decline, falling from £241m to £216m, except for 2015 when costs briefly rose to £250m. This steady reduction highlights efficiency gains and cost control achieved over the period.

The trend also reinforces the fixed-cost nature of such expenses — while operational efficiencies can slightly reduce costs, the overall level remains relatively stable regardless of passenger growth, as core maintenance and infrastructure requirements persist independent of traffic volumes. During the pandemic, while passenger volumes collapsed by around 75%, maintenance costs only fell by roughly 25%, reflecting the need to sustain essential operations even with reduced activity.

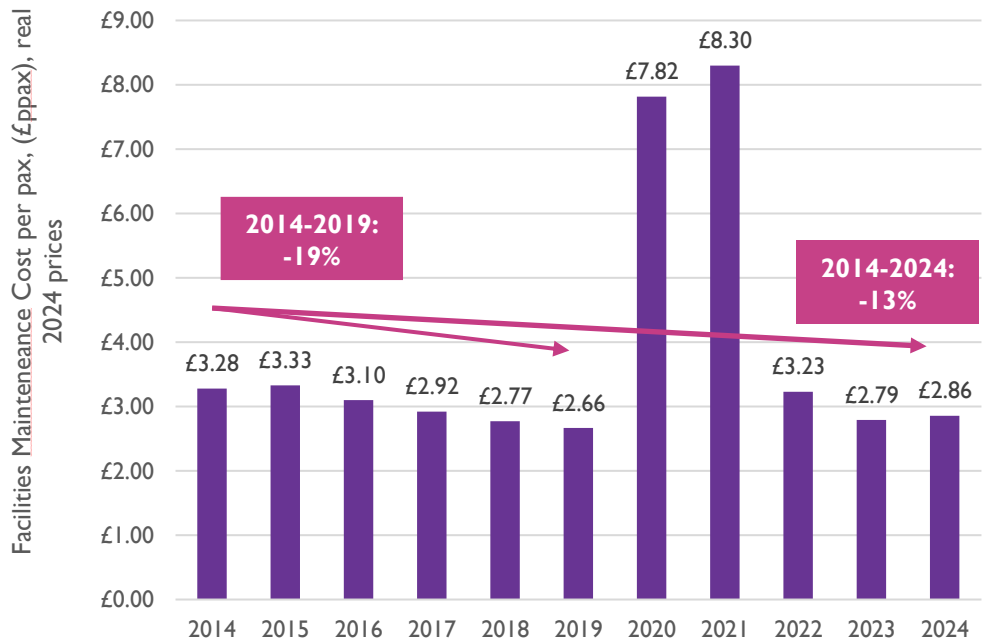
**Figure AI.3.19: HAL’s Historic Facilities/Maintenance Costs (2024 CPI prices)**



Source: HAL

Interestingly, post-pandemic costs have risen significantly, reaching £240m in 2024, even though passenger numbers have only just exceeded 2019 levels. This is highlighted in Figure AI.3.20, which illustrates the trend in costs on a per passenger basis. On a per passenger basis, total Facilities/Maintenance cost is around 13% lower than in 2014 but has risen slightly since 2019. HAL attributes the need for increased expenditure in this area to an ageing asset base coupled with higher levels of utilisation.

**Figure AI.3.20: Facilities/Maintenance Costs per Passenger (2024 CPI prices)**



Source: HAL

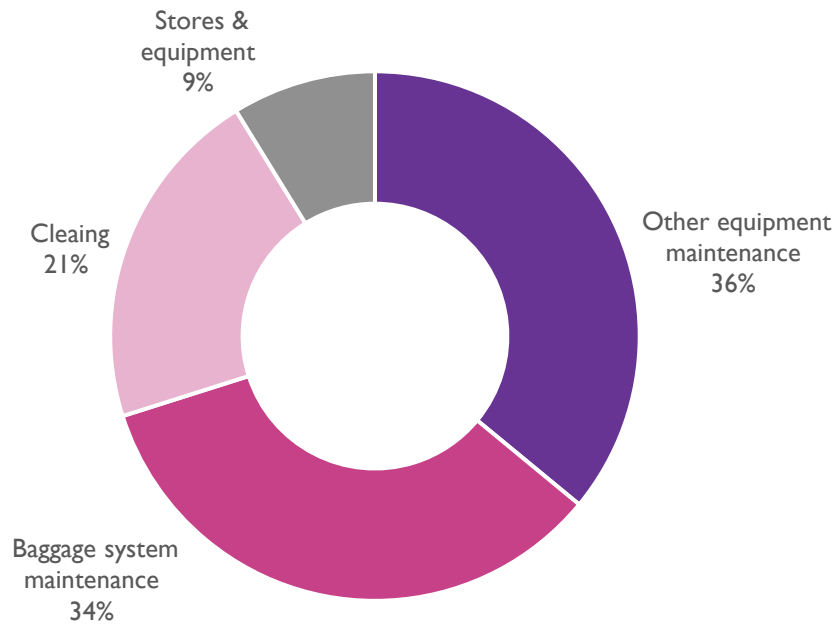
Overall, this would suggest higher input costs, inflationary pressures, or increased expenditure on resilience and reliability, rather than a simple correlation with traffic recovery. We investigate this later in the section.

This analysis tends to confirm that there is not a strong relationship between passenger volume and maintenance costs, albeit higher levels of facility utilisation will tend to drive increases in maintenance and cleaning requirements to some degree. Overall, this tends to validate the use of utilised terminal floor area as the main driver of these costs.

#### Facilities/Maintenance Cost by Category

Figure AI.3.21 shows HAL’s facilities and maintenance costs by category in 2024, showing that the largest proportion of cost is made up of Other Equipment Maintenance, for which we have no more detailed breakdown, with 37%, followed by Baggage System Maintenance with 36%. Cleaning costs take up roughly 22% of total Facilities/Maintenance Costs, which at 22% is a higher share of this total category cost than prior to the pandemic (18% in 2018). This increase is despite the efficiencies claimed by HAL from combining two cleaning contracts into a single contract, which it is claimed reduced costs by c.£3m before taking into account the costs increased associated with the transition to the London Living Wage.

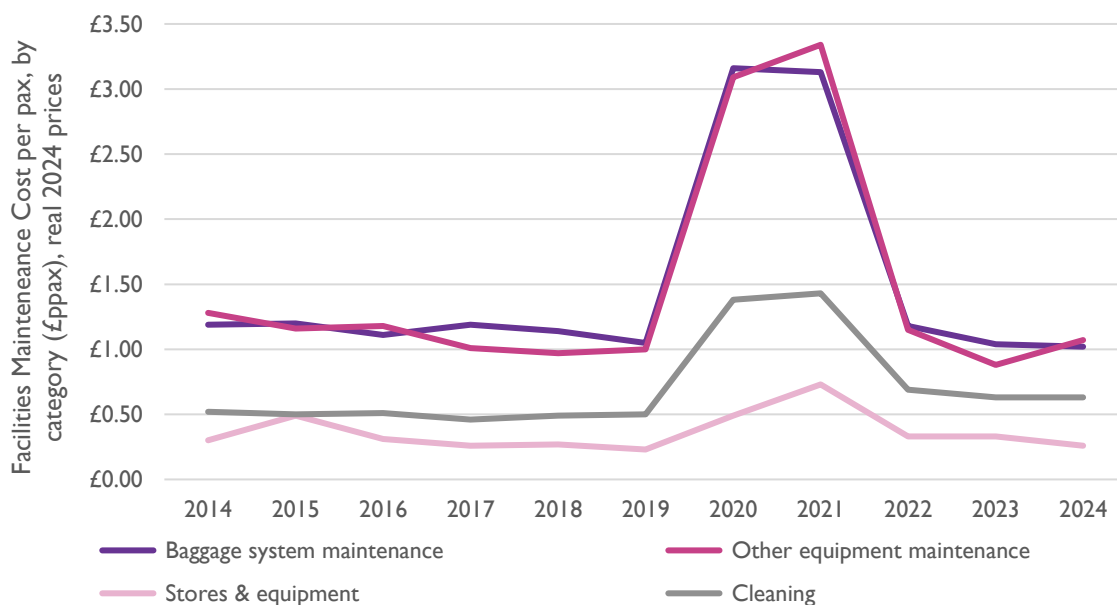
**Figure AI.3.21: HAL's Facilities/Maintenance Cost by Category 2024 as a proportion of total Facilities/Maintenance Costs**



Source: HAL

We consider the trend in these costs over time further in Figure AI.3.22, which shows HAL's per-passenger Facilities/Maintenance Costs between 2014 and 2024. Pre-pandemic, the costs gradually declined or held steady, reflecting operational efficiency gains and the dilution of fixed costs as passenger volumes grew. By 2019, baggage and other equipment maintenance had both fallen to around £1.00 per passenger, cleaning costs were stable at roughly £0.45 per passenger, and stores & equipment stood at around £0.25 per passenger, marking a period of optimised cost performance.

**Figure AI.3.22: HAL's Historic Facilities/Maintenance Cost per passenger by Category (2024 CPI prices)**



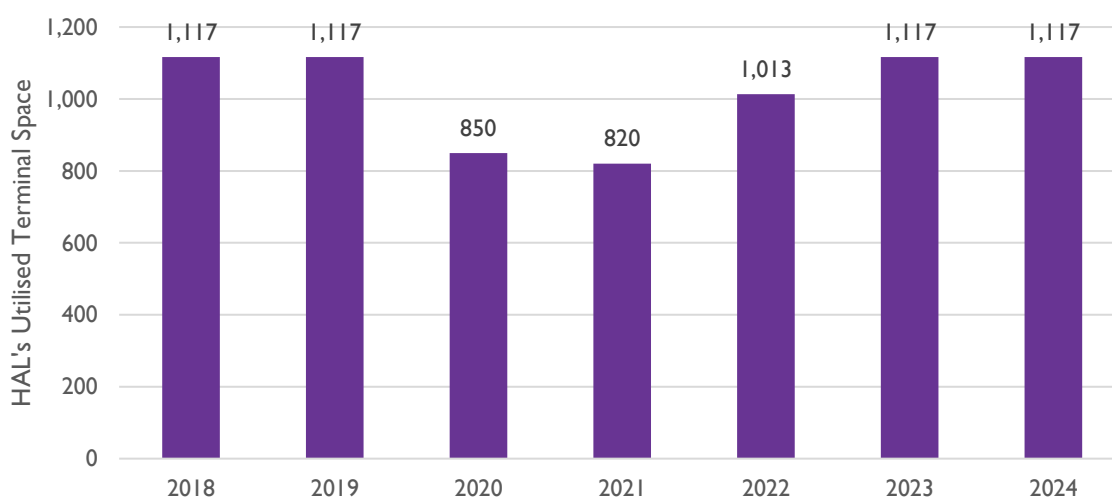
Source: HAL

In 2024, costs have, to some extent, stabilised after the pandemic spike but sit slightly above 2019 levels across most categories, indicating a structural upward shift in baseline expenditure. Baggage System Maintenance, at just under £0.90–£1.00 per pax, is broadly back in line with 2019 levels, while Other Equipment Maintenance is slightly higher than 2019 at just over £1.00 per pax. Cleaning Costs, now closer to £0.63 per pax, exceed 2019 levels. Whilst this may reflect permanently elevated hygiene expectations post-pandemic, this is at somewhat at odds with the £3m annual saving in cleaning costs that HAL claims to have achieved through combining contracts into a single negotiated contract with Mitie in 2021, albeit we understand that the benefits have been counteracted to some extent by the introduction of the London Living Wage. Stores & Equipment Costs hover slightly above £0.25 per pax, indicating a mild but lasting uplift. Overall, although Facilities/Maintenance Costs are close to pre-pandemic norms, there is a subtle rise in costs, particularly in hygiene and equipment-heavy categories.

### Floor Space & Drivers

Although HAL states utilised floor area in 2024 (and for the H8 period) in the data tables as 1,842,250m<sup>2</sup>, this is not consistent with the floor area estimate that has been used in the Business Plan as a basis for assessing elasticities relevant to this driver. The only explanation provided by HAL in the data tables was that the higher figure adopted for 2024 onwards represents the best estimate of the Airport’s Master Planning team. For the purpose of our analysis here, we have used the historic figures adopted by HAL in its analysis informing the Business Plan as set out in Appendix A1 (Figure 62, page 99) thereof. This is shown in Figure A1.3.23 below. We have used this data to analysis Facilities/Maintenance Costs in overall terms and specific Cleaning Costs relative to utilised terminal area in Figure A1.3.24.

**Figure A1.3.23: HAL’s Utilised Terminal Floor Space Time Series**



Source: HAL H8 Business Plan Appendix A1, Figure 62, page 99

**Figure AI.3.24: HAL's Facilities and Maintenance Cost and Cleaning Costs per m<sup>2</sup> (2024 CPI prices)**



Source: HAL Data Tables, HAL H8 Business Plan Appendix A1

Overall, Facilities Maintenance Costs have been rising post-pandemic on a floor area basis, driven in part by increased Cleaning Costs, which have shown a 31% increase over 2019, while overall costs rose by 19%. This may largely be a reflection of the introduction of the London Living Wage, coupled with a post-pandemic greater focus on hygiene.

### Benchmark Comparison

For benchmarking purposes, we have been able to identify specific designated expenditure items for some comparator airports as shown in Table A1.3.16. However, it is worth noting that we may not necessarily be comparing airports by the exact like for like maintenance and cleaning costs as not all airports measure and report Facilities/Maintenance Costs the exact same way as HAL. Also, we have only been able to benchmark on a cost per passenger basis as reliable floor area data is not available for these other airports.

**Table A1.3.16: Benchmark Airports and their Maintenance and Cleaning Cost Categories**

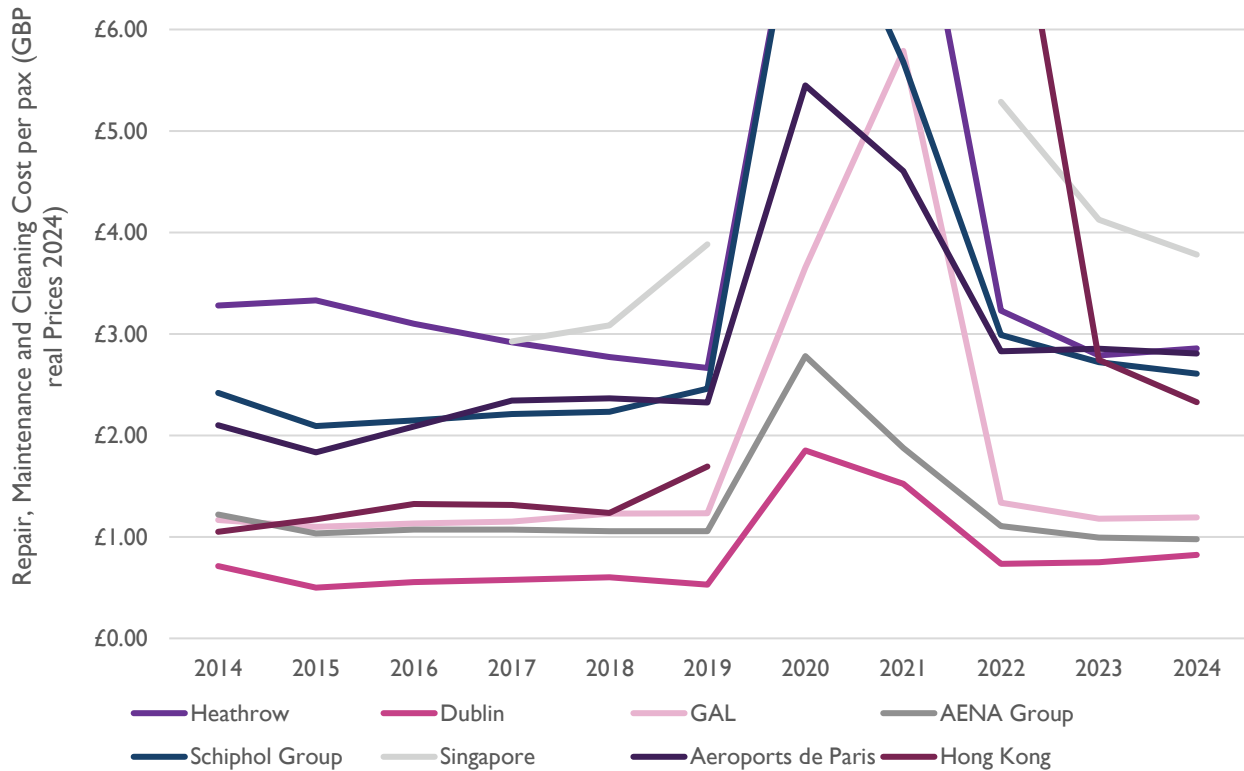
<b>Airport</b>	<b>Cost Line</b>	<b>Source</b>
Dublin Airport (DUB)	Repairs and Maintenance, Cleaning Contracts and materials	Regulatory Accounts
Gatwick (GAL) Airport	Maintenance and IT Expenditure	Annual Report
AENA Group	Repairs and Maintenance	Annual Report
Schiphol Group (AMS)	Maintenance, Cleaning - Subsection of Purchased Services	Annual Report
Aéroports de Paris (AdP)	Cleaning (under Services), Maintenance and Repair – Both under subsection of External Services	Annual Report
Singapore (SIN)	Maintenance of land building and equipment	Annual Report
Hong Kong (HKG)	Repairs and Maintenance	Annual Report

Source: Annual Reports

Figure A1.3.25 shows repair and maintenance cost per passenger by comparator airport since 2014<sup>22</sup>. For Hong Kong and Singapore, figures for 2020 and 2021 have been eliminated due to the significant drop in passenger volumes, significantly skewing the data upwards and distorting the comparable trends. With the exception of Gatwick and the AENA Group, the vast majority of airports are currently operating with higher unit maintenance and repair costs in real terms than pre-pandemic. Singapore is the only airport to have a higher maintenance and repair cost per passenger than Heathrow in 2024, although Heathrow's cost per passenger is lower than historically, it now sits with airports such as Hong Kong and the Schiphol Group, both of which have seen higher costs per passenger post-pandemic.

<sup>22</sup> Figures have been converted from local currencies to GBP using ONS Annual Average Exchange Rates to GBP and price base has been converted using IMF GDP Deflators by Country.

**Figure AI.3.25: Repair and Maintenance cost per pax by airport (2024 CPI prices)**

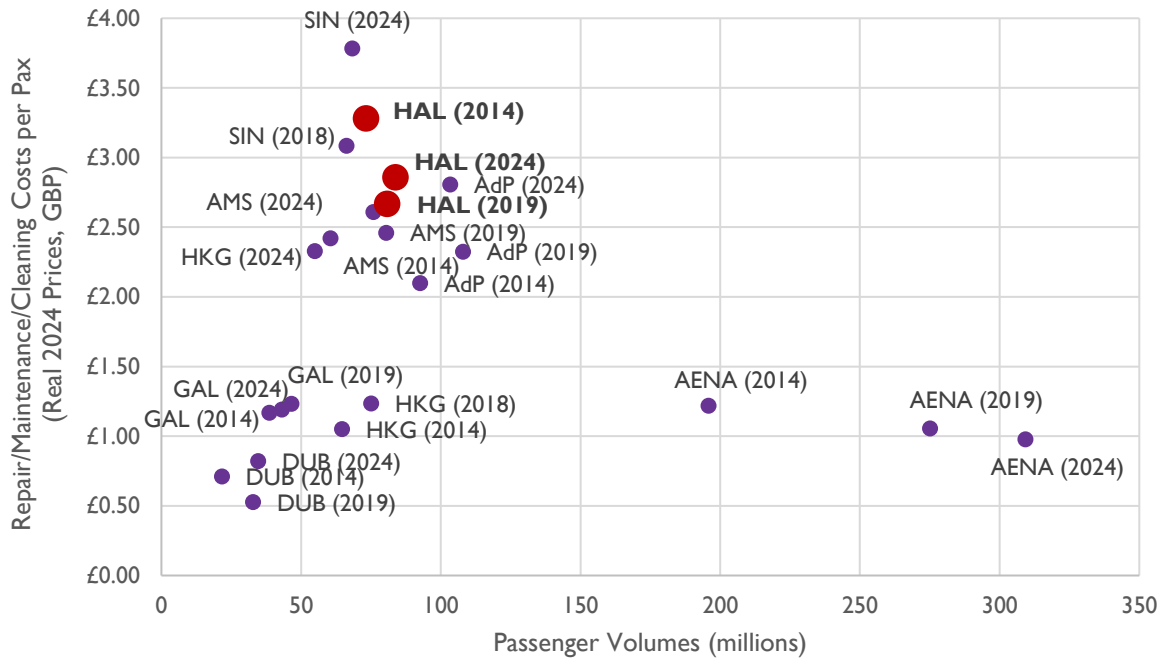


Source: Airport Annual Reports

Note: axis curtailed for the 2020-2022 period comparators

Figure AI.3.26 looks in more detail at the comparison in spot years, 2014, 2018, 2019 and 2024. Heathrow’s costs, currently, sits within the larger airport group made up of Hong Kong, Singapore and Schiphol. Across the entire benchmark group, on average (excluding HAL), Facilities/Maintenance Costs per passenger have risen by 10% in real terms compared to pre-pandemic levels, whilst these costs at Heathrow have risen by 7%, which is below the benchmark average. Indeed, for the larger airport benchmark group (AdP, HKG, SIN and AMS), the average cost here has grown by around 26%, which is significant and would suggest that the increased costs seen at Heathrow on a floor area basis may not reflect inefficiency.

**Figure AI.3.26: Benchmark Airport Maintenance Costs per Pax in 2014, 2018, 2019 and 2024**



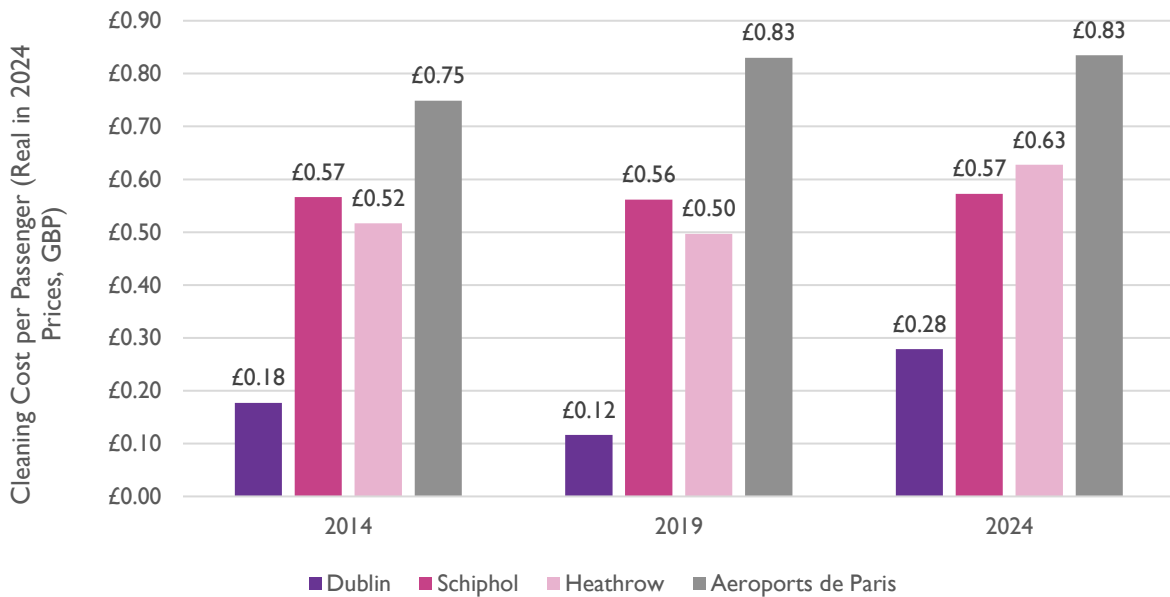
Source: Airport Annual Reports

### Cleaning Costs

Cleaning costs is a sub-category where we were able to identify some specific benchmark data.

Cleaning Costs, where data was available, have also been analysed and outlined in Figure AI.3.27 below. In real terms, cleaning costs for AdP and the Schiphol Group remained consistent before and after the pandemic. However, Dublin Airport’s cleaning costs rose significantly from 12 pence per passenger in 2019 to 28 pence in 2024 (nearly 2.5x), compared to 26% growth in HAL’s cleaning costs per passenger over the same period. The reasons for this growth at Dublin are unclear but provide some further corroboration that increased costs at Heathrow are not necessarily out of line with broader industry trends.

**Figure AI.3.27: Benchmark Airport Cleaning Costs per Pax in 2014, 2019 and 2024 (2024 CPI prices)**



Source: Airport Annual Reports

The recent rise in National Insurance (NI) contributions has directly increased employment costs for cleaning contractors working with HAL as the majority of the cost is accounted for by staff. We also understand that HAL has required Mitie to adopt the London Living Wage. Although this is an additional cost, it is expected to improve staff retention in a sector that has been historically subject to staff shortages.

Post-pandemic, hygiene expectations across the aviation industry have remained elevated, with passengers and regulators demanding visibly higher cleanliness standards in terminals, restrooms, lounges, and airside facilities. As a result, HAL’s cleaning expenditure has risen significantly, which we understand reflects a structural shift toward a more intensive and health-focused cleaning regime rather than a temporary pandemic measure.

Nonetheless, information provided by HAL suggests that consolidation of cleaning into a single contract is expected to deliver a 5% cost saving in this area so we have adjusted the efficient baseline at the end of H7 for this amount.

### Conclusion

Overall, HAL’s Facilities/Maintenance Costs would appear to be efficient relative to benchmark airports. While costs have increased since 2019, largely due to inflation, higher labour costs and sustained higher hygiene standards, these rises are consistent with trends seen across all major airports. Benchmark comparisons show HAL’s costs per passenger are on par with larger airports such as Schiphol, Paris, Hong Kong, and Singapore and its cost growth since the pandemic sits within the industry average. This would suggest that **HAL’s costs in this area are proportionate and reflect efficient cost management rather than inefficiency.**

However, we have factored in a reduction by the end of H7 to reflect the efficiencies expected in the cleaning contract as shown in Table AI.3.17 below.

A further adjustment of £1.6m was made to the adjusted baseline to remove the Facilities Maintenance Costs related to POD parking, reflecting the disallowance of capital costs and this activity no longer being part of the regulated till.

**Table A1.3.17: Adjusted Efficient Baseline for Facilities Maintenance Costs**

£m	HAL 2024 Actual Costs	Efficiency Adjustment	Adjusted Baseline
<b>Facilities Maintenance Costs</b>	<b>239.66</b>		<b>235.42</b>
Of which			
Cleaning	52.64	5%	50.01
Adjustment for POD Parking			-1.6

### A1.3.5 Utilities

This cost equated to 8% of Opex in 2024 and, as such, we consider it to be a significant cost line. We set out to benchmark each of Electricity, Gas and Water separately, recognising that Electricity accounted for nearly 82% of total net Utilities Costs in 2024. We have not separately examined the costs associated with the Electricity Distribution Contract, which is a separate cost line making up just over 2% of total Opex.

Our primary intention has been to consider HAL's tariffs against industry norms to ensure that the unit rates paid are reasonable where they are not otherwise covered by fixed tariffs. We set out our broad proposed approach in Table A1.3.18.

**Table A1.3.18: Utility Costs – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Assess Staff Pay Rates	Assess Growth Rates
Utility Costs	No	No	Yes	Yes	No	Yes

Although we have some reservations about the ability to benchmark against other airports, we do present some comparisons against other airports below.

We have also considered the appropriate volume driver for utility costs at airports. The forecast model used for H7 used passenger numbers as the volume driver, whilst both HAL and CEPA Taylor Airey (28 June 2022) conclude that terminal area, with an appropriate elasticity, is a more accurate driver of utility costs. In practice, the truth may actually be a hybrid of the two. Clearly, the terminal heating, lighting and water costs will be driven largely by the size of the building but, then again, some utilities, such as water usage in toilet blocks, will be a function of the number of passengers. For this reason, we had intended to look at both drivers.

We set out in Table A1.3.19, our information requirements in respect of Utility Costs.

**Table AI.3.19: Utilities – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total Utilities Costs split by key components (electricity, gas, water, other).	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data, notably the forecast terminal area for each year, and sources for forecast unit rates – for electricity, gas and water individually.	✓	✓	✓
Narrative, explanation and data explaining any overlays or step changes to the cost lines that are not driven by price/inflation or volume driver-related changes, for example due to innovation, technology, legislation, sustainability reasons etc.	✓	✓	
External benchmarks on utility costs.			✓

In practice, there was limited granularity and explanation provided in the data tables regarding the drivers of Utility Costs. Furthermore, information about utilised terminal floor area suggested little variation, other than during the pandemic when T4 was closed for a period, so we were unable to look meaningfully at the relationship to utilised terminal area to explain the historic pattern of cost. We have drawn on information provided by HAL in the data tables and other information on cost trends in utilities at other airports and more generally.

### Electricity

#### Consumption

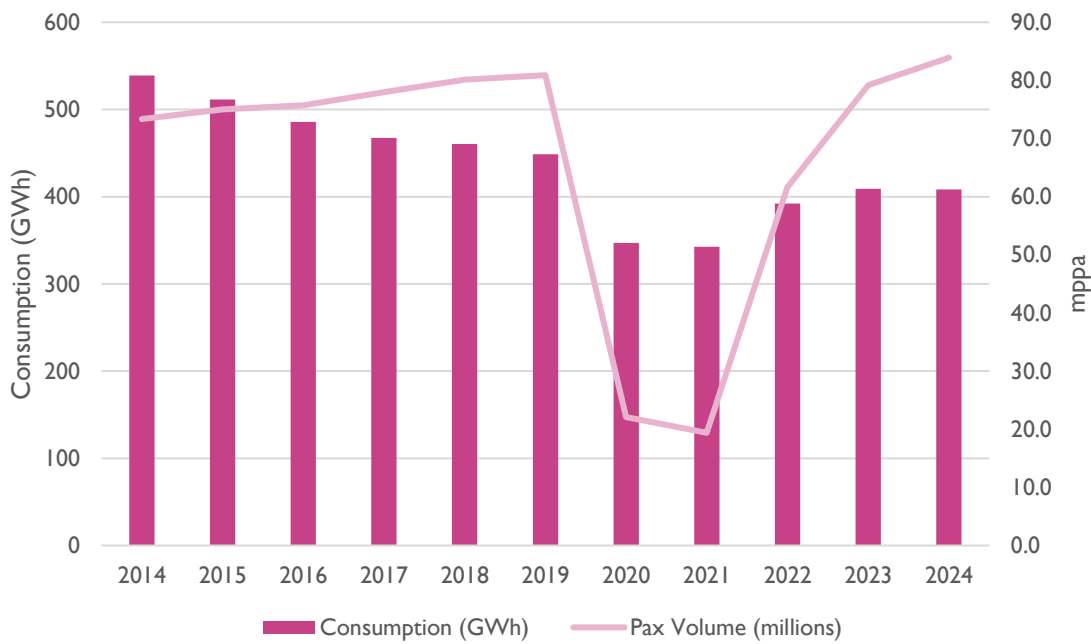
As noted above, electricity currently represents over 80% of the total Utilities Cost (excluding re-capitalised costs) or 6.6% of HAL’s Total Opex, making it a significant individual cost item and the principal component of the total Utilities Cost. We have focussed our analysis on this element of Utilities Cost.

Prior to the pandemic, between 2014-2019, HAL’s consumption had been dropping by around 3.6% CAGR, whilst passenger volumes grew by around 2.0%. At the time of the H7 Review, it was identified that this drop was due to HAL’s Energy Demand Management (EDM) strategies<sup>23</sup> and capex substitutions (whereby higher spend on capex resulted in an improvement in consumption efficiency).

As can be seen in Figure AI.3.28, HAL did achieve a reduction in consumption notwithstanding the growth in passenger volume. Consumption fell during the pandemic as passenger volumes fell and Terminal 4 temporarily closed. Even as passenger demand has built back up to pre-pandemic levels, HAL has been able to maintain a trajectory of reducing electricity consumption relative to passenger numbers - consumption between 2023-2024 remained stable at around 408-409 GWh, despite passenger volumes growing by around 6%.

<sup>23</sup> CAP 1563c, Review of efficiency of Operating Expenditure of Heathrow Airport, CEPA, March 2017.

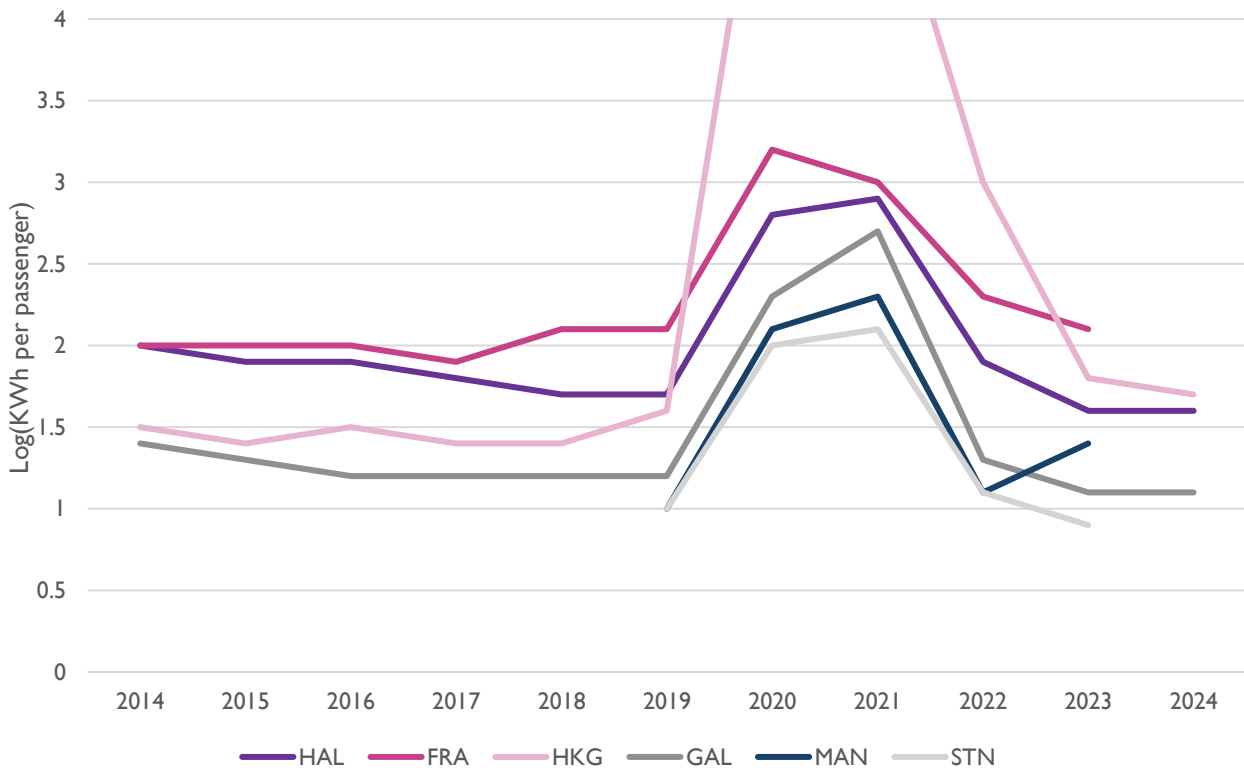
**Figure AI.3.28: HAL's annual electricity consumption (GWh) and Passenger Throughput**



Source: HAL

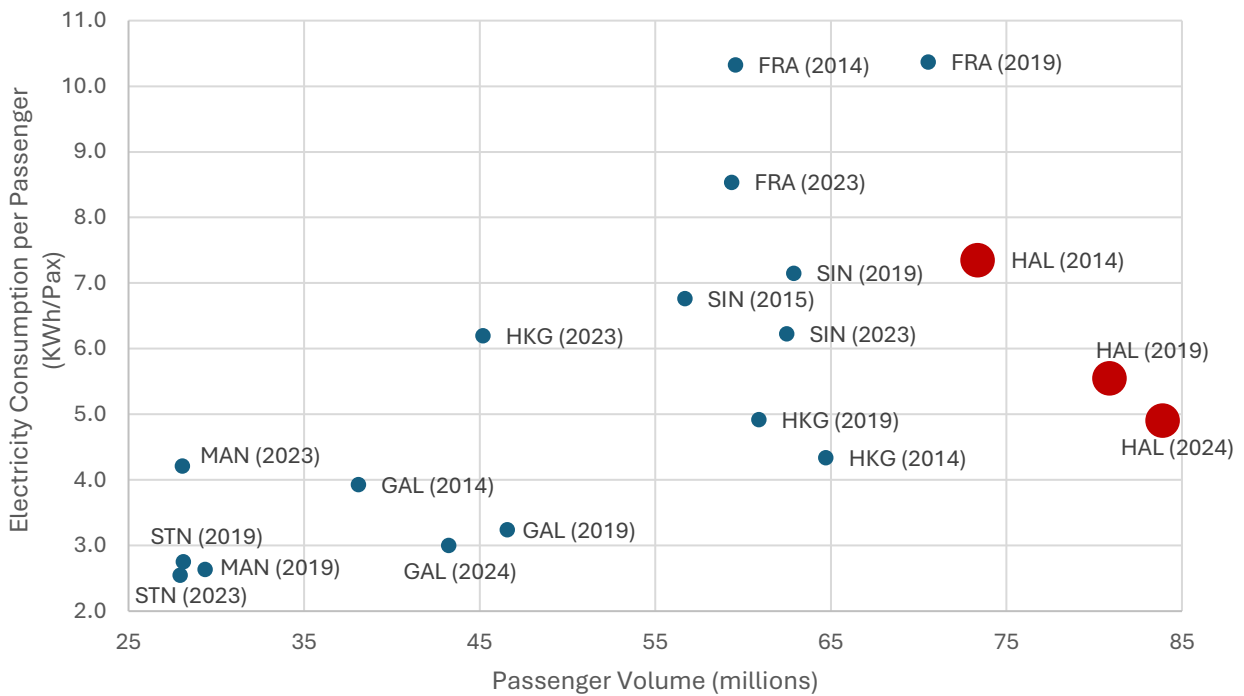
Figures AI.3.29 and AI.3.30 show HAL's electricity consumption alongside a number of airports in the UK and around the world where consumption data is available from published sources. Amongst the larger airports like Hong Kong and Frankfurt, up-until 2019, HAL's electricity consumption fell between the two comparators. However, in more recent years, HAL's consumption per passenger has fallen further. Having regard to the greater scale of infrastructure at Heathrow, compared to smaller non-hub airports such as Gatwick, Stansted and Manchester, this would suggest that levels of electricity consumption at Heathrow overall are not unreasonable or inefficient in 2024.

**Figure AI.3.29: Electricity Consumption per Passenger Benchmarks**



Source: Airport Annual Sustainability Reports and Annual Reports  
Axis curtailed for 2020-2022

**Figure AI.3.30: Electricity Consumption Benchmarks (2014, 2019 & 2023/24)**

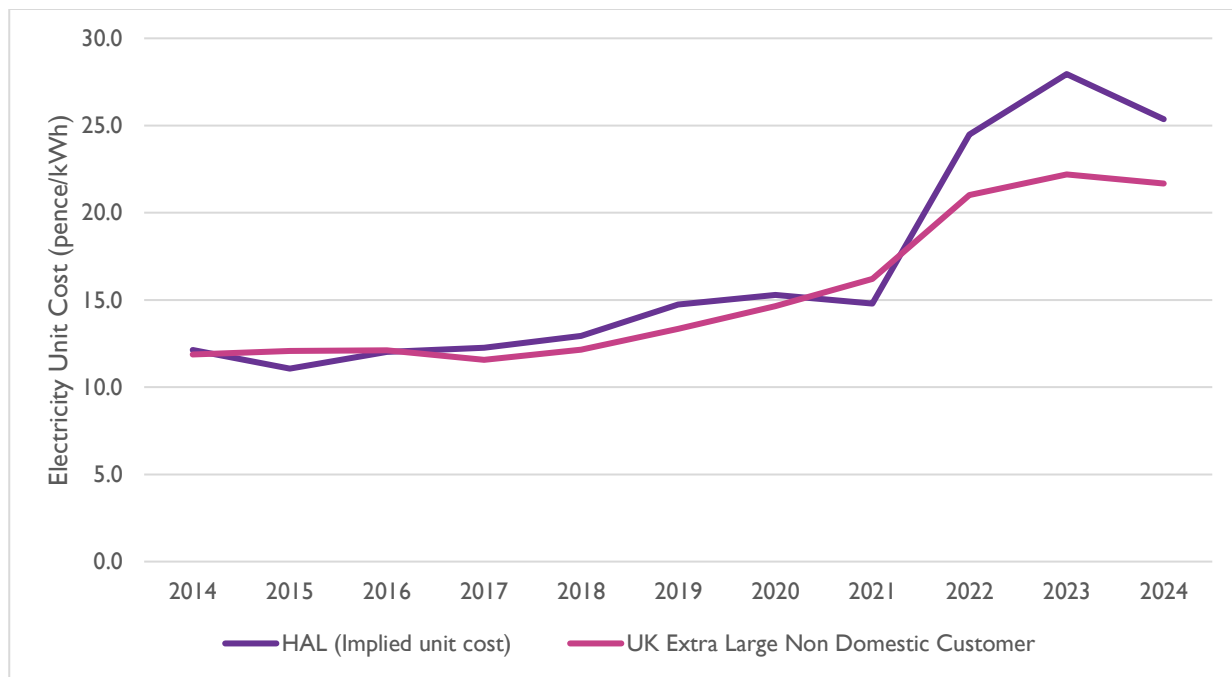


Source: Airport Annual Sustainability Reports and Annual Reports

**Costs**

We have also analysed HAL’s historic electricity expenditure relative to consumption to derive HAL’s unit cost of electricity since 2014. We have compared the unit costs with the Department for Energy Security & Net Zero’s database for energy prices that outlines the price of fuel purchases by non-domestic customers. HAL falls under the ‘extra large’ group of consumers, i.e. consumption of over 150,000 MWh. The rates used for comparison are published annually and exclude the climate change levy. The results are shown in Figure A1.3.31 and Table A1.3.20.

**Figure A1.3.31: HAL’s implied electricity unit cost (p/kWh) in comparison to national average (2024 CPI prices)**



Source: HAL, Department for Energy Security & Net Zero

**Table A1.3.20: Difference between HAL’s unit cost vs average extra large non-domestic consumer**

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Difference (pence/KWh)	0.3	-1.0	-0.1	0.7	0.8	1.4	0.6	-1.4	3.5	5.8	3.7
% Difference	2%	-8%	-1%	6%	7%	11%	4%	-9%	17%	26%	17%

Source: HAL Data Tables & Department for Energy Security & Net Zero: Prices of fuels purchased by non-domestic consumers in the UK

Figure A1.3.31 shows that HAL’s electricity unit costs were broadly stable before the pandemic, rising gradually from around 12 pence/kWh in 2014 to 14.7 pence/kWh in 2019. Any variance from the UK extra-large non-domestic benchmark were small, reflecting the relatively steady wholesale electricity market during this period.

During 2020–2021, costs remained flat at around 14-15 pence/kWh. This stability coincided with reduced demand in the pandemic and muted wholesale price growth. The gap with the national benchmark narrowed, suggesting HAL was in line with wider trends.

From 2022, however, costs spiked sharply in step with the UK energy crisis triggered by Russia’s invasion of Ukraine and reduced gas supplies to Europe. Wholesale electricity prices surged to record highs, driving HAL’s costs above 24 pence/kWh in 2022 and peaking near 28 pence/kWh in 2023. This reflects that HAL negotiated a new contract in 2022 around the time when prices were

at their highest. This represented a gap to the benchmark price of around 5.8 pence (or 26%) above benchmark levels, albeit the gap has fallen somewhat to 3.7 pence (17%) in 2024.

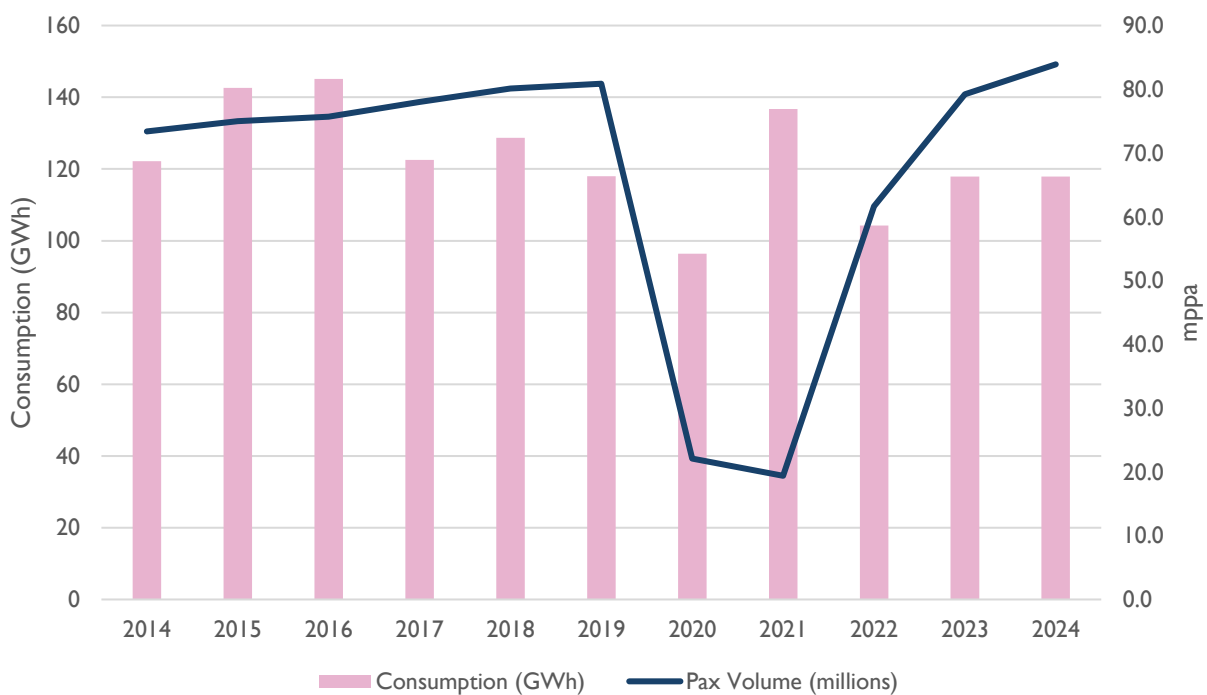
Overall, whilst electricity consumption does not appear inefficient, the prices being paid by HAL would suggest some level of inefficiency in 2024. However, this may simply reflect the timing when contracts were renewed relative to a ‘smoothed’ average profile across a broad range of industries represented by non-domestic consumers as a whole, where some customers will have been on lower tariffs negotiated before the price rises. The fact that the gap is narrowing suggests that HAL may have been ‘unfortunate’ in the timing when its contract was up for renewal.

## Gas

### Consumption

Figure A1.3.32 shows Heathrow’s annual consumption of gas over the period since 2014. In general, it follows a similar pattern as electricity consumption except for the outlier in 2021. HAL has not provided any information on the reason for this step up in consumption during the pandemic.

**Figure A1.3.32: HAL’s annual gas consumption (GWh) in comparison to passenger throughput**

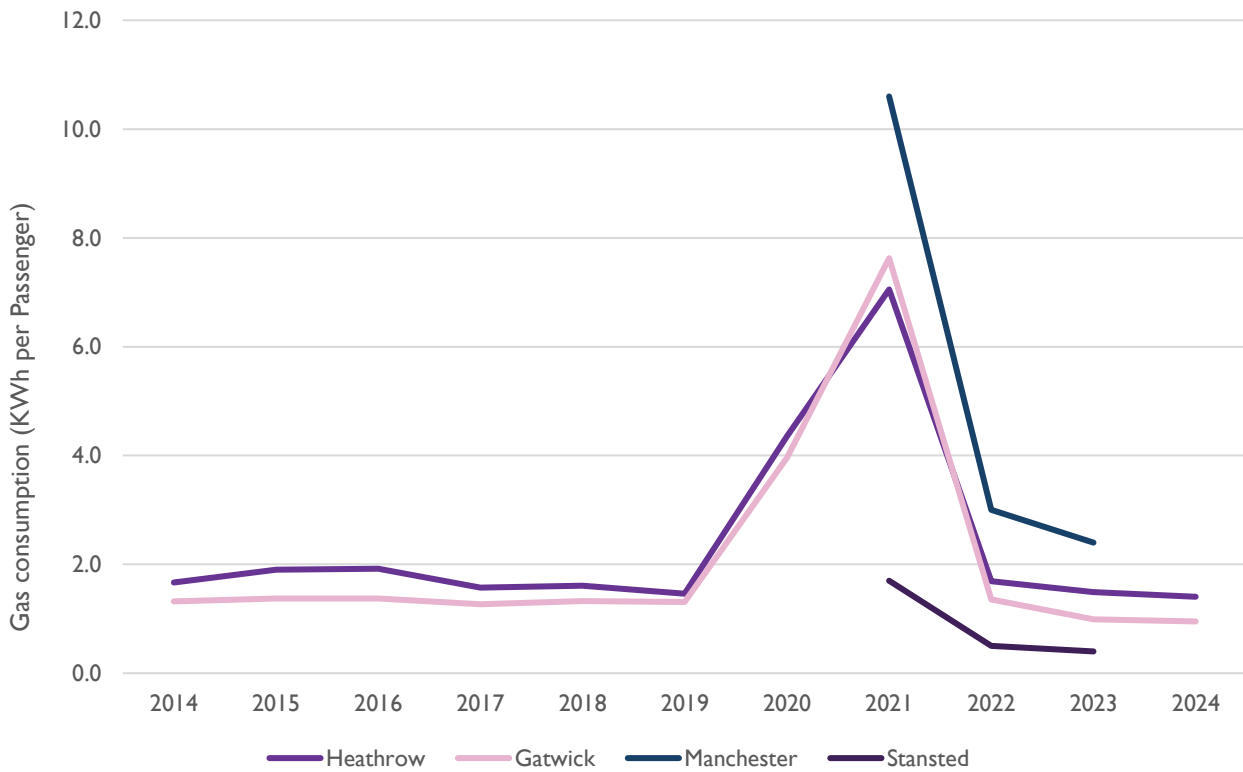


Source: HAL

In this case, we have benchmarked Heathrow’s performance against other UK airports.

Figure A1.3.33 shows Heathrow’s gas consumption alongside that of Gatwick, Manchester and Stansted. Between 2014 and 2024, HAL and GAL show closely aligned gas consumption trends, both steady at around 1.3–2.0 kWh per passenger until 2019, spiking sharply in 2020–2021 due to reduced passenger numbers, and then falling back quickly, with HAL dipping slightly above GAL by 2023–2024 (1.4 vs. 1.0 kWh per passenger). It is notable that a single terminal airport, such as Stansted, has lower costs per passenger than multi-terminal airports. Overall, there is no clear evidence that HAL’s consumption of gas is inefficient.

**Figure AI.3.33: Gas Consumption Benchmarks**



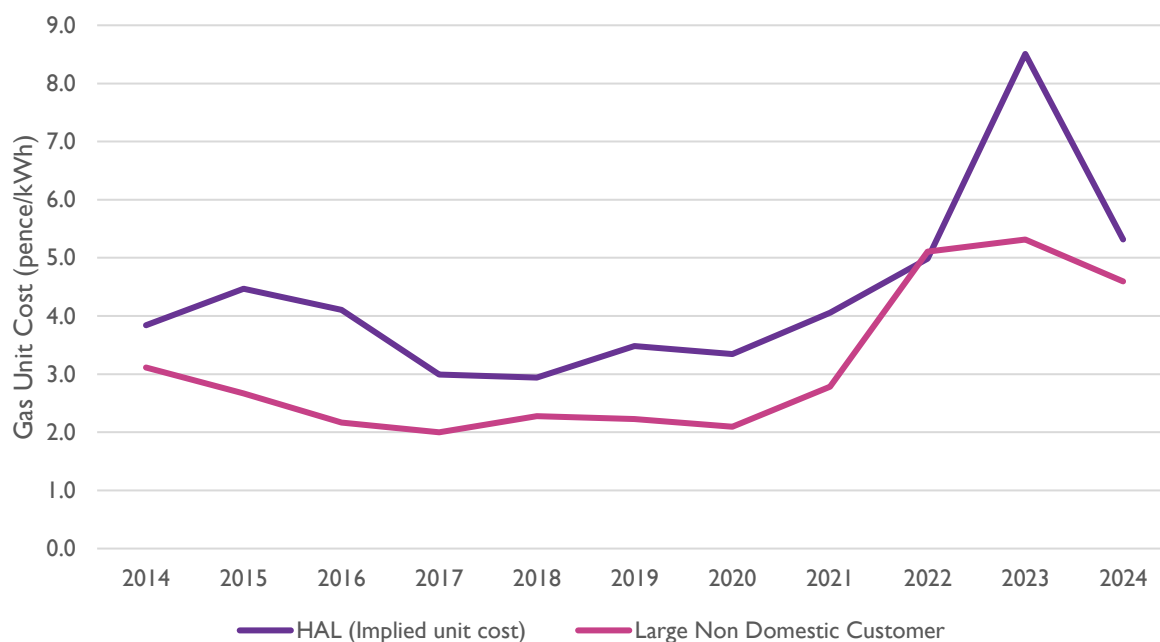
Source: Airport Annual Sustainability Reports and Annual Reports

### Costs

As can be seen in Figure AI.3.34 and Table AI.3.21, HAL’s gas unit costs were dropping between 2015 and 2018. The difference compares reasonably with the benchmark for large non-domestic customers was consistent, typically around 1–2 pence higher each year. Percentage changes during this period were modest, reflecting the subdued gas market and stable wholesale prices across Europe.

In 2020–2021, costs began to edge up, rising to about 4.1 pence/kWh by 2021. This increase coincided with tightening global gas supply and post-Covid demand recovery. HAL’s unit costs stayed slightly above the benchmark, but the gap remained stable at just over 1 pence/kWh.

**Figure AI.3.34: HAL's implied Gas unit cost (p/kwh) in comparison to national average (2024 CPI prices)**



Source: HAL, Department for Energy Security & Net Zero<sup>24</sup>

**Table AI.3.21: Difference between HAL's unit cost vs average extra large non-domestic consumer (nominal)**

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Difference (p/KWh)	0.7	1.8	1.9	1.0	0.7	1.3	1.2	1.3	-0.1	3.2	0.7
% Difference	23%	68%	89%	50%	29%	56%	59%	46%	-2%	60%	16%

Source: HAL, Department for Energy Security & Net Zero

From 2022, HAL experienced the full force of the European gas crisis due to the contract being renegotiated that year. Russia's invasion of Ukraine and the subsequent disruption to gas flows drove wholesale gas prices to record highs, sharply lifting HAL's costs to nearly 5 pence/kWh in 2022 and peaking above 8.5 pence/kWh in 2023. At that point, the gap versus the benchmark widened to over 3.2 pence, which might suggest that HAL was more vulnerable to the price rise than larger consumers overall. However, as with electricity, it might simply reflect the timing when contracts were negotiated.

By 2024, prices had eased to around 5.3 pence/kWh as global supply chains adjusted and Liquefied Natural Gas (LNG) imports increased. However, this remained well above pre-pandemic norms. At this point, the gap between the unit prices paid by HAL and the benchmark returned to the historic pattern.

## Water

### Consumption

<sup>24</sup> Prices of fuels purchased by non-domestic consumers in the UK

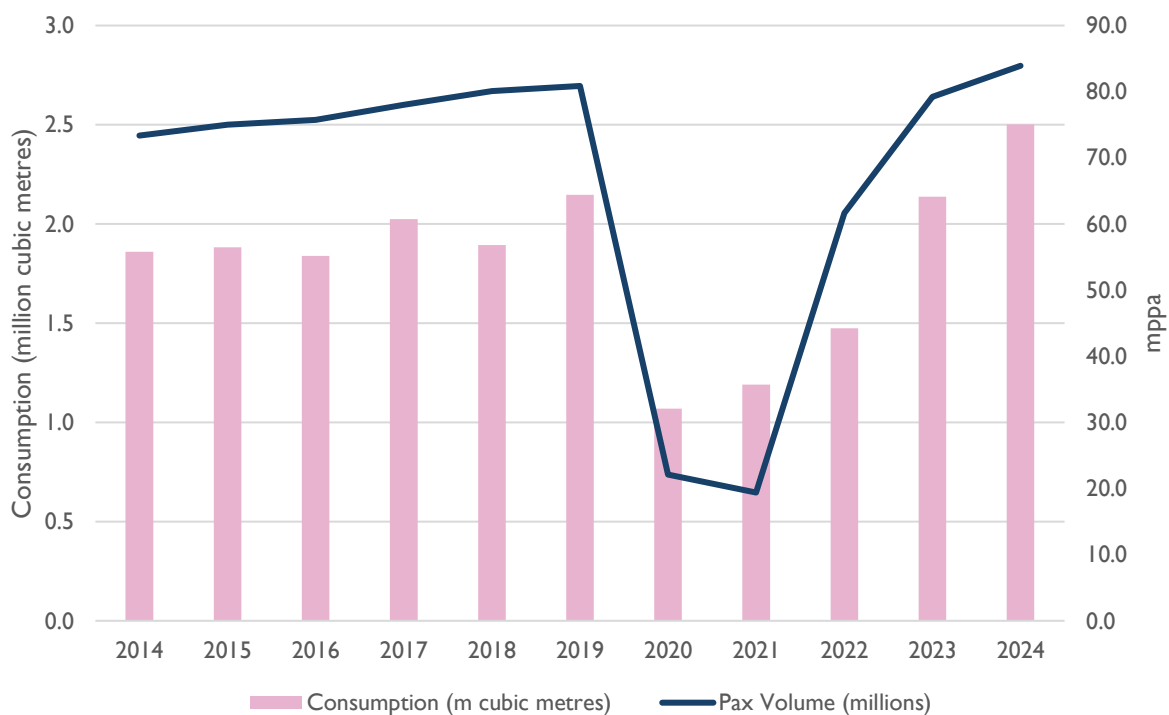
As shown in Figure AI.3.35, HAL’s water consumption remained steady between 2014 and 2019, averaging around 1.8–2.1 million cubic metres, broadly aligned with passenger volumes of 70–80 million a year.

During the pandemic, both passenger traffic and water use fell sharply, with consumption dropping to just 0.7 million cubic metres in 2020–2021, reflecting reduced airport activity.

As passenger numbers recovered from 2022 onwards, water use also rose, though not in direct proportion. By 2024, water consumption reached 2.5 million cubic metres, slightly higher than pre-pandemic levels, while passenger volumes climbed back to over 80 million.

This suggests HAL’s water demand is closely linked to passenger throughput, though recent growth points to rising intensity of use, making 2024 an unusually high benchmark. The reasons for this are not clear from information provided by HAL.

**Figure AI.3.35: HAL’s water consumption (million cubic metres) in comparison to passenger throughput**



Source: HAL Data Tables

HAL’s water consumption per thousand passengers is shown in Table AI.3.22. There appears to be some efficiency between 2014-2018, whereby water consumption increased but the water consumption per mppa was reducing. Although water consumption quickly stabilised post-pandemic, it has risen considerably since 2022 and the reasons for this are not clear.

**Table AI.3.22: HAL’s Water consumption per passenger**

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Cubic metres per mppa	2.54	2.51	2.43	2.60	2.36	2.66	4.84	6.14	2.39	2.70	2.98

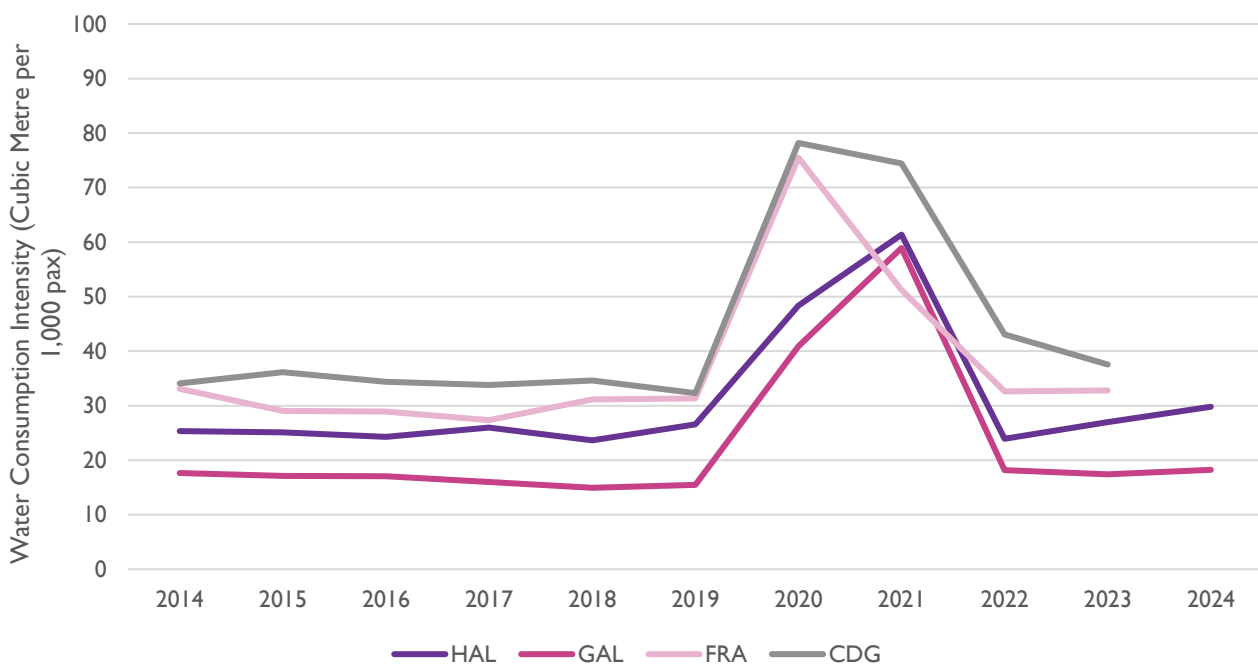
Source: HAL

Figure AI.3.36 shows the water consumption intensity per 1,000 passengers across Heathrow, Gatwick, Frankfurt and Paris CDG from 2014 to 2024. It highlights that all airports have found it

challenging to drive consistent savings in water usage, with clear spikes around 2020–2021 when passenger volumes dropped sharply during the pandemic. While HAL shows a particularly noticeable increase in consumption intensity from 2019 onwards, the overall trend across peers reinforces that more passengers generally translates into greater water demand, making efficiency gains difficult to sustain.

In overall terms, HAL has historically used less water per passenger than CDG and FRA, but more than GAL, with all four airports returning to historical rates of water usage per passenger post-pandemic.

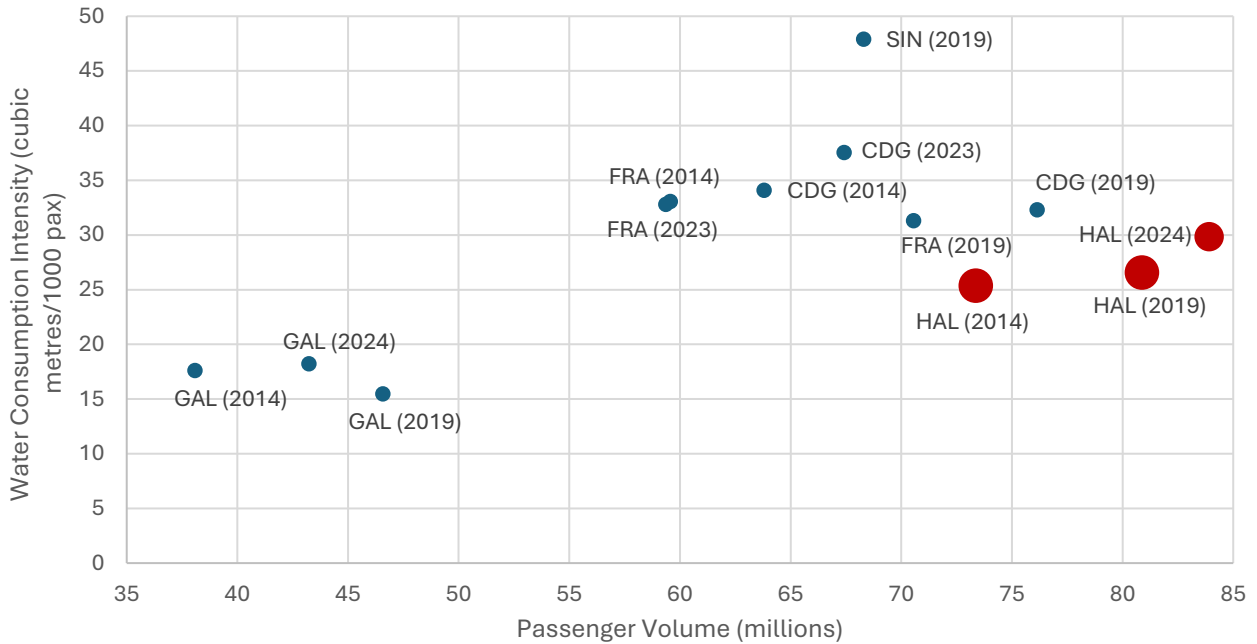
**Figure A1.3.36: Water Consumption Analysis Benchmarks**



Source: Published Airport Annual Sustainability Reports

Figure A1.3.37 shows the relationship between passenger volume (millions) and water consumption intensity (cubic meters per 1,000 passengers) across different airports over time, with Heathrow highlighted in red. Although HAL is not the biggest consumer compared to peers like Paris CDG and Frankfurt, the data shows a clear step change in its own performance, with water consumption intensity rising sharply between 2014 and 2019 and remaining elevated since then. This contrasts with airports such as Gatwick, which have maintained relatively stable and lower intensities, suggesting HAL’s increase reflects a specific shift in its own operations that has resulted in greater water consumption and potentially higher Opex. There is some evidence that in since 2014, the rate at which HAL is consuming water has been growing, which may imply some inefficiency there.

**Figure AI.3.37: Water Consumption Benchmarks (2014, 2019 & 2023/24)**

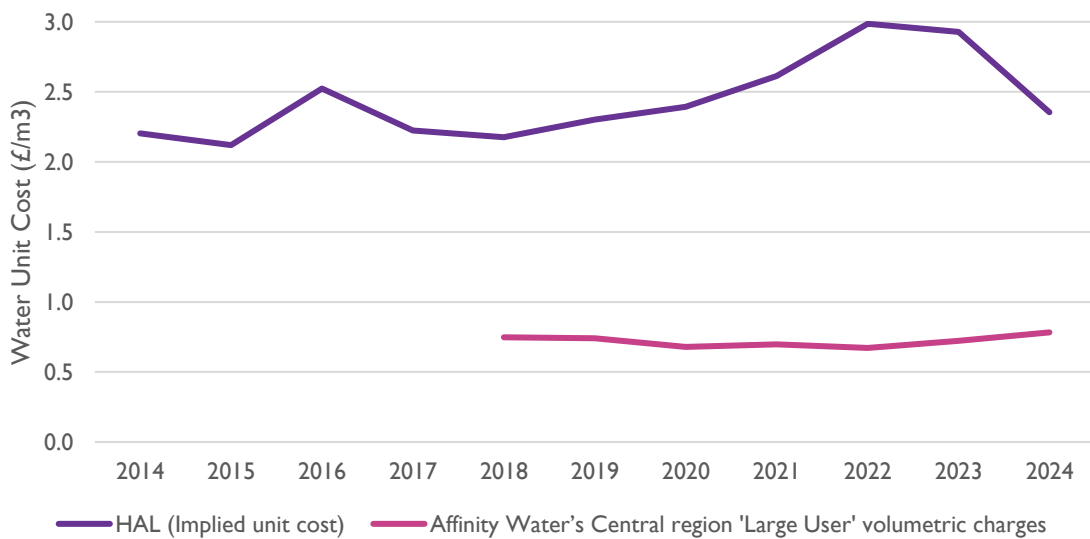


Source: Published Airport Annual Sustainability Reports

**Costs**

Figure AI.3.38 below shows Heathrow’s unit cost of water consumption between 2014-2024, measured in £ per cubic metre of water consumed. The data shows that the unit cost has been on an upward trend over time but with a substantial drop in 2024. This has been compared against Affinity Water’s Volumetric Charge for Large Non-Household users with consumption of over 50,000 cubic metres per year and this shows a significant difference. However, it is not known whether this rate is the rate that is applicable to Heathrow. Hence, we are not able to draw any conclusion about the charges paid by HAL for water. However, this makes up a smaller proportion of overall utility costs and is less significant as a proportion of total Opex.

**Figure AI.3.38: HAL’s Water Unit Cost (£/m3) and Affinity Water’s Volumetric Charge**



Source: HAL, Affinity Water Wholesale Charges Documents

## Conclusion

In overall terms, there is some evidence that HAL may be paying more for utilities than other large companies. The issue appears to be more in term of the unit rates paid by HAL than the levels of consumption, which have improved materially over the last decade, except in the case of water.

However, to the extent that this reflects the timing when new contracts were let, it may not reflect inefficiency in overall terms. Overall, there is no clear evidence that HAL's Utility Costs in 2024 were inefficient given that the higher costs were almost certainly related to the timing when contracts were let. However, given that we understand that the main Utility contracts are due to be relet in 2028, we assess that HAL's prices should harmonise to the industry average at that time, i.e. a saving of 13.1% in the efficient H8 baseline overall as shown in Table A1.3.23 below.

A further adjustment of £0.1m was made to the adjusted baseline to remove the Non-Operational Staff Costs Opex related to POD parking, reflecting the disallowance of capital costs and this activity no longer being part of the regulated till.

**Table A1.3.23: Adjusted Efficient Baseline for Facilities Maintenance Costs**

£m		HAL 2024 Actual Costs	Efficiency Adjustment	Adjusted Baseline
<b>Utilities Costs</b>		<b>126.11</b>		<b>109.41</b>
Of which				
	Electricity	103.54	15%	88.01
	Gas	6.27	17%	5.20
	Other	16.3		16.3
Adjustment for POD Parking				-0.1

## A1.3.6 Summary

In Table A1.3.24 below, we summarise our recommendations on the baseline efficient Opex for 2024. We have adjusted for the full year effect of the outsourcing in 2024, which results in a marginal reduction in overall cost due to the outsourcing of VCPs reducing costs net of the increase in costs due to outsourcing of trolley handling. We have also adjusted Opex categories for the exclusion of costs relating to POD Parking which is no longer within the regulated till. We have adjusted by category based on information provided by HAL.

Our largest area of reduction is in relation to Security Staff Costs where we have assessed that HAL is not operating at the full efficiency offered by new CTix equipment, in part due to over protecting its service standard so as to avoid penalty payments. This equipment also offers the prospect of further efficiency gains which we expect to be realised, at least in part, over the period to the end of H7.

The second largest area of saving that we identify is in relation to Utility Costs where we would expect HAL to be able to achieve substantial savings on contract renewal as it is currently paying above market unit rates for both gas and electricity, which we believe is due to the timing when contracts were last let.

We believe that there are also material efficiencies that could be achieved in relation to some contracted out activities, in particular PRS services, where HAL itself is assuming efficiency gains when the contract is relet. IT related Opex also benchmarks poorly against other airports. For the purpose of assessing an efficient baseline for H8, we have assumed that these will all be achievable by the end of H7.

In principle, similar efficiency savings ought to be achievable in non-Security staff costs, based on our benchmarking of costs overall. Like for like comparison in this area is complicated by the impact of outsourcing that has already taken place but which is not reflected in HAL's actual Staff Costs in 2024 that included some level of cost related to the activities in question, VCP Security and Trolley Recovery, in the early part of 2024. We have applied an efficiency saving derived from the expected saving in Other Operational Costs to Operational and Non-Operational Staff Costs (excluding Security).

Although we did not assess this in detail, we have also made an adjustment to Insurance Costs to reflect HAL's expectation of 10% year on year increases over the next 3 years (less a £0.04m reduction related to POD Parking).

We have also removed HAL's proposed exclusion of costs relating to Noise and Vortex as we understand that these will not be capitalised as HAL had proposed, i.e. these costs remain within Other Operational Costs.

On this basis, we assess the efficient baseline Opex as £1,519.7m compared to HAL's reported 2024 Opex of £1,583.46m, after adjusting for POD parking. Overall, our assessment is that an efficient baseline for Opex in 2024 would be 4.0% below HAL's actual Opex.

**Table AI.3.24: Summary of 2024 and H8 Baseline Opex Adjustments**

Category	HAL Reported Cost	Adjusted for Out-sourcing	Proposed Efficient 2024 Baseline	Percentage Change Versus HAL Reported Costs
	£m	£m	£m	
Security Staff	197.1	188.8	173.62	-11.9%
Other Operational Staff	131.13	127.66	122.87	-6.3%
Non-Operational Staff	155.66		149.02	-4.3%
Pensions and Capitalised Staff Costs	0.95 net			
Other Operational Costs	566.32	576.35	554.23	-2.1%
Insurance	19.72		25.64	30.0%
Facilities/Maintenance	239.66		235.42	-1.8%
Rent and Rates	116.39		116.37	0.0%
Utilities	126.11		109.41	-13.2%
Distribution Contract	33.12		33.12	0.0%
Adjustment for POD Parking Opex	-2.7			

<b>Total</b>	<b>1,583.46</b>	<b>1,519.7</b>	<b>-4.0%</b>
--------------	-----------------	----------------	--------------

\*equates to -8.0% versus the costs adjusted for outsourcing.

\*\*equates to -3.8% versus the costs adjusted for outsourcing.

## A1.4 CommRev

### A1.4.1 Retail and Catering

Our initial backward look assessment considered Catering and Retail Concession Revenues as separate categories, with Retail Concessions accounting for just over 26% of CommRev and Catering 8.5%, i.e. 35% of total CommRev in combination in 2024. Whilst the performance in Catering was largely in line with expectations in the Adjusted H7 Determination in 2024 (2% higher), the performance in Retail Concessions was 25% less than the Adjusted H7 Determination suggested. These income streams were identified for further investigation largely due to their overall contribution to total income.

Whilst Catering and Retail do represent separate income streams, there is some potential cross over in the use of space within the terminals between the two categories that justify them being considered together.

Other Retail (Advertising) is considered separately later in this Appendix. Given the decline in income from Bureaux de Change activity, which we understood also historically included commissions in relation to VAT- free retailing in the UK and now accounts for only 2% of revenues, it was concluded that this activity did not warrant a more detailed bottom up assessment. There is also a very small amount of income recorded as Other Services under the Retail and Catering heading but is not entirely clear to what this relates. This is distinct from the Service Revenue earned directly by HAL considered separately below.

Tables A1.4.1, A1.4.2 and A1.4.3 set how we proposed to approach consideration of Retail and Catering Revenues and the primary information sources that we would use to do so. In addition, a detailed site visit was undertaken to enable a more in depth understanding of the retail and catering product mix across the terminals.

**Table A1.4.1: Retail and Catering Revenues – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/ Market Data	Historical Trend Analysis	Assess Pay Rates	Staff	Assess Growth Rates
Catering	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>		<b>Yes</b>
Retail	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>		<b>Yes</b>

**Table AI.4.2: Catering Revenue – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total Catering income	✓	✓	
The number of retail outlets per terminal and square meterage, growth plans covering the proposed number of new outlets, switches in use (e.g. Catering outlets switching to other retail), changes to square meterage.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or other step changes to the catering income that are not driven by price/inflation or volume driver-related changes, for example changes in contractual terms and concession rates with catering providers.	✓	✓	
Information on catering incomes from other airports.			✓

**Table AI.4.3: Retail Revenue – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total Retail Concessions income split by main retail category	✓	✓	
The number of retail outlets per terminal and square meterage, growth plans covering the proposed number of new outlets, switches in use (e.g. Retail Concessions outlets switching to Catering), changes to square meterage.	✓	✓	
Income and passenger volumes split by geographical region.			✓
Income per m <sup>2</sup> for different categories of retail or outlet.	✓	✓	✓
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or other step changes to the retail concessions income that are not driven by price/inflation or volume driver-related changes, for example changes in contractual terms and concession rates with retail concessions providers.	✓	✓	
Retail income by category for different airports.			✓

Our intention had been to look in some granularity at the income earned by HAL from different categories of outlet and to assess the extent to which HAL was using the space allocated to Retail and Catering efficiently to meet passenger needs in 2024. This was considered important given that HAL told us that there was underperformance by some types of Catering outlet (e.g. higher end restaurants) and the obvious drop in income from Luxury Retail following the abolition of tax-

---

free shopping in 2021. However, HAL was only able to provide a broad division of space by category for 2024 so we were unable to assess trends in this regard.

We have drawn on information provided by HAL in the data tables and subsequent clarification requests. However, we have not been provided with the details of the Concession contracts that, ideally, we would have wanted to see. These were considered commercially confidential by HAL, although it did provide some very limited contractual details late in the process. We have drawn on the Pragma Report, covering all non-aeronautical revenues, that was appended to HAL's H8 Business Plan to fill in some data and information gaps. The Pragma Report provided an evidence base that HAL used to inform its commercial revenue projections in the Business Plan. To a large degree, however, the Pragma Report deals with overall trends in spend per passenger in the retail outlets, which does not translate directly into the revenue received by HAL especially as the recent data confirms that margins vary by outlet to some degree.

There are also some inconsistencies in terminology used for the different categories of Retail activity between the data tables, the Pragma Report and information provided by HAL throughout our engagement. For the purpose of our analysis here, we have adopted the revenue categories used in the data tables.

We have also taken into account other information available on trends in retail and catering income at other airports where information is available to provide some benchmarking of HAL's performance. In so doing we have taken account of the fact that every airport has different customer profiles which will impact on the spend per passenger. This is particularly relevant given the high proportion of premium passengers at Heathrow and its specific geographic mix of passengers. To that end, HAL was able to segment its income from Duty Free sales between geographic markets which was helpful to our analysis of trends. A key issue in considering HAL's performance is that, relative to other airports, HAL achieves high commercial income per passenger, especially from Retail, that is driven by its passenger mix as can be seen in the Pragma Report. However, a relevant consideration is the extent to which this ostensibly strong performance conceals the scope to improve revenues further by better matching the products offered to the changed passenger mix in categories other than Luxury Retail.

#### Historic Performance and Headwinds

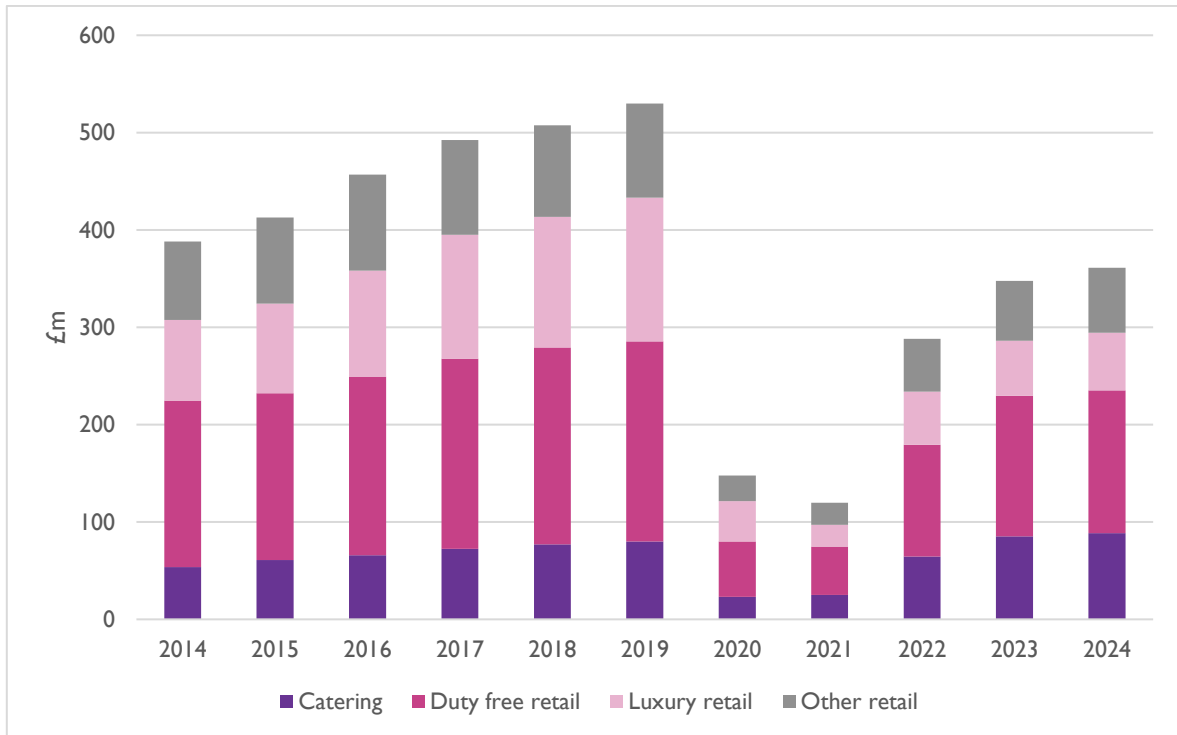
### Historic Performance

As discussed above, HAL's retail performance, excluding catering, is below that projected in the Adjusted H7 Determination.

Figure A1.4.1 shows total income from the core Retail and Catering sub-categories over the period from 2014 to 2024. Unsurprisingly, Duty Free is the largest component of income as would be expected at any airport with substantial international traffic. What set Heathrow apart was the high proportion of income traditionally earned from Luxury Retail, which accounted for 28% of all Retail and Catering revenue in 2019 but this proportion has fallen to 16% in 2024. However, the fall in all Retail income categories since 2019 is evident, with Catering revenue having increased both in real terms and as proportion of the total income from 15% to 25%.

Figure A1.4.2 shows the revenue per passenger across the core Retail and Catering sub-categories from 2014.

**Figure AI.4.1: Breakdown of Retail and Catering Income by Category 2014-2024 (2024 CPI prices)**



Source: HAL

**Figure AI.4.2: HAL's Retail and Catering Income per passenger 2014-2024 (2024 CPI prices)**



Source: HAL

The historic pattern of income per passenger indexed to 2019 is shown in Figure AI.4.3. What is clear is that, pre-pandemic, i.e. up to 2019, both Retail and Catering income per passenger was growing, i.e. Retail and Catering revenue was growing faster than passenger growth.

**Figure AI.4.3: HAL's Retail and Catering Income per passenger 2014-2024 (2024 real prices indexed to 2019)**



Source: HAL

Catering income per passenger has increased over time and peaked during the pandemic but has now fallen back to around 2019 levels. Retail Concession income has fallen since 2019. HAL attributed this fall principally to the ending of VAT-free sales airside<sup>25</sup> following Brexit, the effect of which it considered had been underestimated by the CAA for H7.

A further factor in the pattern of higher revenue per passenger being observed through the pandemic could be the effect of some retail or catering outlets trading at the level of a ‘minimum guaranteed’ sum (MGS), which is typically embedded in Retail and Catering concession contracts. It is not clear the extent to which these were waived at Heathrow during the pandemic but, to the extent any concessionaires were paying at MGS level, this could have resulted in some inflation of income per passenger whilst passenger numbers were low. In the absence of any information on this from HAL, we are assuming that this had limited impact at Heathrow.

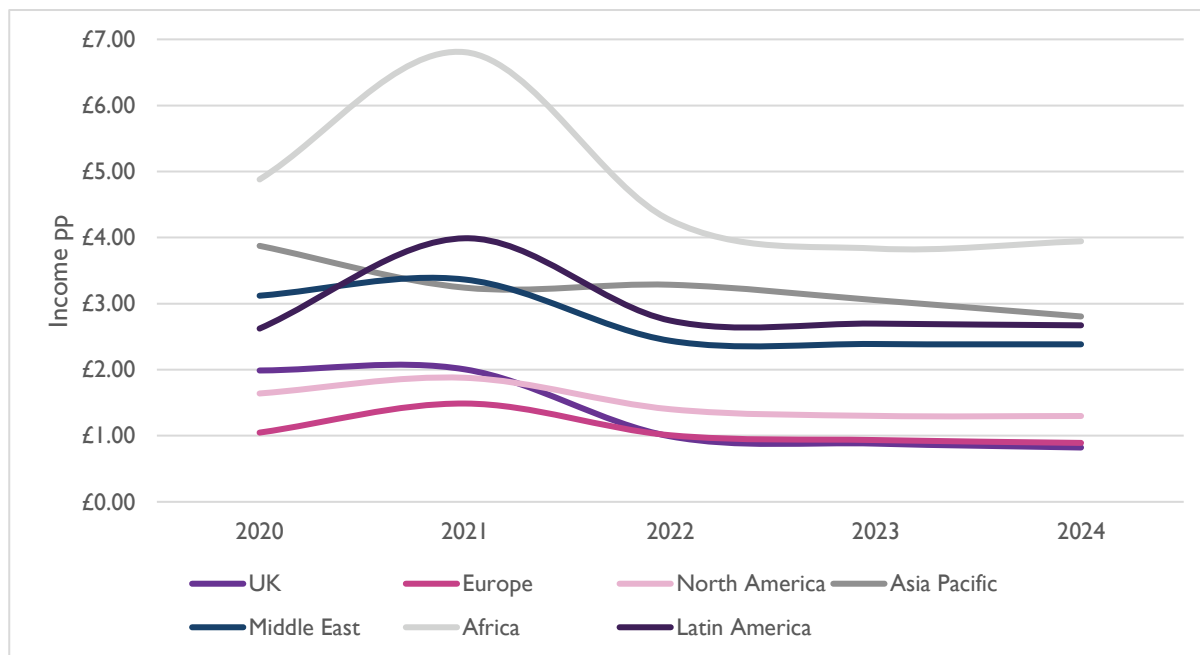
In discussion, HAL has indicated further ‘headwinds’ to retail performance that we discuss further below. It is clear that HAL’s income per passenger from all retail categories has fallen since 2020 and Brexit but the reason for the fall in Other Retail, i.e. non-Duty Free and non-Luxury Retail is less clear.

<sup>25</sup> HAL also referenced additional reasons for the discrepancy with the determination in that retail prices had not risen to the same extent at CPI as high energy prices had not been fully passed through and that the CAA’s ‘management stretch’ target for retail and catering incomes in H7 was unrealistic.

In discussion, and in the Pragma Report, much is also made of specific negative factors (headwinds) affecting the Asia-Pacific market and in relation to luxury goods specifically. We understand from our discussions with HAL that these factors have also impacted on the sale of high end beauty products in Duty Free.

HAL has provided data on Duty Free income by geographic market since 2020 and it is clear from Figure AI.4.4 that there has been a pattern of declining Duty Free income per passenger across all markets, accepting that this covers the pandemic period. The fall in Duty Free income per passenger coincides with the loss of VAT- free shopping in the UK following Brexit, which impacted beauty and other goods as well as the Luxury Retail category. However, the fall in income can be seen across all geographic categories of passenger and is perhaps less related to the headwinds affecting income from Asia Pacific passengers specifically than HAL has claimed. However, it is possible that the impact has been more specific in the Luxury Retail category but HAL has been unable to provide the information in sufficient granularity to enable this analysis by geographic region to be undertaken other than for Duty Free. We note that Pragma did present sales per passenger data which would suggest that the declines in sales per passenger between 2019 and 2024 have been most pronounced for passengers travelling to emerging parts of East Asia (not specifically defined) and Central and Eastern Europe, presumably related to the loss of Russian passengers since the outbreak of the war in Ukraine.

**Figure AI.4.4: Duty Free income per passenger across geographic markets 2020-2024 (2024 CPI prices)**



Source: HAL

A further factor cited by HAL has been the change in passenger mix overall. However, the changes in the geographic composition of the passenger mix are relatively minor, as shown in Table AI.4.4 and it is not clear that changes in the mix at this level would have a substantial effect. HAL and Pragma specifically reference the decline in the number of Chinese resident passengers since 2019 as being a factor in the performance in the Retail sector but, to put this in context, Chinese resident passengers made up only 1.1% of total passengers using Heathrow in 2019 and this has

declined to 0.6% in 2024<sup>26</sup>. Hence, in overall terms, changes in the geographic mix of passengers would appear to be of less significance in relation to Retail revenues than claimed by HAL.

**Table AI.4.4: Changes in the geographic mix of passengers at Heathrow between 2019 and 2024**

Region	2019	2024
UK	5.6%	6.0%
Europe	40.2%	41.0%
North America	24.6%	23.3%
Asia Pacific	12.8%	14.1%
Middle East	10.2%	9.6%
Africa	4.0%	4.3%
Latin America	2.6%	1.7%

Source: HAL

The other factor cited by HAL as material is the increase in the proportion of leisure passengers post-pandemic. This is borne out by CAA Survey data for 2019 and 2024 as shown in Table AI.4.5. The increase in UK resident leisure passengers in the mix is relevant to the deliverability of Retail and Catering income targets in 2024 but also gives rise to the question as to whether HAL has adapted quickly enough to the changing profile of passengers and their needs to maximise revenue.

**Table AI.4.5: Mix of Passengers at Heathrow 2019 and 2024**

Purpose	Business		Leisure	
	UK	Foreign	UK	Foreign
2019	10.4%	14.8%	31.2%	43.6%
2024	8.9%	9.3%	39.0%	42.9%

Source: CAA Survey Data

## Headwinds

As noted above, HAL cites substantial headwinds to its performance in Retail and Catering revenues in its H8 Business Plan. These comprise principally:

- increasingly crowded terminals due to recovery of passenger volumes whilst building additional terminal space will take time to deliver; and
- the loss of VAT-free shopping.

HAL also references the changing passenger demographic with much of the growth being leisure travel related, with business travel recovery still lagging. This means that Heathrow faces a different customer mix than previously as noted above, which potentially has implications for whether the Retail and Catering mix was optimised in 2024 and the extent to which revenues earned made efficient use of space, which we go onto consider further.

In addition, HAL suggested that the process of installing next generation security (CTix) equipment had resulted in some loss of space for Retail and Catering across the terminals. Some of this loss of space was stated as temporary and some of a more permanent nature. However, based on the most recent data provided by HAL, overall space devoted to Retail and Catering in

<sup>26</sup> CAA Survey data.

---

2024 was actually higher at 51,515m<sup>2</sup> in 2024 (slightly lower than recorded in the data tables) than at any point over the last 10 years<sup>27</sup>. There was some reappropriation of space, with space for Duty Free reduced by c.12% and that for Catering reinstated to pre-pandemic levels. In any event, the effect of next generation security ought to see some improvements in passenger processing times that would, prima facie, serve to increase passenger dwell time airside where most Retail and Catering income is earned<sup>28</sup>.

### Challenges for H8

Accepting that there remains global political uncertainty, it is far from clear to us that the specific headwinds identified by HAL would persist into H8 so as to impact further on revenues from Retail and Catering Concessions, other than in relation to the impact of increasing levels of crowding in the terminals that can act as a deterrent to shopping. This needs to be considered further as part of the roll forward assessment of revenues and the extent to which any adjustment to elasticities is warranted.

We understand that HAL intends to refurbish and, in some cases, expand the space available for Retail and Catering during H8, although a large part of the additional commercial area is intended to increase space for lounges for premium passengers, for which the revenues are included within the Property category considered separately. To the extent that there is some increase in space for Retail and Catering delivered in H8, stated by HAL as the addition of 486m<sup>2</sup> in T5 and 385m<sup>2</sup> in T2<sup>29</sup>, this represents a small uplift in space of c.1.7% over the space available in 2024 dependent on whether the available area for this category of activity is 51,848m<sup>2</sup> as cited in the HAL data tables or 51,515m<sup>2</sup> as provided in a more recent response from HAL<sup>30</sup>. However, the intention is to refurbish a much larger proportion of the space available for Retail and Catering during H8, equivalent to around half of the floor area related to this category of revenue based on HAL's figure during H8. It is anticipated that the full benefit of this may not be realised until towards the end of H8. Although the effect of these changes will need to be considered further in terms of the implications for H8, they are not directly relevant to consideration of the efficient baseline for 2024.

### Space Constraints

Using updated data for the floor areas allocated to Retail and Catering based on the HAL responses through the Q&A process, which also provided a breakdown by category and how this had changed over time, it is evident that Heathrow has less area allocated to Retail and Catering relative to passenger throughput than other comparator groupings of airports, drawn from ACI data<sup>31</sup>, as shown in Figure A1.4.5. The ACI data relates to 2022, when virtually all the airports included in the benchmarks will have been operating with reduced passenger numbers relative to the scale of their facilities. Nonetheless, the relative comparison is considered a reasonable indicator and, if 2024 data was available, it would be expected to show a similar pattern of

---

<sup>27</sup> 74 Response to CAA questions 34-36, Historic Retail Space, September 2025.

<sup>28</sup> Data was not available to allow us to consider the difference between income earned from airside as distinct from landside facilities.

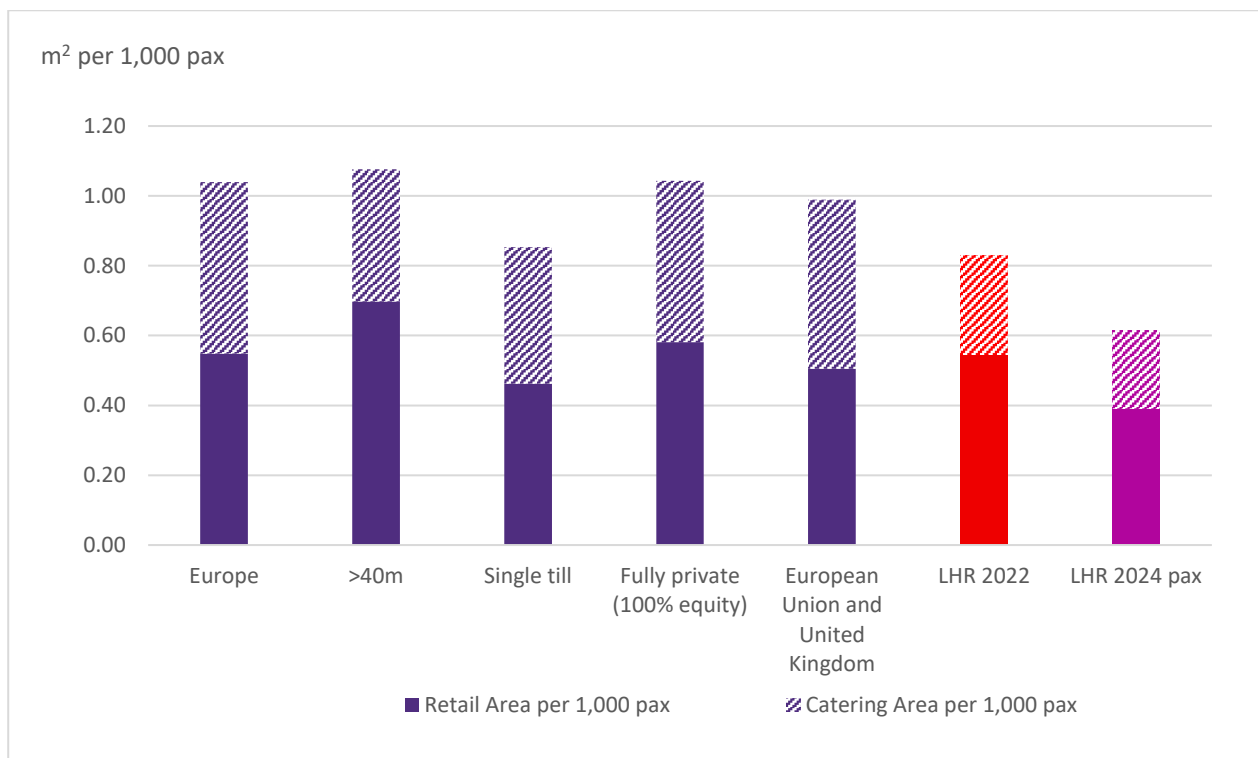
<sup>29</sup> CAA/HAL bilateral meeting 5.8.25.

<sup>30</sup> Pragma cite an area for Retail and Catering of 55,044m<sup>2</sup> in 2024 but we believe that this may include areas for Bureaux and Other Services and HAL's Annual Reports for 2022 and 2024 cite 58,600m<sup>2</sup> of space for Retail and Catering.

<sup>31</sup> ACI Economics Report and KPIs 2022.

reduced floor area per 1,000 passengers across the range of airport comparators as is indicated for Heathrow due to recovery of passenger volumes post-pandemic. As noted earlier, HAL has made some adjustments in the apportionment of space between Retail and Catering between 2022 and 2024 but the overall space is very similar.

**Figure AI.4.5: Benchmark Retail and Catering Areas (m<sup>2</sup>) per 1,000 passengers (2022)**

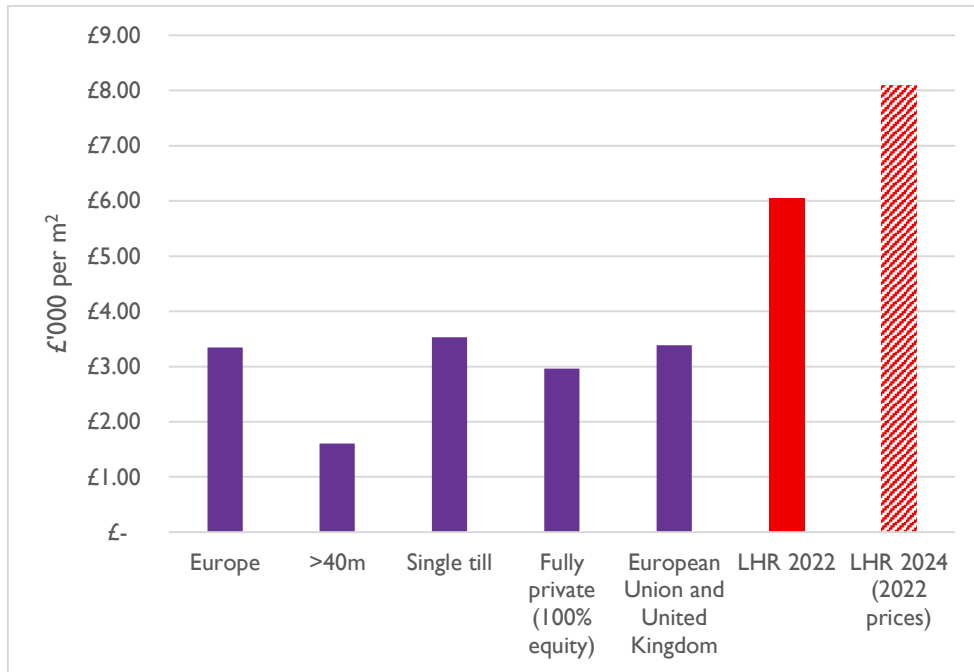


Source: ACI Economics Report Key Performance Indicators, HAL, Pragma

What is evident is that Heathrow had similar space per 1,000 passengers for Retail compared to the benchmark groupings overall in 2022 but was falling below the space available at larger airports of which Heathrow is clearly one. It is in terms of space for Catering that HAL is definitively below benchmarks. However, it needs to be borne in mind that the ACI analysis includes a wide range of airports across many countries, including a sizeable number of large airports in the USA handling mostly domestic passengers. Hence, some caution needs to be applied to the extent to which these aggregate benchmarks are relevant to assessing the efficiency of HAL's performance and we focus on some specific individual airport benchmarks further below.

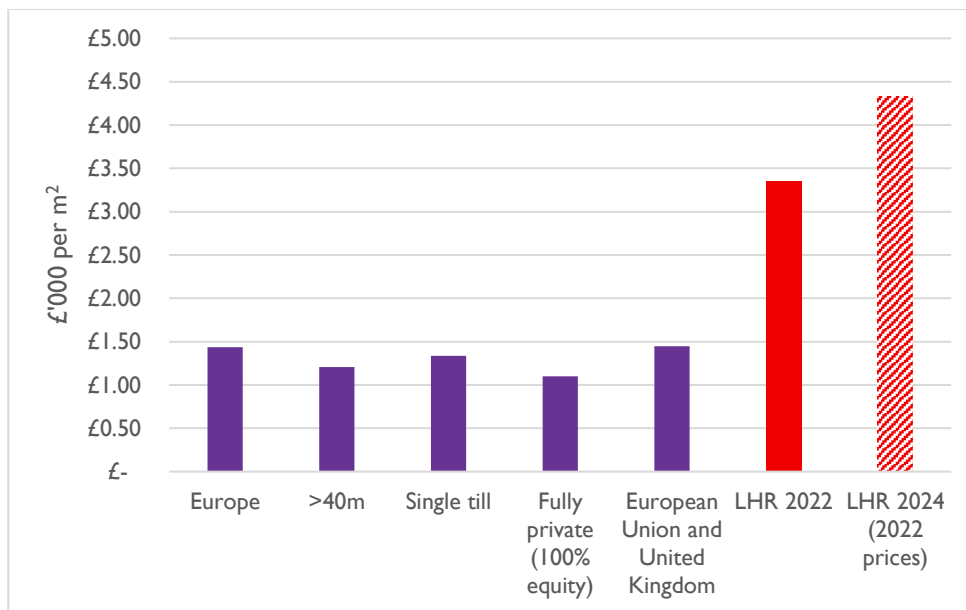
It is clear that the effect of the constrained space is that HAL earns more from each m<sup>2</sup> of space than any of these benchmark groupings as shown in Figures AI.4.6 and AI.4.7.

**Figure AI.4.6: International Benchmarks for Retail revenues per m<sup>2</sup> (2022 CPI prices)**



Source: ACI, HAL, Pragma

**Figure AI.4.7: International Benchmarks for Catering revenue per m<sup>2</sup> (2022 CPI prices)**



Source: ACI, HAL, Pragma

To some degree, these benchmarks may reflect diminishing returns to scale by simply adding additional Retail and Catering area but the pattern is clearly also a function of the particular traffic mix at Heathrow with a high proportion of international passengers, including in high spending demographics.

Even though the space is below most benchmarks and revenue earned per m<sup>2</sup> significantly higher, it is still relevant to consider whether the available space is being deployed to best advantage to maximise income, especially having regard to the changes in passenger profile post-pandemic.

## Retail

During our visits to Heathrow in January and June 2025, we heard much about the specific nature of the passenger mix at Heathrow deriving from its hub role and the high proportion of premium passengers as well as those transferring through Heathrow. This is relevant and has historically justified a relatively high proportion of space being devoted to high end luxury retail with the presence of brands such as Chanel, Cartier, Dior, Gucci, Louis Vuitton, Rolex and Saint Laurent. We understand that HAL continues to prioritise the space historically allocated to Luxury Retail to such high end brands as it does not wish to dilute the product.

However, HAL is seeking to release more space for diversification into a broader range of other retail by seeking to combine its CTN<sup>32</sup> with its pharmacy offer in single 'convenience' stores. It has begun to implement this policy rolling out 'Travel Essentials' stores across its terminals. By combining these two outlets, space is released for other retail offers.

In general, HAL is correct that space deployed to Speciality Retail<sup>33</sup> earns more per m<sup>2</sup> than space used for Catering as shown in data reproduced from the Pragma Report in Table AI.4.6 but this was less than the earnings per m<sup>2</sup> from Duty Free shops. This explains why it has been reluctant to reallocate space from the Speciality Retail category to Catering, despite the evidence that this is where there is the strongest growth in demand from the changing traffic mix with significantly more UK resident outbound leisure passengers.

**Table AI.4.6: Space by Retail Category and Income per m<sup>2</sup>**

Category	2023 space (m <sup>2</sup> )	2023 income density (£/m <sup>2</sup> )	Trend in income per passenger since 2019
Duty Free	12,363	11,660	-3%
Speciality Retail	20,599	5,979	-8%
Catering	22,082	4,015	6%

Source: Pragma

The Pragma Report<sup>34</sup> shows the biggest fall in revenue since 2019 has been in the Luxury category, followed by Technology, whilst CTN has shown growth within the Speciality Retail category. HAL's revenue from Luxury retail has fallen from 56% to 38% of the Speciality Retail category, whilst the share of CTN has risen from 13% to 25%. This clearly reflects changes in the mix of passengers and what they require from airport retailing, giving rise to the question as to whether the actual retail income earned in 2024 represented an efficient outcome. Indeed, given that HAL identified the need to shift towards more mid-market retail in its H7 Business Plan<sup>35</sup>, it is not clear that HAL has been implementing its own strategy to drive retail income growth from the changing passenger mix. The Pragma Report<sup>36</sup> would suggest that, whilst spend per passenger from Luxury Retail is highest and the amount of space allocated to this category is the highest outside of the Duty-Free category, the margins earned from more Affordable Luxury and basic services such as CTNs are higher in 2024. This would indicate that revenues might be better optimised by

<sup>32</sup> Cigarettes, Tobacco, News offer.

<sup>33</sup> In the Pragma Report, Speciality Retail includes all retail areas apart from Duty Free and F&B/Catering.

<sup>34</sup> Page 123

<sup>35</sup> Constructive Engagement Round 2, Baseline Building Blocks, 4<sup>th</sup> March 2025, page 53

<sup>36</sup> Pragma Report, page 127.

adjusting the mix of Retail outlets to reflect potentially higher returns from more mid-market offers.

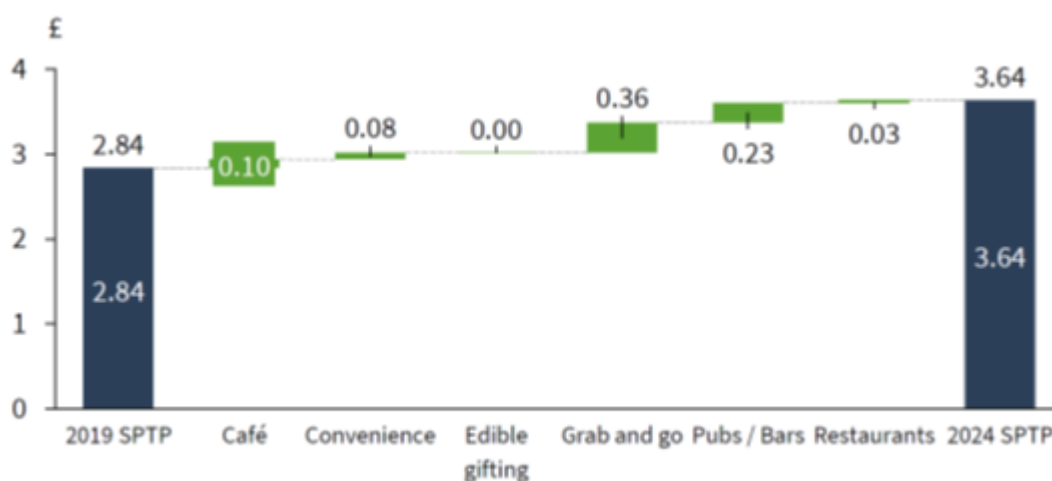
Although there are some differences in revenue per passenger across the terminals, we do not consider these to be material to our assessment of an efficient baseline.

Overall, whilst it remains the case that HAL's earnings per passenger from Retail are high, there is some emerging evidence that HAL does have some scope to improve its revenues from Retail by better matching the use of space to changing consumer needs to compensate, in part, from the reduction in Retail revenues since the abolition of VAT-free shopping. We have been provided with some information regarding the timescale over which the Retail concession contracts fall to be renewed and these vary from some changes that have been implemented in 2025 through to other contracts that run over the longer term. It seems to us that there is reasonable scope to increase revenues either from contract renewal or ensuring that the product offering, e.g. within Duty Free, is optimised to the changing passenger mix as it is clear that other airports have been able to do better post-pandemic than Heathrow as we explore further below.

### Catering

The Pragma Report provides information on the changes in Catering spend over the period post-pandemic, noting that this is not necessarily the same as the income to HAL. This is reproduced in Figure A1.4.8.

**Figure A1.4.8: Changes in the pattern of Catering Spend (£ per passenger, 2024 CPI prices)**

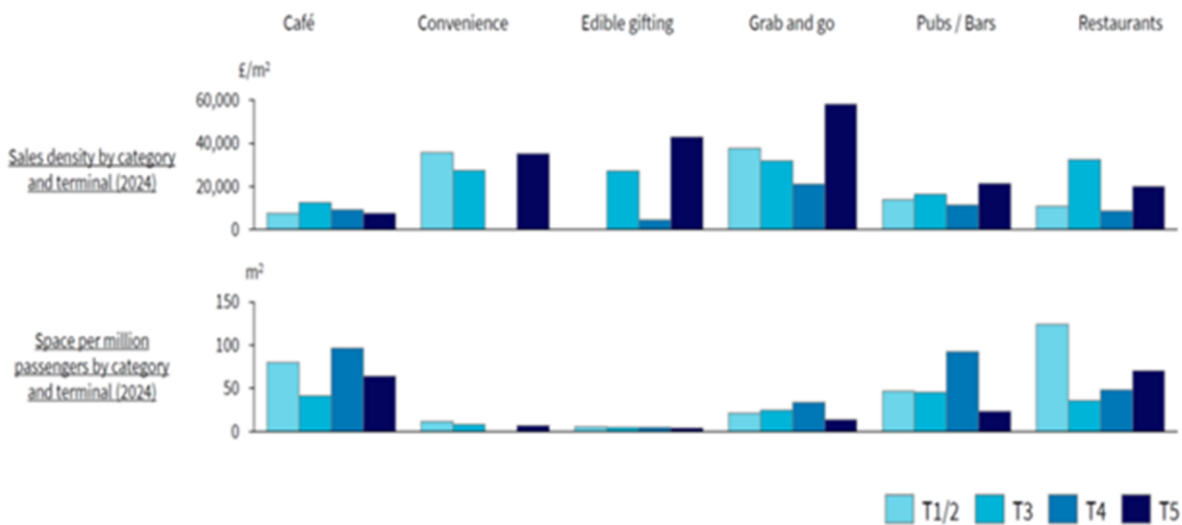


Source: Pragma

The Pragma Report also provides information on the space allocated for different types of catering outlet by terminal and the sales density (sales per m<sup>2</sup>) as shown in Figure A1.4.9. In general, across the terminals, more space is allocated to Cafés and Restaurants than Pubs/bars and other more convenience outlets, including Grab and go, which has been the fastest growing Catering income stream. It is also notable that Heathrow lacks a fast food offer, which HAL justified on the fear of cannibalising other Catering outlets' income. However, it seems to us that there is a growing mismatch in the Catering offer between the requirements of the fastest growing market segment of UK outbound leisure passengers and the food offer available. Given that the sales relative to space from the Convenience and Grab and go categories are higher than that of Cafés and

Restaurants, it is not clear to us that HAL has optimised the use of its space to maximise revenues from Catering, which it has also identified as a priority through constructive engagement.

**Figure AI.4.9: Area by Terminal for different categories within Catering and spend per passenger**



Source: Pragma

Pragma also reports higher margins are earned by HAL from Cafés, Grab and go, and Pubs/bars than Restaurants, albeit the difference is more marginal. Nonetheless, this also tends to point to the need for HAL to prioritise growth in fast food and more middle market offers rather than using space for more Restaurant type offers. This would provide scope to drive revenue growth.

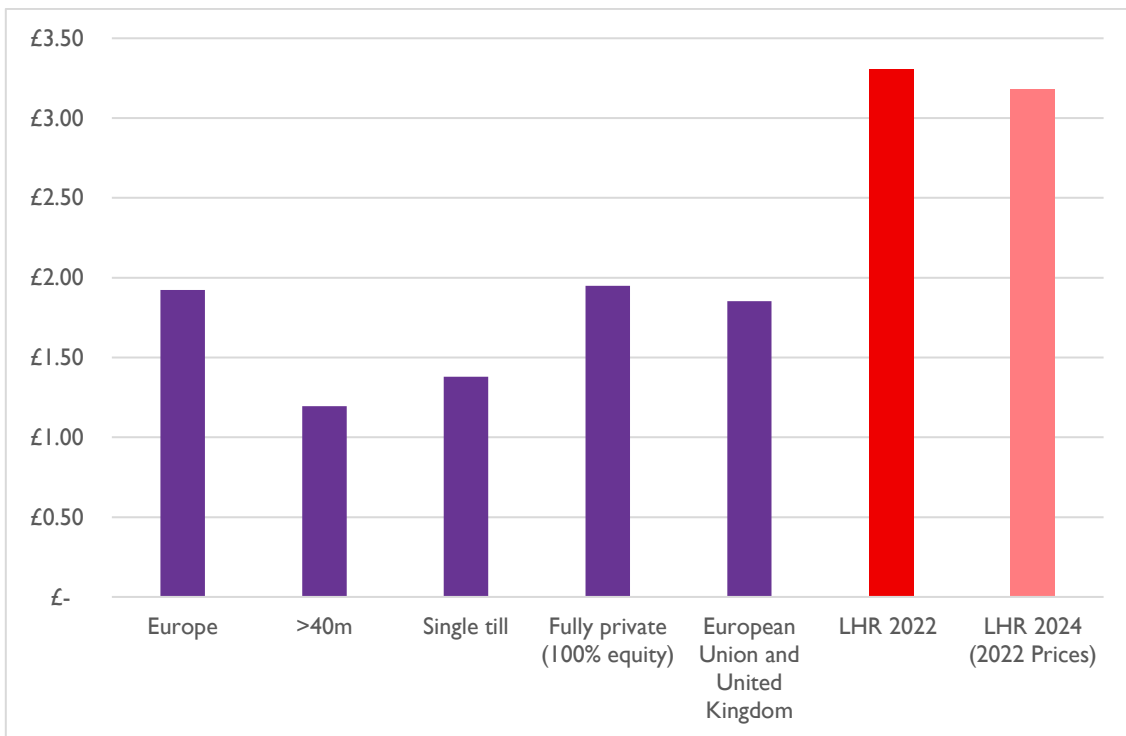
## Benchmarks

### International

Given the high Retail revenues earned at Heathrow, it is difficult to benchmark its performance as can be seen in the space benchmarks reported above, although the Pragma Report does suggest that its performance across Retail and Catering in terms of revenue per passenger is bettered by Hong Kong.

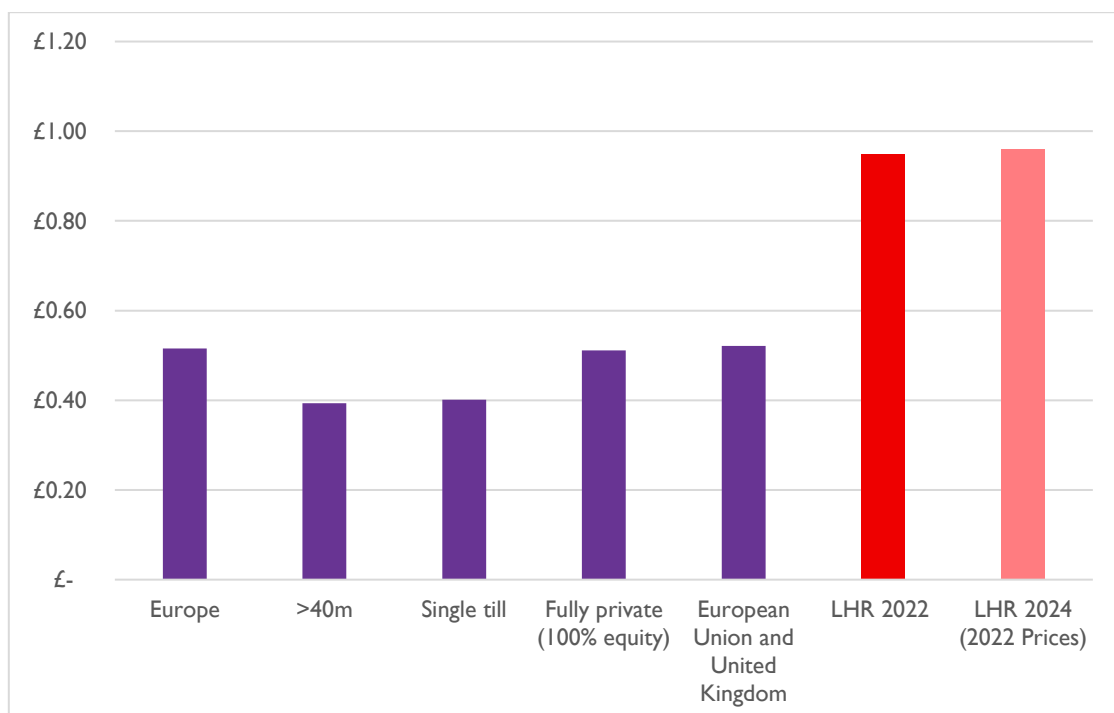
Using the same ACI data source, Figures AI.4.10 and AI.4.11 show the international benchmarks for Retail and Catering income per passenger. These similarly show that HAL achieves higher income per passenger from both Retail and Catering.

**Figure AI.4.10: International Benchmarks for Retail revenue per passenger (2022 CPI prices)**



Source: ACI, HAL

**Figure AI.4.11: International Benchmarks for Catering revenue per passenger (2022 PCI prices)**



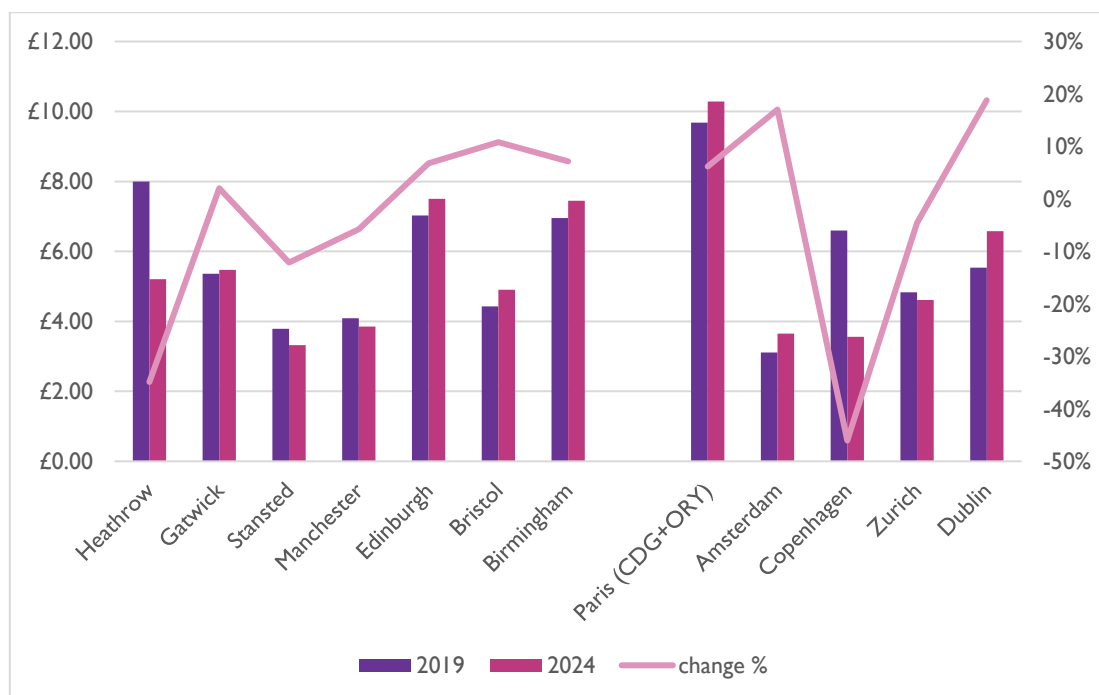
Source: ACI, HAL

For the reasons indicated earlier, these benchmarks represent average data across a large number of airports globally with very different mixes of passengers. Even some of the larger airports will be dominated by domestic passenger volumes and as such may not provide realistic comparisons

with Heathrow and other categories will include smaller airports with much more limited Retail and Catering offers.

For this reason, we have also looked at larger European airports where some breakdown of income is given in their annual reports along with the larger UK airports<sup>37</sup>. We have focussed on the change between 2019 and 2024 to see the extent to which the headwinds that have affected Heathrow, in terms of a shift in the passenger demographic towards more leisure passengers and changes in geographic mix, have been evident elsewhere in Retail and Catering income elsewhere. Clearly, Brexit related headwinds, namely the loss of VAT-free sales in 2021, are specific to UK airports, although this is countered to some degree by the return of intra-European Duty Free sales. We have endeavoured to use comparable data relating to income from Retail Concessions, including Catering and Advertising, but the precise categorisation by individual airport is not always clear. Comparisons across airports may not be precise but the trend at the individual airport level should be correct. For Heathrow, we have used information from the data tables, which does differ marginally from that in its Annual Reports. It is notable that the fall in income per passenger is only matched at Copenhagen Airport but it is unclear the extent to which Copenhagen has been impacted by major ongoing expansion works and the closure of some retail outlets over the period.

**Figure A1.4.12: Comparative Performance in Retail and Catering Concession Income per passenger across selected UK and European airports (£ 2024 CPI prices)**



Source: Annual Reports, HAL

In terms of the UK comparators, Manchester and Stansted have both seen a small drop in Retail concession income per passenger since Brexit. In the case of Manchester, the major redevelopment of Terminal 2 will have impacted revenues, however the reasons for the fall at Stansted are less clear. All other UK airports have seen an increase in concession revenue per

<sup>37</sup> Data for Gatwick relates to the 9 months to December 2019 and that for Manchester, Stansted and Birmingham for the financial year ending March 2020 and March 2025.

passenger, which we believe can largely be attributed to the reintroduction of duty-free sales on flights to the EU post-Brexit. This contrasts with HAL’s performance impacted by the loss of VAT-free sales, which that has not impacted these other airports to anything like the same extent, whereas there will have been a direct benefit from the reintroduction of duty free for European travel, with other UK airports typically having more than 60% of their passengers travelling on services to EU countries compared to c.32% at Heathrow in 2024<sup>38</sup>. We have confidential information from one airport that suggests it was able to increase real income per passenger by 25% in the Retail category and over 22% in the Catering category but it is accepted that this may be due to a mix of traffic that is far less dependent on high spending passengers travelling on long haul services.

Although comparisons between airports need to be treated with some caution, in 2024 and as Figure AI.4.12 shows, Heathrow no longer reports the highest Retail and Catering concession revenue per passenger across UK airports, with higher per passenger revenues being reported at Gatwick, Edinburgh and Birmingham.

Our analysis would suggest that HAL was also being outperformed by the Paris Airports and Dublin in 2024. These airports have also reported growth post-pandemic and, as suggested by Pragma, Paris may have gained in terms of international tax free sales from the abolition in the UK.

In most cases, it is not possible to disaggregate the comparison into the different components of Retail and Catering to understand why the discrepancies might be arising. However, data is available in some granularity for Gatwick Airport for 2024<sup>39</sup> and this is compared to that at Heathrow in Table AI.4.7.

**Table AI.4.7: Comparative revenue per passenger by Category 2024 compared to 2019 (2024 CPI prices)**

	Real Rev/pax	Duty Free	Specialist Retail	Catering	Aggregated
<b>Gatwick</b>	2024	2.11	1.01	1.50	4.63
	2019 (9 months)	1.61	1.18	1.26	4.11
	Change	31%	-19%	19%	13%
<b>Heathrow</b>	2024	1.75	1.50	1.06	4.31
	2019	2.54	3.02	0.99	6.55
	Change	-31%	-50%	7%	-34%

Source: HAL, Gatwick Financial Statements

The contrast in performance is clear, with HAL’s aggregate income per passenger across the three categories falling from £6.55 per passenger (2019) to £4.31 (2024) in real terms whilst Gatwick’s income per passenger across like for like concession categories has risen from £4.11 (2019) to £4.63 (2024), outpacing HAL’s 2024 £4.31 per passenger. Whilst increased Duty Free sales to leisure passengers at Gatwick will undoubtedly be a contributory factor, it is significant that Gatwick in 2024 earns more per passenger from Duty Free and Catering than Heathrow. In part, this is due to recent terminal refurbishment at Gatwick, as cited in the Pragma Report, which notes that Gatwick has focussed on “*delivering an exceptional passenger experience by modernising its F&B<sup>40</sup> outlets and tailoring them to passenger demographics.*”

<sup>38</sup> CAA Airport Statistics.

<sup>39</sup> Gatwick Airport Ltd, Financial Statements 31 December 2024 and 9 months to December 2019.

<sup>40</sup> Food and Beverage = Catering

---

However, given that HAL identified that it would need to address changing consumer requirements in both Retail and Catering in its H7 Business Plan, it is less clear that it has taken steps to do so. Hence, there is clearly a level of inefficiency to be addressed.

### Conclusion

In coming to our conclusions, we recognise that there is some inertia in changing the mix of Retail and Catering outlets due to the length of contracts, typically let on the basis that the retailer is responsible for the cost of fit out requiring a longer contract length. Although there have been some retail brand failures during the pandemic, leading to reallocation of space, it can take some time to achieve a broader based reallocation of space. Unfortunately, we have not been able to review the contracts in sufficient detail to understand the end dates for contracts and the extent to which such space reallocation would have been possible by 2024 so as to deliver improved revenues in that year.

Considering the evidence of Heathrow's performance in Retail and Catering so far in H7 and having regard to the comparative performance of its near neighbour Gatwick, it does seem to us that it could have done better in both Retail and Catering had it been swifter to adapt to the changing passenger mix.

In relation to Retail, it is hard to define a precise value for the underperformance because of the over-riding complication of the loss of VAT-free shopping, impacting both Speciality Retail and the tax free element of Duty Free. Prima facie, though, it is difficult to understand why HAL could not at least match Gatwick for Duty Free income per passenger of £2.11 per passenger, i.e. an uplift of 21% (£0.36) on HAL's £1.75 per passenger. This seems reasonable as the increase in leisure passengers in the mix, and with over 40% of passengers travelling within Europe, it is reasonable to expect that HAL should be able to earn as much income per passenger on average as Gatwick from Duty Free. Such an uplift would amount to recovery of less than half of the reduction actually seen in Duty Free income per passenger at Heathrow since 2019 reflecting the ongoing challenges with the reduction in sales of high end beauty products that no longer have tax-free status. An increase of £0.36 per passenger in HAL's Duty Free income in 2024 would represent a 11% uplift on total income per passenger from Retail concessions<sup>41</sup>.

Similarly, it would be reasonable to have expected Heathrow to have achieved, in 2024, at least the same percentage uplift in Catering income per passenger from 2019 as achieved at Gatwick, i.e. 19% as shown in Table A1.4.7. In this case, we see no reason why an efficient and customer focussed offer at Heathrow should not be able to match the increase in income per passenger achieved at Gatwick as there are no countervailing pressures in terms of loss of tax-free status impacting Catering. This would add £0.18 per passenger to Catering income increasing total revenue per passenger to £1.17, which is still below the Catering income per passenger earned at Gatwick, reflecting the higher propensity of passengers at Heathrow to use airline lounges rather than Catering concessions.

Overall, this would suggest that HAL should have been able to achieve £0.53 more income per passenger from Retail and Catering combined in 2024 than it actually did if it had better matched

---

<sup>41</sup> £0.37 as a proportion of £3.25 (£1.50+£1.75) Duty Free and Specialist Retail income per passenger combined.

its product offerings to the changing customer mix and requirements post pandemic. This would amount to a 12% uplift on the income per passenger earned from these categories in 2024

However, accepting the complications relating to the impact on space from the implementation of new generation security, which we do not believe to have impacted Gatwick in the same way, **a more cautious estimate of the under-performance would be of the order of 6.5% across the Retail and Catering categories combined** (9.5% on Catering and 5.5% on Retail) representing half of the achievable uplifts assessed above relative to the performance at Gatwick. This is inherently a conservative assumption. Accepting that there is a rolling programme of contract renewal, this level of increase is considered achievable by 2027 to form the updated baseline. In proposing this upward adjustment to revenue, we are cognisant of the extent to which there is intended to be refurbishment of a substantial part of the Retail and Catering area during H8, which will facilitate further increases in revenue during H8.

In summary, our adjusted baseline for Retail and Catering is shown in Table AI.4.8.

**Table AI.4.8: Adjusted Efficient Baseline for Retail and Catering**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	Adjusted Baseline
Catering	88.63	9.5%	97.05
Retail	272.66	5.5%	287.66

#### A1.4.2 Other Retail Revenue (Advertising)

Similar to Retail Concessions above, Other Retail Revenue underperformed against the Adjusted H7 Determination by 30% and 2024. This line equated to 5% of CommRev (excluding Cargo) in 2024 and was considered substantial enough to warrant more detailed consideration. We understand that this category principally relates to income from Advertising, which we assume has been the case over time.

We set out our proposed approach to assessing Other Retail revenues in Table AI.4.9 and our information requirements in Table AI.4.10. Initially, it was not entirely clear what this category was comprised off so we had assumed that it might include some physical outlets as well as advertising sites, hence the additional information sought from HAL.

**Table AI.4.9: Other Retail (Advertising) – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/ Market Data	Historical Trend Analysis	Other	Assess Elasticities
Other Retail	No	Yes	No	Yes	No	Yes

**Table AI.4.10: Other Retail (Advertising) – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total Other Retail income split by item.	✓	✓	
The number of other retail outlets per terminal and square metreage, growth plans covering the proposed number of new outlets, switches in use (e.g. Retail Concessions outlets switching to Other Retail), changes to square metreage.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or other step changes to the income that are not driven by price/inflation or volume driver-related changes, for example changes in contractual terms and concession rates with providers.	✓	✓	
Any benchmark information from other airports.			✓

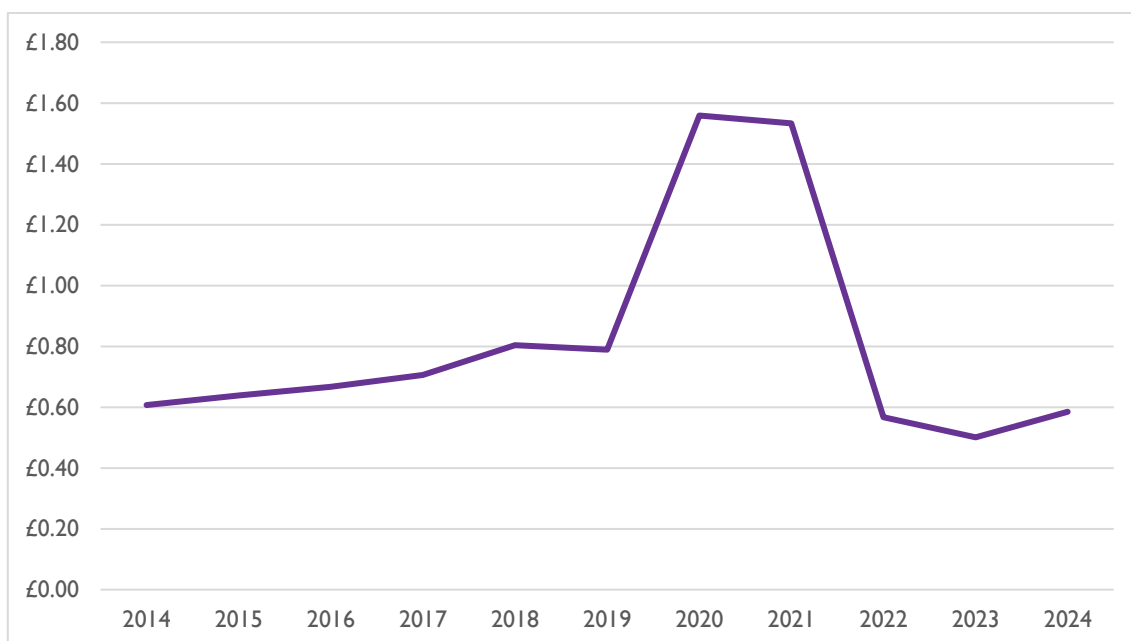
Given that we now understand that this line item comprises solely revenue from Advertising some of the information sought, e.g. information about outlets, is no longer relevant. However, in practice, HAL has provided no further information on the drivers of this revenue stream, although some information is available from the Pragma Report.

#### Historic Performance

As shown in Figure AI.4.13, HAL’s performance in terms of income from Advertising has not recovered to pre-pandemic levels. Pragma reports that this is, in part, due to greater caution on the part of companies in terms of advertising at airports for CSR<sup>42</sup> reasons. We believe that the slower recovery of business related air travel may be a more significant factor.

<sup>42</sup> Corporate Social Responsibility.

**Figure AI.4.13: Other Retail (Advertising) Revenue per passenger at Heathrow (2024 CPI prices)**



We understand that the concession contract for Advertising is with [redacted] and expires in [redacted], as does the sponsorship arrangement with [redacted] for advertising on airbridges (worth £[redacted] a year equating to around 16% of this revenue line). Pragma notes that [redacted] overall dominance in the Advertising market has been an impediment to achieving better contract terms.

### Benchmarks

In the absence of any more detailed information from HAL, we have sought to benchmark HAL's performance as far as we are able but specific information about Advertising revenues is very limited. Some examples of Advertising revenue per passenger are (values reported in 2024 CPI prices):

- UK regional airports typically report revenue from advertising in the range from 8p to 15p per passenger, reflecting lower business passenger levels.
- Dublin Airport reported 17p per passenger in 2024, down slightly from 18p in 2019.
- Schiphol Group reported 25p per passenger, down from 30p in 2019.
- Aeroports de Paris reported similar income per passenger to Heathrow in 2024 of 61p per passenger but this was up 15% from 2019.

As with Retail and Catering overall, HAL records Advertising revenue per passenger towards the top end of the range. Undoubtedly, this is a consequence of its specific passenger mix. However, the reduction in Advertising revenue at Heathrow since 2019 appears to be at the top end of the range of reductions seen elsewhere at 25% down. Based on Schiphol, the reduction should only have been c.17%, suggesting an inefficiency of around 10%.

### Conclusion

Given the constraints of what could be achieved under the existing contracts, it is hard to conclude that the performance in 2024 was inefficient. However, the HAL Business Plan notes an

intention to improve the Advertising installations and move to more digital Advertising. Overall, we consider that it would be reasonable to assume a 5% uplift in revenue attainable on contract renewal, i.e. by the end of H7. The impact of this is summarised in Table A1.4.11.

**Table A1.4.11: Adjusted Efficient Baseline for Other Retail (Advertising)**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	Adjusted Baseline
Other Retail	49.09	5%	51.54

### A1.4.3 Car Parking and TDOC (Surface Access)

Car Parking Revenues were selected for a more in-depth bottom-up analysis of the efficient baseline revenues in 2024 primarily as they accounted for 18% of total CommRev in 2024 (excluding cargo), the second largest income group after retail and catering.

In addition, car park income exceeded the Adjusted H7 Determination by a significant 10% in 2024, which HAL indicated was due to improved yield management. Based on initial information provided by HAL, there remained lack of clarity as to what had driven this increase and, hence, we considered it important to investigate this further to ensure that the correct drivers and elasticities are used for H8.

Assessing car parking income is a relatively complex equation. Whilst income mainly reflects changes in price and changes in passenger volumes, as with other income streams, the average price paid is in part a function of inflationary price increases but is also, increasingly, a function of dynamic pricing, which depends on how full a car park is, or is expected to be, and any changes to the mix of parking products the customers use. The volume of users is in part driven by overall passenger number growth but is then impacted by any changes to the proportion of passengers using cars as their mode of arrival to the Airport as well as off-site competition.

Tables A1.4.12 and A1.4.13 set out how we proposed to approach the assessment of car parking income and the primary information sources that we would use to do so.

**Table A1.4.12: Car Parking – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Other	Assess Growth Rates
Car Parking	Yes	No	No	Yes	Yes*	Yes

\*Analysis of modal share, capacity changes, tariff changes, new products all feature in our detailed assessment of car parking income.

**Table AI.4.13: Car Parking – Information Requirements**

Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total passenger volumes.	✓		
Airport passenger modal mix, and specifically the forecast number of car park users.	✓	✓	
Forecast tariff increases.	✓	✓	
For more granular analysis - usage and tariff details split by car park product.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or other step changes to the income that are not driven by price/inflation or volume driver-related changes for example new products introduced or old ones removed.	✓	✓	
Information on car parking revenues at other airports.			✓

## Methodology

This analysis has sought to assess the efficiency of the 2024 baseline in three ways:

- Historical analysis of volumes, market share and yields per passenger;
- An assessment of the composition of the underlying market demand; and
- Benchmarking of current parking charges at Heathrow.

We have drawn on information provided by HAL in the data tables, alongside the Pragma Report, CAA Passenger Survey data and other information on airport parking charges at other airports.

We are cautious about benchmarking Heathrow’s car parking income against other peer airports, as the dynamics are significantly different at each airport, including in terms of the prices offered, the mix of modes used to access the airport, the proportion of resident versus non-resident passengers and the proportion of connecting passengers. Given the difficulty in benchmarking overall car parking revenue on a per passenger basis, we have relied more on a comparison of 2024 car parking income versus previous years to provide some evidence as to the efficiency of the baseline.

We have also considered Heathrow’s parking tariffs vis-à-vis charges at off-site third-party car parks and nearby competing airports to provide guidance as to whether HAL is optimising overall pricing.

We also requested additional information to help our assessment, including assumed/actual changes to capacity in the car parks and any potential constraints, forecast tariff increases and any new products being introduced or old products being removed, but this was not provided.

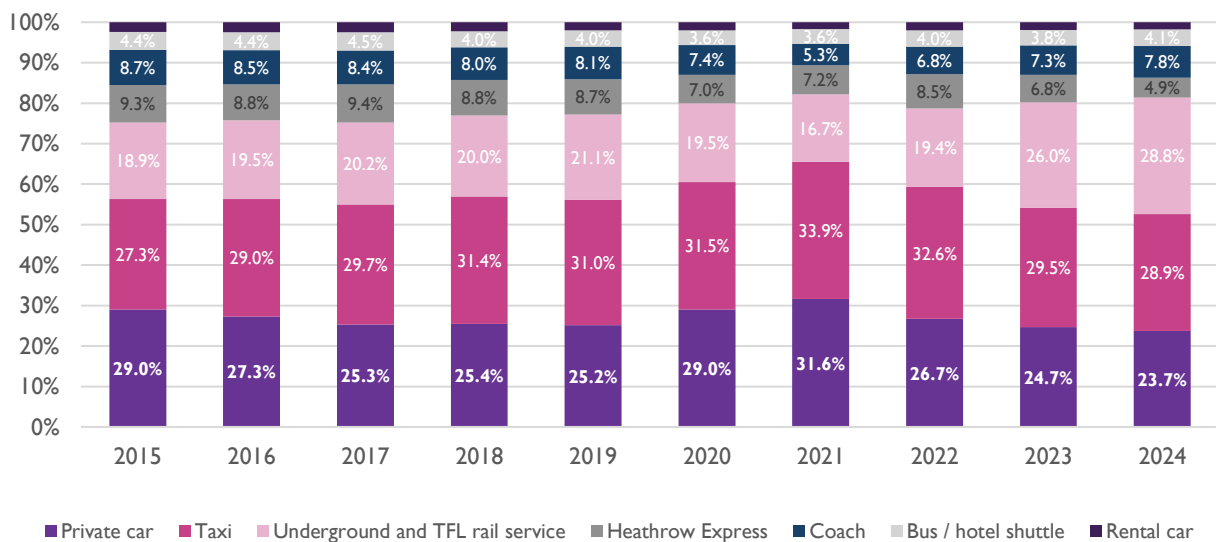
Historic car parking revenue was provided at a total level only so we have been unable to examine revenue by type of car park in detail.

## Historical Analysis

### Modal Share

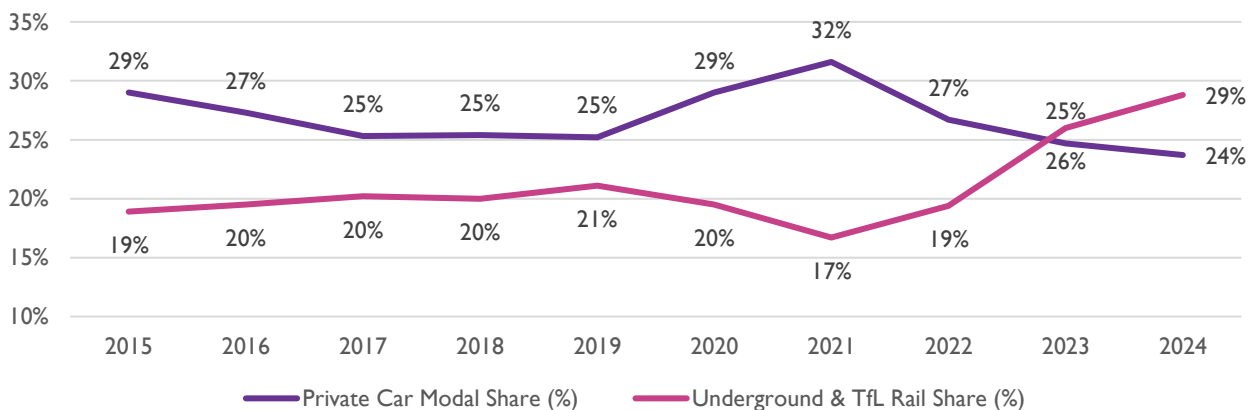
Figures A1.4.14 and A1.4.15 illustrate a clear and sustained decline in private car usage and Heathrow Express patronage since the onset of the pandemic, accompanied by a notable shift toward Underground and TfL Rail services, which now includes the Elizabeth Line. Between 2019 and 2024, private car use dropped from 25.2% to 23.7%, while Heathrow Express fell from 8.7% to 4.9%. In contrast, Underground and TfL Rail services surged from 21.1% to 28.8% over the same period. This change aligns with the introduction of the Elizabeth Line – opened in 2022 – which offers a faster, more convenient service to Central London and beyond compared with the Piccadilly Line, and a cheaper alternative to the Heathrow Express. The trend suggests a long-term modal shift toward mass transit options, reflecting passengers’ growing preference for reliability, affordability, and integration with the wider London transport network.

**Figure A1.4.14: Heathrow Airport – Passenger Modal Share**



Source: Pragma

**Figure A1.4.15: Private Car versus Underground & TfL Rail Modal Share 2015-2024**

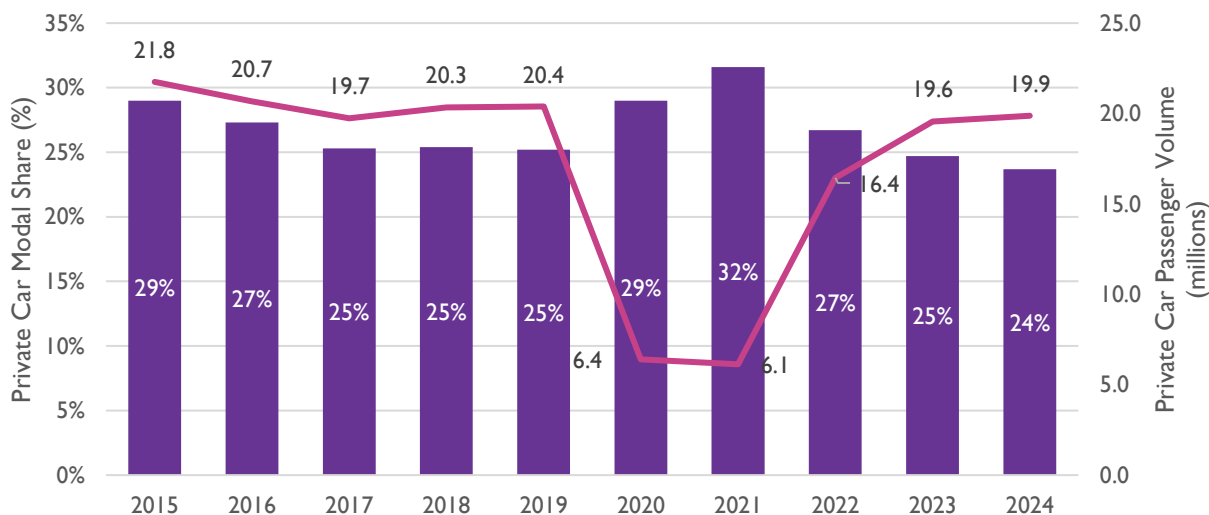


Source: Pragma

Figure A1.4.16 shows that while the modal share of private car use has gradually declined from around 29% in 2015 to 24% in 2024, the absolute number of passengers travelling by private car

has nearly returned to pre-pandemic levels. This indicates that overall airport passenger volumes have grown substantially since 2020, offsetting the reduced share of car use. Following a sharp drop in volume in 2020–2021 due to travel restrictions, private car volumes rebounded strongly, reaching approximately 19.9 million passengers in 2024 — close to the 2019 figure of 20.4 million. Therefore, despite travellers increasingly opting for public transport alternatives, private car travel remains a significant and resilient component of airport access underpinning car parking revenues as passenger volumes grow.

**Figure AI.4.16: Private Car Modal Share and Passenger Volumes between 2015-2024**



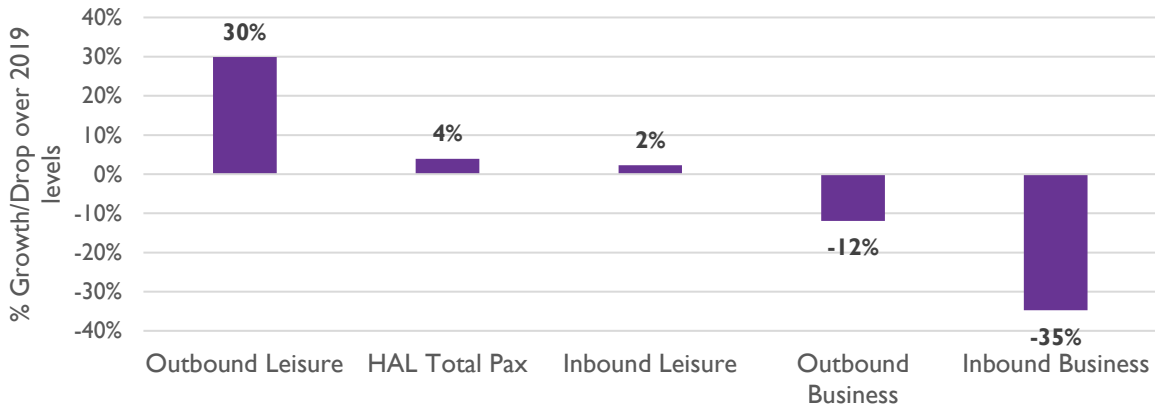
Source: Pragma, York Aviation Analysis

### Current Market Context – Underlying Demand

Figure AI.4.17 illustrates the change in HAL’s passenger market composition between 2019 and 2024, highlighting a pronounced shift toward outbound leisure travel. Outbound leisure passengers have grown by approximately 30%, representing the strongest recovery and expansion among all market segments.

By contrast, business travel, both outbound and inbound, has contracted significantly, with inbound business traffic down 35% and outbound business down 12% compared to 2019 levels. Meanwhile, inbound leisure travel has seen only modest growth (+2%), indicating a slower recovery in overseas visitor demand. Overall, the data underscores a rebalancing of HAL’s passenger base, with leisure travel, especially UK outbound, playing an increasingly important role in the Airport’s traffic mix post-pandemic. This is relevant as outbound passengers are far more likely to use Heathrow’s car parks than foreign visitors. Similarly dwell times are likely to be longer for leisure passengers than for business passengers.

**Figure AI.4.17: 2024 vs 2019 Growth by Passenger Market**

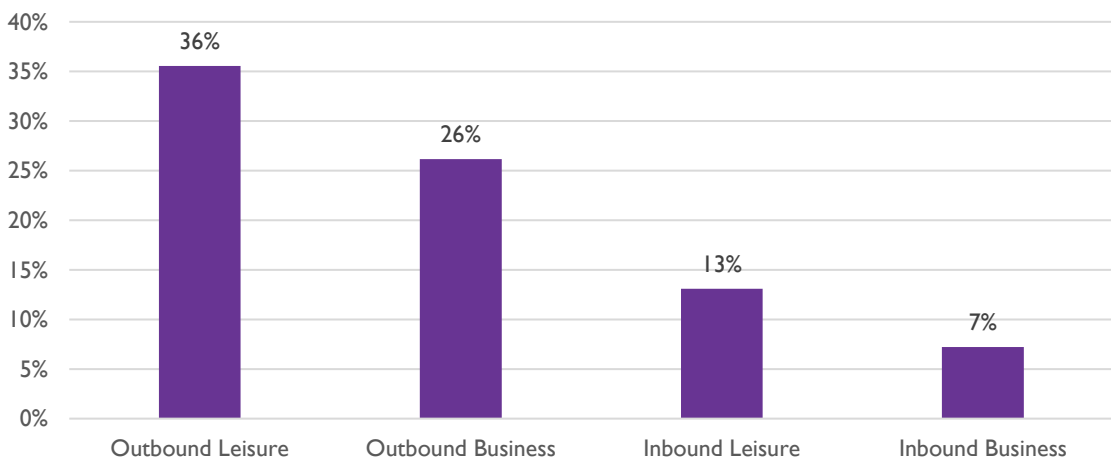


Source: CAA Passenger Survey data 2019-2024

Figures AI.4.18 and AI.4.19 demonstrate the dominant role of outbound leisure passengers in HAL’s car parking usage. As shown in Figure AI.4.18, 36% of outbound leisure passengers use private cars as their mode of transport, representing the highest participation rate among all passenger market segments. This is substantially higher than the usage observed in outbound business (26%), inbound leisure (13%), and inbound business (7%) markets.

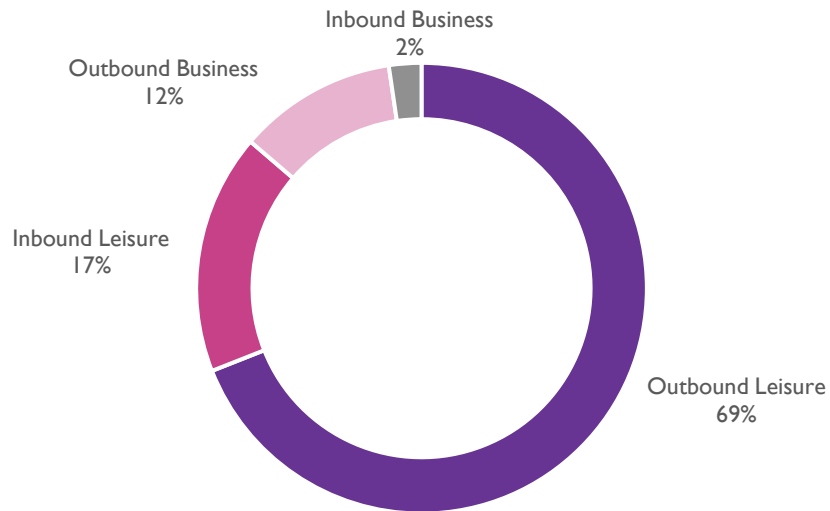
Figure AI.4.19 further illustrates the importance of outbound leisure passengers for car parking, which account for around 69% of all private car usage, outlining their increasing importance to HAL’s parking revenue base. The significant share of this segment reflects both the strong recovery of outbound leisure travel and its higher propensity for private vehicle access, often due to factors such as group travel, luggage volumes, and convenience for holiday departures. Together, these figures indicate that HAL’s car parking performance is increasingly dependent on the outbound leisure market, emphasising the need for continued alignment of parking products, pricing, and promotions to this key customer group but also representing an opportunity for revenue growth.

**Figure AI.4.18: Private Car Propensity by Passenger Group**



Source: CAA Passenger Survey data 2024

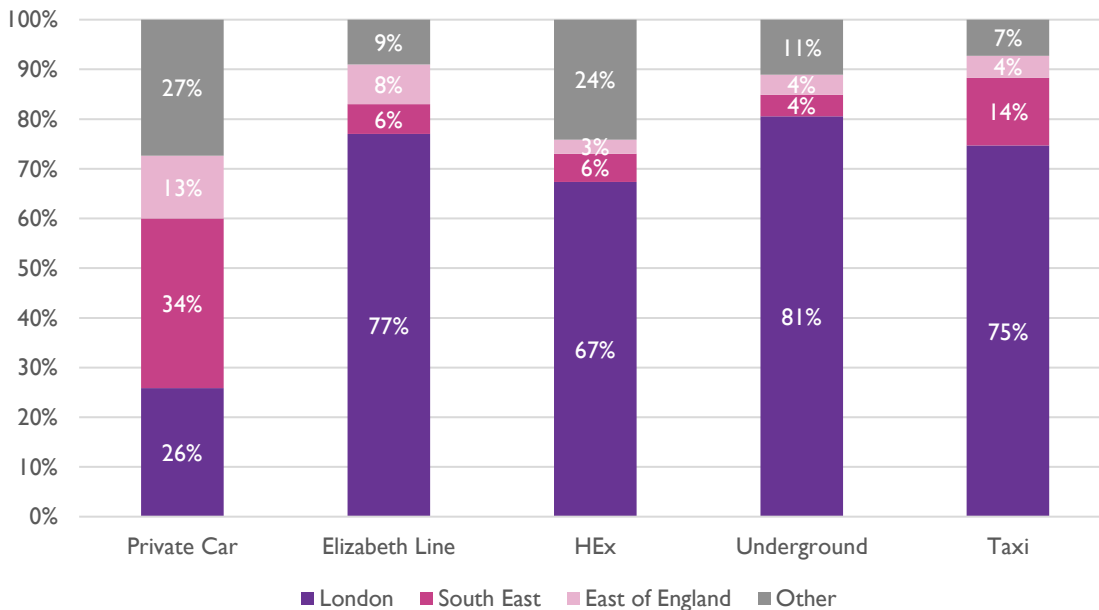
**Figure AI.4.19: Share of Private Car Passengers by Passenger Group**



Source: CAA Passenger Survey data 2024

Figure AI.4.20 shows the regional split in HAL passengers’ surface access mode choices, showing that car parking demand is dominated by passengers originating from outside London, particularly those in the South East region. Around 74% of private car users come from outside London, compared with only 23% for the Elizabeth Line, 33% for Heathrow Express, 19% for the Underground and 25% for taxis. This, in contrast, reflects the geographical accessibility and practicality of different transport options, while London-based passengers benefit from frequent and direct public transport services such as the Elizabeth Line and London Underground, those from more distant areas rely more heavily on private car travel.

**Figure AI.4.20: Mode Share of Heathrow Passengers by UK Region**



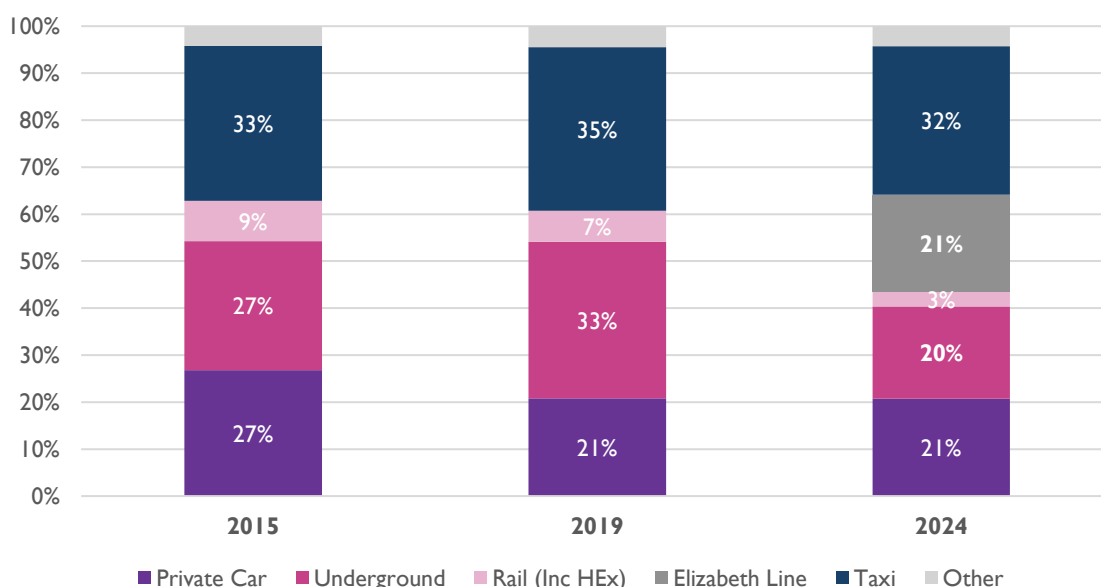
Source: CAA Passenger Survey data 2024

For the regions outside London, the South East stands out as the largest single source of car park demand, accounting for 34% of all private car users, the highest share by region. The South East also has the highest relative taxi usage outside London, underscoring the region’s strong overall reliance on road-based modes for airport access. Collectively, these findings indicate that HAL’s car parking operations are particularly sensitive to passenger volumes from the South East, reaffirming the importance of maintaining competitive and convenient parking offerings for this key regional market.

### Impact of the Elizabeth Line on Outbound Leisure Passengers

Figure A1.4.21 shows the impact of the Elizabeth Line on outbound leisure passengers within London since its introduction in 2022. The new line has rapidly become a new preferred mode of access to Heathrow, achieving a 21% modal share by 2024 and, in doing so, has drawn passengers away from both the London Underground, which fell from 33% in 2019 to 20% in 2024 and from traditional rail services, now representing only 3%. This shift demonstrates the Elizabeth Line’s success in offering a faster, more seamless, and competitively priced connection across London. As a result, the growth of HAL’s car parking market has been partially softened, as more London-based outbound leisure travellers opt for the convenience and accessibility of the new line over driving or using older (and more expensive) rail links such as the Heathrow Express. Revenues earned from rail, including HEx, the Elizabeth Line and the Piccadilly Line are assessed later in this report.

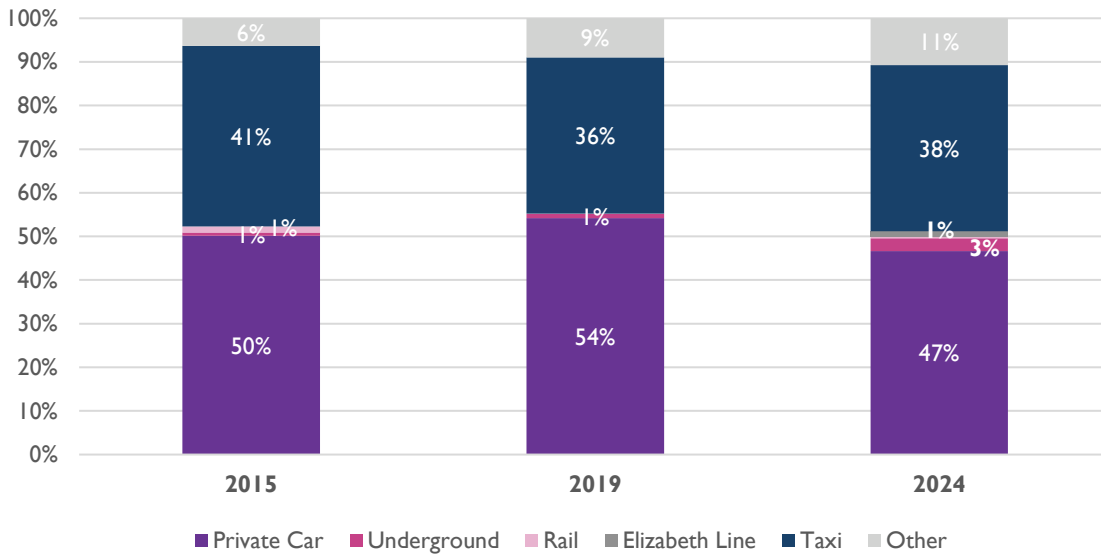
**Figure A1.4.21: Mode Share of London Outbound Leisure Passengers using Heathrow**



Source: CAA Passenger Survey data 2024

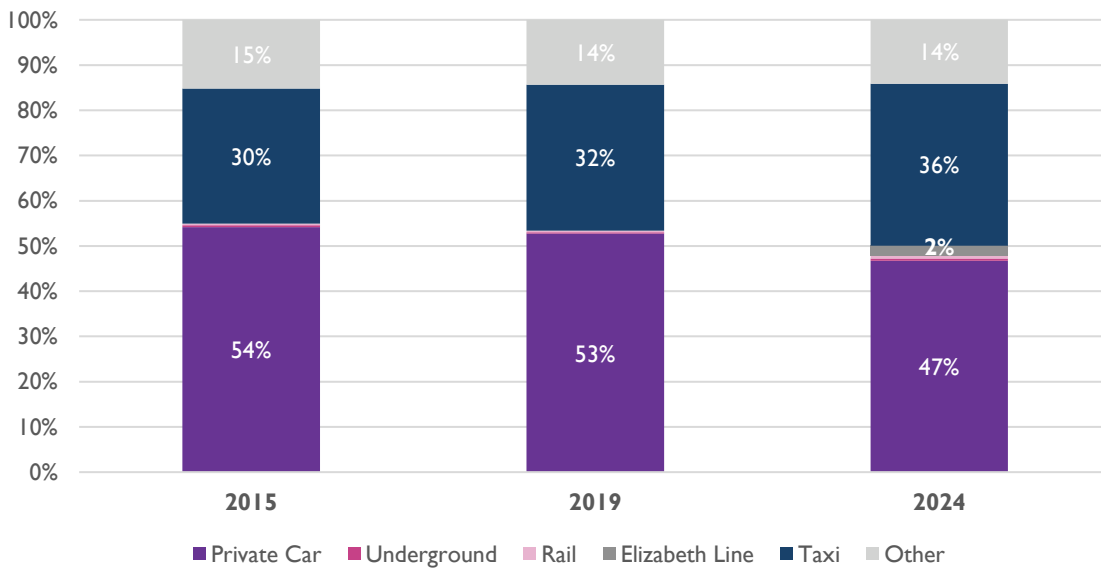
Figures A1.4.22 and A1.4.23 show the same modal share breakdown for Surrey and Berkshire - the counties with the largest volumes of Heathrow passengers in the South East region outside London. These show how the introduction of the Elizabeth Line has had minimal impact on travel behaviour. Private car and taxi use remain the dominant modes, together accounting for the majority of airport access. In both counties, private car usage stands at around 47% in 2024, only slightly below pre-pandemic levels. This indicates that, despite the new line, travellers in these areas continue to prefer road-based modes due to convenience, proximity, and limited direct Elizabeth Line benefits.

**Figure AI.4.22: Mode Share of Surrey Outbound Leisure Passengers at Heathrow**



Source: CAA Passenger Survey data 2024

**Figure AI.4.23: Mode Share of Berkshire Outbound Leisure Passengers at Heathrow**

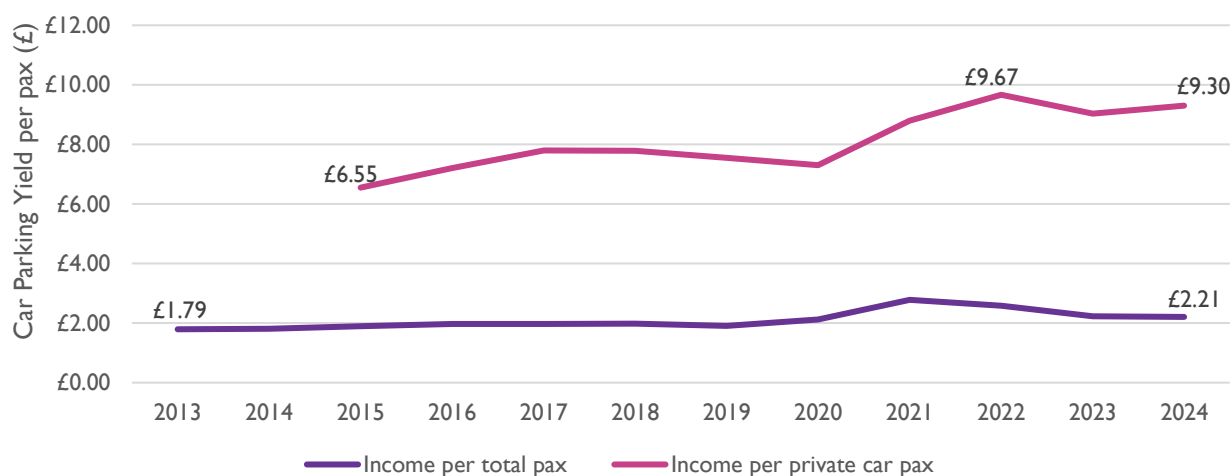


Source: CAA Passenger Survey data 2024

### Car Parking Yields

Figure AI.4.24 highlights a consistent improvement in HAL’s car parking yields in real terms over time. Income per total passenger has risen in real terms from £1.79 in 2013 to £1.90 in 2019, and further to £2.21 in 2024, indicating that HAL has successfully grown parking revenues faster than overall passenger growth.

**Figure AI.4.24: Car Parking Yields, Income per total passenger and Income per passenger using private car at Heathrow (2024 CPI prices)**



Source: Pragma, York Aviation Analysis

Similarly, income per private car passenger has also grown substantially, increasing from £6.55 in 2015 to £7.55 in 2019, and reaching £9.30 in 2024 (real 2024 prices). This growth suggests that HAL has been effective in upselling to premium parking services such as valet, business, and short-stay options, as well as implementing above-inflation price adjustments. Overall, the upward trajectory in both yield metrics underscores the resilience and profitability of HAL’s car parking operations, even as travellers diversify their transport choices. However, as with Retail and Catering, the strong performance may be more related to Heathrow’s premium passenger mix and does not necessarily mean that revenues have been optimised efficiently.

HAL has not provided a breakdown of car parking income historically between short and long stay parking<sup>43</sup> but its projection for 2025 in the data tables shows 41% of income coming from long stay parking, with 59% from the short stay product, excluding revenues from TDOC.

### Benchmarking

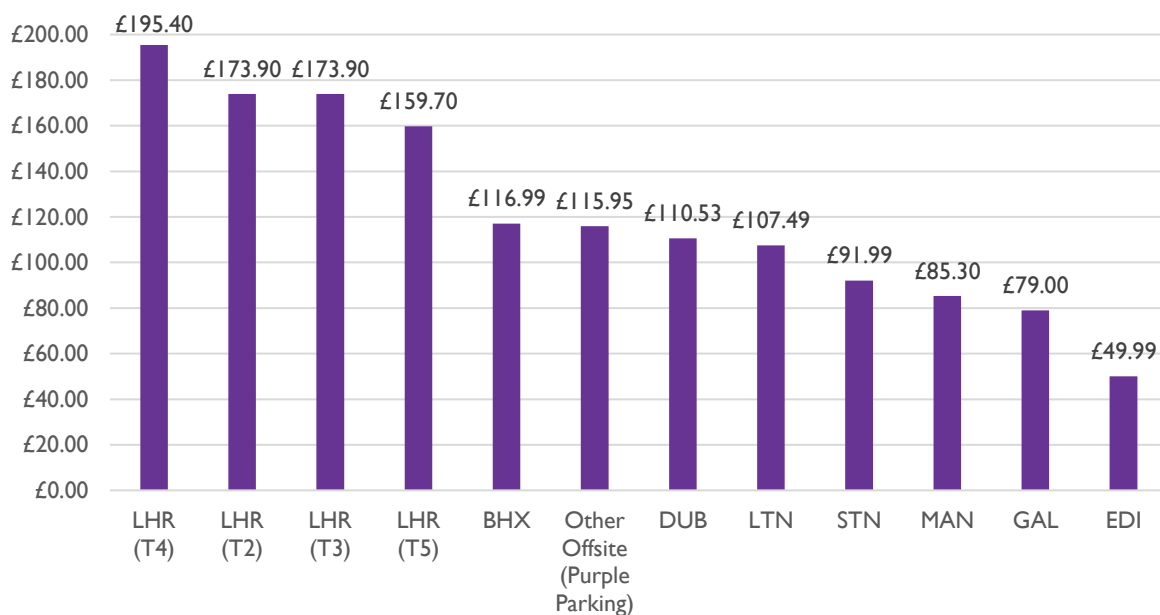
This section presents a benchmark analysis of HAL’s current car parking charges against a selection of airports to assess whether HAL’s parking products are competitively priced. The comparison includes HAL’s immediate offsite competitor, Purple Parking, alongside major UK and Irish airports; Stansted (STN), Gatwick (GAL), Manchester (MAN), Edinburgh (EDI), Birmingham (BHX), and Dublin (DUB). The analysis evaluates pricing across a range of key products, including Short Stay, Long Stay, and Meet & Greet parking, as well as Pick-Up and Drop-Off charges. This benchmarking exercise provides insight into HAL’s relative market positioning, highlighting where its pricing strategy may reflect a premium, be in line with, or fall below comparable airport offerings.

### Short Stay Car Parking

<sup>43</sup> The data tables are not entirely consistent regarding the 2024 Mode Share with different shares by car park type provided in the historic and forward-looking drivers. There is some uncertainty therefore regarding how many of those passengers that use private car to reach the airport and leave their car parked for the duration of their trip use the airport’s own car parks, either short or long stay, or use third party off-site car parks. Hence there are some limitations to our analysis of car parking revenue at the more granular level.

Figures A1.4.25 and A1.4.26 outline short-stay car park charges at HAL compared with benchmark airports, based on two-week advance bookings for a three-night stay and one-day advance bookings for a same-day return, respectively. The comparison shows that HAL consistently has the highest average short-stay parking prices among major UK airports. In Figure A1.4.25, HAL's terminal car parks, most notably T4 (£195.40) and T2/T3 (£173.90), are priced well above those at Birmingham (£115.95), Dublin (£110.52), and Stansted (£91.99). In contrast, Purple Parking, HAL's main offsite competitor, offers significantly lower rates, particularly attractive to leisure passengers who tend to book further in advance.

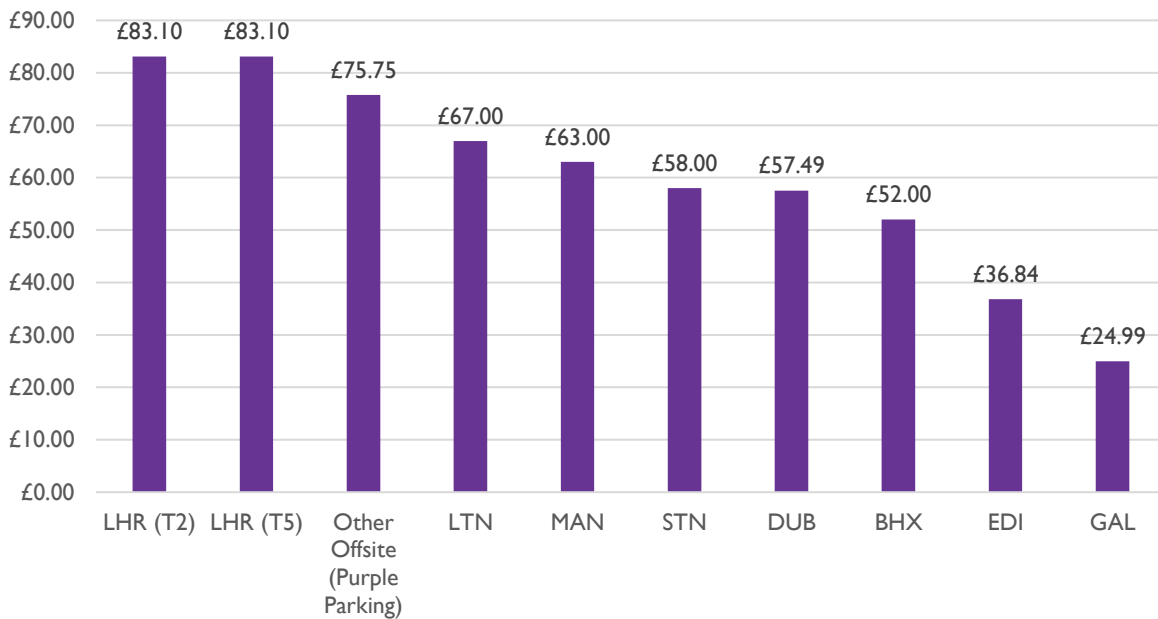
**Figure A1.4.25: Short Stay Benchmark, booking two weeks in advanced for a duration of 3 nights stay (2024 CPI prices)**



Source: Airport Car Parking Websites, Purple Parking

Figure A1.4.26, which represents short-notice, same-day return bookings typical of business travel, HAL remains the highest-priced operator, with T2 and T5 both at £85.70. Despite this premium, Purple Parking continues to offer lower prices, maintaining a competitive edge for cost-sensitive customers. Overall, these figures highlight HAL's premium pricing position in the short-stay segment, with strong convenience and proximity advantages, but also demonstrate that offsite competitors such as Purple Parking capture significant price-sensitive demand, particularly from advance leisure travellers.

**Figure AI.4.26: Short Stay Benchmark, booking one day in advanced for same day return**

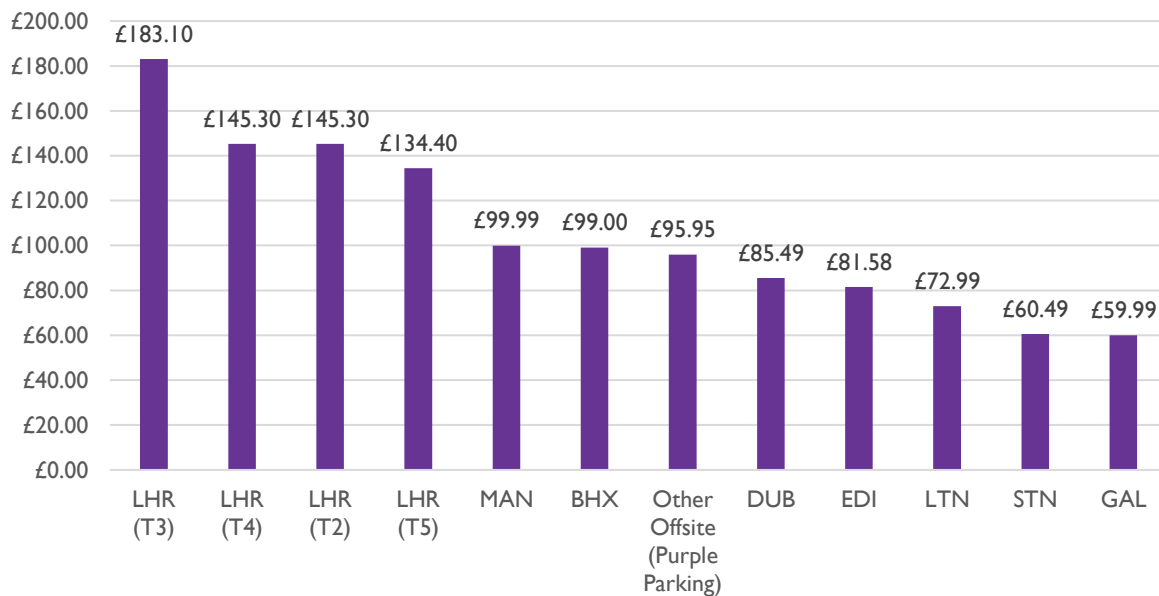


Source: Airport Car Parking Websites, Purple Parking

### Long Stay Car Parking

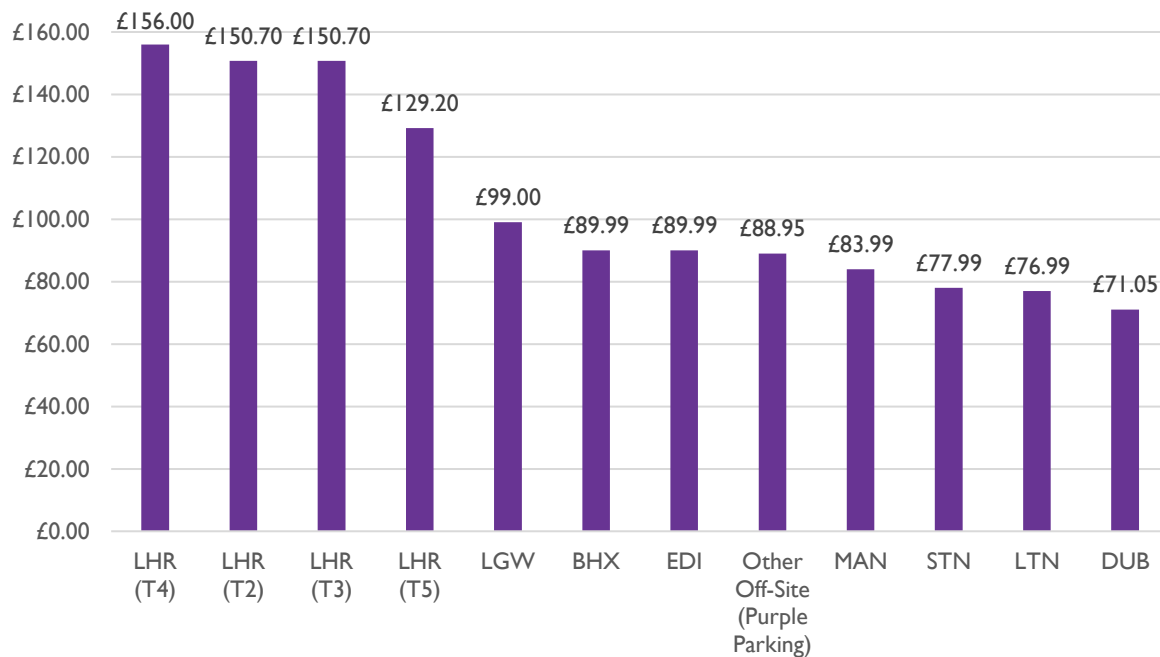
Figures AI.4.27 and AI.4.28 show long-stay parking charge benchmarks for HAL and comparator airports, based on bookings made three months in advance and three weeks in advance, respectively.

**Figure AI.4.27: Long Stay Benchmark, booking three months in advanced for a duration of 7 nights stay**



Source: Airport Car Parking Websites, Purple Parking

**Figure AI.4.28: Long Stay Benchmark, booking three weeks in advanced for a duration of 7 nights stay**



Source: Airport Car Parking Websites, Purple Parking

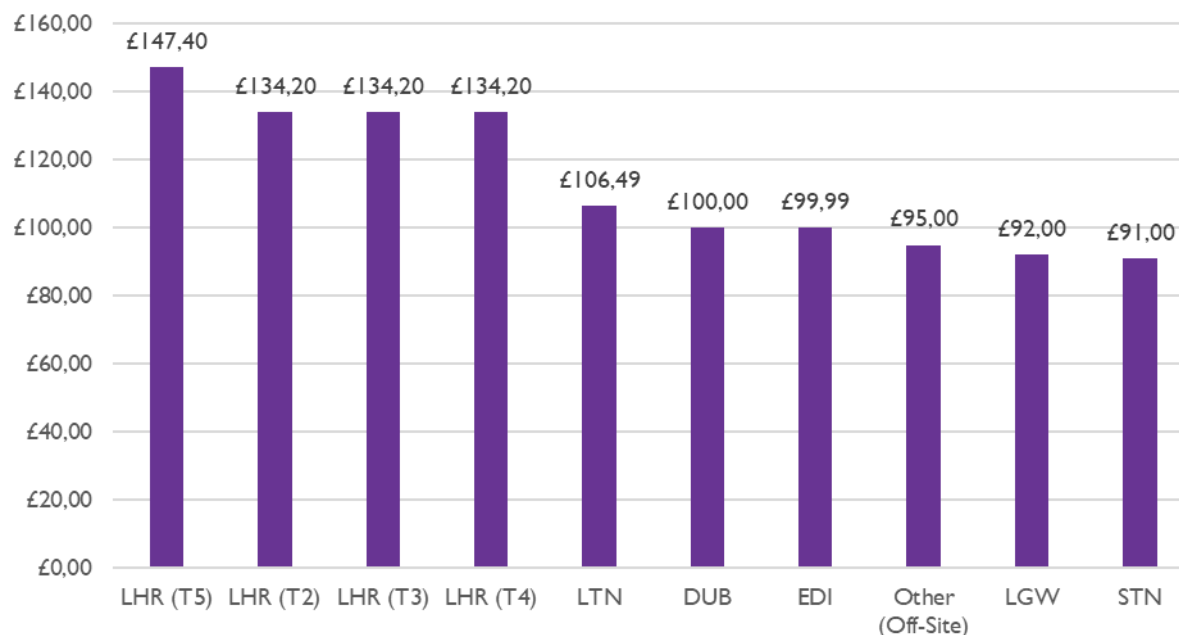
For a seven-night stay, HAL is the most expensive airport when booked either 3 weeks or 3 months in advance. For the three months advanced booking, HAL’s long-stay car parks consistently command a substantial premium, with T3 reaching £183.10 compared to around £99 at Manchester and Birmingham. In contrast, Purple Parking, HAL’s nearby offsite operator, remains significantly cheaper, offering strong value for cost-conscious leisure travellers. This comparison highlights HAL’s clear premium pricing position in the long-stay market, while offsite providers like Purple Parking effectively capture price-sensitive demand.

### Meet and Greet

Figure AI.4.29 shows Meet & Greet parking charges across major UK airports for a three-night stay booked one week in advance. The data shows that HAL is the most expensive operator, with T5 priced at £147.40 and other terminals (T2, T3, and T4) all around £134.90. These rates are significantly higher than those at comparator airports such as Luton (£106.49), Dublin (£100.00), and Edinburgh (£99.99), as well as offsite operators (£95.00).

This pricing highlights HAL’s premium positioning in the Meet & Greet segment, targeting travellers who prioritise convenience and time savings. However, the significant price gap compared with other airports and offsite operators (£95.00) indicates that competitors continue to attract more price-sensitive customers, while HAL focuses on maximising value from its premium market segment. As with long-stay parking more generally, it is unclear whether HAL’s pricing strategy is optimised in terms of overall revenue generation, i.e. to what extent would lower prices achieve higher market penetration and increase revenue overall.

**Figure AI.4.29: Meet and Greet, booking one week in advanced for a duration of three nights stay**



Source: Airport Car Parking Websites, Purple Parking

### Conclusion

Overall, HAL’s car parking revenues have shown robust real terms yield growth over the last decade. Pricing appears to be aligned with its premium positioning, generating strong yields even as private car modal share has declined, partly due to the Elizabeth Line drawing passengers to and from London onto public transport.

The core catchment for car parking revenues remains residents of the South East region, particularly outbound leisure travellers, who continue to rely heavily on private vehicle access. As parking capacity becomes increasingly constrained, HAL’s ability to grow revenues will rely on active demand management rather than broad price increases.

Whilst there is no clear evidence that HAL’s pricing and inventory management is being operated sub-optimally, both in absolute terms and also when compared with other UK airport benchmarks, there may be scope for yield improvement through the implementation of further dynamic pricing strategies, such as offering incentives during off-peak periods and premium rates during peak times, HAL can better manage utilisation, boost demand in trough periods, and capture market share currently held by competitively priced offsite operators like Purple Parking. This would offer scope for some increase in market penetration and income.

POD parking is now outside regulated activity and, therefore, we understand that £9.8m of long stay car parking income needs to be removed from the baseline to be consistent with the regulatory treatment and equivalent exclusion of Opex.

Similarly, we have not addressed revenues from Car Rental, which is included as the other element of Surface Access income in HAL’s categorisation, amounting to 3% of CommRev (excluding cargo income) and so has not been considered in detail.

## TDOC

TDOC income is categorised by HAL separately from car parking revenue and we identified that charges at Heathrow are less than the other larger airports, even though the charge has recently been increased to £7 from the £5 charged in 2024. Gatwick has increased its charge to £10, with London City charging £8 and Bristol now charges £8.50.

The charge in the 2024 baseline was £5 and has already been increased to £7 (both including VAT)<sup>44</sup>. Whilst we believe that there is scope for further increases given that Gatwick has recently increased the charge to £10. However, we recognise that the CAA oversees these charges at Heathrow and that the revenue is calculated bottom up. We reflect the current bottom up charge calculation, taking into account the current price and mode share in the table below.

The adjusted surface access revenues are shown in Table A1.4.14 below.

**Table A1.4.14: Adjusted Efficient Baseline for Surface Access**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	POD Parking Adjustment	Adjusted Baseline
Car Parking	185.42		-£9.8	175.62
Car Rental	27.28			27.28
TDOC	53.08	70%		53.08

### A1.4.4 Service Revenue

Service Revenue accounted for 6% of total CommRev (excluding Cargo) in 2024. Our Phase I backward look identified that this revenue stream was 9% down on the Adjusted H7 Determination in 2024. Service Revenue includes income generated from Fast Track and other VIP charges as well as other, undefined, revenues from services provided by HAL.

In Table A1.4.15, we set out our proposed approach to service revenues and in Table A1.4.16, we set out our information requirements to enable the assessment.

**Table A1.4.15: Service Revenue – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Other	Assess Elasticities
Service Revenue	Yes	No	No	Yes	No	Yes

<sup>44</sup> This is the level of charge assumed by HAL in its H8 projections.

**Table AI.4.16: Service Revenue – Information Requirements**

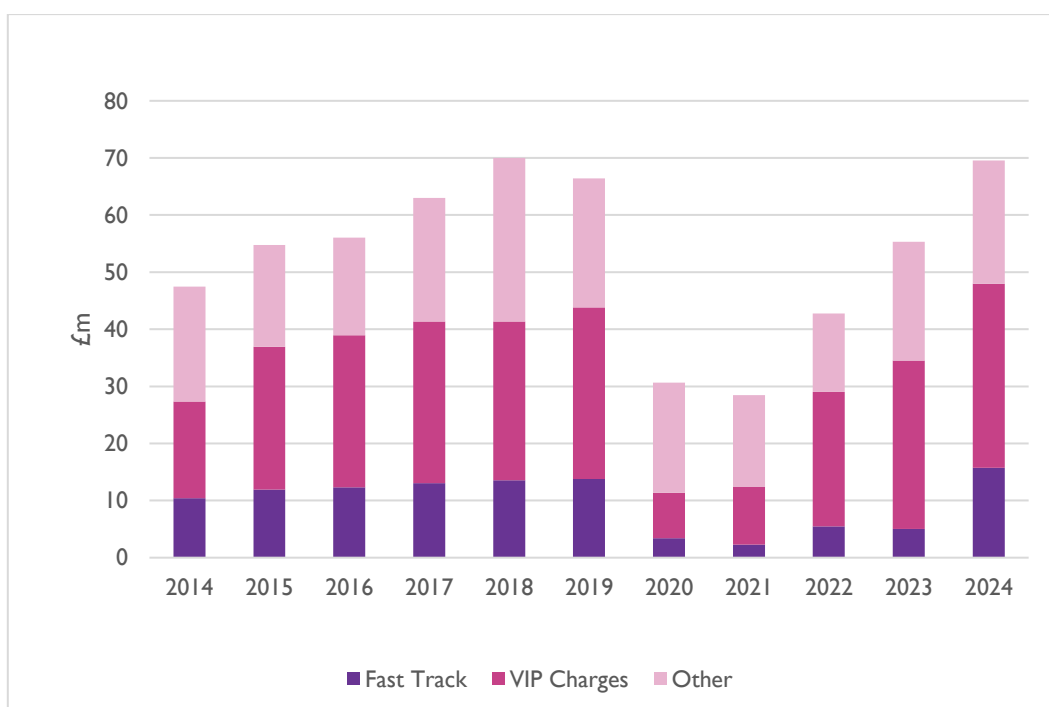
Information Requirement	Expected in HAL Business Plan	Targeted Discussions and Follow Up Information	Consultant Information
Total passenger numbers	✓	✓	
Service Revenues split by individual product so we have visibility of the constituent parts of this revenue line, and can assess revenue growth by product	✓	✓	
Forecast tariff increases by product.	✓	✓	
Defined volume drivers, price/inflation drivers, elasticities and associated volume and price/inflation data.	✓	✓	✓
Narrative, explanation and data explaining any overlays or other step changes to the income that are not driven by price/inflation or volume driver-related changes for example new products introduced or old ones removed.	✓	✓	
Any available benchmarks from other airports.			✓

We identified early that we would not have any benchmark information to compare service revenues with other airports and so we would be reliant on assessing HAL’s own performance and information in relation to the drivers of income growth.

#### Historic Analysis

HAL did provide some granularity in terms of this income stream, breaking down revenues into Fast Track, VIP charges and Other Services. The breakdown of these revenues is show in Figure AI.4.30.

**Figure AI.4.30: Service Revenue by Category (2024 real prices)**



Source: HAL

In overall terms, this income stream has largely returned to 2019 levels, the majority of the income derives from VIP services but we have no information on what drives this specific income stream albeit it is clearly related to passenger volume to some degree.

### Fast Track

Whilst it is not possible to benchmark total Service Revenue income, the one area where there is some benchmarking information is in relation to the price of Fast Track services, albeit this only accounts for 22.6% of this income category. There are limited benchmarks outside the UK as many European airports only offer the service as part of a much larger Meet and Greet type service, at a substantially higher cost.

**Table A1.4.17: Comparative Fast Track Prices in 2025**

Heathrow	£12.50	Amsterdam	€7.00
Gatwick	£6.00	Madrid	€11.95
Stansted	£6.90-£9.99	Copenhagen	€9.00
Manchester	£5.49-£7.49	Rome	€7.00

Source: Airport websites

### Conclusion

We have no specific evidence that HAL is not achieving an efficient level of revenues in this category overall. However, the very high price charged for Fast Track may deter usage, accepting that Heathrow's premium passengers will be paying for the service through their ticket price. It is possible that revenues could be increased through greater usage at a lower price point, albeit this might have implications for how security lane throughput is optimised. We believe that HAL could have generated more revenue in this category with more attractive pricing and so we have added 1% to the 2024 baseline for Fast Track services only. Our recommended baseline for Service Revenue is set out in Table A1.4.18 below.

**Table A1.4.18: Adjusted Efficient Baseline for Other Service Revenue**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	Adjusted Baseline
Fast track services	15.75	1%	15.91
VIP charges	32.20		32.20
Other service revenues	21.63		21.63

### A1.4.5 Property Revenue

Property revenues equated to 14% of HAL's CommRev in 2024. Our backward look against the Adjusted H7 Determination showed property income to be 3% above expectations in 2024.

Property revenues were highlighted as an area of focus by the airlines but this may be more to do with HAL’s proposals for adjusting the single till in relation to some potential property developments. Hence, we included this category for more detailed assessment.

Our aim was to understand the size of the property portfolio, both on and off site, both in terms of the number of buildings, or rooms, the square metrage of the properties and the income generated from these properties having regard to benchmarks for similar types of property both at airports and in the West London property market more generally. Our aim had been to look at a sub-categorisation, such as in-terminal offices, other offices, other commercial properties, warehouses etc. to facilitate some benchmarking. Our proposed approach is set out in Table AI.4.19 and our information requirements in Table AI.4.20.

**Table AI.4.19: Property Revenue – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Other	Assess Elasticities
Property	No	No	Yes	Yes	No	Yes

**Table AI.4.20: Property Revenue – Information Requirements**

Information Requirement	Expected in HAL Business plan	Targeted Discussions and Follow Up Information	Consultant Information
Total passenger numbers	✓	✓	
Total property portfolio, split by individual building, with accompanying square metrage and annual income or provided, at least, at a subcategory level.	✓	✓	
Forecast rental increases for each property or by sub-category.	✓	✓	
Narrative, explanation and data explaining any overlays or other step changes to the income that are not driven by price/inflation or volume driver-related changes for example new properties introduced or old ones sold/disposed of.	✓	✓	
Any relevant property income benchmarks by type of property.			✓

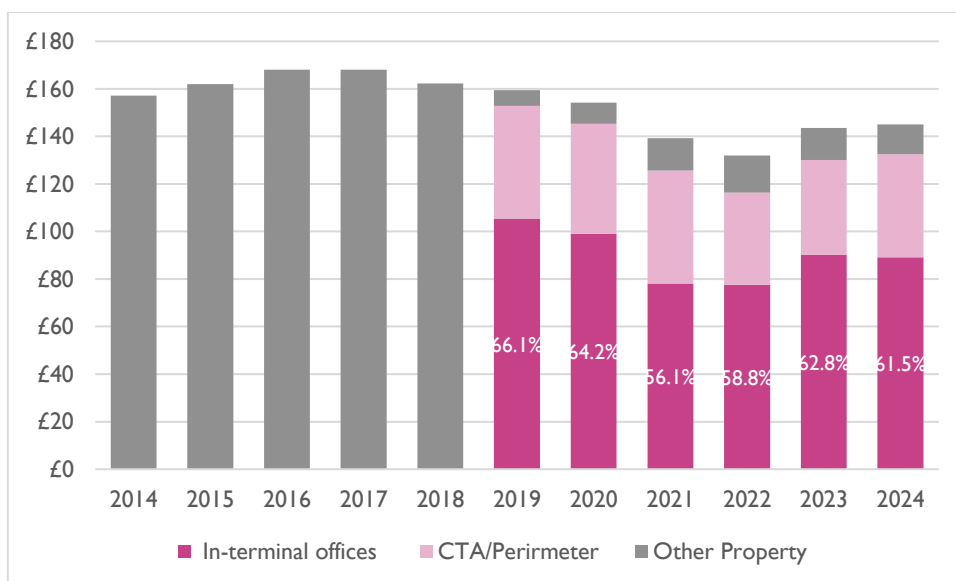
It had been our intention to look in some detail at the historic pattern of revenue growth and to consider the periodicity of rent reviews and where each property is in the cycle. However, although HAL provided income broken down into In-terminal offices, CTA/perimeter properties and other properties, this was not supported by specific information to enable in depth analysis of each property type. A breakdown of property floor area was provided for 2024 but this did not match the breakdown of income sub-categories so we were unable to analyse this in detail.

Rather, we were referred to HAL’s ‘Guide Price’ approach that covers approximately 60% of all property revenues.

### Revenue by Sub-category

Figure A1.4.31 shows the breakdown of Property Revenues by Sub-category. A breakdown was only provided from 2019. Other than during the height of the pandemic, In-terminal offices accounted for over 60% of all rental income. Most of the rest of the revenue comes from CTA/Perimeter property. It is unclear what is included within the ‘Other property category’ but this accounted for only a small proportion of property income prior to 2022. However, we understand that this now includes residential rental properties.

**Figure A1.4.31: Property Revenue by Category 2014-2024 (2024 real prices)**



Source: HAL

### In-terminal Offices

This is the one category for which we have the floor area on an equivalent basis provided by HAL. Based on the floor area stated, rental levels would appear to be £1,435 per m<sup>2</sup>, which is high and close to premium rental levels achieved for offices in Central London.<sup>45</sup> This category does include airline lounges and we note that this is the main category of commercial space that is due for substantive expansion in H8 according to HAL’s Business Plan – 5,800m<sup>2</sup> of new space<sup>46</sup> representing an increase of around 16% compared to the current area for Lounges.<sup>47</sup>

It is our understanding that it is largely the In-terminal accommodation that is covered by ‘Guide Prices’. Based on HAL’s Decision Document for 2024/5<sup>48</sup>, rents covered by these Guide Prices are:

- In-terminal offices;
- Airline lounges;

<sup>45</sup> Statista.

<sup>46</sup> Constructive Engagement Presentation 11<sup>th</sup> September 2025.

<sup>47</sup> Pragma Report 36% of 99,911m<sup>2</sup> of Front of House Commercial Floor Area.

<sup>48</sup> Heathrow Airport – Property Rents 2024/5 and Associated Matters, May 2024.

- 
- Ramp accommodation; and
  - Check-in and other airlines desks.

As well as In-terminal accommodation, these Guide Prices also cover D’Albiac House in the CTA and Building 820 adjacent to Terminal 3.

The Guide Prices each year are consulted on each year and, other than through the pandemic where prices were largely held constant, set using a formula that averages RPI, passenger numbers and the MSCI/IPD index<sup>49</sup> for real estate. Due to falling passenger numbers during the pandemic this would have meant rental levels per m<sup>2</sup> falling so prices were held until the formula was reapplied again from 2023/4. Some discounts are in place for T2 property, in part reflecting the phasing of delivery of the full infrastructure.

The relatively strong recovery of passenger volumes since the pandemic has meant that the passenger growth component has been higher than inflation and so enabled rental levels to increase in real terms whereas pre-pandemic the rate of passenger growth did not always exceed inflation, resulting in yield dilution in some years, i.e. rental incomes in this sub-category below inflation. Prices during the pandemic were frozen in nominal terms and real growth has only resumed since 2023 as is evident from Figure A1.4.31.

Given that 60% or more of total Property Revenue is covered by these Guide Prices, HAL does not have scope to increase income above these levels. However, the fact that 60% of Property Revenue is covered by these Guide Prices does mean that in normal years, HAL is able to grow income at or close to inflation, whereas often rental levels for any individual property would be held steady for a number of years and only increase at the time of the next rent review.

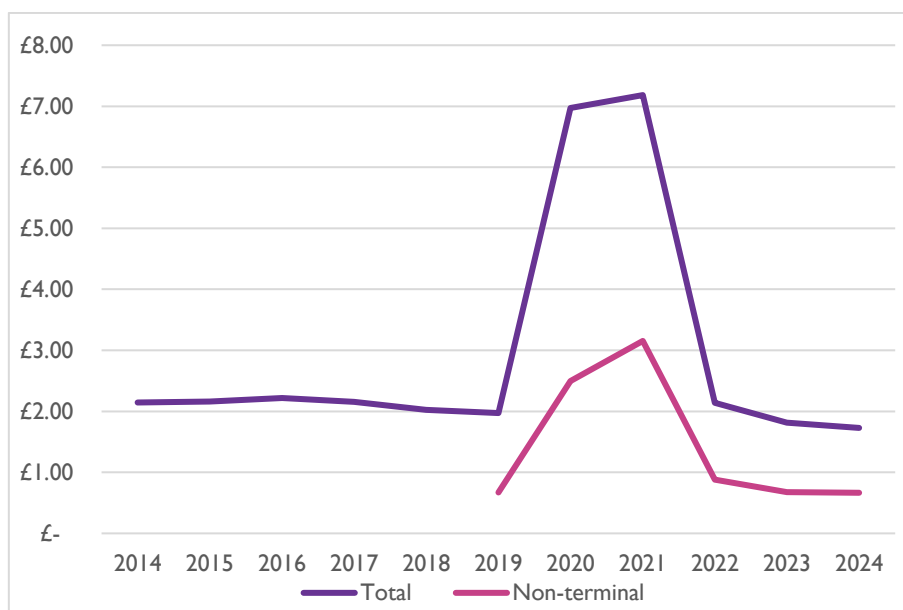
### **Other Property Revenue**

Figure A1.4.32 shows Property Revenue on a per passenger basis and clearly demonstrates an increase during the pandemic when passenger levels were depressed. Since the pandemic, revenues from Non-terminal related properties have followed the same broad trajectory as total property rental levels, suggesting that a similar approach to the Guide Prices is being adopted by HAL.

---

<sup>49</sup> A monthly property index and we understand that an average of Central, Outer and West London offices is used.

**Figure AI.4.32: Property Revenue per Passenger (2024 real prices)**



Source: HAL

### Benchmarks

Benchmarking Property Revenue across airports at the aggregate level is difficult as it depends on the quantum of property in different categories linked to space availability. Ideally, benchmarks would be by facility or area as we had originally intended.

Some comparable reported property revenues per passenger (2024 prices) are shown in Table AI.4.21.

**Table AI.4.21: Property Revenues per Passenger at Benchmark Airports (2024 real prices)**

	2019	2024	% Change
<b>Gatwick</b>	£0.82	£0.81	-1.2%
<b>Schiphol Group</b>	£2.31	£2.29	-0.9%
<b>AdP non-terminal property</b>	£2.59	£2.81	8.4%
<b>Dublin</b>	£1.92	£1.82	-5.2%
<b>HAL</b>	£1.97	£1.73	-12.2%

Source: Airport Published Accounts

Given land constraints at Heathrow, especially compared to Paris CDG (Roissy) and the Schiphol Airport City development, achieved total Property Revenue of £1.73 per pax does not appear out of line. Future commercial development of the CTA at Heathrow might deliver a similar outcome to the other airports.

However, it is notable that property revenues per passenger have reduced significantly more than other airports on a per passenger basis. Whilst this may be explained to some extent by the 'Guide Price' mechanism, it does suggest that HAL has not been as proactive as other airports in managing its property estate. Hence, we consider some upward adjustment to the baseline warranted.

## Conclusion

Based on the information available, it is hard to form a view that HAL is underperforming in terms of Property Revenue, especially in the light of the specific and longstanding 'Guide Price' approach and when limitations on space are taken into account. If it could match Dublin, this would suggest that revenue could be 5% higher, but given the Guide Price structure, this could only apply to Non-Terminal/Guide Price income. We have applied a 2.5% uplift to the Baseline for this sub-category only. The impact on Property revenue is shown in Table A1.4.22.

**Table A1.4.22: Adjusted Efficient Baseline for Property Revenue**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	Adjusted Baseline
Property Revenue	145.02	1%	146.43
of which			
Guide Price	89.20		89.20
Non-Guide Price	55.83	2.5%	57.23

### A1.4.6 Rail Revenue

At £118 million in 2024, Rail Revenue accounted for 11% of all CommRev income (excluding Cargo and ORCs) and is, therefore, a significant revenue stream requiring assessment in terms of the 2024 Baseline.

Whereas most other cost and income lines have generally either been favourable or adverse to the Adjusted H7 Determination between 2022 and 2024, rail revenues have swung hugely, with revenues 8% higher than the Adjusted H7 Determination in 2023 but have then fallen in 2024 to an income level 20% below the assumed income in the Adjusted H7 Determination. While HEx revenue was only 4% below the Adjusted H7 Determination, Track Access and Piccadilly Line revenue were substantially below that previously estimated once adjusted for total passenger volume. We are not entirely clear why the income from Track Access charges is so far below that assumed in the Adjusted H7 Determination given that the shortfall in HEx revenue is in large part related to the Elizabeth Line for which Track Access charges are payable.

In Table A1.4.23, we set out our proposed approach to assessing these revenues.

**Table A1.4.23: Rail Revenue – Proposed Approach**

	Bottom-up Build Up	Benchmark with Other Airports	Benchmark with Other Economic/Market Data	Historical Trend Analysis	Other	Assess Elasticities
Rail	Yes	No	No	Yes	No	Yes

Most rail income – 82% of the total in 2024 – is generated by Heathrow Express (HEX) revenue, with the remainder being Track and Station Access Revenue and income earned from the Piccadilly Line through a revenue sharing arrangement with Transport for London (TfL) that we understand relates to the extension of the Piccadilly Line to T5.

We understand from HAL that the new Elizabeth Line train services have significantly adversely impacted the Heathrow Express revenue, with the latter being significantly more expensive for a ticket to Central London (£25 versus £12.80 on the Elizabeth Line), and only as far as London Paddington Station, compared to the cheaper Elizabeth Line service which is only marginally slower (30 minutes versus 15 minutes on the HEX, but can take passengers beyond Paddington, into the West End, the City, Canary Wharf and further into East London and Essex/Kent.

Our proposed approach was to assess the revenue stream by analysing the modal share of passengers, both in terms of rail as a percentage of the total passenger volumes, but also to better understand the mix of rail passengers between these three main categories. We also understand that there is some uncertainty regarding ongoing track access for the HEX service beyond 2028 and this could be a material factor in this income stream in H8. Our information requirements are set out in Table A1.4.24.

**Table A1.4.24: Rail Revenue – Information Requirements**

Information Requirement	Expected in HAL Business plan	Targeted Discussions and Follow Up Information	Consultant Information
Total passenger numbers split by mode of travel, including all the individual rail options (Heathrow Express, Elizabeth Line, Underground, Other)	✓	✓	
Revenue by different category – HEX, other track access charges etc.	✓	✓	
Defined volume drivers, price/inflation/tariff drivers, elasticities and associated volume and price/inflation data	✓	✓	
Narrative, explanation and data explaining any overlays or other step changes to the income that are not driven by price/inflation or volume driver-related changes for example new products and services introduced or old ones suspended.	✓	✓	

Our expectation was there would be limited, if any, data available for equivalent services at other airports to enable benchmarking of these activities as most airports do not themselves operate rail links. Hence, our focus has been on analysing the historical trends at Heathrow.

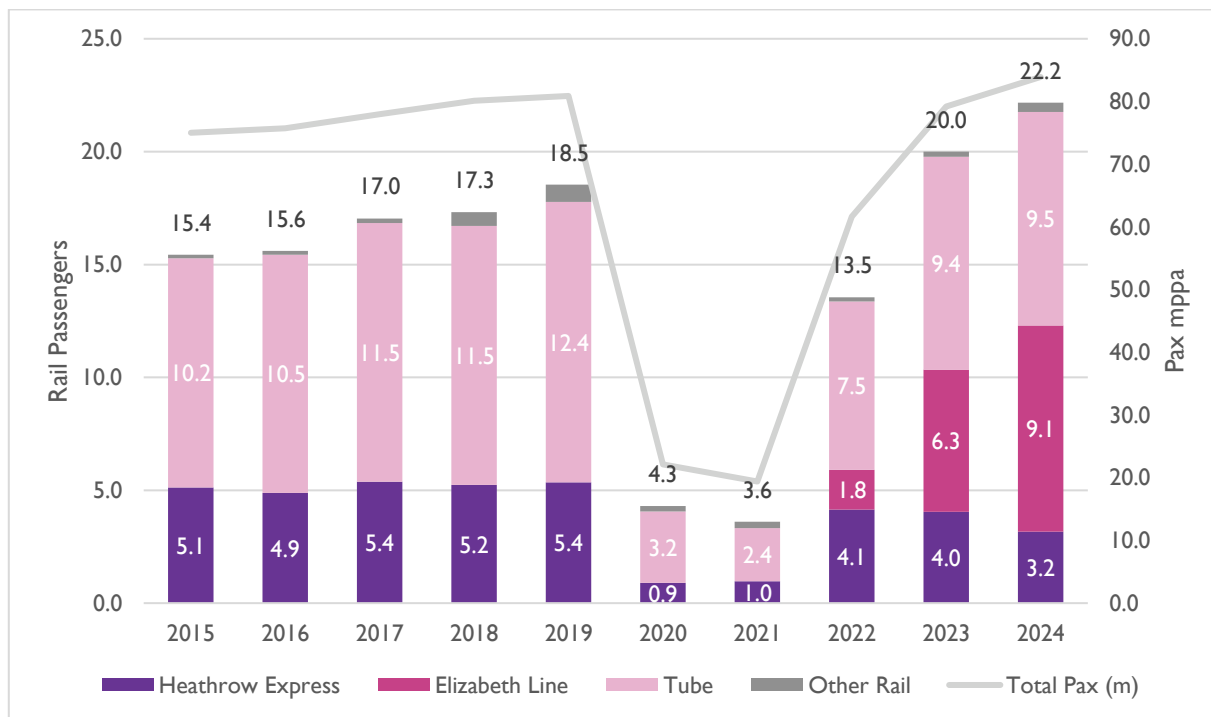
### Historic Market Analysis

#### Modal Share Analysis

Figure A1.4.33 shows the volume of passengers using HEX, the Piccadilly Line and the Elizabeth Line to access Heathrow over time based on HAL’s data tables. Pre-pandemic, HEX enjoyed steady demand, carrying 5 or more million air passengers annually between 2015 and 2019. During this period, total rail and underground usage to Heathrow rose gradually to just over 18 million

rail passengers, underpinned mainly by the Piccadilly Line. HEx remained a premium service catering to business and time-sensitive travellers, maintaining a relatively stable market share but with limited growth compared to overall passenger growth.

**Figure A1.4.33: Heathrow Rail Passengers by Rail Mode and Total Passengers 2015-2024**



Source: calculated from HAL, July 2025 data tables

Following the pandemic, total rail use has risen sharply driven largely by the Elizabeth Line, which offers direct, affordable, and convenient links from Central and East London. By 2024, the Elizabeth Line was carrying 9.1 million passengers, nearly triple HEx's 3.2 million passengers<sup>50</sup> and had become the dominant rail mode to the Airport.

Overall, rail's mode share increased significantly, with around one in three of Heathrow's point to point passengers (33%) now using rail or underground compared to 28% in 2015. While total airport passengers returned to 104% of 2019 levels, rail use grew to 120%, underscoring a major shift in travel behaviour. However, this has not translated into increased income due to the shift from HEx to the Elizabeth Line.

### Market Drivers

Figure A1.4.34 shows the different passenger profiles between HEx and the London Underground pre-pandemic, as shown by CAA survey data<sup>51</sup>. Figure A1.4.35 shows the pattern across all three rail modes in 2024. Business travellers dominated HEx's user base pre-pandemic so, when considering why patronage of HEx may be lower in 2024, it is material that business travel has not

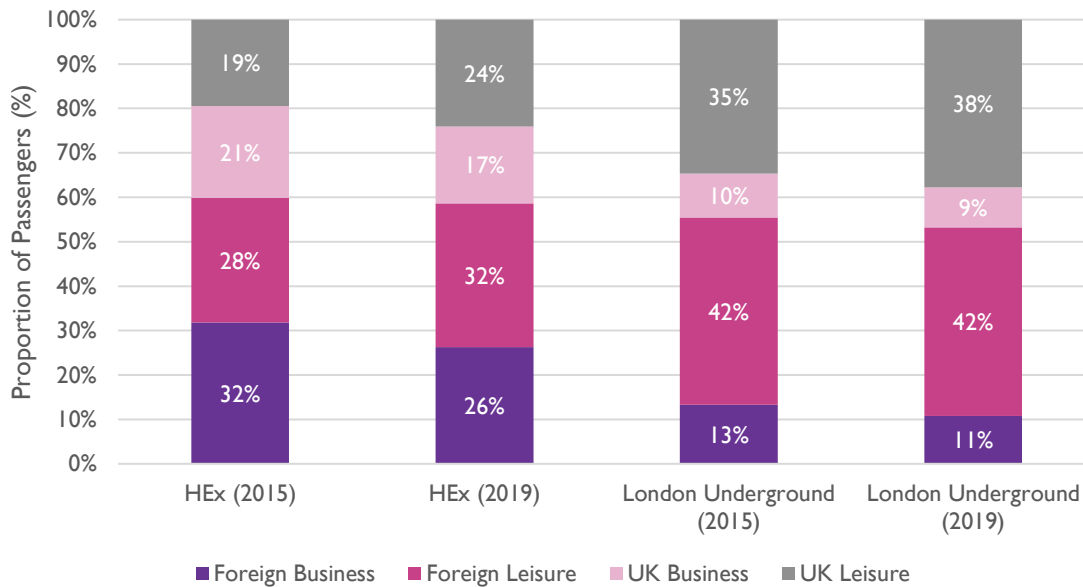
<sup>50</sup> We note that the Heathrow Express Annual Report cites higher passenger numbers for each year at 4.4 million in 2024. We assume that this higher patronage relates to non-air passenger usage of the service, which contributes to revenue. There will be similar non-passenger usage of other rail modes.

<sup>51</sup> CAA survey data reports a smaller number of passengers as using both the Elizabeth Line and HEx in 2024 than reported by HAL in the data tables but we are assuming that the broad passenger composition indicated by CAA survey data is reasonable in terms of the drivers of rail usage.

yet returned to pre-pandemic levels. As explained earlier (Table AI.4.5), UK outbound leisure passengers now make up a much higher proportion of the passengers using Heathrow.

In contrast, the London Underground was primarily used by leisure passengers, accounting for around 77% in 2015 and rising to 80% in 2019.

**Figure AI.4.34: Heathrow Passenger Profile by Rail Mode in 2015 and 2019**

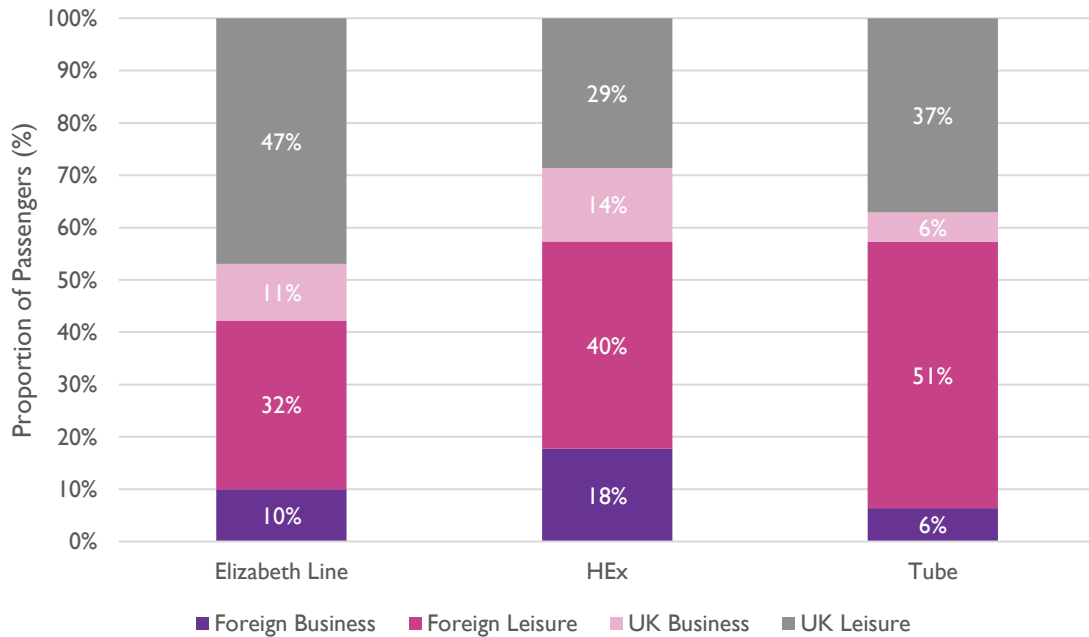


Source: CAA Passenger Survey 2015/2019 data

Figure AI.4.35 shows that the introduction of the Elizabeth Line has enabled rail to increase its penetration of UK outbound leisure markets. This is especially the case for traffic to and from the Greater London region as shown in Figure AI.4.21 earlier in this Appendix, but not from key parts of Heathrow’s catchment area to the west and southwest of the Airport (Figure AI.4.22 and AI.4.23). Around 47% of Elizabeth Line users are UK leisure passengers, underscored by its convenience, affordability, and accessibility across a wider London and regional catchment.

Hence, there are some understandable reasons why HEx’s share has fallen, not least as the Elizabeth Line offers a better product than the Piccadilly Line but still offers through travel from a wider area across London without the need to change trains at Paddington.

**Figure AI.4.35: Heathrow Passenger Profile by Rail Mode in 2024**

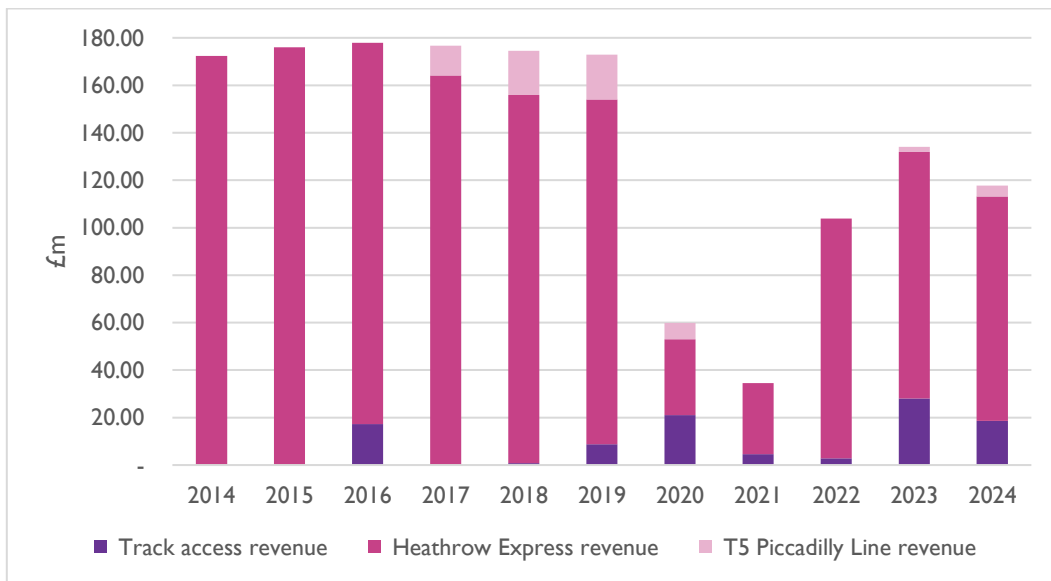


Source: CAA Passenger Survey data 2024

**Impact on Revenues**

The change on HEx’s mode share is the primary driver of the reduction in HAL’s Rail Revenue as shown in Figure AI.4.36. HAL’s revenue from HEx was 85% of the income earned from rail modes in 2019 and this had fallen to 80% by 2024. Track access revenue has increased as a consequence of Elizabeth Line services but this income is related to the number of trains rather than the volume of passengers carried. Overall, Rail Revenue is down 32% in 2024 compared to 2019.

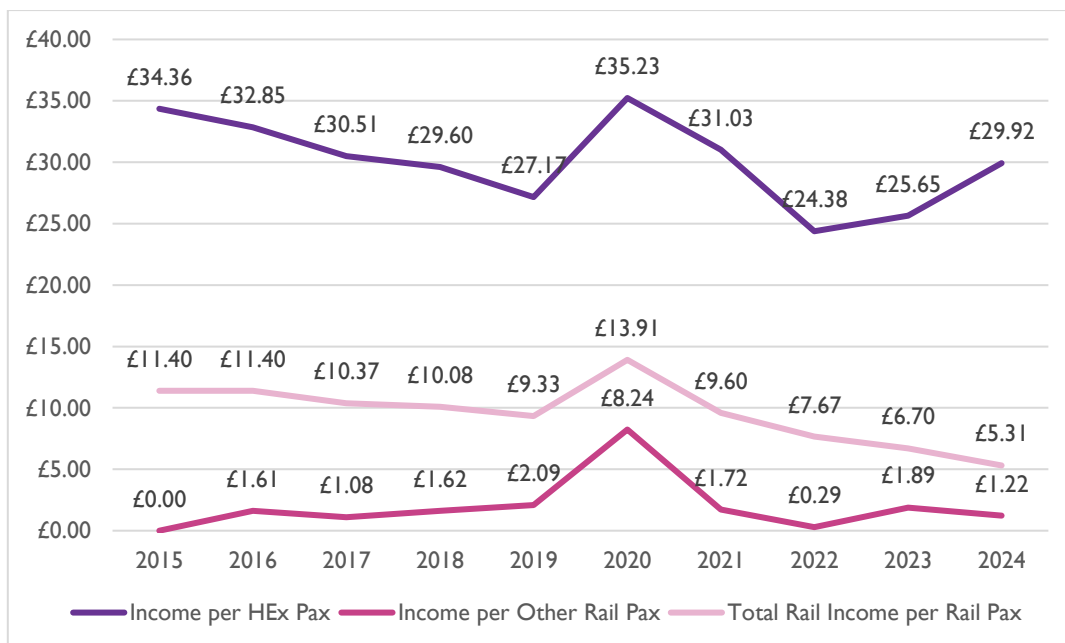
**Figure AI.4.36: HAL Total Rail Revenues (2024 CPI prices)**



Source: HAL

This manifests itself at the income per rail passenger level as shown in Figure AI.4.37. For each air passenger using HEx, HAL earnt £29.92<sup>52</sup> in 2024, but the average yield for each rail passenger has fallen significantly since before the pandemic, from £9.33 in 2019 down to £5.31, largely driven by the reduction in the higher-yielding HEx share of the rail market. The average income earned by HAL from passengers using the other rail modes is only £1.22.

**Figure AI.4.37: HAL Revenue per passenger from HEx and Total Rail 2015-2024 (2024 CPI prices)**



Source: HAL

Table AI.4.25 shows the product offering and fares of each rail service to Heathrow Airport. Unless booked in advanced, HEx currently costs around £25 one way, which takes 15 minutes to get to Heathrow from Paddington. In comparison, the Elizabeth Line offers a material fare saving and with a journey time materially less than the Piccadilly Lane. This differential, coupled with the greater geographic reach explains why the Elizabeth Line has contributed to the erosion of the market share of both HEx and the Piccadilly Line.

**Table AI.4.25: HAL Passenger Profile by Rail Mode in 2024**

	Journey Time	Single Fare	Frequency
<b>Heathrow Express</b>	15 min	£25 (from £10 advance)	Every 15 min
<b>Elizabeth Line</b>	27–28 min	£13.90	Every 15 min
<b>Piccadilly Line</b>	43–46 min	£5.60–£6.70	Every 5–10 min

Source: TfL

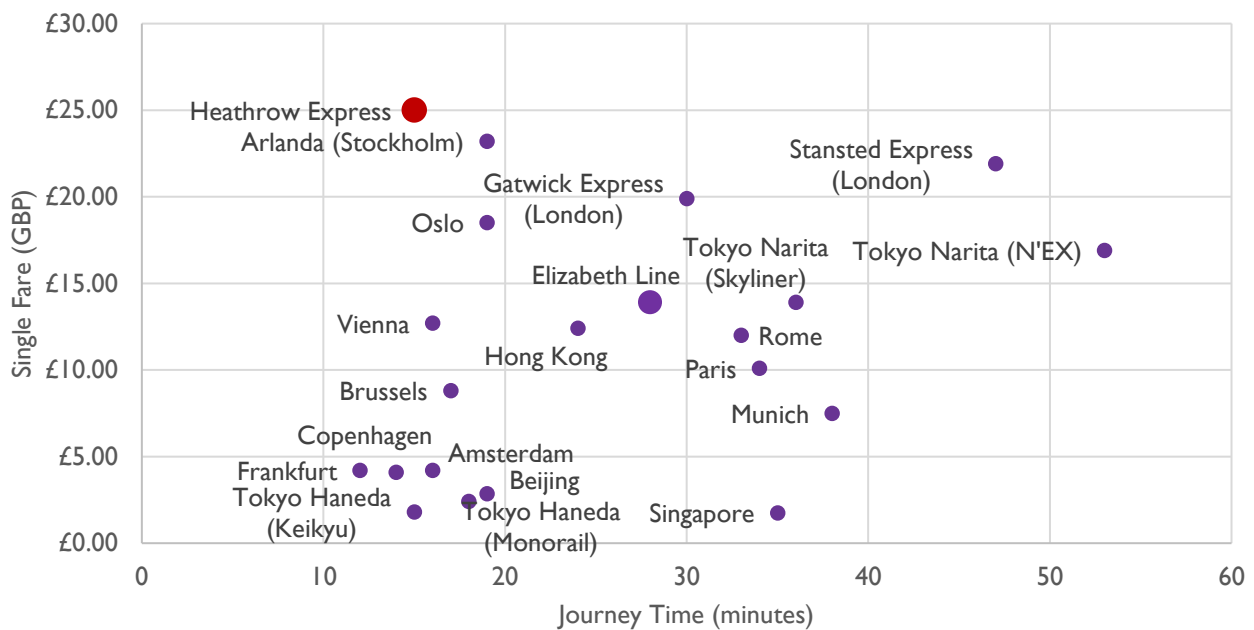
As a result, while HEx maintains relatively high per-passenger yields, the overall revenue performance of Heathrow’s rail network has weakened, reflecting a structural shift toward higher volumes but lower-yielding leisure and commuter travel.

<sup>52</sup> This exceeds the average fare on HEx as, based on the 4.4 million HEx passengers reported in the operating company’s annual accounts, only around ¾ of the users of the service are air passengers. The average revenue per HEx passenger in 2024 was £21.98.

## Rail Fares Benchmarking

Figure A1.4.38 shows that the Heathrow Express is the most expensive airport rail link of those benchmarked, with a single fare of around £25, despite having the shortest journey time of roughly 15 minutes to Central London. By comparison, the Gatwick Express and Stansted Express are both slower, with journey times of approximately 30 and 45 minutes respectively, but also slightly cheaper, costing around £20–£22. This highlights that UK airport rail services are generally priced at a premium compared to similar express services in other countries such as France, Germany, or Japan, where fares typically fall below £15. Overall, while the Heathrow Express delivers speed and convenience, it stands out as a high-cost option relative to both domestic and international counterparts.

**Figure A1.4.38: HEx Benchmark vs international airports**



Source: Desktop Research

## Conclusion

Overall, we conclude that the nature of HAL's rail income and, in particular, income from HEx reflects the change in passenger profile and thus, the modal share. This makes it crucial for HAL to capitalise on its HEx market and further promote usage through such as the promotion of its lower advanced booking fare, whereby passengers can potentially save over using the Elizabeth Line if booked in advance.

We assess that there is some scope for HAL to drop HEx fares so as to achieve a higher share of the rail market. In so doing, we assess that its revenue overall could have been higher. By way of illustration, if greater promotion of the £10 advance fare had enabled HAL to maintain a HEx air passenger share of 4 mppa in 2024, this would have resulted in increased revenue for each passenger switching from the other rail modes of £8.78 (£10-£1.22). This would have earned HAL an extra £7m in revenue from rail, equivalent to an uplift of 7.4%. The calculation of this is summarised in Table A1.4.26 below.

**Table A1.4.26: Calculation of Potential Increase in HEx Revenue**

HEX Revenue discounted fare	£10
-----------------------------	-----

Revenue per Passenger from Track Access	£1.22
Incremental Revenue per Additional HEx pax	£8.78
Assumed increase in HEx pax	0.8 mppa
Increase in Rail Revenue	£7.02m

This is an upper bound but it is reasonable to think that HAL could have achieved at least half of this uplift, i.e. 3.7%, in terms of increased Rail Revenue in 2024. This is a conservative assumption. Note that a reduction of this scale in passengers on the Elizabeth Line and the Tube is assumed not to have impacted on Track Access Revenues.

The impact on total Rail Revenue is shown in Table A1.4.27.

**Table A1.4.27: Adjusted Efficient Baseline for Rail Revenue**

£m	HAL 2024 Actual Revenue	Efficiency Adjustment	Adjusted Baseline
Rail Revenue	117.75	3.0%	121.24
Of which			
Track access revenue	18.55		18.55
Heathrow Express revenue	94.61	3.7%	98.11
T5 Piccadilly Line revenue	4.58		4.58

Does not sum due to rounding

### A1.4.7 Summary

In overall terms, we believe that HAL may have focussed too much on its premium passenger offering in 2024 and not adapted its products and services sufficiently to meet the changing composition of passenger demand, with a greater focus on outbound leisure passengers. Hence, its failure to adapt its offer has resulted in some underperformance in some categories of CommRev, most notably in Retail and Catering.

In terms of Retail and Catering, which account for 35% of all CommRev, we have made adjustments to reflect the performance attained at Gatwick, which now outperforms Heathrow in terms of Retail and Catering revenue per passenger. Given initiatives already underway and the opportunity to further adapt the product offer, we expect HAL to achieve higher Retail and Catering revenue per passenger by the end of H7. Accepting some ongoing 'headwinds' in terms of terminal congestion, in part due to loss of space to security processing, we do not expect HAL to exactly match Gatwick's performance with average revenue per passenger of c.£4.60 compared to £4.63, albeit this is £0.29 per passenger higher than the average revenue per passenger that HAL actually earned in 2024.

Similarly, we believe that HAL can do better in terms of revenue from Advertising (Other Retail) on contract renewal, which is due before the end of H7. So we have assumed a 5% uplift is possible.

There is also a general theme emerging in relation to a number of commercial revenue streams such as Car Parking, Fast Track and HEx where HAL is pricing at a premium product level such that this may deter usage to some degree, in particular in the context of a shift in customer mix towards more price sensitive UK leisure passengers. The extent to which this maximises income is unclear, albeit we recognise that HAL is subject to competitive pressures from off-site operators. It is possible that more competitive pricing might generate higher overall income but, conservatively, we have only made this adjustment to Fast Track and HEx revenues. For Fast Track, we have added 1% to the 2024 Baseline. For HEx, we have assumed that greater promotion of its discounted advance fare could have enabled HAL to stem the loss of passengers to the Elizabeth Line to some degree, with a 3% uplift in Rail Revenue.

In relation to Car Parking, we have removed £9.8m of revenue from POD parking, which is not within the regulated till. Hence, the adjusted baseline for Car Parking revenue is below the 2024 actual reported revenue.

We have retained the TDOC income at current levels in the baseline and the future estimate of TDOC revenue is calculated bottom up using the CAA methodology. This is a conservative assumption given the level of charge already being levied at Gatwick (£10) and reflects some caution in terms of an increase to this level being reflected in a reduced level of usage. In relation to the other large component of CommRev, Property, there is evidence that property revenues at Heathrow have not kept pace with those at other benchmark airports so we have adjusted accordingly to reflect more efficient pricing of rentals outside of the 'Guide Price' basket, increasing them by 2.5%, which equates to a 1% increase in overall property revenue.

In Table AI.4.28, we have summarised our proposed adjustments to the baseline for CommRev. These adjustments equate to an uplift in CommRev of 5.6% in the baseline, on the basis that these uplifts should be attainable by the end of H7.

**Table AI.4.28: Summary of 2024 and H8 Baseline CommRev Adjustments**

Category	HAL Reported Revenue (£m)	Proposed Efficient 2024 Baseline (£m)	Percentage Change
Catering	88.63	97.05	9.5%
Retail	272.66	287.66	5.5%
Other Retail (Advertising)	49.09	51.54	5.0%
Bureaux	22.98	22.98	0.0%
Other Services	3.74	3.74	0.0%
Car Parking	175.62	175.62	0%
Other Surface Access (Car Rental)	27.28	27.28	0.0%
Service Revenue	69.58	69.74	0.2%
Terminal Drop Off	53.08	53.08	0%
Property	145.02	146.43	1.0%
Rail	117.75	121.24	3.0%
Other CommRev	7.32	7.32	0.0%

---

Cargo	21.39	21.39	
<b>Total</b>	<b>1,054.14</b>	<b>1,085.07</b>	<b>2.9%</b>

---

## Annex A: Backward Look Opex

	Unit	Regulatory Settlement (£m)			Reworked Settlement Model (£m) *			Actuals (£m)			Variance (£m)			Variance %		
		2022	2023	2024	2022	2023	2024	2022	2023	2024A	2022	2023	2024	2022	2023	2024
<b>Total Staff Costs</b>	£m, nominal	<b>£388</b>	<b>£383</b>	<b>£426</b>	<b>£379</b>	<b>£397</b>	<b>£434</b>	<b>£392</b>	<b>£438</b>	<b>£485</b>	<b>-£13</b>	<b>-£41</b>	<b>-£51</b>	<b>-3%</b>	<b>-10%</b>	<b>-12%</b>
Security staff	£m, nominal	£195	£171	£197	£191	£178	£202	£148	£169	£197	£43	£9	£5	23%	5%	2%
Operational staff	£m, nominal	£81	£91	£97	£79	£93	£99	£106	£121	£131	-£27	-£27	-£32	-34%	-29%	-32%
Non-operational staff	£m, nominal	£69	£79	£86	£68	£82	£86	£108	£141	£156	-£40	-£59	-£69	-59%	-72%	-80%
Pensions	£m, nominal	£42	£41	£46	£41	£43	£47	£46	£38	£42	-£5	£5	£5	-13%	12%	10%
Capitalised staff costs	£m, nominal							-£16	-£31	-£41	£16	£31	£41	-	-	-
Rail expenditure (staff)	£m, nominal							£0	£0	£0	£0	£0	£0	-	-	-
Operational costs excl. insurance	£m, nominal	£286	£328	£337	£278	£329	£349	£378	£461	£491	-£100	-£132	-£142	-36%	-40%	-41%
Insurance	£m, nominal	£18	£19	£20	£18	£19	£20	£10	£19	£20	£8	£1	£1	43%	3%	3%
Facilities maintenance costs	£m, nominal	£180	£200	£200	£175	£196	£203	£181	£215	£240	-£6	-£19	-£36	-3%	-10%	-18%
Rates costs	£m, nominal	£133	£143	£143	£133	£142	£146	£116	£113	£116	£17	£29	£30	13%	21%	20%
Utility costs excl. distribution contract	£m, nominal	£106	£123	£119	£106	£127	£121	£102	£134	£126	£3	-£7	-£5	3%	-6%	-4%
Distribution contract	£m, nominal	£33	£34	£32	£33	£34	£32	£32	£33	£33	£2	£1	-£1	6%	3%	-3%
General expenses	£m, nominal	£124	£140	£143	£124	£144	£150	£92	£112	£75	£32	£32	£74	26%	22%	50%
Preopening																
Terminal drop-off charge opex	£m, nominal	£6	£6	£7	£6	£6	£7	£0	£0	£0	£6	£6	£7	100%	100%	100%
Surface access																
Covid-19 overlay	£m, nominal	£6			£6	£0	£0	£0	£0	£0	£6	£0	£0	100%	-	-
Service overlay	£m, nominal	£1	£4	£8	£1	£4	£8	£0	£0	£0	£1	£4	£8	100%	100%	100%
<b>Total</b>	£m, nominal	<b>£1,281</b>	<b>£1,380</b>	<b>£1,436</b>	<b>£1,260</b>	<b>£1,399</b>	<b>£1,471</b>	<b>£1,303</b>	<b>£1,525</b>	<b>£1,586</b>	<b>-£43</b>	<b>-£126</b>	<b>-£115</b>	<b>-3%</b>	<b>-9%</b>	<b>-8%</b>
<i>Combined Opex Lines</i>																
<i>Non-Operational Staff + Capitalised Staff Combined</i>					£68	£82	£86	£92	£110	£114	-£24	-£28	-£28	-35%	-34%	-32%
<i>Operational Costs + General Expenses + TDOC + Service Overlay</i>					£410	£483	£513	£470	£573	£566	-£61	-£90	-£53	-15%	-19%	-10%

\* updated from actual volume drivers and inflation where available

## Annex B: Backward Look CommRev

	Unit	Regulatory Settlement (£m)			Reworked Settlement Model (£m) *			Actuals (£m)			Variance (£m)			Variance %		
		2022	2023	2024	2022	2023	2024	2022	2023	2024A	2022	2023	2024	2022	2023	2024
<b>Total Retail &amp; Catering</b>	£m, nominal	<b>£354</b>	<b>£453</b>	<b>£497</b>	<b>£353</b>	<b>£492</b>	<b>£538</b>	<b>£320</b>	<b>£408</b>	<b>£437</b>	<b>-£33</b>	<b>-£85</b>	<b>-£100</b>	<b>-9%</b>	<b>-17%</b>	<b>-19%</b>
Catering	£m, nominal	£57	£73	£80	£57	£79	£87	£59	£83	£89	£1	£4	£2	2%	5%	2%
Retail concessions - UK	£m, nominal	£17	£17	£16												
Retail concessions - EEA	£m, nominal	£92	£112	£122												
Retail concessions - North America	£m, nominal	£39	£54	£58	£233	£329	£361	£204	£256	£273	-£30	-£73	-£89	-13%	-22%	-25%
Retail concessions - Middle East	£m, nominal	£27	£33	£37												
Retail concessions - Asia/Pacific	£m, nominal	£38	£57	£69												
Retail concessions - Other	£m, nominal	£21	£29	£32												
<b>Retail concessions</b>		<b>£235</b>	<b>£302</b>	<b>£334</b>												
Other retail revenue	£m, nominal	£47	£59	£65	£46	£64	£70	£32	£39	£49	-£15	-£25	-£21	-32%	-40%	-30%
Bureaux Revenue	£m, nominal	£16	£18	£18	£16	£20	£20	£23	£26	£23	£7	£6	£3	43%	30%	18%
Other Services	£m, nominal	-	-	-				£4	£4	£4	£4	£4	£4	-	-	-
<b>Surface Access &amp; Car Parking</b>		<b>£143</b>	<b>£171</b>	<b>£185</b>	<b>£143</b>	<b>£182</b>	<b>£198</b>	<b>£168</b>	<b>£196</b>	<b>£213</b>	<b>£25</b>	<b>£15</b>	<b>£15</b>	<b>17%</b>	<b>8%</b>	<b>7%</b>
Car parking	£m, nominal	£122	£146	£157	£121	£154	£168	£143	£170	£185	£22	£15	£17	18%	10%	10%
Other surface access	£m, nominal	£22	£26	£28	£22	£27	£30	£24	£27	£27	£3	-£1	-£3	14%	-2%	-8%
<b>Service Revenue</b>	£m, nominal	<b>£51</b>	<b>£63</b>	<b>£68</b>	<b>£51</b>	<b>£67</b>	<b>£73</b>	<b>£39</b>	<b>£54</b>	<b>£70</b>	<b>-£12</b>	<b>-£13</b>	<b>-£3</b>	<b>-24%</b>	<b>-20%</b>	<b>-4%</b>
<b>Terminal Drop off Charge</b>	£m, nominal	<b>£44</b>	<b>£45</b>	<b>£53</b>	<b>£43</b>	<b>£47</b>	<b>£56</b>	<b>£37</b>	<b>£40</b>	<b>£53</b>	<b>-£6</b>	<b>-£7</b>	<b>-£3</b>	<b>-14%</b>	<b>-15%</b>	<b>-6%</b>
<b>Property</b>	£m, nominal	<b>£131</b>	<b>£139</b>	<b>£139</b>	<b>£131</b>	<b>£139</b>	<b>£139</b>	<b>£120</b>	<b>£140</b>	<b>£145</b>	<b>-£11</b>	<b>£1</b>	<b>£6</b>	<b>-8%</b>	<b>1%</b>	<b>4%</b>
<b>Rail</b>	£m, nominal	<b>£97</b>	<b>£108</b>	<b>£129</b>	<b>£97</b>	<b>£122</b>	<b>£140</b>	<b>£94</b>	<b>£131</b>	<b>£118</b>	<b>-£2</b>	<b>£9</b>	<b>-£23</b>	<b>-2%</b>	<b>8%</b>	<b>-16%</b>
Track access revenue	£m, nominal	£8	£17	£26	£8	£17	£26	£3	£27	£19	-£5	£10	-£8	-68%	61%	-29%
Heathrow Express revenue	£m, nominal	£83	£79	£87	£83	£89	£96	£92	£101	£95	£9	£12	-£1	11%	14%	-1%
T5 Piccadilly Line revenue	£m, nominal	£6	£12	£16	£6	£15	£19	£0	£2	£5	-£6	-£13	-£14	-100%	-86%	-75%
<b>Other</b>	£m, nominal	<b>£2</b>	<b>£2</b>	<b>£2</b>	<b>£2</b>	<b>£2</b>	<b>£2</b>	<b>£8</b>	<b>£5</b>	<b>£7</b>	<b>£6</b>	<b>£3</b>	<b>£6</b>	<b>431%</b>	<b>206%</b>	<b>333%</b>
<b>Total Commercial Revenues</b>	£m, nominal	<b>£821</b>	<b>£980</b>	<b>£1,074</b>	<b>£819</b>	<b>£1,050</b>	<b>£1,146</b>	<b>£786</b>	<b>£974</b>	<b>£1,043</b>	<b>-£33</b>	<b>-£76</b>	<b>-£104</b>	<b>-4%</b>	<b>-7%</b>	<b>-9%</b>

\* updated from actual volume drivers and Inflation where available

# Appendix 2: Top-Down Benchmarking

## A2.1 Modelling approach

In this appendix we explain the top-down benchmarking econometrics that was carried out as a sense-check to our bottom-up models.

In what follows we first explain the modelling approach, then the dataset, then we explain the application of our modelling approach and set out the results for each of the dependent variables in our benchmarking models: Opex and Commercial Revenue. We note that since our purpose with these models is to provide a top-down cross-check of the bottom-up benchmarking of Opex and Commercial Revenues, those are the relevant variables and alternatives such as Totex are not relevant for our purposes here (since the bottom-up benchmarking does not include analysis of Capex).

### A2.1.1 Dataset

The core dataset for the econometric modelling is the Jacobs Airport Performance Indicators dataset.<sup>53</sup>

The Jacobs dataset is a panel of airport-level operational and financial indicators covering reporting years 2012 to 2024, based on underlying data from 2010 to 2022, for 53 airports. It is compiled from publicly available annual reports and standardised by Jacobs to enable consistent comparisons across airports. The dataset is extracted from Jacobs' Airports Performance Indicators publications which are widely used for benchmarking airport cost and revenue efficiency. Data completeness varies by airport and year, particularly for smaller airports or those outside Europe.

It includes a broad set of operational variables - such as total passengers, cargo and mail volumes, workload units (WLUs), air traffic movements (ATMs), and number of employees - alongside financial indicators including aeronautical revenues, commercial revenues, other revenues, operating expenditure, personnel expenditure, depreciation, and total expenditure. All financial figures are reported in Special Drawing Rights (SDRs), with conversions based on mid-year exchange rates for each reporting year.

To support comparability across time and airports, Jacobs applies various adjustments and normalisations. These include the removal of non-core or exceptional items - such as social security contributions, rail access charges, and impairments - where separately disclosed. In cases where airports are operated as part of a wider group (such as Airports of Thailand or Grupo Aeroportuario del Pacifico), Jacobs includes group-level data when disaggregated financials are not available for individual airports. These entries are clearly identified and treated consistently throughout the dataset, although they may limit the scope for precise like-for-like comparisons with standalone airports.

---

<sup>53</sup> We note Jacobs' disclaimer regarding this dataset. "The information contained herein is the property of Jacobs UK Limited. Whilst every effort has been made to ensure that the material presented is relevant, accurate and up-to-date at the time of provision, Jacobs UK cannot accept any liability for any error or omission."

In addition to the Jacobs dataset, CAA provided traffic composition information from the Official Aviation Guide (OAG) for the majority of airport-years covered in the Jacobs data. The data included the share of passengers at each airport that were international passengers in a given year, and the share of passengers that were premium passengers in a given year. The data is derived from seats on scheduled departure flights and covers calendar years 2010-2024. “Premium” passengers include passengers in First Class and Business Class seats but does not include passengers in Premium-Economy seats.

Macroeconomic data on GDP per capita, purchasing power parity and inflation was collected from the World Bank.

### A2.1.2 General algorithm

This section sets out the process or algorithm that was followed to determine and test our benchmarking models. Our approach was guided by the following principles:

- Simplicity and transparency
- Data availability and quality
- Consistency with operational, engineering, and economic Rationale
- Relevance for H8
- Favour cost drivers that minimise the risk of regulatory gaming or otherwise create perverse incentives
- Robust econometric models

Below, where reference to specific variables is required, we use Opex for illustrative purposes. The same general algorithm was followed for our models of commercial revenues. The steps taken for each model class were:

1. From literature, identify list of variables used for modelling the dependent variable (i.e. Opex or a transformation thereof).
2. Identify which variables from the list are available in our dataset.
3. Choose broad econometric approach (e.g. panel, time series, pooled).
4. Conduct univariate regressions for the variables identified in Step 2.
5. Consider a treatment for each of the following categories:
  - Region
  - Size
  - Regulatory regime
  - Ownership type
  - Hub airports
  - Infrastructure
  - Seasonality
  - Groups
6. Treatments:
  - Switches (for inclusion or exclusion).
  - Dummies (as controls, not switches)
  - Variables
  - Non-treatment (with justification)

7. Choose variables and dummies so as to avoid duplication. In base model prefer variables with univariate significance. Consider alternatives as sensitivity cross-checks (if required).
8. Consider potential functional forms (e.g. linear, Cobb-Douglas or translog).
9. Define a frontier principle (e.g. Upper Quartile).
10. Estimate Opex using our econometric approach (e.g. Pooled, COLS), under our candidate functional forms, for the variables and dummies we identified, applying the switches we have determined, for the data period up to 2019. Identify how close Heathrow was to the frontier at key points in that period (e.g. 2010, 2015, 2019).
11. Assess how close the up-to-2019 Upper Quartile firms were to the efficient level (defined by that Upper Quartile) in 2022. Define that as Upper Quartile Efficiency Loss (2022). Compare that efficiency loss to the efficiency loss Heathrow experienced in 2022 (relative to its own previous efficiency level).
12. Perform sensitivity analysis by switching certain switches on and off and by cross-comparing to alternative functional forms and alternative forms for controls (e.g.  $\ln(X)$  vs  $X$ ).

### A2.1.3 Dependent variables

In what follows we explain the dependent variables used in our benchmarking models for Opex and Commercial Revenues.

#### Opex

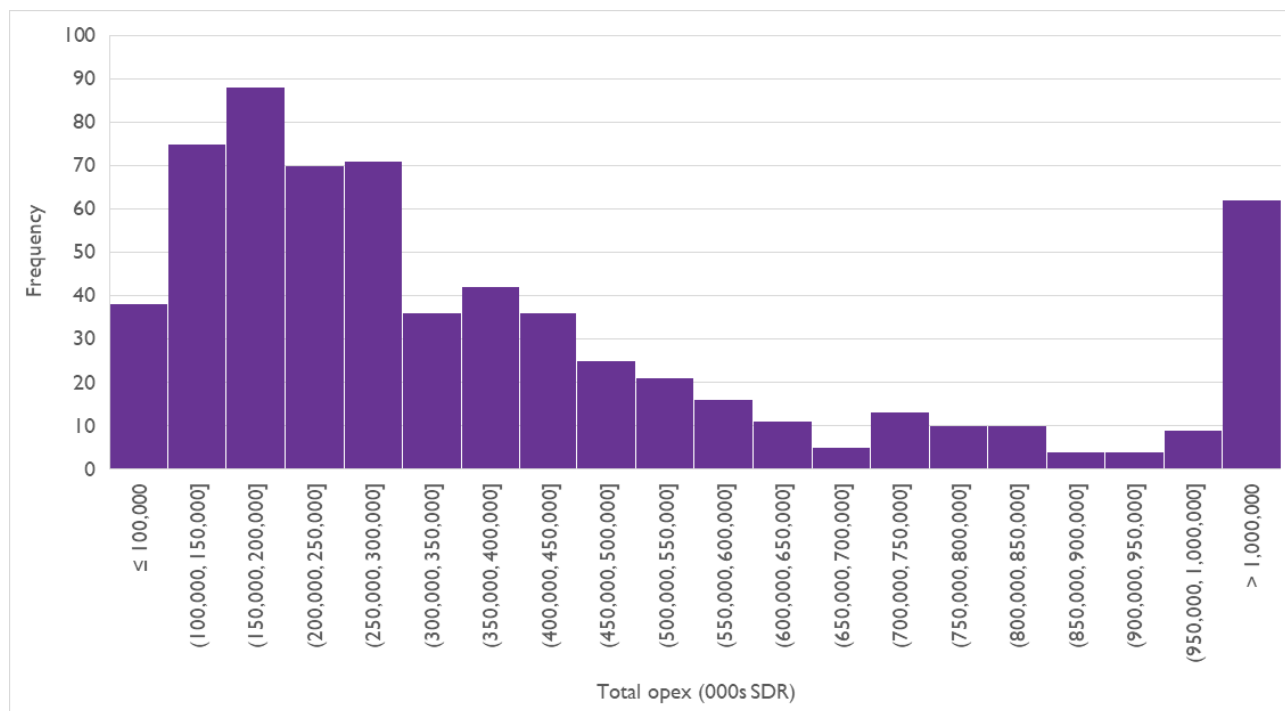
Total operating costs (opex) are defined in line with the Jacobs methodology and comprise all costs associated with the day-to-day operation of the airport. They include materials and services costs (such as maintenance, utilities, and outsourced services including cleaning), staff costs, and depreciation. Financial costs, including interest charges, are excluded, as are capital expenditures and other balance-sheet items. The monetary values taken from Jacobs were all nominal Special Drawing Rights (SDR) values. We used SDR deflators published by the World Bank to convert the nominal values to real values.<sup>54</sup>

#### Pre-processing of dependent variable

We began the modelling process by examining the distribution of opex across the full panel dataset. This is shown in the histogram below.

<sup>54</sup> World Bank SDR deflators are taken from: <https://datahelpdesk.worldbank.org/knowledgebase/articles/378829-what-is-the-sdr-deflator>

**Figure A2.1.1: Distribution of airports' annual total operating expenditures across all airport-year observations (2010-2022, SDR 000s)**



Source: Jacobs data, Europe Economics analysis

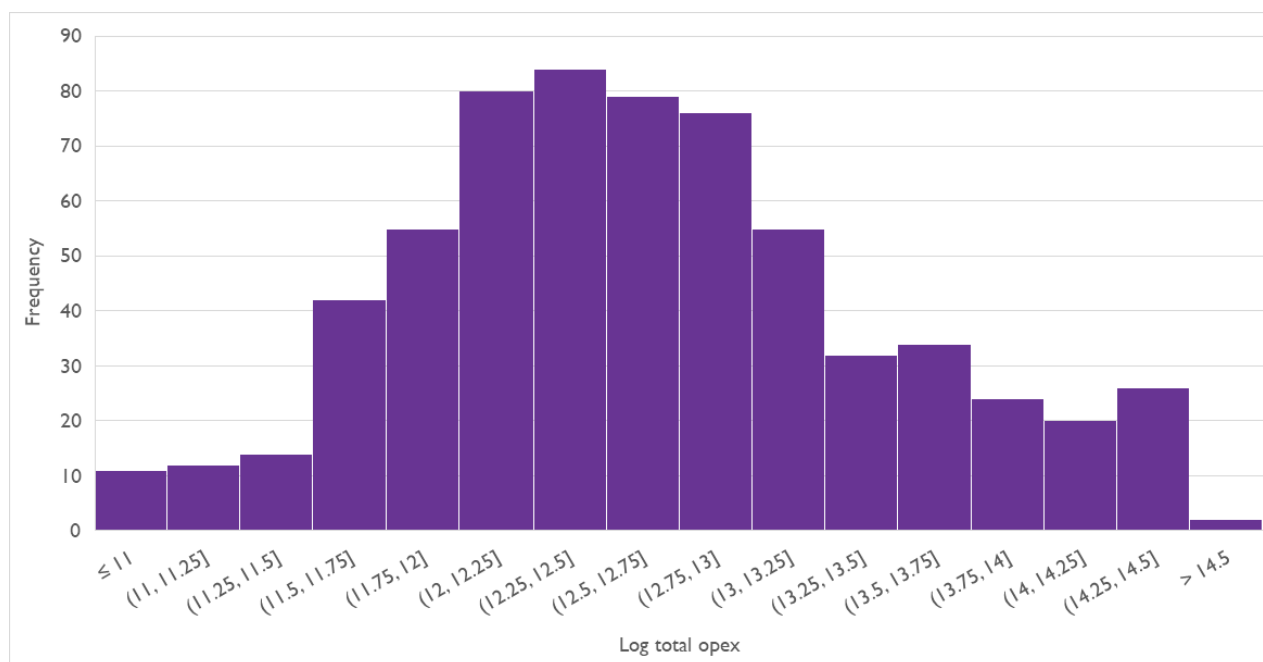
As the histogram shows, the distribution of total operating expenditure (opex) across airports is highly right-skewed. Most airports report opex below 500,000 SDR, with a concentration in the 100,000–300,000 SDR range. However, a long right tail extends toward a number of very large airports with opex exceeding 1 million SDR, and a maximum value of over 2 million SDR.

The skewness of 1.91 and kurtosis of 6.24, based on STATA summary statistics, confirm the asymmetric and heavy-tailed nature of the distribution. The mean opex is 433,512 SDR, substantially above the median of 286,855 SDR, highlighting the influence of high-cost outliers.

**Table A2.1.1: Opex summary statistics**

Statistic	Value
Mean	433,512
Median	286,855
Standard Deviation	399,331
Min	36,876
Max	2,065,356
Skewness	1.91
Kurtosis	6.24

The non-normality and heteroskedasticity implied by the raw distribution of total opex suggest that a natural logarithmic transformation of total opex would be suitable. The histogram below shows the distribution of the logged opex.

**Figure A2.1.2: Log total opex distribution**

Source: Jacobs data, Europe Economics analysis

Compared to the raw distribution, which is highly right-skewed, the logged version of total operating expenditure appears much more symmetric and approximately bell-shaped. Most values cluster around the centre, and the distribution tapers off fairly evenly on both sides.

Summary statistics support this improved normality: the skewness of the log-transformed total opex is close to zero (0.22), and the kurtosis is 2.71 - near the benchmark of 3 for a normal distribution. This indicates that the log transformation substantially improves normality, making the variable more suitable for use in regression modelling.

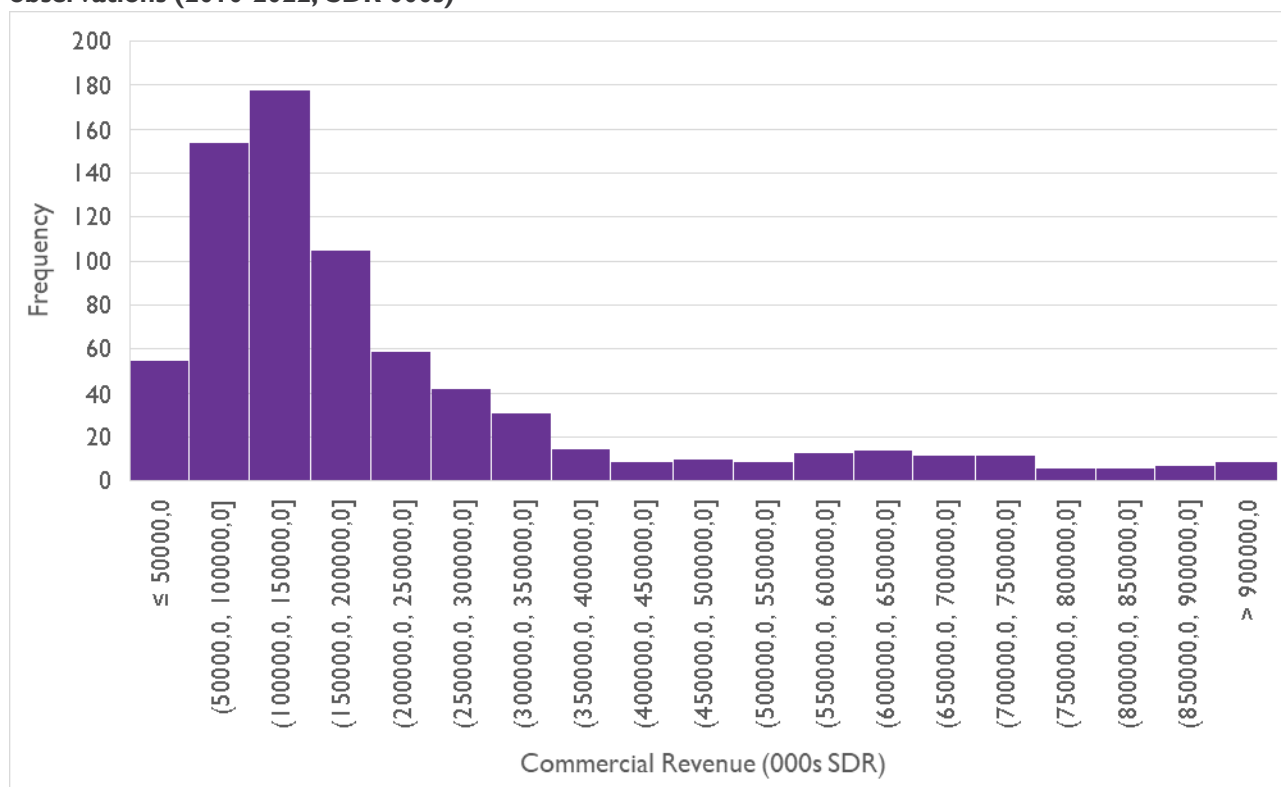
### ComRev

Commercial revenues are defined in line with the Jacobs methodology and comprise revenues generated from non-aeronautical activities, including rents, real estate developments, concessions, and profit- or turnover-based agreements with concessionaires. Revenues from in-house operated activities, such as car parks, hotels, directly operated retail outlets, and other non-core commercial activities, are excluded. As with Opex, we use SDR-deflated monetary values for Commercial Revenues.

### Pre-processing of dependent variable

We began the modelling process by examining the distribution of commercial revenue across the full panel dataset. This is shown in the histogram below.

**Figure A2.1.3: Distribution of airports' annual commercial revenues across all airport-year observations (2010-2022, SDR 000s)**



Source: Jacobs data, Europe Economics analysis

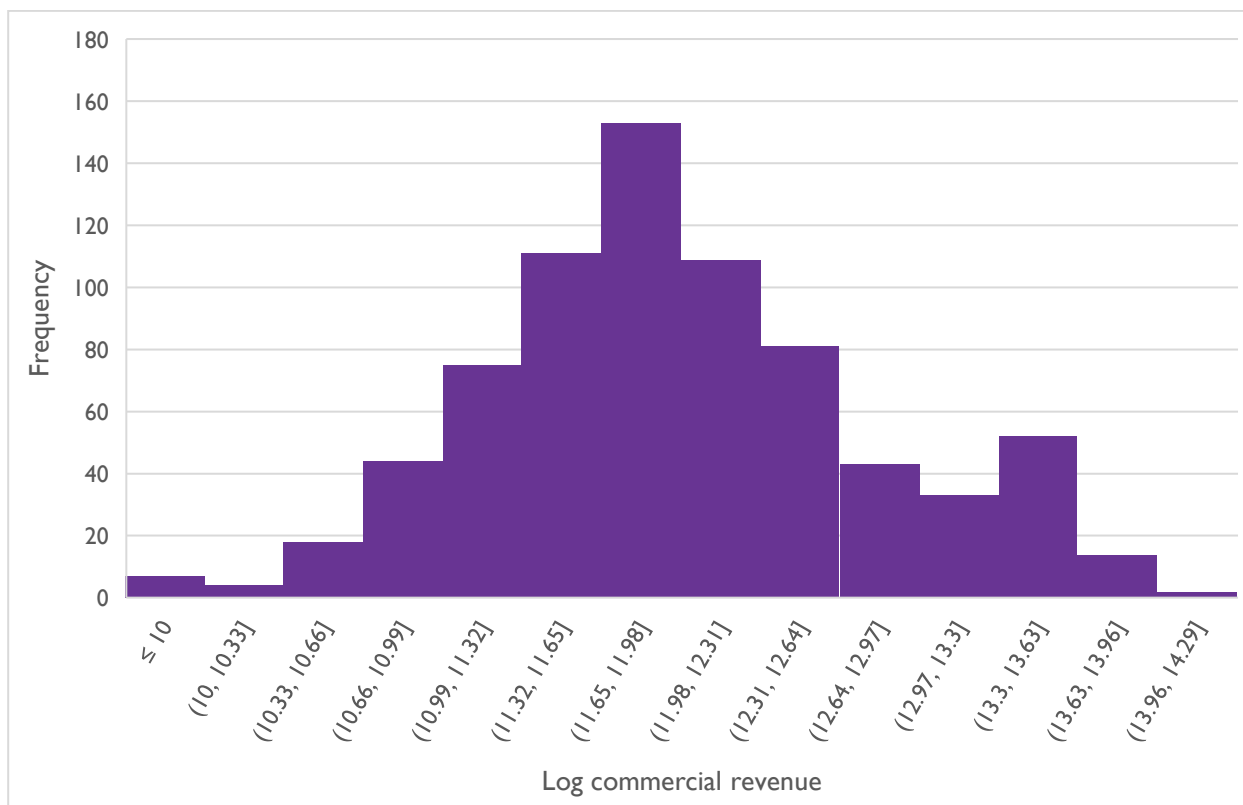
As the histogram shows, the distribution of commercial revenue is highly right-skewed, with a long tail of observations above 500,000 SDR, and a small number of very large airports with revenues approaching or exceeding 1 million SDR. Summary statistics from STATA further indicates strong skew, with a skewness of 1.90 (a non-skewed distribution has skewness of zero), and a heavy-tailed distribution of commercial revenue (kurtosis equal to 6.27, whereas a normal distribution has kurtosis equal to 3). The median is significantly lower than the mean.

**Table A2.1.2: Commercial Revenue summary statistics**

Statistic	Value
Mean	222,213
Median	151,427
Standard Deviation	206,282
Min	8,036
Max	1,190,082
Skewness	1.90
Kurtosis	6.27

The non-normality and heteroskedasticity implied by the raw distribution of commercial revenue suggest that a natural logarithmic transformation of commercial revenue would be suitable. The histogram below shows the distribution of the logged commercial revenue.

**Figure A2.1.4: Log commercial revenue distribution**



Source: Jacobs data, Europe Economics analysis

Compared to the raw distribution, which is highly right-skewed, the logged version is more symmetric and bell-shaped. The skewness of the logged commercial revenue is close to zero (0.12), and the kurtosis (3.04) is near the normal benchmark of 3. This indicates that the log transformation substantially improves normality, making the variable more suitable for use in regression modelling.

### A2.1.4 Drivers

In this section we set out the selection process for drivers of Opex and Commercial Revenue to include in our benchmarking models.

#### Variables used for modelling opex in literature

We identified a set of candidate independent variables for an opex model from our literature review. There are numerous variables that could be included in a regression seeking to estimate the efficient frontier. These are set out in Table A2.1., below.

**Table A2.1.3: Candidate independent variables**

Factors/Drivers of opex	Candidate independent variables
Size and scale	Passenger Movements
	Aircraft Movements (ATMs)
	Cargo
	WLUs
Service Quality	ACI ASQ
	Skytrax

<b>Traffic Mix</b>	Share of International passengers Share of long-haul traffic Share of premium passengers Share of connecting passengers Share of traffic in busiest month Market share of largest airline(s)
<b>Commercial activity</b>	Commercial revenues
<b>Scale of airport</b>	Core asset scale Terminal Surface Area Number of Runways Total Airport Area Number of Check-in Desks
<b>Capacity Constraints</b>	Runway Demand/Capacity Ratio Aircraft Parking Positions
<b>Input prices</b>	Average labour costs Energy prices
<b>Region</b>	Dummy variable(s) for whether located in given continent
<b>Macroeconomic Conditions</b>	Gross Domestic Product (GDP) Cost of Living Index
<b>Ownership &amp; Governance</b>	Dummy for public or privately owned
<b>Market Competition &amp; Regulation</b>	Measure of Airport Competition Index Dummy for subject to Price Regulation
<b>Environmental &amp; External Factors</b>	Annual snowfall Dummy for pandemic years

A similar list applies for commercial revenues.

Identify which variables are available in our dataset

The second step is to determine which of the candidate variables are available in our dataset or can be added to our dataset by collecting data from publicly available sources.

The Jacobs dataset included the following variables:

- Total passengers
- Cargo/mail
- WLUs
- ATMs
- Employees
- Aeronautical revenues
- Commercial revenues
- Other revenues
- Operating Expenditure
- Personnel Expenditure
- Depreciation
- Fixed assets
- Total Expenditure

All monetary values in the Jacobs dataset are reported in SDRs, with Jacobs using SDR conversion rates from the mid-point of each reporting year. Fixed assets are included as a balance-sheet proxy for airport infrastructure scale and capital intensity, and are used in our modelling as an additional structural control.

The CAA provided traffic composition data on international passenger shares and premium passenger shares sourced from OAG.

In addition, we collected data for the following variables for each airport in each year from public sources and added them to the Jacobs dataset.

- Geographical indicators (continent and country)
- GDP per capita
- Purchasing Power Parity (PPP)
- Annual inflation (based on SDR deflators)
- Number of runways<sup>55</sup>
- Total surface area of terminal<sup>56</sup>
- Status as a “hub” airport
- Ownership model (publicly owned, privately owned, or public-private partnership)
- Share of international passengers
- Share of premium passengers

Each airport is classified by country and continent, with a distinction made between European and non-European locations to support regional comparisons. These classifications are fixed for the duration of the analysis.

To account for differences in the economic factors facing airports, we include GDP per capita at the country level. We measure GDP in real SDR terms, constructed by taking the World Bank’s GDP per capita series and converting it into real SDRs using the same deflators as are used for the dependent variables. GDP per capita is included because it proxies for systematic cross-country differences that affect airports’ costs and revenues even after controlling for scale (e.g. passengers or WLUs). In an international benchmarking context, omitting such a control risks misattributing structural economic differences to “inefficiency”. In particular, GDP per capita is a parsimonious proxy for several underlying factors that are typically not observed consistently across airports (or not available in a comparable form internationally), including wage levels, the cost of contracted services, general operating cost environments, consumer spending power, and service expectations.

In addition to expressing monetary variables in real SDR terms, we also include PPP conversion factors as a further control for cross-country differences in domestic price levels. PPPs are designed to equalise purchasing power across countries by converting local-currency values into a common unit that purchases an equivalent basket of goods and services. This can be relevant in an airport cost and revenue setting because a large share of operating inputs (e.g. labour and locally procured services) and many commercial transactions are priced in domestic markets, where local price levels may diverge materially from market exchange rates. We therefore tested the World Bank PPP conversion factor as an additional regressor in both opex and comrev models.

We include two indicators capturing passenger mix:

- Share of international passengers – intended to capture systematic differences in traffic composition (e.g. domestic-focused airports versus airports with a higher international or transfer component), which may affect both costs (e.g. border processing, security requirements) and revenues (e.g. duty-free exposure).

<sup>55</sup> For airport groups, the reported figure reflects the number of runways at the largest airport within the group, based on annual passenger traffic.

<sup>56</sup> For airport groups, the surface area reported corresponds to that of the largest airport in the group by passenger volume.

- Share of premium passengers – intended to capture differences in passenger spending propensity and service expectations, which may influence commercial revenue intensity and potentially aspects of cost intensity.

These are constructed as shares (percentages). While the variables have broad coverage over time, they are not available for all airports in the panel, so specifications including them reduce the usable estimation sample.

The number of runways at each airport is available to reflect infrastructure capacity and is sourced primarily from the annual reports of individual airports. These figures were cross-checked across both the first and last years of the analysis period to identify any changes. To further ensure accuracy, the data were verified using the Jacobs infrastructure report, which documents major capital projects and developments at the analysed airports. Where airports are part of a group, the number of runways is based on the largest airport in the group by passenger volume.

The total terminal surface area is also available as a control for infrastructure scale. This information is typically reported in the sustainability or infrastructure sections of airport annual reports. In the absence of documented expansions or redevelopments, the surface area is assumed to remain constant over the analysis period. As with runway data, where the airport is part of a group, the reported terminal area corresponds to the largest constituent airport.

Status as a “hub” airport is determined using data from the OAG Megahubs Index 2024. Following the methodology used in the index, we calculate a ratio of total scheduled connections to unique destinations for each airport. Airports with a ratio exceeding 100 are classified as hubs, while those with a ratio less than 100 are classified as non-hubs. This threshold reflects a high degree of connectivity relative to network breadth and aligns with industry standards for identifying major transit points within the global aviation network.<sup>57</sup>

For ownership classification, our primary source is the Jacobs report, which provides detailed information on the ownership structure of each airport. Airports are generally classified as publicly owned where the majority of ownership lies with public entities. In cases where public bodies hold a significant but non-majority stake, ownership is typically described as mixed. Only when public ownership is minimal or absent is the airport considered privately owned. For cases with missing or unclear information, we consult official external sources such as company reports, regulatory filings, or reputable industry databases to cross-check and supplement the data.

We also generated a dummy variable to indicate companies in the dataset that are responsible for operating multiple airports under a group ownership.<sup>58</sup> For these group operators, the Jacobs dataset only provides data aggregated at the group level (i.e. summing up expenditure and activity across all airports in the group and reporting them under a single entity).

We also generated a dummy variable to indicate years impacted by the COVID-19 pandemic (2020, 2021 and 2022).

By cross-referencing the variables available in our dataset with those we identified from our literature review as relevant to opex, we obtain the following set of variables that could be used in our opex modelling:

<sup>57</sup> Megahubs 2024 | Most Connected Airports in the World [[online](#)]

<sup>58</sup> For one group, Schipol, one airport accounted for more than 90 per cent of passenger volumes for the group as whole. This was labelled as “non-group” in our dataset.

- Total Expenditure (dependent variable or a transformation thereof)
- Total passengers
- Cargo/mail
- WLUs
- ATMs
- Employees
- Personnel Expenditure
- Geographical indicators (continent and country)
- GDP per capita
- Purchasing Power Parity (PPP)
- Fixed assets
- Share of international passengers (IP)
- Share of premium passengers (PP)
- Number of runways
- Total surface area of terminal
- Status as a “hub” airport
- Ownership model (publicly owned, privately owned, or public-private partnership)

#### Key variable selection - opex

The first step in selecting explanatory variables was to determine the most appropriate measure of airport activity to serve as the principal driver of opex. There are four candidate variables included in our dataset as drivers of opex (and commercial revenues):

- **Passengers:** total annual passenger throughput
- **Cargo/mail:** volume of freight and mail handled
- **Weighted Landing Units (WLUs):** a composite activity measure combining passengers and cargo
- **Air Traffic Movements (ATMs):** number of aircraft movements (take-offs and landings)

#### Theoretical expectations

We begin by evaluating which operational variables best explain variation in opex across airports. Passenger volumes are a natural candidate, as many cost components, including terminal operations, security, cleaning, and customer services, scale directly with the number of passengers handled. However, the cost structure of airports is broader than passenger-driven components alone, so there is a case for also considering other drivers.

Specifically, ATMs and WLUs may influence opex in ways not fully captured by passenger counts. ATMs may better reflect airside activity and associated costs (e.g. runway, apron, and air traffic services), while WLUs include both passengers and cargo, potentially accounting for infrastructure and staffing burdens beyond passenger-facing operations.

To understand how these variables relate to each other, we conducted a pairwise correlation analysis:

**Table A2.1.4: Pairwise correlation matrix for activity variables**

	Passengers	Cargo/mail	WLUs	ATMs
Passengers	1.0000			
Cargo/mail	0.4610	1.0000		
WLUs	0.9804	0.6269	1.0000	
ATMs	0.9594	0.3893	0.9288	1.0000

All correlations are statistically significant at the 1 per cent level.

Passengers and WLUs are, unsurprisingly, extremely highly correlated ( $\rho = 0.98$ ). ATMs are also highly correlated with both passengers and WLUs ( $\rho = 0.96$  and  $0.93$ , respectively). Cargo/mail is moderately correlated with passengers ( $\rho = 0.46$ ) and WLUs ( $\rho = 0.63$ ), and these correlations are within acceptable levels. The results suggest that there is considerable overlap between passengers, WLUs and ATMs, whereas cargo/mail provides additional, less collinear information. Models that include combinations of passengers, WLUs and ATMs may therefore face multicollinearity or redundant explanatory power.

To further test this, we ran a multi-variate regression of total opex on passengers, WLUs, and ATMs, and calculated VIFs, presented in the table below.

**Table A2.1.5: Variable Inflation Factors for regression with passengers, WLUs and ATMs.**

Variable	VIF
Passengers	46.48
WLUs	26.92
ATMs	13.16
<b>Mean VIF</b>	<b>28.86</b>

All three VIFs are well above the conventional threshold of 10, confirming severe multicollinearity. While each variable may be a plausible cost driver on its own, their overlap in explanatory power prevents clear estimation when used together. In practical terms, this means we cannot identify the separate effect of each, and must avoid including them in the same model.

### Empirical testing

We tested each of the four main activity variables – passengers, cargo/mail, WLUs, and ATMs – in univariate regressions, using both levels and logged values, to assess which had the strongest statistical relationship with total opex. We also examined two-variable models combining passengers + cargo/mail and ATMs + cargo/mail to test whether separating passenger and cargo effects improved model fit.

**Table A2.1.6: Univariate / bivariate regression results for opex (full airport sample, N=646)**

Variables	Functional form	Coefficient(s)	P-value(s)*	R <sup>2</sup>	AIC	BIC
Passengers	Levels	0.008	0.000	0.51	18,039	18,048
Passengers, Cargo	Levels	0.006, 0.155	0.000, 0.001	0.61	17,894	17,907
WLUs	Levels	0.007	0.000	0.58	17,937	17,946
ATMs	Levels	0.981	0.000	0.45	18,113	18,122
Passengers	Logs	0.63	0.000	0.39	1,231	1,240
Passengers, Cargo	Logs	0.376, 0.253	0.001, 0.000	0.53	1,068	1,082
WLUs	Logs	0.753	0.000	0.54	1,050	1,059
ATMS	Logs	0.799	0.000	0.42	1,199	1,208

Models using **passengers** or **WLUs** consistently outperform those using **ATMs**. Although the coefficient on ATMs is statistically significant in all specifications, it is associated with a substantially lower R<sup>2</sup> (0.45 in levels and 0.42 in logs) and higher AIC/BIC, suggesting that ATMs are a weaker predictor of operating expenditure.

The inclusion of **cargo/mail** alongside passengers materially improves explanatory power. In the levels specification, R<sup>2</sup> increases from 0.51 (passengers only) to 0.61 when cargo is added. In the log-log model, the improvement is also meaningful, with R<sup>2</sup> rising from 0.39 to 0.53. These results support the view that cargo/mail imposes operational demands not fully captured by passenger volumes alone.

WLUs, which combine passenger and cargo volumes into a single weighted metric, perform less well than the passenger-plus-cargo model in levels (R<sup>2</sup> = 0.58 vs. 0.61), but perform slightly better in logs, achieving the highest R<sup>2</sup> (0.54) and lowest AIC/BIC of any model tested. This may reflect the fact that WLUs smooth variation and reduce noise in a way that benefits log-log estimation.

To assess robustness, we re-estimated the log-log models on progressively restricted subsamples:

- European airports only (N = 266): Explanatory power increased for both specifications. R<sup>2</sup> rose to 0.73 for WLUs and 0.77 for passengers + cargo/mail. However, the passenger + cargo/mail model outperformed WLUs on both R<sup>2</sup> and AIC/BIC.
- Excluding group-owned airports (N = 428): Explanatory power declined for both models. R<sup>2</sup> fell to 0.48 for WLUs and 0.45 for passengers + cargo/mail, with WLUs having a slight edge in AIC/BIC.
- Restricting to European, non-group airports (N = 149): R<sup>2</sup> fell to 0.49 for WLUs and 0.54 for passengers + cargo/mail. In this most restrictive sample, passengers + cargo/mail outperformed WLUs across all fit metrics, suggesting stronger robustness.

Taken together, the **log-log model using WLUs** is preferred for modelling total opex. It consistently delivers strong explanatory power and significantly improves fit over passenger plus cargo models, both in levels and logs. Since **passengers + cargo/mail** perform slightly better in some specifications, we retain it only as a **sensitivity check**, not as the main specification.

#### Key variable selection - comrev

The first step in selecting explanatory variables was to determine the most appropriate measure of airport activity to serve as the principal driver of commercial revenue. There are four candidate variables included in our dataset:

- **Passengers:** total annual passenger throughput

- **Cargo/mail:** volume of freight and mail handled
- **Weighted Landing Units (WLUs):** a composite activity measure combining passengers and cargo
- **Air Traffic Movements (ATMs):** number of aircraft movements (take-offs and landings)

### Theoretical expectations

From a theoretical standpoint, passenger volumes are expected to be the strongest predictor of commercial revenues. This is because most commercial revenue derives from retail, food and beverage, and car parking – all of which scale closely with the number of passengers processed. In contrast, while cargo/mail volumes do contribute to commercial revenue, they are less directly linked to passenger-facing commercial spends, as freight operations do not typically involve retail spend or personal services.

Air Traffic Movements (ATMs) might appear relevant as a proxy for airport activity, but ATMs do not consistently track passenger numbers: some aircraft are larger or fuller than others, and will include cargo-only flights.

Weighted Landing Units (WLUs) combine passengers and cargo into a single index, assigning fixed weights to each. While WLUs aim to capture operational workload or infrastructure use, they do not distinguish between activity that is revenue-generating (passengers) and that which is not (cargo). Moreover, WLUs are less intuitive and harder to interpret than raw passenger counts. As a result, there is a natural prior preference for passenger volumes unless statistical performance clearly favours a different variable.

As with opex, we ran a multivariate regression including Passengers, WLUs and ATMs (all in levels). The results showed that none of the variables were statistically significant individually, despite the overall model fitting the data well ( $R^2 = 0.69$ ). This is a classic symptom of multicollinearity: when variables are highly correlated with one another, it becomes difficult to isolate the individual effect of any single one. This conclusion is confirmed by the Variance Inflation Factor (VIF) results for the regression, presented in the table below.

**Table A2.1.7: Variable Inflation Factors for regression with passengers, WLUs and ATMs.**

Variable	VIF
Passengers	128.43
WLUs	78.17
ATMs	28.95
<b>Mean VIF</b>	<b>78.52</b>

All three variables have a VIF well above the typical threshold of 10, indicating that the explanatory variables are highly collinear. In practical terms, it means we should not attempt to include more than one of these variables in the same model. Instead, we need to determine which one is the best individual predictor to serve as the core "driver" variable in our commercial revenue models.

### Empirical testing

We tested each of the four main activity variables — passengers, cargo/mail, WLUs, and ATMs — in univariate regressions to assess which had the strongest statistical relationship with commercial revenue. Regressions were run in levels and logs form (for both commercial revenue and the activity variable). We also examined two-variable models combining passengers + cargo/mail to test whether separating passenger and cargo effects improved model fit.

**Table A2.1.8: Univariate / bivariate regression results for comrev (full airport sample, N=646)**

Variables	Functional form	Coefficient(s)	P-value(s)*	R <sup>2</sup>	AIC	BIC
<b>Passengers</b>	Levels	0.0037	0.000	0.44	17,271	17,280
<b>Passengers, Cargo</b>	Levels	0.0024, 0.1204	0.000, 0.000	0.67	16,938	16,952
<b>WLUs</b>	Levels	0.0037	0.000	0.55	17,124	17,133
<b>ATMs</b>	Levels	0.4187	0.000	0.31	17,409	17,418
<b>Passengers</b>	Logs	0.7520	0.000	0.54	1,075	1,083
<b>Passengers, Cargo</b>	Logs	0.5702, 0.1813	0.000, 0.026	0.61	974	988
<b>WLUs</b>	Logs	0.8523	0.000	0.67	864	873
<b>ATMS</b>	Logs	0.8348	0.000	0.45	1,197	1,206

P-values calculated using cluster-robust standard errors, clustered at the airport level.

Models using WLUs or passenger numbers consistently outperform models using ATMs. Although the coefficient on ATMs is statistically significant, it yields a much lower R<sup>2</sup> than passengers or WLUs, suggesting that ATM volumes are a weaker predictor of commercial revenue.

When comparing passenger-only models to passenger-plus-cargo models, the inclusion of cargo mail adds substantial explanatory power in the levels specification (raising R<sup>2</sup> from 0.44 to 0.67). However, in the log-log specification, the increase in fit is smaller, and the marginal contribution of cargo is much lower and less statistically robust.

WLUs performs worse than the passenger-plus-cargo model in levels, but better in log-log. The logged WLU model achieves the highest R<sup>2</sup> (0.67) and the lowest AIC/BIC of any specification in the table. Given that WLU is a constructed variable combining the passenger and cargo components, this finding is not obvious – especially since passenger-plus-cargo models should, in principle, have at least as much explanatory power. This suggests that the WLU composite may smooth noise or nonlinearities in a way that benefits a log-log specification.

To test the robustness of the variable selection and functional form choice, we estimated the log-log univariate models on progressively restricted subsamples. The first restriction was to European airports only (reducing the sample size from 646 to 276). This resulted in a notable increase in explanatory power for both the logged WLUs and logged passengers models: R-squared rose to 0.75 for WLUs and 0.73 for passengers, and both showed increases in estimated coefficients. Importantly, however, WLUs continued to outperform passengers on both R<sup>2</sup> and AIC/BIC, and cargo lost significance in the logged passengers + cargo model, suggesting that WLU remains the more stable composite measure.

The second restriction excluded group-owned airports (reducing N to 441). Here, the R-squared for logged WLUs remained high at 0.67, while the logged passenger model fell sharply to 0.50, further strengthening the case for WLUs. Again, WLUs retained the edge in AIC/BIC.

When both restrictions were applied simultaneously — excluding both group-owned and non-European airports — the sample size fell to 150. In this restricted sample, the coefficient on WLUs rose to 0.95, consistent with the broader pattern that exclusion of group airports has a stronger impact on coefficient estimates than geographic restrictions alone. Still, WLUs remained superior on all fit metrics, and the passenger models were more sensitive to the sample definition.

Taken together, these results suggest that while restricting the sample improves model fit, the gains in explanatory power do not clearly justify the loss in statistical precision from reducing the sample size. More importantly, they underscore that WLUs are the most robust predictor of commercial revenue across multiple subsamples, while passenger-based models are more sensitive

to the inclusion of groups and to sample composition. As such, WLUs were selected as the primary scale variable. However, from an interpretability perspective, passenger numbers remain the most intuitive and easily communicable measure. It is possible that the additional explanatory power of the WLUs model is a result of the WLUs variable is, in part, proxying for some other (secondary) driver of commercial revenues in addition to passengers. As a result, the log-passenger specification was retained as a key sensitivity check, even though WLUs (logged) were chosen for the core model on statistical grounds.

### A2.1.5 Statistical techniques

Once the dataset is established, we then seek to determine the broad econometric approach most suited to our modelling objectives. Our central aim is benchmarking – i.e. explaining persistent cross-sectional differences in costs and revenues across airports, and using the remaining unexplained component as an indicator of relative performance. This points towards an approach that places primary weight on between-airport variation, while treating the time dimension as a useful source of additional observations and a basis for robustness checks.

#### Core estimation approach and treatment of panel structure

For both opex and commercial revenue, we use a **pooled OLS framework** as the core specification and report cluster-robust standard errors at the airport level. Pooling allows us to exploit cross-sectional variation across airports while retaining a transparent interpretation of coefficients, and clustering allows for serial correlation and heteroskedasticity within airports over time. Common macroeconomic or sector-wide shocks can be captured through year effects (year dummies). Separately, where appropriate, we treat COVID-impacted years explicitly through sample restrictions to avoid abnormal observations driving results.

Because the data are panel in structure, we also consider alternative panel estimators as sensitivity checks. In principle, **fixed effects (FE)** control for unobserved time-invariant airport heterogeneity by absorbing airport-specific effects. However, in a benchmarking context this is a material drawback, as FE removes persistent cross-sectional differences, including long-run differences that may reflect underlying efficiency and enduring structural features. **Random effects (RE)** retains cross-sectional variation, but relies on the strict assumption that unobserved airport-specific effects are uncorrelated with the included regressors, which is often implausible for variables such as asset intensity, traffic composition, and other structural features. As will be set out in the results chapter, Hausman tests do not support the use of RE models for our dataset. For these reasons, our preferred panel sensitivity is a **correlated random effects (CRE/Mundlak)** specification. CRE relaxes the strict RE assumption by allowing unobserved airport-specific effects to be correlated with the regressors (via airport-level means of time-varying covariates), while preserving the cross-sectional variation that is central to benchmarking and providing an interpretable within-between decomposition. We discuss the sensitivities, statistical tests and the rationale underlying the CRE approach further in the results sections for opex and comrev.

#### Choosing initial functional form - opex

Before estimating full models or including control variables, we assess the **functional relationship** between opex and its drivers. The goal is to select a functional form that is:

- Economically interpretable,

- Statistically well-behaved (e.g. handles skewness, reduces heteroskedasticity),
- Flexible enough to capture the underlying relationships without overfitting.

We considered three primary functional forms for modelling opex:

- **Linear (levels):** Both the dependent variable (opex) and its drivers are entered in untransformed levels. This model is easy to interpret but may perform poorly in the presence of skewed distributions (which, as we have shown, we have here), non-constant variance (heteroskedasticity), or non-linear relationships.
- **Log-linear:** both opex and its key drivers are logged, implying constant elasticities. This is equivalent to a Cobb-Douglas functional form often used in production functions by economists and implies constant elasticity of substitution equal to 1. It has the advantage of strong interpretability (the coefficients of the model can be directly interpreted as elasticities) and its ability to linearise percentage relationships, especially when variables span several orders of magnitude.
- **Translog:** The translog specification extends the log-linear form by allowing for second-order flexibility (e.g. interaction and squared terms) while retaining the benefits of logarithmic transformation. This form allows elasticities to vary with the level of inputs and can better capture non-linearities and input complementarities, which is useful if the relationship between variables is expected to be non-constant across the sample. However, it is a less parsimonious functional form than the log-linear model, and the coefficients are less straightforward to interpret.

There is an inherent trade-off in selecting between the Cobb-Douglas and translog functional forms. The Cobb-Douglas (log-linear) form offers transparency and ease of interpretation, with coefficients directly representing elasticities. This simplicity supports clearer communication of results and avoids overfitting, especially in contexts where the relationships between variables are expected to be stable and monotonic. In contrast, the translog form provides greater flexibility by allowing for non-linear relationships and interaction effects between inputs, which can improve model fit if the underlying data relationships are complex.

Our modelling strategy prioritises parsimony and interpretability. Accordingly, we adopt the simpler Cobb-Douglas form unless the translog form offers a clear and material improvement in explanatory power (e.g. lower AIC/BIC and stronger predictive performance). This aligns with the principle of avoiding unnecessary complexity in regulatory benchmarking exercises.

However, we note that there is a potential theoretical advantage to a translog model in the opex context. Airports operate under cost minimisation constraints and face complex interactions between inputs such as scale, staffing, and infrastructure. The translog form allows for varying elasticities and input complementarities, which may better reflect real-world cost structures, particularly if there are economies of scale or non-linear cost drivers.

The final choice of functional form is based on a balance between parsimony, explanatory power, and economic coherence. Our initial preference for functional form for opex is a **log-linear form**, given the distributional analysis of the raw opex data indicates a log transformation is suitable and our desire for a parsimonious model. However, we explicitly test whether the added flexibility of a translog specification yields meaningful gains in fit or insight.

### Choosing initial functional form - comrev

The discussion of the optimal functional form set out for opex can also, largely, be applied to commercial revenues. We have opted for a pooled OLS regression model using standard errors clustered at the airport level for the same reasons as set out for opex. We also maintain the position that the greater parsimony and interpretability of linear models, as opposed to higher-order models, is preferable unless there is a strong statistical and/or theoretical justification for a more complex (and less interpretable) functional form.

In the case of commercial revenue specifically, the theoretical motivation for a translog form is weaker than for opex. There is no clear reason to expect airports to be solving a commercial revenue maximisation problem using multiple inputs in a flexible way. By contrast, in cost or efficiency modelling the assumption of an optimisation objective (e.g. cost minimisation) is more plausible, making the added flexibility of a translog specification more justifiable in that context.

Therefore, our initial preference for functional form for commercial revenues is a **log-linear form**, given the distributional analysis of the raw commercial revenues data indicates a log transformation is suitable, and due to the lack of a clear rationale for a more complicated translog functional form.

## A2.2 Model estimations

### A2.2.1 Opex results

This section sets out the results from our operating expenditure modelling.

Section A2.1.4 Drivers established that the preferred core driver for our opex model is WLUs (logged). While WLUs capture scale effects, other factors are likely to influence airports' total opex and should be controlled for to avoid omitted variable bias and to improve explanatory power. These include macroeconomic conditions, price levels, airport infrastructure, ownership, and time-specific shocks. In line with the literature and the data availability discussed in Sections A2.1.1 Dataset and A2.1.4 Drivers, we tested the following candidate controls.

- Time (year dummies) and an explicit treatment for COVID-impacted years (2020–2022)
- GDP per capita (log)
- Fixed assets (log)
- Passenger mix indicators (international passengers share; premium passengers share)
- Purchasing power parity (PPP)
- Hub status
- Number of runways
- Geographic effects (continent dummies)

Table outlines the key stages of our model development process. We began with a simple baseline model of logged total opex regressed on logged WLUs and then introduced additional controls and restrictions step by step. At each stage, we assessed model performance using R-squared, AIC and BIC and examined the stability and significance of key coefficients. While R<sup>2</sup> can be compared across models with different samples, AIC and BIC cannot be directly compared across regressions using different sample sizes. However, within subgroups of models estimated on the same sample, they provide useful guidance on model selection.

The base model performs strongly, with an elasticity of opex with respect to WLUs of around 0.753 and an R<sup>2</sup> of 0.54.

**Time dummies** (Year fixed effects) were introduced early to capture macroeconomic shocks. A Wald test confirmed that the set of yearly dummies were jointly significant at the 1 per cent level. We then **excluded COVID-affected years (2020–2022)** to avoid abnormal operating expenditure during that period. While this reduced the sample size, it helped improve model fit by removing noise. Remaining year dummies remained jointly significant.

The inclusion of **GDP per capita** (in SDR) as a control variable was tested using both raw data and a logged transformation of GDP per capita, given there is a moderate right-skew in the raw figures. Each gave similar results with a strongly significant positive coefficient, an intuitive result as higher-income countries will tend to face structurally higher input costs, particularly for labour, contracted services, and utilities, which translates into higher operating expenditure for a given level of activity. We have chosen to use the logged GDP per capita variable for easier interpretability. This variable materially improves model fit.

Next, we incorporated **fixed assets (logged)** as a proxy for airport asset intensity and infrastructure scale. When included alongside WLUs, this variable is statistically significant and improves model performance. The positive coefficient is economically intuitive: conditional on traffic volumes, airports with a larger and more complex asset base tend to incur higher operating expenditure due to increased requirements for maintenance, staffing, utilities, and operational support. When GDP per capita is also included, the fixed assets coefficient loses statistical significance, potentially reflecting overlap between asset intensity and national cost environments rather than a lack of economic relevance. Given its strong theoretical justification and its role in capturing infrastructure-driven cost differences across airports, we retain the fixed assets variable in the preferred specification.

After establishing the GDP per capita and fixed asset controls, we reassessed the role of time dummies. Although they are not jointly significant and their exclusion marginally improves AIC and BIC within the common sample, we retain them in the preferred specification to capture common time effects. We will also report an additional sensitivity excluding the time dummies.

We then tested **additional traffic mix variables** to capture systematic differences in operating cost intensity across airports. The **share of international passengers** is positive and statistically significant, as expected. Airports with a higher proportion of international traffic typically face additional operational requirements, including border control, enhanced security screening, customs processing, and longer passenger dwell times, all of which increase staffing, space, and support service needs and therefore raise operating expenditure.

The **share of premium passengers** is also positive and statistically significant (at the 5 per cent level) and improves model fit. This result is likewise economically intuitive. A higher premium share is associated with more space- and service-intensive facilities, such as lounges, fast-track security, and enhanced passenger services, which require additional operating inputs and increase opex.

Controlling for scale, GDP per capita, and fixed assets, both variables capture meaningful differences in traffic composition that affect operating costs and are therefore retained in the preferred specification.

We also tested **purchasing power parity (PPP)** as a control for cross-country differences in price levels. PPP is included to account for variation in domestic input prices—such as labour, utilities, and contracted services—that may systematically affect airports’ operating costs across countries. PPP is statistically significant when introduced alongside WLUs and GDP per capita, and

it improves model fit in the larger sample where it is available. However, once additional controls are included, particularly fixed assets and traffic mix variables, PPP does not add incremental explanatory power and is not statistically significant in any specification. This suggests that the variation captured by PPP is largely absorbed by these more direct controls. While there is a clear economic rationale for including PPP, it is not retained in the preferred specification.

We tested the inclusion of **number of runways** as a control for physical infrastructure. Runways was not statistically significant in the preferred specification (p-value 0.53), when fixed assets was removed (p-value = 0.725), or when group airports were excluded (p-value 0.36). Given its lack of explanatory power across specifications, and the fact that infrastructure scale is already captured by the fixed assets variable, the number of runways is not included in the preferred model.

We also tested a hub dummy to control for the effect of being a major transfer airport. Hub status may be associated with different passenger behaviours, longer dwell times, and more complex operational requirements. However, once scale, GDP per capita, fixed assets, and traffic mix are controlled for, the hub dummy is not statistically significant (p-value = 0.201) and does not improve model fit. We therefore do not include hub status in the preferred specification. Similarly, we explored both binary (**non-public vs public**) and categorical (**public → private scale**) forms of ownership status. Ownership variables were generally statistically insignificant and did not materially improve model fit.

Geographic controls (i.e. continent dummies) were also tested in the model. While some of these individual variables were not statistically significant, they were jointly significant as a group. This suggests that most of the cross-regional variation in opex is already captured by the included economic controls.

We also explored terminal area as an alternative measure of infrastructure capacity to fixed assets. However, this variable was not statistically significant in our preferred model forms. This may reflect inconsistent or incomplete reporting of terminal area across airports, or collinearity with other activity and infrastructure indicators.

**Table A2.2.1: Regression results for opex**

Model	WLUs (log)	Time	Covid-excluded	GDP per capita (log)	Fixed assets (log)	International passengers (%)	Premium passengers (%)	PPP	Hubs	N	R <sup>2</sup>	AIC	BIC
Base (WLUs)	0.753***	✗	✗	-		-	-	-	-	646	0.54	1050	1059
Add time	0.877***	✓	✗	-		-	-	-	-	646	0.63	926	988
Drop Covid years	0.923***	✓	✓	-		-	-	-	-	500	0.67	672	719
Test GDP/capita	0.965***	✓	✓	0.333***		-	-	-	-	495	0.83	351	402
Test fixed assets	0.866***	✓	✓	0.301***	0.122	-	-	-	-	495	0.83	339	393
Drop time	0.861***	✗	✓	0.299***	0.105	-	-	-	-	495	0.83	323	340
Test international passengers	0.788***	✗	✓	0.205***	0.131**	0.643***	-	-	-	416	0.89	87	107
Test premium passengers	0.794***	✗	✓	0.199***	0.114**	0.606***	1.766***	-	-	416	0.90	67	91
<b>Premium passengers + time dummy</b>	<b>0.795***</b>	✓	✓	<b>0.199***</b>	<b>0.111*</b>	<b>0.605***</b>	<b>1.82**</b>	-	-	<b>416</b>	<b>0.90</b>	<b>82</b>	<b>142</b>
Test PPP	0.956***	✓	✓	0.352***	-	-	-	0.007***	-	495	0.84	301	356
Test PPP + other controls	0.801***	✓	✓	0.147**	0.101*	0.598***	1.924**	-0.168	-	416	0.90	69	134
Test hubs	0.810***	✓	✓	0.187***	0.118*	0.576***	2.279**	-	-0.109	416	0.90	74	138

\* Indicates statistical significance at the 1% level; \*\* Indicates statistical significance at the 5% level; \*Indicates statistical significance at the 10% level

Based on the results set out above, our preferred model is a pooled OLS regression with log-transformed opex as the dependent variable sourced from Jacobs dataset, and includes the following regressors:

- Log WLUs – the primary activity driver, sourced from Jacobs dataset;
- Log GDP per capita – capturing cross-country differences in input cost environments, sourced from the World Bank;
- Year dummies – to control for time-specific shocks (e.g. COVID, inflation);
- Log fixed assets - capturing differences in airport infrastructure scale and asset intensity, sourced from Jacobs dataset; and
- International passenger share and premium passenger share - capturing differences in traffic composition associated with more complex and cost-intensive operations, sourced from OAG.

### Sensitivity analysis and robustness checks

To validate the robustness of our preferred model, we conducted a series of sensitivity tests and statistical checks. These covered variations in model specification, functional form, sample selection, and error structure. Our goal was to determine whether the key findings were sensitive to reasonable changes in assumptions or data treatment.

#### I. Panel model selection

As a sensitivity check to the preferred pooled COLS specification for operating expenditure, we also estimated alternative panel data models. The pooled COLS approach treats the airport-specific component of costs as part of the composite error term, which is appropriate for benchmarking provided the included regressors capture the main systematic drivers of cost differences. However, because the dataset has a panel structure, it is also useful to test whether the results are sensitive to alternative treatments of unobserved airport-specific heterogeneity.

Using the preferred covariate set from the pooled model, we first estimated both fixed-effects and random-effects specifications and applied the standard Hausman test. A classical Hausman test rejects the random-effects specification, indicating that unobserved airport-specific effects are correlated with the included cost drivers and that the random-effects assumption does not hold. The Hausman test does not mechanically determine the preferred estimator; rather, it assesses whether the assumptions underlying the random-effects model are credible. However, the standard test is not well behaved in this setting, as the differenced variance matrix is not positive definite. This appears to be driven by the inclusion of year dummies. Although the year dummies are not jointly significant, they are retained in the preferred pooled specification to capture common macroeconomic shocks. We therefore re-estimated the Hausman test using the “sigmamore” variant in Stata.<sup>59</sup> This again rejects the random-effects specification, confirming that the core conclusion is not driven by the numerical instability in the standard test.

As a further sensitivity, we re-ran the same panel specification without year dummies. This is also informative because the year dummies are included mainly to capture common macroeconomic shocks rather than because they are individually or jointly significant. In this alternative specification, the standard Hausman test again rejects random effects but remains affected by the

<sup>59</sup> The sigmamore option modifies the construction of the Hausman test and effectively ensures a well-defined (positive) test statistic in cases where the standard version is numerically unstable.

same non-positive-definite variance matrix. Applying the sigma more variant yields a well-behaved test statistic, which rejects the random-effects assumption.

While a fixed-effects estimator would address this correlation, it does so by absorbing all time-invariant airport-level effects. In a benchmarking context this is a material limitation: persistent differences between airports may reflect long-run efficiency and enduring structural features, and removing these differences would be inconsistent with the purpose of estimating relative performance.

For this reason, we adopt a correlated random effects (CRE/Mundlak) specification as the appropriate panel sensitivity. Under this approach, the random-effects model is augmented with airport-level means of the time-varying regressors, which allows the unobserved airport-specific effects to be correlated with the explanatory variables while preserving the cross-sectional variation that is central to benchmarking. The CRE framework also provides an explicit within–between decomposition, clarifying whether relationships are driven primarily by changes within airports over time or by differences in average levels across airports. The CRE results provide a more appropriate panel-based sensitivity check than standard random effects, while avoiding the key drawback of fixed effects in a COLS benchmarking setting.

The table below compares the preferred pooled OLS specification against the correlated random effects (CRE/Mundlak) sensitivity, estimated on the same pre-COVID sample (N = 416). Both specifications show a high degree of explanatory power ( $R^2 = 0.90$ ).

**Table A2.2.2: Comparison of Pooled OLS and CRE results for opex**

Model	WLUs	Year dummies	GDP per capita	Fixed assets	IP	PP	N	R2
<b>Pooled OLS</b>	0.80***	✓	0.20***	0.11**	0.60***	1.82**	416	0.90
<b>CRE (within/ between)</b>	0.19 / 0.67***	✓	0.63*** / 0.39***	0.12**/ 0.07	-0.50/ 1.09**	0.50**/ 2.04	416	0.90

The CRE results display the expected within–between decomposition:

- **WLUs:** the between effect is large and significant, while the within effect is small and not significant. This explains WLUs being a largely structural scale driver in opex: cross-airport differences matter more for explaining cost levels than year-to-year changes within an airport.
- **GDP per capita:** both the within and between effects are positive and statistically significant. This supports GDP per capita as a robust control for national cost environments.
- **Fixed assets:** the within effect is positive and significant, while the between effect is not significant. This suggests that changes in asset base over time within an airport are linked to higher opex, whereas cross-sectional variation in assets could be largely absorbed by other structural controls in the model.
- **International passenger share (IP):** the between effect is positive and significant, while the within effect is not significant and changes sig. This pattern is consistent with IP being primarily a persistent airport characteristic in the sample, with limited reliable within-airport variation once time effects are controlled for.
- **Premium passenger share:** the within effect is positive and significant, while the between effect is not significant. This indicates that premium passenger contains informative within-airport

---

variation in the available sample, but cross-sectional differences are estimated less precisely once other structural controls are included.

Overall, the fact that several within and between components are not statistically significant is informative rather than problematic: it indicates which drivers primarily operate through persistent cross-airport differences (most relevant for benchmarking) versus within-airport changes over time. The decomposition also reinforces the case for CRE as the appropriate panel sensitivity, while leaving the pooled COLS approach as the core benchmarking model.

## 2. Alternative Scale Variable

We tested models that used *logged passengers* in place of *logged WLUs* as the primary activity driver. The fit was nearly identical: the passengers model yielded an R-squared of 0.90, with similar coefficient magnitudes for GDP and fixed assets. Alternatively when using logged passengers + cargo/mail as the primary activity driver, cargo/mail no longer remained a significant variable ( $p=0.99$ ). This reinforces our decision to use WLUs in the preferred model but confirms that passengers only can be used for sensitivity purposes without materially changing the conclusions.

## 3. Levels Specification

We tested a version of the model using unlogged (levels) activity and economic variables. The  $R^2$  dropped to 0.78. Although the core coefficients remained stable in sign, some coefficients were not significant anymore (fixed assets and premium seats). The level specification is harder to interpret and less well-behaved, reinforcing the suitability of the log-log functional form.

## 4. Excluding Group Airports

We ran the model excluding all group-owned airports. The  $R^2$  fell slightly to 0.89, but all core coefficients remained stable and significant at (10%). Since this restriction does not improve model fit and reduces generalisability, we retain the full sample in our preferred model.

## 5. Europe-Only Sample

Restricting the sample to European airports increased the  $R^2$  to 0.95, with all core variables maintaining their expected signs and statistical significance (international passengers remained significant at the 10% level). While this specification offers a slightly better fit, it comes at the cost of a reduced sample size. We therefore retain the broader model as our primary specification.

## 6. Clustering Standard Errors at Country Level

We re-ran the model clustering standard errors at the country level rather than the airport level. The results were consistent, with no material changes to statistical significance (fixed assets remained significant at 10% level), or model fit ( $R$ -squared fell slightly to 0.89). This provides reassurance that serial correlation within countries is not driving our results.

## 7. Heteroskedasticity robust Standard Errors (No Clustering)

Using robust (heteroskedasticity-consistent) standard errors instead of clustered SEs had little impact on the statistical significance of core variables.

## 8. Statistical Diagnostics of residuals

Variance Inflation Factor (VIF) tests showed no evidence of multicollinearity among the explanatory variables. Residual diagnostics (including histograms and normal quantile plots)

---

confirmed that residuals were approximately normally distributed with minimal skew and kurtosis (2.44). These diagnostics support the validity of inference from our model.

## 9. Translog Functional Form

Finally, we tested a more flexible translog specification, allowing for second-order and interaction terms between the demeaned logged variables (WLUs, GDP per capita, fixed assets, international passengers and premium passengers). To address issues of multicollinearity, we first demeaned all continuous variables before generating their squared and interaction terms. This centring process reduces correlation among polynomial terms to avoid multi-collinearity.

The full translog model achieved a slightly higher R-squared (0.91 vs. 0.90 for the core model). However, this improvement came at the cost of a significant increase in model complexity, with many additional terms and a higher Bayesian Information Criterion (BIC). Given our emphasis on parsimony and transparency, we do not view this gain as sufficient to justify replacing the simpler log-linear model.

## 10. Time Dummies

We tested specifications excluding the time dummies. Their removal had little impact on the magnitude or statistical significance of the core variables, and overall explanatory power remained broadly unchanged. This suggests that the estimated relationships between costs and the main drivers are not sensitive to the inclusion of common time effects. Nonetheless, we retain the time dummies in the preferred specification to account for macroeconomic shocks and other period-specific effects, with results excluding them reported as a sensitivity.

### A2.2.2 ComRev results

This section sets out the results from our commercial revenue modelling.

Section A2.1.4 Drivers established that the preferred core driver for our commercial revenues model is WLUs (logged). While WLUs capture scale effects, other factors are likely to influence airports' commercial revenue and should be controlled for to avoid omitted variable bias and to improve explanatory power. These include macroeconomic conditions, airport infrastructure, and traffic composition. In line with the literature and the data availability discussed in Sections A2.1.1 Dataset and A2.1.4 Drivers, we tested the following candidate controls.

- Time effects (year dummies) and an explicit treatment for COVID-impacted years (2020–2022)
- GDP per capita (log)
- Fixed assets (log)
- Passenger mix indicators (international passengers share; premium passengers share)
- Purchasing power parity (PPP)
- Hub status
- Number of runways
- Geographic effects (continent dummies)

In Table A2.2. we outline the key stages of our model development process. We began with a simple baseline model of logged commercial revenue regressed on logged WLUs and then introduced additional controls and restrictions step by step. At each stage, we assessed model performance using R-squared, AIC and BIC and examined the stability and significance of key

---

coefficients. While  $R^2$  can be compared across models with different samples, AIC and BIC cannot be directly compared across regressions using different sample sizes. However, within subgroups of models estimated on the same sample, they provide useful guidance on model selection.

The base model performs strongly, with an elasticity of commercial revenue with respect to WLUs of around 0.85 and an  $R^2$  of 0.67.

**Time dummies** (Year fixed effects) were introduced early to capture macroeconomic shocks. A Wald test confirmed that the set of yearly dummies were jointly significant at the 5 per cent level, but the  $R^2$  was unchanged and information criterion slightly worsened, suggesting the year-to-year variations are not a primary driver of difference in commercial revenue in this pooled setting. We then excluded **COVID-affected years** (2020–2022) to avoid abnormal commercial revenues during that period. This reduced the sample size and slightly deteriorated model fit. Remaining year dummies remained jointly significant.

The inclusion of **GDP per capita** (in SDR) as a control variable was tested using both raw data and a logged transformation of GDP per capita, given there is a moderate right-skew in the raw figures. Each gave similar results with a strongly significant positive coefficient, an intuitive result as higher-income countries will tend to have passengers with greater spending power, raising the revenue per unit of traffic. We have chosen to use the logged GDP per capita variable for easier interpretability. This variable materially improves model fit.

Next, we incorporated **fixed assets** (log) as a proxy for airport asset intensity and commercial capacity. This variable is statistically significant and improves model performance. The positive coefficient is economically intuitive because, conditional on traffic volumes and national income, airports with a larger asset base tend to have greater scope for commercial development (for example, terminal infrastructure and associated retail and concessions capacity).

We then tested additional traffic mix variables that may capture systematic differences in commercial intensity. The share of **international passengers** was not statistically significant and reduces the estimation sample due to incomplete airport coverage, so it is not retained. By contrast, the share of **premium passengers** is statistically significant and improves model fit in the available subsample. This variable also has a clear economic interpretation, which is that a higher premium share is expected to be associated with higher propensity to spend on commercial offerings such as duty free, food and beverage, and premium parking (conditional on overall traffic, country income, and airport assets). For these reasons, premium passengers share is retained in the preferred model.

We also tested **PPP** as an additional control for cross-country differences in price levels. PPP is statistically significant when introduced alongside WLUs, GDP per capita and fixed assets, and it improves fit within the larger sample where it is available. However, when premium passenger share is included, PPP does not add incremental explanatory power and is not statistically significant. This suggests that, in practice, PPP is capturing variation that overlaps with the premium passenger share. While there is economic intuition behind the inclusion of PPP as a driver, on balance we prefer to retain premium passenger share over PPP in the core model given it is a more direct proxy for spending propensity, though we retain PPP in sensitivity testing.

---

We also tested a **hub dummy** to control for the effect of being a major transfer hub. While hub status may be associated with different passenger behaviours and dwell times, it is not statistically significant once scale, GDP, fixed assets and passenger mix are controlled for. We therefore do not include hub status in the preferred specification.

In addition to the variables reported in Table A2.2., we tested the inclusion of **number of runways** as a further control for physical infrastructure. While runway count is statistically significant when added to the preferred specification, the estimated coefficient is negative, which is not consistent with a straightforward capacity-based interpretation. The runway coefficient is potentially capturing differences in commercial intensity or space utilisation, rather than traffic volume. For example, it could be that a larger number of runways implies a more spatially spread-out terminal layout, leading to lower passenger density per square metre of commercial space. In addition, passengers in larger airports may spend more time walking to gates and less time engaging with retail environments. However, it is also possible that the runways variable is capturing measurement issues with the runway counts for airport groups rather than genuine infrastructure effects. Moreover, adding the runway variable reduces the usable sample (to 400). Given these data quality concerns and the cost in observations, and given we already have a control for fixed assets, we do not include runways in the core model, but we report it as a sensitivity check.

We also explored both binary (non-public vs public) and categorical (public → private scale) forms of **ownership status**. Ownership variables were generally statistically insignificant and did not materially improve model fit.

We also explored terminal area as an alternative measure of infrastructure capacity to runways. However, this variable was not statistically significant in our preferred model forms. This may reflect inconsistent or incomplete reporting of terminal area across airports, or collinearity with other activity and infrastructure indicators. On balance, runways proved to be a more robust and interpretable control in our final specification.

Geographic controls (i.e. continent dummies) were also tested, but were not statistically significant unless GDP was removed. This indicates that most of the cross-regional variation in commercial revenues is already accounted for by the economic control.

## Appendix 2: Top-Down Benchmarking

**Table A2.2.3: Regression results for Commercial Revenue**

Model	WLUs	Time	Covid-excluded	GDP per capita (log)	Fixed assets (log)	International Passengers (%)	Premium Passengers (%)	PPP	Hubs	N	R <sup>2</sup>	AIC	BIC
Base (WLUs only)	0.852***	✘	✘	-	-	-	-	-	-	646	0.67	864	873
Add time	0.865***	✓	✘	-	-	-	-	-	-	646	0.67	882	945
Drop Covid years	0.891***	✓	✓	-	-	-	-	-	-	500	0.66	657	704
Add GDP/capita	0.908***	✓	✓	0.206***	-	-	-	-	-	495	0.73	536	587
Add fixed assets	0.693***	✓	✓	0.137***	0.221**	-	-	-	-	495	0.75	490	545
Drop time	0.696***	✘	✓	0.137***	0.220**	-	-	-	-	495	0.75	473	490
Test international passengers	0.660***	✘	✓	0.132**	0.219**	0.224	-	-	-	416	0.79	302	322
<b>Test premium passengers</b>	<b>0.680***</b>	✓	✓	<b>0.141**</b>	<b>0.186**</b>	-	<b>2.702**</b>	-	-	<b>416</b>	<b>0.80</b>	<b>301</b>	<b>358</b>
Test PPP	0.705***	✓	✓	0.168***	0.197**	-	-	0.009***	-	495	0.78	429	488
Test premium passengers + PPP	0.676***	✓	✓	0.181**	0.193**	-	2.632**	0.013	-	416	0.80	298	359
Test hubs	0.666***	✓	✓	0.162***	0.173**	-	2.141**	--	0.146	416	0.81	292	352

\*\*\*Indicates statistical significance at the 1% level; \*\* Indicates statistical significance at the 5% level; \*Indicates statistical significance at the 10% level

Based on the results set out above, our preferred model is a pooled OLS regression with log-transformed commercial revenue as the dependent variable sourced from Jacobs dataset, and includes the following regressors:

- Log WLUs – the primary activity driver, sourced from Jacobs dataset;
- Log GDP per capita – capturing differences in passenger spending power across countries, sourced from the World Bank;
- Year dummies – to control for time-specific shocks (e.g. COVID, inflation);
- Log fixed assets – capturing differences in airport asset intensity and commercial capacity, sourced from Jacobs dataset; and
- Premium passenger share – capturing differences in traffic mix that are associated with higher spending propensity, sourced from OAG.

### Sensitivity analysis and robustness checks

To validate the robustness of our preferred model, we conducted a series of sensitivity tests and statistical checks. These covered variations in model specification, functional form, sample selection, and error structure. Our goal was to determine whether the key findings were sensitive to reasonable changes in assumptions or data treatment.

#### 1. Panel model sensitivity

As in the opex section, we also estimate a panel specification as a sensitivity check to the preferred pooled COLS models for commercial revenue. For the preferred covariate set used in the pooled model (log WLUs, log GDP per capita, log fixed assets, and premium passenger share), we first estimated fixed- and random-effects specifications and applied the standard Hausman test.

Similar to the opex results, the classical Hausman test is not well behaved and does not provide a reliable basis for inference. Using the “sigmamore” variant in Stata yields a well-behaved test statistic and strongly rejects the random-effects specification, indicating that the strict random-effects assumption is unlikely to hold. As a further sensitivity, we re-estimated the model without year dummies. This is also informative given that time effects only become jointly significant once premium passenger share is included, suggesting some overlap in what these variables capture. Consistent with the opex findings, the standard Hausman test remains inconclusive, while the sigmamore variant again provides a stable result and rejects random effects.

As a further robustness check, we ran the standard Hausman test on a closely related specification that replaces premium passenger share with PPP. This is a natural alternative given that premium passenger share and PPP appear to capture overlapping cross-sectional differences in spending-related factors and yield similar pooled model performance. In this alternative specification, the Hausman test provides borderline evidence of systematic differences between the fixed- and random-effects estimates ( $p \approx 0.06$ ), suggesting that the strict random-effects assumption may not hold.

On this basis – and for consistency with the approach adopted for opex – we report a correlated random effects (CRE/Mundlak) specification as the appropriate panel sensitivity. This approach allows for correlation between unobserved airport-specific effects and the regressors by augmenting the random-effects model with airport-level means of the time-varying covariates, producing the expected within-between decomposition.

The table below compares the preferred pooled OLS specification against the correlated random effects (CRE/Mundlak) sensitivity, estimated on the same pre-COVID sample (N = 416).

**Table A2.2.4: Comparison of Pooled OLS and CRE results for ComRev**

Model	WLUs	Year dummies	GDP per capita	Fixed assets	PP	N	R2
Pooled OLS	0.68***	✓	0.14***	0.19**	2.70**	416	0.80
CRE (within/between)	0.93*** / 0.42**	✓	0.62*** / 0.53***	0.03 / 0.33***	0.06 / 3.70**	416	0.83

The CRE results show the expected within–between decomposition and a similar overall model fit ( $R^2 = 0.83$ ). In particular:

- The within estimates suggest a strong positive relationship between commercial revenue and both WLUs and GDP per capita, consistent with higher traffic and stronger macroeconomic conditions being associated with higher commercial revenues over time within an airport.
- The between estimates indicate that cross-airport differences in fixed assets and premium passenger share remain positively associated with commercial revenue, consistent with more asset-intensive airports and airports with a higher premium mix exhibiting stronger commercial revenue intensity.
- Differences between pooled and decomposed coefficients for some variables underline the relevance of allowing for correlation between time-invariant airport effects and observed drivers – reinforcing the case for CRE as the appropriate panel sensitivity.

Overall, the CRE results are supportive of the pooled specification as the core drivers remain economically meaningful and model performance remains strong. This provides reassurance that the preferred COLS results are not unduly sensitive to alternative treatments of unobserved heterogeneity.

## 2. Alternative Scale Variable

We tested models that used *logged passengers* in place of *logged WLUs* as the primary activity driver. The fit was very similar: the passenger model yielded an R-squared of 0.79 (compared to 0.80 in the preferred model), and the coefficient on passengers (0.67) was very similar to the coefficient on WLUs (0.68). There were also similar coefficient magnitudes for GDP (0.13) and fixed assets (0.22), with an increase in the premium passengers to 3.43 (versus 2.70). All coefficients were statistically significant at the same level of significance as they are in the core model. Adding cargo to the passenger model had no effect – cargo was statistically insignificant. This reinforces our decision to use WLUs in the preferred model, but confirms that passengers can be used for sensitivity purposes without materially changing the conclusions.

## 3. Levels Specification

We re-estimated the preferred commercial revenue specification in levels to test whether the results are sensitive to the log–log functional form. The levels specification delivers a materially weaker fit ( $R^2 \approx 0.67$ , compared with around 0.80 in the preferred log specification). The core activity and macroeconomic drivers remain positive and statistically significant and the premium passenger term remains positive but only marginally significant ( $p = 0.050$ ). However, fixed assets

---

becomes statistically insignificant ( $p = 0.265$ ), consistent with the levels model being more affected by scale differences, heteroskedasticity and outliers. Overall, this sensitivity suggests that while the qualitative relationships are broadly consistent, the log specification provides a more stable and interpretable proportional relationship and materially better explanatory power, supporting our choice of the log-linear functional form in the preferred model.

#### **4. Excluding Group Airports**

We tested whether excluding group airports and including a runway count variable affected the preferred results, given the concerns regarding runway counts for groups. This sensitivity is estimated on a substantially smaller sample ( $N = 260$ ).

In this specification, the runway variable is negative ( $-0.14$ ) and statistically significant. This suggests that – conditional on WLUs, GDP per capita, fixed assets and passenger mix – airports with more runways have lower commercial revenue. As already discussed, a negative sign could reflect differences in commercial intensity (for example, more operationally complex airports may have more dispersed terminal layouts and lower passenger density around retail areas). However, the inclusion of runways and the group exclusion also affects the stability of other coefficients: while WLUs and GDP per capita remain strongly significant, fixed assets and premium passenger share are no longer statistically significant in this restricted sample. This reinforces our decision not to include runways in the core model. Instead, we retain fixed assets as the primary infrastructure proxy in the preferred specification.

#### **5. Europe-Only Sample**

Restricting the sample to European airports ( $N=194$ ) produced an R-squared of 0.84, indicating the overall fit remains strong. However, GDP per capita became completely statistically insignificant ( $p=0.75$ ), likely due to the reduced variation in economic conditions across the more homogeneous European sample. Premium passengers also becomes statistically insignificant ( $p=0.20$ ), which may again reflect a reduction in variation across the sample, and the fact that a smaller sample size reduces statistical power more generally.

#### **6. Clustering Standard Errors at Country Level**

We re-ran the model clustering standard errors at the country level rather than the airport level. The results were consistent, with no material changes to statistical significance or model fit (R-squared remained 0.80). This provides reassurance that serial correlation within countries is not driving our results.

#### **7. Heteroskedasticity robust Standard Errors (No Clustering)**

Using robust (heteroskedasticity-consistent) standard errors instead of clustered SEs had little impact on the model results. All core regressors remain positive and are statistically significant under robust inference (WLUs, GDP per capita, fixed assets and premium passenger share all significant at the 1 per cent level), and coefficient magnitudes are effectively unchanged. This provides reassurance that the preferred results are not sensitive to the choice between clustered and robust variance estimators.

#### **8. Statistical Diagnostics of residuals**

Variance Inflation Factor (VIF) tests showed no evidence of multicollinearity among the explanatory variables. All VIFs are low (ranging from around 1.1 to 2.5, with a mean VIF of 1.86),

---

suggesting that the regressors are not highly correlated and that coefficient estimates are not being unduly inflated by collinearity. Residual diagnostics (including histograms and normal quantile plots) confirmed that residuals were approximately normally distributed with minimal skew and kurtosis (2.71).

We tested for heteroskedasticity using the Breusch–Pagan/Cook–Weisberg test applied to the preferred pooled specification. The null of constant variance is rejected indicating that the residual variance is not constant. This is not unexpected in a cross-sectional benchmarking context, even with log-transformed variables. We therefore place weight on inference based on heteroskedasticity-robust and/or cluster-robust standard errors, and we report clustered standard errors at the airport level in the core results.

These diagnostics support the validity of inference from our model.

## 9. Translog Functional Form

Finally, we tested a more flexible translog specification, allowing for second-order and interaction terms between the demeaned logged variables (WLUs, GDP per capita, fixed assets and premium passengers). The full translog model achieved a slightly higher R-squared (0.82 vs. 0.80 for the core model). However, this improvement came at the cost of a significant increase in model complexity, with many additional terms and a higher Bayesian Information Criterion (BIC). Given our emphasis on parsimony and transparency, we do not view this gain as sufficient to justify replacing the simpler log-linear model.

### A2.3 HAL's relative efficiency

#### A2.3.1 Frontier analysis for opex

To assess the relative efficiency of Heathrow by operating expenditure, we benchmark based on a Corrected Ordinary Least Squares (COLS) approach. COLS is a benchmarking technique that adjusts an OLS regression to reflect best-practice performance by shifting the best-fit locus to pass through a top-performing observation.

This method estimates the level of opex or commercial revenue that would be expected from an airport, conditional on its observable characteristics. Using our preferred models, the analysis is applied separately to opex and commercial revenue, using a pooled OLS regression model covering data from 2010 to 2022.

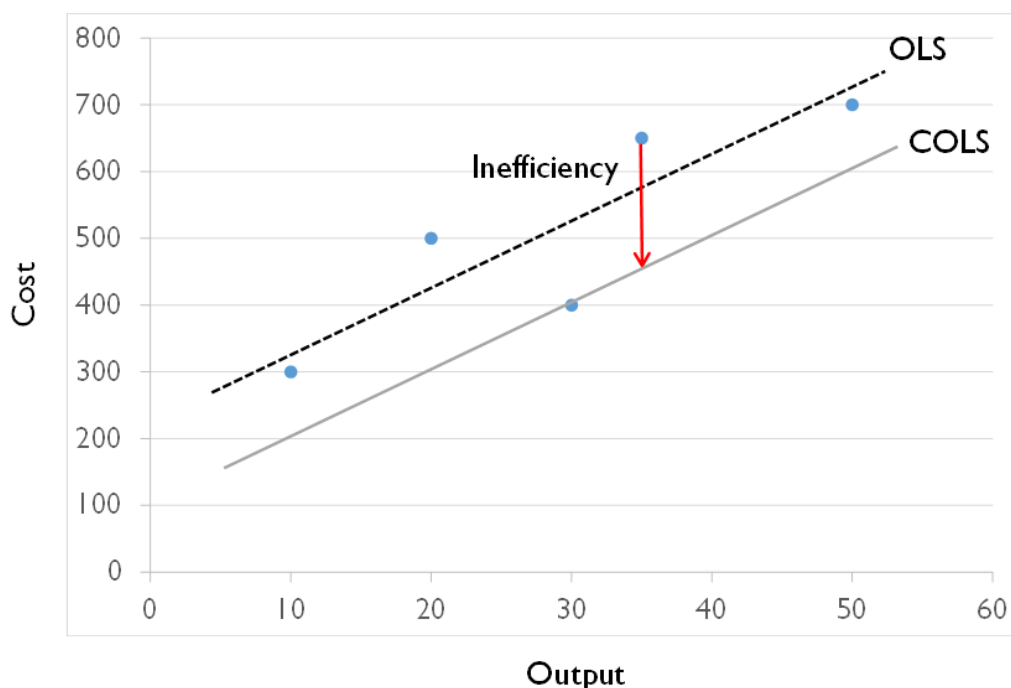
The OLS model provides a fitted value for each airport-year, representing predicted performance given an airport's structural features. We then compute residuals as the difference between actual and predicted values. For opex, negative residuals suggest greater efficiency (i.e. spending less than expected), while for commercial revenue, positive residuals indicate stronger-than-expected commercial returns.

To define a best-practice frontier, we focus on a fixed reference year 2019. We focus on 2019 because it is the most recent year reflecting broadly “normal” operations prior to the COVID disruption (given the latest year in our sample, 2022, is still not fully absent of Covid impacts), and therefore provides a stable basis for defining best-practice performance.

We identify the top-quartile performer by calculating the 25th percentile residual for opex, and the 75th percentile residual for revenue. This is often referred to as the “Upper Quartile” approach and is commonly used in regulatory benchmarking. The OLS prediction line is then shifted vertically so that it passes through this residual. The result is a corrected benchmark on the COLS frontier, which defines the expected level of best-practice performance conditional on airport characteristics. Using the upper quartile performance provides a robust but stretching benchmark, given it is a level of efficiency achieved by a material subset of airports, rather than by the single most extreme residual. This also reduces sensitivity to outliers and measurement error. We do not adopt an average or median benchmark, as this would represent typical performance rather than best practice and would therefore be less informative for an efficiency-focused cross-check.

To illustrate, the diagram below provides a stylised example of the difference between a standard OLS regression line and the COLS frontier. The OLS line represents average expected performance, conditional on certain economic characteristics. The COLS line is constructed by vertically shifting the OLS line so that it passes through a top-quartile performer, typically defined using the 25th percentile of residuals. The vertical distance between any observation and the COLS frontier reflects its inefficiency. This corrected line defines the benchmark for best-practice performance, holding structural factors constant.

**Figure A2.3.1: Illustrative example of COLS**



We construct four versions of the COLS frontier, corresponding to different peer groups:

- All airports: the full international sample;
- European airports only: restricted to airports located in Europe;
- Non-group airports only: excluding airports that are part of a wider airport group;
- Non-group European airports: applying both filters simultaneously.

Each airport's efficiency is then assessed by calculating its gap to the frontier in 2019 and 2022. These two years were selected to provide a clear pre- and post-COVID comparison: 2019

---

represents the last full year before the pandemic, while 2022 was selected both to observe how performance had evolved in the most recent available post-COVID year and to assess how each airport fared relative to its peers during the recovery phase, as air traffic and operations began to normalise. The percentage gap is defined as:

$$\text{Gap (\%)} = \frac{\text{Actual costs} - \text{Frontier prediction}}{\text{Frontier prediction}} \left( = \frac{\text{Residual}}{\text{Frontier prediction}} \right)$$

For opex, a positive gap indicates inefficiency (spending above the top-quartile benchmark), while a negative gap implies efficient performance. For commercial revenue, the interpretation is reversed: a negative gap indicates underperformance relative to the top-quartile benchmark.

## Results

We apply this approach to our [preferred model](#) for opex, which uses a log-linear functional form with WLUs as the scale variable, and includes controls for GDP per capita, fixed assets, and traffic mix. The frontier is estimated for 2019, and efficiency results are calculated for 2019 and 2022.

Heathrow was one of the most inefficient airport in the comparator set in 2019 in terms of opex performance (ranked 39 out of 43), with a positive gap to the [efficiency frontier of +3.14%](#). By 2022, this gap had [widened further to +4.92%](#), maintaining Heathrow's position as one of the least efficient airport in the group, ranking 40 out of 43. The efficient frontier is anchored by Amsterdam Schiphol Airport. Heathrow's position is similarly weak under other definitions of the efficiency frontier:

- European airports: from +2.93% in 2019 to +4.70% in 2022;
- Non-group airports: from +3.41% to +5.19%;
- Non-group European airports: from +3.14% to +4.92%.

While Heathrow's deterioration is notable, it occurred in the context of a broader post-COVID trend of rising operational inefficiencies. Several other airports saw comparable or even greater increases in their gap to the frontier between 2019 and 2022. For example:

- Airports of Thailand's gap rose by +4.97 percentage points (from 1.49% to 6.46%),
- Melbourne's by +3.80pp (from -2.17% to 1.64%),
- Manchester's by +4.09pp (from 0.18% to 4.27%),
- and Hong Kong's by +3.59pp (from -0.82% to 2.77%).

These shifts highlight a widespread increase in opex inefficiencies across the sector, likely reflecting pandemic-driven disruptions, fixed cost burdens during suppressed traffic, and inflationary pressures during the recovery. This is reflected in the small number of airports meeting the efficiency benchmark in 2022 when measured against the 2019 frontier. Nonetheless, Heathrow's consistently high gap before and after COVID, combined with its position at the bottom of the efficiency ranking, indicates significant ongoing inefficiencies.

The tables report each airport's percentage "gap to the frontier", defined as the difference between actual performance and the COLS frontier prediction. For [opex](#), a positive gap means the airport is spending above the efficient frontier (i.e. is less efficient), while a negative gap means it is spending below the frontier (i.e. is more efficient). Airports are ordered from the most efficient (lowest gap) to the least efficient (highest gap).

For readability, we present here a subset of results showing European and frontier airports (in italics) only. The full set of results, including Heathrow's performance against the entire international comparator sample and the alternative peer-group definitions, are reported in the Annex below.

**Table A2.3.1: Efficiency scores for operating costs (European airports and frontier airports)**

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
Melbourne	-2.17%	<i>Airports of Portugal</i>	-2.52%
<i>Aeropuerto del Sureste (Mexico)</i>	-2.05%	<i>Aeropuerto del Sureste (Mexico)</i>	-1.60%
Bangalore	-1.84%	<i>Delhi</i>	-0.78%
<i>Airports of Portugal</i>	-1.37%	<i>Vienna</i>	-0.36%
<i>Vienna</i>	-1.27%	<i>Miami</i>	-0.07%
<i>Delhi</i>	-0.97%	<i>Airports of Portugal</i>	-2.52%
<i>Malaysian Airports</i>	-0.97%	<i>Vienna</i>	-0.36%
<i>Hong Kong</i>	-0.82%	<i>Fraport</i>	1.02%
<i>Copenhagen</i>	-0.51%	<i>Athens</i>	1.25%
<i>Miami</i>	-0.26%	<i>Amsterdam Group</i>	1.62%
<i>Amsterdam Group</i>	0.00%	<i>Copenhagen</i>	1.68%
<i>Manchester</i>	0.18%	<i>Brussels</i>	2.26%
<i>Brussels</i>	0.38%	<i>Spanish Airports</i>	2.54%
<i>London-Gatwick</i>	0.61%	<i>Paris</i>	2.90%
<i>Spanish Airports</i>	0.68%	<i>Geneva</i>	2.94%
<i>Zurich</i>	1.19%	<i>London-Gatwick</i>	3.03%
<i>Fraport</i>	1.20%	<i>Swedavia</i>	3.17%
<i>Aeroporti di Roma</i>	1.24%	<i>Aeroporti di Roma</i>	3.56%
<i>Athens</i>	1.33%	<i>Zurich</i>	3.91%
<i>Geneva</i>	2.16%	<i>Aeroporti di Milano</i>	4.08%
<i>Swedavia</i>	2.25%	<i>Manchester</i>	4.27%
<i>Paris</i>	2.50%	<i>Norwegian Airports</i>	4.59%
<i>Finavia</i>	2.66%	<i>Dusseldorf</i>	4.69%
<i>Dusseldorf</i>	2.93%	<i>London-Heathrow</i>	4.92%
<i>Aeroporti di Milano</i>	3.00%	<i>Finavia</i>	5.68%
<i>London-Heathrow</i>	3.14%		
<i>Norwegian Airports</i>	4.90%		

To test the robustness of our frontier benchmarking results, we repeated the full analysis using the **CRE model specification**. This involved re-estimating the preferred econometric model, recomputing the 2019 residuals, and re-identifying the upper quartile (UQ) comparator group under four comparator sets.

The results of this sensitivity are presented in the table below. They show that the efficiency rankings and gaps are very similar to those based on COLS. When switching to CRE specification, the 2019 gap increases slightly to +3.16%, and to +4.46% in 2022. Similarly, across the other comparator groups, Heathrow is above the frontier in 2019, and remains inefficient in 2022.

This sensitivity analysis supports the robustness of our findings. While COLS remains our preferred model specification, the frontier benchmarking results are not materially sensitive to the use of CREs instead for measuring Heathrow's efficiency. The ranking of Heathrow and its relative efficiency are preserved.

**Table A2.3.2: Efficiency scores for total opex for sensitivity (CRE, European airports and frontier airports)**

	Gap to 2019 frontier in 2019		Gap to 2019 frontier in 2022
<i>Hong Kong</i>	-1.70%	<i>Malaysian Airports</i>	-0.86%
<i>Miami</i>	-1.47%	<i>Miami</i>	-0.45%
<i>Aeropuerto del Sureste (Mexico)</i>	-1.42%	<i>Airports of Portugal</i>	-0.24%
<i>Melbourne</i>	-1.17%	<i>Delhi</i>	-0.23%
<i>Delhi</i>	-0.96%	<i>Vienna</i>	0.66%
<i>Bangalore</i>	-0.64%	<i>Copenhagen</i>	0.95%
<i>Copenhagen</i>	-0.46%	<i>Amsterdam Group</i>	1.57%
<i>Vienna</i>	-0.42%	<i>Fraport</i>	2.20%
<i>Airports of Portugal</i>	-0.22%	<i>Brussels</i>	2.39%
<i>Dallas/Fort Worth</i>	-0.08%	<i>Geneva</i>	2.56%
<i>Amsterdam Group</i>	0.00%	<i>Zurich</i>	2.72%
<i>Zurich</i>	0.41%	<i>Athens</i>	2.93%
<i>Brussels</i>	0.60%	<i>Swedavia</i>	3.47%
<i>London-Gatwick</i>	1.43%	<i>Paris</i>	3.48%
<i>Manchester</i>	1.47%	<i>Aeroporti di Roma</i>	3.74%
<i>Spanish Airports</i>	1.61%	<i>Spanish Airports</i>	4.16%
<i>Geneva</i>	1.89%	<i>London-Gatwick</i>	4.20%
<i>Aeroporti di Roma</i>	1.99%	<i>Aeroporti di Milano</i>	4.46%
<i>Fraport</i>	1.99%	<i>Norwegian Airports</i>	4.56%
<i>Paris</i>	2.49%	<i>Dusseldorf</i>	4.76%
<i>Athens</i>	2.69%	<i>London-Heathrow</i>	5.01%
<i>Swedavia</i>	2.85%	<i>Finavia</i>	5.64%
<i>London-Heathrow</i>	3.16%	<i>Manchester</i>	6.88%
<i>Dusseldorf</i>	3.28%		
<i>Aeroporti di Milano</i>	3.29%		
<i>Finavia</i>	3.71%		
<i>Norwegian Airports</i>	6.11%		

### A2.3.2 Frontier analysis for commercial revenue

To assess the relative efficiency of Heathrow in generating commercial revenue, we apply the same general methodology used for opex in Section A2.3.1 Frontier analysis for opex. As with opex, we consider multiple ways of defining the UQ comparator group, including:

- All airports in the sample
- All non-group airports;
- European airports only;
- Non-group European airports only;

We apply this approach to our **preferred model** for commercial revenue, which uses a log-linear functional form with WLUs as the scale variable, and includes controls for GDP per capita, fixed assets, and premium passengers. The frontier is estimated for 2019, and efficiency results are calculated for 2019 and 2022.

As noted above, commercial revenue gaps are interpreted in the opposite direction to opex: positive gaps indicate outperformance relative to the frontier, and negative gaps indicate underperformance. For readability, Table A2.3.3 reports European and frontier airports only; the full set of results for the international comparator sample and alternative peer-group definitions is provided in the Annex below.

**Table A2.3.3: Efficiency scores for Commercial Revenue (European airports and frontier airports)**

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
<i>Delhi</i>	3.34%	<i>London-Gatwick</i>	2.62%
<i>Singapore</i>	3.28%	<i>Dusseldorf</i>	1.83%
<i>Beijing</i>	2.77%	<i>Aeropuerto del Sureste (Mexico)</i>	1.78%
<i>Norwegian Airports</i>	2.62%	<i>Zurich</i>	1.17%
<i>Airports of Thailand</i>	2.56%	<i>Paris</i>	1.15%
<i>Athens</i>	2.42%	<i>Auckland</i>	1.04%
<i>Hong Kong</i>	2.22%	<i>Beijing</i>	0.71%
<i>Dusseldorf</i>	1.01%	<i>Delhi</i>	0.49%
<i>Airports of Portugal</i>	0.09%	<i>Norwegian Airports</i>	0.35%
<i>London-Gatwick</i>	0.03%	<i>Athens</i>	0.33%
<i>Aeropuerto del Sureste (Mexico)</i>	0.00%	<i>Spanish Airports</i>	0.16%
<i>Auckland</i>	0.00%	<i>Airports of Portugal</i>	-0.16%
<i>Paris</i>	-0.28%	<i>Geneva</i>	-0.63%
<i>Spanish Airports</i>	-0.29%	<i>London-Heathrow</i>	-1.28%
<i>London-Heathrow</i>	-0.46%	<i>Brussels</i>	-1.65%
<i>Geneva</i>	-0.62%	<i>Copenhagen</i>	-2.48%
<i>Brussels</i>	-1.91%	<i>Manchester</i>	-2.70%
<i>Copenhagen</i>	-1.92%	<i>Aeroporti di Roma</i>	-3.41%
<i>Zurich</i>	-1.95%	<i>Aeroporti di Milano</i>	-3.68%
<i>Aeroporti di Roma</i>	-2.43%	<i>Amsterdam Group</i>	-4.42%
<i>Aeroporti di Milano</i>	-3.39%	<i>Vienna</i>	-4.43%
<i>Manchester</i>	-3.46%	<i>Swedavia</i>	-5.14%
<i>Swedavia</i>	-4.43%	<i>Fraport</i>	-7.17%
<i>Vienna</i>	-4.88%	<i>Finavia</i>	-9.96%
<i>Amsterdam Group</i>	-4.91%		
<i>Fraport</i>	-6.74%		
<i>Finavia</i>	-9.77%		

Heathrow was slightly below the frontier in 2019, with a small negative gap of -0.46%, ranked 15 out of 43. In 2022, Heathrow remained inefficient, with the gap increasing to -1.28% (ranked 18 of 43), suggesting that its commercial performance got weaker through the COVID period and recovery (in relative terms). Heathrow's position is similarly inefficient under other frontier definitions:

- 
- European airports: from  $-0.42\%$  in 2019 to  $-1.24\%$  in 2022;
  - Non-group airports: from  $-0.49\%$  in 2019 to  $-1.31\%$  in 2022;
  - Non-group European airports: from  $-0.71\%$  in 2019 to  $-1.53\%$  in 2022.

These results consistently place Heathrow just under the UQ frontier. The results indicate that Heathrow's commercial revenue performance is inefficient in the comparator set, both before and after COVID.

To test the robustness of our frontier benchmarking results, we repeated the full analysis **a CRE model specification**. This involved re-estimating the preferred econometric model, recomputing the 2019 residuals, and re-identifying the upper quartile (UQ) comparator group under four comparator sets.

The results of this sensitivity are presented in the table below. They show that Heathrow remains inefficient, with its efficiency rankings and efficiency gaps deteriorating. When switching to a CRE model specification, the 2019 gap decreases to  $-1.98\%$ , and to  $-3.38\%$  in 2022. Across the other comparator groups, Heathrow is below (below  $-1.9$  per cent the frontier in 2019, and deteriorates its position by 2022.

This sensitivity analysis supports the robustness of our findings. While COLS remain our preferred specification, the frontier benchmarking results are not materially sensitive to the use of CRE instead.

**Table A2.3.4: Efficiency scores for commercial revenue for sensitivity (CRE and frontier airports)**

<b>Airport</b>	<b>Gap to 2019 frontier in 2019</b>	<b>Airport</b>	<b>Gap to 2019 frontier in 2022</b>
<b>Singapore</b>	4.10%	<b>Dusseldorf</b>	2.30%
<b>Norwegian Airports</b>	3.67%	<b>London-Gatwick</b>	1.84%
<b>Athens</b>	2.95%	<b>Beijing</b>	1.44%
<b>Delhi</b>	2.78%	<b>Paris</b>	1.02%
<b>Beijing</b>	2.06%	<b>Spanish Airports</b>	-0.47%
<b>Hong Kong</b>	1.97%	<b>Athens</b>	-0.78%
<b>Dusseldorf</b>	1.95%	<b>Geneva</b>	-0.92%
<b>Airports of Thailand</b>	1.61%	<b>Norwegian Airports</b>	-0.97%
<b>London-Gatwick</b>	0.77%	<b>Airports of Portugal</b>	-1.28%
<b>Aeropuerto del Sureste (Mexico)</b>	0.36%	<b>Zurich</b>	-1.60%
<b>Paris</b>	0.00%	<b>Copenhagen</b>	-2.87%
<b>Spanish Airports</b>	-0.18%	<b>Brussels</b>	-3.05%
<b>Geneva</b>	-0.34%	<b>Manchester</b>	-3.09%
<b>Airports of Portugal</b>	-0.37%	<b>London-Heathrow</b>	-3.38%
<b>Copenhagen</b>	-1.33%	<b>Aeroporti di Roma</b>	-3.39%
<b>London-Heathrow</b>	-1.98%	<b>Aeroporti di Milano</b>	-3.73%
<b>Brussels</b>	-2.02%	<b>Swedavia</b>	-4.25%
<b>Aeroporti di Roma</b>	-2.12%	<b>Amsterdam Group</b>	-4.99%
<b>Aeroporti di Milano</b>	-2.34%	<b>Vienna</b>	-5.35%
<b>Manchester</b>	-3.16%	<b>Fraport</b>	-7.20%
<b>Swedavia</b>	-3.23%	<b>Finavia</b>	-8.88%
<b>Zurich</b>	-4.03%		
<b>Amsterdam Group</b>	-4.75%		
<b>Vienna</b>	-4.81%		
<b>Fraport</b>	-6.44%		
<b>Finavia</b>	-8.59%		

## Annex: Full set of efficiency results

This annex reports the full set of efficiency results for the entire comparator sample, for both opex and commercial revenue. The main text presents a subset of results for readability, while the tables in this appendix provide the complete rankings and efficiency gaps.

The COLS results define the efficiency frontier and the associated airport rankings used in the analysis. The CRE results are reported as a cross-check of the results.

Table A2.1: Efficiency scores for opex (COLS)

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
Melbourne	-2.17%	Airports of Portugal	-2.52%
Aeroportuario del Sureste (Mexico)	-2.05%	Aeroportuario del Sureste (Mexico)	-1.60%
Bangalore	-1.84%	Delhi	-0.78%
Airports of Portugal	-1.37%	Vienna	-0.36%
Vienna	-1.27%	Miami	-0.07%
Delhi	-0.97%	Malaysian Airports	0.49%
Malaysian Airports	-0.97%	Bangalore	0.69%
Hong Kong	-0.82%	Fraport	1.02%
Copenhagen	-0.51%	Athens	1.25%
Miami	-0.26%	Dallas/Fort Worth	1.42%
Amsterdam Group	0.00%	Cape Town	1.47%
Manchester	0.18%	Auckland	1.62%
Brussels	0.38%	Amsterdam Group	1.62%
London-Gatwick	0.61%	Melbourne	1.64%
Spanish Airports	0.68%	Copenhagen	1.68%
Dallas/Fort Worth	0.70%	Washington National	1.86%
Washington National	1.12%	Pacific Airports Group	2.11%
Zurich	1.19%	Singapore	2.25%
Fraport	1.20%	Brussels	2.26%
Aeroporti di Roma	1.24%	Spanish Airports	2.54%
Pacific Airports Group (Mexico)	1.31%	Hong Kong	2.77%
Athens	1.33%	Perth	2.82%
Brisbane	1.41%	Paris	2.90%
Airports of Thailand	1.49%	Brisbane	2.90%
Washington Dulles	2.12%	Geneva	2.94%
Geneva	2.16%	Johannesburg	2.96%
Johannesburg	2.22%	London-Gatwick	3.03%
Swedavia	2.25%	Swedavia	3.17%
Singapore	2.32%	Los Angeles	3.48%
Paris	2.50%	Aeroporti di Roma	3.56%
Finavia	2.66%	San Francisco	3.88%
Perth	2.71%	Washington Dulles	3.89%
Dusseldorf	2.93%	Montreal	3.89%
Aeroporti di Milano	3.00%	Zurich	3.91%
Auckland	3.00%	South African Airports	4.02%
Montreal	3.02%	Aeroporti di Milano	4.08%
Los Angeles	3.11%	Manchester	4.27%
Cape Town	3.12%	Norwegian Airports	4.59%
London-Heathrow	3.14%	Dusseldorf	4.69%
Beijing	3.52%	London-Heathrow	4.92%
South African Airports	3.96%	Finavia	5.68%
Norwegian Airports	4.90%	Airports of Thailand	6.46%
San Francisco	5.99%	Beijing	14.46%

Table A2.2: Efficiency scores for opex (CRE)

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
Hong Kong	-1.70%	Malaysian Airports	-0.86%
Miami	-1.47%	Miami	-0.45%
Aeroportuario del Sureste (Mexico)	-1.42%	Airports of Portugal	-0.24%
Melbourne	-1.17%	Delhi	-0.23%
Delhi	-0.96%	Hong Kong	0.16%
Bangalore	-0.64%	Vienna	0.66%
Copenhagen	-0.46%	Copenhagen	0.95%
Vienna	-0.42%	Singapore	0.99%
Airports of Portugal	-0.22%	Dallas/Fort Worth	1.29%
Dallas/Fort Worth	-0.08%	Aeroportuario del Sureste (Mexico)	1.56%
Amsterdam Group	0.00%	Amsterdam Group	1.57%
Washington National	0.03%	Melbourne	1.82%
Malaysian Airports	0.22%	Washington National	1.82%
Zurich	0.41%	Auckland	1.91%
Brussels	0.60%	Fraport	2.20%
Brisbane	0.97%	Brussels	2.39%
Los Angeles	1.35%	Geneva	2.56%
London-Gatwick	1.43%	Bangalore	2.72%
Manchester	1.47%	Zurich	2.72%
Spanish Airports	1.61%	Athens	2.93%
Perth	1.64%	Johannesburg	2.97%
Washington Dulles	1.77%	Cape Town	2.98%
Geneva	1.89%	Airports of Thailand	2.98%
GAP (Mexico)	1.95%	Perth	3.09%
Aeroporti di Roma	1.99%	Los Angeles	3.14%
Fraport	1.99%	Brisbane	3.15%
Singapore	2.02%	Swedavia	3.47%
Paris	2.49%	Paris	3.48%
Johannesburg	2.61%	Aeroporti di Roma	3.74%
Athens	2.69%	San Francisco	3.83%
Airports of Thailand	2.83%	Washington Dulles	3.88%
Swedavia	2.85%	Spanish Airports	4.16%
Auckland	3.11%	London-Gatwick	4.20%
London-Heathrow	3.16%	Aeroporti di Milano	4.46%
Dusseldorf	3.28%	South African Airports	4.53%
Aeroporti di Milano	3.29%	Norwegian Airports	4.56%
Finavia	3.71%	GAP (Mexico)	4.57%
Cape Town	3.89%	Dusseldorf	4.76%
Beijing	4.08%	Beijing	4.91%
Montreal	4.15%	London-Heathrow	5.01%
San Francisco	4.30%	Montreal	5.32%
South African Airports	4.56%	Finavia	5.64%
Norwegian Airports	6.11%	Manchester	6.88%

Table A2.3: Efficiency scores for commercial revenue (COLS)

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
Delhi	3.34%	London-Gatwick	2.62%
Singapore	3.28%	Dusseldorf	1.83%
Beijing	2.77%	Aeroportuario del Sureste (Mexico)	1.78%
Norwegian Airports	2.62%	Zurich	1.17%
Airports of Thailand	2.56%	Paris	1.15%
Athens	2.42%	Auckland	1.04%
Hong Kong	2.22%	Beijing	0.71%
Dusseldorf	1.01%	Delhi	0.49%
Airports of Portugal	0.09%	Norwegian Airports	0.35%
London-Gatwick	0.03%	Athens	0.33%
Aeroportuario del Sureste (Mexico)	0.00%	Spanish Airports	0.16%
Auckland	0.00%	Singapore	-0.05%
Paris	-0.28%	Airports of Portugal	-0.16%
Spanish Airports	-0.29%	Washington Dulles	-0.42%
London-Heathrow	-0.46%	Geneva	-0.63%
Geneva	-0.62%	Johannesburg	-1.14%
Perth	-1.44%	Montreal	-1.19%
Washington Dulles	-1.64%	London-Heathrow	-1.28%
Johannesburg	-1.65%	Perth	-1.37%
South African Airports	-1.71%	Brussels	-1.65%
Brussels	-1.91%	South African Airports	-2.05%
Copenhagen	-1.92%	Los Angeles	-2.07%
Zurich	-1.95%	Pacific Airports Group	-2.19%
Washington National	-2.03%	Washington National	-2.27%
Brisbane	-2.04%	Brisbane	-2.32%
Melbourne	-2.11%	Copenhagen	-2.48%
Montreal	-2.13%	Airports of Thailand	-2.59%
Aeroporti di Roma	-2.43%	Manchester	-2.70%
Cape Town	-2.91%	Miami	-3.26%
Los Angeles	-3.25%	Aeroporti di Roma	-3.41%
Aeroporti di Milano	-3.39%	Aeroporti di Milano	-3.68%
Manchester	-3.46%	Hong Kong	-3.68%
Pacific Airports Group (Mexico)	-3.48%	Cape Town	-4.00%
Miami	-3.51%	Melbourne	-4.05%
Swedavia	-4.43%	San Francisco	-4.40%
Vienna	-4.88%	Amsterdam Group	-4.42%
Amsterdam Group	-4.91%	Vienna	-4.43%
Malaysian Airports	-5.75%	Swedavia	-5.14%
San Francisco	-5.92%	Bangalore	-5.90%
Bangalore	-5.99%	Fraport	-7.17%
Fraport	-6.74%	Dallas/Fort Worth	-7.51%
Dallas/Fort Worth	-6.96%	Malaysian Airports	-8.40%
Finavia	-9.77%	Finavia	-9.96%

Table A2.4: Efficiency scores for commercial revenue (CRE)

Airport	Gap to 2019 frontier in 2019	Airport	Gap to 2019 frontier in 2022
Singapore	4.10%	Dusseldorf	2.30%
Norwegian Airports	3.67%	London-Gatwick	1.84%
Athens	2.95%	Beijing	1.44%
Delhi	2.78%	Paris	1.02%
Beijing	2.06%	Aeropuerto del Sureste (Mexico)	0.68%
Hong Kong	1.97%	Singapore	-0.37%
Dusseldorf	1.95%	Spanish Airports	-0.47%
Airports of Thailand	1.61%	Athens	-0.78%
London-Gatwick	0.77%	Geneva	-0.92%
Aeropuerto del Sureste (Mexico)	0.36%	Norwegian Airports	-0.97%
Paris	0.00%	Delhi	-1.03%
Spanish Airports	-0.18%	Auckland	-1.04%
Geneva	-0.34%	Airports of Portugal	-1.28%
Auckland	-0.35%	Zurich	-1.60%
Airports of Portugal	-0.37%	Airports of Thailand	-1.96%
Perth	-0.82%	Montreal	-2.05%
Washington National	-1.08%	Washington National	-2.16%
Copenhagen	-1.33%	Hong Kong	-2.32%
South African Airports	-1.64%	Washington Dulles	-2.41%
Brisbane	-1.69%	Los Angeles	-2.45%
Melbourne	-1.77%	GAP (Mexico)	-2.76%
London-Heathrow	-1.98%	Copenhagen	-2.87%
Brussels	-2.02%	Perth	-3.03%
Montreal	-2.08%	Brussels	-3.05%
Aeroporti di Roma	-2.12%	Manchester	-3.09%
Aeroporti di Milano	-2.34%	South African Airports	-3.19%
Los Angeles	-2.42%	Johannesburg	-3.20%
Cape Town	-2.47%	London-Heathrow	-3.38%
Johannesburg	-2.52%	Aeroporti di Roma	-3.39%
Washington Dulles	-2.62%	Brisbane	-3.70%
GAP (Mexico)	-2.94%	Aeroporti di Milano	-3.73%
Manchester	-3.16%	Swedavia	-4.25%
Swedavia	-3.23%	Cape Town	-4.79%
Miami	-3.74%	Melbourne	-4.86%
Zurich	-4.03%	Amsterdam Group	-4.99%
Amsterdam Group	-4.75%	San Francisco	-5.24%
Malaysian Airports	-4.80%	Vienna	-5.35%
Vienna	-4.81%	Miami	-5.36%
Bangalore	-5.14%	Bangalore	-6.03%
San Francisco	-5.43%	Fraport	-7.20%
Fraport	-6.44%	Malaysian Airports	-7.63%
Dallas/Fort Worth	-6.81%	Dallas/Fort Worth	-8.10%
Finavia	-8.59%	Finavia	-8.88%

---

## Statement from Professor Maurizio Conti

### **Professor Maurizio Conti, University of Genova, February 2026**

This statement concerns a review of the Report “Top-Down Benchmarking”, produced by Europe Economics and that concerns the estimation of a set of econometric models to benchmark the level of efficiency of Heathrow Airport using a sample of world-wide operators. My role has been to act as an independent advisor of Europe Economics, interacting with Europe Economics at various stages of their work (e.g., literature review, cost driver assessment, econometric analysis), providing advice and opinions, but without being involved in every decision that was taken by Europe Economics. I believe Europe Economics’ econometric models represent a reasonably good compromise between theoretical rigor, on one side, and a practical application within a regulatory framework, on the other side. All in all, I think that the econometric models can be considered well-suited for benchmarking the relative efficiency of Heathrow Airport against a large set of world peers. In what follows I would provide an overview of the Report’s main content and crucial methodological choices.

First, Europe Economics has conducted a literature review on efficiency analysis of the airport industry. From this analysis Europe Economics has derived a large set of engineering and economic variables that the literature has identified as possible drivers of airport costs. The combination of this knowledge with data availability for their sample has allowed Europe Economics to identify several relevant drivers of both operating expenditure and commercial revenues. The final set of drivers includes variables that capture, directly or indirectly, economies of scale, infrastructure, price level differences across countries, the ownership structure and the passenger mix, which I think are the main categories of airport cost drivers to consider. Input prices are not included in the model: I think this is reasonable in a benchmarking analysis because they are under control of the management and this endogeneity would greatly complicate the estimation, besides possibly distorting managerial incentives. However, differences in input prices are indirectly captured (at country level) by the inclusion in the models of per capita GDP and PPP prices. This choice seems reasonable, given the type of sample that is considered in the Report. The final choice of cost drivers was driven by appropriate statistical analysis and considerations and, when the evidence was mixed, also by careful assessment of alternative models as a robustness check. The reliability of the analysis is also supported by the signs of the coefficients of the various cost drivers that are generally consistent with economic intuition.

Overall, I think that, given the constraints faced in the analysis, like the necessity of using a comparator set of world airports and the associated availability of information, the cost drivers identified by Europe Economics should be sufficient to capture a reasonable amount of the variation in the heterogeneous conditions of operation faced by the various airports that, if neglected, could indeed bias the benchmarking exercise. Moreover, the sign and magnitude of the cost drivers on costs and commercial revenue seem reasonable and the discussion of Europe Economics generally convincing, even if I think that incorporating some selected references to the literature might be helpful to add further validation to the models’ results.

Moreover, Europe Economics has also examined the robustness of their econometric models to (among others): a) change in the functional form. They consider the most common in the applied literature, namely, the linear, log-linear and translog, and they choose the log-linear as the preferred specification; b) changes in the sample (e.g., by limiting the analysis to European airports

---

or excluding group airports); c) elimination of observations related to Covid years, which indeed could complicate the analysis by changing the relationship between cost drivers and the dependent variables in ways that might not be well captured by the inclusion of time dummies into the analysis; d) sensitivity of key cost drivers. Reassuringly, most results seem to be broadly stable.

Turning to the estimation methodology, Europe Economics has relied, as common practice in previous benchmarking studies conducted by various regulators, on a Corrected Ordinary Least Squares (COLS) type of approach. COLS does not attempt to split the error term in the regression in two components (based on assumptions about their distribution), one that is related to pure noise, and the second which is in turn assumed to reflect inefficiency, as in stochastic frontier analysis (SFA). There are obviously pros and cons in the use of COLS versus SFA, especially in the case of benchmarking for regulatory purposes. COLS has the benefit of being simple to implement and to understand, besides the fact that it is less subject to estimation problems underpinning SFA (e.g. convergence issues in the maximum likelihood routines or the selection of the type of distribution for the inefficiency term). Moreover, the fact that Europe Economics considers as the frontier the firm at the 25th percentile for opex and the 75th percentile for commercial revenues should somewhat limit the main drawback of COLS in its original formulation, i.e. being subject to noise and outliers.

Given the use of a COLS type of approach, Europe Economics has decided to rely on pooled OLS as their preferred methodology, where the panel nature of the data is ignored. As a robustness check, Europe Economics has decided not to rely on traditional fixed effects models. This is because a conventional fixed effects model, if applied in a COLS fashion (i.e., by using the time varying error term as the proxy for inefficiency) has the limit of capturing the effect of all time invariant (or very slow moving) variables on costs and commercial revenues. If airport inefficiency has an important structural component, persistent over time (as it is likely), that would be captured by the airport specific fixed effect and would not be reflected as inefficiency. The other side of the coin is that a fixed effect model would also capture unobserved heterogeneity unrelated to inefficiency; however, this is less relevant if a sufficiently large number of cost drivers has been included in the econometric models and their statistical significance tested, as in the analysis of Europe Economics. To probe the robustness of their pooled OLS results to the estimation of a model that takes into account the panel nature of the dataset, Europe Economics has estimated a Correlated Random Effect model that provides a robust alternative to the fixed effects one. Reassuringly, main results appear rather similar to those provided by the pooled OLS model, both in terms of statistical significance of regressors as well as in terms of efficiency levels of Heathrow Airport.

---

# Appendix 3: Elasticity Modelling

This appendix sets out the regression framework and summarises the elasticity estimates determined for each category of opex and commercial revenues. These elasticities quantify the responsiveness of cost and revenue components to changes in their respective activity drivers, most commonly passenger volumes.

## A3.1 Methodology

For each opex and commercial revenues category, up to six regression specifications were estimated to capture the relationship between each variable and its relevant driver (typically total passengers). The purpose of estimating multiple models is not to identify a single “correct” elasticity, but to test the stability of results under different assumptions and to obtain a credible range of point estimates.

### A3.1.1 Model framework

The six models are:

1)  $\text{Log } X = \alpha + \beta \log \text{Driver}$

This is the core specification, estimating the long-run elasticity directly as the percentage change in  $X$  associated with a one per cent change in the driver. It provides an interpretable baseline and allows for non-linear scaling between costs or revenues and activity levels.

2)  $\text{Log } X = \alpha + \beta \log \text{Driver (excluding Covid years, 2020-2022)}$

This model excludes the pandemic period to test whether extreme outliers distort the estimated relationship. Comparing this with the baseline helps identify whether Covid-related shocks have biased the elasticity downwards or upwards.

3)  $\text{Log } X = \alpha + \beta \log \text{Driver} + \gamma \text{ Covid Dummy}$

Instead of excluding pandemic years, this approach retains the full sample but isolates the Covid effect through a dummy variable. This allows the elasticity to be estimated using all available data while controlling for temporary deviations in the Covid years 2020–2022.

4)  $\text{Log } X = \alpha + \beta \log \text{Driver} + \gamma \text{ Covid Dummy} + \delta \text{ Time Trend}$

The inclusion of a simple time trend captures gradual efficiency changes or structural evolution in cost or revenue unrelated to traffic. Comparing this with the simpler models provides insight into whether any residual trend remains after controlling for volume and Covid effects.

5)  $\text{Log } (X_t - X_{t-1}) = \alpha + \beta \log (\text{Driver}_t - \text{Driver}_{t-1})$

This first-difference specification focuses on short-run, year-to-year changes, thereby removing any fixed effects and addressing potential non-stationarity in levels. It provides an alternative elasticity that reflects short-run rather than long-run responsiveness.

6)  $\text{Log } (X_t - X_{t-1}) = \alpha + \beta \log (\text{Driver}_t - \text{Driver}_{t-1}) + \gamma \text{ Covid Dummy}$

---

This adds the Covid control to the differenced model, ensuring that temporary volatility during the pandemic does not unduly influence short-run elasticity estimates.

Each model therefore adds diagnostic value: the log–log forms identify long-run proportionality, the exclusion or dummy variants test sensitivity to exceptional periods, the trend specification checks for structural drift, and the differenced forms capture short-run elasticity and reduce dependence on level assumptions.

Taken together, these specifications provide a cross-check on robustness and produce a range of plausible point estimates for each category. This range reflects both data uncertainty and the limited number of annual observations

### A3.1.2 Sample size and diagnostic testing

Given the short time series available (2014–2024), the usefulness of formal time-series diagnostics is inherently limited. In principle, tests such as the Augmented Dickey–Fuller (ADF) test for stationarity, the Durbin–Watson and Durbin’s alternative tests for autocorrelation, and the ARCH–LM test for conditional heteroskedasticity are designed to check whether the basic assumptions of OLS are satisfied. These tests help identify issues such as non-stationary trends, serial correlation in residuals, or time-varying error variance, all of which can bias standard errors and weaken inference in larger datasets.

However, with only eleven annual observations, these tests have very low statistical power and rely on asymptotic properties that do not hold in small samples. The critical values used to determine significance are derived from much larger samples, meaning any apparent results are unlikely to be robust. Moreover, introducing lagged variables or higher-order terms to model these effects would quickly consume the limited degrees of freedom available, offering little additional insight while increasing the risk of overfitting.

For these reasons, while such tests can be run for completeness, their results should be interpreted cautiously. In this context, greater weight is placed on practical diagnostics rather than formal time-series testing.

### A3.1.2 Data source

The elasticity analysis can be undertaken using several different data sources, namely, the datasets used by HAL in its own elasticity analysis, the Business Plan data tables, and Heathrow’s published regulatory accounts. However, there are inconsistencies between these sources, particularly in the way cost and revenue categories are defined and reported over time. In addition, for some variables, the data used by HAL in its regression work differ from the corresponding figures in the Business Plan tables. Given these discrepancies, this analysis relies solely on the Business Plan data tables, which provide the most consistent and comprehensive time series across all categories.

## A3.2 Opex

We now set out the regression results underlying the elasticity estimates for each opex category.

## Staff

The elasticity estimates for staff costs are consistently positive and broadly stable across the preferred specifications, with most estimates falling between 0.15 and 0.30. This indicates that total staffing costs rise with passenger volumes, though less than proportionately. The results also suggest that once Covid effects and underlying trends are accounted for, the relationship between staff costs and passenger activity remains relatively robust.

Staff costs comprise security and non-security roles, for which the detailed results are presented below. Security staffing shows a moderate and consistent elasticity, reflecting its operational link to passenger throughput, while non-security staffing displays a slightly higher elasticity, indicating a somewhat stronger response to changes in activity levels.

**Table A3.0.1: Elasticity estimates - staff**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.30***	-0.95	0.15	0.21**	0.27***	0.26***
Covid dummy	N/a	N/a	-0.21	-0.09	N/a	-0.08*
Time trend	N/a	N/a	N/a	-0.02***	N/a	N/a
R <sup>2</sup>	0.74	0.27	0.81	0.94	0.86	0.92

**Table A3.0.2: Elasticity estimates - security**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.29***	0.00	0.21**	0.23**	0.26***	0.26***
Covid dummy	N/a	N/a	-0.10	-0.06	N/a	-0.05
Time trend	N/a	N/a	N/a	0.00	N/a	N/a
R <sup>2</sup>	0.86	0.00	0.89	0.91	0.82	0.84

**Table A3.0.3: Elasticity estimates - non-security**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.37***	-0.09	0.24**	0.27***	0.35***	0.34***
Covid dummy	N/a	N/a	-0.17	-0.11	N/a	-0.10**
Time trend	N/a	N/a	N/a	-0.01	N/a	N/a
R <sup>2</sup>	0.87	0.00	0.91	0.94	0.91	0.96

## Utilities

The elasticity estimates for utilities range from 0.22 to 0.49 in the level models and around 0.28–0.29 in the differenced models. Once Covid effects and underlying trends are controlled for, the preferred specifications (3–6) converge on a moderate positive elasticity, indicating utilities rise with passenger volumes but not proportionately.

**Table A3.0.4: Elasticity estimates - utilities**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.22	2.89	0.49*	0.36**	0.28***	0.29***
Covid dummy	N/a	N/a	0.36	0.09	N/a	0.12
Time trend	N/a	N/a	N/a	0.05***	N/a	N/a
R <sup>2</sup>	0.24	0.29	0.38	0.82	0.70	0.78

**Other opex**

The elasticity estimates for other opex are consistently positive across all model specifications, with most results in the range of 0.23–0.32. These values indicate that costs within this combined category tend to increase with passenger volumes but at a rate below one-for-one. The similarity of estimates across the level and differenced models suggests a stable underlying relationship that is not heavily influenced by the pandemic period.

Other opex comprises operational costs and general expenses, for which we also report results below. Operational costs show a modest positive elasticity, indicating a gradual response to passenger growth, while general expenses display a stronger and more consistently significant elasticity, reflecting a closer link to activity levels.

**Table A3.0.5: Elasticity estimates - other opex**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.23***	1.11	0.32***	0.27***	0.27***	0.27***
Covid dummy	N/a	N/a	0.11	0.02	N/a	0.01
Time trend	N/a	N/a	N/a	0.02**	N/a	N/a
R <sup>2</sup>	0.70	0.27	0.74	0.87	0.84	0.84

**Table A3.0.6: Elasticity estimates – operational costs**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.13	2.13	0.27	0.18*	0.18***	0.18***
Covid dummy	N/a	N/a	0.18	0.00	N/a	0.02
Time trend	N/a	N/a	N/a	0.03***	N/a	N/a
R <sup>2</sup>	0.23	0.37	0.32	0.81	0.68	0.68

**Table A3.0.7: Elasticity estimates - general expenses**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.62***	-2.99	0.57**	0.69***	0.67***	0.67***
Covid dummy	N/a	N/a	-0.07	0.18	N/a	0.03
Time trend	N/a	N/a	N/a	-0.05**	N/a	N/a
R <sup>2</sup>	0.75	0.40	0.75	0.89	0.80	0.80

## Total opex

Across the alternative specifications, total opex shows a stable and positive elasticity with respect to passenger volumes, with most models producing estimates around 0.19–0.23. The results imply that overall operating costs rise with passenger numbers but remain less than proportional, and the inclusion or exclusion of Covid years has only a limited effect on the estimated relationship.

**Table A3.0.8: Elasticity estimates - total opex**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.23***	-0.03	0.19***	0.20***	0.22***	0.22***
Covid dummy	N/a	N/a	-0.05	-0.04	N/a	-0.02
Time trend	N/a	N/a	N/a	0.00	N/a	N/a
R <sup>2</sup>	0.94	0.00	0.95	0.95	0.90	0.91

## A3.3 Commercial revenues

We now set out the regression results underlying the elasticity estimates for each commercial revenue category.

### Retail and catering

The elasticity estimates for retail and catering revenues are consistently high across the preferred specifications, with most values in the range of 0.61 - 0.83. These results indicate a strong positive relationship with passenger volumes, reflecting the predominantly transaction-driven nature of these activities. The estimates remain relatively stable once Covid effects and underlying trends are accounted for, pointing to a robust volume relationship.

Retail and catering revenues are split between retail and catering excluding bureaux and bureaux only, with the corresponding results presented below. The non-bureaux component shows a similar pattern to the combined series, with elasticities that are consistently high across the alternative specifications, while bureaux revenues exhibit greater variation, reflecting sharper shifts during the pandemic and a smaller underlying revenue base.

**Table A3.0.9: Elasticity estimates - retail and catering**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.83***	-0.37	0.61**	0.70***	0.81***	0.80***
Covid dummy	N/a	N/a	-0.29	-0.12	N/a	-0.15***
Time trend	N/a	N/a	N/a	-0.03*	N/a	N/a
R <sup>2</sup>	0.88	0.01	0.90	0.94	0.97	0.99

**Table A3.0.10: Elasticity estimates - retail and catering (exc. bureaux)**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.80***	0.22	0.61***	0.67***	0.80***	0.78***
Covid dummy	N/a	N/a	-0.25	-0.12	N/a	-0.16***
Time trend	N/a	N/a	N/a	-0.03	N/a	N/a
R <sup>2</sup>	0.89	0.00	0.91	0.94	0.97	0.99

**Table A3.0.11: Elasticity estimates - bureaux**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	1.11***	-6.52*	0.67	0.97***	0.97***	0.97***
Covid dummy	N/a	N/a	-0.59	0.03	N/a	-0.05
Time trend	N/a	N/a	N/a	-0.12***	N/a	N/a
R <sup>2</sup>	0.67	0.42	0.71	0.96	0.91	0.91

### Service

The elasticity estimates for service revenues are consistently positive, with most preferred specifications producing values between 0.34 and 0.54. This indicates that service-related income tends to increase as passenger volumes rise, though at a rate below one-for-one. The estimates remain broadly stable once Covid effects are controlled for, suggesting a reasonably durable underlying relationship with traffic.

**Table A3.0.12: Elasticity estimates - service**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.54***	2.72***	0.38**	0.34**	0.51***	0.49***
Covid dummy	N/a	N/a	-0.21	-0.30*	N/a	-0.19**
Time trend	N/a	N/a	N/a	0.02	N/a	N/a
R <sup>2</sup>	0.86	0.77	0.89	0.91	0.86	0.94

### Surface access and car parking?

The elasticity estimates for surface access and car parking? revenues linked to parking and car rental activity are consistently high across the preferred specifications, with most results close to or slightly above one. This indicates that revenues in this category move closely with changes in the number of passengers using private transport modes. The estimates are stable across specifications, suggesting a strong and well-defined relationship with the underlying driver.

**Table A3.0.13: Elasticity estimates - surface access**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Car parking/ rental	0.94***	1.08	1.05***	1.02***	0.96***	0.96***
passengers						
Covid dummy	N/a	N/a	0.14	0.07	N/a	0.07
Time trend	N/a	N/a	N/a	0.02**	N/a	N/a
R <sup>2</sup>	0.97	0.22	0.98	0.99	0.99	0.99

**Total commercial revenue**

The elasticity estimates for total commercial revenue are consistently positive across the preferred specifications, with most results falling between 0.56 and 0.66. This indicates that commercial income rises with passenger volumes, though less than proportionately overall once all components are combined. The estimates remain stable across specifications that control for Covid and underlying trends, pointing to a well-established relationship between total commercial revenue and passenger activity.

**Table A3.0.14: Elasticity estimates - total commercial revenue**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.66***	0.22	0.56***	0.60***	0.65***	0.64***
Covid dummy	N/a	N/a	-0.13	-0.05	N/a	-0.07***
Time trend	N/a	N/a	N/a	-0.01*	N/a	N/a
R <sup>2</sup>	0.95	0.01	0.96	0.97	0.99	0.99

When cargo is incorporated, the elasticity of total commercial revenue with respect to passenger volumes remains positive across all preferred specifications, with most estimates between 0.45 and 0.52. These values are slightly lower than those for total commercial revenue excluding cargo, reflecting the fact that cargo income is not directly driven by passenger activity and therefore dampens the overall responsiveness. Even after accounting for Covid effects and underlying trends, the estimated elasticities remain stable, indicating a consistent volume relationship once cargo is included in the aggregate.

**Table A3.0.15: Elasticity estimates - total commercial revenue (incl. cargo)**

Model	(1)	(2)	(3)	(4)	(5)	(6)
Passengers	0.52***	0.30	0.45***	0.47***	0.52***	0.52***
Covid dummy	N/a	N/a	-0.11	-0.05	N/a	-0.07***
Time trend	N/a	N/a	N/a	-0.01	N/a	N/a
R <sup>2</sup>	0.94	0.03	0.95	0.96	0.98	0.99

---

# Appendix 4: Real Price Effects

This appendix sets out our analysis of real price effects for the opex and commercial revenues of Heathrow Airport Limited (HAL) for the H8 price control.

The report is structured as follows:

- Section A4.1 Approach to analysis summarises our approach to the RPEs analysis;
- Section A4.2 Our assessment of RPEs sets out our assessment of RPEs;
- Section A4.3 Approach to addressing RPEs discusses our recommended approach to addressing RPEs that we have identified; and
- Section A4.4 Conclusions presents our conclusions.

## A4.1 Approach to analysis

### A4.1.1 Framework for assessing RPEs

The first stage in our RPEs analysis is to assess whether there are any material RPEs not captured by CPI indexation. This involves applying the following assessment criteria to each RPE cost category proposed by HAL in its business plan, as well as to RPE revenue categories for HAL's commercial revenues.

1. **Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?** To evaluate cost or revenue items against this question, we compare the proportion of a particular item within operating expenditure (opex) or within commercial revenues to the share of the closest equivalent item (or items) within the CPI basket. The underlying rationale is that if an item's share of opex or commercial revenues is close to the share of its equivalent(s) in the CPI basket, then CPI-linked indexation should already provide adequate remuneration for the cost item.
2. **Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the price control period?** A wedge may diverge meaningfully from zero over a price control period for one of two reasons. First, the wedge may have an expected value that is materially different from zero. Alternatively, even if its expected value is not materially different from zero, the input price may be volatile enough that its value could deviate significantly from CPI within any regulatory period. Accordingly, we plan to assess this question by examining two related sub-questions:
  - A. **Is the expected value of the wedge between the input price and CPI materially different from zero?** To assess this, we plan to test whether the wedge between the input price and CPI—calculated using historical data—is statistically significant. We also consider any official forecasts that are publicly available (e.g. OBR wage forecasts).
  - B. **Does the wedge between the input price and CPI exhibit high volatility over time?** Here, we evaluate the degree of fluctuation in the rolling five-year wedge, as this provides an indication of input price uncertainty for a five-year price control period. Short-term (e.g.

---

monthly) volatility is not relevant, as such effects may cancel out over a price control period. This analysis will take account of each item's share of opex or commercial revenues by multiplying that share by the rolling five-year wedge. We consider volatility to be high if the five-year rolling average wedge (multiplied by the share of opex / commercial revenue) exceeds 1 per cent of total opex / commercial revenue at some point in the past.

Passing either of these two sub-criteria is sufficient for the overall criterion (2) to be passed. That is, the criterion is met if either the wedge has a materially different expected value from zero, or if its five-year rolling average demonstrates substantial volatility.

In addition to evaluating cost and revenue categories against the two main criteria above, we also consider the **materiality** of each cost and revenue category in our RPEs assessment. Based on regulatory precedents, we consider it disproportionate to grant an RPE allowance for cost or revenue categories that make up less than 5 per cent of opex / commercial revenues. For categories representing between 5 and 10 per cent of opex / commercial revenues, we consider that the evidence bar that needs to be met to grant an RPE allowance should be particularly high.

#### A4.1.2 Regulatory approach to addressing RPEs

Where the analysis identifies that a cost or revenue item has a material RPE which is not adequately captured in CPI, we advise on the appropriate way to treat this RPE within the regulatory framework.

Potential policy options are as follows:

1. Including a fixed ex ante PRE allowance within price control allowances.
2. An annual ex post indexation mechanism, in which adjustments are made to allowed revenues in each year of H8 to take account of outturn values for relevant input price indices.
3. An ex post true-up mechanism at the next review, in which a true-up is applied at the next review for differences between any ex ante RPE allowance included with price control allowances and outturn values during H8 for relevant price indices.
4. Not applying any RPE allowance.

Options 2 or 3 could in principle be applied alongside option 1. For example, this might be appropriate if there was an expectation of a positive wedge (thus justifying an ex ante allowance), but also substantial uncertainty around the future value (thus potentially justifying an ex post indexation mechanism as well).

To advise on this issue, we would reach a judgment in the round based on an assessment of how the four policy options score against the following four criteria:

- **Accuracy:** How accurately would RPE allowances reflect actual input prices under this policy option? To assess accuracy, we would consider the following questions:
  - What is driving the need for an RPE mechanism? Is it an expectation of a positive wedge (identified by criterion 3A in our assessment framework), which would point towards an ex ante allowance? Or is it high volatility in the wedge (identified by criterion 3B), which might potentially point towards an ex post mechanism? Or is it both, which might suggest using a combination of an ex-ante allowance and an ex-post mechanism?

- 
- Is there a robust basis for forecasting the input price? There could be a good basis for forecasting the RPE if: firstly, the input price trend (and wedge relative to CPI) is relatively stable over time such that past changes in input prices are a good proxy for future price changes; or, secondly, if there is a reliable forecast of the input price. If there is a robust basis for forecasting the input price, then there would be a case for using a fixed ex ante allowance.
  - Is there a robust and relevant index for the input price? This question assesses whether there is a robust and relevant index, published at an appropriate frequency and without too long a lag, that captures well changes in the price of a given input. It would be essential to have a robust and relevant index in order to apply an ex post indexation or true-up mechanism.
  - **Incentives:** Would the policy option create any perverse incentives for HAL?
    - This criterion considers whether different policy options for addressing the RPE might create perverse incentives for HAL, such as a reduced incentive to control input cost increases. This would include consideration of the extent to which indices that might be used for RPE indexation are materially dependent on HAL's reported costs. Where this is the case, it could reduce incentives on HAL to control costs, as higher costs would increase the index value and the RPE allowance.
  - **Simplicity:** Would the policy option add significant complexity to the price control framework?
    - This criterion considers whether the proposed RPE mechanism introduces significant additional complexity, or whether it can be implemented in a straightforward manner without significant administrative burden.
  - **Consistency with CAA regulatory precedent:** Would the policy option be consistent with previous CAA price controls?
    - This criterion examines whether the proposed approach is consistent with previous CAA price controls, to avoid instability in the CAA's regulatory approach over time.

For each cost area identified in Section A4.2 Our assessment of RPEs below as having a material RPE not adequately captured by CPI, we consider in Section A4.3 Approach to addressing RPEs how well each policy option performs against these four criteria.

#### A4.1.3 Factoring in bottom-up considerations

In addition to the analysis set out above, our assessment of RPEs and how to address them also draws, where relevant, on findings from the bottom-up analysis of opex and commercial revenues undertaken by our collaborators, York Aviation. In particular, the bottom-up analysis of cost and revenue pressures specific to HAL acts as a cross-check on the RPEs suggested by our framework, and we refer back to it in later sections where it is relevant to our conclusions for individual cost and revenue categories.

---

## A4.2 Our assessment of RPEs

### A4.2.1 Opex

Based on our review of HAL's own RPE proposals for opex, we have identified the following five categories of inputs for the purpose of assessing RPEs:

- labour;
- electricity;
- insurance;
- RPI-linked contracts; and
- CPI-linked costs.

We have mapped HAL's reported 2024 costs onto these categories. Table A4.2.1 below shows the percentage of opex that each of these RPE categories accounts for.

**Table A4.2.1 Categories for HAL's opex**

Category	Share of Opex (%)
Labour	38.7
Electricity	6.5
Insurance	1.2
RPI-linked contracts	2.1
CPI-linked costs	51.4
Total	100

In the following sections, we present our RPEs analysis for each of these categories in turn (except for CPI-linked costs, where by definition we do not anticipate a wedge relative to CPI).

The insurance category fails the materiality threshold of 5 per cent, by a significant margin. Therefore, our framework would not recommend an RPE allowance for insurance costs, without requiring any further analysis of insurance price movements. However, we present analysis of insurance price movements against the other criterion in our framework because HAL has proposed an RPE for insurance costs in its draft business plan.

#### Labour

*Materiality: Is the input cost item to which the RPE would be applied a material proportion of total company costs?*

Labour costs have been derived by mapping the H8 opex and revenue categories, supplemented where necessary with information from HAL's 2025 accounts, and then assigning them to the labour category on the basis of HAL's own disclosures and our judgement. The labour category therefore includes costs for staff security, operational staff (terminal, airfield, maintenance, and other), non-operational staff, pensions, and deductions for capitalised staff costs. Labour costs have been identified within HAL's costs for maintenance, facilities management and equipment (16 per cent of that category) and within other operational costs (28 per cent of that category) based on information provided by HAL.

---

Taken together, these items amount to approximately £614 million for HAL's labour costs, or about 39 per cent of total opex in 2024. This figure is substantially above the 10 per cent materiality threshold applied in our framework.

**Criterion passed.**

***CPI adequacy: Are there compelling reasons to think that CPI does not adequately capture the input price?***

The CPI measures consumer prices of goods and services and does not include wages or labour costs as a distinct item. Wages affect CPI only indirectly (for example, higher wages may lead businesses to raise consumer prices of services), but CPI itself tracks consumer prices, not input costs like employee salaries. Thus, the share of wages *per se* in the CPI basket is effectively zero, unlike its substantial share in opex. On this basis, there is a clear mismatch between the weight of labour in opex and its representation in CPI.

**Criterion passed.**

***Wedge analysis: Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?***

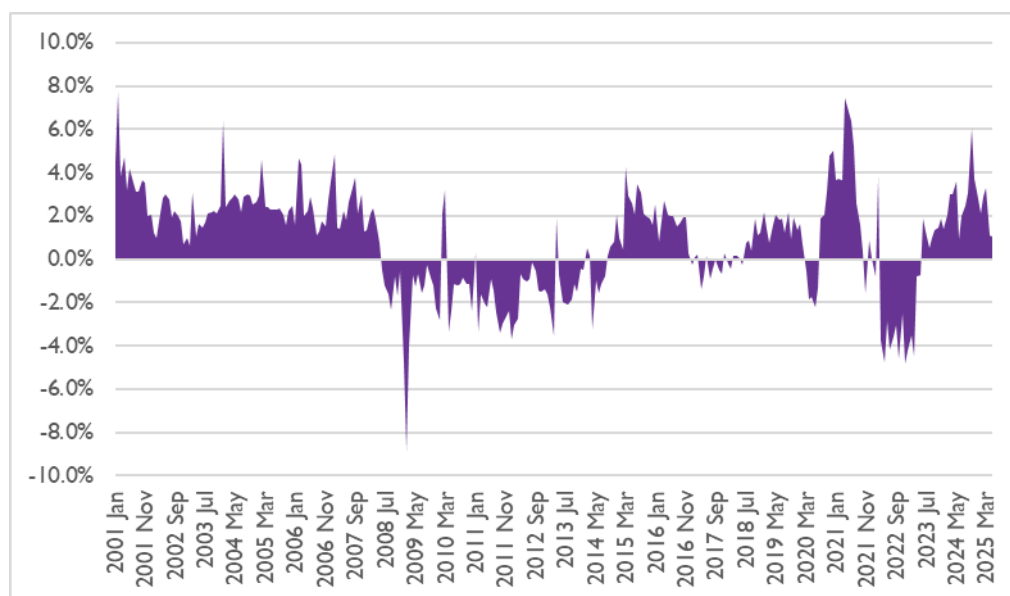
***A. Is the expected value of the wedge between the input price and CPI materially different from zero?***

To assess labour against this criterion, we examine the average annual wedge between wage indices and CPI, and test whether these are statistically different from zero. The wage indices we use are the Annual Survey of Hours and Earnings (ASHE) and Average Weekly Earnings (AWE), both sourced from the ONS. We also consider regional ASHE wage indices for London and the South East, as these may better reflect the wage costs Heathrow faces given its location. Given recent volatility, we conduct sensitivity tests excluding periods affected by Covid (proxied by the duration of the furlough scheme) and by the energy price shock following Russia's invasion of Ukraine (taken to be 2022).

For the ASHE whole-economy index, when the full period is used, the average wedge for median weekly pay ranges between 0.9 and 1.0 per cent. However, this wedge is not statistically significant - almost at the 10 per cent level. Although the magnitude of the wedge remains similar when excluding the Covid period or the period of the energy price shock, it becomes statistically insignificant. The wedge for all weekly pay measures is statistically insignificant. When focusing on weekly pay indices for the South East and London, the magnitude of the average wedge falls slightly to between 0.6 and 0.9 per cent, and the only statistically significant wedge is for the London weekly pay index when the energy price shock period is excluded.

The AWE index also shows a statistically significant wedge over the full period, averaging 0.9 per cent. When the Covid period is excluded, this declines marginally to 0.8 per cent and is no longer significant at the 5 per cent level. The wedge is 1.1 per cent and statistically significant when the energy price shock in 2022 is removed. As shown in Figure A4.2.1, while there is a spike in the wedge during the Covid period, this is offset by a correction in 2022 and 2023.

**Figure A4.2.1: Wedge between annual change in the AWE index and CPI, 2001-2025**



Source: ONS data, Europe Economics' analysis.

Both the AWE and ASHE wedges fall in magnitude and are statistically insignificant when the sample is restricted to the post-financial crisis period (2010 onwards), with average wedges ranging from 0.3 to 0.6 per cent.

We have also investigated the case for an RPE using relevant forecast data. Taking account of forecasts is important because historical data, while informative of past trends, will not necessarily predict developments over the years ahead.

The Bank of England provides forecasts up to 2027, hence only covering the first year of the forthcoming control period. These forecasts imply a wedge between private sector wage growth and CPI of 0.9 per cent in 2027.

We place greater weight on the OBR's wage forecasts, which extend to 2031 Q1 and therefore cover much more of the H8 control period. While we acknowledge concerns regarding the historical accuracy of OBR forecasts, discussed further in Section A4.3 Approach to addressing RPEs, they remain an authoritative source. The OBR produces quarterly forecasts of average annual earnings and CPI extending further, with an average wedge of 0.20 per cent across Q1 2027 to Q1 2031. The OBR forecasts are detailed below.

**Table A4.2.2: OBR average annual earnings and CPI forecast, from 2025 Q2 to 2031 Q1 (per cent)**

	Average annual earnings growth	CPI forecast	Wedge between annual change in earnings forecast and CPI
2025 Q2	5.5	3.5	2.0
2025 Q3	5.1	3.9	1.2
2025 Q4	3.8	3.6	0.2
2026 Q1	3.3	3.2	0.1
2026 Q2	3.4	2.4	1.0

2026 Q3	3.5	2.3	1.2
2026 Q4	3.1	2.1	1.0
2027 Q1	2.7	2.0	0.7
2027 Q2	2.3	2.1	0.2
2027 Q3	2.1	2.0	0.1
2027 Q4	2.0	2.0	0.0
2028 Q1	2.0	1.9	0.1
2028 Q2	2.1	2.1	0.0
2028 Q3	2.1	2.1	0.1
2028 Q4	2.1	2.1	0.1
2029 Q1	2.2	2.1	0.0
2029 Q2	2.2	2.0	0.2
2029 Q3	2.2	2.0	0.2
2029 Q4	2.3	2.0	0.3
2030 Q1	2.3	2.0	0.3
2030 Q2	2.3	2.0	0.3
2030 Q3	2.3	2.0	0.3
2030 Q4	2.3	2.0	0.3
2031 Q1	2.3	2.0	0.3

Source: OBR data, Europe Economics' analysis.

While the evidence from historical wage data is mixed, if weight is placed on the positive wedge forecast by the OBR then this sub-criterion is passed.

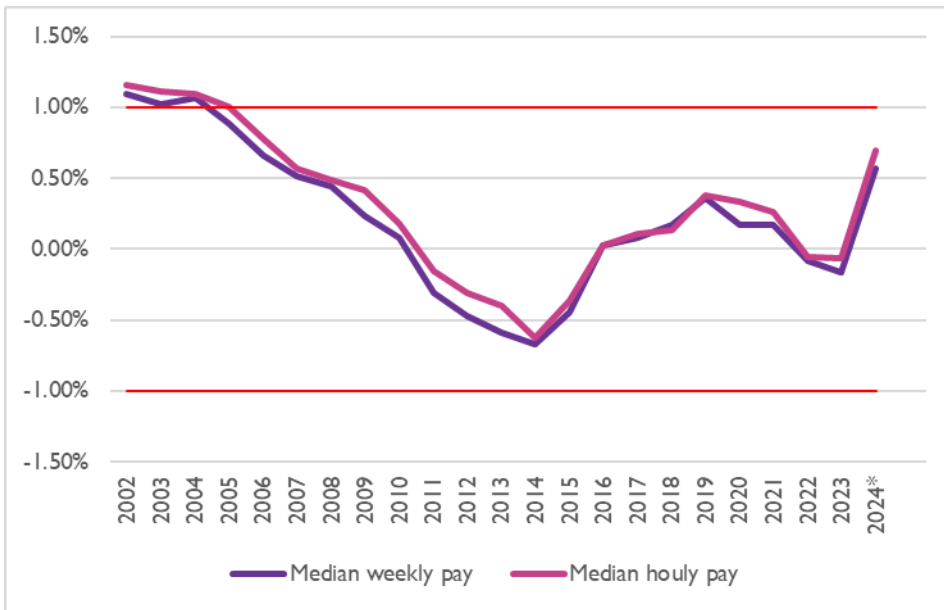
**Sub-criterion passed.**

*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

We investigate the volatility of the five-year rolling average wedge between the wage indices and CPI, multiplied by the share of labour in opex (39 per cent). The results are shown in Figure A4.2.2.2 below.

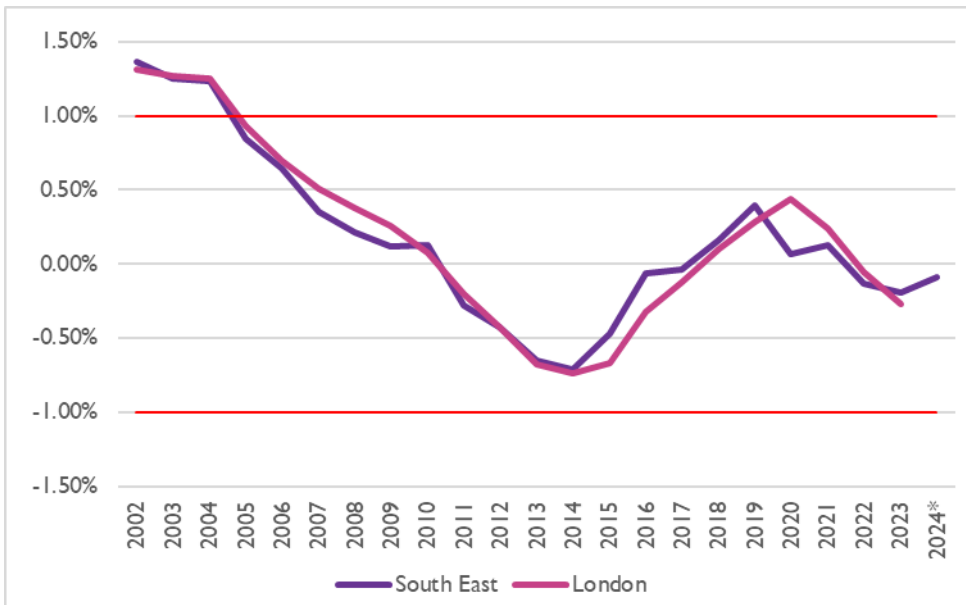
**Figure A4.2.2: Five-year rolling average of wage index – CPI wedges as a share of opex, 2006 – 2025**

(a) ASHE – CPI wedge, 2016 – 2024



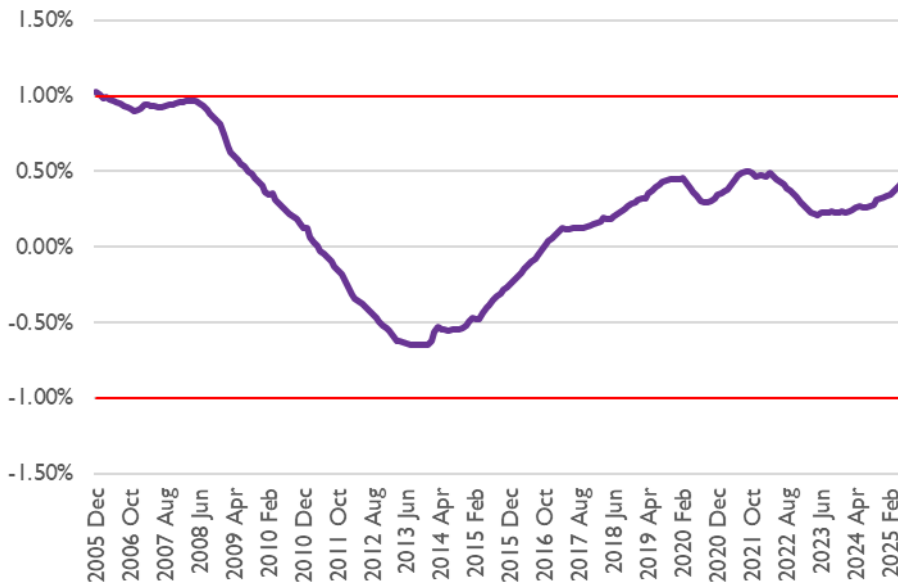
\* The 2024 weekly and hourly pay figures from ONS are provisional and may be subject to revision.

(b) Regional ASHE (median weekly pay) – CPI wedge, Dec 2005 – May 2025



\* The 2024 weekly and hourly pay figures from ONS are provisional and may be subject to revision.

(c) AWE (median weekly pay) – CPI wedge, Dec 2005 – May 2025



Source: ONS data, Europe Economics' analysis.

The wedge based on ASHE data, whether using the weekly or hourly pay measure, exceeds our 1 per cent threshold during the period 2002 to 2004. This volatility is even more pronounced when focusing on the region in which Heathrow operates, with the rolling wedge of the median weekly pay index reaching 1.4 and 1.3 per cent of opex in 2002 in the South East and London respectively. The AWE index exhibits a similar pattern, breaching the 1 per cent volatility threshold in 2006.

However, across all ASHE and AWE indices the threshold has not been exceeded after May 2008. Any assessment of this criterion therefore turns on the weight placed on pre-2009 data.

**Sub-criterion passed if weight placed on pre-2009 data.**

Table A4.2.3 below summarises our RPEs assessment for labour and shows that labour **passes** our criteria for allowing an RPE.

**Table A4.2.3: Summary of Europe Economics assessment for RPE allowance for labour (opex)**

Assessment criteria	Decision
<b>1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?</b>	Pass
<b>2. Are there compelling reasons to think that CPI does not adequately capture the input price</b>	Pass
<b>3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?</b>	Pass
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Pass if weight placed on pre-2009 data
<b>Overall</b>	<b>Pass</b>

---

## Electricity

*Materiality: Is the input cost item to which the RPE would be applied a material proportion of total company costs?*

In HAL's data, electricity is reported separately under utilities (excluding distribution contracts), with an estimated cost of around £104 million in 2024. This represents approximately 6.5 per cent of total opex. Electricity therefore partially passes the 5 per cent materiality threshold used in our framework. While its share of total opex is therefore sufficient to warrant consideration of whether electricity requires an RPE allowance, it remains below the 10 per cent materiality threshold. Accordingly, an RPE allowance for electricity would require especially strong supporting evidence that electricity cost inflation diverges materially from CPI.

### **Criterion partially passed.**

To assess CPI adequacy, we map electricity costs to their closest equivalents in the CPI basket. In the CPI basket, "Electricity" alone is assigned a weight of 2.3 per cent. It may also be appropriate to take account of the weight on "Natural gas and town gas", given that gas remains the marginal price-setting fuel in the wholesale electricity market and therefore gas and electricity prices are likely to move together. "Electricity" and "Natural gas and town gas" have a combined weight of 3.9 per cent.

Comparing these figures, electricity has a 6.5 per cent share in HAL's opex against a 3.9 per cent share in the CPI basket (for electricity and gas combined). This indicates that CPI does capture part of the relevant input cost, but not all of it. The weight mismatch, and the fact that the CPI index reflects household retail tariffs rather than the large non-domestic customer tariffs that HAL faces, suggest that CPI is only a partial proxy for HAL's electricity costs.

### **Criterion partially passed.**

***Wedge analysis: Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?***

*A. Is the expected value of the wedge between the input price and CPI materially different from zero?*

To assess the extent of price changes relative to CPI, we examine the evolution of the electricity price index for industrial customers published by the Department for Energy Security and Net Zero (DESNZ), covering the period from Q1 2007 up to Q1 2025.<sup>60</sup> We analyse the price index for industrial customers rather than the price index for commercial and public sector customers because the latter will include many smaller electricity customers, and hence will incorporate higher distribution charges than may be applicable to HAL.

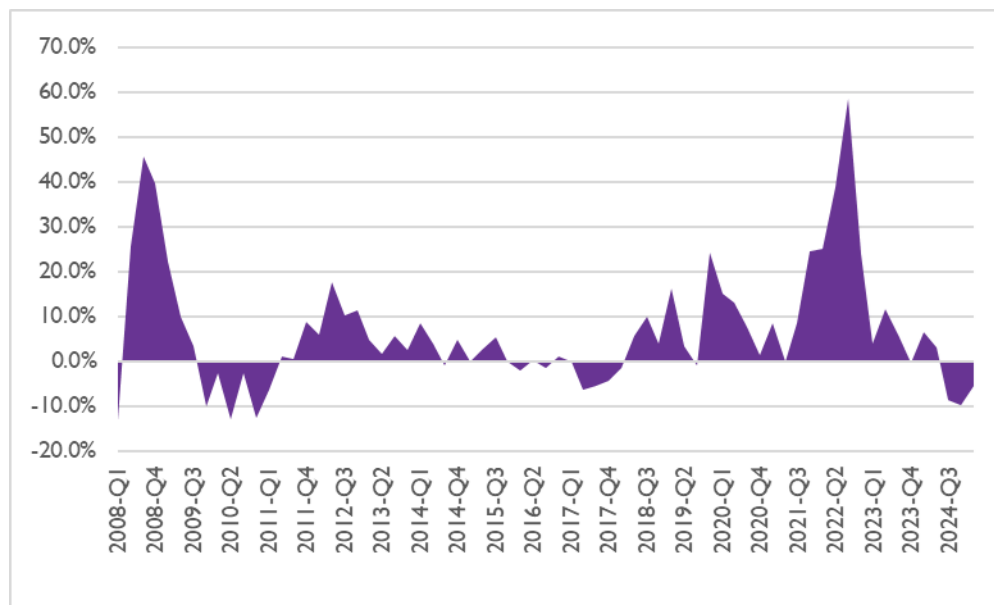
We find evidence of a positive and statistically significant wedge relative to changes in CPI of 6.4 per cent. This wedge is partially driven by very high positive wedges prior to 2010 and during the energy price shock of 2022 (as shown in Figure A4.2.3). Excluding the recent energy price shock reduces the wedge to 4.6 per cent, though it continues to be statistically significant. Figure A4.2.3 shows large spikes in the wedge during the 2008 financial crisis and the recent energy price shock, in the latter case reaching up to almost 60 per cent. It is therefore notable that this wedge remains

---

<sup>60</sup> DESNZ, Quarterly Energy Prices [[link](#)]

positive and significant when these periods are excluded, albeit with a smaller wedge of 3.4 per cent.

**Figure A4.2.3: Wedge between annual change in the industrial electricity price index and CPI, 2008-Q1 – 2025-Q1**



Source: DESNZ data, Europe Economics' analysis.

There is some evidence of a correction following the sharp increases during the 2022 energy shock, with electricity prices falling between 2024-Q3 and 2025-Q1. This is consistent with forecasts published by DESNZ in 2023 of industrial retail electricity prices, which projected negative growth over the years of the H8 price review period.<sup>61</sup> When compared against OBR CPI forecasts, the DESNZ forecasts imply an average wedge between 2025 and 2030 of -2.8 to -14.8 per cent, and an average wedge of -6.8 to -12.2 per cent over the H8 period (2027 to 2030). However, these forecasts have not been updated since November 2023, and there is currently a high level of uncertainty and volatility in energy prices. This issue is discussed further in Section A4.3 Approach to addressing RPEs.

Overall, there is a divergence between the evidence from historical data and the evidence from forecasts. Historical data suggests a positive wedge, whereas forecast evidence (albeit outdated) suggests that the wedge over H8 may be negative.

**Sub-criterion passed (for positive wedge if focus on historical data, or for negative wedge if focus on forecast data).**

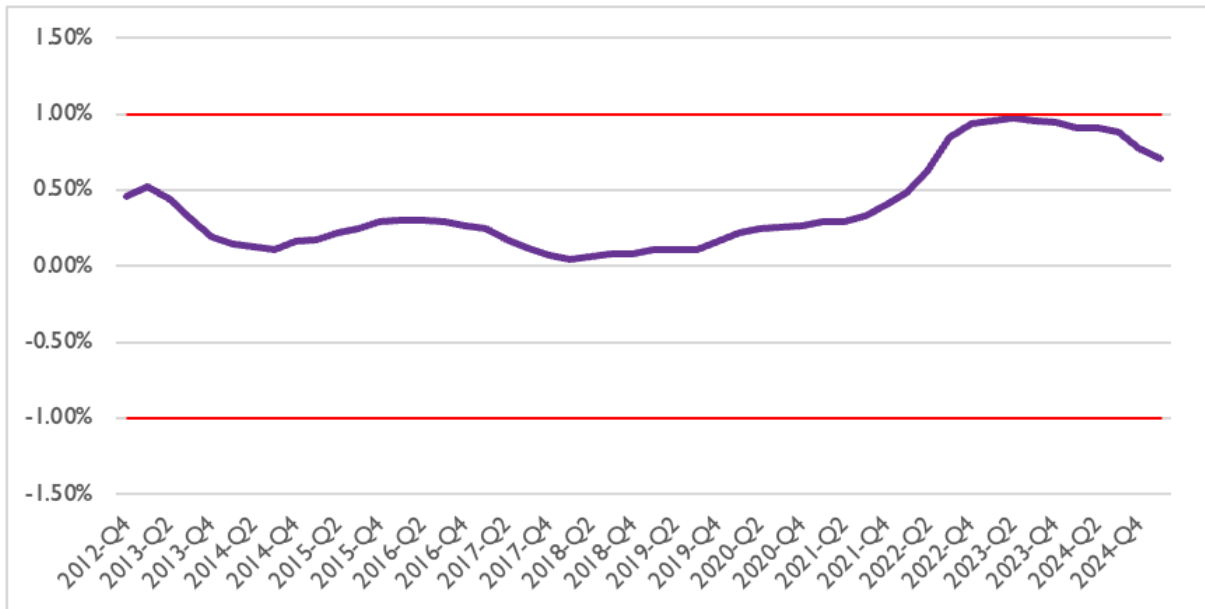
*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

The historical rolling five-year wedge between the electricity price index and CPI varies between -0.8 and 14.9 per cent over the period from 2006-Q1 to 2025-Q1. These wedges are clearly more volatile than the wedges for labour. However, energy costs are a significantly smaller proportion of opex (6.5 per cent) than labour costs, which means that a 1 per cent variation in energy costs has a much smaller impact on opex than a 1 per cent variation in labour costs. In order to

<sup>61</sup> DESNZ, (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal [[link](#)]

formalise this analysis, we again assess volatility by looking at the five-year rolling average wedge as a share of opex. The results are shown in Figure A4.2.4 below.

**Figure A4.2.4: Five-year rolling average of energy price index – CPI wedge as a share of opex, 2012-Q4 – 2025-Q1**



Source: DESNZ data, Europe Economics' analysis.

The results show the wedge ranging from 0.1 to 0.97 per cent of opex but not quite reaching our 1 per cent threshold for material volatility. It should also be noted that the peak of 0.97 occurs in Q2 2023, during the energy price shock in which there was a significant rise in real electricity prices as a result of Russia's invasion of Ukraine in 2022. This is arguably an atypical shock to electricity prices.

### **Sub-criterion failed.**

Table A4.2.4 below summarises our RPEs assessment for electricity. Our overall assessment is that energy **partially passes** our assessment criteria for having an RPE, although there is conflicting evidence as to whether the wedge should be positive or negative. In practice, this partial pass means that any electricity RPE allowance would need to be scaled back to take account of the fact that movements in this input price are already partially captured by CPI indexation.

**Table A4.2.4: Summary of Europe Economics assessment for RPE allowance for electricity (opex)**

Assessment criteria	Decision
<b>1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?</b>	Partial
<b>2. Are there compelling reasons to think that CPI does not adequately capture the input price</b>	Partial
<b>3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?</b>	Pass
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass (for positive wedge if focus on historical data, or for negative wedge if focus on forecast data)
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	<b>Partial pass</b>

## Insurance

*Materiality: Is the input cost item to which the RPE would be applied a material proportion of total company costs?*

Insurance costs are presented as a distinct line in HAL’s H8 opex and revenue categories. The 2024 reported spend is approximately £20 million, which equates to about 1.2 per cent of total opex. In our framework, cost items below 5 per cent of opex are not considered material enough for an RPE allowance, and insurance falls well below this materiality threshold. Even recognising that insurance costs can be subject to sudden increases during “hard market” conditions, the absolute scale of expenditure means such movements are unlikely to have a material effect on total opex during the control period.

### Criterion failed.

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?*

The most relevant comparator in the CPI basket is household insurance, which is weighted at around 0.9 per cent. This is of a similar order of magnitude to the share of insurance in HAL’s opex of 1.3 per cent. Under our framework, when the share of a cost item in opex is similar to its weight in the CPI basket, CPI indexation is deemed to provide adequate remuneration. While HAL’s exposure is to specialist commercial insurance markets and the underlying drivers of pricing may be different from those affecting household insurance, it is unclear what the direction of this effect is likely to be. Hence, since the relative shares are broadly aligned, there is no compelling reason to conclude that CPI fails to capture this input price.

### Criterion failed.

*Wedge analysis: Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?*

*A. Is the expected value of the wedge between the input price and CPI materially different from zero?*

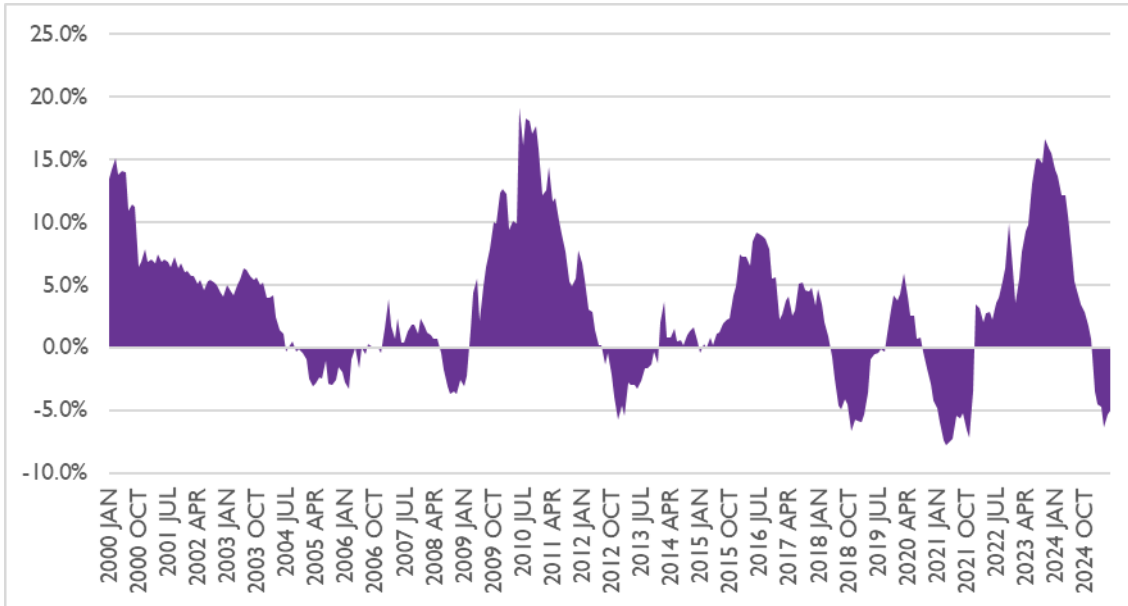
Our analysis focuses on the historical wedge between changes in the insurance component of CPI and changes in overall CPI. While the types of insurance captured within the CPI basket may not fully align with the large-scale industrial insurance required by Heathrow, it nonetheless provides a potentially useful proxy for changes in price of insurance faced by HAL. Using data from 1999 to the present, we find an average wedge of 3.1 per cent, which is statistically different from zero. Moreover, when excluding the period of the energy price shock, the wedge remains statistically significant at 3.0 per cent. Historical wedge analysis therefore indicates a material RPE.

**Sub-criterion passed.**

*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

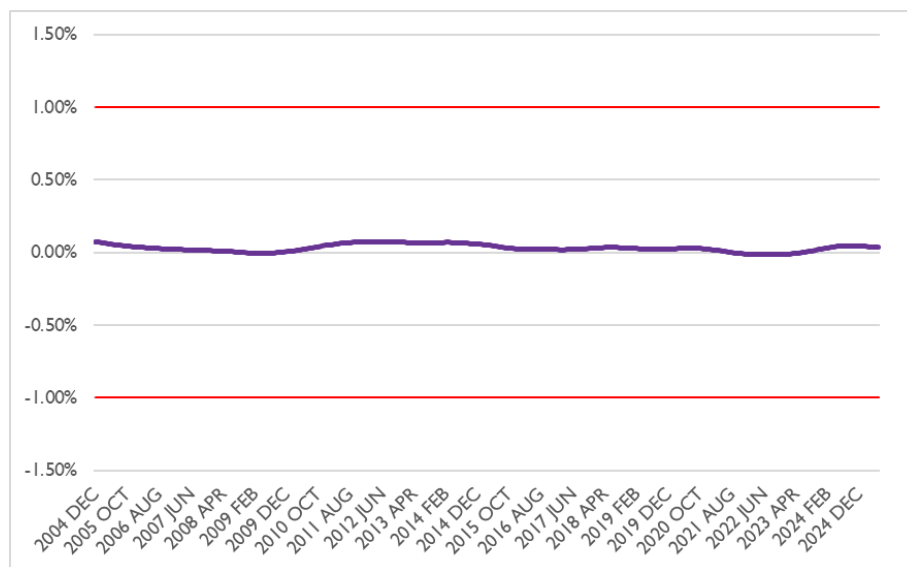
Although the five-year rolling wedge is variable, ranging from -0.9 to 6 per cent over the period, this does not translate into significant volatility in opex. As shown in Figure A4.2.5, there is considerable fluctuation in the size of the wedge, tending to rise during periods of uncertainty such as the financial crisis and the recent energy price shock. However, because insurance accounts for only 1.3 per cent of total opex, the wedge would need to be very large for the impact to exceed our threshold of 1 per cent of opex. In practice, the rolling insurance wedge translates to just -0.01 to 0.08 per cent of opex across the period. Figure A4.2.6 illustrates this absence of volatility when considered as a share of opex.

**Figure A4.2.5 Wedge between annual change in the insurance price index and CPI, 2000-JAN – 2025-JUN**



Source: ONS data, Europe Economics' analysis.

**Figure A4.2.6: Five-year rolling average of insurance price index – CPI wedge as a share of opex, 2004-DEC – 2025-JUN**



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

Table A4.2.5 below summarises our RPEs assessment for insurance and shows that overall insurance **fails** our criteria for allowing an RPE.

**Table A4.2.5: Summary of Europe Economics assessment for RPE allowance for insurance (opex)**

Assessment criteria	Decision
<b>1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?</b>	Fail
<b>2. Are there compelling reasons to think that CPI does not adequately capture the input price</b>	Fail
<b>3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?</b>	Pass
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	Fail

In its business plan, HAL proposes an RPE of CPI+10 per cent for insurance costs, and has provided analysis of trends in the insurance premiums it pays to justify this assumption. We have considered the evidence set out by HAL. Our view is that the evidence fails to justify applying the RPE adjustment HAL has proposed. The argument put forward by HAL focuses on current insurance costs and costs that it expects for the early years of H8, rather than the full control period. HAL's argument only justifies an above-inflation rise in insurance costs up to 2028, rather than 5 consecutive years of 10 per cent increases. In our view, the specific price increase HAL is

---

faced with is better accounted for through an adjustment to the H8 baseline, rather than an annual RPE adjustment of 10 per cent.

#### RPI-linked contracts

A small share of HAL's opex is subject to contractual indexation to RPI rather than CPI. For example, we understand that the electricity distribution contract (around £33 million in 2024) is explicitly RPI-linked. RPI-linked contracts represent roughly 2.1 per cent of total opex.

We consider RPI-linked contracts to sit **outside the scope of our standard assessment framework**. In our view, the appropriate treatment is to allow indexation in line with the contractual terms, provided that the CAA has verified that three conditions are satisfied:

- The relevant contracts are indeed RPI-linked.
- The relevant contracts are not due to expire or be renegotiated during H8, such that HAL has no discretion to alter the basis of indexation. We note that we have allocated some costs currently linked to RPI to the CPI-linked opex category on the basis that the relevant contract will be renegotiated in the early years of H8.
- The contracts represented an efficient arrangement when they were entered into, or appropriate adjustments have been applied separately by the CAA to HAL's allowed revenues for any contracts deemed inefficient.

#### CPI-linked costs

We have categorised a portion of HAL's opex as "CPI-linked" costs. These are costs where price movements are expected to be captured by CPI, and for which there is no evidence to suggest an alternative indexation approach.

Included in this category are costs for individual contracts for which HAL has provided information demonstrating the costs are linked to CPI.

In addition, our analysis has identified further costs for which price movement are best captured by CPI. There are a number of cost lines in HAL's opex stack that do not sit clearly within a single input category. For these costs, we have analysed additional information provided by HAL, including estimates of the share of labour costs within certain cost lines, and identified further costs that should be linked to CPI rather than receiving an RPE allowance.

Costs within this category include rent and rates, general expenses, and the non-labour shares of maintenance and "other operational costs". Taken together, these items account for approximately 51.4 per cent of total opex.

By assumption, changes in the input prices for these items are captured by CPI inflation. On this basis, we do not propose any separate RPE allowance for CPI-linked categories.

#### Summary for opex

The table below summarises the results of applying our RPE assessment framework to opex. The only cost categories where we find that an RPE is justified is labour and electricity, although in the latter case some scaling needs to be applied to reflect the fact that electricity prices are already partially captured within CPI indexation.

**Table A4.2.6: Summary of RPE assessment for opex categories**

Cost Item	Labour	Electricity	Insurance	RPI-linked contracts	CPI-linked
<b>Share in opex (per cent)</b>	<b>38.7</b>	<b>6.5</b>	<b>1.2</b>	<b>2.1</b>	<b>51.4</b>
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Pass	Partial pass	Fail	NA	NA
2. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?	Pass	Partial pass	Fail	NA	NA
3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	Pass	Pass (for positive wedge if focus on historical data, or for negative wedge if focus on forecast data)	Pass	NA	NA
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass	Pass	Pass	NA	NA
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Pass if weight placed on pre-2009 data	Fail	Fail	NA	NA
<b>Overall</b>	<b>Pass</b>	<b>Partial pass</b>	<b>Fail</b>	<b>NA</b>	<b>NA</b>

#### A4.2.2 Commercial revenues

We divide commercial revenues into categories to reflect the different economic and contractual drivers behind each stream. Unlike opex, which is primarily determined by input costs, commercial revenues are shaped by passenger demand, transport patterns, and long-term agreements. It is therefore appropriate to group them into categories that capture these distinct influences while avoiding unnecessary fragmentation.

On this basis, we identify seven main categories for HAL's commercial revenues:

- **Retail and catering.** This represents HAL's revenues from discretionary spending by passengers within the airport environment. Revenues depend on passenger volumes and consumer behaviour and are typically collected through concession agreements with retail and catering operators.
- **Surface access and car parking.** These revenues arise from access to the airport site by road, including car parking, car rental, and drop-off charges. They are driven by demand for private vehicle access and the pricing of facilities controlled by the airport.
- **Heathrow Express** This category reflects revenues from Heathrow Express.
- **Property.** Property income arises from the leasing of offices, warehouses, and other commercial premises. These revenues are typically governed by multi-year contracts and reflect conditions in wider property markets rather than day-to-day passenger flows.
- **Cargo.** Cargo revenues relate to freight handling and logistics activities. They are distinct from passenger-driven categories of commercial revenue, as they depend on global trade volumes, airline cargo capacity, and airport handling arrangements.

- **RPI-linked.** Contracts or charges explicitly indexed to RPI are inherently distinct from CPI-linked commercial revenues. According to HAL, the income from T5 Piccadilly line revenue and track access revenue are linked to RPI.
- **CPI-linked.** A residual grouping for smaller revenue streams such as premium passenger services, fast-track, and miscellaneous charges.

This categorisation ensures that our analysis captures the main sources of commercial income with coherent underlying drivers, while recognising that certain smaller items are best dealt with through CPI indexation.

**Table A4.2.7 Categories for HAL's commercial revenues (per cent)**

Category	Share of commercial revenues
Retail and catering	41.1
Surface access and car parking	25.0
Heathrow Express	8.9
Property	13.6
Cargo	2.0
CPI-linked	7.2
RPI-linked	2.2
<b>Total</b>	<b>100</b>

#### Retail and catering

*Materiality: Is the revenue category to which the RPE would be applied a material proportion of total commercial revenues?*

The retail and catering category includes revenues from duty free, luxury retail, food and beverage, bureau de change, advertising, and other passenger-facing services. The total reported revenue in 2024 is approximately £437 million, representing about 41 per cent of total commercial revenues. This makes retail and catering the single largest component of commercial revenues.

#### **Criterion passed.**

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture prices for this revenue category?*

Retail and catering is assumed to be adequately represented by CPI, because CPI is intended to capture the prices of goods and services purchased by consumers. The items sold within airport concessions, while reflecting a particular mix of goods and influenced by passenger demographics and behaviour, are fundamentally retail purchases of the type covered in the CPI basket. On this basis, there is no strong justification to treat retail and catering as falling outside the scope of CPI coverage.

#### **Criterion failed.**

*Wedge analysis: Is there a significant likelihood that the value of the wedge between the relevant prices and CPI will differ substantially from zero over the period of the price control?*

This criterion is already addressed under Criterion 2, as CPI has been deemed to capture price movements in the retail and catering category. Wedge analysis is therefore not required.

**Table A4.2.8: Summary of Europe Economics assessment for RPE allowance for Retail and catering (commercial revenues)**

Assessment criteria	Decision
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Pass
2. Are there compelling reasons to think that CPI does not adequately capture the input price	Fail
3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	NA
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	NA
B. Does the wedge between the input price and CPI exhibit high volatility over time?	NA
<b>Overall</b>	Fail

In its business plan, HAL proposes an RPE of CPI minus 12.9 per cent for bureau of change revenue within the retail and catering category. HAL argues that bureaux revenues have fallen significantly in recent years in both absolute and per-passenger terms due to the increased use of digital payments and card payments by consumers when abroad. We acknowledge this structural change in the market for currency exchange has led to a drop in demand for bureaux services at Heathrow. However, this impact is better accounted for with a bespoke volume adjustment for Bureaux revenues in the roll-forward model, rather than by applying an RPE. We therefore do not apply an RPE for Bureaux revenues.

#### Surface access and car parking

*Materiality: Is the revenue category to which the RPE would be applied a material proportion of total commercial revenues?*

Surface access and car parking revenues include car parking, car rental, terminal drop-off charges, and other related access revenues. The total reported revenue in 2024 is approximately £266 million, representing about 25 per cent of total commercial revenues. This makes surface access and car parking the second-largest component of commercial revenues.

#### **Criterion passed.**

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture the prices for this revenue category?*

To assess car parking revenues against this criterion, we compare the share of surface access and car parking revenues within commercial revenues (25 per cent) with the share of the CPI basket accounted for by consumer expenditure categories that are closest in scope.

- 
- Primary comparator (used for our assessment): “Toll facilities and parking meters” (0.04 per cent of the CPI basket) and “Hire of garages, parking spaces and personal transport equipment” (0.06 per cent), giving a combined share of 0.10 per cent of the CPI basket. This most directly reflects household expenditure on parking services and the hire of parking spaces and is therefore the closest analogue to airport car parking charges.
  - Secondary comparator (used as a cross-check): the entire CPI category of “Operation of personal transport equipment” (6.74 per cent of the CPI basket). In addition to the above, this also covers wider household costs of private vehicle use, including fuel and maintenance. While broader in scope and less directly linked to parking, it provides a potential cross-check on the scale of car-related expenditures within the CPI basket.

The share of surface access and car parking within HAL’s commercial revenues (25 per cent) is far larger than the primary CPI comparator of 0.10 per cent. Even when the broader comparator is considered, the commercial revenues share remains well above the share of similar expenditures within CPI. This significant mismatch implies that CPI does not adequately capture input prices for this revenue category.

### **Criterion passed.**

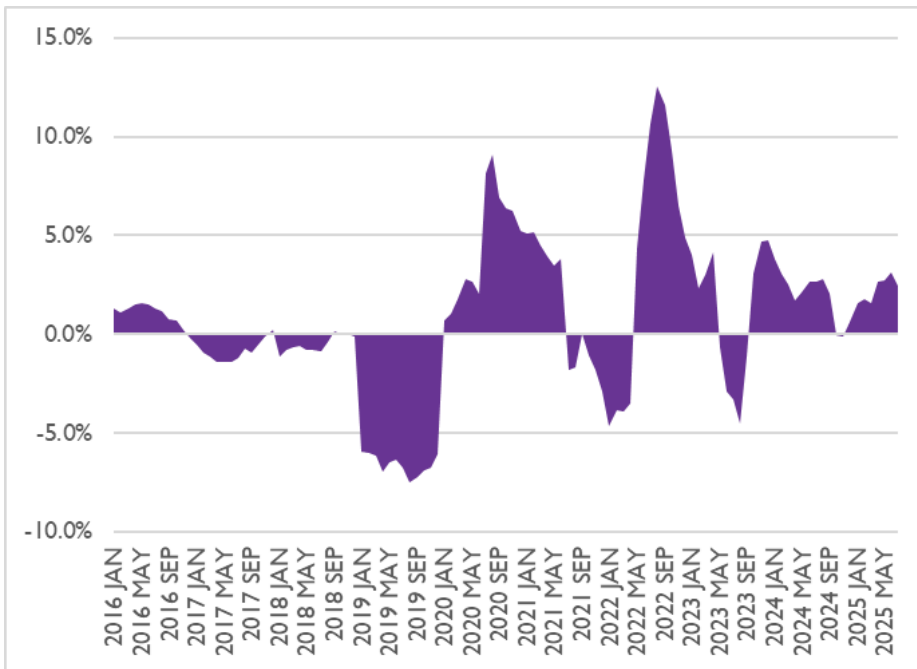
***Wedge analysis: Is there a significant likelihood that the value of the wedge between the relevant prices and CPI will differ substantially from zero over the period of the price control?***

*A. Is the expected value of the wedge between the input price and CPI materially different from zero?*

To analyse the wedge for the *surface access and car parking* category, we use the same two indices from the CPI basket as we used for the Criterion 2 assessment: “*toll facilities and parking meters*” (for parking) and “*hire of garages, parking spaces and personal transport equipment*” (to capture the car hire component). These indices cover the period from January 2015 to July 2025. This is a relatively short time period, limiting the number of data points available and therefore our ability to identify whether there is a consistent wedge relative to CPI.

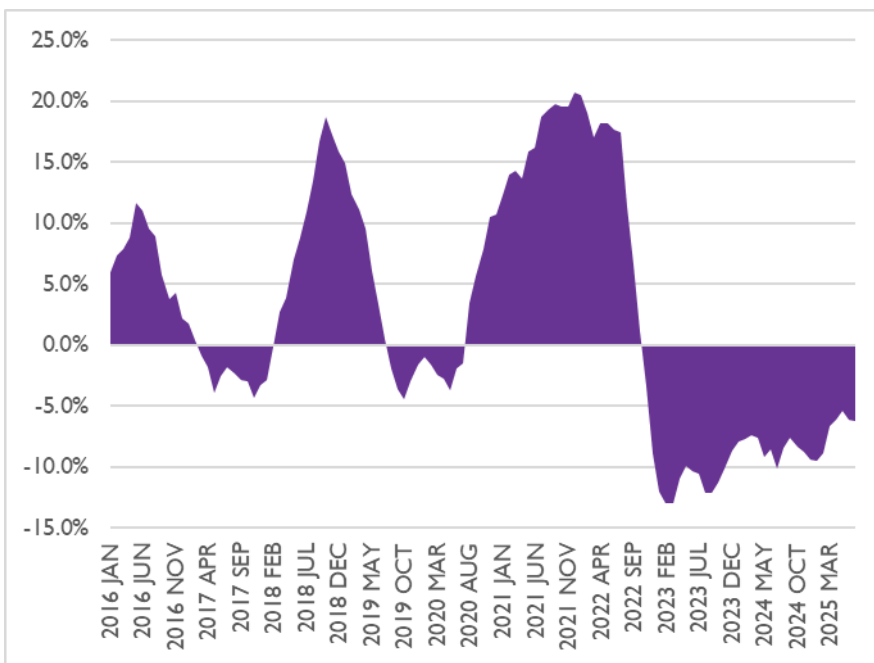
The average annual wedge is statistically insignificant across both indices. For car parking, the wedge averages 0.6 per cent across all years but is not statistically different from zero; and the average falls further to 0.0 per cent and 0.2 per cent respectively when the Covid and energy price shock periods are excluded. The car hire wedge averages 2.2 per cent over all years but is not statistically different from zero, and falls further to 0.4 per cent and 1.3 per cent respectively once the Covid and energy price shock periods are removed. The index is characterised by notable fluctuations in the wedge with CPI, including a large and extended positive wedge during Covid, as shown in Figure A4.2.8. These dynamics are considered further in the volatility analysis under Criterion B.

**Figure A4.2.7: Wedge between annual change in the car parking price index and CPI, 2016-JAN – 2025-JUL**



Source: ONS data, Europe Economics' analysis.

**Figure A4.2.8: Wedge between annual change in the car hire price index and CPI, 2016-JAN – 2025-JUL**



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

The surface access and car parking category accounts for around 25 per cent of total commercial revenues, meaning that volatility in this area has the potential to materially affect overall revenues. However, the evidence on volatility is mixed. The parking index does not exhibit material

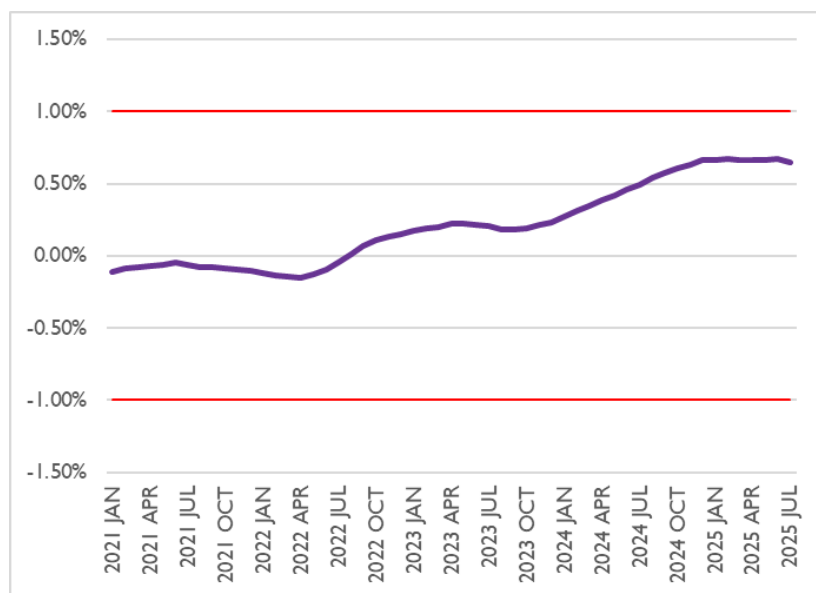
volatility, with the five-year rolling wedge varying only between -0.2 and 0.7 per cent of total commercial revenue across the period. By contrast, the car hire index does display material volatility: from January 2021 to March 2024 the wedge exceeded the 1 per cent threshold, peaking at 2.2 per cent of commercial revenue in November 2022.

It is important to recognise that car hire represents only a small proportion of the revenue category, around 10 per cent in 2024, compared to approximately 70 per cent for car parking.<sup>62</sup> The remaining share is terminal drop-off charge revenue, which is arguably more closely related to parking. Given this weighting, the car parking index provides the more representative benchmark.

On this basis, the absence of material volatility for the car parking index leads us to conclude that this revenue category fails to pass this sub-criterion.

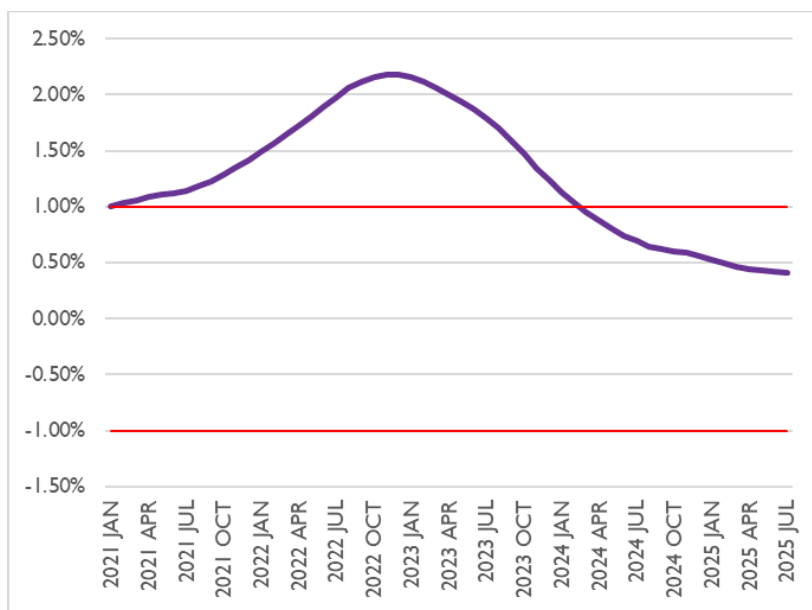
**Figure A4.2.9: Five-year rolling average of surface access and parking price indices – CPI wedge as a share of Commercial revenues, 2020-DEC – 2025-JUL**

(a) CPI toll and car parking – CPI wedge, 2020-DEC – 2025-JUN



<sup>62</sup> HAL business plan submission (2025)

(b) CPI car hire – CPI wedge, 2020-DEC – 2025-JUN



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

Table A4.2.9 summarises our assessment for this revenue category and shows that overall surface access and car parking fails to quality for an RPE allowance.

**Table A4.2.9: Summary of Europe Economics assessment for RPE allowance for surface access and car parking (commercial revenues)**

Assessment criteria	Decision
<b>1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?</b>	Pass
<b>2. Are there compelling reasons to think that CPI does not adequately capture the input price</b>	Pass
<b>3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?</b>	Fail<
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Fail
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	<b>Fail</b>

---

## Heathrow Express

*Materiality: Is the revenue category to which the RPE would be applied a material proportion of total commercial revenues?*

Heathrow Express revenue amounts to approximately £95 million in 2024, representing around 9 per cent of total commercial revenues. This places it above the 5 per cent threshold but below 10 per cent, meaning that the category partially passes the materiality criterion and would require particularly strong evidence of divergence from CPI to support an RPE allowance.

Rail-related revenues also include track access, and T5 Piccadilly Line revenues. However, HAL has confirmed that T5 Piccadilly Line revenue is based on an RPI-linked contract with Transport for London. Track access charges are also linked to RPI by HAL's regulated charging methodology. Consequently, these two elements of rail revenue are allocated to the "RPI-linked" category.

### **Criterion partially passed.**

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture prices for this revenue category?*

For CPI adequacy, we compare the share of rail in HAL's commercial revenues with the share of consumer expenditure categories for rail travel in the CPI basket:

- Primary comparator (used for our assessment): "Passenger transport by railway" (0.84 per cent of the CPI basket). This is the closest analogue to airport rail services, as it directly measures household expenditure on rail fares.
- Secondary comparator (used as a cross-check): "Transport services" (2.54 per cent of the CPI basket), a broader category that includes a wider range of passenger transport modes. While not as precisely related to rail services, it provides a useful cross-check on the share of transport services within CPI.

The share of Heathrow Express revenues within HAL's commercial revenues (9 per cent) is considerably higher than both the primary CPI comparator of 0.84 per cent and the broader comparator of 2.54 per cent. On this basis, we conclude there are compelling reasons to think CPI does not adequately capture prices for this revenue category.

### **Criterion passed.**

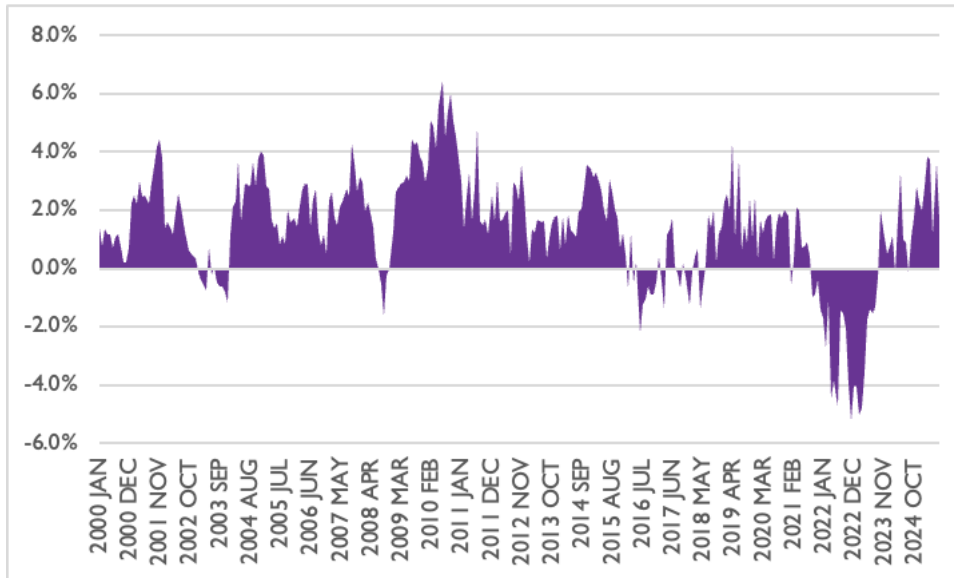
*Wedge analysis: Is there a significant likelihood that the value of the wedge between the relevant prices and CPI will differ substantially from zero over the period of the price control?*

*C. Is the expected value of the wedge between the input price and CPI materially different from zero?*

To assess the materiality of the wedge between the rail prices and CPI, we use the CPI index for "Passenger transport by railway". While not all components of this category will align directly with Heathrow's revenues, we consider that it provides a reasonable proxy. Indeed, we note that this CPI category includes Heathrow Express (HEX) revenue, illustrating its relevance as a proxy. This choice of index is discussed further in our assessment section.

We find a statistically significant average wedge of 1.4 per cent between the railway transport index and CPI. The wedge remains statistically significant when the Covid and energy price shock periods are excluded, with similar average wedges of 1.4 and 1.6 per cent respectively.

**Figure A4.2.10: Wedge between annual change in the passenger transport by rail price index and CPI, 2000-JAN – 2025-JUL**



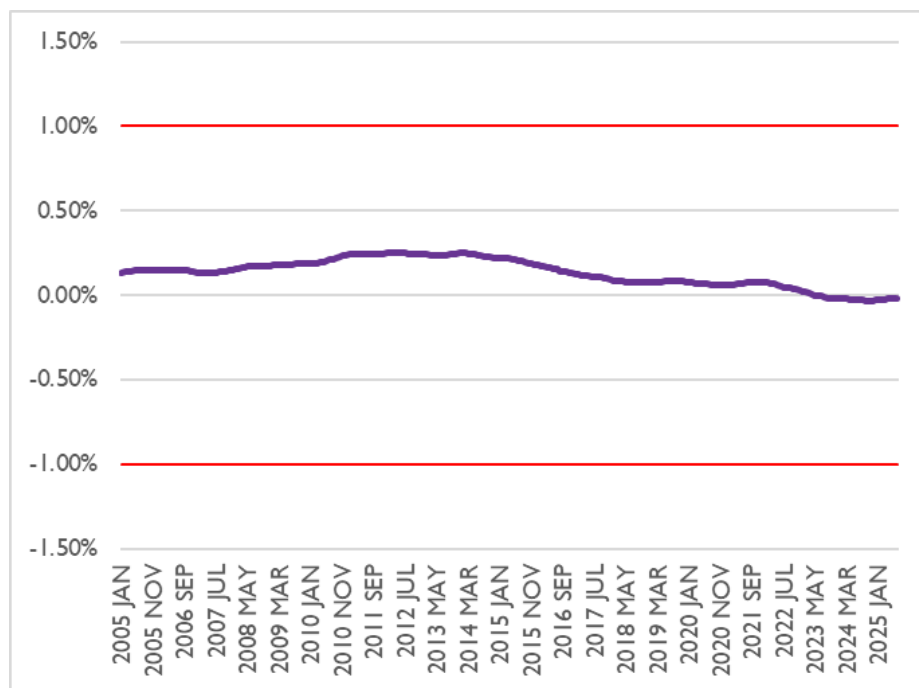
Source: ONS data, Europe Economics' analysis.

### **Sub-criterion passed.**

#### *D. Does the wedge between the input price and CPI exhibit high volatility over time?*

Heathrow Express revenues account for only 8.9 per cent of commercial revenue, which limits the likelihood of the rolling wedge for this category reaching our threshold of 1 per cent of opex. As shown in Figure A4.2.11, over the period from January 2005 to July 2025 the five-year rolling average wedge as a share of commercial revenue remains within the narrow range of 0.0 to 0.3 per cent.

**Figure A4.2.11 Five-year rolling average of passenger rail price index – CPI wedge as a share of Commercial revenues, 2020-DEC – 2025-JUN**



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

Table A4.2.10 summarises our assessment for Heathrow Express revenue, and shows that overall this category passes our criteria for having an RPE allowance.

**Table A4.2.10: Summary of Europe Economics assessment for RPE allowance for Heathrow Express (commercial revenues)**

Assessment criteria	Decision
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Partial Pass
2. Are there compelling reasons to think that CPI does not adequately capture the input price	Pass
3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	Pass
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Pass
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	<b>Pass</b>

---

## Property

*Materiality: Is the revenue category to which the RPE would be applied a material proportion of total commercial revenues?*

Property revenues include in-terminal offices, central terminal area (CTA) and perimeter property, warehouses, and other leased commercial premises. In 2024, these revenues totalled approximately £145 million, equivalent to around 14 per cent of total commercial revenues. This is above our 10 per cent materiality threshold.

### **Criterion passed.**

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture prices for this revenue category?*

For CPI adequacy, we compare the share of property revenues in HAL's commercial revenues with the share of consumer expenditure on housing rentals in the CPI basket. The relevant category in the CPI basket is "Actual rentals for housing", which carries a weight of 7.83 per cent. This reflects household spending on rent, which provides the closest available analogue to HAL's property income streams.

HAL's property revenues represent 14 per cent of commercial revenues, compared to the 7.83 per cent weight of housing rentals in CPI. This indicates some alignment, but not a perfect match. Moreover, there is no component of CPI that accurately reflects movements in commercial real estate. Airport property revenues are based on long-term commercial lease agreements, and may reflect market dynamics (e.g. warehousing linked to logistics demand) that differ from consumer rental markets. On this basis, we judge that CPI only partially captures price movements for this revenue category.

### **Criterion partially passed.**

*Wedge analysis: Is there a significant likelihood that the value of the wedge between the relevant prices and CPI will differ substantially from zero over the period of the price control?*

*A. Is the expected value of the wedge between the input price and CPI materially different from zero?*

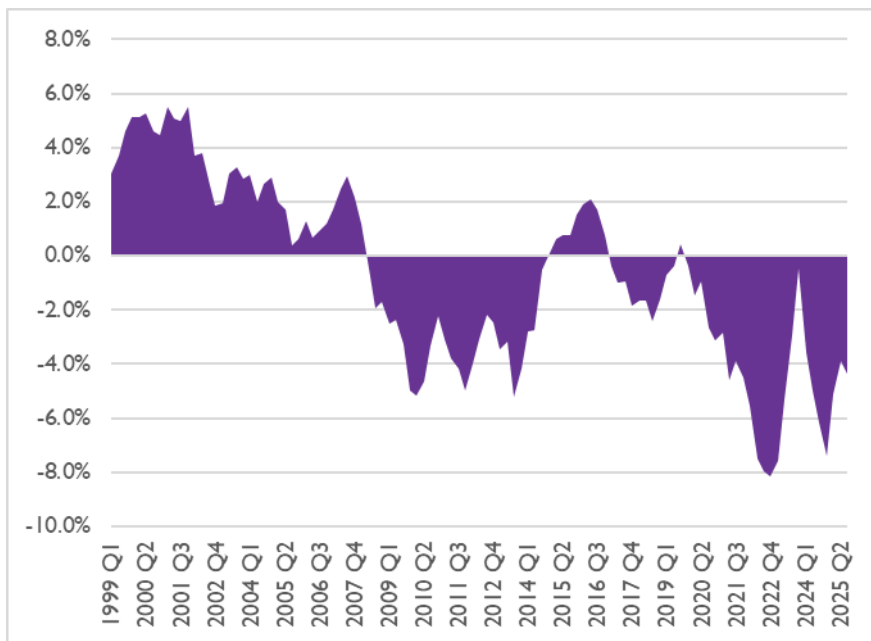
We draw on two indices from the Services Producer Price Inflation (SPPI) index, "rental of real estate" and "warehousing", to reflect the activities underlying HAL's property revenues. We find no statistically significant wedge between the real estate index and CPI at the five per cent level over the full data period from 1999 Q1 to 2025 Q3. The average wedge is minus 0.8 per cent, with the magnitude falling slightly to minus 0.6 and minus 0.5 per cent respectively when the Covid and energy price shock periods are excluded. As shown in **Error! Reference source not found.**, the trend is characterised by two extended periods of negative wedge, following the global financial crisis and the pandemic, after a prolonged phase of positive wedge from 1999 up to 2008. When testing the average wedge with a sample limited to the period after the financial crisis, the wedge increases in magnitude to a statistically significant negative value of -2.7 per cent.

Similarly, the average annual wedge between the warehousing index and CPI is statistically insignificant at minus 0.5 per cent. When the Covid period is excluded, there is a wedge of minus 1.8 per cent, though it remains statistically insignificant. This pattern reflects a temporary positive wedge during the pandemic, which is offset by subsequent periods, as shown in Figure A4.2.12.

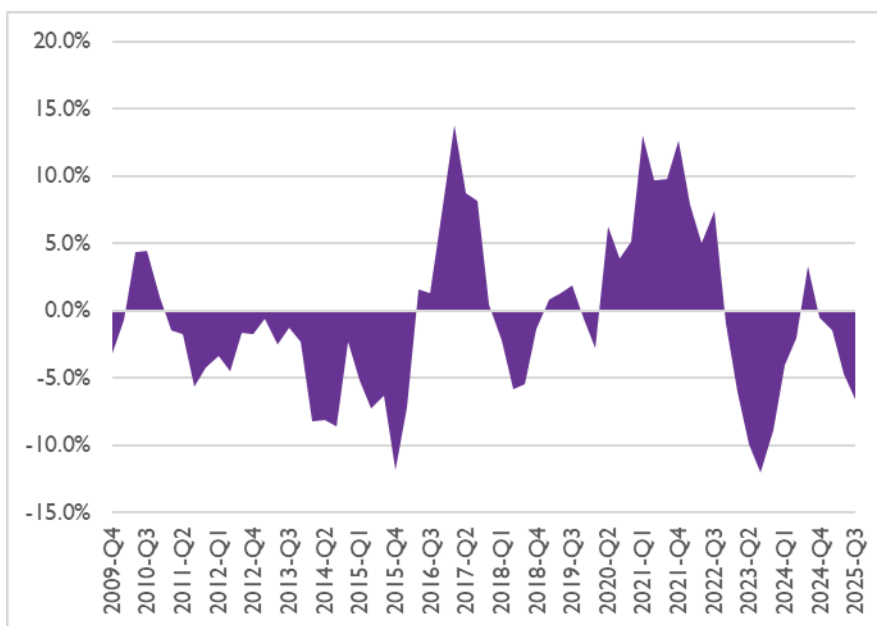
Overall, the assessment under this criterion will depend on the weight placed on the pre- and post-financial crisis periods, as there is a statistically significant negative wedge for real estate prices and CPI post-2010. As previously argued, we prefer to use the full period of data available, over which the wedge is not statistically significant for either index, and this sub-criterion is therefore not met. Moreover, for the warehousing index, the wedge is not significant in either the full period or the post-2010 period.

**Figure A4.2.12: Wedge between annual change in the property price indices and CPI**

(a) SPPI real estate services – CPI wedge, 1999-Q1 – 2025-Q3



(b) SPPI warehousing – CPI wedge, 2009-Q4 – 2025-Q3



Source: ONS data, Europe Economics' analysis.

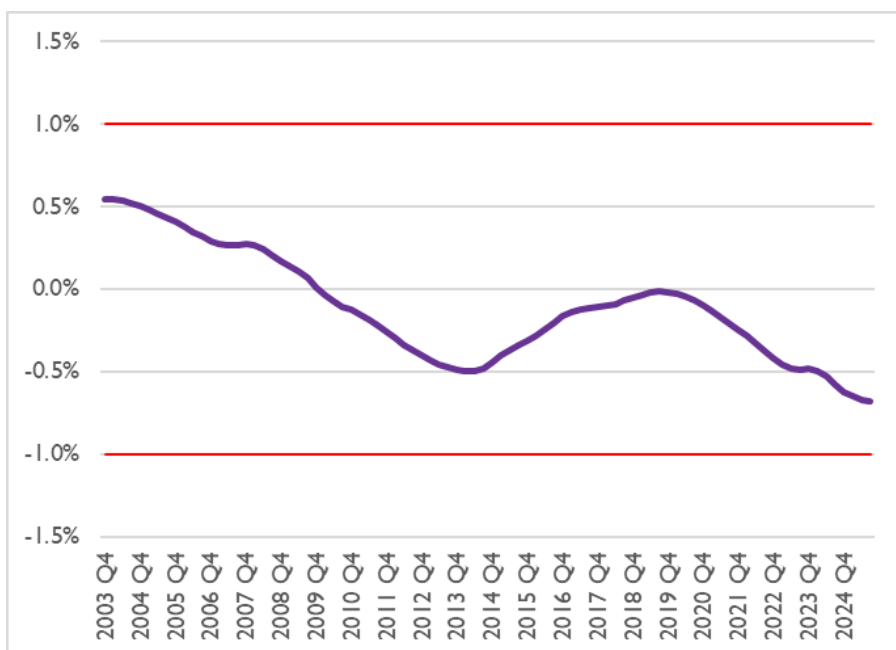
**Sub-criterion failed.**

*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

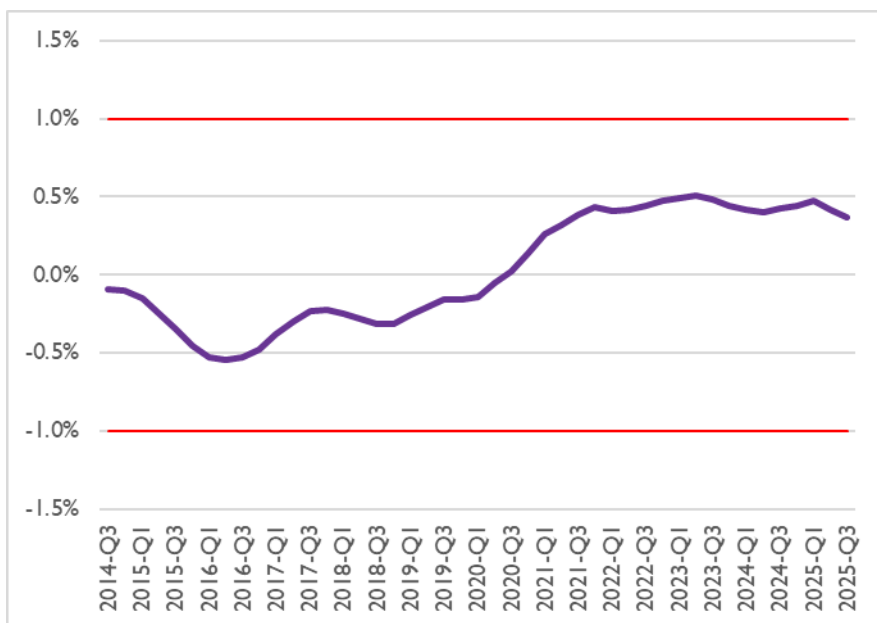
Figure shows the five-year rolling averages for the *real estate services* and *warehousing* SPPI indices relative to CPI, expressed as a share of commercial revenues. The five-year rolling average for real estate fluctuates between  $-0.7$  and  $0.5$  per cent of commercial revenues over the period from 2003 Q4 to 2025 Q3, while the corresponding range for warehousing is between  $-0.6$  and  $0.5$ . Neither index breaches the threshold for material volatility, and therefore property fails against this criterion.

**Figure A4.2.13: Five-year rolling average of property price indices – CPI wedge as a share of Commercial revenues**

(a) SPPI real estate rental – CPI wedge as a share of Commercial revenues, 2003-Q4 – 2025-Q3



(b) SPPI warehousing – CPI wedge as a share of Commercial revenues, 2014-Q4 – 2024-Q4



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

Table A4.2.11 summarises our assessment for property and shows that overall this revenue category fails our criteria for an RPE allowance.

**Table A4.2.11: Summary of Europe Economics assessment for RPE allowance for property (commercial revenues)**

Assessment criteria	Decision
<b>1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?</b>	Pass
<b>2. Are there compelling reasons to think that CPI does not adequately capture the input price</b>	Partial pass
<b>3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?</b>	Fail
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Fail
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	<b>Fail</b>

#### *Bottom-up considerations*

We have also considered bottom-up factors for property revenues. We understand that approximately 60 per cent of HAL’s property prices mechanically move in line with HAL’s Property Price Guide. The annual change to the Guide Price in the Property Price Guide is calculated based on the average annual change in the three formula inputs:

- passenger numbers;
- RPI; and
- Investment Property Databank (IPD) now MSCI, Annual Property Index – the average of Central, Outer and West of London Office Indices.

Equal weight is given to each component. We note that in years impacted by Covid-19, HAL decided against implementing the formula given the significant changes in passenger numbers would have distorted the index.

We have reviewed movements in this composite index relative to CPI going back to 2001. Excluding Covid-19 impacted years, the average annual wedge between changes in the Guide Price and changes in CPI is minus 0.3 per cent, and is not statistically significant. We also analyse the wedge between CPI and movements in the Guide Price excluding the passenger numbers element of the formula (given passenger volume changes are not price movements), meaning we take the average of RPI and the IPD index. The average wedge is minus 0.2 per cent and is not statistically significant. Therefore, the evidence indicates that the expected value of the wedge between Guide Prices (including or excluding the passenger numbers component) and CPI is not materially different from zero. HAL’s forecasts for the Guide Price over the next 5 years are close to 2 per cent growth per annum. The Price Guide does not explain in detail how these forecasts are derived, but suggests that they are “conservative”.

---

This bottom up analysis does not provide any evidence to deviate from the recommendation from our framework of no RPE adjustment for property (see Table A4.2.11). We also note that HAL proposes no RPE adjustment for this category in its business plan.

### Cargo

*Materiality: Is the revenue category to which the RPE would be applied a material proportion of total commercial revenues?*

Cargo revenues are the result of charging for cargo movements. In 2024, these revenues amount to approximately £21 million, representing around 2 per cent of total commercial revenues. This is well below the 5 per cent materiality threshold, so cargo is not considered material for the purpose of assessing an RPE allowance.

#### **Criterion failed.**

*CPI adequacy: Are there sufficient and convincing reasons to think that CPI does not adequately capture prices for this revenue category?*

Cargo services are not directly represented in the CPI basket, which focuses on household consumption. There are strong reasons to conclude that CPI does not adequately capture the drivers of this revenue stream. Cargo revenues are determined by business-to-business charges linked to logistics demand and international trade flows, which are structurally distinct from consumer expenditure indices. On this basis, we consider there to be sufficient and convincing reasons to conclude that CPI does not capture cargo revenues.

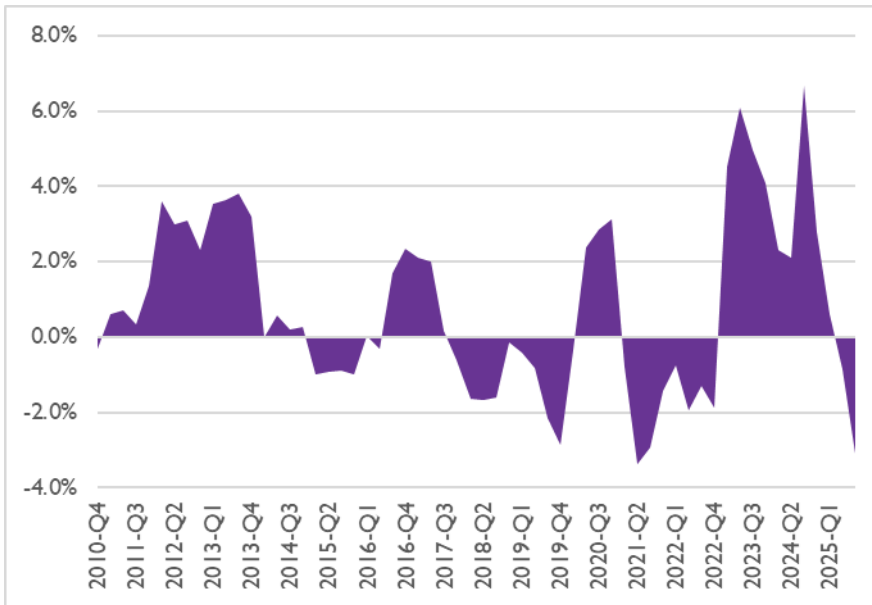
#### **Criterion passed.**

*Wedge analysis: Is there a significant likelihood that the value of the wedge between the relevant prices and CPI will differ substantially from zero over the period of the price control?*

*A. Is the expected value of the wedge between the input price and CPI materially different from zero?*

We use the SPPI “Cargo handling services” to reflect the prices underpinning HAL’s cargo revenues. We find no statistically significant difference between the cargo price index and CPI, with an average annual wedge from 2010 Q4 to 2025 Q3 of 0.0 per cent. Excluding the energy price shock period increases the wedge to 0.5 per cent, though it remains insignificant. As shown in Figure A4.2.14, there is no consistent wedge, either positive or negative, with the wedge between cargo index and fluctuating around zero per cent from 2010 to 2025.

**Figure A4.2.14: Wedge between annual change in the cargo price index and CPI, 2010-Q4 – 2025-Q3**



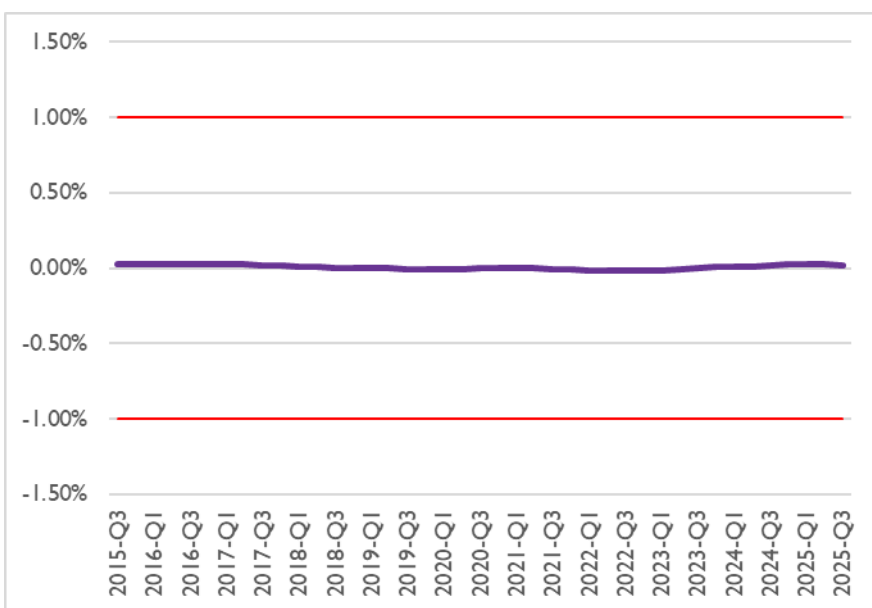
Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

*B. Does the wedge between the input price and CPI exhibit high volatility over time?*

Given that cargo accounts for only 2.0 per cent of total commercial revenue, volatility for this revenue category is unlikely to reach our materiality threshold of 1 per cent of commercial revenues. As shown in Figure A4.2.15, the five-year rolling average wedge between the cargo index and CPI fluctuates between -0.02 to +0.03 per cent of total commercial revenue, and therefore the volatility threshold is not reached.

**Figure A4.2.15: Five-year rolling average of cargo price index – CPI wedge as a share of Commercial revenues, 2015-Q3 – 2024-Q4**



Source: ONS data, Europe Economics' analysis.

**Sub-criterion failed.**

Table A4.2.12 summarises our assessment for cargo and shows that this revenue category fails our criteria for having an RPE allowance.

**Table A4.2.12: Summary of Europe Economics assessment for RPE allowance for cargo (commercial revenues)**

Assessment criteria	Decision
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Fail
2. Are there compelling reasons to think that CPI does not adequately capture the input price	Pass
3. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	Fail
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	Fail
B. Does the wedge between the input price and CPI exhibit high volatility over time?	Fail
<b>Overall</b>	<b>Fail</b>

#### *Bottom-up considerations*

We understand that if the structure of charges remains unchanged, cargo revenues will move in line with the overall price cap, which obviously at this stage has not been determined. We therefore recommend CAA uses CPI (i.e. no RPE) as a holding assumption for cargo at this stage, and replaces this holding assumption with a figure that reflects the actual price cap once this has been determined.

#### *RPI-linked (commercial revenues)*

As confirmed by HAL, the T5 Piccadilly Line revenue and track access revenue are both RPI-linked. Together, these account for around £23 million in 2024, equivalent to approximately 2 per cent of total commercial revenues. We consider such RPI-linked revenues **to fall outside the scope of our standard RPE assessment framework**. In our view, the appropriate approach to these revenues is to allow RPI indexation in line with contractual terms (in the case of T5 Piccadilly Line revenue) or the regulated charging methodology (in the case track access revenue), provided that the link to RPI will remain in force throughout H8.

#### *CPI-linked (commercial revenues)*

The remaining categories of commercial revenues have been grouped under “CPI-linked”, because they are revenues with price movements that our analysis has determined are best represented by CPI. These include fast track services, VIP charges, and other miscellaneous service revenues.

Taken together, these items account for approximately 7 per cent of total commercial revenues.

Price inflation for these revenue categories is assumed to be in line with CPI inflation, and hence we do not propose any separate RPE allowance for these revenues.

## Summary

The table below summaries the results of applying our RPE assessment framework to commercial revenues. The only revenue category where we find that an RPE is justified is rail revenue from Heathrow Express.

**Table A4.2.13: Summary of RPE assessment for commercial revenue categories**

Cost Item	Retail and catering	Surface access and car parking	Heathrow Express	Property	Cargo	RPI-linked	CPI-linked
Share in commercial revenues (per cent)	41.1	25.0	8.9	13.6	2.0	2.2	7.2
1. Is the input cost item to which the RPE would be applied a material proportion of total company costs?	Pass	Pass	Partial pass	Pass	Fail	NA	NA
2. Are there sufficient and convincing reasons to think that CPI does not adequately capture the input price?	Fail	Pass	Pass	Partial pass	Pass	NA	NA
1. Is there a significant likelihood that the value of the wedge between the input price and CPI will differ substantially from zero over the period of the price control?	NA	Fail	Pass	Fail	Fail	NA	NA
A. Is the expected value of the wedge between the input price and CPI materially different from zero?	NA	Fail	Pass	Fail	Fail	NA	NA
B. Does the wedge between the input price and CPI exhibit high volatility over time?	NA	Fail	Fail	Fail	Fail	NA	NA
Overall	Fail	Fail	Pass	Fail	Fail	NA	NA

---

## A4.3 Approach to addressing RPEs

Where Section A4.2 Our assessment of RPEs identifies a cost or revenue item with a material RPE not adequately captured by CPI, we consider four policy options:

- Fixed ex ante allowance;
- Ex post indexation (annual adjustment during H8);
- Ex post true-up (reconciliation at the next review); or
- No RPE adjustment.

We assess these options against the four criteria discussed in Section 0, namely accuracy, incentives, simplicity and consistency. For each relevant cost or revenue item, each of our assessment criterion is discussed in turn before we then score each RPE option against these criteria, using “strong”, “medium”, and “weak” as scoring options.

### A4.3.1 Opex

In Section A4.2 Our assessment of RPEs.1, the cost categories identified as having a material RPE not adequately captured in CPI were labour and electricity. This section therefore considers how an RPE allowance might best be applied to these cost areas, in line with the framework and policy options set out in Section 0.

#### Labour

As discussed below, the choice of approach for labour involves a trade-off between our four assessment criteria.

#### Accuracy: How accurately would RPE allowances reflect actual input prices under this policy option?

In our analysis in Section A4.2 Our assessment of RPEs for the labour category, we found evidence of a positive wedge between labour price indices and CPI, both historically and in forecast data, as well as material volatility in this wedge. This indicates that applying no RPE would be inaccurate, as it would underestimate wage growth and thereby understate the RPE of labour costs on the opex allowance.

A fixed ex ante allowance is unlikely to be the most accurate option. The OBR’s average earnings forecast offers a potential basis for an ex ante mechanism, providing official wage growth projections for the UK economy. However, OBR forecasts have historically exhibited material deviations from outturn earnings growth, as can be seen in Figure A4.3.1. Accordingly, the OBR forecast may not represent the most accurate basis for capturing the RPE of labour costs.

**Figure A4.3.I: OBR wage growth forecasts compared to outturn actuals**



Source: OBR forecasts and ONS outturn

An ex-post mechanism is likely to be the most accurate approach. The flexibility of an ex post adjustment, whether through indexation or a true-up mechanism, to adjust in response to realised changes in wage costs could improve the accuracy of the RPE mechanism by ensuring that allowances more closely track actual cost movements. Several suitable indices exist for an ex-post mechanism, including the ONS’s Average Weekly Earnings (AWE) series, which is published monthly, and the Annual Survey of Hours and Earnings (ASHE), which is released annually and provides regional breakdowns that may better reflect Heathrow’s cost base..

**Incentives: Would the policy option create any perverse incentives for HAL?**

The design of a labour RPE should ensure that allowances accurately reflect adjustments in the labour costs Heathrow faces over the price control period, without weakening its incentives to manage these costs efficiently. If increases in Heathrow’s labour costs were to feed directly into an ex post adjustment mechanism, thereby increasing the RPE allowance, this could in principle reduce incentives for cost control. However, all the identified indices, whether used for an ex ante or ex post mechanism, are based on economy-wide or regional data and therefore cannot be influenced by Heathrow. The most localised option would be ex post indexation using ASHE wage indices for London or the South East; however, even these reflect labour market conditions across large regional economies and remain outside Heathrow’s control. As such, none of the potential mechanisms considered would create a risk of perverse incentives or weaken Heathrow’s cost discipline.

**Simplicity: Would the policy option add significant complexity to the price control framework?**

This criterion considers the simplicity of the RPE mechanism. A fixed ex ante allowance is the simplest to set and explain, requiring a single decision at the start of the control period that applies consistently across all years. Full annual indexation introduces greater complexity, as the RPE allowance would vary each year in line with the chosen wage index. This reduces clear specification of the index, the timing and frequency of updates, and the treatment of any revisions. A true-up mechanism represents an intermediate level of simplicity: allowances are set ex ante, maintaining stability within the period, but are reconciled against an external wage index at the end of the control period. While this avoids the ongoing administrative burden of annual indexation, it

still requires clear reconciliation arrangements and could involve material adjustments at the end of the period.

### Consistency with CAA regulatory precedent: Would the policy option be consistent with previous CAA price controls?

The CAA's previous approach in the H7 price control was to apply ex ante allowances for labour costs, using OBR average earnings forecasts relative to CPI to capture expected wage growth.<sup>63</sup> Indexation and true-up mechanisms have not been used historically by the CAA for labour RPEs, with labour cost pressures instead reflected within the fixed opex allowance. Maintaining an ex ante allowance during H8 would therefore be the most consistent with CAA precedent and with the treatment of comparable cost areas.

### Overall assessment

The table below summarises our assessment of different RPE options for labour.

**Table A4.3.1: Summary of our assessment of RPE options for labour**

	Ex ante Allowance	Indexation	True-Up	No RPE
<b>Accuracy</b>	Medium	Strong	Strong	Weak
<b>Incentives</b>	Strong	Strong	Strong	Strong
<b>Simplicity</b>	Strong	Weak	Medium	Strong
<b>Consistency</b>	Strong	Weak	Weak	Weak

The table shows that there is a clear trade-off: if the CAA places most weight on accuracy, then an ex post true-up (alongside an ex ante allowance) would represent the best approach, whereas if it places most weight on simplicity and consistency then the best approach is just to set an ex ante allowance.

### Electricity

Electricity was assessed as having an RPE under our assessment framework. However, electricity only received a partial pass for the materiality criterion, representing a 6.5 per cent share of total opex. It passed the wedge criterion (3A), though with a positive historical wedge and a negative forecast wedge, and failed the volatility criterion (3B). We note that HAL assumes an RPE of 1 per cent (CPI+1 per cent) for electricity.

### Accuracy: How accurately would RPE allowances reflect actual input prices under this policy option?

The accuracy of a fixed-ex ante allowance is very questionable for electricity because there is no clear basis for estimating the size, or even the sign, of the RPE. The historical analysis indicates a positive wedge, with a statistically significant average difference between electricity price indices and CPI, even when the two periods of exceptional positive price shocks, the 2008 financial crisis and the 2022 energy price spike, are excluded. However, forecast evidence does not support this continuing for H8. The most recent DESNZ forecast for industrial electricity prices predicts

<sup>63</sup> CAA (2023) CAP2524C: H7 Final Decision: Section 2 on the key price control 'building blocks' [\[link\]](#)

---

negative electricity price inflation across the price control period. Economic intuition would also suggest a negative RPE for electricity, given that the severe spike in recent years should unwind at some point. There are, however, concerns regarding the accuracy of the DESNZ forecast. because it dates from November 2023 and was prepared during a period still directly affected by the 2022 energy price shock, meaning it carries a high degree of uncertainty. The forecast uses baseline assumptions from 2023, and some of its forecasted prices have already been overtaken by outturn data. It is unlikely to be an accurate basis for an RPE allowance at this point. We note that DESNZ forecasts of wholesale electricity prices published in 2025 are also negative in real terms over the years of H8. While wholesale prices only account for around half of industrial customer electricity tariffs, and therefore cannot be used to estimate a fixed ex ante allowance, they do provide further evidence that using the positive historical wedge as the basis for an ex ante allowance is unlikely to be an accurate reflection of electricity price movements over H8. At the same time, anticipated reductions in wholesale electricity costs may be countered by increased network tariffs due to the large investment programme being undertaken by electricity networks.

Given the high degree of uncertainty in forecasts, an ex post mechanism is likely to provide a significantly more accurate approach. The DESNZ non-domestic electricity index, which is published quarterly and includes data for extra large industrial customers like Heathrow, is a viable index for an accurate ex-post mechanism.

#### Incentives: Would the policy option create any perverse incentives for HAL?

There is no reason to believe that HAL would be able to influence any of the proposed indices. An ex ante allowance would rely either on an existing forecast or on a fixed RPE derived from historical wedges, neither of which HAL could affect. The forecast and historical analyses are external and already determined, while the DESNZ non-domestic electricity index, although based on a relatively small number of extra-large consumers, is compiled at the UK level and would not be materially affected by Heathrow's activity. Therefore, this criterion is passed for all options.

#### Simplicity: Would the policy option add significant complexity to the price control framework?

This criterion considers the administrative burden of implementing an RPE mechanism. A fixed ex ante allowance is the most straightforward to implement, requiring a single decision at the start of the control period that remains unchanged throughout. By contrast, both indexation and true-up mechanisms introduce additional complexity. Full indexation would require regular updates to the price cap based on an external index, as well as clear rules for timing, frequency, and data revisions. A true-up mechanism is somewhat simpler, involving only a single reconciliation point at the end of the period, but still adds procedural steps and end-of-period adjustments.

#### Consistency with CAA regulatory precedent: Would the policy option be consistent with previous CAA price controls?

In the H7 price control, the CAA set an ex ante allowance for energy costs, covering both electricity and gas, based on OBR and EIC energy price forecasts. Hence, applying a fixed ex ante allowance for electricity during H8 – or applying no RPE, if there is no robust evidence of a future wedge – would follow precedent applied to energy-related cost categories.

#### Summary

The table below summarises our assessment of different RPE options for electricity.

**Table A4.3.2: Summary of RPE assessment for electricity**

	<b>Ex ante Allowance</b>	<b>Indexation</b>	<b>True-Up</b>	<b>No RPE</b>
<b>Accuracy</b>	Weak	Strong	Strong	Weak
<b>Incentives</b>	Strong	Strong	Strong	Strong
<b>Simplicity</b>	Strong	Weak	Medium	Strong
<b>Consistency</b>	Strong	Weak	Weak	Strong

In reaching a policy decision, the CAA will need to consider the greater accuracy of indexation and true-up mechanisms against the greater simplicity and consistency of a fixed ex ante approach. We note that the fact that electricity only partially passes the materiality criterion would be an argument for placing greater weight on simplicity and consistency.

Under an ex ante approach, there remains considerable uncertainty around the appropriate RPE adjustment to apply. Using the historical wedge would imply an allowance in the range of CPI + 4–6 per cent, or 3.4 per cent if discarding the energy shock and financial crisis periods. This is well above HAL’s own RPE for electricity of CPI+1 per cent. It would, however, be unreasonable to wholly disregard forecast evidence, which points to negative electricity price inflation, even if those forecasts are not up to date. At the same time, it would not be appropriate to use the forecast directly to set HAL’s allowance, given the reliability concerns discussed above. Acknowledging this uncertainty, we therefore recommend applying a zero RPE allowance.

We note that it would be possible for the CAA to obtain a more robust forecast of electricity prices for H8 by buying a forecast of industrial retail electricity prices from an established energy price forecasting body.

### A4.3.2 Commercial revenues

In Section A4.2 Our assessment of RPEs.2, the only commercial revenue category identified as having a material RPE not adequately captured by CPI was Heathrow Express. This section therefore considers how an RPE allowance might best be applied to these revenues, in line with the framework and policy options set out in Section 0.

#### Heathrow Express

The CPI sub-index Passenger Transport by Railway is used as the benchmark for this category, as it tracks household rail fares. As an ONS-published index, it is independent of HAL, regularly updated, and transparent, providing a robust and impartial basis for assessing RPE mechanisms for this category.

#### Accuracy: How accurately would RPE allowances reflect actual input prices under this policy option?

Historically, changes in the passenger rail price index have exceeded CPI by a measurable margin. Our wedge analysis found a statistically significant average rail RPE of 1.4 to 1.6 per cent per annum over the long run. The wedge remains statistically significant when the Covid and energy

price shock periods are excluded. This suggests that the no-RPE adjustment option would be inaccurate.

A fixed ex ante allowance is more likely to be accurate than allowing no RPE. A 1.5 per cent allowance reflects the midpoint of the long-run average wedges estimated for rail using historical data. However, there are no forecasts available for rail prices, so a fixed ex-ante allowance would rely solely on the historical wedge, which may not be representative of future price movements.

By contrast, an ex post indexation or true-up mechanism would offer greater accuracy by aligning allowances to actual outturns. The CPI rail index is published monthly by the ONS and offers a viable index for an accurate ex-post mechanism.

**Incentives: Would the policy option create any perverse incentives for HAL?**

No perverse incentives are expected under any mechanism. The CPI Passenger transport by railway sub-index is external and economy-wide, reflecting nationwide pricing rather than airport-specific decisions. As the benchmark index is independent of HAL’s reported data, all RPE options score strongly on incentives as none of them create any feedback effects or distortions.

**Simplicity: Would the policy option add significant complexity to the price control framework?**

No RPE is the simplest option overall, as it relies solely on CPI and requires no additional calculations. Among the options that incorporate an RPE adjustment, a fixed ex ante allowance is the simplest to set, explain, and monitor. A single decision at Final Determination establishes the RPE for all years of H8, ensuring minimal administrative effort. A true-up is moderately more complex: it preserves in-period stability (through ex ante setting) while correcting for forecast error at a single reconciliation point at the end of the control period. However, it creates the potential for material end-of-period adjustments. Full indexation is the least simple, requiring annual recalculations of allowed revenues based on the rail price index, which, while easily sourced from the ONS’s monthly Passenger transport by railway data, would still impose a recurring administrative burden.

**Consistency with CAA regulatory precedent: Would the policy option be consistent with previous CAA price controls?**

In H7, the CAA set RPE allowances for both costs and commercial revenues using an ex ante framework, without bespoke indexation or true-ups. Hence, a fixed ex ante allowance aligns with regulatory precedent. By contrast, applying no RPE (where a clear positive wedge exists) or applying a more complex indexation mechanism would not be consistent with precedent for the CAA.

**Summary**

The table below summarises our assessment of different RPE options for Heathrow Express.

**Table A4.3.3: Summary of RPE assessment for Heathrow Express**

	Ex ante Allowance	Indexation	True-Up	No RPE
<b>Accuracy</b>	Medium	Strong	Strong	Weak
<b>Incentives</b>	Strong	Strong	Strong	Strong
<b>Simplicity</b>	Strong	Weak	Medium	Strong

<b>Consistency</b>	Strong	Weak	Weak	Weak
--------------------	--------	------	------	------

The CAA’s policy decision on rail depends on the weight it wishes to place on accuracy relative to the weight it wishes to place on simplicity and consistency. If CAA places greater weight on simplicity and consistency, then the appropriate policy option is to set an ex ante allowance. Historical analysis suggests a wedge of CPI+1.5 per cent, where 1.5 per cent represents the average historical wedge of passenger rail prices over CPI. If accuracy is prioritised, a true-up using the CPI Passenger Transport by Railway index at the end of the control would provide a robust alternative without requiring annual recalculations.

However, for Heathrow Express revenues there are bottom-up considerations that override the findings from our RPE framework. In particular, increased competition for rail passengers from the Elizabeth line means that it is highly unlikely HAL would be able to increase Heathrow Express fares at CPI+1.5 per cent year-on-year over H8 without experiencing a reduction in the number of Heathrow Express passengers. Therefore, our recommendation is that no RPE adjustment should be applied to this category, meaning only CPI indexation should be applied. Any impacts of increased competition on volumes can be captured in an adjustment to the elasticity and/or baseline assumptions for Heathrow Express revenues.

## A4.4 Conclusions

This section sets out our conclusions on RPEs.

### A4.4.1 Opex

The only cost categories for which we find that an RPE is justified are **labour** and **electricity**, although in the latter case some scaling needs to be applied to reflect the fact that electricity prices are already partially captured within CPI indexation.

For labour, our recommendation is to set a fixed ex-ante allowance based on the most recent OBR average earnings forecast available. This is consistent with the approach taken by CAA at H7 and aligns with HAL’s proposed approach for H8.

For electricity, there is considerable uncertainty around the appropriate RPE adjustment to apply, as discussed in Section A4.3 Approach to addressing RPEs. Given the current lack of a recent publicly available forecast and the inappropriate wedge implied by the historical electricity price data, as well as the fact that electricity is already partially captured by CPI, we have applied a zero RPE allowance to electricity for now. Nearer to the final determination, it may be appropriate to revisit this assumption. For example, DESNZ may have published a more up-to-date electricity price forecast by then, or the CAA may decide to purchase a bespoke forecast of electricity prices for H8 from an energy price forecasting organisation.

For RPI-linked contracts, the appropriate treatment is to allow RPI indexation in line with the contractual terms, provided that the CAA has verified that three conditions are satisfied:

- the relevant contracts are indeed RPI-linked;
- the relevant contracts are not due to expire or be renegotiated during H8, such that HAL has no discretion to alter the basis of indexation.

- the contracts represented an efficient arrangement when they were entered into, or appropriate adjustments have been applied separately by the CAA to HAL's allowed revenues for any contracts deemed inefficient

For insurance and CPI-linked costs, we recommend no RPE allowance is applied.

We have mapped our opex RPE recommendations for the input categories to the cost categories used by HAL in its business plan. Our RPE recommendations by HAL cost category are set out in the table below.

**Table A4.4.1: Recommended RPE allowances for opex**

Cost category	Recommended indexation
Staff	OBR average earnings forecast
Maintenance, facilities management & equipment	16 per cent Staff RPE, 84 per cent CPI*
Rent & rates	CPI
Utilities (excluding distribution contract)	CPI
Electricity distribution contract	RPI
Insurance	CPI
Other opex	28 per cent Staff RPE, 72 per cent CPI, except for subcategories where HAL has informed us costs are linked to CPI or RPI

\*We recommend no RPE for cleaning costs within maintenance based on information provided by HAL regarding its cleaning services contract being outsourced, and therefore we expect the contract to track general inflation.

#### A4.4.2 Commercial Revenues

The only revenue category where we find that an RPE could potentially be justified is rail revenue from Heathrow Express. However, as discussed in Section A4.3 Approach to addressing RPEs, Heathrow Express is subject to competition from the Elizabeth Line for rail passengers and our bottom-up analysis suggests that HAL is unlikely to be able to increase fare prices above CPI given the competition it faces and increase revenues.

For RPI-linked commercial revenues, which includes the T5 Piccadilly Line revenue and track access revenue, we recommend allowing RPI indexation in line with contractual terms (in the case of T5 Piccadilly Line revenue) or the regulated charging methodology (in the case track access revenue), provided that the link to RPI will remain in force throughout H8.

For all other revenue categories, we recommend applying no RPE and using CPI indexation.

Our RPE recommendations for commercial revenues are set out in the table below.

---

**Table A4.4.2: Recommended RPE allowances for commercial revenues**

<b>Revenue category</b>	<b>Recommended indexation</b>
<b>Retail and catering</b>	CPI
<b>Surface access and car parking</b>	CPI
<b>Heathrow Express</b>	CPI
<b>Property</b>	CPI
<b>Cargo</b>	CPI
<b>RPI-linked</b>	RPI
<b>CPI-linked</b>	CPI

---

# Appendix 5: Management Stretch Estimates

This appendix sets out our approach to assessing management stretch for Heathrow's commercial revenues.

## A5.1 Overview

Commercial revenues at Heathrow are shaped by a number of observable volume drivers, most notably passenger volumes, which are incorporated directly into our forecasting framework. Revenues may also change over time due to factors that are not included in the model. As a result, commercial performance can improve even when the modelled drivers remain unchanged.

In this setting, management stretch reflects the degree to which HAL's commercial revenues may grow beyond what is accounted for by modelled volume drivers. It represents the ongoing challenge applied to commercial activities and captures the underlying rate at which revenues may be expected to increase once scale effects have been removed.

## A5.2 Approach

### Two-step assessment process

Our starting point for management stretch is to adopt the same figures as those proposed by HAL in its Business Plan, departing from them only where we identify strong reasons to do so. We therefore assess management stretch using the following two steps:

- Step 1: Econometric testing, for each category of commercial revenue, of whether there is statistical evidence to reject HAL's proposed figure for management stretch. In cases where HAL's figure for management stretch is not rejected, we recommend applying that figure in the roll-forward analysis.
- Step 2: For those categories where there is statistical evidence suggesting that HAL's figure should be rejected, examination of the trend coefficient in our econometric regression. If the trend is positive, then we can set management stretch on the basis of our estimated coefficient. On the other hand, if the trend is negative, then we propose no management stretch, given that management stretch is characterised as additional gains in commercial revenue.

### Model specifications

We now describe the econometric regressions used in carrying out the above steps.

A key feature of the approach is that the relationship between revenues and their driver is set by the agreed elasticity values (see Section 3.2.2), which are imposed rather than estimated. This allows the scale effect to be removed in a way that is consistent with our elasticity assumptions. Any remaining systematic movement is captured by the time trend. To implement this, we

---

consider a range of model specifications (in log–log form) for each revenue category, with HAL’s revenue as the dependent variable and the relevant driver (for example, total passengers or parking passengers) as the independent variable. Alongside a specification which does not make any adjustment for the Covid pandemic, we run two additional specifications which adjust for Covid-affected years in two alternative ways – excluding 2020–22 or including a Covid dummy – to test whether the estimated trend is sensitive to the treatment of the pandemic period.

To maintain consistency across categories and to reflect the limited size of the dataset, we apply three variants of the same basic specification:

1. Full-sample model with time trend

$$\ln(R_t) = \alpha + \beta \ln(D_t) + \gamma t + \varepsilon_t,$$

where  $R_t$  is the revenue category,  $D_t$  is the driver,  $\beta$  is fixed at the agreed elasticity, and  $\gamma$  is the coefficient on the trend variable  $t$ .

2. Non-Covid model

The same specification as (1) estimated on a sample excluding 2020–22.

3. Covid-dummy model

$$\ln(R_t) = \alpha + \beta \ln(D_t) + \delta \cdot \text{Covid}_t + \gamma t + \varepsilon_t,$$

where  $\text{Covid}_t = 1$  for 2020–22 and zero for other years.

Across all three specifications, the coefficient on the time trend ( $\gamma$ ) provides the estimate of the underlying annual movement in revenues once the scale effect specified by the elasticity has been removed. A positive value indicates that revenues have tended to increase over time after controlling for the driver, while a negative value suggests a decline. The estimated trend is a backward-looking descriptive measure and is not intended to represent a forecast of future revenue performance. The estimated trend is compared with HAL’s proposed management stretch to test whether HAL’s proposal is statistically supported by the data. The Covid dummy, where included, isolates the temporary effect of the pandemic period.

### Assessment of HAL’s proposed management stretch

The estimated underlying trends from the econometric models described above are used to assess HAL’s proposed management stretch assumptions for each revenue category.

HAL’s Business Plan sets out management stretch values of either zero or 1 per cent per year, depending on the category. For each revenue line, we test whether the estimated underlying trend provides statistical evidence to reject HAL’s proposed assumption. Where HAL proposes no management stretch, this corresponds to testing whether the underlying trend differs from zero. Where HAL proposes a 1 per cent management stretch, this corresponds to testing whether the underlying trend differs from a 1 per cent annual growth rate.

Tests are conducted at the 5 per cent significance level and results are examined across the three model specifications described above. Where results differ across specifications, greater weight is placed on those that explicitly adjust for the Covid-affected years.

---

## Data Coverage

The analysis uses HAL's business-plan data as the primary source, covering all revenue categories for which consistent data and a defined driver are available. Results are produced for the following categories:

- Retail and catering (including/excluding bureau)
- Bureau
- Surface access and car parking
- Service revenue (excluding surface access)
- Property
- Track access revenue
- Heathrow Express revenue

In the case of surface access and car parking, HAL applied 1 per cent management stretch to short stay car parking and rental, but not to long stay car parking. However, our analysis of elasticities (on which our management stretch analysis depends) considers surface access and car parking in aggregate, and hence for consistency we have tested whether the data are consistent with 1 per cent management stretch for the category as a whole.

Other categories could not be analysed due to limited or inconsistent data.

## Jacobs data

As a further cross-check, we applied the same econometric specification to the Jacobs dataset, which contains annual observations for around 50 airports over 2010–22. This provides an external panel against which to test whether the trends identified in Heathrow's own data align with patterns observed across a wider set of airports.

Individual commercial categories could only be analysed where two conditions were met: the category could be reconstructed from the Jacobs breakdown of commercial revenues; and the driver used in our roll-forward model was total passengers, as this is the only driver available in the Jacobs dataset. Only retail and catering revenues met both criteria. Retail and catering revenues were constructed by summing advertising, food and beverage, retail, and concessions revenues (noting that Jacobs treats "retail" and "concessions" as interchangeable).

## A5.3 Results

### Step 1: econometric testing of HAL's proposed figure for management stretch

Here we report the results of the statistical tests of HAL's proposed management stretch assumptions, based on the econometric models described above. For each revenue category, we assess whether the estimated underlying trend provides statistical evidence to reject HAL's proposed management stretch. We first discuss the results obtained using HAL's business-plan data.

For revenue categories where HAL proposes a management stretch of 1 per cent per year, the results differ across categories.

In the case of retail and catering (excluding bureau), HAL's proposed 1 per cent management stretch is rejected once the Covid period is excluded or controlled for, indicating that the data are

not consistent with a sustained underlying growth rate of 1 per cent per year after removing passenger-related scale effects. While the full-sample specification does not reject HAL's proposal, the rejection observed in both Covid-adjusted specifications suggests that this conclusion is robust once adjustments are made for the pandemic period.

By contrast, for surface access and car parking revenues, HAL's proposed management stretch of 1 per cent per year is not rejected in any of the model specifications. This indicates that a 1 per cent underlying growth assumption is statistically consistent with the data once scale effects are removed. A similar result is observed for service revenue (excluding surface access), where HAL's proposed 1 per cent management stretch is not rejected across all specifications.

For revenue categories where HAL proposes no management stretch, the results show a mixed pattern. For bureau revenues, HAL's proposal of no management stretch is rejected in all specifications, indicating a statistically significant underlying trend. For property revenue, the evidence is less clear-cut: HAL's proposal is rejected in only one specification, and we therefore place limited weight on this result. For track access revenue and Heathrow Express revenue, HAL's proposed assumption of no management stretch is not rejected in any specification, suggesting that the data are consistent with no underlying growth once scale effects are removed.

Table A5.0.I summarises the results of these statistical tests, reporting p-values for the null hypothesis corresponding to HAL's proposed management stretch under each model specification.

**Table A5.0.I: Statistical testing of HAL's proposed management stretch (p-value)**

Category	Driver	HAL's proposed stretch	No Covid Adjustment	Excluding 2020-22	Covid dummy	Conclusion
<b>Retail &amp; catering (excl. bureau)</b>	Total pax	1%	0.109	<b>0.040</b>	<b>0.037</b>	Reject
<b>Bureau</b>	Total pax	0%	<b>0.000</b>	<b>0.001</b>	<b>0.000</b>	Reject
<b>Surface access &amp; car parking</b>	Parking pax	1% *	0.083	0.147	0.179	Fail to reject
<b>Service revenue</b>	Total pax	1%	0.944	0.725	0.944	Fail to reject
<b>Property<sup>#</sup></b>	Terminal floor area	0%	0.086	<b>0.020</b>	0.111	Mixed / weak
<b>Track access<sup>#</sup></b>	Total pax	0%	0.568	0.475	0.662	Fail to reject
<b>Heathrow Express</b>	HEX pax	0%	0.196	0.129	0.162	Fail to reject

Note: **Bold** indicates rejection at the 5% level. # We place low weight on results for property and track access revenue due to limited data points. \*Applied to short stay car parking and car rental

We have carried out a cross-check for retail and catering using Jacobs data, as shown in the table below. The results for this cross-check differ from our core results using HAL data, as the statistical tests for the specifications that adjust for Covid effects fail to reject HAL's proposed management stretch of 1 per cent. On balance, we have placed more weight on our core results using HAL data when reaching our overall conclusions, thus ensuring consistency with the analysis for other categories of commercial revenue. (We note as well that our estimated coefficients

using the Jacobs data are negative, as reported later. Hence, our results imply a zero or downwards trend rather than an upwards trend of 1 per cent, even if the differences between our coefficients and HAL’s proposal were not found to be statistically significant in the specifications that adjust for Covid impacts.)

**Table A5.0.2: Cross-check for retail and catering using Jacobs data (p-value)**

Category	Driver	HAL’s proposed stretch	No Covid Adjustment	Excluding 2020-22	Covid dummy	Conclusion
<b>Retail &amp; catering</b>	Total pax	1%	<b>0.030</b>	0.433	0.252	Fail to reject

Note: **Bold** indicates rejection at the 5% level.

**Step 2: examination of trend coefficient for categories where HAL’s proposal is rejected**

Table A5.0.2 reports the estimated underlying trends in revenues across the three model specifications using HAL’s business-plan data. These estimates illustrate the direction and magnitude of underlying movements once scale effects have been removed.

For revenue categories where step 1 did not reject HAL’s figure for management stretch, our estimated coefficients do not determine the recommended management stretch, which is instead based on HAL’s proposal. Hence, the table reports results for these revenue categories for information only.

For revenue categories where step 1 rejected HAL’s proposed figure (namely, retail and catering, bureau, and in one model specification, property), we examine our regression results to determine what management stretch assumption is appropriate. In all of these cases, our results found a negative trend coefficient, supporting a conclusion of zero management stretch given that management stretch is characterised as the potential for further improvement in revenues.

**Table A5.0.3: Estimated annual trends across model specifications (HAL data)**

Category	Driver	Elasticity	No Covid Adjustment (%)	Excluding 2020-22 (%)	Covid dummy (%)
<b>Retail &amp; catering (excl. bureau)</b>	Total pax	1.0	-2.0	-2.7	-3.1*
<b>Bureau</b>	Total pax	1.0	-11.3***	-11.3***	-11.3***
<b>Surface access &amp; car parking</b>	Parking pax	1.0	2.0***	2.0**	2.0**
<b>Service revenue (excl. surface access)</b>	Total pax	0.6	0.0	1.0	1.0
<b>Property<sup>#</sup></b>	Terminal floor area	0.5	-3.0*	-2.0**	-3.0
<b>Track access revenue<sup>#</sup></b>	Total pax	1.0	12.7	18.5	10.5
<b>Heathrow Express revenue</b>	HEX pax	1.0	-2.0	-2.0	-2.0

Note: \*, \*\*, \*\*\* denote statistical significance at 10%, 5% and 1% respectively. In this table, the null hypothesis being tested in all cases is that the coefficient is zero. # We place low weight on results for property and track access revenue due to limited data points.

For information, results for the retail and catering category using the Jacobs dataset are presented in the table below Table 3.14.

**Table A5.0.4: Estimated annual trends across model specifications (Jacobs data)**

Category	Driver	Elasticity	No Covid Adjustment (%)	Excluding 2020-22 (%)	Covid dummy (%)
<b>Jacobs – Retail &amp; catering</b>	Total pax	1.0	-1.0	-0.2	-0.9

Note: \*, \*\*, \*\*\* denote statistical significance at 10%, 5% and 1% respectively.

## A5.4 Conclusion

On the basis of these results, we propose to apply management stretch of 1 per cent per year to surface access and car parking, and service revenue. We propose not to apply management stretch to any other categories of commercial revenue. This basis for this approach is summarised below.

**Table A5.0.5: Summary of our analysis**

Category	HAL's proposed management stretch (per annum)	Step 1: do statistical tests reject HAL's proposal?	Step 2: if HAL's proposal rejected, what direction is trend?	Recommended management stretch (per annum)
<b>Retail &amp; catering Bureau</b>	1%	Yes	Negative	No stretch
<b>Surface access &amp; car parking</b>	No stretch	Yes	Negative	No stretch
<b>Service revenue</b>	1%	No	n/a	1%
<b>Property<sup>#</sup></b>	No stretch	No	n/a	1%
<b>Track access<sup>#</sup></b>	No stretch	Mixed	Negative	No stretch
<b>Heathrow Express</b>	No stretch	No	n/a	No stretch

Source: Data from HAL, Europe Economics analysis # We place low weight on results for property and track access revenue due to limited data points.

In the case of retail and catering, HAL's proposed 1 per cent management stretch is rejected in specifications that exclude or control for the Covid-affected period (when using HAL data). Given that our econometric regression found a negative trend for this category, we recommend not applying any management stretch to retail and catering revenues.

For bureau revenues, HAL's proposal of no management stretch is rejected across our model specifications. However, given that our models suggest a negative trend, we would nonetheless recommend applying zero management stretch for this category.

By contrast, for surface access and car parking revenues, HAL's proposed management stretch of 1 per cent per year is not rejected in any of the model specifications. This indicates that a 1 per cent underlying growth assumption is statistically consistent with the data for surface access and car parking. A similar result is observed for service revenue (excluding surface access), where HAL's proposed 1 per cent management stretch is not rejected across all specifications.

For property revenue, the evidence is mixed: HAL's proposal is rejected in only one specification, and we therefore place limited weight on this result. We also found a negative trend in our econometric regression. On this basis, we propose no management stretch for property revenue.

For track access revenue and Heathrow Express revenue, HAL's proposed assumption of no management stretch is not rejected in any specification, suggesting that the data are consistent with no underlying growth once scale effects are removed.

# Appendix 6: Regulatory Precedents on Frontier Shift

**Table A6.0.1: Regulatory precedents on frontier shift (%)**

Regulator	Price review	Determination date	Sector	Years covered	Opex	Capex
<b>Ofwat</b>	CMA PR24 provisional redetermination	October 2025	Water	2025-2030	0.7	
	PR24	December 2024	Water	2025-2030	1.0	
	CMA PR19 redetermination	March 2021	Water	2020-2025	1.0	
	PR19	December 2019	Water	2020-2025	1.1	
<b>Ofgem</b>	RIIO-3 draft determination	July 2025	Electricity and gas transmission and gas distribution	2026-2031	1.0	
	RIIO – ED2	November 2022	Electricity distribution	2023-2028	1.0	1.0
	CMA RIIO – GD2/T2 redetermination	October 2021	Electricity and gas transmission and gas distribution	2021-2026	1.05	0.95
	RIIO – GD2/T2	December 2020	Electricity and gas transmission and gas distribution	2021-2026	1.25	1.15
	RIIO – ED1	November 2014	Electricity distribution	2015-2023	1.0	0.7 to 1.0
	RIIO – GD1/T1	December 2012	Electricity and gas transmission and gas distribution	2013-2021	1.0	0.7
	<b>CAA</b>	CAA H7	March 2023	Aviation	2022-2026 2014-2019	1.0
CAA H6		October 2013	Aviation	(with extension)	1.0	-
<b>Northern Ireland Utility Regulator</b>	NIE RP7	October 2024	Electricity distribution and transmission	2025-2031	1.0	1.0
	NI GD23	October 2022	Gas distribution	2023-2028	1.0	1.0
	NI GT22	March 2022	Gas transmission	2023-2028	0.8	0.8
	NIW PC21	May 2021	Water	2021-2027	0.8	0.6
	NIE RP6	June 2017	Electricity distribution and transmission	2017-2024	1.0	1.0
	NI GT17	August 2017	Gas transmission	2017-2022	1.0	1.0
	NI GD17	September 2016	Gas distribution	2017-2023	1.0	1.0
NIW PC15	April 2014	Water	2015-2021	0.9	0.6	