



**An tÚdarás Inniúil um
Thorann Aerárthaí**

**Aircraft Noise
Competent Authority**

Draft Regulatory Decision

Appendix G

Review of Applicant's Fleet and
Forecast Assumptions and Curfew Commentary



**Projections of Future Aircraft
Mix at Dublin Airport**
03 September 2021

**altitude
aviation
advisory**



Disclaimer

- This report contains the results of our analysis in relation to the future aircraft mix at Dublin Airport (the “Work”). It has been prepared for Noise Consultants Limited (the “Client”) in connection with the provision of aviation noise expert consultancy services for Fingal County Council (“the Project”) and for no other purpose.
- The contents of this report are private and confidential. It is for the Client’s exclusive use and is not to be relied on by or made available to any other party without our prior written consent.
- This report is not intended to be a comprehensive review of all potentially relevant issues relating to the Project. It is intended to draw attention to those issues which we, in our absolute discretion and in carrying out the Work, consider to be material in the context of the Project.
- We do not accept a duty of care to any person (including the Client) in respect of this report.

ALTITUDE AVIATION ADVISORY LIMITED

03 September 2021

We have developed forecasts of future aircraft mix, to provide a second opinion to the projections developed by the DAA's consultants.

Introduction

- The Aircraft Noise (Dublin Airport) Regulation Act 2019 designated Fingal County Council as the Competent Authority for the purposes of aircraft noise regulation at Dublin Airport. The Aircraft Noise Competent Authority (ANCA) has been established as a separate and independent Directorate within Fingal County Council.
- Altitude Aviation Advisory is supporting Noise Consultants Limited, which is providing the ANCA with an independent view of the possible future aircraft noise profiles at Dublin Airport.
- Altitude has produced detailed projections of the potential future aircraft mix at Dublin.
 - Annual projections 2020-27.
 - Further spot year 2037.
- The objective of this forecast is to provide a second opinion on the aircraft mix profile generated by the Dublin Airport Authority (“DAA”) and its consultants, Mott MacDonald.
- These projections have been provided in a spreadsheet form, and include:
 - Airline (top 10 airlines individually + other).
 - Aircraft type.
 - MTOW category.
- This document accompanies the spreadsheet output, and:
 - Shares some of the background analysis that informed the forecast.
 - Provides a summary of the detailed aircraft assumptions.
 - Gives an overview of the overall forecast results.
- Our work has drawn on publicly available subscription data sources, namely the CAPA Centre for Aviation fleet database and OAG passenger schedules. We have also reviewed investor relations material from key airlines, especially in relation to fleet planning.
 - We have not had access to detailed data on actual flight operations at Dublin (only planned schedules) and have not been able to consult directly with the DAA or airlines on their plans.
- There are some discrepancies between the 2019 and 2020 ATM values reported in the Mott MacDonald outputs compared with the schedule database.
 - The schedules database does not have complete coverage of passenger charter flights and very limited coverage of cargo flights.
 - Furthermore, the database only reflects planned schedules not the actual operations (e.g. cancellations due to aircraft technical issues will not be removed from the database).
- For airlines outside the top 10, we have used the schedule database to provide aircraft type detail.
 - This is likely to understate the noise footprint, as cargo aircraft (not shown in schedules database) are often older aircraft types.

Forecast Parameters

- We have not developed passenger forecasts for Dublin Airport.
 - Instead, **we have used the Mott MacDonald central unconstrained ATM forecast.**
 - Additionally, **we have adopted the Mott Macdonald 2019 ATM shares by airline,** reported for Aer Lingus, Ryanair and British Airways.
 - This allows some consistency of comparison between the two sets of projections.

Our ATM mix forecast is developed individually for the largest 10 airlines at Dublin... These projections draw on published information regarding fleet orders (typically covering the next few years) as well as our own assumptions (based on a range of factors).

Aircraft Generations

- To aid comparisons, we have adopted the aircraft generation definitions used by Mott MacDonald in its analysis.
- Generation 0 (G0):
 - Older aircraft types, typically developed in the 1970s or 1980s and now generally out of production.
 - E.g. B737 Classic (300/400/500), B757, B767, A300, A310.
- Generation 1 (G1):
 - Current aircraft types, typically developed in the 1990s or 2000s and still in production.
 - E.g. B737NG (700/800/900), B777, A320 series, A330, A340, A380, Bombardier CRJ, Embraer EJets, Avro RJ, Bombardier Q400, ATR42/72.
- Generation 2 (G2):
 - Latest aircraft types recently entering production or under development.
 - E.g. B737MAX, B787, B777X, A320neo, A330neo, A350, A220 (aka Bombardier CSeries), Embraer EJet E2, Sukhoi Superjet.

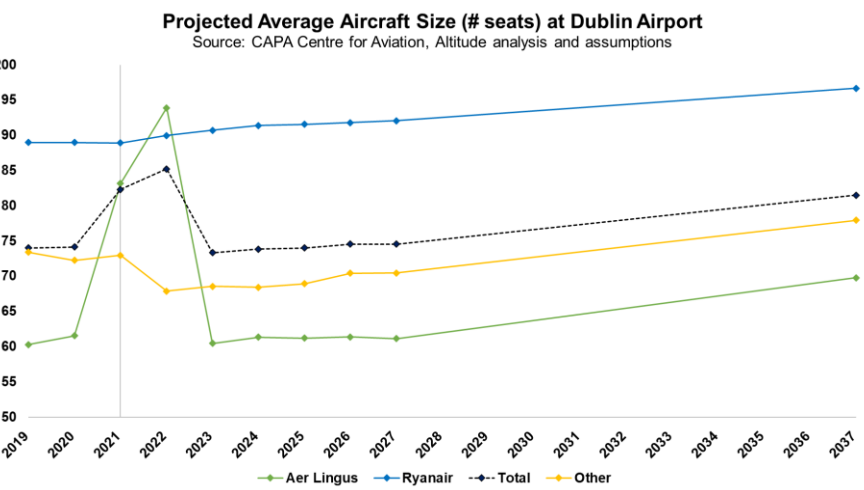
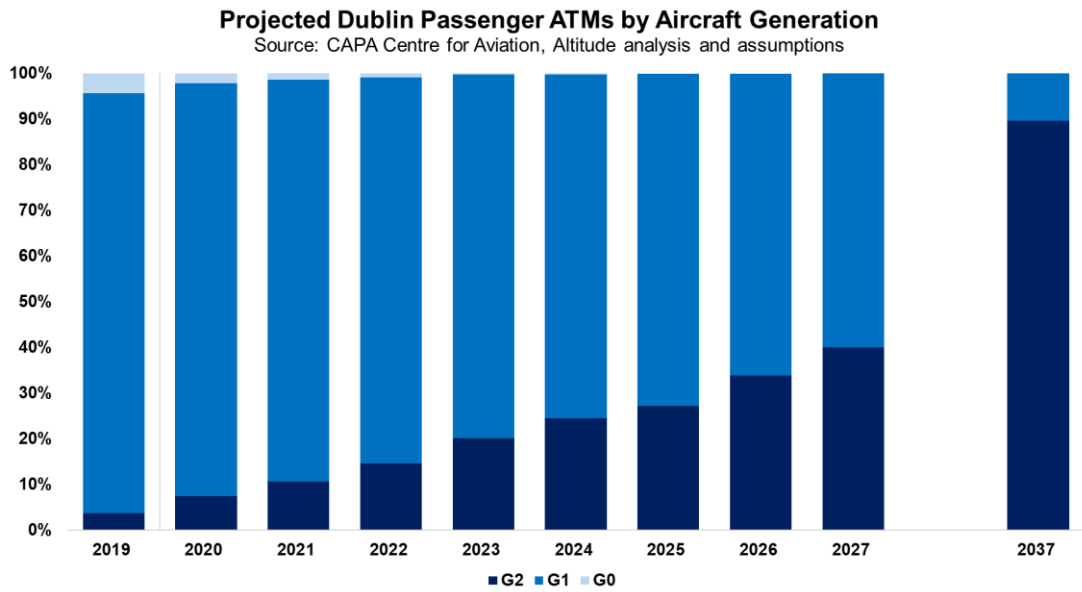
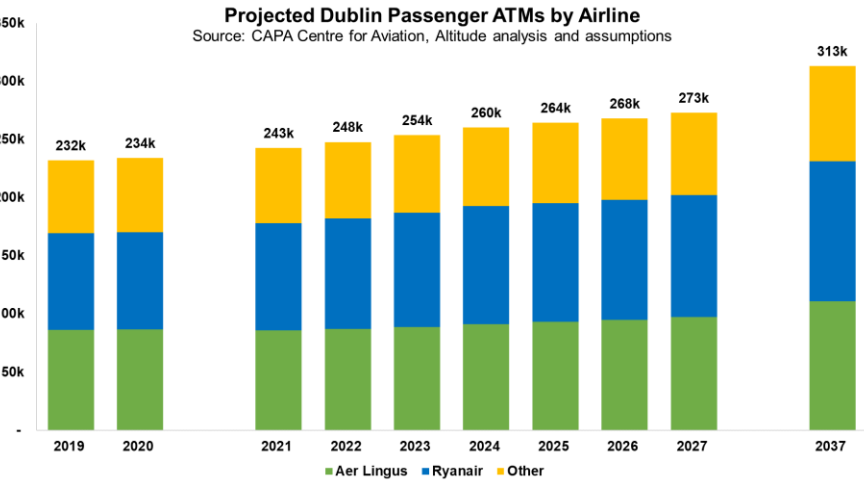
Summary of Historic Trends

- We have analysed historic aircraft mix trends at both Dublin and for European airports overall.
 - [See Appendix 1 for details.](#)
- The trends across the European airport sector are clear cut:
 - Gradual reduction of Generation 0 aircraft types.
 - In recent years, gradual build up of Generation 2 aircraft types.
 - Consistent growth in average seats per flight, individually by haul (domestic, international short haul, long haul) and overall.
- The impact of the trends above is to reduce the per-passenger and per-ATM noise footprint of passenger growth – through greater utilisation of new generation aircraft and increases in passengers per flight (reducing the number of individual flights needed to support growth).
- The historic trends at Dublin are less consistent:
 - Mainly caused by some reductions in Aer Lingus aircraft size.
 - Also more variable transition from old to new aircraft types.

Forecast Methodology

- Aer Lingus and Ryanair are the two largest airlines at Dublin (generating around 75% of scheduled passenger flights). For these two airlines, we have developed network-level fleet plans.
 - Based on the CAPA Centre for Aviation fleet database of historic and current fleet and outstanding aircraft orders.
 - Also considering investor relations guidance.
- We then make assumptions on the percentage of flying by each aircraft type that touches Dublin, to generate a projected PATM volume and aircraft mix.
- For the other airlines in the top 10 largest Dublin airlines and the remaining other airlines overall, we have made assumptions on the future mix of aircraft (without developing an overall fleet plan).
 - This also reflects known aircraft orders from the CAPA fleet database.
- While we have used insights from the fleet database, we have nevertheless still needed to make a range of assumptions:
 - For most airlines, there is little public information of aircraft retirement intentions. We have therefore made assumptions based on the age of the current aircraft in the fleet.
 - Information on aircraft orders does not always specify delivery dates, so we have needed to assume delivery schedules. Furthermore, existing aircraft orders only give insight on the next few years, requiring assumptions for medium and longer term fleet development.
- As previously noted, we have aligned total ATMs with the Mott MacDonald central unconstrained case.
 - In general, airline ATMs proportions are assumed not to change over the forecast period (kept flat at the 2019 values reported by Mott MacDonald for Aer Lingus, Ryanair, British Airways).
 - Within the remaining airlines, we do adjust ATM share for the permanent downsizing of Norwegian operations, and for some pandemic related swings in share over 2020-21 (returning by 2025 to a similar mix within this group to that seen in 2019).
- [See Appendix 2 for detailed assumptions.](#)

We have modelled new generation (G2) aircraft taking an increasing share of flying... The average aircraft size is forecast to grow moderately over the period to 2037.





Analysis of Historic Aircraft Trends

Appendix 1

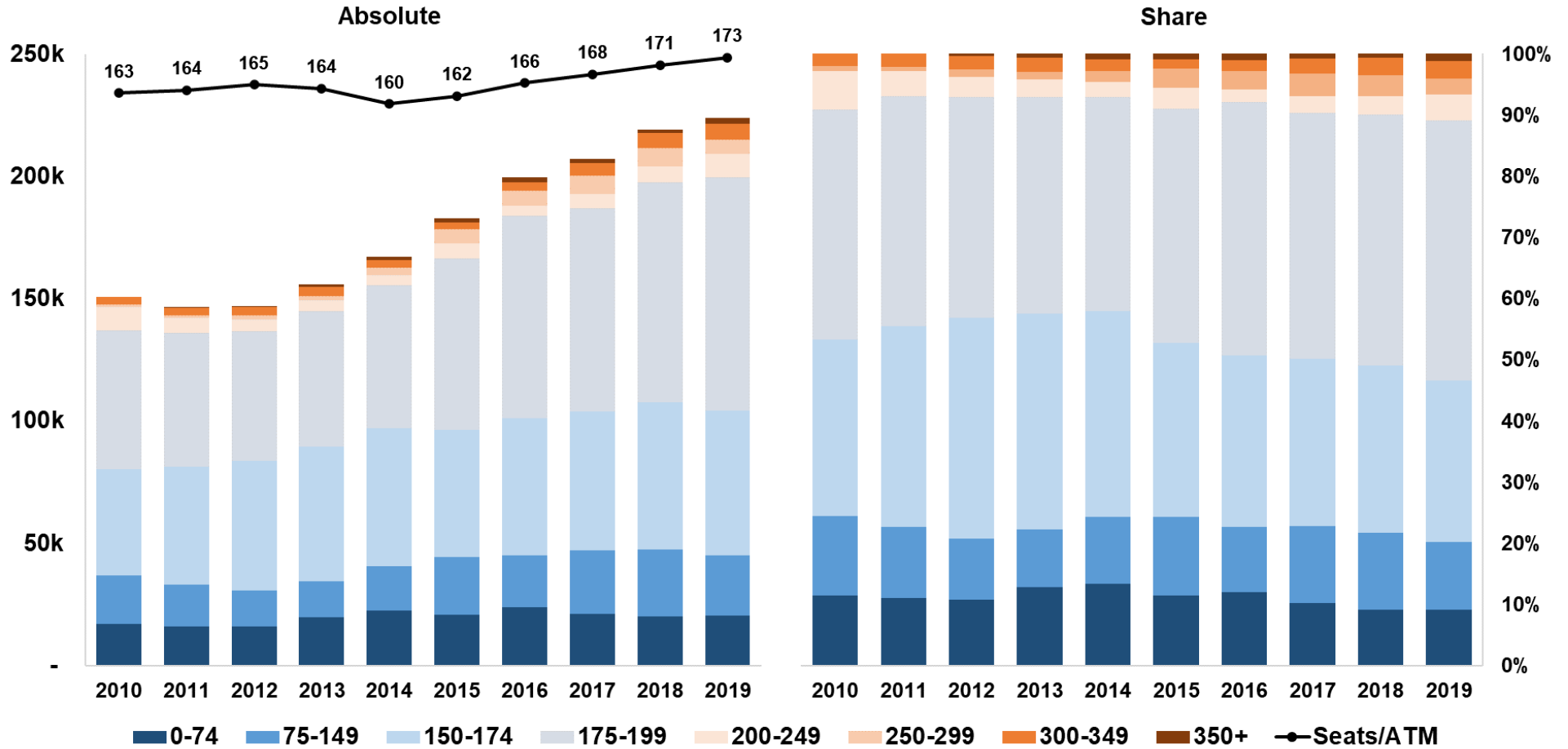
We have analysed schedule data from 2010-19 to identify aircraft mix trends at both Dublin specifically and across Europe... We have reviewed changes in average aircraft size and the evolution of ATMs by aircraft generation.

- As context to our forward looking aircraft projections, we have analysed published passenger flight schedules from 2010-19.
 - Aircraft schedules are publicly available and act as a reasonable proxy for actual flying activity.
- We have analysed schedules to/from Dublin Airport and also taken a wider view of trends across Europe.
 - In some cases, trends at Dublin have differed from European trends (due to specific fleet decisions by Dublin based airlines), so it is useful to understand wider developments when considering the future.
- We have focussed on two main areas:
 - Trends in average aircraft size (and what is driving the trends). Increases in average aircraft size (alongside seat factor improvements) reduces some of the requirement for additional flights to meet increasing passenger demand (with subsequent impact on overall noise footprint).
 - Trends in aircraft generation (based on technology). Broadly speaking, newer aircraft generations are quieter than their previous generation equivalents. Therefore, the speed with which new generation aircraft are adopted also influences noise footprints.
- In the analysis of Dublin Airport specifically, we have focussed on Aer Lingus and Ryanair, while grouping together all remaining airlines.
 - Aer Lingus and Ryanair are by far the largest airlines at Dublin, between them accounting for just over 75% of total scheduled passenger flights in 2019 (based on the OAG schedules database, reflecting planned flights rather than actual operations).
- Note: we have not included 2020-21 in this analysis as, due to the impact of COVID-19, demand has been very low. Aircraft mix through this period is likely to be significantly impacted by tactical scheduling in response to the latest demand and restrictions; it is not thought to be representative of 'normal' activity expected in the post-pandemic period.

There has been a steady increase in average aircraft size since 2014... This was primarily driven by faster growth of the (larger-than-average) 175-199 seat aircraft category than of other categories.

Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category

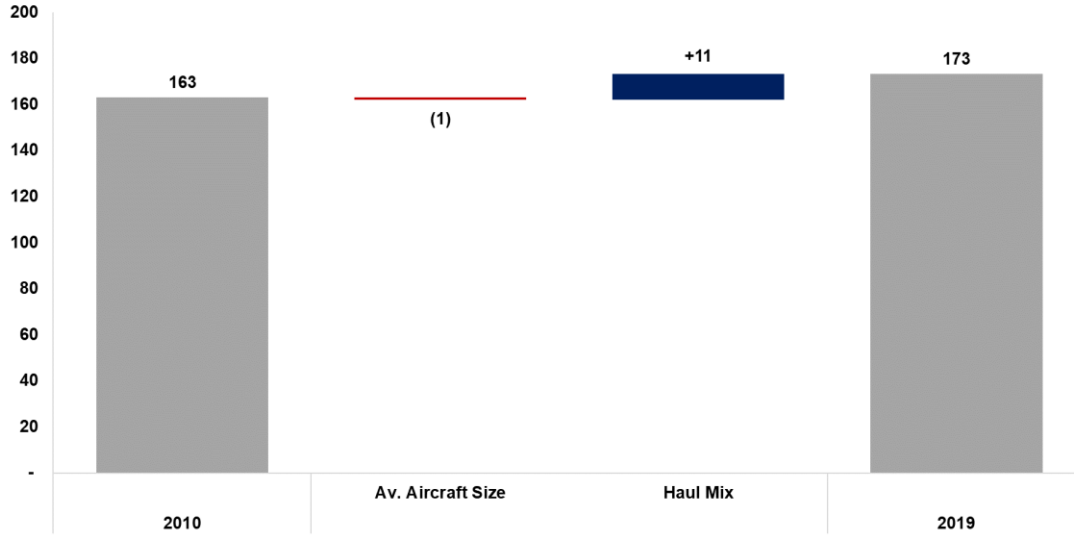
Source: OAG, Altitude Analysis



The increase in average aircraft size at Dublin has primarily been driven by an increase in the proportion of long haul flights and a major reduction in domestic flying... Within each haul category, average aircraft size has been increasing in recent years but longer term trends have been variable.

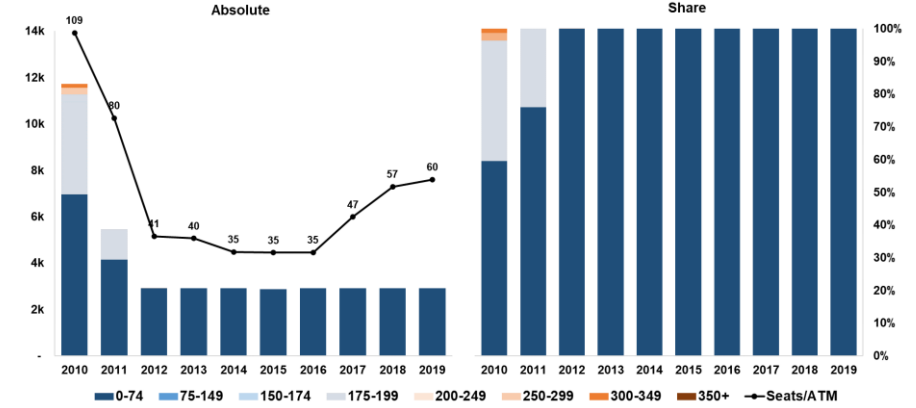
2010-19 Change in Average Seats per Scheduled PATM at Dublin

Source: OAG, Altitude Analysis



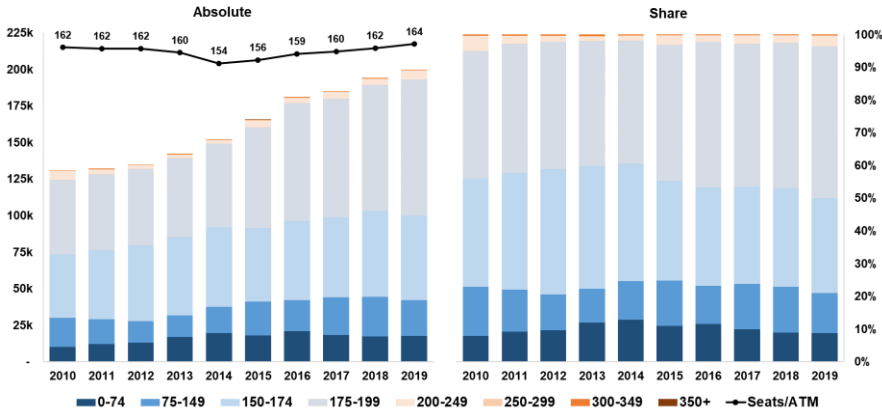
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category Domestic

Source: OAG, Altitude Analysis



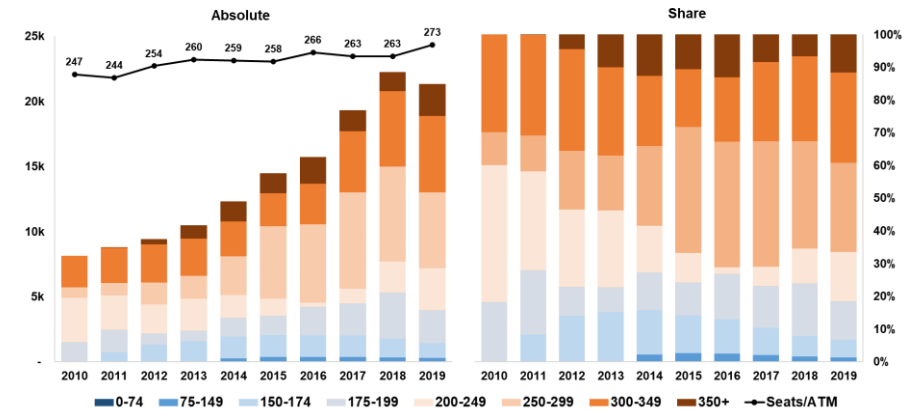
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category Int Short Haul

Source: OAG, Altitude Analysis



Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category Long Haul

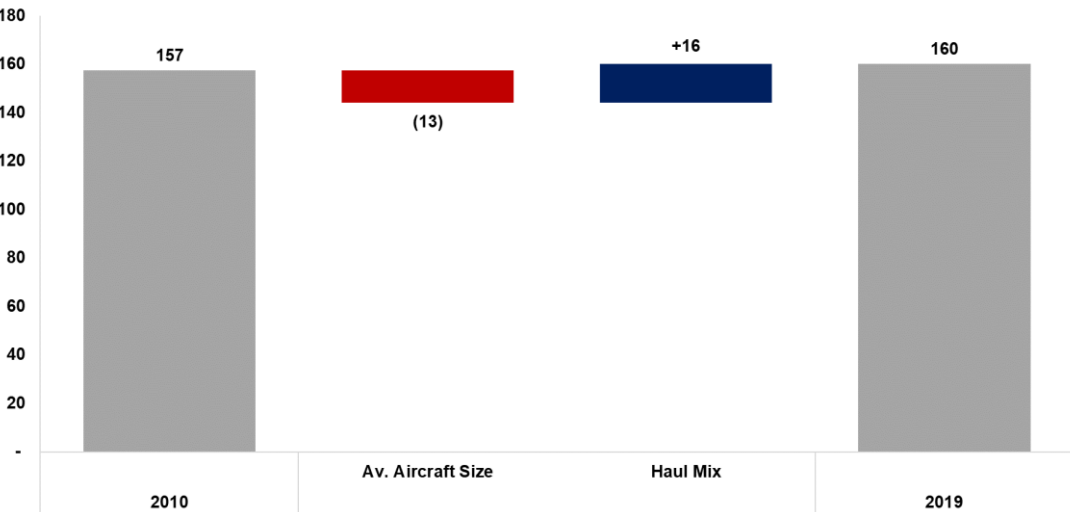
Source: OAG, Altitude Analysis



Within each haul category, Aer Lingus average aircraft size has fallen since 2010... However, this has been offset by an increase in the proportion of long haul flights (which use larger than average aircraft).

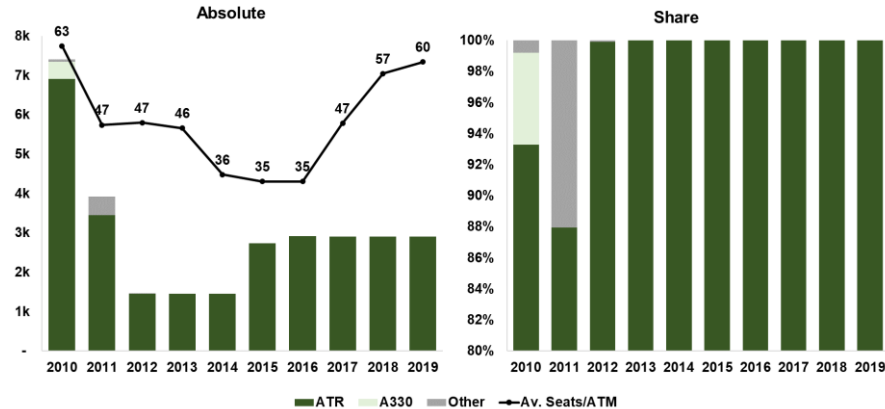
2010-19 Change in Average Seats per Scheduled PATM at Dublin
Aer Lingus

Source: OAG, Altitude Analysis



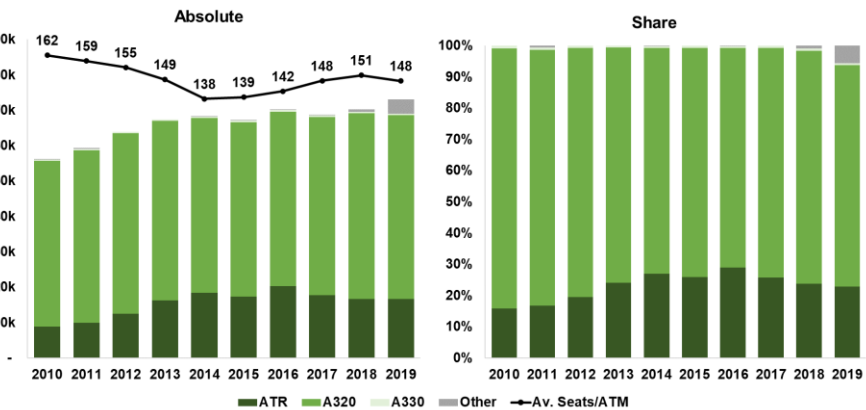
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
Aer Lingus - Domestic

Source: OAG, Altitude Analysis



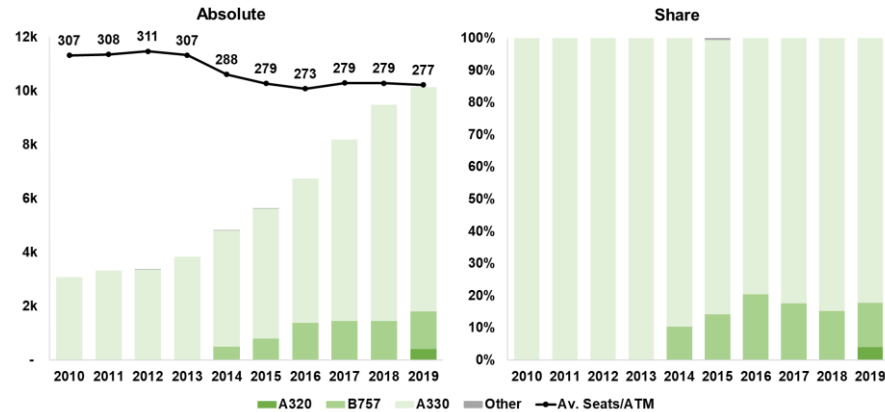
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
Aer Lingus - International Short Haul

Source: OAG, Altitude Analysis



Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
Aer Lingus - Long Haul

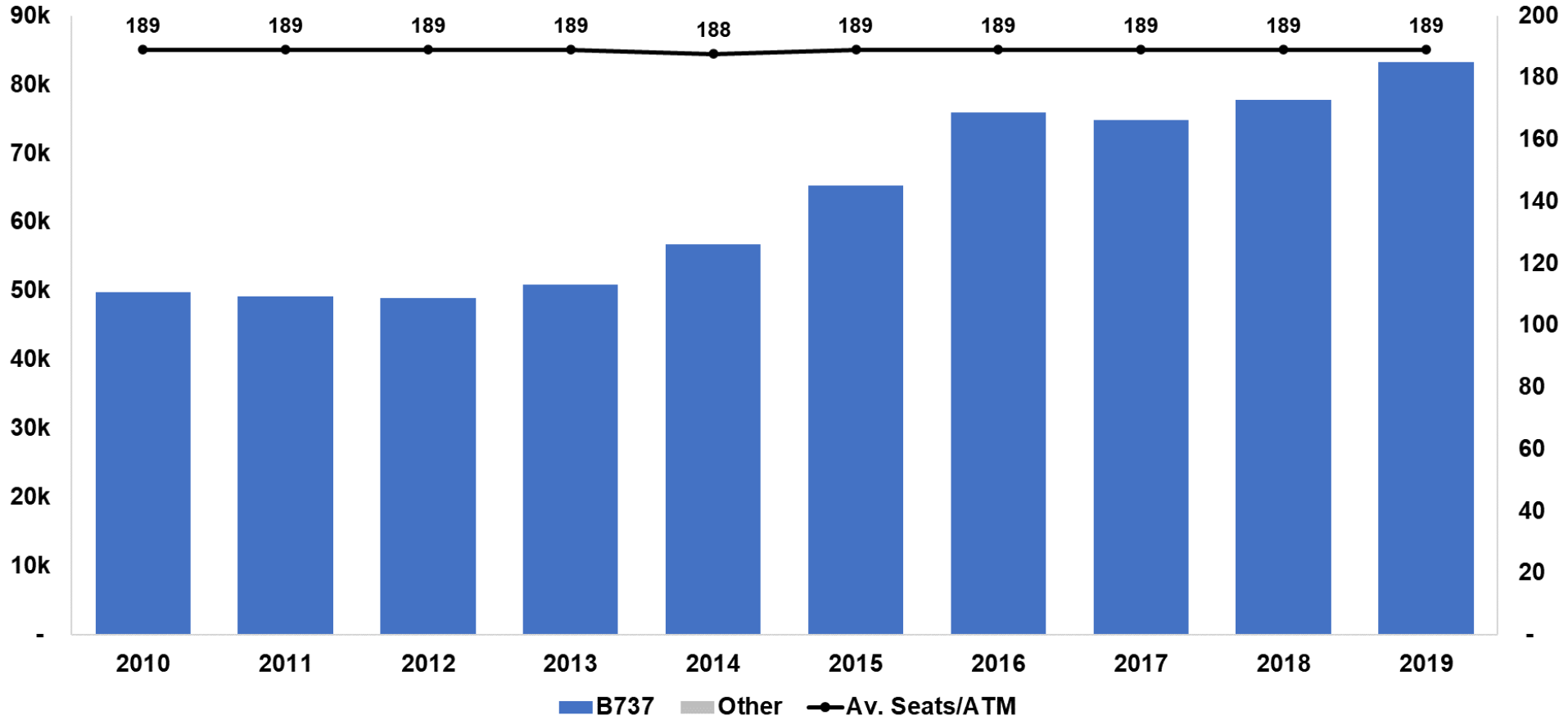
Source: OAG, Altitude Analysis



Ryanair has historically used a single aircraft type (B737-800) for almost all its flying from Dublin. As such, there has been no material change in average aircraft size since 2010.

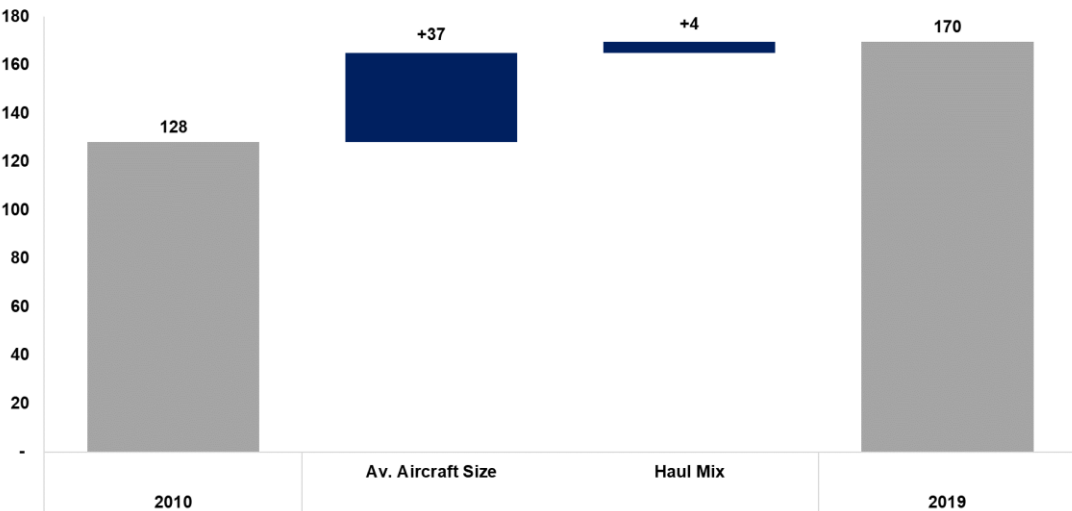
Ryanair ATMs & Seats per ATM Int Short Haul

Source: OAG, Altitude Analysis

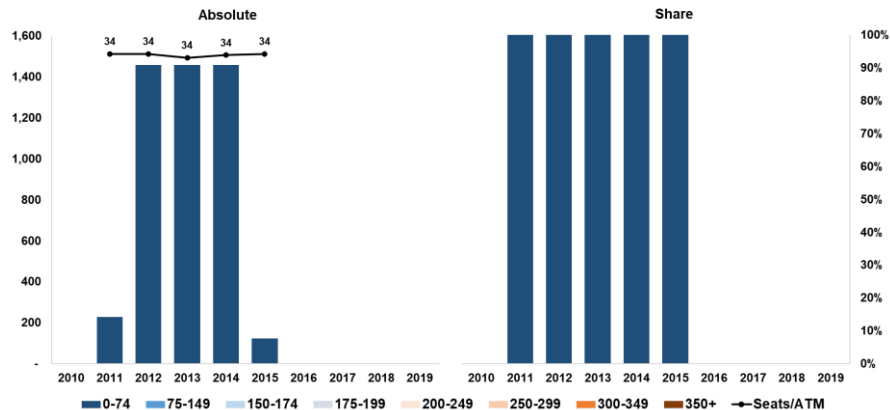


Within the other carrier category, there is a clear trend of increasing average aircraft size across both short haul and long haul flying... There is a small mix impact which has further increased overall average aircraft size.

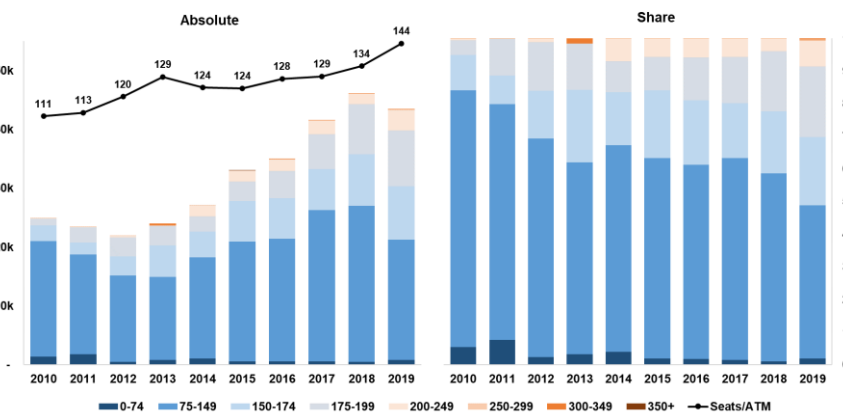
2010-19 Change in Average Seats per Scheduled PATM at Dublin
Excl. Ryanair & Aer Lingus
Source: OAG, Altitude Analysis



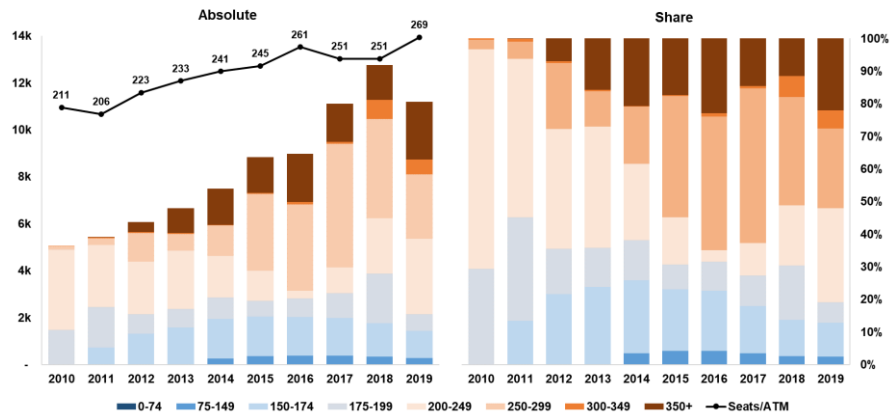
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
Domestic - Excl. Ryanair, Aer Lingus
Source: OAG, Altitude Analysis



Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
International Short Haul - Excl. Ryanair, Aer Lingus
Source: OAG, Altitude Analysis



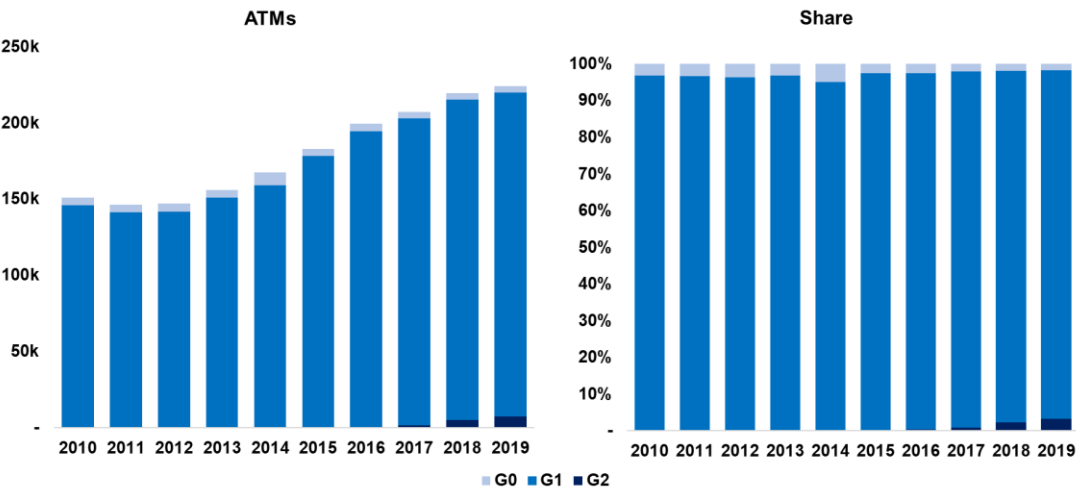
Dublin Scheduled Passengers ATMs, by Aircraft Size (# Seats) Category
Long Haul - Excl. Ryanair, Aer Lingus
Source: OAG, Altitude Analysis



Generation 0 aircraft (out of production aircraft types, typically from 1970s and 1980s) represent a small and declining proportion of flying at Dublin... Generation 1 aircraft (current aircraft types) dominate PATMs, while Generation 2 (latest aircraft types) are starting to enter the fleet.

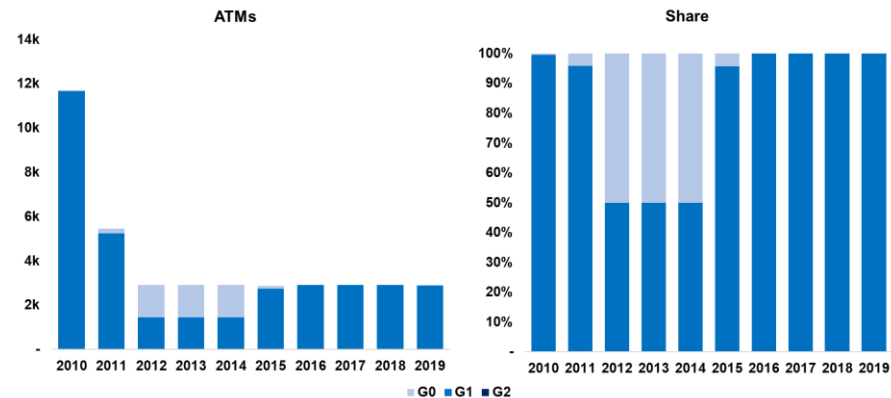
Dublin Scheduled Passengers ATMs, by Aircraft Technology Generation

Source: OAG, Altitude Analysis



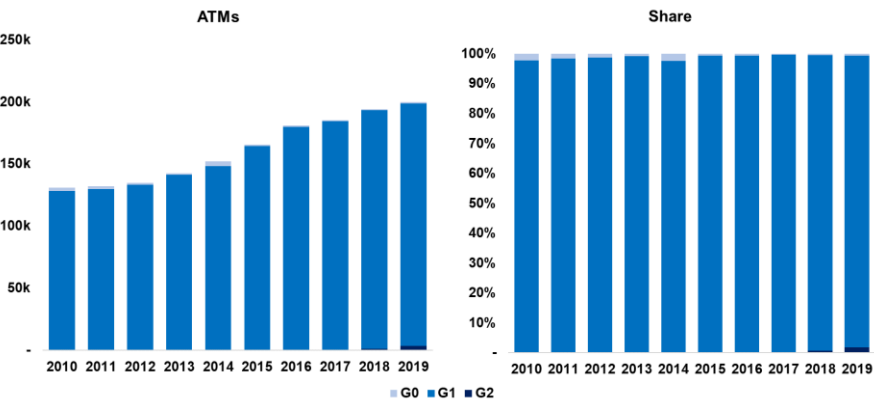
Dublin Scheduled Passengers ATMs, by Aircraft Technology Generation Domestic

Source: OAG, Altitude Analysis



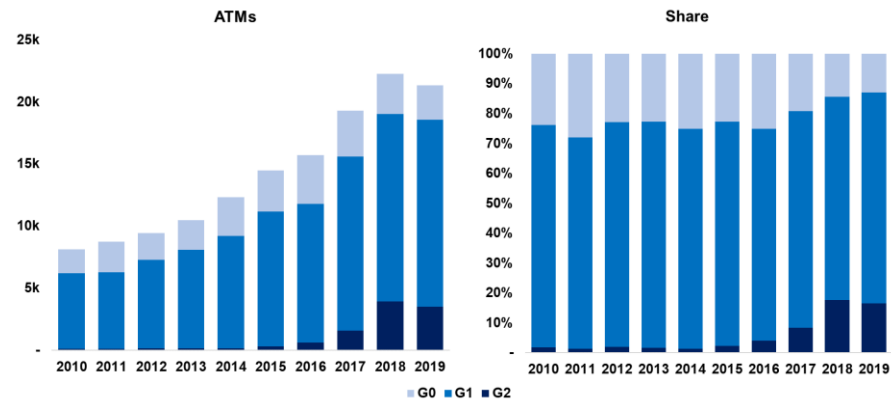
Dublin Scheduled Passengers ATMs, by Aircraft Technology Generation Int Short Haul ATMs

Source: OAG, Altitude Analysis



Dublin Scheduled Passengers ATMs, by Aircraft Technology Generation Long Haul

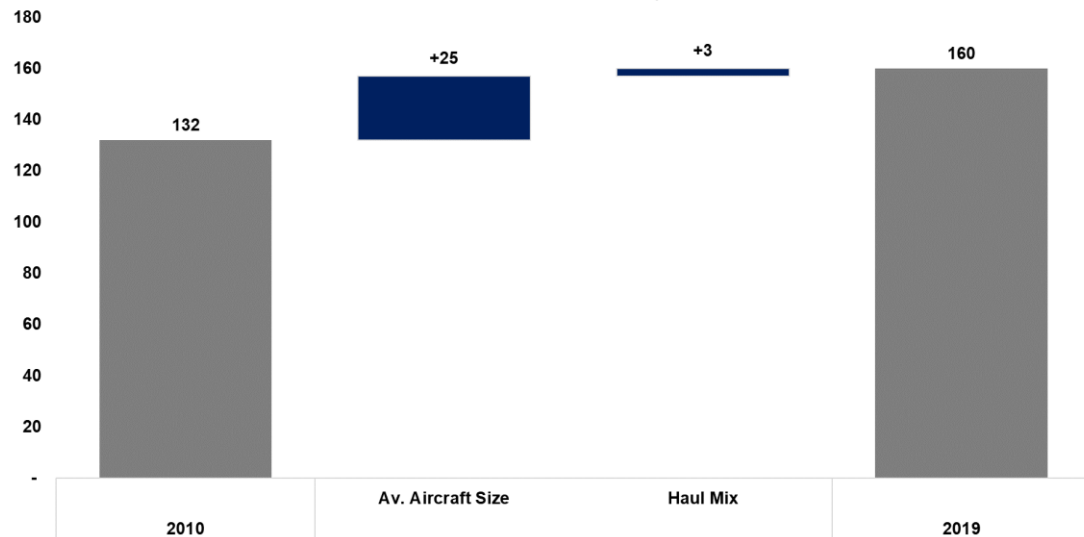
Source: OAG, Altitude Analysis



Within Europe, average aircraft size has been the main driver in average aircraft size growth (not haul mix)... Over the past decade, average aircraft size on domestic and international short haul routes has increased by nearly 30 seats, while the size of long haul aircraft has on average only increased by 20 seats.

2010-19 Europe Change in Average Seats per ATM

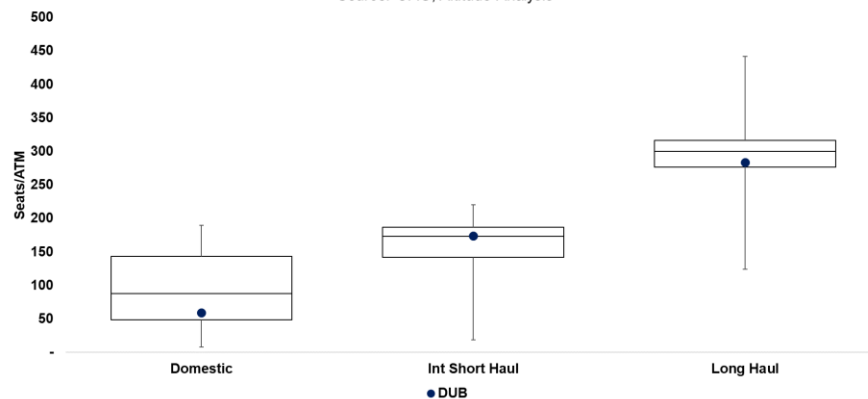
Source: OAG, Altitude Analysis



2019 Average Seats/ATM - European Airports vs DUB by Haul (Set Int Short Haul routes < 4000km, Long haul routes >= 4000km)

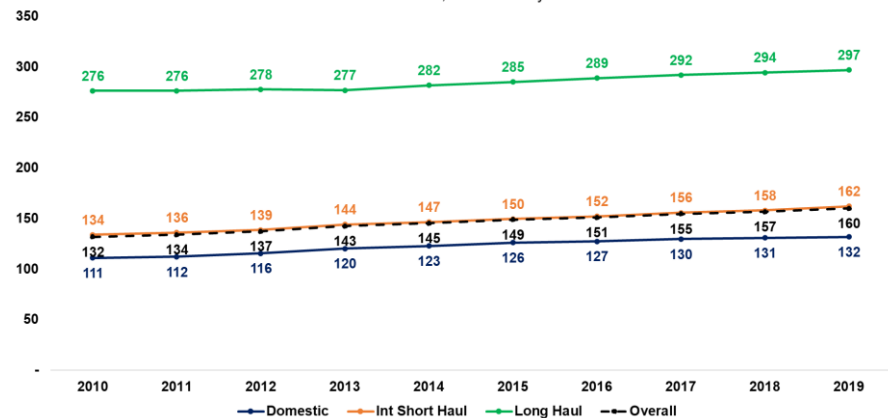
Limited Max/Mins to 1st/99th Percentile to exclude extreme values

Source: OAG, Altitude Analysis



Average Seats/ATM from Europe by Haul (set Int Short Haul < 4000km, Long Haul >=4000km)

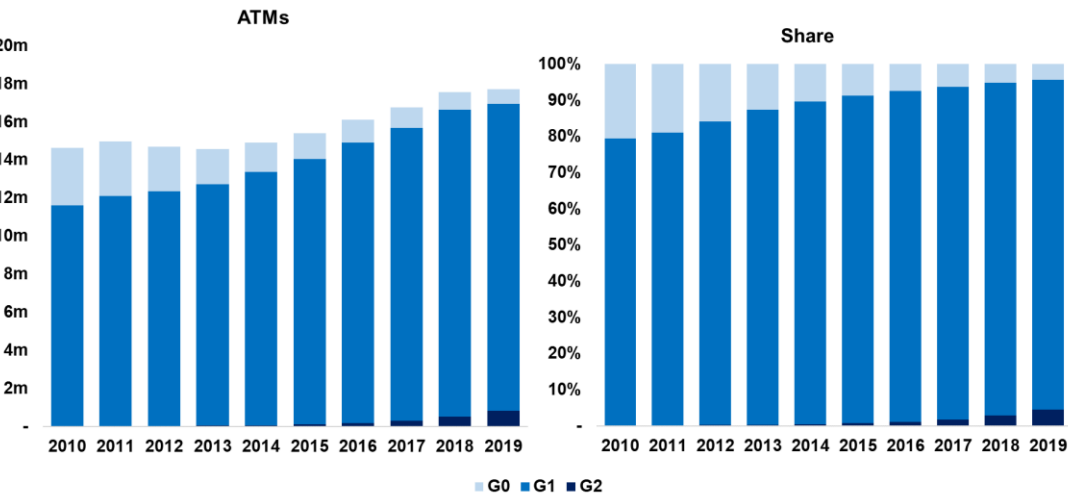
Source: OAG, Altitude Analysis



Compared to Dublin, Europe has a higher proportion of flying from both old aircraft types (Generation 0) and new aircraft technology (Generation 2)... Trends for transition from older to newer aircraft generations is more clear cut at the European level.

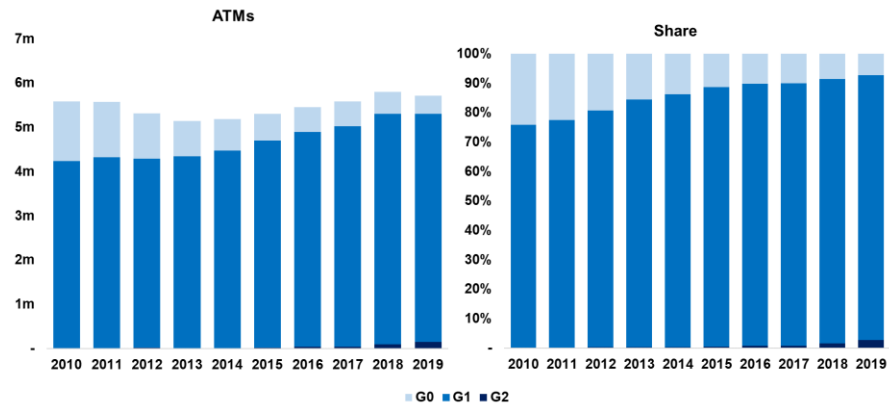
Europe Scheduled Passengers ATMs, by Aircraft Technology Generation

Source: OAG, Altitude Analysis



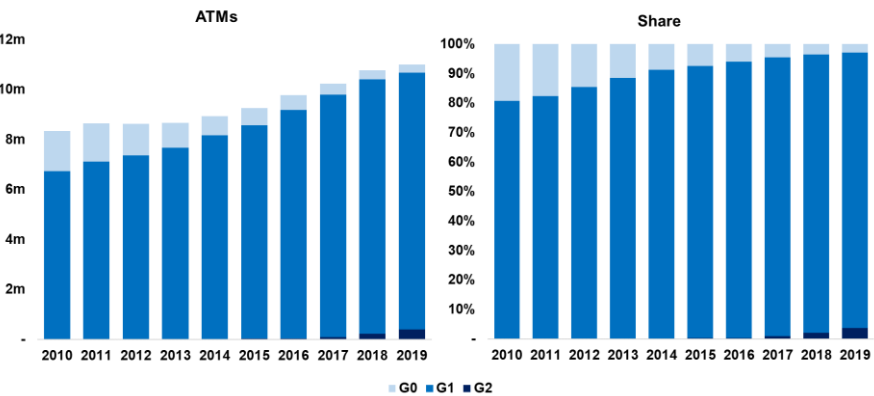
Europe Scheduled Passengers ATMs, by Aircraft Technology Generation Domestic

Source: OAG, Altitude Analysis



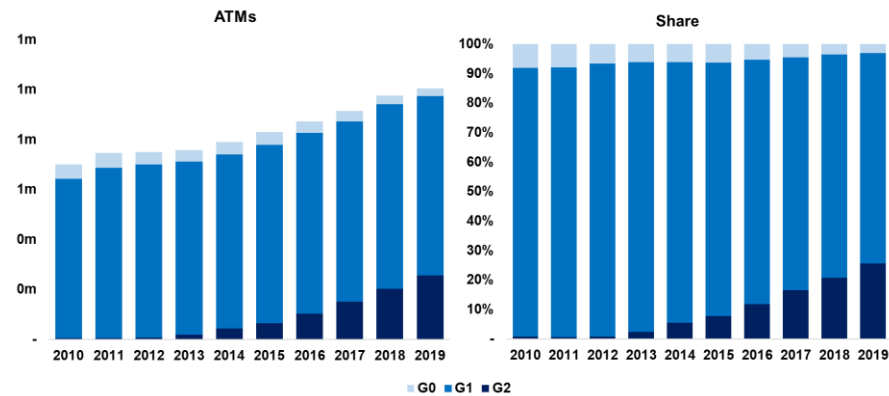
Europe Scheduled Passengers ATMs, by Aircraft Technology Generation Int Short Haul (Int Short Haul <= 4000km)

Source: OAG, Altitude Analysis



Europe Scheduled Passengers ATMs, by Aircraft Technology Generation Long Haul (Long Haul >= 4000km)

Source: OAG, Altitude Analysis





Detailed Aircraft Assumptions

Appendix 2



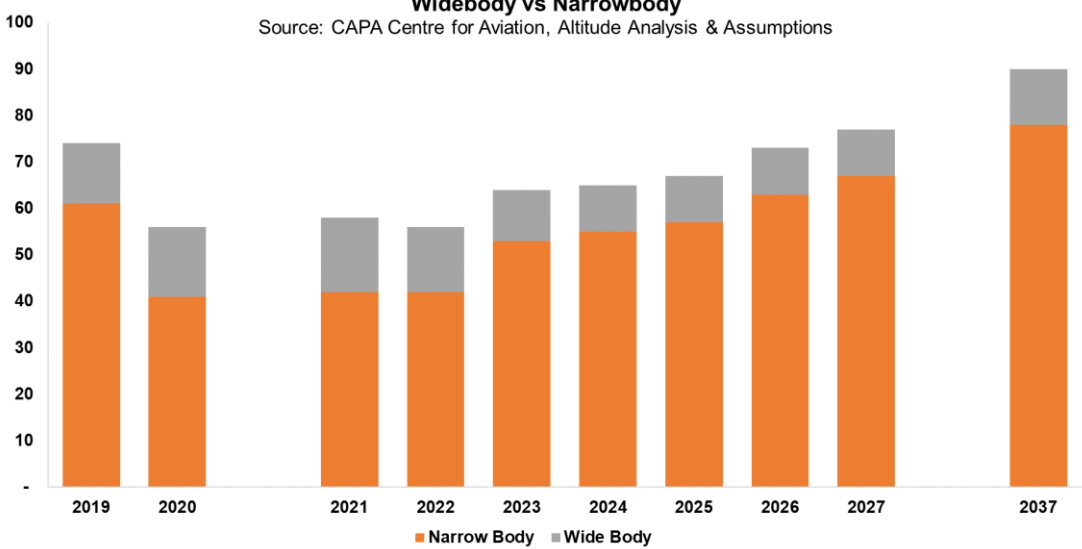
Aer Lingus

Detailed Aircraft Assumptions

We have modelled the potential Aer Lingus fleet evolution to 2037... We model a shift towards narrow bodies, with long range A321s replacing some A330 flying.

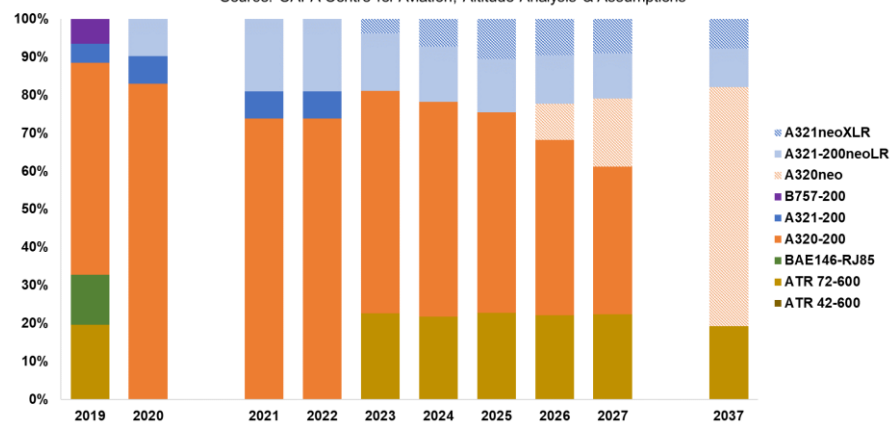
**Projected Number of Aircraft in Aer Lingus Fleet
Widebody vs Narrowbody**

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions



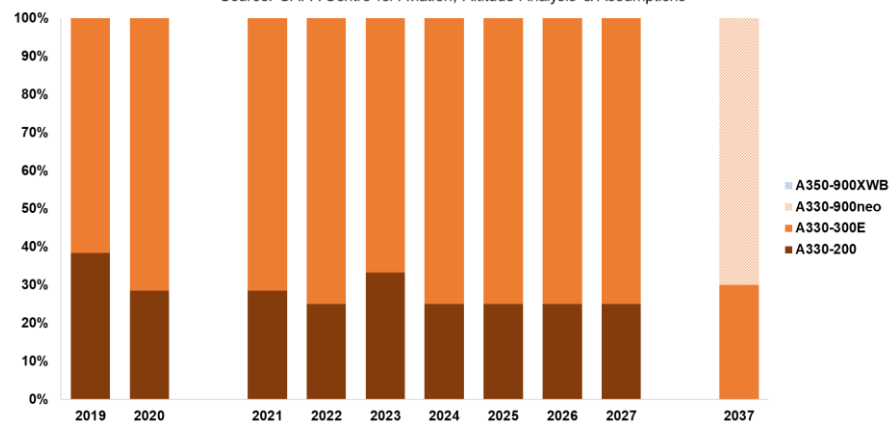
**Projected Aer Lingus Fleet Evolution, by Aircraft Type
Narrowbody Aircraft Types**

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions



**Projected Aer Lingus Fleet Evolution, by Aircraft Type
Widebody Aircraft Types**

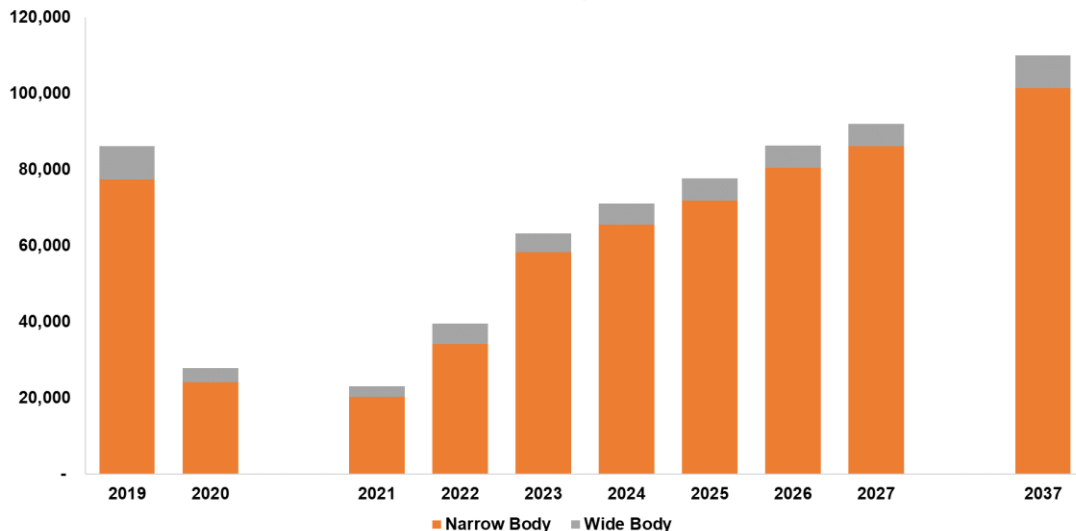
Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions



We also model Dublin's share of Aer Lingus flying to remain broadly similar to 2019 – both overall and for different aircraft types.

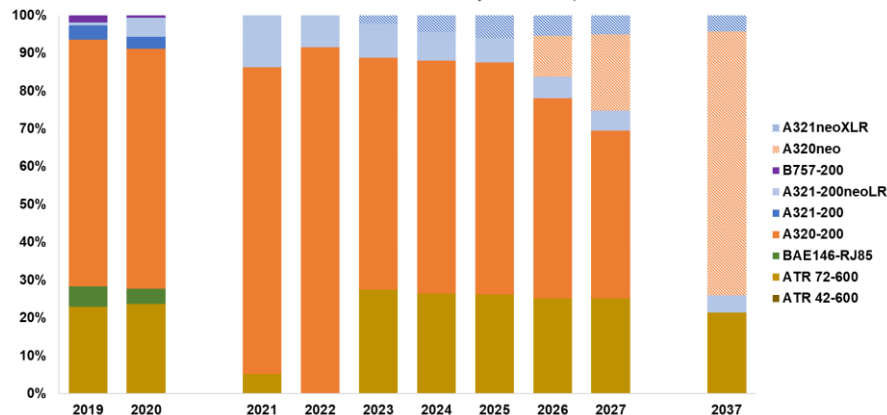
Projected Aer Lingus PATMs at Dublin Airport, by Widebody/Narrowbody

Source: OAG, Altitude Analysis & Assumptions



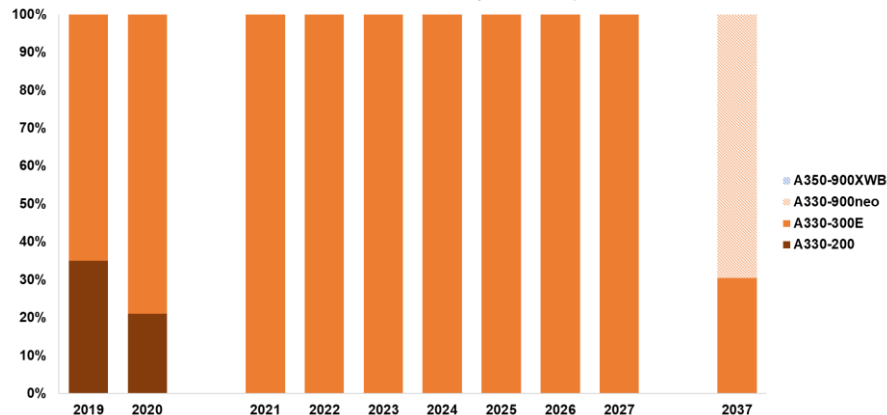
Projected Aer Lingus PATMs Distribution at Dublin Airport by Aircraft Type
Narrowbody Aircraft Types

Source: OAG, Altitude Analysis & Assumptions



Projected Aer Lingus PATMs Distribution at Dublin Airport by Aircraft Type
Widebody Aircraft Types

Source: OAG, Altitude Analysis & Assumptions



- Note that the aircraft type A321neoLR is shown on this slide to have a small share of Aer Lingus ATMs at Dublin in 2019, whereas the previous slide shows the type is not due to enter the Aer Lingus fleet until 2020.
- This is because the data on the previous page shows a snapshot of the fleet as at a single point in 2019 (30 June 2019), whereas the data on this page shows an aggregation of ATMs from across the whole of each year.
 - Aer Lingus had 4 A321neoLR aircraft delivered in 2019, but *after* 30 June. As such, they do not appear in the data on the previous slide until 2020, but these aircraft did operate in part of 2019.
 - The fleet snapshot date of 30 June was used as it enabled us to sidestep analytical complexities associated with aircraft being stored or leased out over the quiet winter period.
- Similar issue for the removal of ATR72 from the fleet in 2021.

Summary of key assumptions for Aer Lingus narrowbody aircraft at Dublin Airport.

Aircraft	Details
Bae146	<ul style="list-style-type: none"> 2021: These aircraft were operated by CityJet for Aer Lingus. CityJet no longer provides services for Aer Lingus and so these aircraft are not part of the forecast.
ATR 42 / 72	<ul style="list-style-type: none"> 2021: These aircraft were operated by Stobart Air for Aer Lingus, which has ceased operations. 2021-27: We <u>assume</u> Emerald Air services will begin in 2023 as announced and that they will use ATR-72 aircraft as announced.
A320 / A320neo	<ul style="list-style-type: none"> 2021: Average age of existing A320 is ca. 14yrs with min age of ca. 10yrs and max age of ca. 20yrs. 2021-27: We <u>assume</u> A320 aircraft are used to cover capacity on some of the routes previously operated by Stobart/CityJet. 2021-27: We <u>assume</u> a gradual phase out of the existing A320 aircraft beginning 2023. 2021-31: We <u>assume</u> an order will be made for A320neo aircraft (or allocated to Aer Lingus from existing group capacity), and that these will begin to replace the A320 (with gradual growth of the combined A320/A320neo fleet). 2028-37: We <u>assume</u> continued gradual growth of the A320neo fleet.
A321-200	<ul style="list-style-type: none"> 2021: The airline maintains a small sub-fleet of 3 A321-200 aircraft. These are over 20 years old. These aircraft are currently inactive and we <u>assume</u> they do not enter service again at DUB.
A321neoLR	<ul style="list-style-type: none"> 2021: Aer Lingus had 8 aircraft in its fleet by mid 2021 (source: CAPA). 2021-37: With no further aircraft delivered, the share gradually reduces.
A321neoXLR	<ul style="list-style-type: none"> 2021: This type is not currently operated by Aer Lingus, but the airline has an order for 6 aircraft. The delivery schedule is not known. The aircraft will enter service globally in 2023 (source: Airbus). There are many other airline customers, and hundreds of orders overall. 2021-27: We <u>assume</u> all 6 aircraft enter the fleet through this period (i.e. beginning shortly after the entry into service of the type). 2028-37 onwards: We <u>assume</u> no further changes in the net number of aircraft.
B757-200	<ul style="list-style-type: none"> 2021: These aircraft were operated by ASL Airlines for Aer Lingus. We <u>understand</u> this lease deal ended in Q1 2020 and we <u>assume</u> the lease is not extended and the aircraft exit the fleet.

Summary of key assumptions for Aer Lingus widebody aircraft at Dublin Airport

Aircraft	Details
A330-200	<ul style="list-style-type: none"> ▪ 2021: There were only 4 of these aircraft in the fleet as of 2021. They have an average age close to 20yrs. ▪ 2021-27: We <u>assume</u> the aircraft are retired from the fleet over this period.
A330-300E	<ul style="list-style-type: none"> ▪ 2021: This aircraft makes up the majority of the widebody fleet. We <u>understand</u> the fleet has an average age of ca. 8yrs, but within that there are 4 older airframes (over 10 yrs old) and 6 young airframes (less than ca. 5yrs old). ▪ 2021-27: We <u>assume</u> the 4 older airframes will be retired over this period. ▪ 2028-37: We <u>assume</u> that a slow retirement of remaining airframes takes place through this period.
A350-900XWB	<ul style="list-style-type: none"> ▪ 2021: This aircraft is not currently in the fleet. The carrier has an order for the aircraft, although the delivery date is unknown (source: CAPA). Previous A350 orders have been transferred to group airline Iberia. Aer Lingus investor relations materials do not make reference to a future fleet with A350 aircraft. ▪ 2021-37: We do not assume the type enters service with Aer Lingus.
A330-900neo	<ul style="list-style-type: none"> ▪ 2021: This aircraft is not currently in the fleet and the carrier has not announced any orders for the type. However, we <u>understand</u> this type is now considered by Aer Lingus to be preferable in some ways to the A350. ▪ 2028-37: We <u>assume</u> this type enters the fleet over this period, partly to grow the long haul fleet and partly as replacement for the retiring A330-300E.



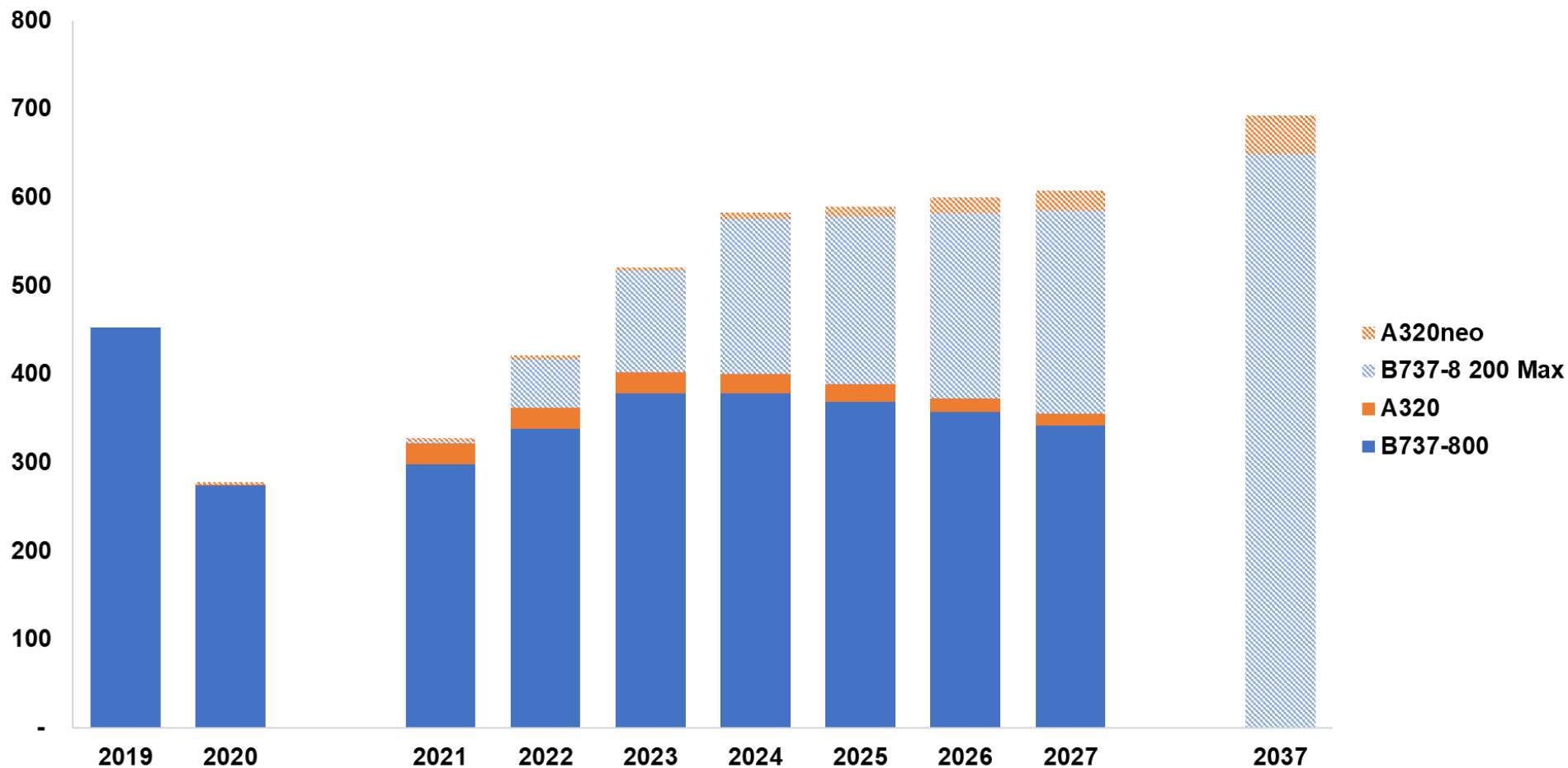
Ryanair

Detailed Aircraft Assumptions

The Ryanair fleet is anticipated to continue growing, with the B737-8 200 Max gradually replacing existing B737-800 aircraft.

Projected Number of Aircraft in Ryanair Group Fleet, by Aircraft Type

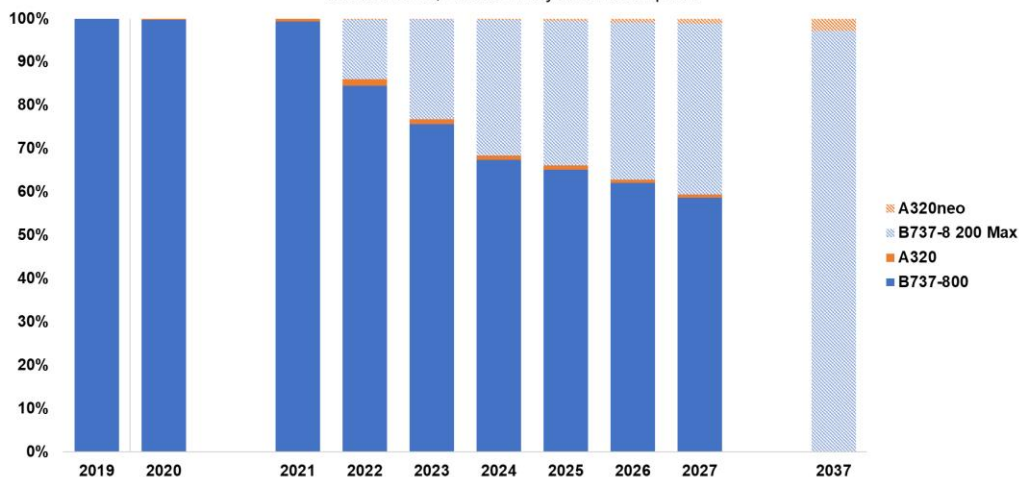
Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions



Summary of key assumptions for Ryanair aircraft at Dublin Airport.

Projected Ryanair Group PATMs Distribution at Dublin Airport by Aircraft Type

Source: OAG, Altitude Analysis & Assumptions



Aircraft	Details
B737-800	<ul style="list-style-type: none"> 2021: This aircraft type makes up almost the entirety of Ryanair’s fleet, and accounts for a large majority of operations at Dublin. A large proportion of the fleet is currently inactive due to the impact of the pandemic on demand. The carrier has no orders for this aircraft type. We <u>understand</u> that many of the airframes are new, but that the oldest are ca. 18 years old. 2021-27: We <u>assume</u> the carrier reintroduces several of the inactive airframes over 2022-23. We <u>assume</u> the carrier gradually retires older airframes over the period (as they approach 20 years of age). At network level, Ryanair has a recently-stated aim of operation a fleet of ca. 600 aircraft in 2026, and it is likely to temper retirements in line with deliveries of other types to meet this goal. 2028-37: We <u>assume</u> continued retirement of the type through the period, such that it has exited the fleet by 2037.
B737-8 200 MAX	<ul style="list-style-type: none"> 2021: This aircraft is now certified for service once again. Ryanair has 173 outstanding orders for the type, with a schedule for deliveries over 2022-24 (source: CAPA). 2021-27: We <u>assume</u> the aircraft are delivered as per the schedule over this period. Further, we assume that Ryanair is able to secure delivery slots for further aircraft over 2025-27. 2028-37: We <u>assume</u> further aircraft of this type will be ordered, and that deliveries will continue over this period (gradually replacing B737-800 airframes). We <u>assume</u> deliveries come at a faster rate than retirements of other aircraft types, leading to net fleet growth consistent with short term projections by the company but at a lower rate than seen historically.
A320	<ul style="list-style-type: none"> 2021: This type is operated by Ryanair Group airlines (the aircraft are inherited; Ryanair itself is unlikely to begin using Airbus aircraft in future, and has recently stated that it expects its future fleet to be largely comprised of B737 aircraft). 2021-37: We model a gradual phase-out of this type over the forecast period.
A320neo	<ul style="list-style-type: none"> 2021: This type is not operated by Ryanair Group airlines. 2021-37: We model replacement of A320 by this type beginning ca. 2025.



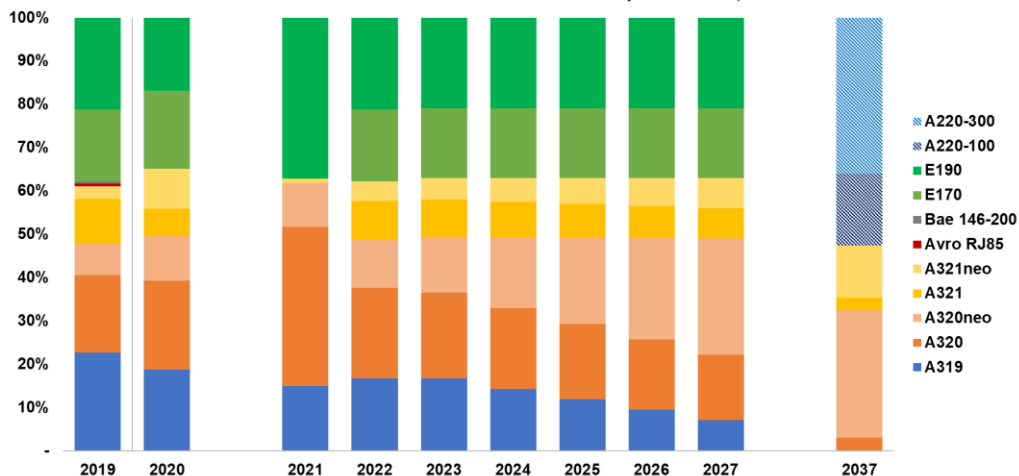
Other Carriers

Detailed Aircraft Assumptions

Summary of key assumptions for British Airways aircraft at Dublin Airport.

Projected British Airways PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

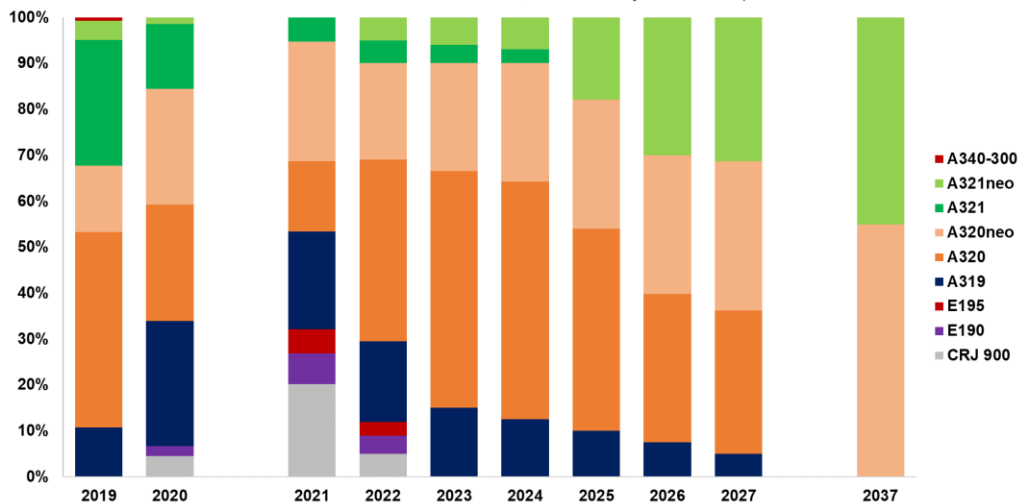


Aircraft	Details
E170/190	<ul style="list-style-type: none"> 2021: E170 fleet is inactive as a result of the current low demand. 2021-27: We <u>assume</u> the E170 fleet returns to service in 2022. 2028-37: We assume the E170/190 fleet is phased out over the early part of the period, replaced by A220 aircraft.
A321 / A321neo	<ul style="list-style-type: none"> 2021: Youngest of A321 aircraft is ca. 12yrs, with the neo airframes being relatively new (delivered since 2019). British Airways has orders for 3 more neo aircraft. 2021-37 onwards: We <u>assume</u> increasing share of the newer type used on DUB route with minimal flying by 2037 on A321 due retirements (orders for further neo aircraft have not yet made).
A320 / A320neo	<ul style="list-style-type: none"> 2021: Youngest existing A320 ca. 7yrs. neo airframes are relatively new, with deliveries still in progress. 2021-37: We <u>assume</u> the A320 family is gradually replaced by A321neos. Within the A320 family, we <u>assume</u> continued retirement of A320 and replacement with A320neo.
A319	<ul style="list-style-type: none"> 2021: Youngest aircraft age of ca. 14 yrs. 2021-27: We <u>assume</u> this type is gradually phased out. 2028-37: The aircraft is completely phased out early in this period.
A220-100/300	<ul style="list-style-type: none"> 2021: This type is not currently operated by British Airways. 2027-37 onwards: We <u>assume</u> an order will be made for A220-100 and A220-300 aircraft, and these will replace the E170/E190 and A319 respectively.

Summary of key assumptions for Lufthansa aircraft at Dublin Airport.

Projected Lufthansa PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA - Centre for Aviation, Altitude Analysis & Assumptions

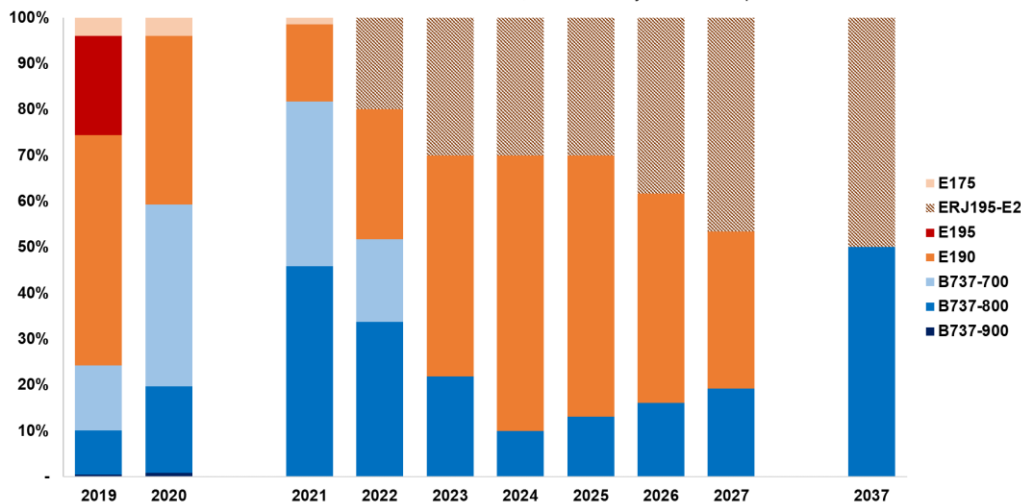


Aircraft	Details
CRJ 900	<ul style="list-style-type: none"> 2021: This aircraft has historically not operated significant frequencies at DUB, but in the current low demand environment it accounts for a higher share of Lufthansa ATMs. 2021-27: We <u>assume</u> this aircraft will cease operations at DUB from 2023 as demand returns to normal.
E190/195	<ul style="list-style-type: none"> 2021: This aircraft has historically not operated significant frequencies at DUB, but in the current low demand environment it accounts for a higher share of Lufthansa ATMs. 2021-27: We <u>assume</u> this aircraft will cease operations at DUB from 2023 as demand returns to normal.
A319	<ul style="list-style-type: none"> 2021: Many airframes already over 20 years old. 2021-27: We <u>assume</u> a gradual phase out of the existing A319 aircraft over this period. 2028-37: The type is completely removed early in this period.
A320 / A320neo	<ul style="list-style-type: none"> 2021: The airline is operating a mix of A320 and A320neo aircraft with aircraft ranging from new to 30 years old. 2021-27 onwards: We <u>assume</u> the type replaced the CRJ/E190//195 over by 2023 as demand returns to normal. We <u>assume</u> a gradual phase out of the existing A320 aircraft, which will be replaced with the A320neo aircraft over the forecast period.
A321 / A321neo	<ul style="list-style-type: none"> 2021: Average age of existing A321 is over 10yrs. Lufthansa has begun to take delivery of the A321neo aircraft, with deliveries scheduled in 2022 and then 2025-27. 2021-27: We <u>assume</u> increasing share of A321neo aircraft as they come into the fleet. 2028-37: We assume further increasing share of the larger A321 type versus the A320 on the DUB route.

Summary of key assumptions for KLM aircraft at Dublin Airport.

Projected KLM PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA - Centre for Aviation, Altitude Analysis & Assumptions

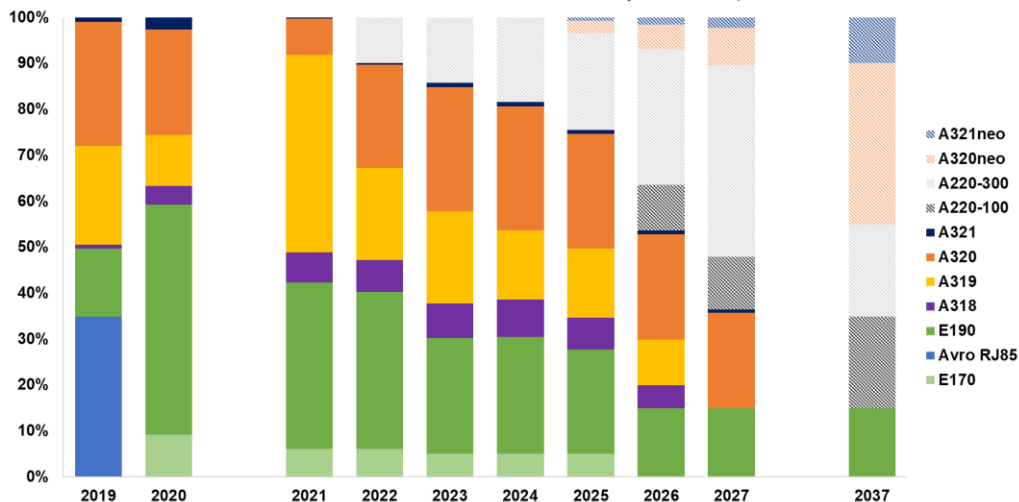


Aircraft	Details
E175	<ul style="list-style-type: none"> 2021: Only a small fraction of capacity operated on this type. 2022: We <u>assume</u> this aircraft will no longer be operated at DUB, with focus on E190s.
E190	<ul style="list-style-type: none"> 2021: Reduced share in low demand environment. Average age of existing E190 is ca. 10 years. The carrier has no existing orders for this type. 2021-27: We <u>assume</u> the share of E190 aircraft will return to 2019 levels by ca. 2024 as demand returns. In the later years of the period, the share will begin to reduce again as it is replaced by the E195-E2. 2028-37: We <u>assume</u> this type is completely replaced by the –E2 variant by the early part of this period.
ERJ195-E2	<ul style="list-style-type: none"> 2021: Deliveries of this type have begun with ca. 5 aircraft in the fleet and ca/. 20 still to come (scheduled over the period to 2024). 2021-27: We <u>assume</u> the aircraft will start services at DUB in 2022, gradually replacing the E190. 2028-37: The aircraft will completely replace the E190 by the early part of the period.
B737-700	<ul style="list-style-type: none"> 2021: Share has increased through pandemic period. 2021-27: We <u>understand</u> this aircraft is to be retired by 2022, and <u>assume</u> that it will be gradually phased out over this period.
B737-800	<ul style="list-style-type: none"> 2021: Share has increased through the pandemic period. Large range of airframe ages (some relatively new). 2021-37: Share reverts to per-pandemic levels over 2021-24. Given the young age of some airframes, we <u>assume</u> continued operations of this aircraft type over the period. We <u>assume</u> capacity limitations at AMS will drive up seats/ATM strongly in the long term; increased flying of this type would be beneficial in that regard.

Summary of key assumptions for Air France aircraft at Dublin Airport.

Projected Air France PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

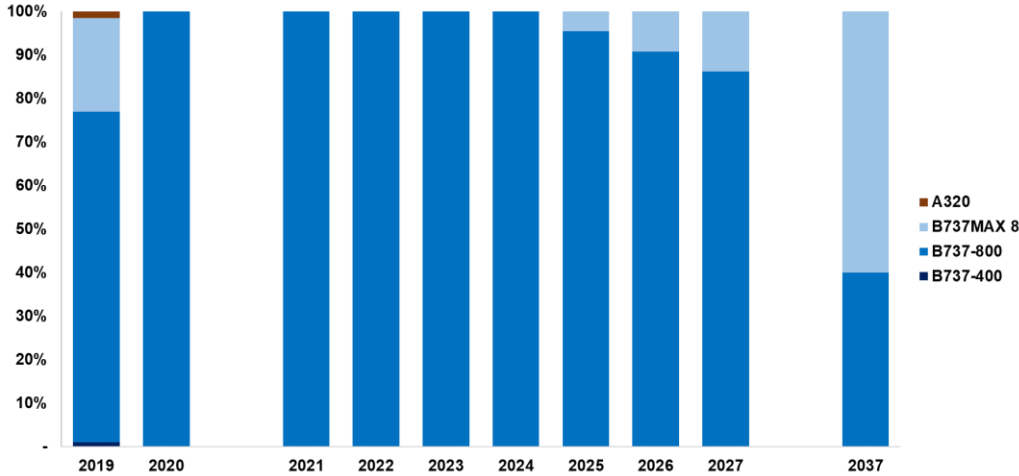


Aircraft	Details
A319	<ul style="list-style-type: none"> 2021: Increased share through the pandemic period. 2021-27: We <u>assume</u> a reversion to pre-pandemic share level in 2022. We <u>assume</u> the type is phased out such that by 2027 it no longer operates to/from DUB.
A220-100 / A220-200	<ul style="list-style-type: none"> 2021: This type is currently not operated by Air France, but the airline has an order for 60 aircraft, with deliveries scheduled from September 2021. 2021-27: We <u>assume</u> the A220-300 starts operating to DUB very soon after it is received into the fleet (effectively replacing the A319). Towards the latter end of the period, we <u>assume</u> entry of the A220-100 as E170/190 is phased out. 2028-37: We <u>assume</u> the A220-100 share grows and -300 share reduces.
E170 / E190	<ul style="list-style-type: none"> 2021: Increased share through the pandemic period, including capacity on wet lease. 2021-27: We <u>assume</u> some of this increased share is retained, as the aircraft is used in replacement for RJ85s previously operated for Air France by CityJet. 2028-37: We <u>assume</u> a small share retained through period.
A320 / A321	<ul style="list-style-type: none"> 2021: Reduced share through pandemic period. 2021-27: We <u>assume</u> reversion to pre-pandemic share level in 2022. We <u>assume</u> moderate growth in ATMs operated to/from DUB over the period. We <u>assume</u> replacement by neo equivalents begins towards the end of the period (no orders currently) for neo variants. 2028-37: We <u>assume</u> the gradually phasing out of aircraft by 2036, replaced by neo equivalents.
A320neo / A321neo	<ul style="list-style-type: none"> 2021: These aircraft types are currently not operated by Air France. 2021-27: We <u>assume</u> the aircraft will enter the fleet towards the end of this period and start services at DUB. 2028-37: We <u>assume</u> the neo aircraft will replace current generation aircraft fully by 2037.

In 2021 Norwegian operates a significantly reduced schedule as a result of both the pandemic and its revised business plan, which focuses on short haul primarily from Scandinavia... We assume Norwegian does not operate any widebody flights in the period to 2037.

Projected Norwegian PATMs Distribution at Dublin Airport by Aircraft Type
Narrowbody Aircraft Types

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

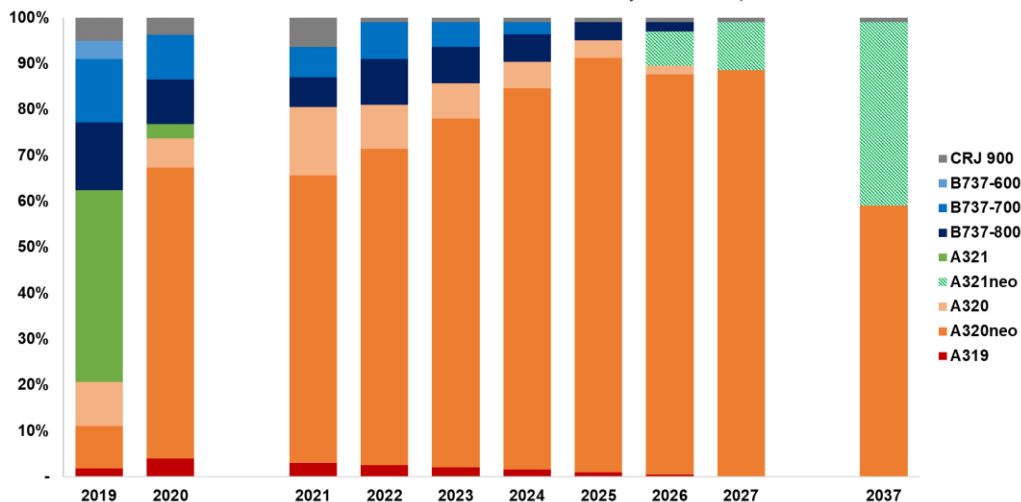


Aircraft	Details
B737-800	<ul style="list-style-type: none"> 2021: The only type in the current fleet. There are no orders. 2021-27: We <u>assume</u> over the forecast period that this aircraft will begin to be phased out and replaced with the B737 MAX8.
B737MAX 8	<ul style="list-style-type: none"> 2021: This aircraft is not in the current fleet. There are as yet no orders for this aircraft type. 2021-37: We <u>assume</u> that orders for this aircraft will be made as soon as is financially viable (due to superior operating economics).and that it will gradually replace the -800 version.

Summary of key assumptions for SAS at Dublin Airport.

Projected SAS PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

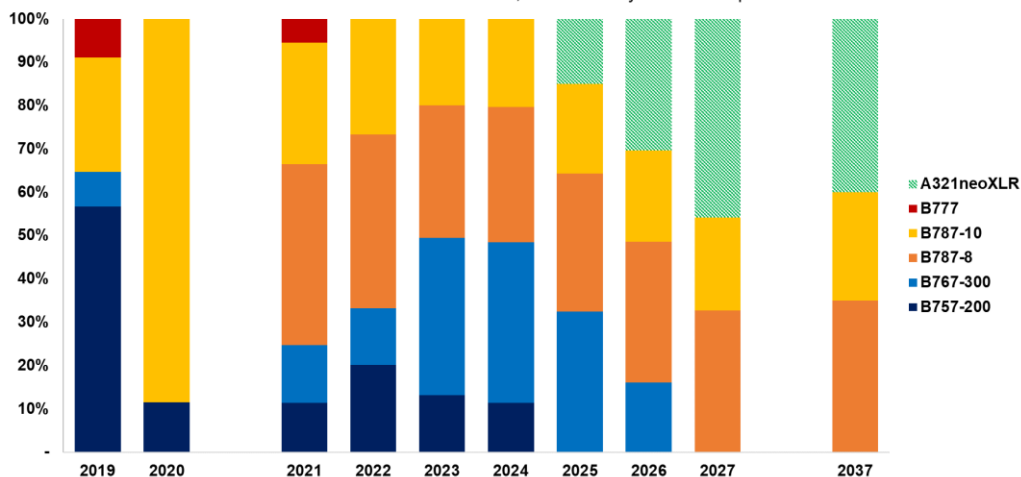


Aircraft	Details
CRJ 900	<ul style="list-style-type: none"> 2021: We <u>understand</u> that this aircraft is leased from CityJet. 2021-37: We <u>assume</u> that this aircraft will continue to serve at DUB throughout the forecast period, albeit at a smaller proportion of SAS flights, closer to historic performance.
B737-700	<ul style="list-style-type: none"> 2021: Average age of existing aircraft ca. 18yrs. The airline has announced its intention to operate a single-family narrowbody fleet (of A320neo aircraft). 2021-27: We <u>assume</u> the phase out of this aircraft before the end of the period.
B737-800	<ul style="list-style-type: none"> 2021: Average age of existing aircraft is 14yrs. The youngest aircraft is ca. 7yrs (Source: CAPA). 2021-27: The airline has announced its intention to operate a single-family narrowbody fleet (of A320neo aircraft)... We <u>assume</u> the phase out of this aircraft by the end of the period.
A321 / A321neo	<ul style="list-style-type: none"> 2021: A321 is not used in 2021 and we <u>assume</u> it is not used in future on the DUB route. A321neo is on order, but the LR version which is likely to be used for longer sectors. 2021-27: We <u>assume</u> that SAS will place orders for the A321neo (normal version) in to replace existing aircraft. We <u>assume</u> an entry on the DUB route towards the end of the period. 2028-37: Increasing proportion of ATMs operated by A320neo as demand increases.
A320 / A320neo	<ul style="list-style-type: none"> 2021: Significant share increase over pandemic period. 35 neo aircraft scheduled for delivery over period to 2026. Carrier has stated intention to operate primarily A320neo narrowbody fleet. 2021-27: We <u>assume</u> the recent increased share will be largely maintained and grow further through the period as a result of SAS fleet strategy. A320 will gradually be phased out and replaced with A320neo equivalents. 2028-37: We <u>assume</u> reducing mix of A320neo as larger-capacity A321neo is rolled out.
A319	<ul style="list-style-type: none"> 2021: Average age of aircraft ca. 15yrs. Small share in 2021. 2010-27: We <u>assume</u> this aircraft will be gradually phased out over this period due age.

Summary of key assumptions for United Airlines aircraft at Dublin Airport.

Projected United Airlines PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

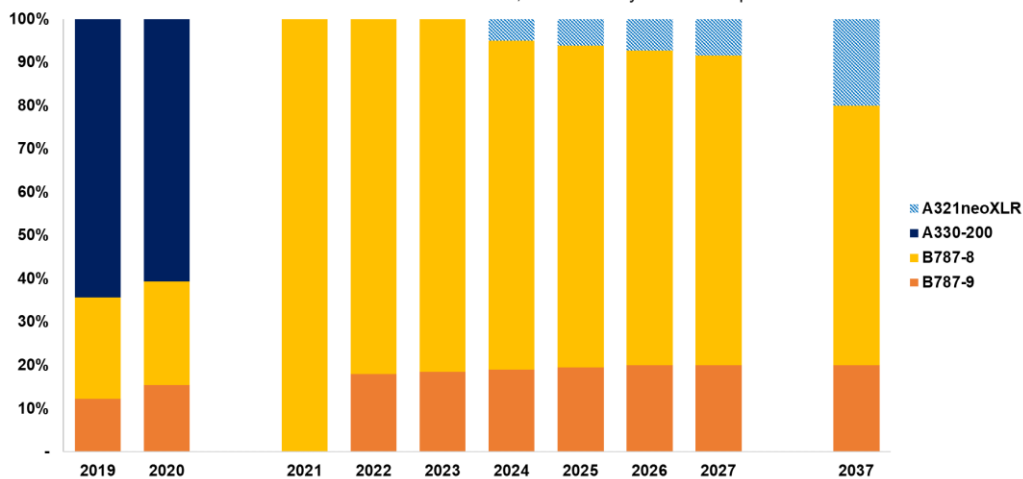


Aircraft	Details
B777	<ul style="list-style-type: none"> 2021: large fleet of -200 aircraft with a wide range of airframe ages. We <u>understand</u> that United has much newer -300ER fleet. The proportion of this aircraft being used by United at DUB has been declining (Source: OAG). 2021-27: We <u>assume</u> the aircraft is not used post 2021.
B757-200	<ul style="list-style-type: none"> 2021: Old aircraft, being replaced by 2024. 2021-27: We <u>assume</u> the aircraft will gradually get phased out before the end of the period.
B787-10	<ul style="list-style-type: none"> 2021: New airframes with further deliveries to come in 2022. 2021-37: We <u>assume</u> that the aircraft will carry on operating throughout the forecast period.
B787-8	<ul style="list-style-type: none"> 2021: Average age of existing aircraft ca. 8yrs. Type is used in place of retiring B757. 2021-37: We <u>assume</u> that the aircraft will carry on operating throughout the forecast period.
B767-300	<ul style="list-style-type: none"> 2021: Average age of existing aircraft over 20yrs. We <u>understand</u> that the aircraft are being fitted with new seats, with that investment indicating it will remain in service for some years to come. 2021-27: We <u>assume</u> the aircraft will carry on operating at DUB until the latter part of this period.
A321neoXLR	<ul style="list-style-type: none"> 2021: This type is currently not operated by United, but the airline has an order for 50 new A321neoXLR, scheduled for delivery in 2024 (source: United). 2021-37: We <u>assume</u> that United will start using the aircraft for services at DUB soon after it receives them from 2024.

Summary of key assumptions for American Airlines aircraft at Dublin Airport.

Projected American Airlines PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions

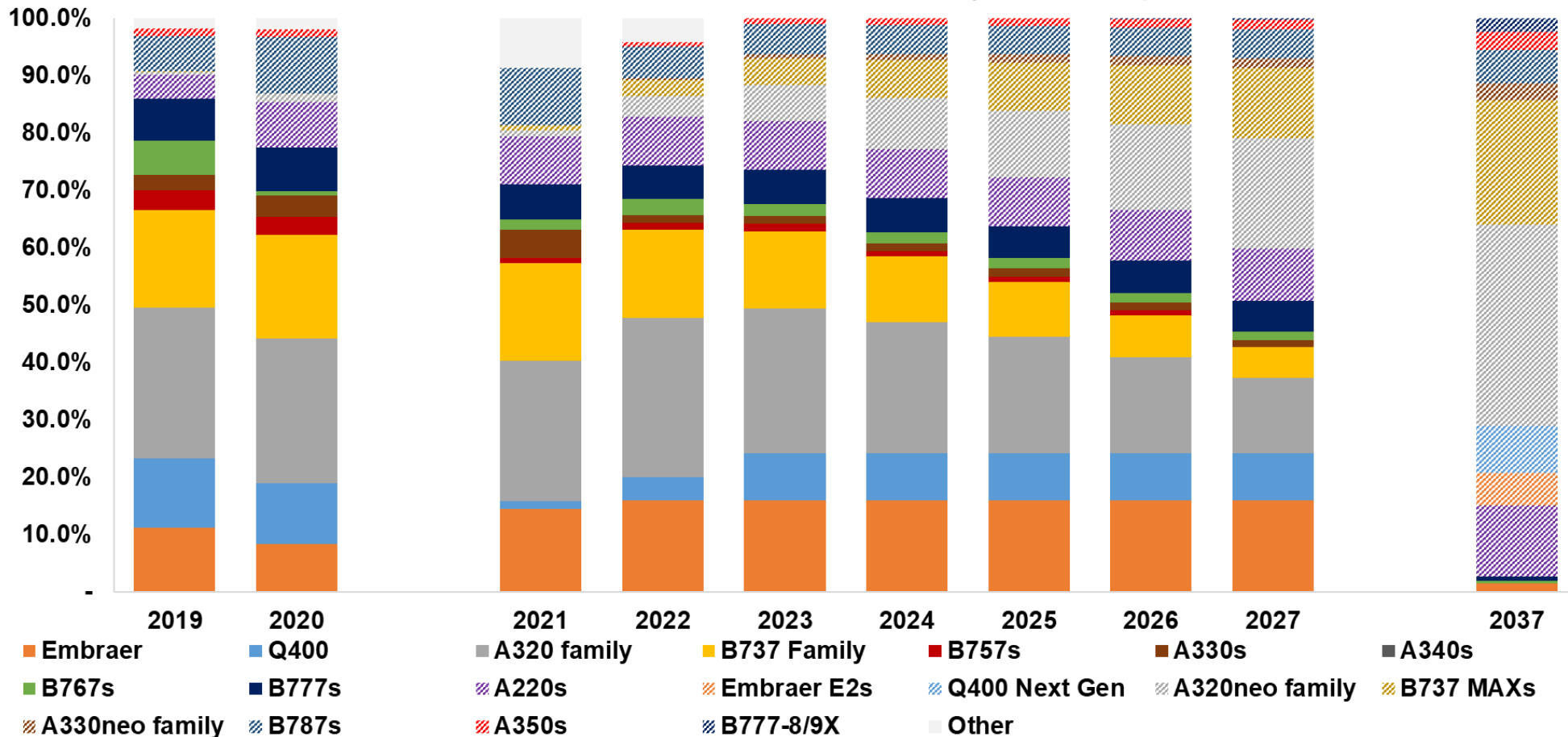


Aircraft	Details
A330-200	<ul style="list-style-type: none"> 2021: This type has been retired.
B787-8 / B787-9	<ul style="list-style-type: none"> 2021: B787-8 is the only aircraft being used on the route in the altered demand pandemic period. It has further deliveries scheduled over 2022-27. 2021-27: We <u>assume</u> that the aircraft share will continue to grow as the A330-200s are phased out.
A321neoXLR	<ul style="list-style-type: none"> 2021: This type is currently not operated by American, but we <u>understand</u> the airline has orders, scheduled for delivery between 2024-27. 2021-37: We <u>assume</u> that American will start using the aircraft for services at DUB throughout the forecast period.

We have modelled airlines outside the top 10 as a consolidated group... We assume the gradual replacement of old and current generation aircraft by their new generation equivalents.

Projected Other Airlines PATMs Distribution at Dublin Airport by Aircraft Type

Source: CAPA Centre for Aviation, Altitude Analysis & Assumptions





**Comments on Mott
MacDonald Reports**

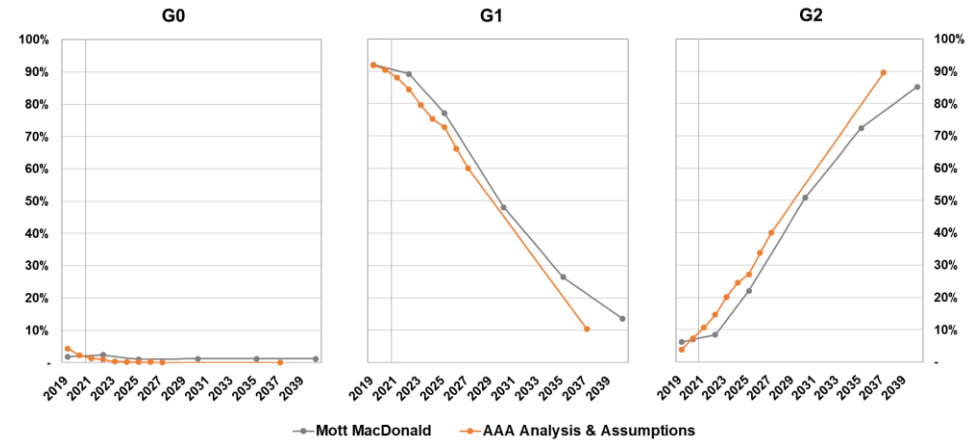
Appendix 3

The Mott MacDonald forecast ATM mix does not appear to be significantly out of line with our own view... There may be greater upside potential than downside risk in the forecast ATM growth rate in the mid-long term.

- We have been provided the following reports prepared by Mott MacDonald (MM):
Dublin Airport Operating Restrictions, May 2021 – version 1.2 (Final)
- While the report hints that the forecasts have been carried out in some detail, they convey relatively limited information as to the assumptions behind the unconstrained forecasts. On that basis it is hard for us to comment on the detail of the forecasts.
- The outcome by aircraft generation is presented, and we have aggregated our mix forecast to the same level (using the definition stated by MM on p29) and produced the comparison shown in the top right chart.
- Overall, our forecast has resulted in a similar mix change to that presented by MM.
 - We assume faster replacement of G1 aircraft with G2 aircraft in the first and last part of the forecast period, which may indicate scope for better noise performance (i.e. less noise generated by aircraft at the airport) than is implied by the MM forecast.
- Separately, a high level comparison of the MM forecast ATM growth vs historic ATM growth highlights a relatively low forecast growth rate especially in the mid-latter years of the forecast.
 - While the high growth rates over some of the historic period (particularly 2014-16) are not reflective of the level we would expect to see going forward, we still feel there is more upside potential than downside risk in the Mott MacDonald forecast long term.
 - Note that there is considerable uncertainty in the long term (e.g. the impact of climate change / climate-driven regulations on aviation are largely unknown).
 - Growth rates over the period 2020 to approximately 2025 are impacted by the pandemic and so not shown (2025 is the first year in the MM forecast in which 2019 ATMs are exceeded).

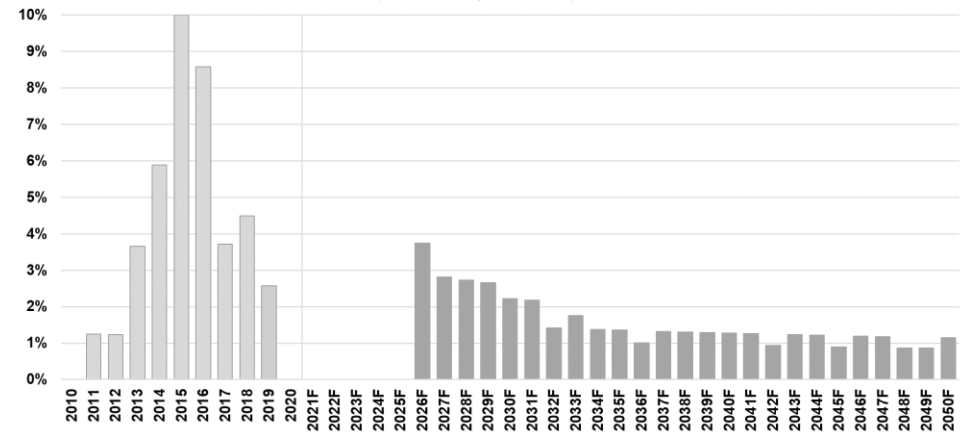
Aircraft Mix by Generation: Mott MacDonald Forecast versus Altitude Assumptions

Source: Dublin Airport Operating Restrictions, Altitude Analysis



Annual ATM Growth Rate at Dublin Airport
Comparison of Mott MacDonald Forecast Growth with Historic Growth
Mott MacDonald Unconstrained Centreline Case

Source: Dublin Airports Authority Annual Reports, Mott MacDonald





Comments on Potential Impact of Night Curfew at DUB

Appendix 4

An overly restrictive curfew at Dublin Airport has the potential to significantly impact airline operations, in particular profitability / future growth of low cost operators (Ryanair alone operates a significant proportion of capacity at DUB)... Competitiveness of Dublin as a hub and viability of some long haul routes to North America could also be negatively impacted.

Aircraft Utilisation

- Airlines, in particular low cost airlines which seek to maximise operational efficiency in order to offer low fares, seek to use their (expensive) aircraft assets as much as possible.
 - On any given day, they seek to maximise the number of sectors each aircraft operates.
 - For based aircraft, this usually requires early morning departures (from 06:00 onwards) and last flight sector returning back to the airport after 23:00.
- Having a fully utilised aircraft throughout the operational day, particularly in periods of peak demand, allows airlines to offer a balanced schedule with morning, lunchtime, and early evening departures.
- Not being able to return to the airport at night would have a knock on effect on the viability of other departures, particularly early evening flights which can negatively impact profitability of each aircraft's line of flying.
- As such, airport night time curfews can act to reduce airline profitability and make the airport less attractive for deploying capacity (compared to an airport with a limited or no curfew).
- Curfews can also negatively impact development of airline schedules where they need to be integrated into the available arrival and departure slots at destination airports.
 - This is particularly difficult for departures from popular holiday airports in the peak summer season when slot demand is high.
 - In these instances, reduced hours of operation at the home airport due to night time curfew restrictions reduces planning flexibility, and may even make a route impossible to operate on a commercial basis.

Hub Viability

- Aer Lingus has an established hub operation at Dublin. It is able to offer a range of long haul routes (primarily to North America) only because demand to/from Ireland is supplemented by demand to/from Europe.
- However, Aer Lingus must compete with direct services from major cities in Europe for the Europe-North America demand.
 - Direct services currently have an advantage in terms of flight time vs. connecting over a hub such as Dublin.
 - Aer Lingus attempts to offset this advantage through competitive pricing and having US pre-clearance at Dublin.
- An overly restrictive curfew would potentially result in an additional competitive disadvantage for Aer Lingus:
 - Direct services are able to offer overnight flights from North America that give a full working day in Europe.
 - Aer Lingus currently matches this proposition by having flights from North America arrive in Dublin very early in the morning. Europe-bound passengers can then connect on an early departure flight from Dublin to their final destination.
 - An overly restrictive curfew may result in Aer Lingus not being able to match the 'whole-day-in-Europe' proposition of direct North America–Europe services.
- Offsetting this new disadvantage through pricing is likely to diminish the profitability of long haul services, potentially to the point that some are no longer viable which could lead to reduced connectivity for the Irish market.