

**TR020002-002459-7.4 Azimuth Report, Volumes 1 to 4**

Project Name: Manston Airport Development Consent Order

Regulation: Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, as amended

Date: July 2018

Author: Dr Sally Dixon, Azimuth Associates

**Volume III – The forecast**

Dated July 2018

# NNF08 – a critique by No Night Flights

February 2019



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## Introduction

1. The Planning Act 2008 sets out the criteria by which the Planning Inspectorate must assess any application for a Development Consent Order (**DCO**) for a Nationally Significant Infrastructure Project (**NSIP**). The key criterion for RiverOak Strategic Partners' (**RSP**) potential DCO application is that RSP's project should be "*expected to have the effect*" of increasing "*by at least 10,000 per year the number of air transport movements of cargo aircraft for which the airport is capable of providing air cargo transport services*".<sup>1</sup>
2. We appreciate that, in major projects, submissions by residents are often given less weight than the documentation presented by the developer. However, we have taken great pains to base our critiques on hard evidence. We have demonstrated conclusively that Dr Dixon's work in support of RSP's proposal is unsound. Given that, it would not be safe for the Planning Inspectorate to assume that our evidence can be given little weight.
3. This document is a critique by No Night Flights (**NNF**) of the **third** volume of Dr Dixon's work – "**Azimuth III**". We show the core of Dr Dixon's long-term forecasting to be flawed beyond use. We describe further fundamental flaws, highlighting her reliance on arbitrary and unexplained assertions, and her misrepresentation of quoted sources. Dr Dixon's forecasts in Azimuth III are unusably unreliable.
4. Azimuth III has been through three editions:
  - **1<sup>st</sup> edition**, dated March 2017, available for the public consultation that ran from 12<sup>th</sup> June 2017 to 23<sup>rd</sup> July 2017.
  - **2<sup>nd</sup> edition**, dated January 2018, available for the public consultation that ran from 12<sup>th</sup> January 2018 to 16<sup>th</sup> February 2018.
  - **3<sup>rd</sup> edition**, dated July 2018, that has not been consulted on. This document forms part of the submission that the Planning Inspectorate is examining from 10<sup>th</sup> January 2019.

## The heart of the matter

5. Azimuth III is a key document in RSP's proposal, because it is the source of the forecasts of freighter air traffic movements.
6. The forecast number of freighter Air Traffic Movements (**ATMs**) is – literally – the be all and end all of RSP's proposition. It determines whether the airport could be viewed as "*nationally significant*", and thus determines whether the DCO application is capable of being approved. It underpins each phase of RSP's business plan, driving the requirements for aircraft stands, warehousing, truck parking, cargo handling, fuelling, staffing and so on.
7. Everything depends on freighter ATMs. Indeed, RSP's entire proposal can be thought of as an inverted pyramid, precariously balanced on a single stone – the forecast number of freighter ATMs. That forecast comes from Azimuth III.

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<sup>1</sup> Planning Act 2008 section 23 (5)(b)

8. Dr Dixon's forecast separates Years 1-10 (in her terminology, the short-term and medium-term) and Years 11-20 (the long term). We have no sight of how Dr Dixon calculates the numbers for Years 1-10 – they are drawn solely from Dr Dixon's assessment of the inputs from her panel, as described in her section 2.2. We have summarised the results of Dr Dixon's Year 2-10 analysis in Table 2 on p7.
9. Dr Dixon's "*qualitative methodology*" doesn't lend itself to scrutiny – we'll never know what convinced Dr Dixon to commit to precisely this pattern of growth forecast, and that level of precision. Relying on these forecasts is an act of faith.
10. However, we *can* scrutinise Dr Dixon's **long-term forecast**, because it is a mathematical extrapolation, based on a multiplier, from the last year of the medium-term forecast. Dr Dixon has published three versions of this exercise – and each of the three editions of Azimuth III has had a different source for the multiplier. The key paragraph containing the multiplier is sign-posted elsewhere in each version the report (coincidentally with the same paragraph numbers in all three versions):
  - para 2.3.2 "[...] *Therefore, from Years 11 to 20 an annual percentage growth has been applied to the figures derived for Year 10.*"
  - para 3.1.1 "[...] *From Year 11, an incremental growth rate of 4% per annum has been applied (see Section 2.3 for full details).*"
11. None of the three editions of Azimuth III has had a coherent rationale for the multiplier, and Dr Dixon has been haphazard in her sourcing of the multiplier: in the 1<sup>st</sup> edition by misquoting a report; in the 2<sup>nd</sup> edition by misunderstanding a flawed model; and in the 3<sup>rd</sup> edition by making it up. Remember – Dr Dixon is RSP's hand-chosen expert and her forecasts are the foundation of RSP's proposals.

### 1<sup>st</sup> edition – March 2017

12. In this edition of Azimuth III, Dr Dixon claimed to take her multiplier (for the **annual increase in freighter ATMs** at Manston) from an Airbus report – mistakenly, as it turns out. On her page 7:
13. *"However, to be conservative, and in line with the Airbus forecast, a 4% uplift on the Year 10 figures has been applied to extrapolate the long-term forecast for Manston Airport."*<sup>2</sup>
14. The Airbus report that Dr Dixon mentions was referenced earlier in her document, on page 4:
15. *"Boeing's traffic and market outlook describes an air cargo market recovery that began in 2014. Their market outlook 2016-2035 (Boeing, 2016a) forecasts air cargo traffic, measured in revenue tonne-kilometers, at 4.2% although there are differences between the forecasts for regional pairs. For example, Asia-Europe is forecast to show growth of 4.6% (Boeing, 2016b, p. 16). **Airbus forecast growth at 4% globally (Airbus, 2016).** The Boeing and Airbus forecasts are based on the opinions of experts who summarise the world's major air trade markets and identify key trends. These organisations*

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<sup>2</sup> Azimuth III, March 2017, para 2.3.3

*present comprehensive forecasts between and within each of the air freight markets as well as for the world freighter airplane fleet.”<sup>3</sup> [emphasis added]*

16. The citation is expanded in her bibliography, on page 19:
17. *“Airbus (2016), Global Market Forecast: Mapping demand 2016/2035. Available from <http://www.airbus.com/company/market/global-market-forecast-2016-2035/> (accessed 2 February, 2017).”<sup>4</sup>*
18. **There is no reference in the document cited by Dr Dixon to 4% global growth**, of freighter ATMs or of anything else.<sup>5</sup> The document mostly focusses on passengers and on Revenue Passenger Kilometres (**RPK**). It occasionally mentions freight aircraft, but makes no mention of ATMs. We have reproduced this document at Appendix A.
19. The figure of “4% uplift” that Dr Dixon is using in this March 2017 version of her report has no basis in fact – it is Dr Dixon’s fiction – but Dr Dixon and RSP were happy to publish it as the cornerstone of their proposals in March 2017.

## 2<sup>nd</sup> edition – January 2018

20. In this edition of Azimuth III, Dr Dixon’s search for a multiplier (for the **annual increase in freighter ATMs** at Manston) took her to the Department for Transport, where she got rather badly lost. On her page 8:
21. *“The most recent DfT figures show that:*
22. *“Total freight carried at the UK airports in the department’s model rose from 2.9 million tonnes in 2011 to 3.1 million tonnes in 2016, with a growth of 4% in cargo tonnage on freighter aircraft and 5% increase in bellyhold freight on passenger aircraft.” (DfT, 2017, p. 67)*
23. *Whilst there was an 8% growth rate in the dedicated freighter segment between January and August 2017 and 12.5% growth year-on-year to July in the UK, coupled with the potential for current reporting to underestimate the success of the airfreight industry, the DfT figure of 4% has been used to uplift on the Year 10 figures to extrapolate the long-term forecast for Manston Airport.”<sup>6</sup>*
24. Closer examination of these few lines reveals Dr Dixon’s poor methodology, poor choices, poor understanding and poor maths.

## Methodology

25. Dr Dixon is guilty of misrepresentation through partial quotation – cherry-picking. Dr Dixon ignores the first half of the DfT paragraph that she quotes. In full, it reads:
26. *“4.4 Freight, in terms of both tonnage and numbers of aircraft movements, has not kept pace with the growth in passenger numbers. In 2011 (77%) and 2016*

<sup>3</sup> Azimuth III, March 2017, para 2.1.10

<sup>4</sup> This is a better link: <https://www.airbus.com/content/dam/corporate-topics/financial-and-company-information/GMF.pdf>  
For completeness, and verifiability, the Airbus document is attached at Appendix A.

<sup>5</sup> Closest matches: **Page 35** “Airbus GMF 2016: 4.5% growth p.a.”; in RPK (Revenue Passenger Kilometres); **Page 36** refers to CIS having a 4% share of 2015 and 2035 world RPK; **Page 36** “20-year world annual traffic growth 4.5%”, in RPK.

<sup>6</sup> Azimuth III, January 2018, para 2.3.6

*(78%) most freight by tonnage is carried in the holds of passenger aircraft ('bellyhold'). Total freight carried at the UK airports in the department's model rose from 2.9 million tonnes in 2011 to 3.1 million tonnes in 2016, with a growth of 4% in cargo tonnage on freighter aircraft and 5% increase in bellyhold freight on passenger aircraft."* <sup>7</sup> [emphasis added]

27. By omitting the first half of the paragraph, Dr Dixon ensures her audience is ignorant of the fact that the freighter share of tonnage **shrank** from 23% to 22% between 2011 and 2016, which continues the long-term trend – actual UK air freight tonnage shifted by dedicated freighters has fallen by over 13% since 2004. The percentage of air freight in the UK market that is shifted by dedicated freighters has fallen by 22.6% since 2004.
28. It is worth bearing in mind that the monthly CAA data on freight tonnage (and everything else) is consumed avidly and analysed minutely throughout the aviation industry – it is the league table of UK aviation. These long-term trends haven't suddenly become apparent with hindsight – the industry will have been watching, month after month, as each trend developed. Dr Dixon should have been well aware of the reality of the situation when writing her reports. RSP's business case is explicitly centred on the freighter market, but dodges the fact that this market is small and shrinking.

### Choices

29. Dr Dixon has chosen to rely on this DfT model, and offers no explanation for ignoring its obvious flaws. Neither Dr Dixon nor the DfT offer any explanation as to why the numbers generated by the DfT model for 2011 and 2016 were so far adrift from the known **actual** figures produced at the time.

	2011 tonnes	2016 tonnes	Increase
<b>Prediction</b> (DfT's model)	2,900,000	3,100,000	6.9%
<b>Actual data</b> (CAA)	2,297,587	2,385,230	3.8%

30. Clearly, the DfT's model is not grounded in reality, and produces significantly inaccurate forecasts, but Dr Dixon has chosen to adopt their figure of 4% freighter tonnage growth and apply it to her long-term forecasts for Manston.

<sup>7</sup> Department for Transport, UK Aviation Forecasts (Oct 2017) p67

Table 2: Dr Dixon's forecast

	Freight ATMs	Year/Year Increase
<b>Y1</b>	0	n/a
<b>Y2</b>	5,252	n/a
<b>Y3</b>	5,804	<b>10.5%</b>
<b>Y4</b>	9,700	<b>67.1%</b>
<b>Y5</b>	9,936	<b>2.4%</b>
<b>Y6</b>	10,144	<b>2.1%</b>
<b>Y7</b>	10,872	<b>7.2%</b>
<b>Y8</b>	11,184	<b>2.9%</b>
<b>Y9</b>	11,392	<b>1.9%</b>
<b>Y10</b>	11,600	<b>1.8%</b>
<b>Y11</b>	12,064	<b>4.0%</b>
<b>Y12</b>	12,547	<b>4.0%</b>
<b>Y13</b>	13,048	<b>4.0%</b>
<b>Y14</b>	13,570	<b>4.0%</b>
<b>Y15</b>	14,113	<b>4.0%</b>
<b>Y16</b>	14,678	<b>4.0%</b>
<b>Y17</b>	15,265	<b>4.0%</b>
<b>Y18</b>	15,875	<b>4.0%</b>
<b>Y19</b>	16,510	<b>4.0%</b>
<b>Y20</b>	17,171	<b>4.0%</b>

31. Dr Dixon chooses 4% as her multiplier rather than either of the other (higher) percentages she mentions in her paragraph 2.3.6. Again, no explanation is offered.

### *Understanding*

32. Although the figure of 4% is the output of the DfT's flawed model, and is explicitly set out as "*growth of 4% in cargo tonnage on freighter aircraft*", Dr Dixon takes this modelled growth in **tonnage** and turns it into projected growth in freighter **ATMs**. This makes no sense.
33. Dr Dixon doesn't appear to understand what the numbers she is working with actually mean. She has latched on to the 4% figure for growth in cargo tonnage carried on freighters, and applied it to her forecast for growth in ATMs, as if tonnes and ATMs were interchangeable – they're not, of course.
34. Dr Dixon doesn't understand the significance of recent history when forecasting – but the DfT does. The DfT accepts the reality of "*national decline in recent decades*", and makes it clear that the expectation is for **no growth in freighter ATMs for the next 30 years**. The relevant recent paragraph from the DfT, in that it directly addresses the question of freighter ATMs, is this:
35. *"Freight is not modelled in detail. An assumption about the number of freighter ATMs is nevertheless required in the model as freighters potentially affect the space for passenger ATMs available where capacity constraints exist and, as discussed in Chapter 3, CO<sub>2</sub> emissions.<sup>31</sup> At the airport level the number of*



*freighter movements has been volatile with some evidence of overall national decline in recent decades. In the absence of clear trends for individual airports, the modelling now assumes that **the number of such movements will remain unchanged from 2016 levels at airport level across the system.** [until 2050]"<sup>8</sup> [emphasis added]*

36. Dr Dixon also doesn't understand the clear message from the historical data. Freighter ATMs in the UK dropped 53% between 2000 and 2016 (from 110,371 to 51,839) according to the CAA figures. Despite the fact that this is evidently a shrinking market, Dr Dixon forecasts two decades of continuous growth at Manston.

### Maths

37. The DfT's figure of 4% describes growth over a period of five years (2011-2016) but Dr Dixon applies it **annually**, meaning that the growth in her long-term forecast is absurdly exaggerated. This is a very basic failure in maths, and (presumably) also a failure in checking, and a failure in the peer-reviewing process.
38. The "DfT figure of 4%" that Dr Dixon refers to in this version of her report is simply a misunderstood number from a demonstrably inaccurate model, which Dr Dixon then misuses by misapplying it, five-fold, to her own "qualitative" forecast.

### 3<sup>rd</sup> edition – July 2018

39. In this edition of Azimuth III, the search for a multiplier (for the forecast **annual increase in freighter ATMs** at Manston) takes Dr Dixon back to the realms of fiction.
40. The paragraph about Airbus that Dr Dixon misquoted in the 1<sup>st</sup> edition is still in the document (at para 2.1.11) but Dr Dixon now ignores it.
41. The paragraph about the DfT model that Dr Dixon so completely misunderstood in the 2<sup>nd</sup> edition is still in the document (at para 2.3.6) but Dr Dixon now ignores it.
42. In this 3<sup>rd</sup> edition of her report, Dr Dixon no longer tries to provide a valid independent source for her favourite figure of 4% – she simply plucks it out of thin air:
43. *"In summary, there was an 8% increase in the number of freighters between 2010 and 2015, and a 9% growth in FTKs in the dedicated freighter segment in 2017 globally and in the UK. In the absence of global and European cargo-only ATM forecasts, these indicators are used as a proxy guide to future performance in the sector. The full impact of e-commerce is yet to be felt but, to be conservative, **a 4% uplift has been used to extrapolate Year 10 figures** to provide the long-term forecast for Manston Airport."*<sup>9</sup> [emphasis added]
44. **This is important.** Dr Dixon cannot claim that her 4% annual multiplier for freighter ATMs at Manston is independently sourced or corroborated, or is justifiable. Dr Dixon's long-term forecast is **not** "quantitative" – it is just as opaque and unverifiable as her other "qualitative" predictions. Moreover, there was not an increase of 8% in UK dedicated freighter ATMs between 2010 and 2015. In fact, the annual UK

<sup>8</sup> Department for Transport, UK Aviation Forecasts (Oct 2017) p33 para 2.56

<sup>9</sup> Azimuth III, July 2018, para 2.3.7



dedicated freighter total contracted slightly during that period with the 2015 total being just 98.9% of the 2010 figure.

## Dr Dixon's Methodology Flaw

45. Dr Dixon asserts that her previous report, Azimuth II, “*showed that a qualitative approach was the most appropriate method through which to gather data on the potential demand for an individual airport*”<sup>10</sup> and that “*it was necessary to convert this information into a quantitative forecast*”<sup>11</sup>. Dr Dixon tells us that this could be achieved by attributing a portion of the freight forecasts (e.g. from Eurostat and DfT) to Manston, but dismisses this approach because of “*the difficulty in identifying a realistic formula by which to divert air freight to Manston*”.<sup>12</sup>
46. Dr Dixon tells us that her preferred approach to forecasting is “*to take a qualitative approach focused on collecting market data [which] allows base data to be derived from a method that takes account of how commodities are currently transported and how they are likely to be transported in the near future.*”<sup>13</sup> [emphasis added]
47. Thus Dr Dixon's preference is to avoid the challenge of using a “*realistic formula*” in favour of guessing the “*likely*” future behaviour of freight operators. This is not a sound basis from which to derive forecasts that are intended to support the assertion that Manston will be a nationally significant freight airport.
48. Dr Dixon seeks to support her assertion that forecasting freight is problematic by quoting Ishutkina.<sup>14</sup> Inexplicably, Dr Dixon relies on an unpublished document, so we are obliged to take this logical *non sequitur* as it stands. What is it? Taken in isolation – as it is in her report – the Ishutkina quote is irrelevant. The argument appears to be that the very existence of pan-global carriers such as UPS makes it impossible to analyse the freight flows for any country accurately. There is no further explanation.
49. The simple fact, as Dr Dixon is aware, is that the CAA **does** record accurate monthly data on UK air freight, including that carried by UPS etc. This data does not show wild fluctuations or random variations, but does show trends that reflect the global, national and regional realities of the time. Dr Dixon offers no explanation for not using this readily available historical data, and in doing so ignores this sound advice from one of her quoted sources (ACI-NA):
50. “*Historical data factors show how an airport's traffic has evolved and will serve as the starting point for the development of comprehensive forecasts. A review of recent trends also identifies those factors, which have, or in the future might, influence future traffic volumes. It is suggested that **at least the same number of years of historical data be used as the time horizon of the forecast.***”<sup>15</sup> [emphasis added]
51. Dr Dixon does not use **any** of the available historical data – let alone the last 20 years' worth – to inform her 20 year forecast. She does not explain this decision.

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<sup>10</sup> Azimuth III, July 2018, para 2.1.2

<sup>11</sup> Azimuth III, July 2018, para 2.1.3

<sup>12</sup> Azimuth III, July 2018, para 2.1.3

<sup>13</sup> Azimuth III, July 2018, para 2.1.4

<sup>14</sup> Azimuth III, July 2018, para 2.1.1

<sup>15</sup> ACI North America (2013), Air Cargo Compendium: Chapter 3: Demand Forecasting Techniques. para 5.1.3

52. Dr Dixon does not use any of the “*well developed*”<sup>16</sup> methodologies for forecasting passenger air travel that she mentions, preferring to apply her own “*qualitative*” approach to passenger forecasting (sections 2.4 and 2.5). Dr Dixon does not explain this decision.
53. Dr Dixon seems to be overly keen to project and superimpose global figures not just onto the UK, but onto a single airport. In fact the smoothed, averaged, global picture rarely reflects *any* of the local realities. The global figures in the reports that Dr Dixon relies on stand in stark contrast to the **actual** figures for the UK.
54. *In para 2.1.12, Dr Dixon quotes Boeing: “freighters are expected to continue carrying more than half of global air cargo traffic” [emphasis added]*
55. In fact, in the UK, **less than 30%** of air freight is carried in freighters.<sup>17</sup>
56. *In para 2.3.4, Dr Dixon quotes Boeing: “World air-cargo volume [...] grew an average of 5.2 percent per year over the last three decades.” [emphasis added]*
57. In fact, in the UK, freight tonnage grew an average **3.4 percent per year** over the last three decades, and has **stagnated** at around 2.3 million tonnes for the last 17 years.<sup>18</sup>

## Dr Dixon’s FTK Flaw

58. Dr Dixon places great reliance on reports from Airbus, Boeing and IATA to support her forecasts.<sup>19</sup> This is a fundamental flaw because **the freight predictions from Airbus, Boeing and IATA are all about “how much and how far”, and have nothing to do with “how many flights”**.
59. Airbus, Boeing and IATA all frame their freight predictions in terms of **Freight Tonne Kilometres (FTKs)**. Thus, in their terms, 100 tonnes carried 1,000 kilometres is equivalent to 1,000 tonnes carried 100 kilometres, but is ten times more significant than 100 tonnes carried 100 kilometres.
60. Critically, FTKs make no reference to, and have no implications for, Air Traffic Movements (ATMs). Any projected growth in FTKs might be achieved with half the number of ATMs, or with double the number of ATMs.
61. Dr Dixon makes the critical and fundamental error of focussing on the forecasts for growth in FTKs (and RTKs)<sup>20</sup> and mistakenly assuming they will translate into growth in freight ATMs.<sup>21</sup> Dr Dixon then compounds this error by using these spurious ATM figures as a basis for her forecast of tonnage.<sup>22</sup>
62. Dr Dixon repeats these errors in her passenger forecasts, invalidly translating a projected growth in Revenue Passenger Kilometres (RPKs) into a projected growth in passenger ATMs, and hence passenger numbers.<sup>23</sup> Curiously, Dr Dixon once

<sup>16</sup> Azimuth III, July 2018, para 2.1.1

<sup>17</sup> CAA figures (2016): 2,382,271 tonnes in total, 706,195 tonnes by freighter, i.e. 29.6%

<sup>18</sup> CAA data: 1986 total freight 881,202 tonnes; 2016 total freight 2,382,909 tonnes.

<sup>19</sup> Azimuth III, July 2018, paras 2.1.10, 2.1.11, 2.1.12, 2.3.3, 2.5.2

<sup>20</sup> Azimuth III, July 2018, paras 2.1.10, 2.1.11, 2.3.4, 2.3.7, 3.2.3

<sup>21</sup> Azimuth III, July 2018, para 3.1.2 Table 2

<sup>22</sup> Azimuth III, July 2018, paras 3.2.2 Table 3, 3.2.3, 3.2.4 Table 4

<sup>23</sup> Azimuth III, July 2018, paras 2.5.2, 4.0.3

again chooses 4% as her multiplier for long-term growth, and once again, there's no rational explanation for that choice.

63. **A forecast increase in FTKs cannot be equated to an increase in ATMs.**

## Dr Dixon's Arbitrary and Unexplained Assertions

64. Azimuth III is littered with unexplained assertions, and numbers apparently picked from thin air.

### In the Executive Summary

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65. ***"in the South East of the UK where aviation industry demand is highest and most constrained"***

66. Dr Dixon produces no evidence in this report that aviation demand in the south-east as a whole is "constrained".
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67. ***"The airport has a long runway"***

68. The length of the runway is significant in that it means that Manston could accept some of the largest and heaviest planes – "Class F" as Dr Dixon describes them. This category accounts for less than 2% of ATMs and 7% of tonnage in Year 20. Of course, the airport had "a long runway" between 1999 and 2014 and it still failed to become a successful cargo airport.
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69. ***"an ideal airspace location"***

70. Dr Dixon does not clarify what makes Manston's airspace "ideal". Any benefit from the airspace presently being empty – because the airport is shut – would clearly be lost should the airport reopen. We note the comment in the DfT's report of the SERAS study:

71. *"Although there are no local airspace restrictions, Manston lies beneath some of the busiest cross channel airways giving access to Europe and so movements would need to share airspace capacity with heavy traffic flows to and from the main London airports."* <sup>24</sup>
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72. ***"benefits from easy surface access to London and the rest of the UK"***

73. In practice, this involves 25km of A299 before joining the M2. There is no analysis of how "easy" this will be when this route has to carry the additional load of HGVs resulting from filling, emptying and fuelling the thousands of additional freighters a year that RSP must deliver to meet the NSIP criterion.

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<sup>24</sup> SERAS Stage Two appraisal findings report – April 2002

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74. ***“can provide rapid handling and turnaround times for air freight”***

75. Dr Dixon refers to the rapid turnaround times that Manston has achieved when handling one or two planes a day. There is no evidence that this could be maintained at higher volumes – in fact, the longer turnaround times at other, busier, airports suggests that it can’t.

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76. ***“Exports are forecast to slightly exceed imports, particularly in the early years of operation.”***

77. Dr Dixon provides no explanation as to why she believes exports would exceed imports. Historically, they never have. As pointed out in the Falcon report to TDC:

78. *“It is however clear that whilst across the UK around 5 per cent of businesses have the potential to export, in Thanet this figure is half (2.5%). This can be partly explained by foreign ownership figures which are lower than the UK average, although given the presence of Ramsgate Port and Manston Airport provided easy access to overseas markets we might expect this figure to be higher.”*<sup>25</sup>

79. When Manston was operational, planes typically departed empty.<sup>26</sup> There is no basis for Dr Dixon to assert that they will depart more full than they arrived.

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80. ***“Manston is also strategically well located to play a vital role in the supply chain that will be stimulated by initiatives such as the proposed Lower Thames Crossing”***

81. Again, assertion without explanation, and entirely without evidence. There is no date for the delivery of the Lower Thames Crossing.

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82. ***“Manston is capable, in terms of its geographic and airspace position, of making a substantial contribution”***

83. Dr Dixon is blind to the fact that Manston’s geographical location is its fatal weakness – it is peripheral, and has a small catchment area with weak demand for exports as well as for passengers, as evidenced by its consistent commercial failure.

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84. ***“the opening of Heathrow’s third runway will not hamper Manston’s viability”***

85. The assertion that massive additional capacity (for passenger *and* freight) at the world’s favourite UK airport won’t hamper plans for a re-opened airport at Manston is wholly unrealistic. As we point out in our critique of Azimuth I:

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<sup>25</sup> Falcon Consultancy, “Expert opinion on the prospects for the viable development of Manston Airport” (2014), p30.

<sup>26</sup> AviaSolutions, Commercial Viability of Manston Airport 2016, section 6.3

86. *"By treating the prospect of a third runway at Heathrow as something of negligible importance, Dr Dixon fundamentally undermines her conclusion that there is a need for a new dedicated cargo hub at Manston to provide an additional 10,000 cargo ATMs every year. Put simply, she has failed to consider what massive expansion at the UK's biggest cargo airport could do to the future shape and size of the UK cargo market as a whole."*<sup>27</sup>
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87. ***"Driven by the lack of capacity at south east airports, passenger numbers at Manston Airport are forecast to commence at around 660,000 per year"***

88. This is the first mention of lack of passenger capacity, and with it comes the assertion that the first year's traffic at Manston will be more than three times the level achieved in its all-time peak year. Dr Dixon asserts that LCCs, charter flights and cruise passengers will account for this huge number of passengers, again, without evidence. Dr Dixon provides no explanation as to why Manston didn't ever benefit from this demand when it was open.
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89. ***"the UK simply cannot afford to lose one of its long-serving airports"***

90. Once again, Dr Dixon is blind to the facts – the UK has already lost this airport. Manston closed nearly four years ago after 15 years of commercial operation, with no discernible national impact.
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## In the body of the report

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91. ***1.1.1 "Unmet demand for freight carrier slots in the South East"***

92. Dr Dixon provides no evidence in this report of *"unmet demand"*, nor does she explain why Manston failed to attract this *"unmet demand"* when it was open.
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93. ***1.1.2 "using a qualitative method, identified from the literature review as a more reliable means of forecasting"***

94. Dr Dixon doesn't say which literature supports her assertion that a qualitative method is more accurate.
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95. ***2.1.1 "As Ishutkina, MIT International Center for Air Transportation (ICAT), says"***

96. It is unacceptable in a document of this importance to rely on an *"unpublished PhD thesis"*, as Dr Dixon does here. We must question the quality of the peer-reviewing of Dr Dixon's work.
- 

<sup>27</sup> From the NNF critique of Azimuth I.

---

97. **2.1.14 “Freight airlines do not publish timetables [...] This makes gathering base data difficult and forces a number of assumptions to be made”**

98. This is plainly nonsense. A timetable is **not** required in order to gather data – all the relevant data is published monthly by the CAA online.

---

99. **2.2.2 “The qualitative data collected for this research and discussed in Volume II of this series of reports, highlights the ‘push’ and ‘pull’ factors that are likely to drive demand for Manston Airport.”**

100. Dr Dixon relies on anecdotal, subjective, unquantified factors to support her assertions. Dr Dixon’s suggestion that the “*current dominance of belly freight in the UK*” might change is unevidenced and absurd. It is economically inevitable that bellyhold, being subsidised by passenger fares, will be cheaper than dedicated freighters, so much so as to marginalise the freighters into niche markets. On another note, Dr Dixon thinks that the “*geographic location of the airport*” will “*work to attract customers*”. Here she is ignoring the results of numerous analyses and reports, and the evidence of history – Manston has always been in its current location, and it has always failed to attract customers.

---

101. **2.2.3 “[...] the current UK air freight model is for shippers to preference belly-freight [...] The qualitative research [...] describes the frustrations associated with this model [...] It seems likely, therefore, that the model will change”**

102. What Dr Dixon describes as a “*model*” is what the rest of us would describe as “**reality**”. The reality is that shippers prefer bellyhold – because it’s so much cheaper and because it offers a wide range of routes and destinations. They willingly tolerate occasional inconvenience, as evidenced by the fact that bellyhold has had a growing share of the UK market since the late 1990’s, and the fact that it now accounts for over 70% of UK air freight. The facts lend the lie to Dr Dixon’s assertions.

---

103. **2.2.5 “qualitative research also indicated a number of potential markets for Manston Airport”**

104. With the exception of freighting live animals,<sup>28</sup> none of these markets have any reason to favour Manston over any other airport. Some are so niche as to be negligible – how often would parts for the oil and gas industry be freighted through Manston, given that the airport is nowhere near the end customer?

---

105. **2.2.7 “Tonnage figures have been calculated from the maximum payload for each aircraft type and multiplying by 65%”**

106. Dr Dixon provides no evidence that this is achievable. CAA Statistics 2016, Table 13.2 and Table 14 for East Midlands Airport (EMA), the main dedicated

---

<sup>28</sup> Manston’s previous owners, Infratil, built an Equine Border Inspection Post.



freight hub in UK, state that 19,357 dedicated freighter ATMs accounted for 300,101 tonnes of cargo – an average payload of 15.5 tonnes per ATM. The equivalent value for Stansted (the 2<sup>nd</sup> ranked dedicated freight airport) was 19.8 tonnes. A realistic assumption for any evidence based forecast would be no more than 20 tonnes per ATM. The maximum payload for a 747 freighter is typically 100-120 tonnes depending on variant. Dr Dixon's assumption of 65% loading (between 65 and 78 tonnes) is ridiculous.

---

107. **2.2.9 “Backloads [...] have been calculated by applying a small percentage, sometimes zero in the early years, increasing over time dependent on the potential in that market in the longer-term.”**

108. There is no explanation from Dr Dixon as to how and why these percentages were chosen. There is no explanation from Dr Dixon as to why she assumes they will steadily increase.

---

109. **2.2.10 “the costs of switching airports have been taken into account”**

110. Dr Dixon gives no indication as to how these costs have been “taken into account” in her projections, or how much impact they have had, or where these details appear in her reports.

---

111. **2.3.1 “Whilst the proposed third runway at Heathrow may become operational during this timeframe ...”**

112. Dr Dixon asserts that the opening of H3 will not solve increasing capacity problems. Inexplicably, she also argues that congestion may lead to an increase in air fares – it is unclear why this is in a section about “long-term freight forecasting”.

---

113. **2.4.1 “As with the air freight forecast, the short to medium-term passenger model is built from market information ...”**

114. Despite stating in para 2.1.1 that “methodologies for passenger air travel forecasting are well developed”, Dr Dixon chooses to ignore these methodologies and re-use the “qualitative” technique she has applied to freight.

---

115. **3.0.2 “Manston Airport is also well placed to be active in niche markets such as the movement of luxury street vehicles ... Formula One cars ... breeding stock ... racehorses ... outsized cargo including oil and gas equipment”**

116. This is a helpfully clear illustration of the absurdity that underlies this proposal: Dr Dixon thinks that a part share of a few “niche markets” will offer “considerable business”. Again, micro-niche markets such as these have always been available and have not made Manston successful in the past.



---

117. **3.0.3 “A forecast [of military and humanitarian operations] that matches past operations has therefore been included”**

118. There’s no sign of the military and humanitarian flights in any of the tables in this report. Historically, Manston has had about 550 military ATMs a year – that’s about 10% of the number of ATMs from the flying school, to put it in perspective.

---

119. **3.2.1 “Markets include: Africa ... China ... Middle East ... Pakistan ... Russia ... South America ... US”**

120. Dr Dixon ignores the fact that these markets have always existed and that Manston has consistently failed to attract their exporters.

---

121. **3.2.3 “In terms of imports/exports and backloads ... the following conservative assumptions and calculations have been used ...”**

122. These are not conservative, they are arbitrary, and come with an unexplained presumption of continual growth, year after year.

## Dr Dixon’s Misrepresentation of Quoted Sources

123. **1.1.1 “York Aviation’s significant report calculates that by 2050 with no additional airport capacity, 2.1 million tonnes of freight (potentially equating to 80,000 freighter movements) may have to be trucked elsewhere, particularly to northern Europe to find airport slots”**

124. This YA report focusses specifically on airport capacity in London and not in the UK. The report actually says the forecast tonnage would have to be transported to **“other airports either in the UK or on the continent”**.

---

125. **2.1.5 “This method [the “qualitative approach”] is confirmed by the ACI-North America [...] and recommends deriving customised inputs from a detailed market assessment. (ACI-NA, 2013, p. 3)”**

126. However, a few pages further on in ACI-NA, 2013 – at p16 (section 5.1.3) – we find a clear recommendation regarding the use of historical data:

127. *“Historical data factors show how an airport’s traffic has evolved and will serve as the starting point for the development of comprehensive forecasts. A review of recent trends also identifies those factors, which have, or in the future might, influence future traffic volumes. **It is suggested that at least the same number of years of historical data be used as the time horizon of the forecast.** Evaluating a longer historical time frame can make it easier to distinguish true trends from short-term aberrations, and thus enhances the accuracy of the projected relationships between independent and dependent variables. The historical analysis of aviation activity is one of the key factors in developing assumptions underlying the forecast.”* [emphasis added]

128. Dr Dixon has chosen to ignore this – she has not assessed 20 years of historical data in to complement her 20 year forecast.

---

129. **2.3.1 “secondary airports have several other advantages over the major airports. These include lower-cost facilities and less congestion which allows rapid turnaround times and hence more efficient aircraft operations”**

130. Once again quoting an unpublished PhD thesis, Dr Dixon ignores the fact that these purported advantages would **not** apply to Manston Airport, as envisaged in RSP’s plans. By definition, the Manston they foresee would be **nationally significant**, not secondary, and would presumably suffer from the inverse of these purported benefits. It is also unlikely that Manston would be cheaper. It is a fact that, when Manston was operational, its complete lack of congestion and the promise of night flights were not enough to woo BA World Cargo (BAWC) from Stansted. The cargo operation at Stansted is subsidised by the passenger operation. In the face of Manston’s proposals to BAWC, the cargo team at Stansted simply lowered the price of their operation for BAWC and BAWC stayed at Stansted.

---

131. **2.5.5 “The calculation [...] applies an average load factor of 65% for the scheduled KLM flight (gauged from previous Manston figures) and 90% for all other services, an industry norm. These load factors are applied on inbound and outbound movements.”**

132. Dr Dixon is ignorant of, or deliberately ignoring, the facts. KLM achieved an average load factor of 44.4% in the time it operated at Manston, so it is clearly wrong of Dr Dixon to assume 65%.<sup>29</sup> We know of no passenger airline that operated out of Manston with a 90% average load figure. Dr Dixon’s assessment is absurd.

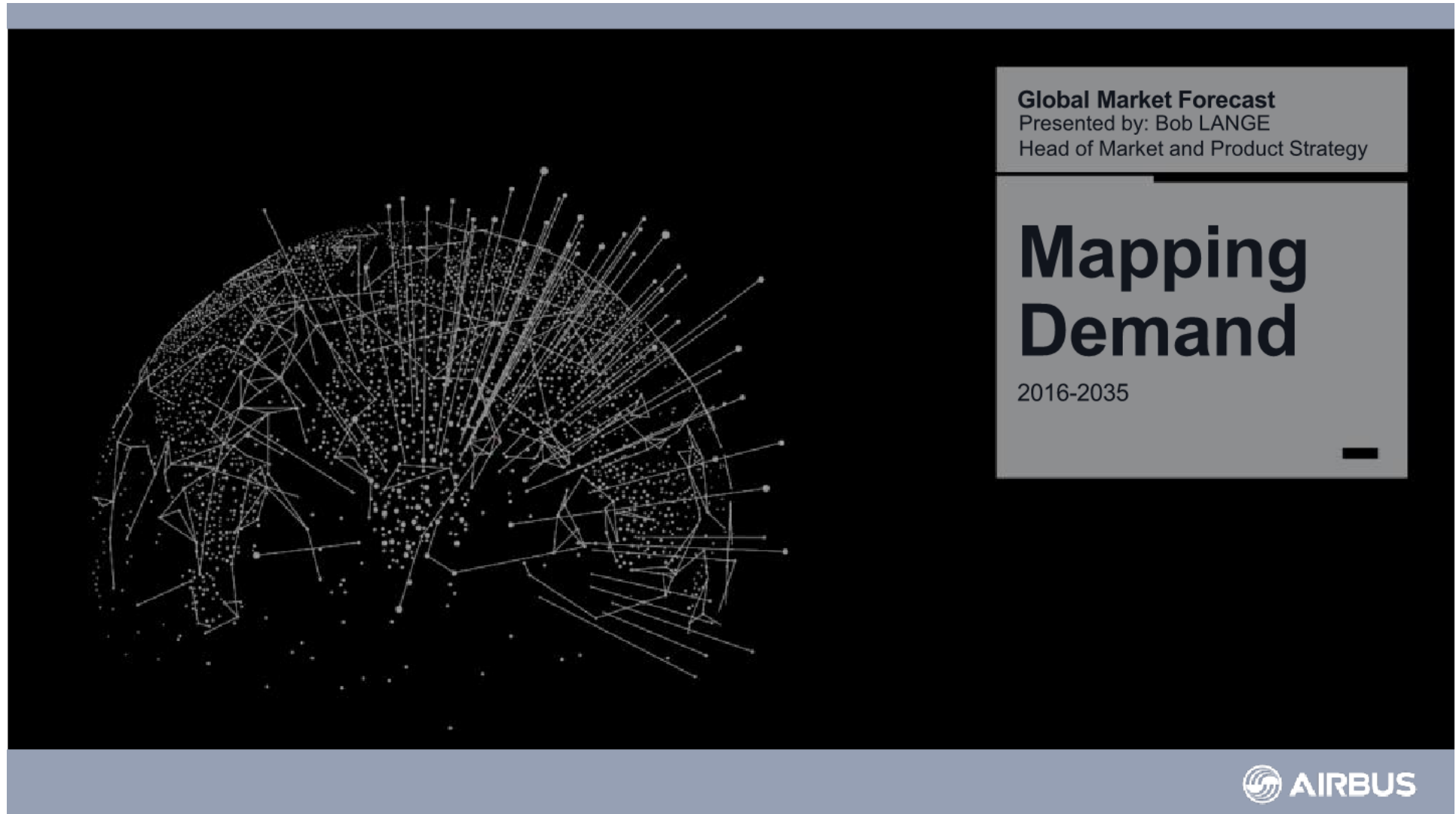
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<sup>29</sup> KLM flew 80-seater planes on 2 return trips daily from 2nd Apr 2013 to 9th Apr 2014 – maximum capacity 119,040. Actual passengers through Manston 52,859 (44.4%). CAA data.

## Conclusion

133. In the 3<sup>rd</sup> edition of Azimuth III (July 2018) – **all** of Dr Dixon’s forecasts – short-term, medium-term and long-term – are “qualitative”. The credibility of Dr Dixon’s qualitative forecasts depend on Dr Dixon’s personal credibility as a subject expert, and as a reliable analyst. The three editions of Azimuth III demonstrate a lack of understanding and an inconsistency of reasoning that suggest Dr Dixon is neither.
134. In the first and third editions of Azimuth III, Dr Dixon goes straight to “the answer” by simply asserting it. Only in the second edition does Dr Dixon “show her workings”. The section in this document entitled “*2nd edition – January 2018*” (paragraphs 20-38 of this document) explores Dr Dixon’s failings in planning and execution in what is essentially the only “analytical” piece of work on this topic. Dr Dixon’s shambolic handling of the all-important multiplier in the 2<sup>nd</sup> edition does not display careful analysis, and produces unreliable numbers. **The errors resulting from Dr Dixon’s lack of understanding, poor choices, and failings in methodology and maths serve to compound and magnify each other, rendering the forecast itself unusably unreliable.**

## Appendix A – Airbus Global Market Forecast: Mapping Demand 2016-2035



# Global Market Forecast 2016: Highlights

GMF 2016 key numbers and 20-year change

World Fleet Forecast	2015	2035	vs. GMF15	% change 2015-2035
RPK (trillions)	6.6	16.0	+5.3%	142%
Passenger Aircraft Fleet	18,020	37,710	+5.5%	109%
New passenger aircraft deliveries		32,425	+650	
Dedicated Freighters	1,560	2,110	-21.5%	35%
New freighter aircraft deliveries		645	-150	
<b>Total New Aircraft Deliveries</b>		<b>33,070</b>	<b>+500</b>	

New aircraft deliveries

**+500  
aircraft**

GMF 2016 vs.  
GMF 2015

Passenger aircraft (≥ 100 seats)

Jet freight aircraft (>10 tons)

Source: Airbus GMF 2016

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## 20-year demand for more than 33,000 new passenger and freight aircraft



**23,530** single-aisle aircraft  
100-210 seater passenger aircraft



**8,060** twin-aisle aircraft  
250-400 seater passenger aircraft  
10-80 tonne freighter aircraft



**1,480** very large aircraft  
>400 seater passenger aircraft  
>80 tonne freighter aircraft

---

**33,070** new aircraft

Market Value of  
–  
**\$5.2**  
trillion

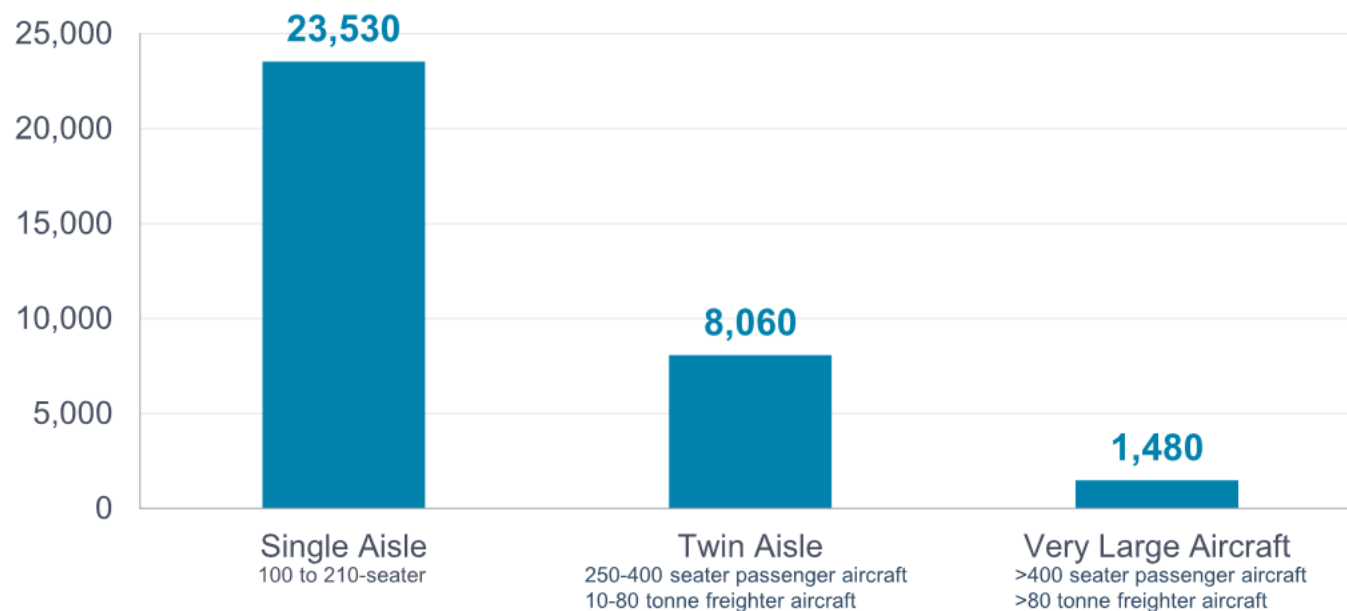
Passenger aircraft (≥ 100 seats)

Jet freight aircraft (>10 tons)

Source: Airbus GMF 2016

## Single Aisle: 71% of units; Wide-bodies: 54% of value

20-year new deliveries of passenger and freighter aircraft



**% units**      **71%**

**24%**

**5%**

**% value**      **46%**

**43%**

**11%**

**New Deliveries**

**33,070**

GMF 2016-2035

Passenger aircraft (≥ 100 seats) and jet freight aircraft (>10 tons)

Source: Airbus GMF 2016

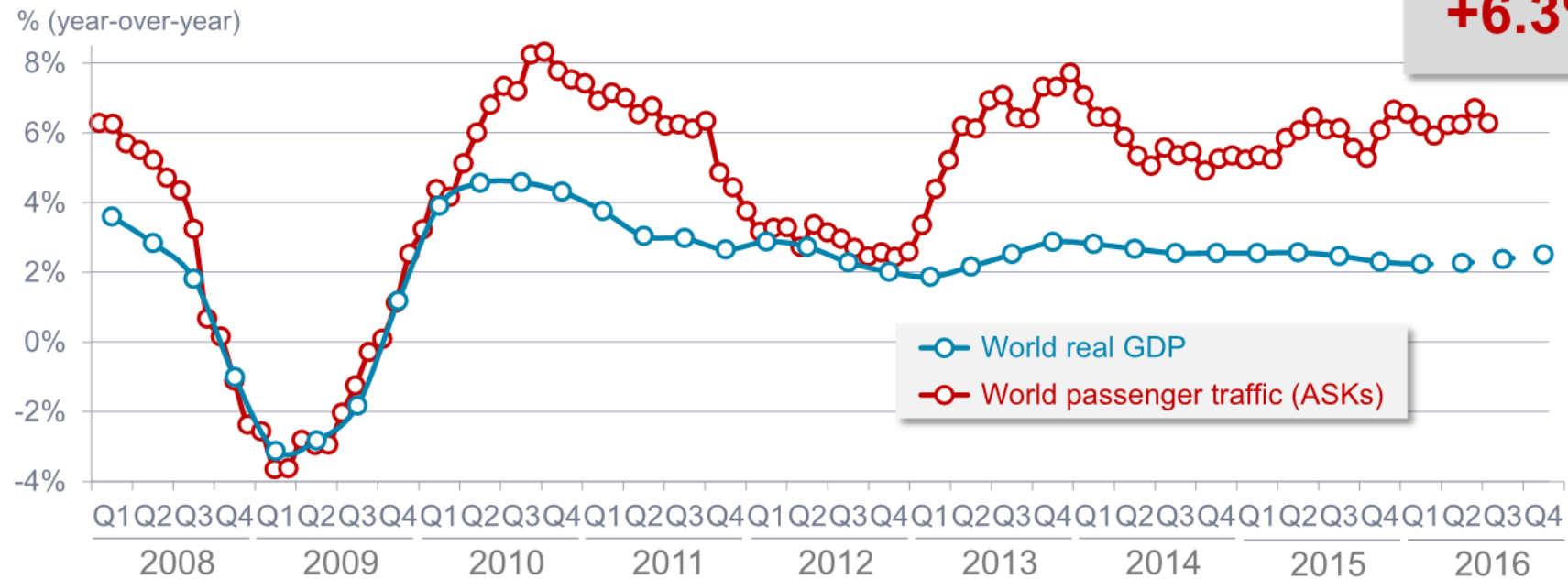
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# Passenger traffic is outperforming GDP growth

World real GDP and passenger traffic



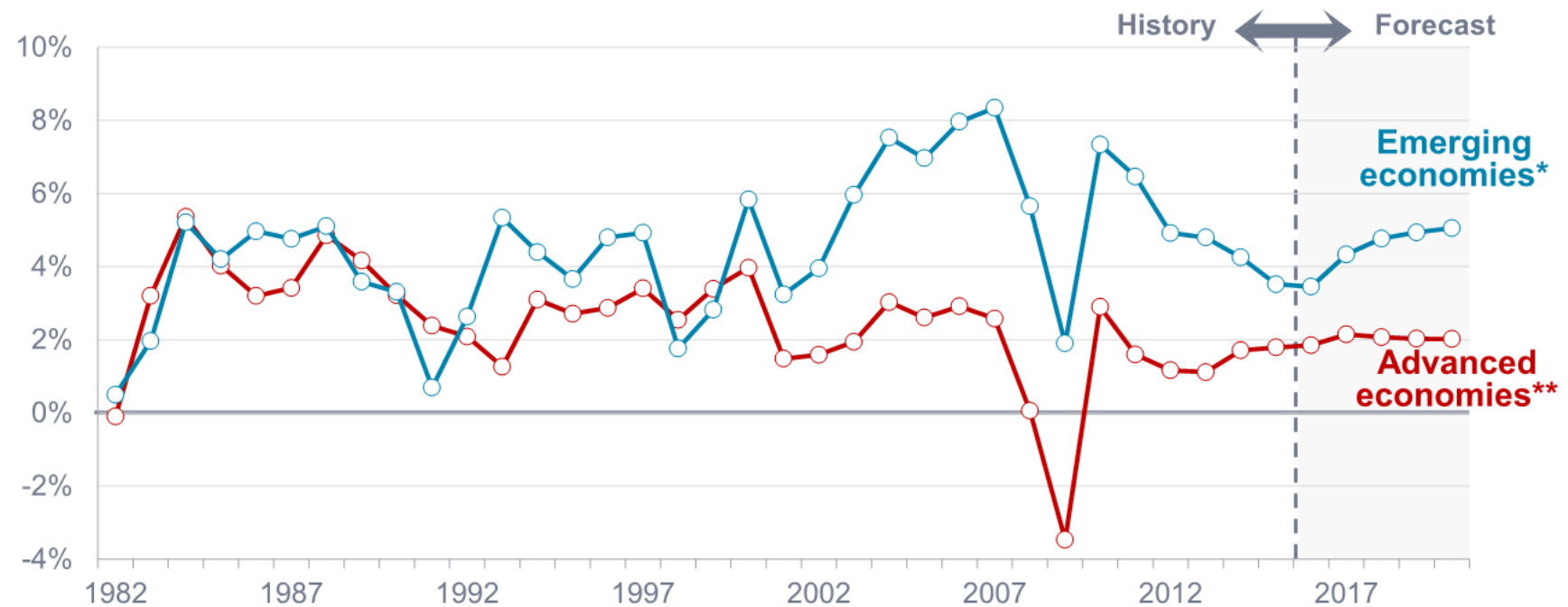
Source: IHS Economics, OAG, Airbus

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# Still a two-speed economic world

Comparison of year-over-year GDP growth



Source: IHS Economics, Airbus

\* 54 emerging economies

\*\* 32 advanced economies

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## Air transport growth is highest in expanding regions

### Emerging/Developing

China  
India  
Middle East  
Asia  
Africa  
CIS  
Latin America  
Eastern Europe



**6.2**  
billion  
people  
2015

Yearly RPK growth  
2016 - 2035

**+5.6 %**



### Advanced

Western Europe  
North America  
Japan



**1**  
billion  
people  
2015

**+3.7 %**



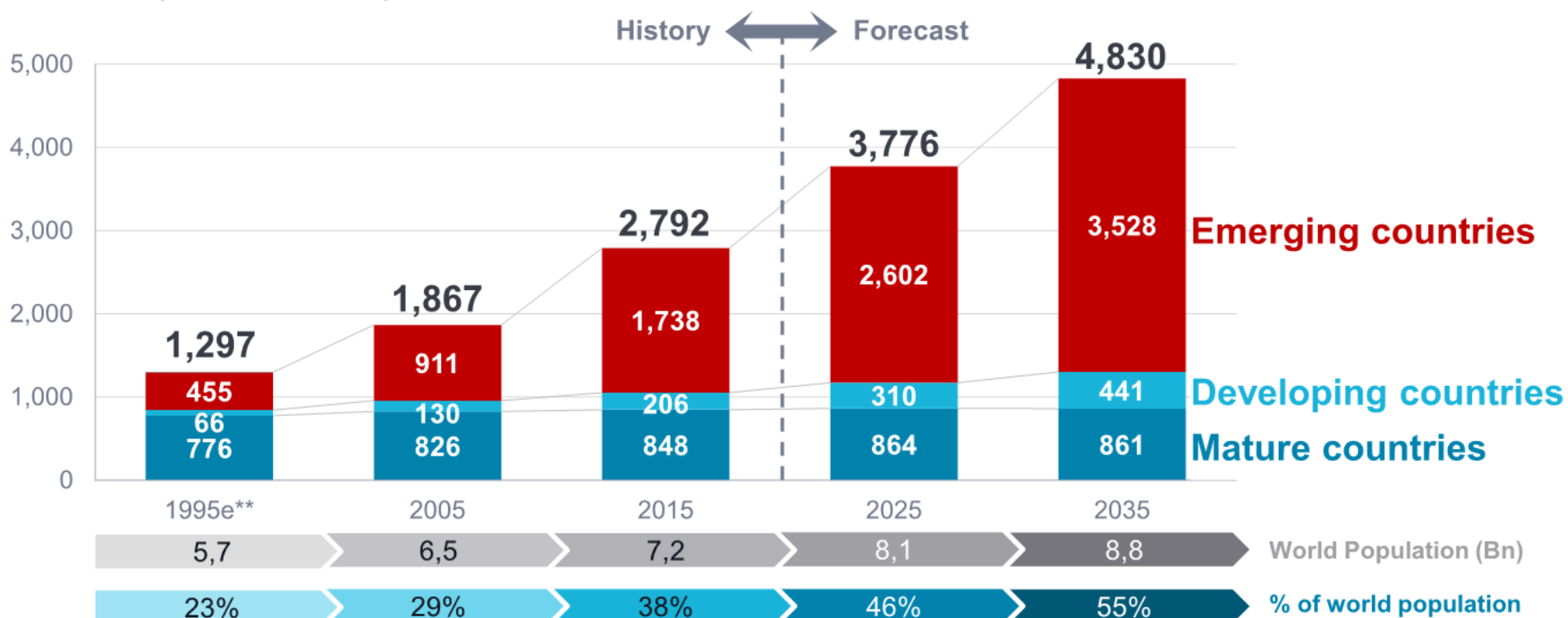
Source: IHS Economics, Airbus GMF 2016

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# Middle Class\* to move from 2.8 Billion to 4.8 Billion in 20 years

Middle Class\* (millions of people)



\* Households with yearly income between \$20,000 and \$150,000 at PPP in constant 2015 prices

\*\* Estimate for 1995 split by region

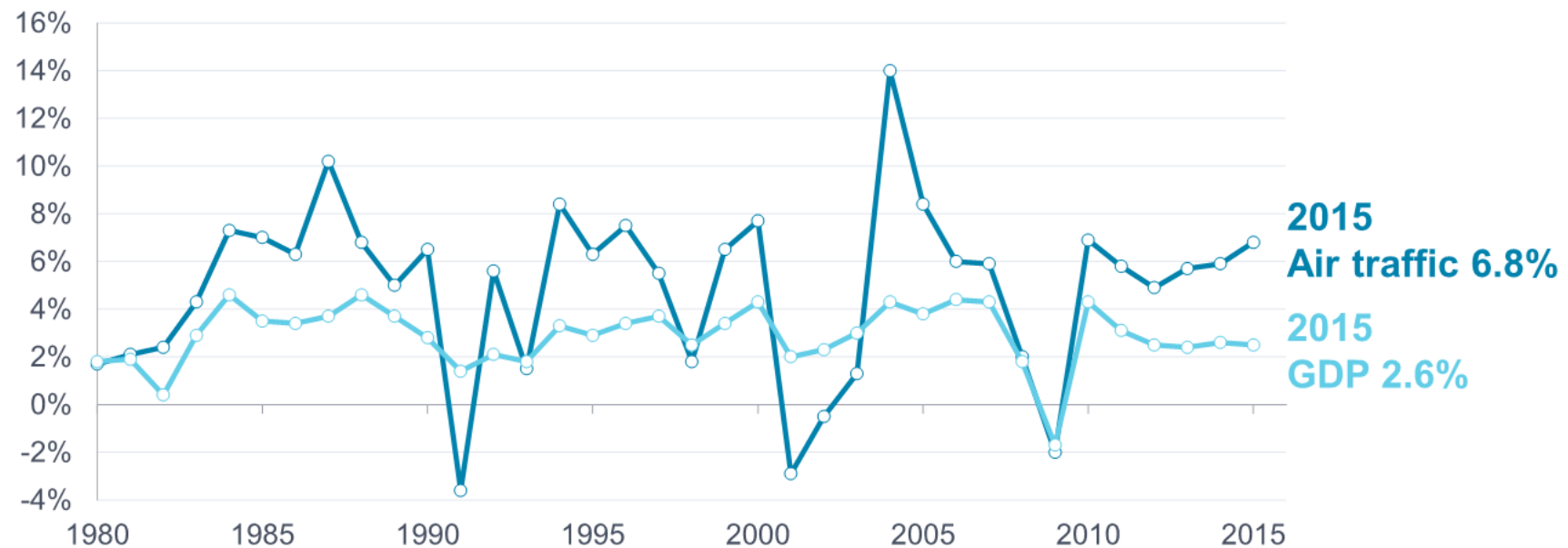
Source: Oxford Economics, Airbus

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## Economy is key factor in traffic growth but other drivers gaining importance...

Traffic and GDP Growth (%)



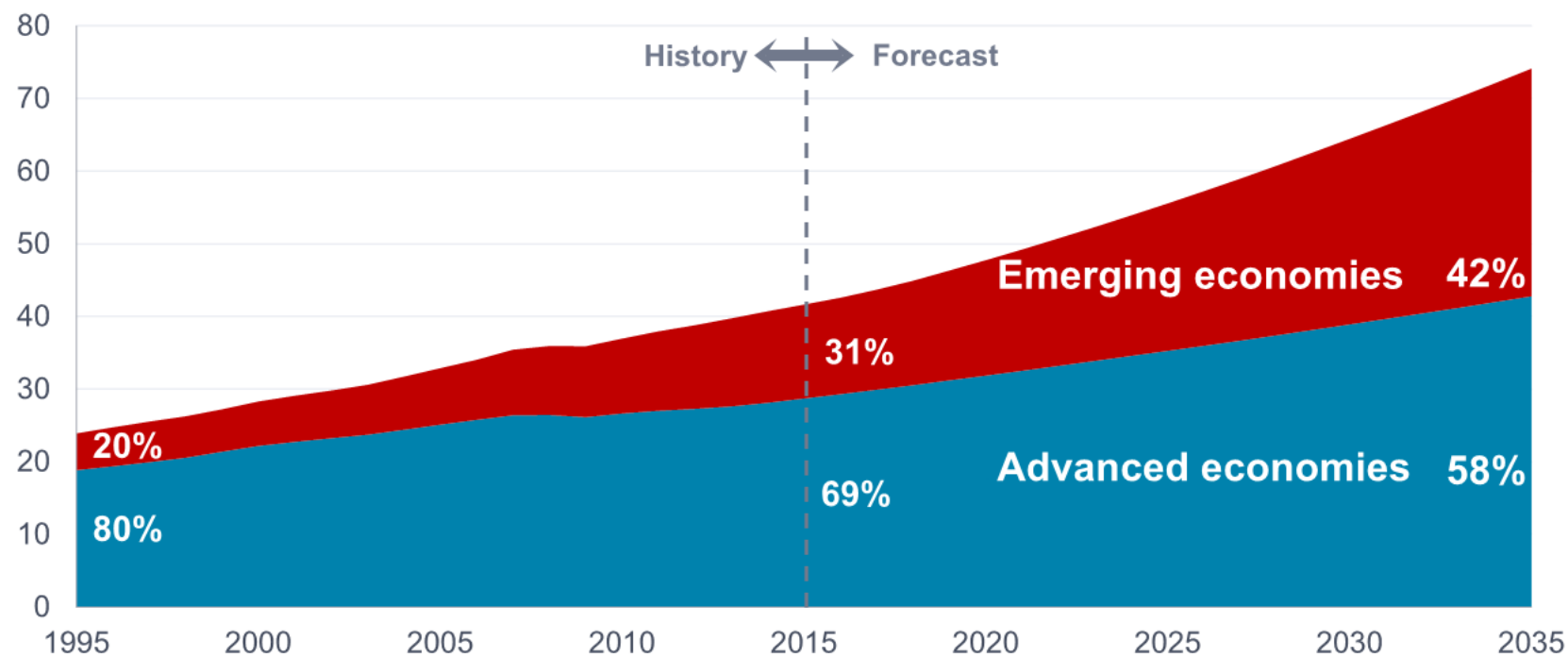
Source: ICAO, IHS Economics, Airbus

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## 42% of world's private consumption to come from emerging markets

World private consumption (in trillion \$US, 2010)



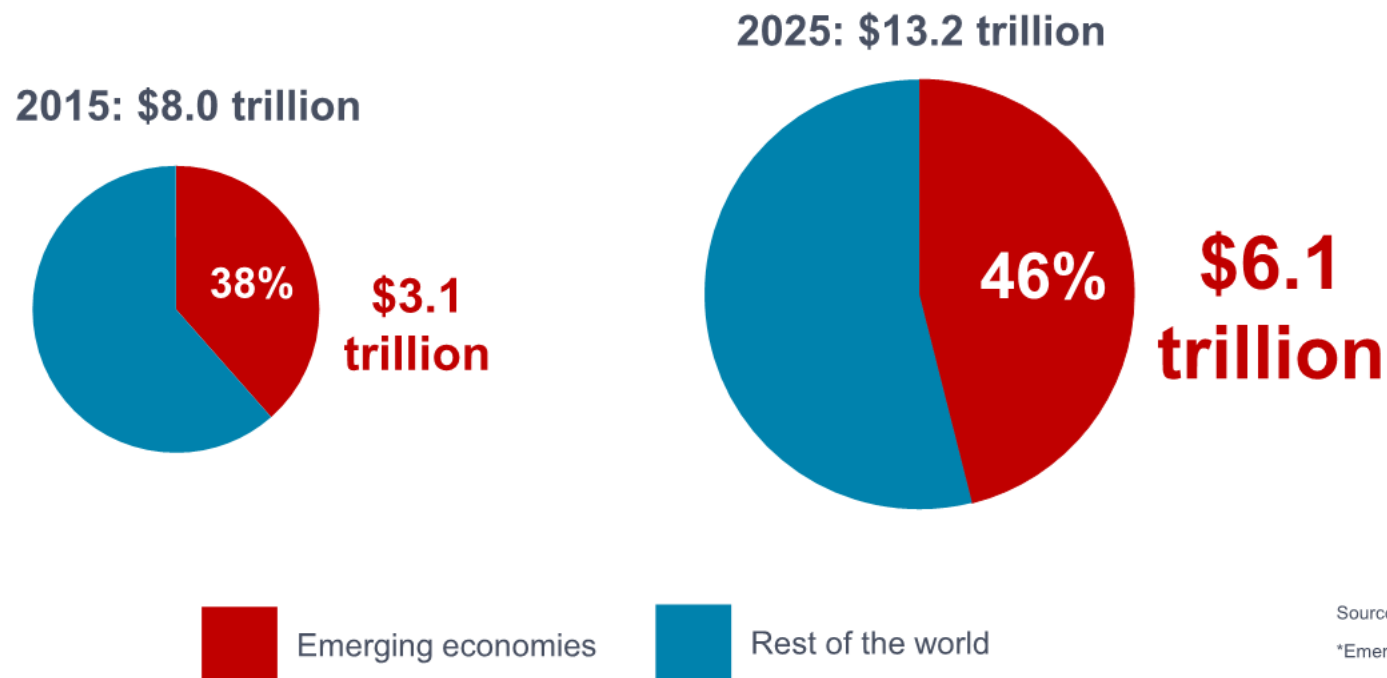
Source: IHS Economics (May 2016), Airbus GMF

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## Emerging economies' discretionary spending will double in just 10 years

Emerging economies\* spending on recreational good and services\*\* (2010 \$US, PPP)



Source: Oxford Economics, Airbus GMF 2016

\*Emerging + Developing economies

\*\*Including restaurants and accommodation

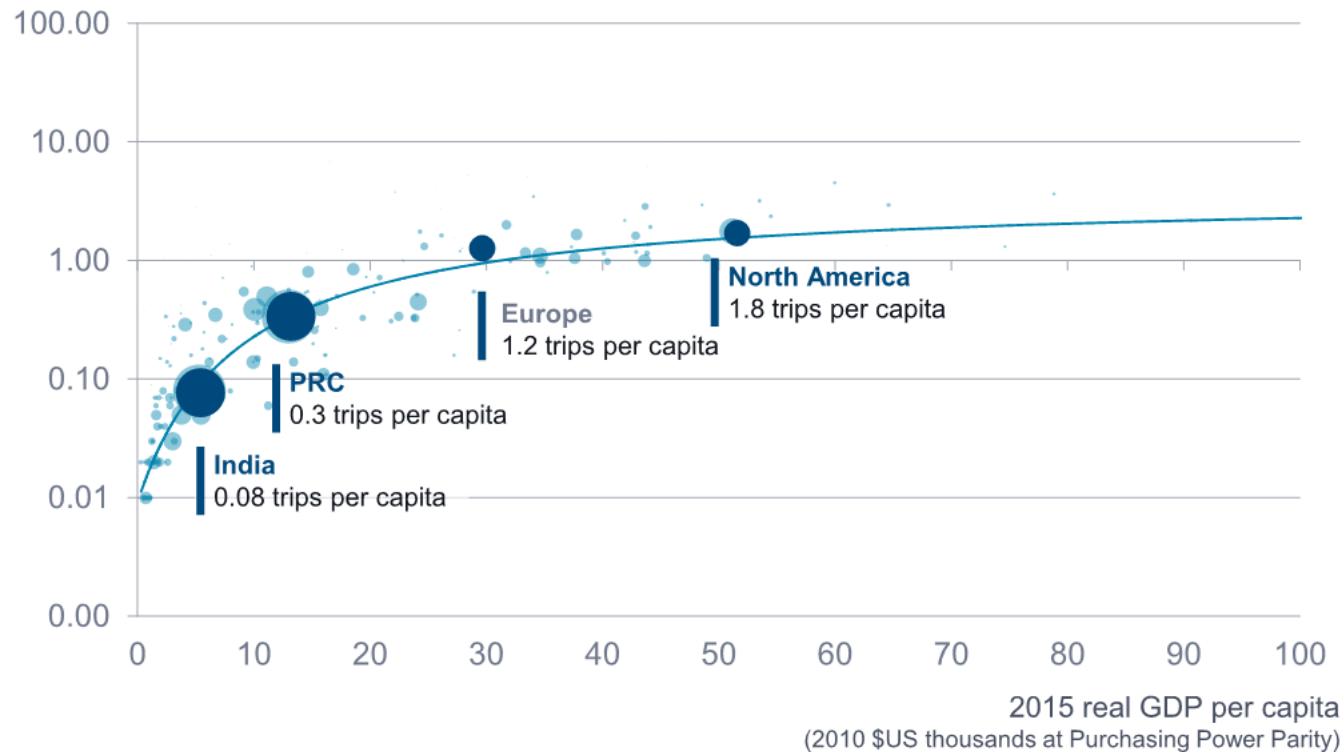
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## Europeans and North Americans are the most willing to fly...

2015 trips per capita



Propensity to travel

25%

of the population of the emerging countries took a trip a year in 2015

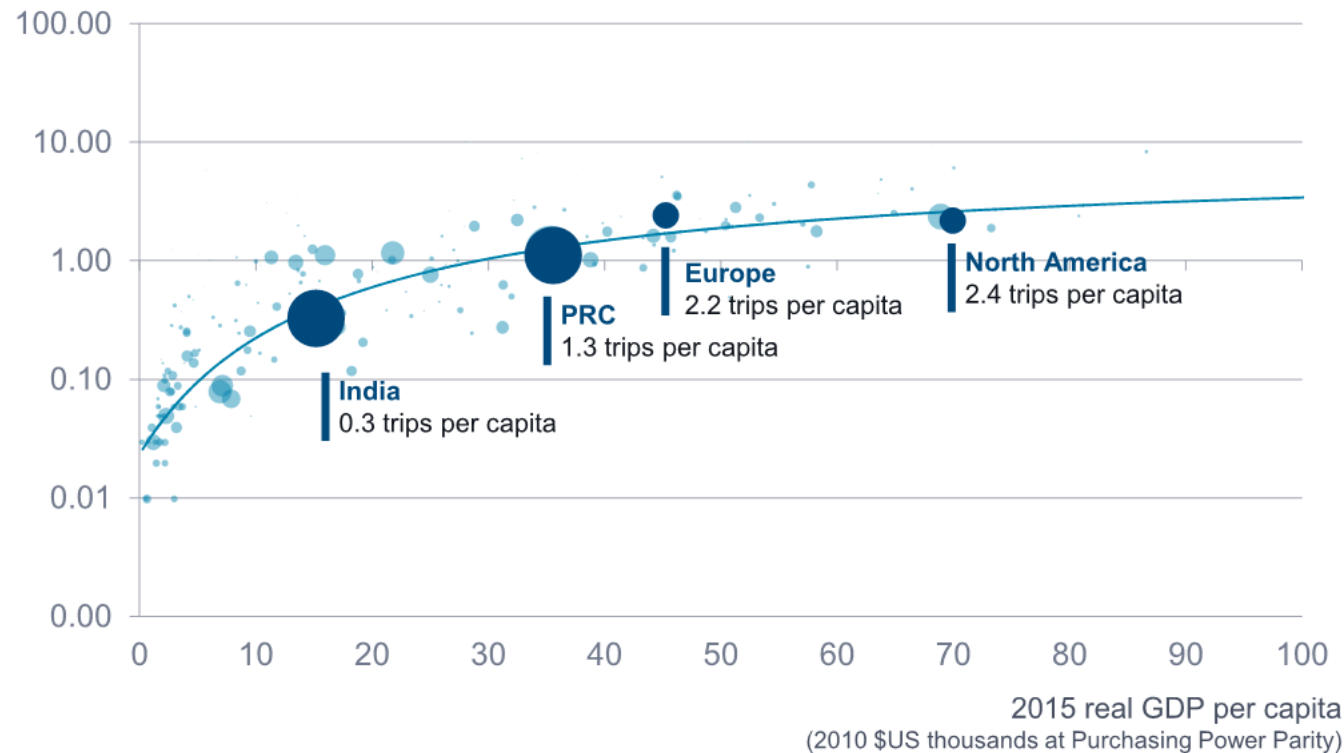
Sources: Sabre, IHS Economics, Airbus GMF 2016

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## ...but by 2035, PRC will reach current European levels

2035 trips per capita



Propensity to travel

75%

of the population of the emerging countries will take a trip a year in 2035

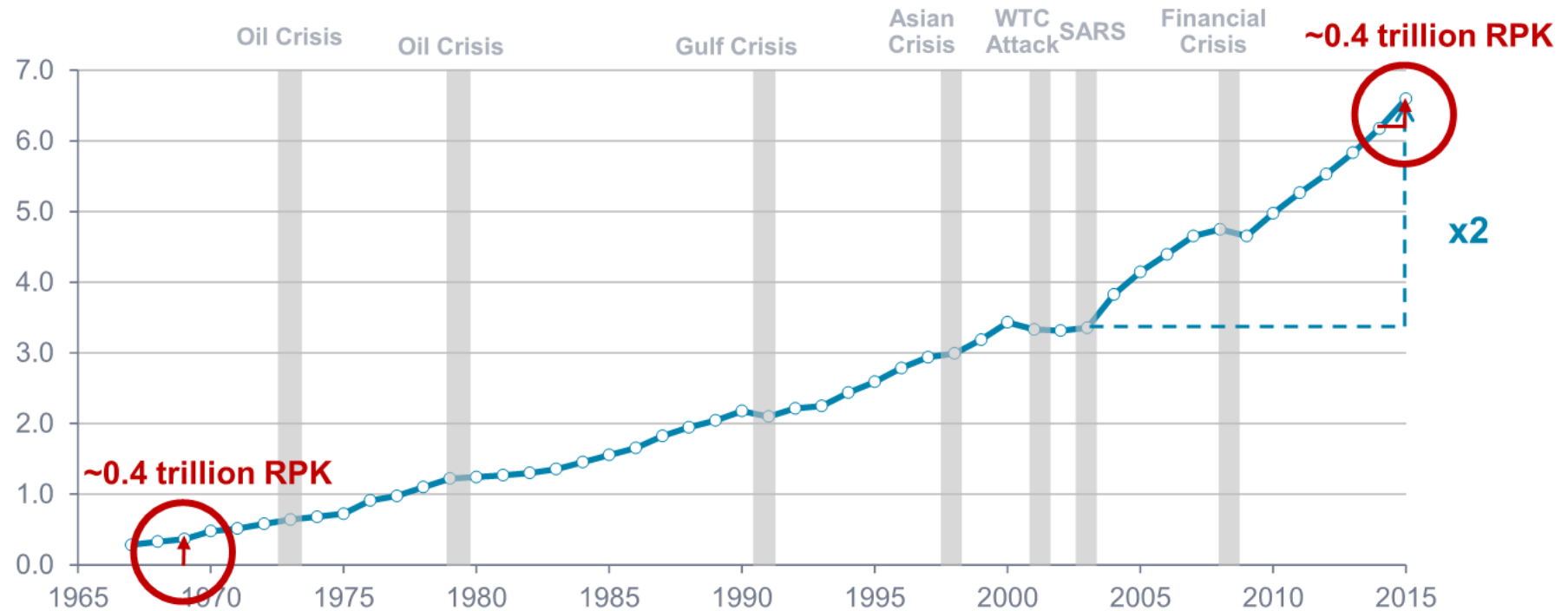
Sources: Sabre, IHS Economics, Airbus GMF 2016

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## Air travel has proved to be resilient to external shocks

World annual traffic (trillion RPK)



Source: ICAO, Airbus GMF 2016

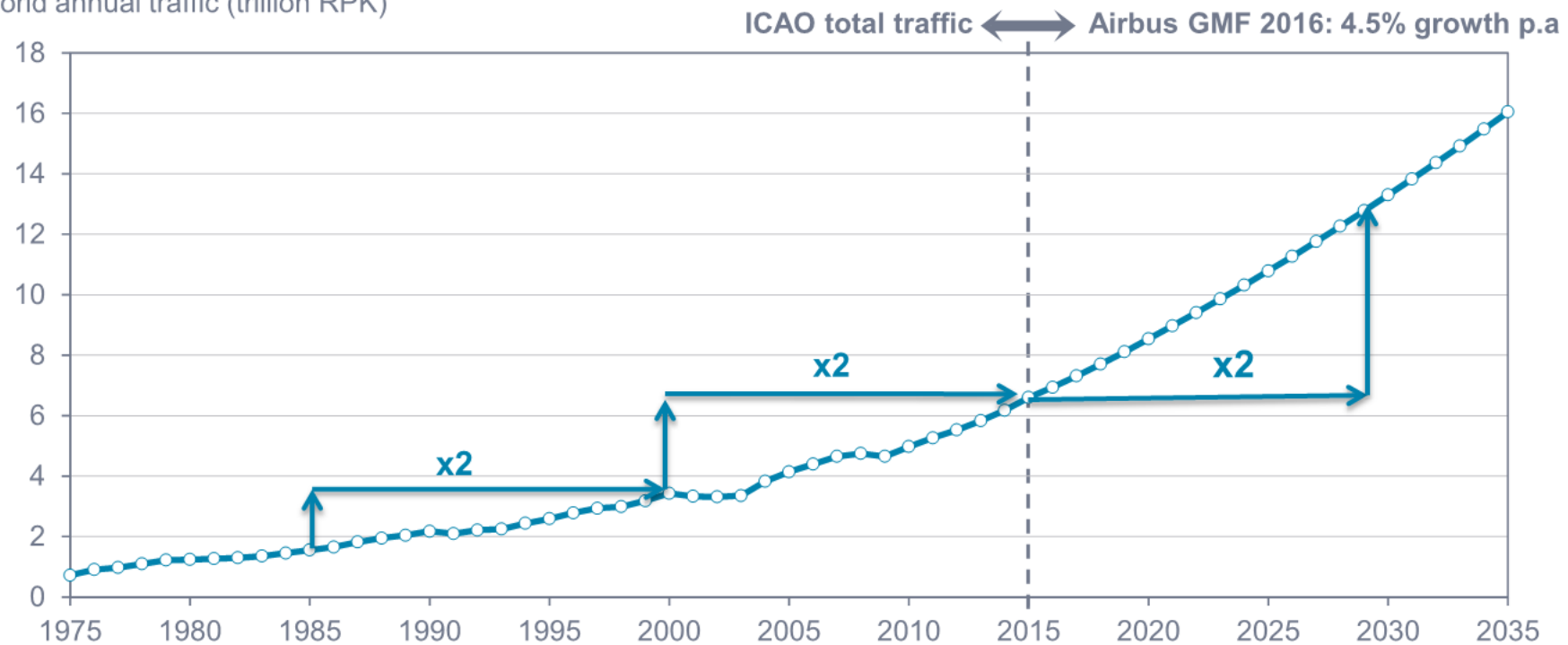
RPK = Revenue Passenger Kilometre

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## Air traffic will double in the next 15 years

World annual traffic (trillion RPK)



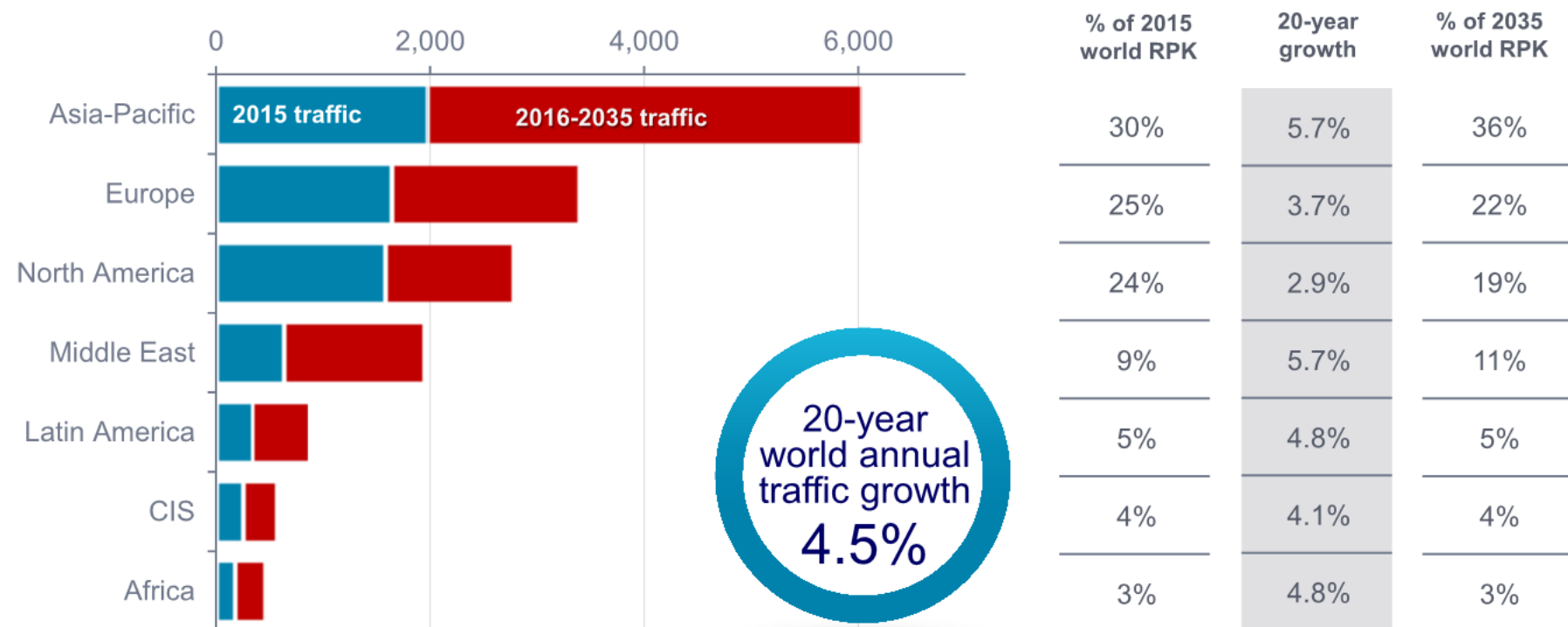
Source: ICAO, Airbus GMF 2016

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## Asia-Pacific lead in world traffic will increase further by 2035

RPK traffic by airline domicile (billions)



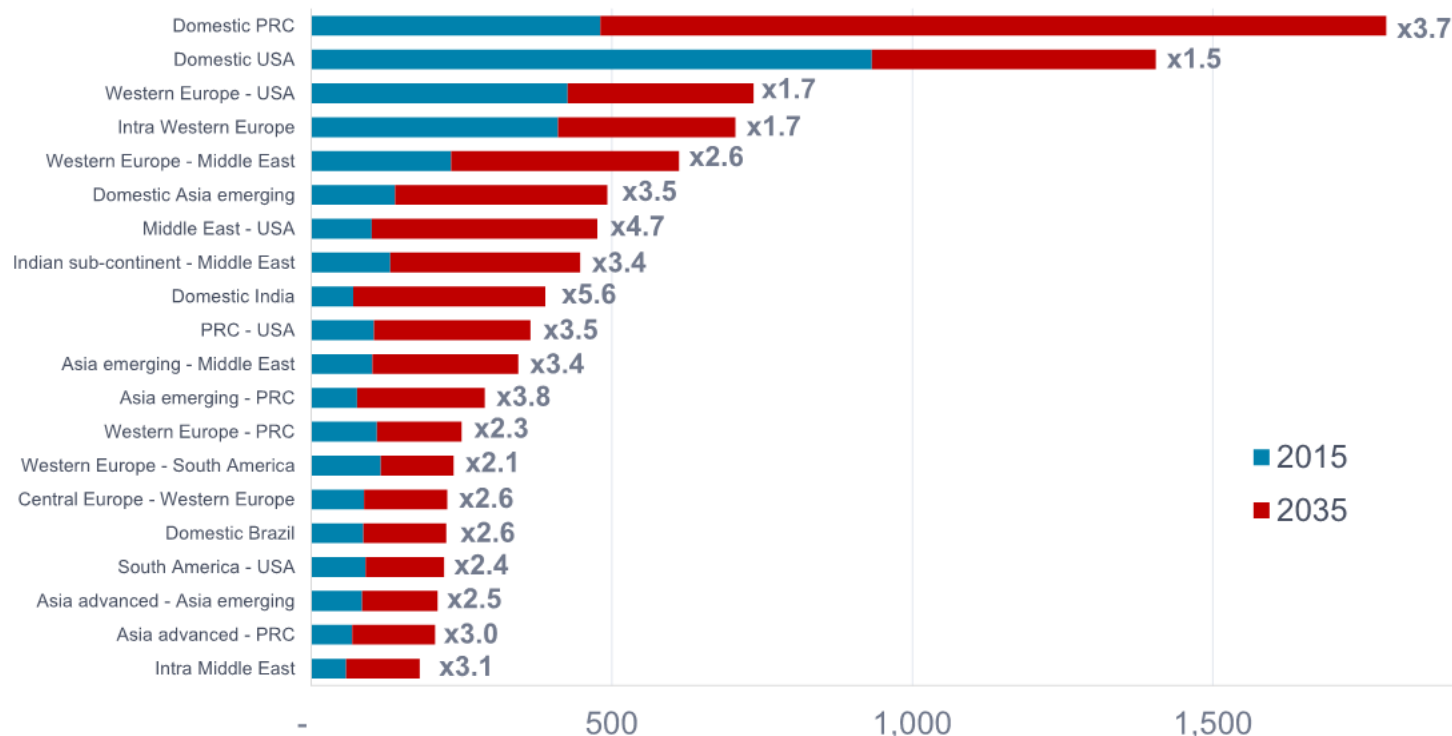
Source: Airbus GMF2016

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# Domestic Chinese traffic flow to be number one

Annual traffic per leg flow (billion RPK)



Asia Pacific  
leading growth

50%

of the top twenty  
traffic flows will  
involve Asia Pacific

■ 2015  
■ 2035

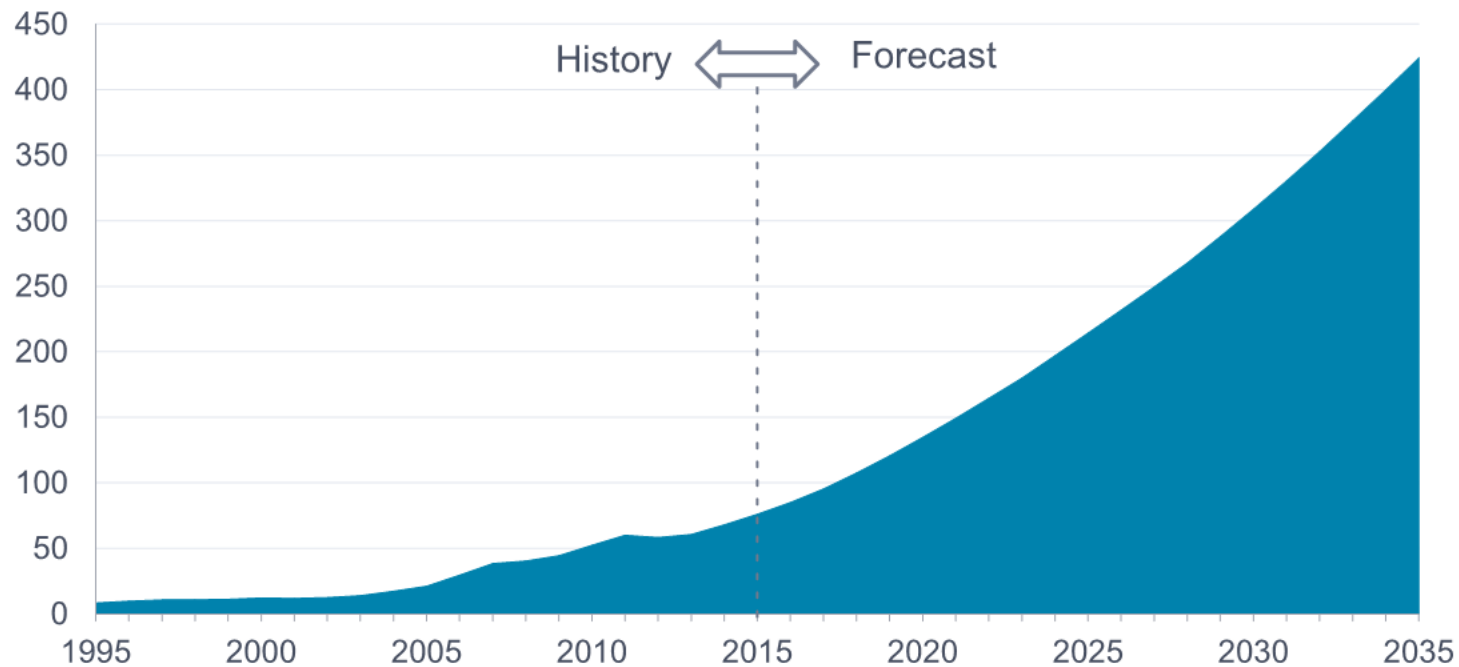
Source: Airbus GMF 2016

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## Domestic traffic in India to grow more than 5-fold over next 20 years

Domestic India - Annual traffic per leg flow (billion RPK)



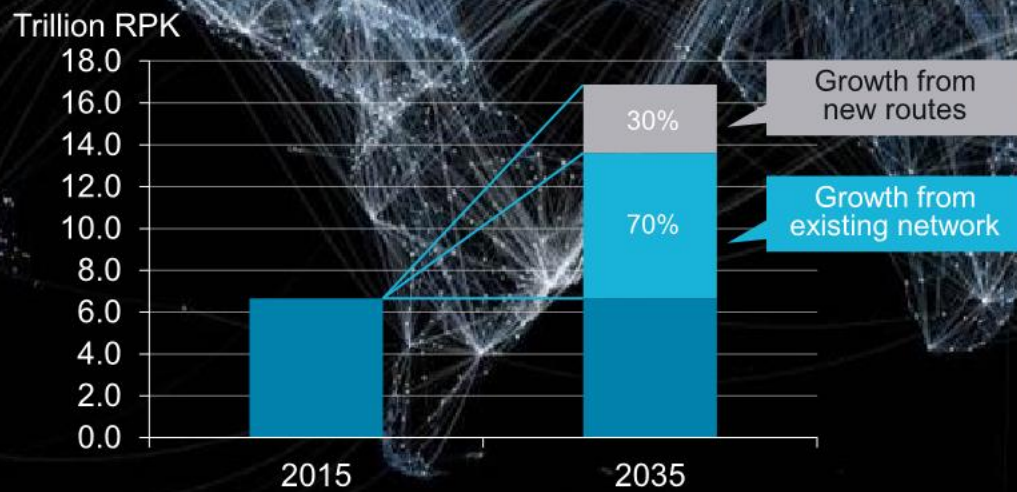
Source: DGCA India, Airbus GMF

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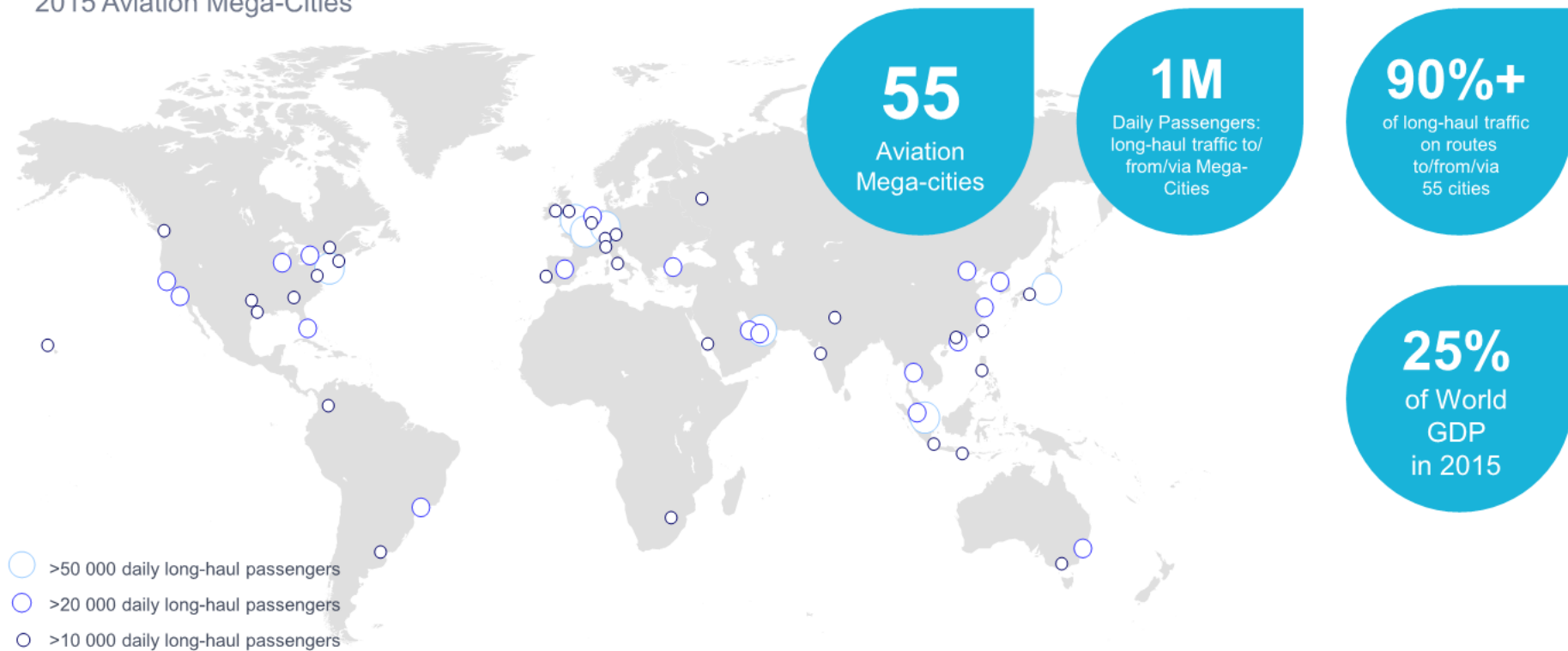
## 70% of traffic growth until 2035 will come from existing network



Source: Airbus GMF 2016

# There are currently 55 Aviation Mega-Cities...

2015 Aviation Mega-Cities



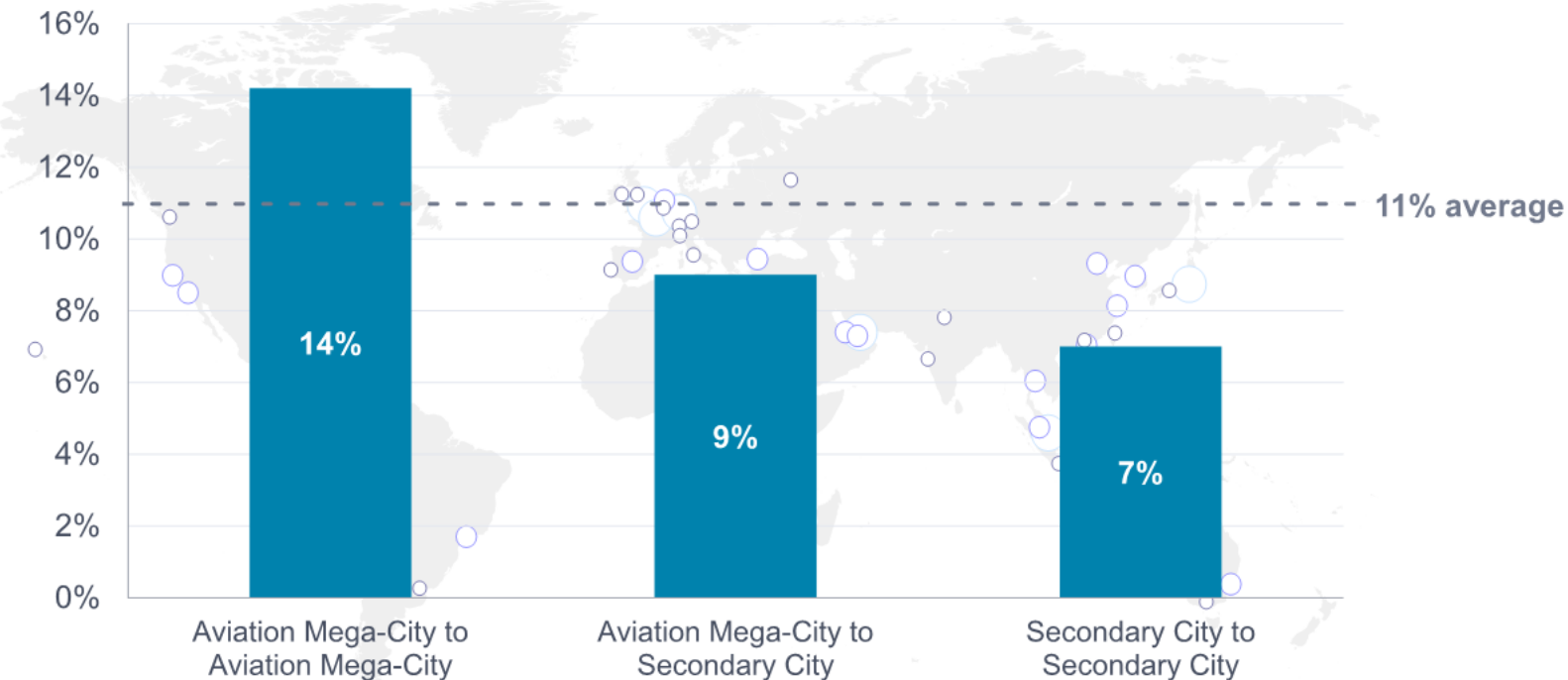
Source: McKinsey, UNPD, Airbus GMF 2016

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## Routes between Aviation Mega-Cities have more premium passengers

Percentage of premium passengers on routes types



Cities with more than 10,000 daily passengers, Long-haul, flight distance >2,000nm, excl. domestic traffic

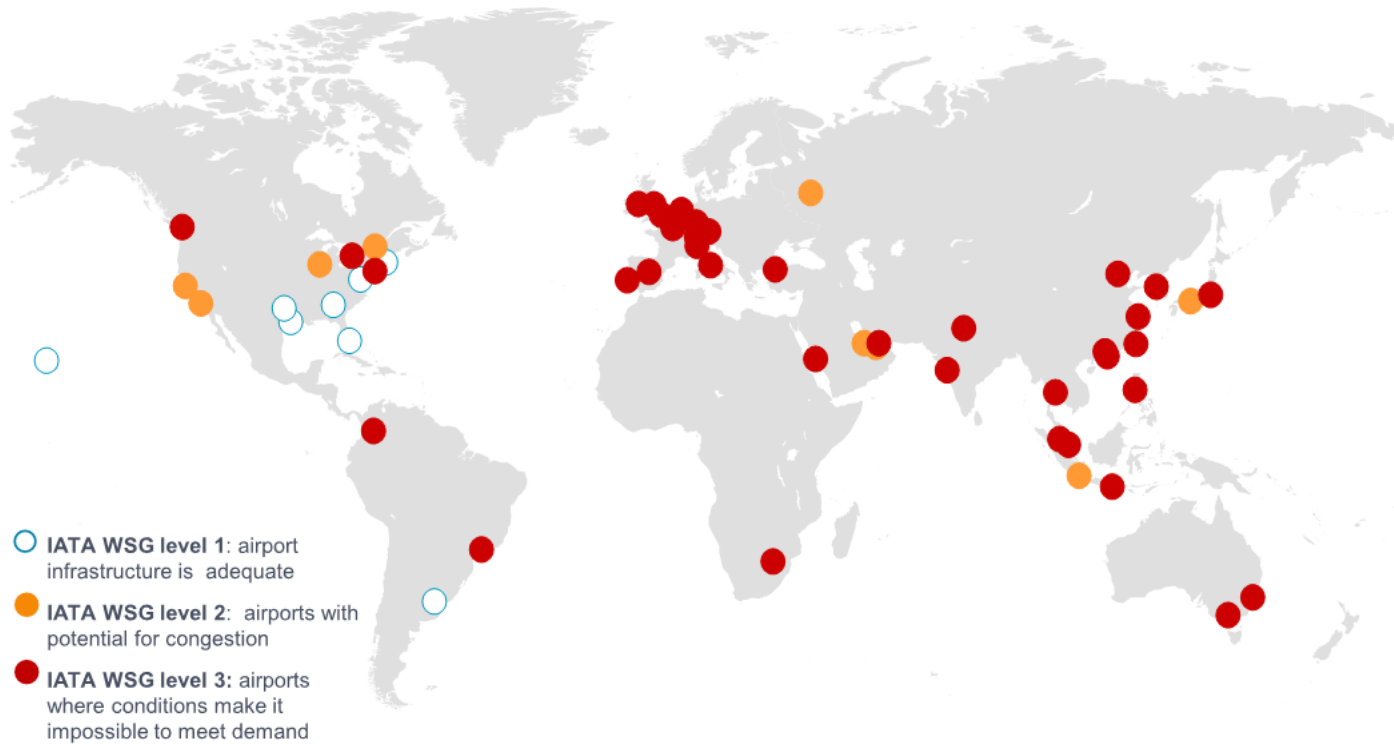
Source: Sabre (September 2015 data), Airbus GMF 2016

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## 47 of 55 Aviation Mega-Cities main airports are schedule-constrained

2015 Aviation Mega-Cities



Source: IATA WSG database,  
Airbus GMF 2016

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## 38 of the Aviation Mega-Cities fly the A380

2015 Aviation Mega-Cities



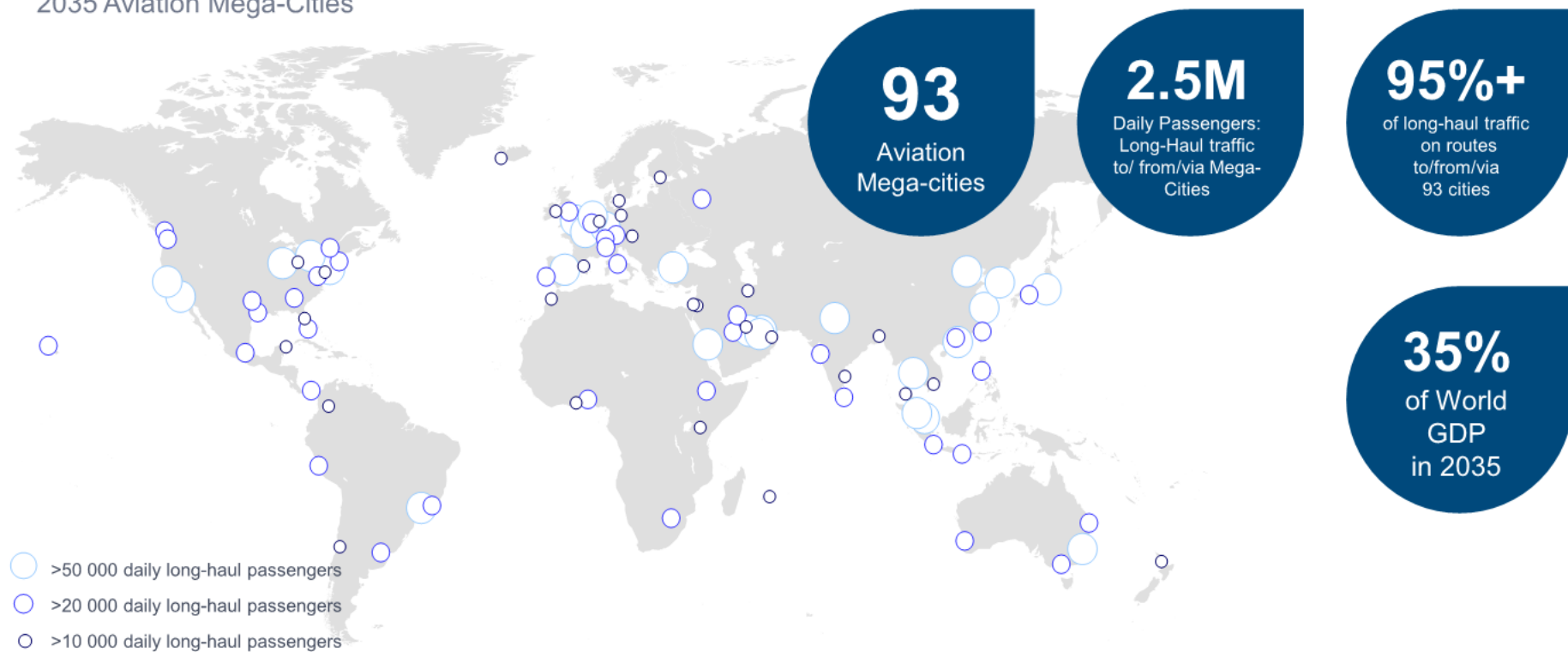
Source: McKinsey, UNPD, OAG (Sept 2015),  
Airbus GMF 2016

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# There will be 93 Aviation Mega-Cities by 2035

2035 Aviation Mega-Cities



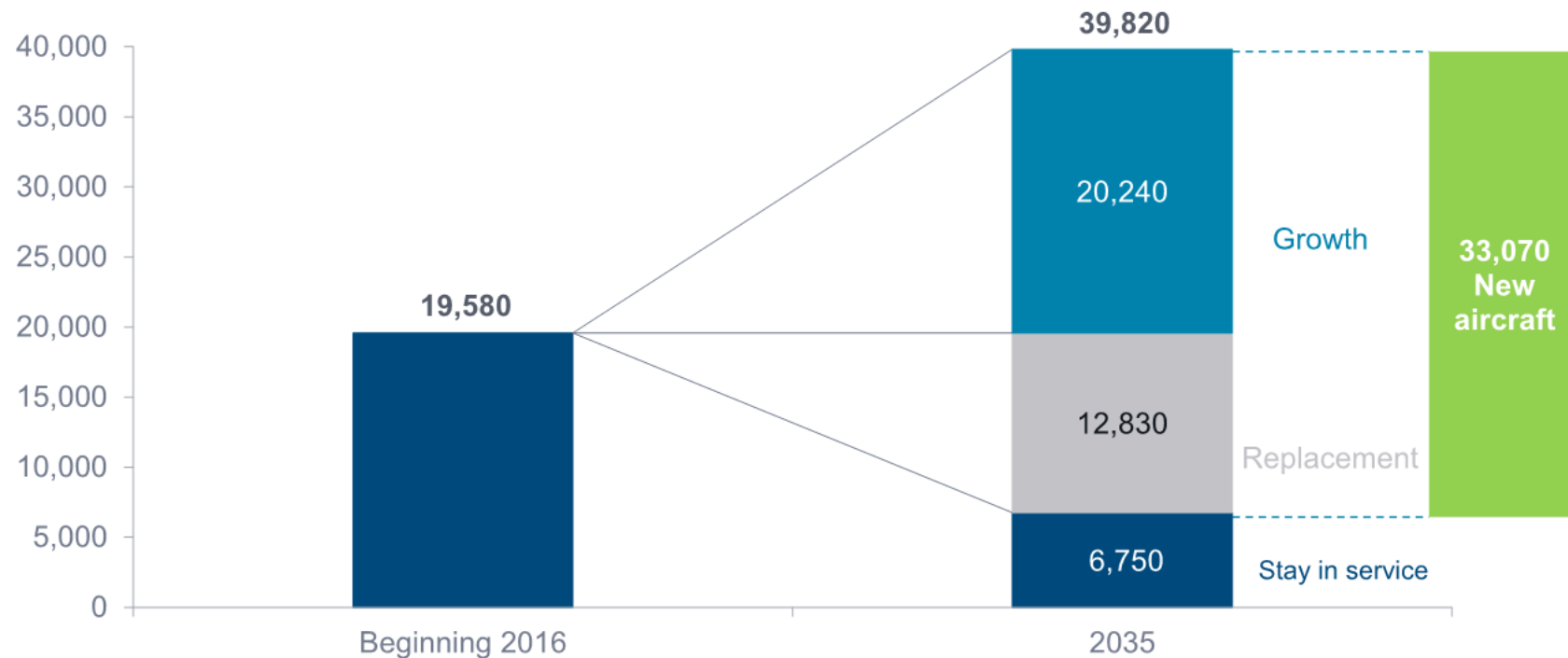
Source: McKinsey, UNPD, Airbus GMF 2016

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## Demand for some 33,000 new passenger and freighter aircraft

Fleet in service evolution: 2016-2035



Source: Airbus GMF 2016

Note: Passenger aircraft ≥100 seats,  
Freighter aircraft ≥10 tonnes

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In 2015, an aircraft generates 50% more RPKs than in 1995

**1995**

**9,800**  =  
pax a/c above 100 seats

 **7.6**  
hours/day

 **160**  
seats/flight

 **68%**  
load factor

**2015**

**18,000**  =  
pax a/c above 100 seats

 **8.6**  
hours/day

 **172**  
seats/flight

 **80%**  
load factor

**1**  **2015** = **1.5x** **1**  **1995**  
Yearly RPK per a/c

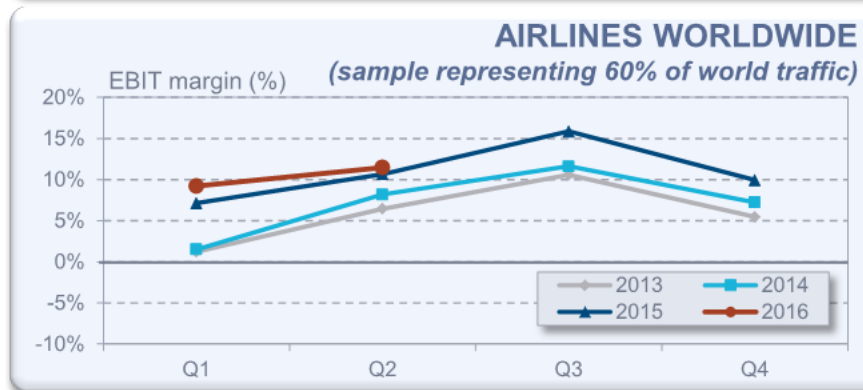
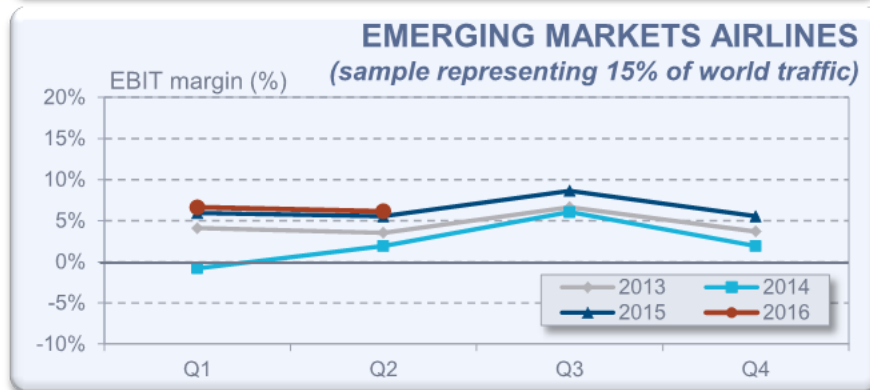
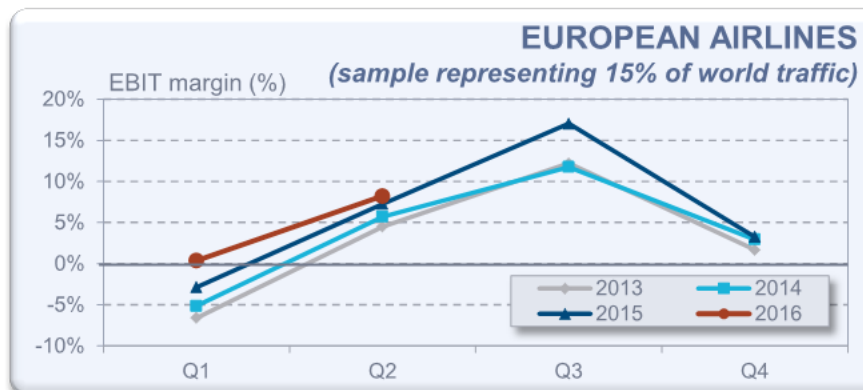
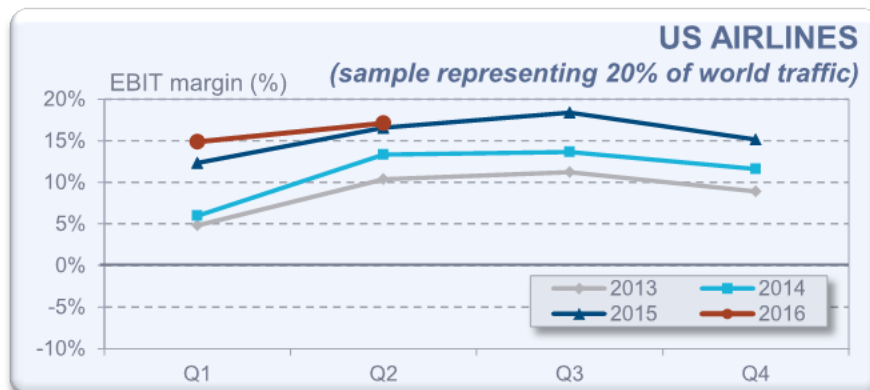
Source: ICAO, OAG, Ascend, Airbus

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## Airline profitability - Q2/2016 update



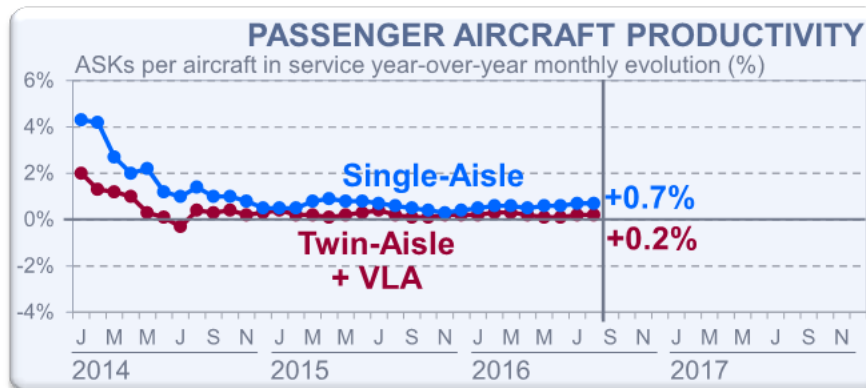
Source: The Airline Analyst, Airbus

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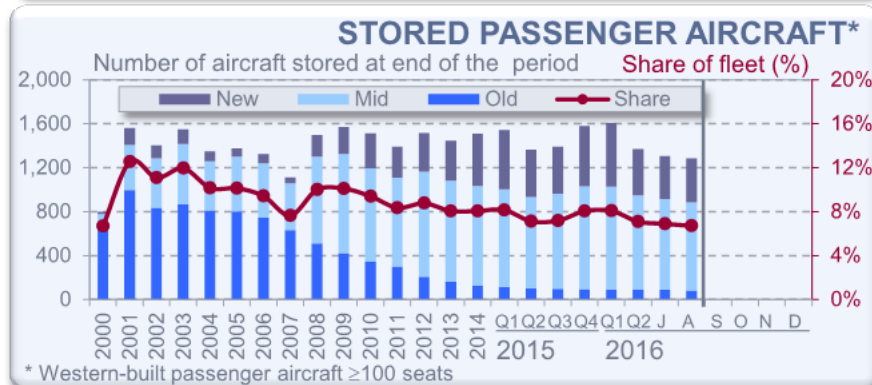


## Productivity increasing, stored aircraft around historical low

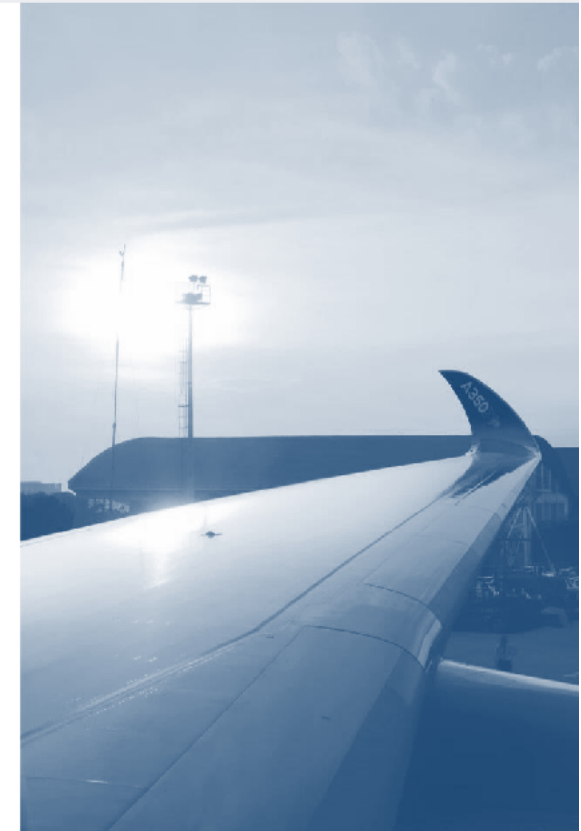
Productivity



Stored Aircraft



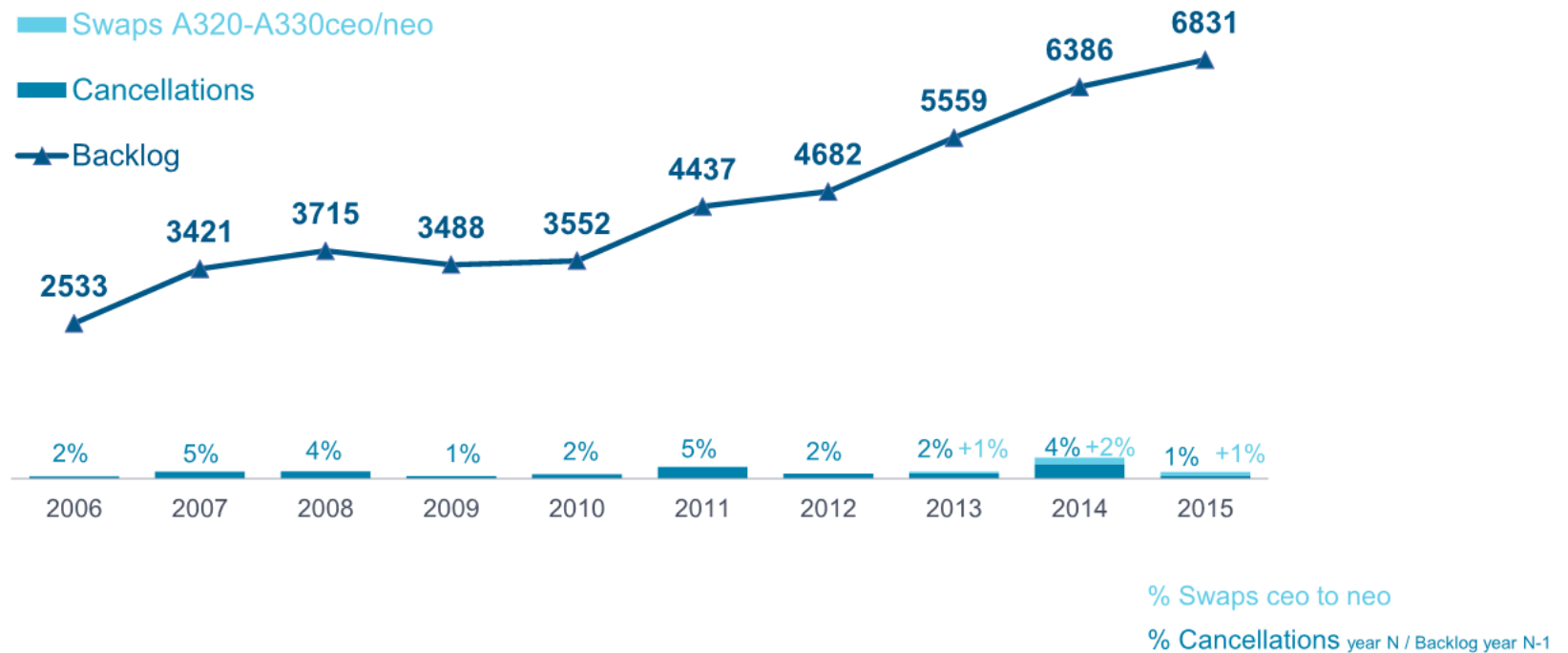
Source: Ascend, OAG, Airbus



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## Backlog x 2.7 since 2006 – Cancellations within historic bounds

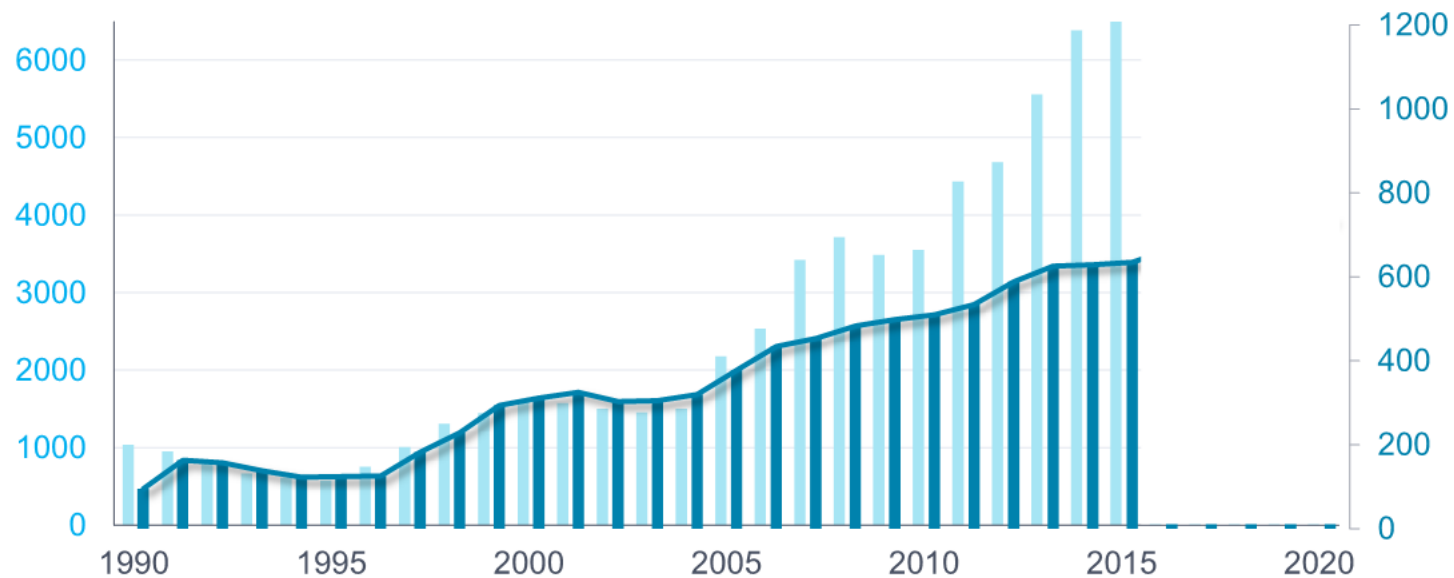


## Backlog and delivery ratio above 10:1 in 2015

Airbus backlog

Airbus deliveries

(scale 1/5 x backlog)



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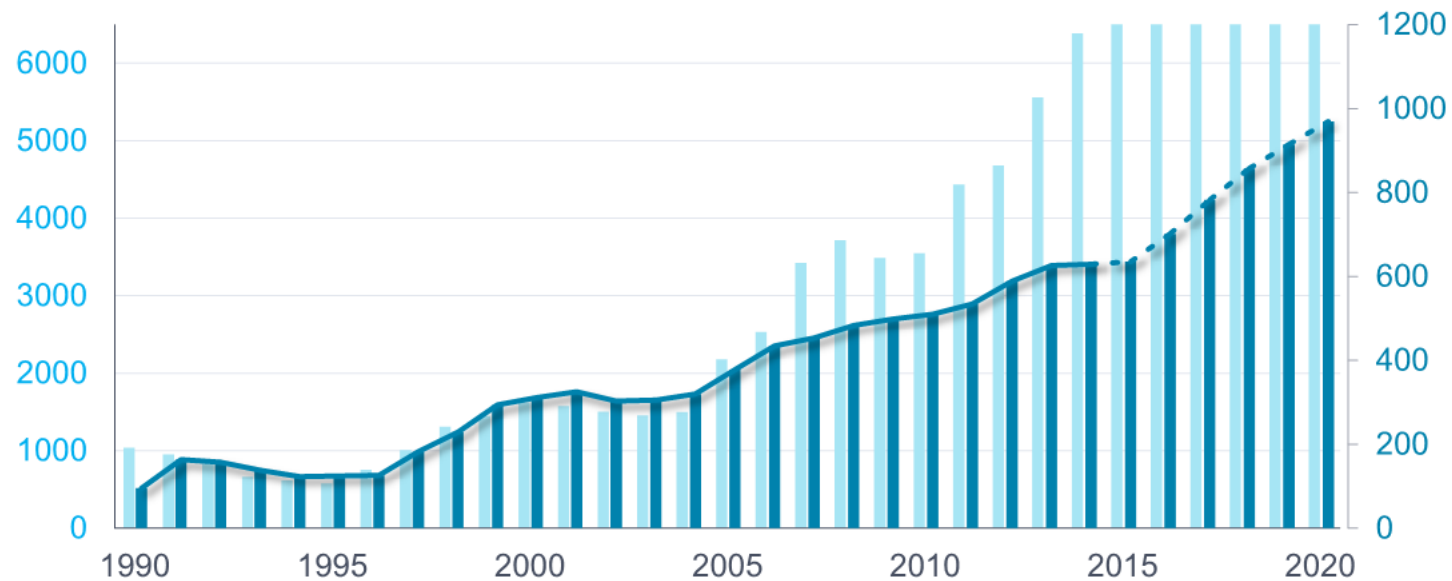


## Backlog and delivery ratio at 7:1 in 2020, A320 at rate 60 from mid 2019

Airbus backlog

Airbus deliveries

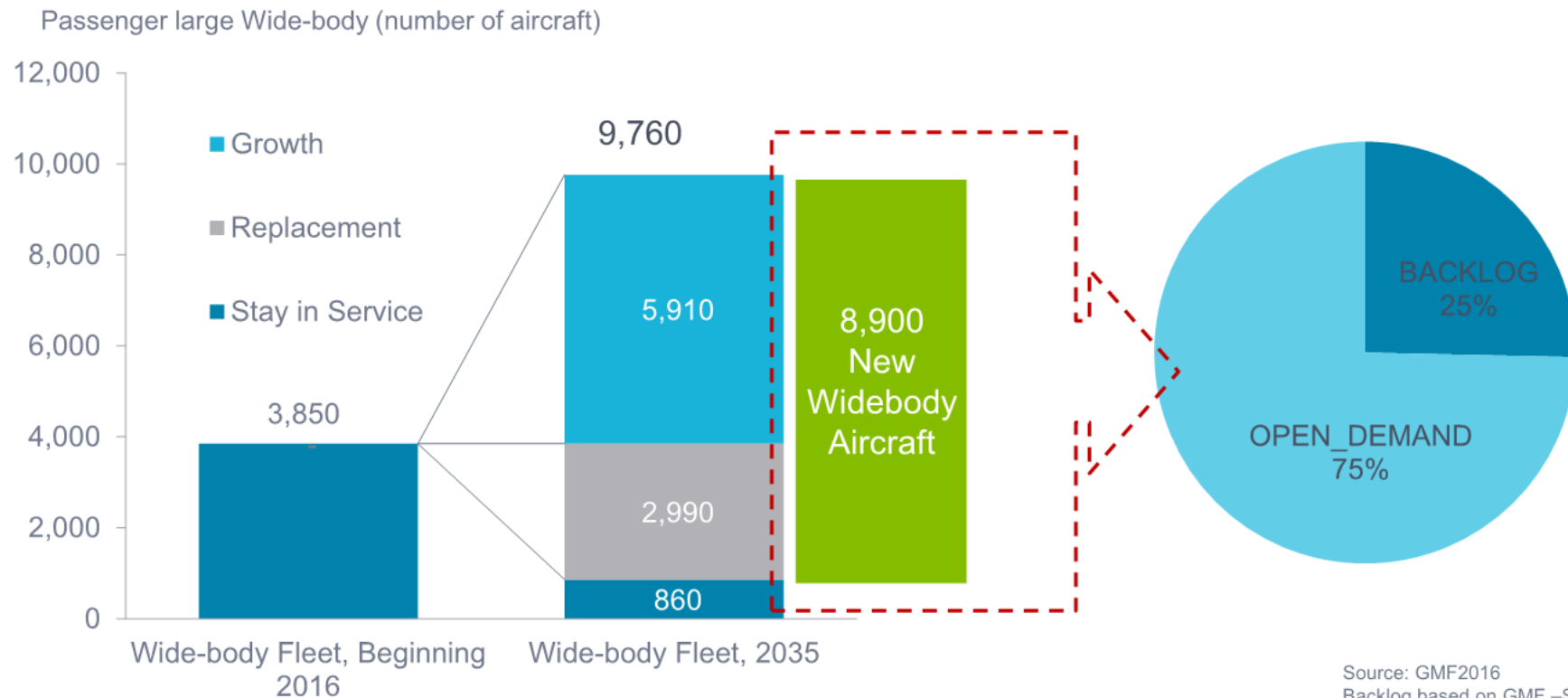
(scale 1/5 x backlog)



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## Demand for ~8,900 additional new passenger widebody aircraft until 2035



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## Summary

- Strong and **resilient** passenger traffic growth
- **Air traffic** (RPK) **doubles** every **15 years**
- As air transport develops, **new drivers** become more significant
- Demand for 33,070 new aircraft by 2035: ~**32,430** passenger aircraft and **650** freighters
- **40%** of passenger aircraft demand needed for **replacement**, and **60% for growth**
- Single-aisle represent 71% of units, and wide-bodies represent 54% of value
- VLA demand largely concentrated on **Aviation Mega-Cities** and network efficiencies will facilitate new VLA destinations