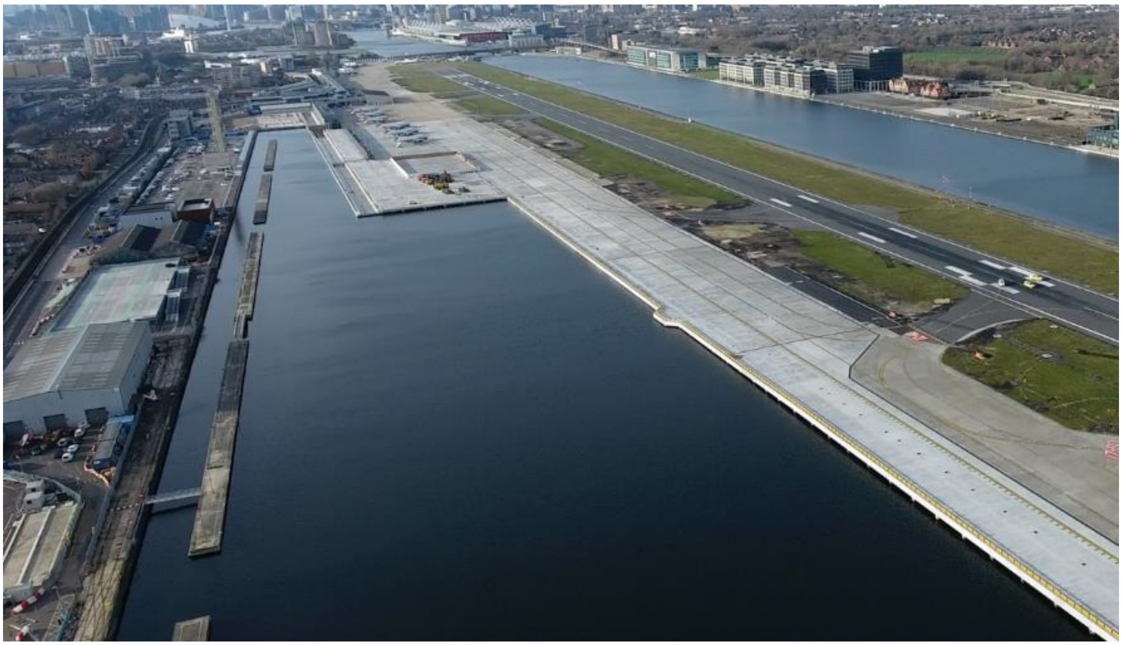
Chris Smith Aviation Consultancy Limited



London City Airport: Review of Need Statement

London Borough of Newham

June 2023

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1 Introduction

Purpose

1.1 CSACL was asked to advise the London Borough of Newham (LBN) on the air transport issues associated with the S73 Planning Application lodged by London City Airport Ltd. (LCY[1]) to vary some of the conditions associated with the 2016 approval of its Development Plan.

1.2 This report is a review of the Need Statement (NS) produced by York Aviation Limited, consultants for LCY, and published in December 2022.

Background

1.3 CSACL has assisted LBN on air transport matters in the past. It advised on the initial City Airport Development Plan (CADP) in 2015: this was subsequently approved by the Council. However, when the Council's decision was overruled by the then London Mayor, Boris Johnson, CSACL appeared at the Public Inquiry in 2016 as one of LBN's witnesses. More recently in 2019, CSACL advised on LCY's Draft Master Plan.

Scope of this Report

1.4 This Report is based on the Need Statement only, and no other documents submitted in conjunction with the S73 Application have been reviewed.

1.5 Government Airports Policy, recent traffic development, and airline efficiency issues have been considered. In relation to traffic forecasts, the focus of CSACL's work has been on LCY's core Development Case only, and no consideration has been given to the 'Do Minimum' Case. Primary attention has been centred on passenger traffic. Airport capacity issues have also been considered.

1.6 No assessment has been made of York's projections on economic impact.

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1.7 Following an Executive Summary (Chapter 2), a more detailed analysis of the Need Case is presented as Chapter 3.

[1] LCY is used to refer to both the company owning and operating the airport, as well as to it as a physical entity, the context generally permitting understanding of which is being referred to.

2 Summary

Airports Policy Context

2.1 LCY's application is not inconsistent with Government's Airports Policy although this policy does give the right to Local Authorities to decline planning permission *inter alia* for environmental reasons, albeit that carbon emissions may not be a reason for refusal as this is a central Government matter.

Traffic Development since 2016

2.2 Prior to the Covid-19 Pandemic, LCY's passenger growth had been ahead of that forecast in 2015/16 at the time of the CADP Public Inquiry. Commercial aircraft movements had though been significantly lower than York predicted, with a materially underestimated rate of increase in average numbers of passengers per Air Transport Movement (ATM). This had been expected by CSACL and was one of the reasons for the introduction of an annual cap on passenger numbers of 6.5 million passengers per annum (mppa).

2.3 The Pandemic led to a great reduction in passenger numbers at all airports, and LCY suffered particularly. LCY has been the slowest of the major London airports to recover the peak numbers of 2019, with LCY's 2022 total reaching only 59% of 2019 levels: this compares to an average of 75% for the other four airports.

Airline Efficiency

2.4 The rationale set out in the Need Statement for the improvements in airline efficiency that should lead from the proposed extension of opening hours is valid, although the importance of Positioning Flights is over-stressed as LCY has a lower proportion of such operations than three of the other major London airports.

2.5 It is important to note that the rationale outlined is exactly the same as might be used for any future application to extend further the opening hours later into Saturday evening, or opening on Sunday morning, or more generally stretching allowed operations into earlier and later hours on other days of the week.

2.6 If growth were slower than predicted by LCY, airline efficiency considerations would result in aircraft operations still expanding into the additional operating hours sought in this application.

Traffic Forecasts

2.7 York's approach to forecasting demand is unchanged from previous exercises and is consistent with the Department for Transport's (DfT's) High Ambition passenger growth scenario published in March 2022, utilising many of the assumptions (or updated versions) and derived relationships (elasticies) of those forecasts. Although not ideal, York's approach is the most appropriate method to apply to LCY given its particular circumstances. York has reviewed its many assumptions.

2.8 CSACL's assessment is that it is likely that:

- The DfT's March 2022 forecasts are optimistic for a number of reasons; for example, GDP assumptions pre-date the Russian invasion of Ukraine[2];

- York's Development Case passenger forecasts are similarly optimistic: but

- At some point in the future, 9 mppa could be attracted to LCY.

2.9 York's forecasts do include some increase in the numbers of passengers per ATM, although at about half the historic rate. However, overall this is reasonable.

Demand:Capacity Balance in the London Area

2.10 There is likely to be sufficient airport capacity in the London Airport system to enable all overall air passenger demand in the region to be handled without relaxation of the current conditions of LCY's throughput.

2.11 Demand which is not handled through LCY on its relatively low capacity aircraft could be handled at other airports, and this would result in a materially lower volume of CO_2 emissions associated with the travel of those passengers.

LCY Capacity

2.12 Few if any physical changes at LCY are proposed as a consequence of both the proposed longer operating hours of the airport and changes in the pattern of demand. This position seems reasonable. In view of the current cap on passengers at 6.5 mppa, the capacity of the terminal building was not critically reviewed during the CADP process in 2015/16. At the time, CSACL concluded that it was not possible to determine whether the size of the terminal expansion was either adequate or excessive.

[2] More recent DfT forecasts produced in March 2023 are lower although long term GDP assumptions continue to pre-date the war in Ukraine;

CSACL

3 Assessment

Introduction

3.1 This chapter provides an analysis of a number of aspects of the Need Case prepared by York.

Policy

3.2 Section 2 of the Need Case seeks to demonstrate that the proposed amendments are in line with Government policy. The basic principle cited by York is "*…making better use of existing runway capacity…*", this phrase coming from the Government's Aviation Policy Framework (APF), published in 2013[3]. This fundamental is repeated in subsequent Government Policy documents, although often one of the three words in the phrase 'existing runway capacity' is dropped. This is potentially important since the four phrases can have subtly different meanings[4]. 'Better' is generally also replaced by 'best'. The APF does caveat this policy as being dependent on the benefits of growth being balanced against the costs of airport development, "*…particularly its contributions to climate change and noise…*".

3.3 A subsequent Government document, the Airports National Policy Statement (ANPS) published in June 2018, made clear that airport development proposals "*…should be judged on their individual merits by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts…*"[5].

3.4 York does note, however, that the ANPS states that "*…Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets…*"

3.5 Since there might currently only be two airport developments in the UK that might approach such a threshold, this means that LBN would need to find other reasons to refuse the application. Although the wording above does not appear to preclude carbon emissions from being an additional reason for refusing the application, the accompanying Making Best Use policy (MBU) makes clear that carbon emissions should be considered at a national level.

3.6 Although York does note the Government's Jet Zero Strategy published in July 2022, it makes limited mention of the 6th Carbon Budget, and no mentions of the associated report of the Climate Change Committee (CCC) published in December 2020, or of the annual report by the CCC as the Government's advisor on climate change presented to Parliament in June 2022, the month before the Jet Zero Strategy was published.

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[3] Department for Transport, Aviation Policy Framework, 2013

[4] Viz 'existing runway capacity' (meaning well specified), 'runway capacity' (capacity measured at what time?), 'existing runway' (capacity not necessarily fixed), and 'existing capacity' (capacity not limited to runway)

[5] Airports National Policy Statement, Department for Transport, June 2018, para. 1.39.

3.7 One of the recommendations of the CCC in its 6th Carbon Budget Report was that there should be no net expansion of airport capacity in the UK as one mechanism for managing down demand for air travel[6]. This and other demand management measures resulted from the CCC's assessment that reductions of aviation emissions in various ways and off-setting of remaining emissions in other sectors and by other means would be insufficient to allow the aviation sector to reach Net Zero by 2050 unless growth was held down. The CCC was obviously also aware of the contents of the forthcoming Jet Zero Strategy, as it was critical in its report to Parliament on the lack of progress on (and inclusion of) demand management measures.

3.8 York does note (Page 20, Para 2.39) that the Government's Jet Zero modelling sets out LCY's capacity as 151,000 annual aircraft movements and up to 11 mppa. The source document[7] notes that (a) *"…the capacity assumptions…do not pre-judge the outcome of future planning applications…"* (DfT Para 3.17); and (b) *"…modelling scenario is not…a prediction of what the Department of Transport thinks will happen…but acts as a reasonable upper bound of possible future airport capacity levels…"* (DfT Para 3.19).

3.9 Despite naming its reference scenario for aviation growth 'High Ambition' (with all the implications that such a name has for expectations of success), the Government's Jet Zero Strategy has eschewed any 'safety net' in the form of demand management provisions.

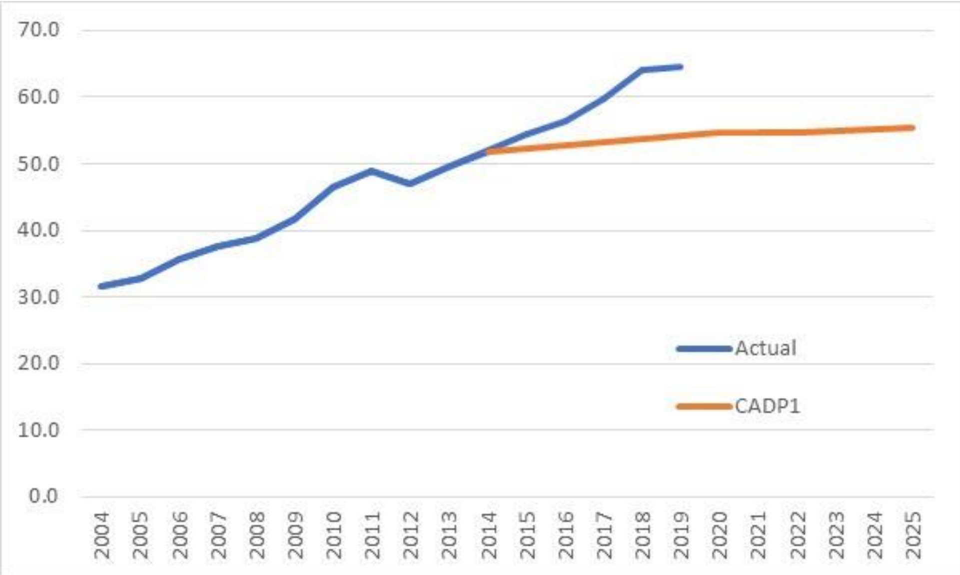
LCY Recent Performance

3.10 Section 3 of the Need Statement considers LCY's current market performance, and seeks to explain the over-forecasting of commercial aircraft movements during the CADP1 application in 2014/16. This is to lay the foundation for raising the passenger cap in the current application by taking advantage of the annual limit of 111,000 aircraft movements that would not otherwise be reached.

3.11 The forecasts presented by York during the CADP process were a material underestimate of the growth in passengers per Air Transport Movement (ATM)[8]. Indeed, the forecasts implied that the number of passengers per ATM would grow very slowly during the forecast period from 2015 to 2025 (0.6% per annum on average), despite the strong long term growth in this parameter between 2004 and 2015, averaging 5.1% per annum. It was clear at the time that the York forecast was not credible. It is particularly important to recognise that the divergence between forecast and actual outturn began immediately, since it is in the short term that 'bottom-up' forecasting should be at its most reliable.

[6] The CCC's recommendation was not applied by the Inspectors to a Public Inquiry into the expansion of Bristol Airport held in 2021, and this decision was announced in February 2022, before the publication of the Government's Jet Zero Strategy.
[7] DfT Jet Zero Modelling Framework.
[8] For LCY, the term 'ATM' is used to exclude movements using the Jet Centre.

Figure 3.1: Development of Passengers per ATM at LCY



Source: CSACL analysis of CAA data and CADP forecasts

3.12 Another consequence of the under-forecasting during the CADP1 process is that the agreement made then on an annual passenger cap (at 6.5 mppa) obviated the need to examine critically the proposed (and then approved) expansion of the terminal facilities. In this way, the current terminal may well be able to handle a higher volume of annual passengers, with its annual capacity being further boosted by the additional opening hours requested in this application.

3.13 Of the five major airports in the London area, LCY has been the slowest to recover previous traffic peak levels seen in 2019, and has lagged by some margin.

Table 3.1: London Airports' Recovery from Pandemic

Airport	Annual Passengers (mppa)		2022 as % of 2019	Last 12 Months* as % of 2019
	2019	2022		
London City	5.1	3.0	59%	62%
Heathrow	80.9	61.6	76%	80%
Gatwick	46.6	32.8	70%	73%
Stansted	28.1	23.3	83%	87%
London Luton	18.2	13.3	73%	76%
Total (exc. LCY)	173.8	131.0	75%	79%

* To end January 2023

Source: CSACL analysis of CAA airport data (Table 9)

Operators' Efficiency Improvement

3.14 Section 4 of the Need Statement outlines the benefits of greater operational efficiency for airlines which the proposed amendments would offer. The fundamental point here is allowing airlines with aircraft based at LCY to generate more flying hours (viz. production) from these assets, although the point is also made that non-based airlines could improve the quality of their network offer through LCY.

3.15 It is self-evident that the more hours for which an airport is open, then the greater the opportunity provided to the airlines using that airport to maximise the hours flown by their aircraft. Exactly the same points could be made at some point in the future to increase the opening hours of LCY still further, and the first draft of any future application could start from the existing Need document and simply replace 'Saturday (afternoon)' with 'Sunday (morning)'. CSACL's examination of LCY's Draft Master Plan in 2019 concluded that such extension of operating hours would probably be required to allow LCY to handle 151,000 aircraft movements and 11 million passengers (and potentially more) each year.

3.16 York indicates that under current constraints, airlines with aircraft based at LCY and wishing to use them over the weekend closure period, need to position them at other airports and this may mean flying them empty (thereby not generating any revenue). Such operations are termed 'positioning' flights. In 2019, LCY in fact had a far lower proportion of positioning flights than three other major airports in the London area: in June 2019 (the month selected by York to illustrate this issue) the position was also similar.

Table 3.2: Positioning Flights at London Airports, 2019

Airport	Annual Movements		Positioning Flights as % of Air Transport Movements
	Air Transport Movements*	Positioning Flights	
London City	79,351	450	0.6%
Heathrow	475,859	1,343	0.3%
Gatwick	280,681	3,457	1.2%
Stansted	183,090	5,134	2.8%
Luton	112,209	1,276	1.1%

* Excludes Air Taxi operations

Source: CSACL analysis of CAA airport data, Table 3.1

3.17 It is unclear how the proposed opening of LCY on Saturday afternoon for just six extra hours[9] would impact the use of based aircraft on a Sunday morning: the operators could continue to position an aircraft away from LCY in the early evening of Saturday, or choose to forgo 18 hours utilisation by keeping it at LCY. In due course, it would be reasonable to expect there to be calls to put-back the revised Saturday closure time until later in the evening, and/or to remove the prohibition of flights on Sunday morning.

3.18 If passenger growth were to be lower than forecast by York in its central scenario, aircraft operations would nonetheless still expand into Saturday afternoon and take advantage of the higher number of movements requested in other hours. This follows from these considerations of airline efficiency as even with a lower passenger demand it is better to carry that demand with the smallest fleet possible, flying as many hours as possible.

[9] Seven hours for up to 12 arrivals during BST.

Demand Forecasts

3.19 In general terms, the approach to producing passenger and aircraft movement forecasts used by York is the same as in previous exercises, although there are changes at a more detailed level. This approach has previously been agreed by CSACL as being the most appropriate given the unusual circumstances of LCY even though it is far from being standard: it was not agreed though that the York approach was robust (Page 111, Para 2). It is important to recognise that despite being very detailed and requiring an extremely large number of judgements, these characteristics do not render it inherently more accurate than a more standard approach.

3.20 Indeed, comparisons of previous York forecasts with actual outturn have demonstrated the weaknesses of the approach. The significant over-forecast of ATMs has been identified earlier (Paragraph 3.11 above), while the following table illustrates the differences in passenger forecasts on two major routes during the CADP process, one presented in the Original Need Statement (ONS) and the second in a later Updated Need Statement (UNS): such large differences on these major routes in forecasts published less than a year apart highlight the weaknesses of York's approach, albeit recognised as the most appropriate (or perhaps least inappropriate) approach available.

Table 3.3: Illustration of Weakness in York's CADP forecasts

Route	ONS		UNS	
	Frequency	Passengers	Frequency	Passengers
Dublin	7	222,849	14	493,200
Edinburgh	12	438,004	18	591,000

Source: CADP ONS and UNS Tables 3.12 and 3.12A

3.21 York has indicated that its passenger forecasts are prepared at an individual route level using an approach and assumptions consistent with the Department for Transport's (DfT's) national traffic forecasts, to forecast demand in the London boroughs considered by York to constitute LCY's core catchment area. This is done on a yearly basis, and if the proportion of demand from this core area that might be captured by LCY is considered viable for an operation from LCY, that demand is included in LCY's forecast numbers (subject to there being aircraft and airport capacity available).

3.22 The starting point for York's current forecasts are assumptions which feed the forecasts prepared by the DfT as the basis for its Jet Zero Strategy consultation in 2022, except when more recent assumptions from the same (or comparable) sources are available. It should be noted that the 2022 DfT forecast publication is materially less detailed than previous forecasts, making assessment and analyses more complex/cumbersome and sometimes less accurate.

3.23 At the time of production of York's forecasts, the most recent DfT forecasts were those published in March 2022. These used a model that has been developed over a very long period by the Department. The previous DfT forecasts were published in 2017, and since then the model has had a 'normal' re-calibration of relationships between the drivers of growth (such as GDP and price changes) and the expected numbers of passengers, as well as a potentially more significant change in the segmentation of passenger demand: to refine the relationships between demand drivers and forecast passengers, the model has traditionally segmented demand between journey purpose (viz. business or leisure), residency (viz. UK or foreign), and domestic or international, with international being further sub-divided into four distinct geographic regions.

3.24 In the 2017 forecasts, there were 19 demand segments in total: two domestic (split by journey purpose), 16 international, with the four regions further divided by both residency and journey purpose, and a final category for those passengers connecting between two international flights at a UK airport. The 2022 forecasts also had 19 categories, but the international regions were different, with 2017's 'Western Europe' being divided into two parts (Southern Europe (SE) and the Rest (RoE)), since in 2017 the Europe region had accounted for 79% of the total international demand. For the 2022 forecasts, these two new categories represent approximately 36% and 42% of international demand respectively[10]. To accommodate this division in 2022 the two smallest regions in 2017 (Newly industrialised Countries (NIC) and Less Developed Countries (LDC) and accounting for just 11% in total) were consolidated into a single Rest of World (RoW) region. The fourth region, other OECD countries (10%), remains.

3.25 The revised model does though produce an interesting forecast. Despite the impact of the Covid-19 Pandemic, the 2022 forecast for UK passenger traffic in 2050 is virtually unchanged from that of the 2017 forecast at some 495 million passengers per annum (mppa), notwithstanding that an important driver of future demand, namely UK GDP growth, has been revised significantly downwards between the two forecasting exercises.

Table 3.4: Comparison of the DfT Air Passenger Forecasts, 2017 and 2022

Passengers	2017 Forecasts	2022 Forecasts
Passengers in 2025 (mppa)	325 mppa	322 mppa
UK GDP Growth, 2025-2050	+2.2% pa	+1.6% pa
Passengers in 2050 (mppa)	494 mppa	493 mppa

Source: DfT Forecasts

3.26 The comparison above is between the 2017 Central Unconstrained scenario and the 2022 'Continuation of Current Trends' (or Base) scenario, before Climate Change actions are factored into the calculations. York has stated that it has based its forecasts on a different 2022 scenario which takes account of some further changes made in response to Climate Change considerations. However, the 2050 forecast for this scenario (High Ambition) is only slightly lower than the base 'Continuation of Current Trends', at 482 mppa (vs 493 mppa).

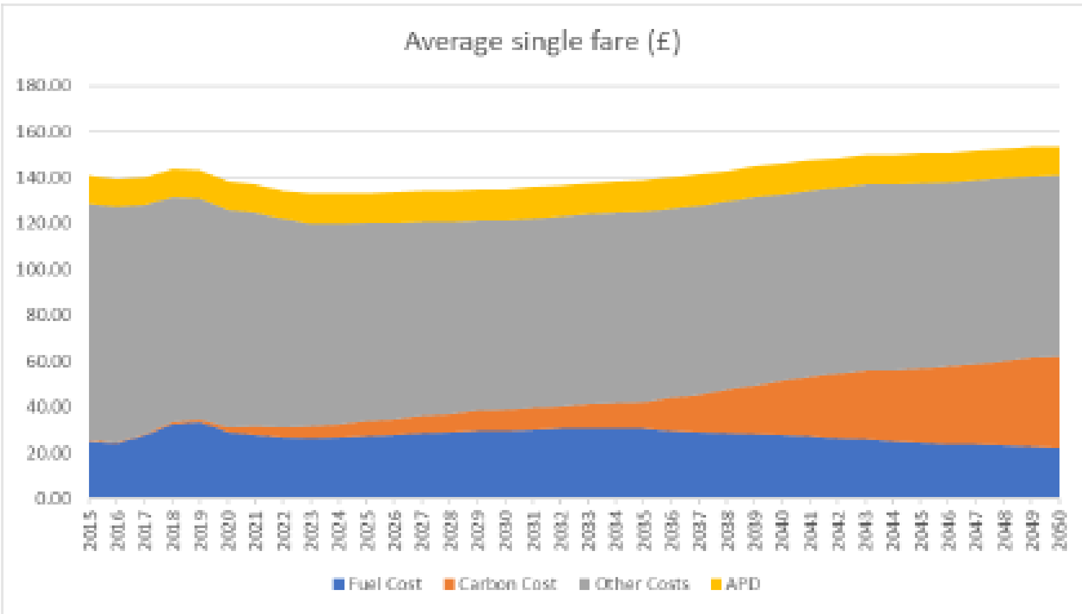
[10] Estimated by CSACL from CAA Airport Statistics as 2022 DfT forecasts contained considerably less detailed content than have its previous forecasts.

3.27 Very detailed examination of the changes made to the DfT's model leads to the conclusion that division of the European market into two components has probably off-set the effects of the lower UK GDP forecast.

3.28 The long-term UK GDP forecast (for 2025-2050) used by the DfT was made by the Office for Budget Responsibility (OBR), but in March 2020, a full two years before the forecasts it fed were published. In the three years since those OBR forecasts were produced, the World saw in addition to the stresses of the Pandemic (and those of the subsequent recovery), the Russian invasion of Ukraine with all the economic consequences that that has led to, including in the UK to a high inflation rate and a cost-of-living crisis.

3.29 The DfT 2022 forecasts indicate that assumptions about changes in air fares have been made for each of the four geographic regions, but no data is provided about the assumptions. The only clue to developments is given in a diagram in the document (reproduced below) from which it may be estimated that air fares have been assumed to increase by 0.6% per annum between 2025 and 2050. (This diagram is an amalgam of the assumptions for the four individual regions.) This is slightly higher than the 2017 assumption of a 0.5% per annum increase over the same period.

Figure 3.2: DfT 2022 Future Air Fare Assumptions



Source: DfT Jet Zero: Modelling Framework, Page 19, Figure 6

3.30 As the accompanying text points out the largest single element of the air fare is 'other costs' which the DfT did not separately re-assess in 2022, even though it was estimated in 2017 to represent 70% of costs at the beginning of the period and still more than 50% by 2050. The chart above does show that the DfT has assumed a decrease in cost components and air fares from 2019 levels until perhaps 2024, before a combined rise in fuel and carbon costs starts.

3.31 Neither DfT forecast makes clear how differences in the price of Jet A1 Kerosene (the traditional fuel) and Sustainable Aviation Fuel (SAF) are treated within its models. The DfT has though indicated to CSACL[11] that SAF costs are not explicitly included in the air fare assumptions and that implicitly any additional costs are assumed to be absorbed by the airlines rather being passed on in air fares. Such an approach is consistent with assuming that any additional costs in using SAF are off-set by avoiding having to buy carbon allowances.

3.32 While Kerosene is a product of 'cracking' crude oil, SAF may be manufactured in one of several ways by effectively 're-cycling' other sources of carbon from a range of feedstocks, used cooking oil being much the most frequently cited. The great advantage of SAF is that it has many of the characteristics of Kerosene (but much lower levels of emissions[12]) and may be used in existing aero-engines and airport ground infrastructure. SAF represents the cornerstone of short- and medium-term efforts of the aviation industry to reach Net Zero: for example, the UK Government's Jet Zero Strategy is based on a 10% replacement of Kerosene with SAF by 2030, and a 50% replacement by 2050.

3.33 The major disadvantage of SAF is its cost. The Royal Society recently published a paper on SAF and included an assessment of its cost of production by various processes, summarised in Table 3.5 below. The current minimum fuel selling prices include the costs of both the feedstock used and the energy needed in the process. The Royal Society recognised that these costs would change drastically with time: *"…on the one hand, new technologies and economies of scale could reduce costs, while on the other hand, resource limitations could make some processes more costly than at present…"*.

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[11] A Freedom of Information request was lodged with the DfT on 9 March 2023 to gain more clarity on this point.

[12] While its combustion still produces similar amounts of Carbon Dioxide as Kerosene, since this CO_2 had been previously released but then re-captured, climate scientists, policy makers and governments have approved SAF's use as a low/zero emissions fuel.

Table 3.5: Cost Estimates for Sustainable Aviation Fuels (GBP per GigaJoule)

Fuel Type /Production	Cost (GBP per GJ) Low	Central	High	Multiple	Feedstocks/Comments
HEFA/HVO	19	28	40.5	2.0	Soy oil, Palm oil, PFAD, Used cooking oil
Gasification/FT	22.5	36	47	2.5	MSW, Agricultural residues, Energy crops
Pyrolysis	25	36	48	2.5	
ATJ	20.5	43	66	3.0	Corn grain, Sugar grain, Agricultural residues, Energy crops
Catalytic hydrothermolysis	14	23	34	1.6	
Hydrothermal liquifaction	22	46	76	3.2	
Power to liquid and FT	72.5	84	94.5	5.9	
Green Hydrogen	32.5	38	41.5	2.7	
Renewable Ammonia	32	47.5	62	3.3	
Jet A1 Kerosene	13.5	14.2	25		Actuals for June 2021, March 2023 and June 2022 respectively
Brent Crude	75	79	120		US$ per barrel

Note: Multiple is of Central Cost estimate in relation to March 2023 price for Brent Crude

Source: CSACL extraction from Figure 6, Royal Society Policy Briefing Net Zero Aviation Fuels, February 2023

3.34 It may be seen that on a per unit of energy basis, the alternative fuel options are multiples of the cost of Kerosene. This range is in line with that given by the DfT in a recent consultation document[13]: *"…SAF will be around 2-5 times the cost of kerosene (without a carbon price) in 2025, falling to 1.2-2.8 times the cost by 2040…",* albeit these multiples were based on a price per tonne comparison (rather than the more appropriate price per unit of energy comparison used by the Royal Society).

3.35 An illustration of the effect that higher SAF prices might have on the average overall air fare (viz. across all regions) may be gained by combining the Jet Zero assumptions on SAF targets in 2030 with the DfT's other air fare assumptions, as detailed in its 2017 forecasts, adjusted for its 2022 assumptions on Oil and Carbon prices. A 2030 SAF target of 10% is assumed and combined with a SAF:Kerosene price multiple of 2 which is the estimate for SAF from used cooking oil, although at least one UK airline is basing its SAF strategy on Municipal Solid Waste (MSW) with a multiple of 2.5. Current DfT practice is to assume a 100% carbon emissions saving when SAF is used, although it is possible that this might be lowered to 70%. Holding all other fare elements the same between with and without SAF cases, suggests that air fares to 2030 from 2024 would be 0.24 percentage points higher in the with SAF case. With

[13] DfT uk-sustainable-aviation-fuel-mandate-consultation-stage-cost-benefit-analysis (March 2023), Paragraph 2.19

a price elasticity of -0.9[14], this translates to a reduction in passenger growth of 0.2 percentage points per annum over the period. As the DfT forecast growth in its primary scenario over the period is only 1.6% per annum (driven as well by economic factors), this would be a material reduction.

Table 3.6: Illustration of Consideration of SAF Price on Air Fares (£ per Passenger)

Year	Fuel	Carbon	Other	APD	Total
		With 2017 Assumptions			
2023	26.2	5.0	76.3	10.8	118.3
2030	30.9	13.3	73.0	10.8	128.0
		Adjusted for 2022 Fuel and Carbon, No SAF			
2023	27.5	4.4	76.3	10.8	119.0
2030	30.5	8.5	73.0	10.8	122.8
Annual increase in Air Fare 2023-2030					0.44% pa
Change in Passengers 2023-2030					-0.40% pa
		With 10% SAF in 2030			
2023	27.5	4.4	76.3	10.8	119.0
2030	33.6	7.6	73.0	10.8	125.0
Annual increase in Air Fare 2023-2030					0.70% pa
Change in Passengers 2023-2030					-0.63% pa

Note: Decimal places shown to facilitate understanding and not to imply accuracy
Source: DfT 2017 Forecasts (Table 54) and CSACL analysis

3.36 While SAF, the cost of carbon and their modelling are areas of considerable uncertainty, this exercise using a low SAF:Kerosene price multiple suggests that there may be inconsistencies between the explicit carbon input assumptions currently used and current estimates of the cost of SAF.

3.37 It should be noted that the DfT's Jet Zero Strategy based on a 50% use of SAF in 2050 assumes *"…it is also likely that power-to-liquid SAF would need to be deployed at scale…"*[15] because of feedstock constraints applying to other production channels. This SAF has the highest multiple of price above Kerosene prices of all the potential production pathways in Table 3.5 of 5.9 times.

3.38 York has indicated to CSACL that it has not received any unpublished material relating to the Jet Zero forecasts from the DfT, although it has had discussions with DfT economists to ensure the correct interpretation of analyses and assumptions.

York's Input Assumptions

3.39 All air passenger forecasts are based on a large number of input assumptions. Table 3.7 below summaries the sources used by York, as well as the year in which these assumptions were produced.

[14] DfT Jet Zero Modelling Framework, 2022, Annex A
[15] DfT Jet Zero Strategy Analytical Annex (Illustrative scenarios and sensitivities) July 2022, Paragraph 3.3

Table 3.7: Sources of Assumptions used by York

Assumption	Primary Source	Source Date	Used by DfT
Economic Drivers			
UK GDP to 2026	OBR	March 2022	No, uses Oct 2021
UK GDP from 2026	OBR	July 2020	No, uses March 2020
South Europe GDP	OECD	Oct 2021	No. IMF (April 2021) to 2026
Rest of Europe GDP	OECD	Oct 2021	OECD (July 2018) from 2026
Price Drivers			
Oil Price	Modified BEIS to reflect high oil		BEIS Feb 2020
ETS Carbon Cost	BEIS (via DfT)	March 2022	Yes
CORSIA Carbon Cost	BEIS (via DfT)	March 2022	Yes
Fuel Burn	DfT 2017	October 2017	Yes
Fuel Efficiency	DfT Consultants	March 2022	Yes, in High Ambition
Non-Fuel Costs	DfT 2017	October 2017	Yes
Air Passenger Duty	HMRC (via DfT)	March 2022	Yes
Elasticities	DfT	March 2022	Yes
Monte Carlo Probabilities	York	2023	N/A

Source: CSACL summary of cited sources

3.40 It may be seen that York has used more recent forecasts of the main economic variables than did the DfT, although the sources still largely pre-date the Russian invasion of Ukraine. The situation for the price-related variables is more complicated, however. York adopts Government forecasts for both Air Passenger Duty and the two Carbon costs, these being for the purchases which airlines must make to acquire allowances to emit Carbon Dioxide. York's oil price assumptions are derived from the BEIS (Department for Business, Energy & Industrial Strategy) 2019 forecasts, published in February 2020. In order to reflect the high oil price in 2022, York adopted the BEIS High forecast for that year for both its Central and Low scenarios, and then assumed that in these two scenarios the oil price would migrate over the following six years to the BEIS forecasts for 2028. This is a reasonable approach to developing oil price assumptions.

3.41 Fuel efficiency assumptions are those which form the basis of the Jet Zero strategy preferred High Ambition scenario, which the DfT's consultants advising on this aspect categorised as 'optimistic': its central forecasts were included in the 'Continuation of Current Trends' scenario. Fuel burn assumptions come from DfT's 2017 forecasts, as do Non-fuel (i.e. Other) costs.

3.42 It is not obvious that the assumptions incorporate any other potential cost changes including:

- Higher staff costs which airlines, airports and support service providers are having to pay in the UK in the face of staff shortages after the Pandemic;

- The need for all private sector companies involved in the air transport sector to re-build their balance sheets, service loans and recommence dividend payments to shareholders after the ravages of the Pandemic; and

- Although the March 2023 Budget limited increases in APD to below-inflationary levels, the likelihood is that Government will soon need to strengthen the country's finances, and that real-term increases to Air Passenger Duty levels will be seen as an easy target, with or without a green spin: air travel is largely a discretionary activity undertaken by those not struggling with paying for essentials.

3.43 Whether or not these considerations are incorporated into the next set of DfT forecasts, some or all of them could become reality, and would lower demand below current predictions.

3.44 The regression analyses of the DfT 2022 forecasts and on which the elasticities are based (which are also used by York) have been undertaken on data for a period before the Covid-19 Pandemic. During the Pandemic teleconferencing became much more widely practiced. When linked with organisations' growing awareness of Climate Change, their own 'green footprint' and also of their cost bases, some diminution of business travel seems likely, at least when in relation to internal company business: flying for internal meetings, training etc has in the past accounted for some 30% of business travel at UK airports.

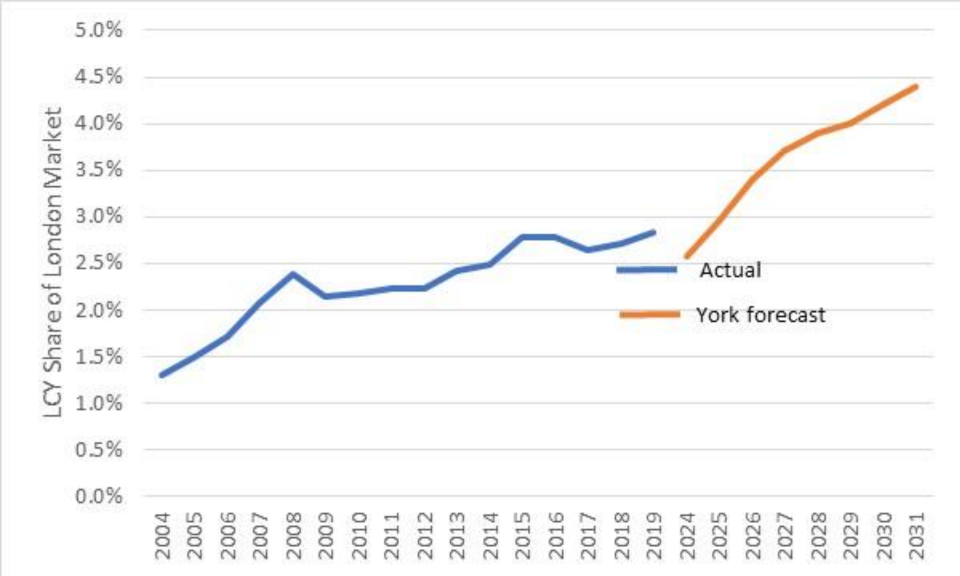
3.45 A further factor that might dampen demand for air travel is Brexit, and this only came into force in January 2020, with the transition period extending to the end of that year.

3.46 When these several factors are considered alongside more recent economic projections which for the UK are likely to be lower than those forecast between July 2020 and March 2022 given the global issues which have emerged in recent times, future forecasts are likely to be lower. Indeed, passenger forecasts published in March 2023 by the DfT were lower than those it published in 2022, despite still being based on long term GDP assumptions which pre-date the Russian invasion of Ukraine.

3.47 It has not been possible to construct a complete audit trail of York's work. As one illustration of this, Table D.6 (Page 118) gives annual growth rates by passenger segment to 2035. Normally, these growth rates would be the result of multiplying an explanatory variable by the appropriate elasticity, for example the growth rate of UK Business Passengers to Rest of Europe is driven by a single variable (UK GDP growth), with an assumed GDP growth of 1.7% in 2026 (Table D.3) and an elasticity of 1.1 (Table D.2), the growth rate should be 1.87% (=1.7 x 1.1), but Table D.6 gives a rate of 1.3%. York has indicated that this is a consequence of the use of a Monte Carlo simulation.

3.48 York forecasts that passenger demand in the Development Case would reach 9 mppa in 2031. If this throughput were achieved it would result in LCY increasing further its share of the London air passenger market to 4.4% in 2031. This is based on the London airports themselves taking a 40% share of the total UK market as forecast in the DfT's March 2023 forecasts.

Figure 3.3: Predicted LCY Market Share of London Area

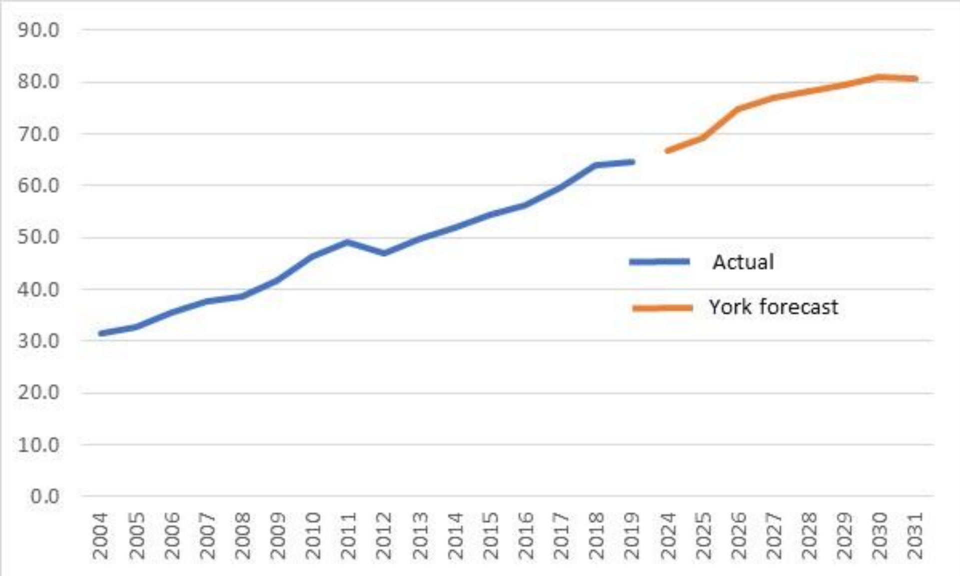


Source: CSACL derived from CAA Statistics and LCY Need Case

3.49 York has forecast that transportation of these passengers would need all allowed aircraft movements to carry them (i.e. there would be no movements through the Jet Centre). The ATM forecasts have been developed from the bottom-up forecasts and considerations of airline fleet re-equipment. These assumptions seem *prima facie* reasonable, with consistency between the annual forecasts, the Busy Day Time Table (BDTT) and the aircraft distribution in the 92 day forecasts.

3.50 The resulting increase in passengers per ATM within York's forecasts is more reasonable than previous forecasts, with an average growth of 2.8% per annum between 2024 and 2031. This is though significantly lower than the rate of 4.9% per annum between 2004 and 2019. In York's current forecasts, load factor increases to 75% by the end of the period, although there is a slight fall between 2030 and 2031.

Figure 3.4: Development of Passengers per ATM



Source: CSACL analysis of CAA statistics and York Development Case forecasts

3.51 York suggests at Page 121 (Paragraph 29) that '…*Heathrow, Gatwick and Luton will be essentially full again…*' (although no mention is made of either Stansted or Southend). While made in relation to an increase in LCY's share of the London market, the point is also pertinent to the policy of 'Making Best Use of Existing Runway Capacity'.

3.52 Examination of the Capacity:Demand balance in the London area suggests that there should be sufficient airport capacity available. Although government policy, a third runway at Heathrow is highly unlikely by 2030, although the airport's passenger handing capacity will continue to grow as a result of an increase in passengers per ATM. Similarly, an increase in capacity at Gatwick is likely for the same reason, while there are also stated intentions by the airport's owners to convert an existing taxiway into a dependent parallel runway. London Luton Airport is proposing to expand its capacity from 18 mppa to 32 mppa, while Stansted Airport was granted permission to expand to 43 mppa following a Public Inquiry in 2021. Southend showed in 2019 its ability to handle at least 2 mppa. Table 3.8 compares these capacities with London Area Demand, assuming that 60% of total UK demand is handled through these airports, and using the DfT's most recent March 2023 forecasts.

Table 3.8: Passenger Demand:Capacity Balance in the London Area, 2024 to 2031 (mppa)

	2025	2026	2027	2028	2029	2030	2031
Demand							
UK Total	304.3	312.9	319.1	324.3	329.1	340.2	341.0
London Area	182.6	187.8	191.4	194.6	197.5	204.1	204.6
Capacity							
Heathrow	82.2	83.0	83.8	84.7	85.5	86.4	87.2
Gatwick	48.6	49.4	50.1	50.6	51.1	51.6	52.2
Stansted	43	43	43	43	43	43	43
Luton	18	18	18	18	18	18	18
LCY	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Southend	2	2	2	2	2	2	2
Total	200.3	201.9	203.4	204.8	206.1	207.5	208.9
Balance	17.7	14.1	12.0	10.2	8.7	3.4	4.3

Note: Assumes a regional airport share of demand of 40%.

Source: CSACL analysis of DfT sustainable-aviation-fuel-mandate-dataset March-April 2023

3.53 It may be seen that there is sufficient airport capacity until 2031. This position could be strengthened further if either more capacity became available at the other London airports and/or total UK demand were to be lower than the current forecasts predict for the reasons given earlier.

3.54 Therefore, relaxation of the existing passenger cap at LCY would not be necessary to meet overall London area demand in the timescale considered as part of this application.

3.55 As the analysis summarised below strongly suggests a passenger travelling from LCY on an Embraer 190 would lead to a higher weight of CO_2 emissions than if they had used one of the other London airports. The illustration is based on a round trip to Palma Mallorca (a major holiday destination), using the largest airline at each of the four airports and flying a typical aircraft at a typical load factor for each carrier. It may be seen that the round-trip emissions from LCY would be almost twice as high than would have been the case had easyJet (Gatwick) or Ryanair (Stansted) been used.

Table 3.9: Comparison of CO_2 Emissions on Flights to Palma

Airport	Aircraft	Seats	Load Factor	Passengers	Round Trip Emissions (Tonnes CO_2)	CO_2 Emissions Kg per RT Passenger
LCY	E190	98	74.8%	73.3	23.5	320
Gatwick	A320	183	91.0%	166.9	29.6	177
Stansted	B737-800	189	96.0%	181.4	32.2	178
Heathrow	A321	185	79.5%	147.0	37.0	251

Source: CSACL analysis of CAA Airline data (Table 1.11.2) and EMEP EEA Air Pollutant Emission Inventory Guidebook 2019

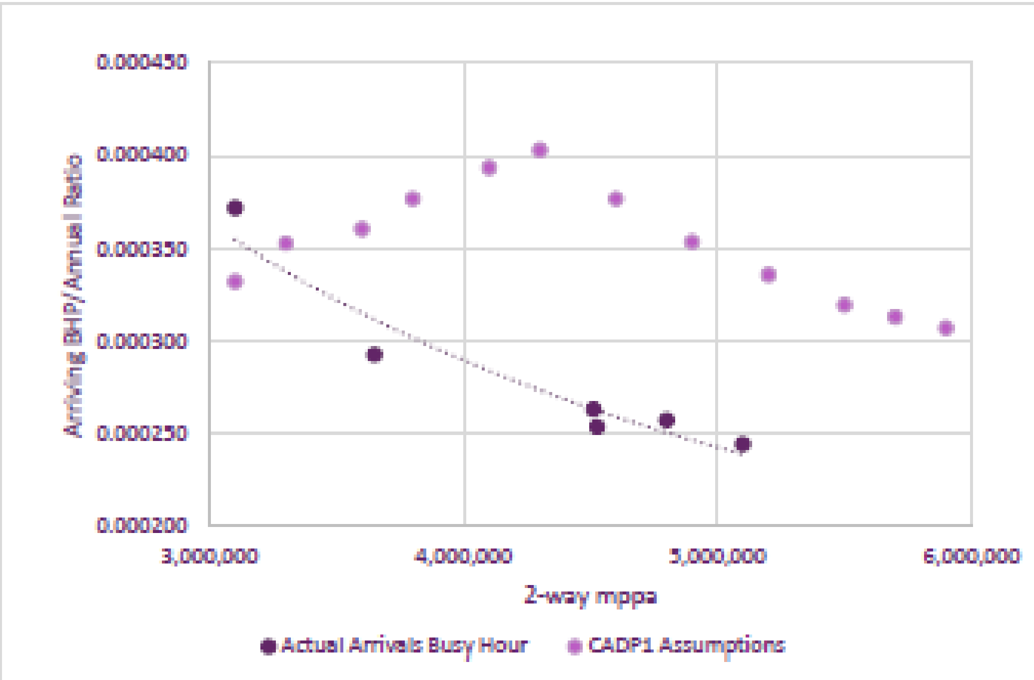
3.56 Return travel by rail of passengers from Central London to Gatwick or Stansted airports might add some 5 kilograms of CO_2 emissions per Round Trip passenger to the totals associated with flights from these airports, so that the emissions gap would remain large.

Capacity Assessment

3.57 Few if any physical changes at LCY are identified in the Planning Application as a consequence of both the proposed longer operating hours of the airport and changes in the pattern of demand. This position seems reasonable. In view of the agreement to cap passengers at 6.5 mppa, the capacity of the terminal building was not critically reviewed during the CADP process in 2015/16. At the time, CSACL concluded that it was not possible to determine whether the size of the terminal expansion was either adequate or excessive.

3.58 York's current capacity assessment is based primarily on its Busy Day Time Table, also used in its aircraft movement and fleet mix forecasts. While this BDTT does produce a reasonable increase in passengers per ATM, the application of busy day schedules to forecast busy hour passengers has previously produced over-estimates. This is clearly illustrated in Figure 7.2 of the Need Case (reproduced below for arriving passengers), which compares York's forecasts with actual 30th Busy Hour figures: the picture for Departure Busy Hours is very similar. Hence, the use of the BDTT for this purpose is far from fool-proof.

Figure 3.5: York CADP Forecasts vs Actual Busy Hour Arrival Figures



Source: LCY Need Statement, Figure 7.2

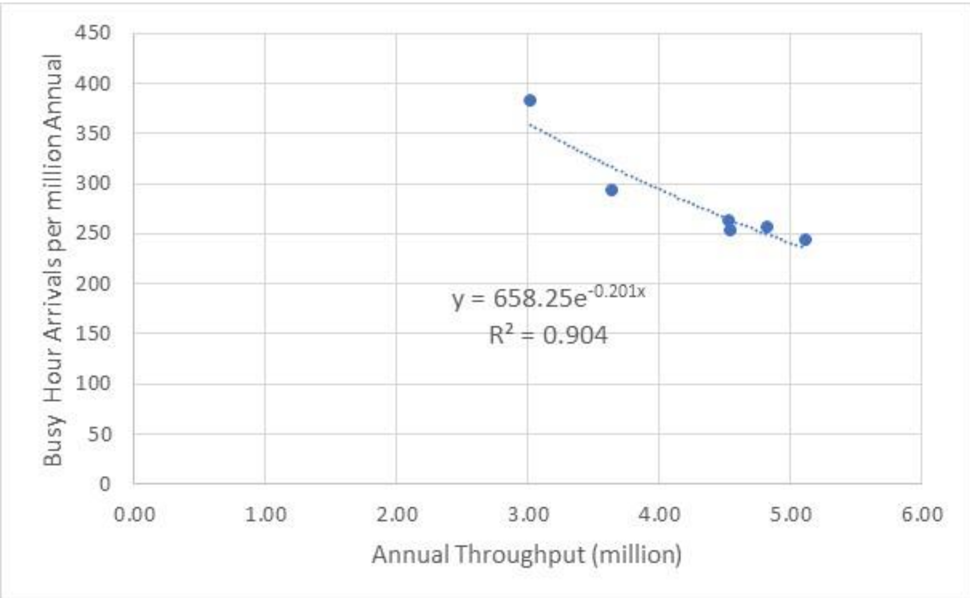
3.59 York has indicated that since the preparation of the forecasts for the CADP there has been a change in the pattern of traffic, which had exhibited an asymmetry between arrival and departure flows, with the former materially stronger in the morning period and the situation reversing in the afternoon/evening. There has also been more activity during the middle of the day, partly related to increased leisure flying. While it is reasonable to assume that the pattern of future demand will continue to be similar to that which existed immediately prior to the Pandemic, that cannot be guaranteed.

3.60 The Pandemic has also masked any effect that Brexit may have on the pattern of demand, and additionally has generated another potential impact on demand patterns in the form of a reduction in business flying, especially to attend internal company meetings etc..

3.61 The BDTT produces busy hours of 1,885 passengers for both arriving and departing passengers for a 9 mppa airport, with the busiest arrival hour on the schedule day starting at 8 am, and the departures hour 30 minutes later. The equality of the busy hours and the similarity of the times is of course a function of the assumed schedule with most aircraft on the ground for 30 minutes. It is a feature of this approach to determining busy hours and was observed in the original CADP forecasts in 2015/16.

3.62 An alternative approach is to extrapolate the trend in the development of observed Busy Hours, or rather the ratio of the Busy Hour to Annual throughput. York has provided actual 30th Busy Hour data for six previous years (and passenger throughputs) as shown above for Arrivals. Applying the best statistical trend line and extrapolating to an annual throughput of 9 mppa, allows estimates to be made of future Busy Hours (Figure 3.6).

Figure 3.6: 30th Arrival Busy Hour Trends



Source: CSACL analysis of LCY data

3.63 This approach suggests busy hours below those determined by the BDTT approach. If all six data pairs of actual 30th Busy Hours and annual throughputs are used, they are implausibly lower (Table 3.10). However, if the oldest data (for 2012) is excluded, the results become more plausible though are still materially lower than the BDTT approach.

Table 3.10: Projection of 30th Busy Hours with 9 mppa

Approach	Arrival Busy Hour	Departure Busy Hour
Schedule Analysis	1,885	1,885
Extrapolation		
6 data pairs	970 (R^2 = 0.90)	1,101 (R^2 = 0.95)
5 data pairs	1,362 (R^2 = 0.94)	1,310 (R^2 = 0.96)

Source: CSACL analysis

3.64 There is clearly no perfect approach even ignoring the need to factor in the relaxation of opening hours etc. sought in this application. Hence, for the purposes of impact assessment, the York projections provide a reasonable basis.

3.65 The BDTT may also be used to assess the additional pressure on the surface access that additional passengers might bring. There has been some updating of the time profiles relative to flight times for departing and arriving (air) passengers entering and leaving LCY by surface means, but the changes from the figures used to prepare the Draft Master Plan in 2019 appear very minor. The data presented in Appendix E of the Need Case is consistent with the BDTT.

3.66 As there are no proposed changes in runway movements, no investigation of either runway or stand capacity has been undertaken. It is noted though that since the CADP process, LCY has become the first UK airport to move from having a manned air traffic control tower to having remote resources controlling this activity supported by the use of TV cameras.