

The second frontier

The climate is changing for airlines

Transport accounts for 16% of GHGs – and airlines are one of the hardest modes to decarbonise, but pressure is growing

In this collaboration between our airlines, ESG and data science teams, we consider the response of EU and US airlines

We find a 2019 spike in climate discussions in earnings calls, with emissions disparities between low cost and legacy carriers

The following is a redacted version of a report published on 10 September 2019.

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Did you know?

- ◆ Transport accounts for c16% of all GHG emissions from fossil fuels, and 24% of CO₂ emissions from the same
- ◆ Aviation accounts for 12% of CO₂ emissions from the transport sector
- ◆ Whilst aviation only contributes 2% of current GHG emissions, it is under acute pressure as it is high growth and hard to decarbonise
- ◆ Whilst fuel consumption per available seat kilometre has consistently fallen by 2% annually, annual global growth of 5% in international aviation volume means emissions have grown overall
- ◆ Under CORSIA rules, 2020 is targeted as the peak-and-plateau year for international aviation sector emissions
- ◆ Climate issues have historically not been a major discussion item across listed airline conference calls in Europe and the US, averaging 4.1 mentions per company per year from 2001-2010
- ◆ There was a spike in 2011-12, when mentions rose to 8.1 per company per year at the time of the application of the EU ETS (Emissions Trading Scheme) to the aviation sector. This increase was seen for both US and European airlines.
- ◆ Mentions then fell back to only 2.6 per company per year during 2013-2017
- ◆ In 2019 the number of mentions spiked to 13.5, driven by a significant increase to 19.0 among European airlines. In the US, the number of mentions was not materially changed, at 5.3 vs the long-term average of 4.4
- ◆ Ryanair has the lowest CO₂/RPK among the peer set analysed, but has the highest CO₂/EUR of revenue
- ◆ CO₂/RPK is a function of fleet age and business model. It correlates positively with fleet age and the share of premium seats, negatively with stage length and aircraft size.
- ◆ US airlines and SAS are the strongest performers in terms of having low CO₂/EUR of revenue

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Executive summary

The second frontier – The climate is changing for airlines

All countries signed up to the 2015 Paris Agreement aim to limit global warming in 2100 to below 2°C above pre-industrial times.

In this report, we consider the growing pressure on airlines to decarbonise. We use our proprietary data science methodology to analyse the sharp uptick in discussions around climate change on airline earnings calls. We compare and contrast emissions metrics for European and US airlines.

Aviation accounts for 12% of CO₂ emissions from the transport sector (Chart 1). Transport in turn accounts for 24% of CO₂ emissions from burning fossil fuels for energy, which is continuing to rise overall as oil is burned to power engines in most vehicles (Chart 2).

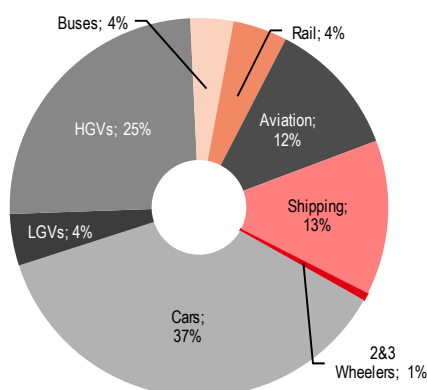
Aviation emissions are also growing, as fuel efficiencies fail to offset the 5% annual growth in volume. Against a backdrop of greater regulation and public pressure to cut emissions, we look at:

- ◆ The emissions of the sector within the context of the need to decarbonise large parts of the economy to achieve the goals of climate policy, including the Paris Agreement.

- ◆ Which airlines have discussed climate change on earnings calls, and changes over time, incorporating analysis of terminology used and geographic disparities.
- ◆ How airlines are performing in terms of their emissions relative to traffic and to revenue, and how these metrics are changing over time. We also look at the factors underlying such performance, including fleet age, number of engines, seating density and average stage length.

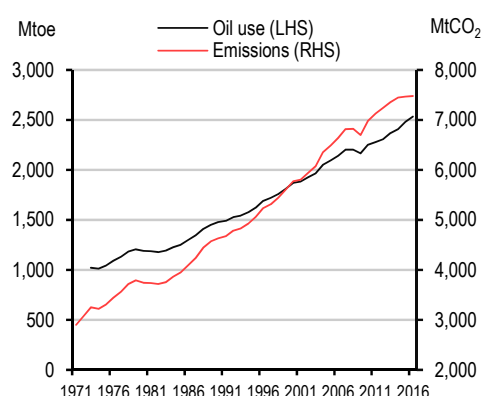
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Chart 1: CO₂ emissions by transport type (2015)



Source: UCL; HSBC

Chart 2: Transport oil consumption and emissions



Source: IEA, WRI

Maximum altitude

- ◆ Aircraft engines burn kerosene – it's a great source of energy, but means that aviation is an emissions-intensive mode of transport
- ◆ And aviation is a difficult sector to decarbonise, although still important to meeting climate targets
- ◆ Offsetting airline emissions is the focus of the global CORSIA regulations – 2020 is the target date for a peak-and-plateau of emissions

Aviation's Green House Gases

Aviation contributes around 12% of transport-related Green House Gases (GHGs) and around 1.7% of the total. Given the sensitivity of aircraft performance to weight, there has been limited progress away from burning kerosene – an oil derivative – as the fuel source for aviation. This is due to kerosene's high calorific value relative to its weight and the lack of alternatives with matching attributes.

Aviation's improving fuel efficiency has mitigated emissions growth, but not enough to offset the more rapid rise in traffic growth, meaning emissions from the sector are still rising in absolute terms. These emissions comprise localised air pollutants including sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and carbon monoxide (CO). However, by far the greatest emission, by a factor of several thousand in terms of mass, is CO₂, the main driver of manmade climate change. In this brief section, we consider how regulation can limit net sector emissions.

Regulatory catalysts

The Paris Agreement aims to meet its goals through national, i.e. domestic, climate actions. It does not cover cross-border or international emissions, i.e. those that are not directly attributable to any particular country, such as the international emissions from aviation or shipping. The International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO) are specialised agencies under the UN that have come under increasing pressure to address climate change within their respective sectors.

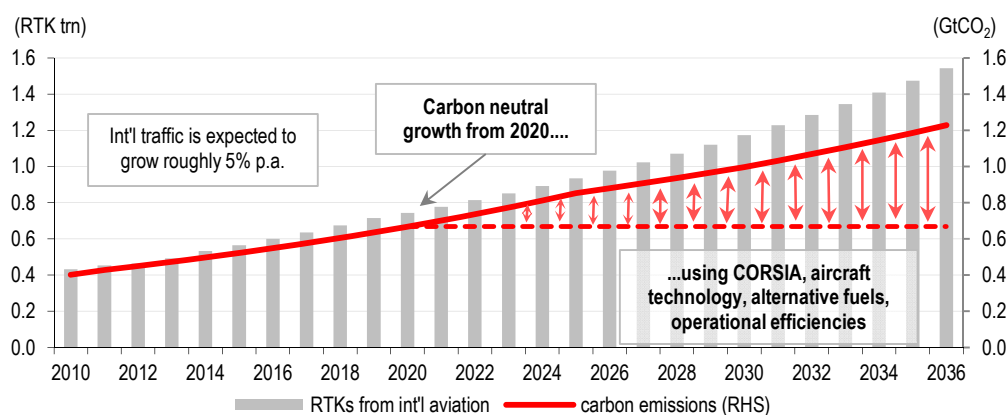
The ICAO adopted a new scheme in October 2016 designed to hold net carbon emissions from international aviation at 2020 levels (i.e. to achieve carbon neutral growth from 2020). The **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)** will mainly use carbon offsets to address any emissions above 2020 levels.

The ICAO expects international aviation volumes to grow at roughly 5% per year, resulting in emissions in 2035 of 1.1-1.27GtCO₂ (Chart 3 shows the difference opening up versus the 2020 level over time), without regulatory measures to limit this.

The inclusion of aviation in the EU-ETS

The European Union's Emissions Trading Scheme (ETS) included aviation from 2012, but this was met with opposition from the vast majority of non-European countries. In 2013, the European Union decided to

Chart 3: International aviation aims to hold carbon emissions at 2020 levels



Source: HSBC (based on the ICAO and the CAEP) Note: RTK = revenue tonne-kilometre

“stop-the-clock” on including intercontinental aviation within its ETS on the condition that the ICAO agreed an ambitious scheme, which deals with emissions. The European Commission has also stated that although the ICAO’s market-based measure (MBM) was a positive first step forward, key design elements still need to be developed to fully secure environmental integrity

What can transport contribute to climate targets?

Aviation has been named by many activists as one activity that should be curbed in order to reduce emissions. UK Civic society pressure was matched in the UK government, as a Labour-led motion declaring a ‘climate emergency’ was passed by MPs. Public pressure on the industry is growing, with the flygskam – or ‘flight-shaming’ – movement beginning in Scandinavia.

In [The second frontier](#), January 2019, we created a Clean-Power-and-Transport-2040 scenario, in which we looked at the potential for cleaner power generation and transport to close the ‘emissions gap’. This involves the aviation sector meeting the targets of the CORSIA plans. Overall, the gap in the case of the 2°C target is closed in our scenario by 72%, and in the case of the more ambitious target of 1.5°C of warming, by 48%. This shows what can be achieved by deep ambition around transforming the power generation and transport sectors, and aviation has a material role to play here.

Please contact your HSBC representative or email Research.Direct@hsbc.com for more details on our Clean-Power-and-Transport-2040 scenario.

We note that our scenario is not a projection for what we think is most likely to happen – rather it demonstrates what we think is a more likely approach to closing the emissions gap. But what is certain is that, if economies around the world don’t go beyond clean power and also tackle some of the sectors which are harder to address – like aviation – then the climate impacts we are already seeing, such as rising temperatures, altered water cycles and more severe extreme weather events, will worsen and associated socio-economic impacts alongside them.

Supportive policy, technological advances and cost improvements mean that electricity, hydrogen, natural gas and biofuels can all replace oil as fuel feedstocks for different transport modes. Decarbonisation of transport is a crucial step to achieving climate goals, but within the sector it is more challenging to achieve a low-carbon transition for certain means of moving people and goods – for aviation in particular, as well as trucks and shipping, it is harder than for cars, buses and trains.

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Talking about climate change

- ◆ During 2019 we have seen a dramatic increase in the frequency with which airlines discuss climate change on earnings calls
- ◆ However these discussions have been concentrated amongst European airlines
- ◆ US airlines have typically focussed more on issues of fuel efficiency and fuel consumption

Listen up: talking about climate change

Here we investigate the degree to which different airlines have discussed climate change on their earnings calls. To do this we apply Natural Language Processing tools to our database of earnings call transcripts.

What we did

We searched through the historical¹ earnings call transcripts for the following companies:

- ◆ **Europe:** IAG, easyJet, Ryanair, Lufthansa, SAS, and Air France-KLM;
- ◆ **US:** American, Delta, Southwest, and United.

For each conference call from these companies in our database we identified the sentences in which they discuss climate change. This allows us to track the frequency with which this has been discussed over time. We can also break down the analysis by company and by region.

How do we find these sentences?

Identifying the relevant sentences was done by searching the text for specific search strings². We have used similar techniques in several previous reports.

For some climate change topics this was simple. For example, there are only a limited number of ways in which people can discuss the topic of "Carbon Dioxide". However, other topics required a much larger list of search terms in order to comprehensively cover.

Table 4: Climate change search terms

Climate Topic	Comment
Carbon Dioxide	Simple to search for
Global Warming	Simple to search for
Climate Change	Simple to search for
Emissions Trading	A variety of search terms were needed to capture this
Environmental	"Environmental", not "environment"
Climate <something>	Searching for "climate" by itself returns many results, almost all of which are irrelevant. However, searching for climate in conjunction with a variety of other words enabled us to hone in on relevant phrases
Emissions	A variety of search terms were needed to capture this
Climate / Carbon Footprint	Simple to search for
Fuel	Fuel consumption and fuel efficiency returned many results. Sadly, these are only tangentially related to climate change.

Source: HSBC

Recent pick-up in discussions

In our analysis of earnings calls from these 10 companies we found that climate change was mentioned, on average, in 4.8 sentences per company, per year over the time period analysed (since 2002/3 for most companies).

To put this number in context, when we previously investigated the degree to which companies spoke about their employees in a meaningful, non-cost focussed manner on earnings calls, the equivalent frequency was less than one sentence per company per year.

That said, as climate change is very topical at the moment, it was initially surprising that it had not been discussed even more frequently on earnings calls³. If we track the discussions through time however, we do see a spike in 2019 to coincide with the sharp increase in topicality this year as shown in chart 5 below.

¹ For most of these companies we have transcripts beginning in 2002 or 2003. We were unable to find transcripts for IAG from Refinitiv until 2011.

² More accurately, we used specific "regular expressions".

³ Indeed, we were initially concerned that this low frequency was simply a result of our word-searching methodology missing subtle discussions of the subject in which the company used phraseology not covered in our searches. As a result, we subsequently tried to build a Machine Learning model to help with this. However, this model did not help us find more sentences so we continued to use the more direct methodology for this analysis.

Chart 5: Discussion of climate change in Airlines Earnings Calls


Source: HSBC, Refinitiv TRKD

What happened in 2011?

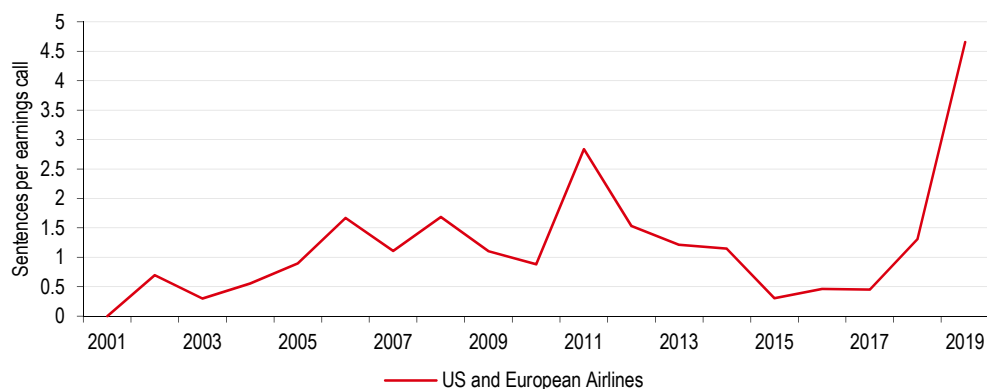
The previous high in the chart was back in 2011, which coincided with the run-up to the EU Emissions Trading Scheme (ETS) being applied to aviation in 2012. As analysts sought to understand how to model the application of the ETS this was a factor that was often discussed on EU airline calls at the time.

This factor was also a very big issue for US carriers (and hence often discussed on US calls as well) as the EU had initially proposed that the EU ETS apply to all flights to and from the EU as well as within the EU. This stance was opposed by the US airlines and politicians. On 27 November 2012 the United States enacted the European Union Emissions Trading Scheme Prohibition Act of 2011 which prohibited US carriers from participating in the European Union Emission Trading Scheme.

Fuel-related discussions only tangentially related to climate change

Of the climate change topics searched, the topics of fuel efficiency and fuel consumption could be considered as only tangentially related to climate change. Lower fuel consumption and better fuel efficiency clearly deliver lower emissions; however, most of the discussions on these subjects, at least historically, have related to the justification of capex or had a focus on cost-cutting. As a result, in Chart 6 we show the discussion of climate change excluding the fuel-related topics. We see that the same recent surge in discussions remains and, if anything, looks even more pronounced on this measure.

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Chart 6: Even more pronounced spike excluding the fuel-related topics


Source: HSBC, Refinitiv TRKD

Mirror mirror on the wall, who is the greenest airline of all?

- ◆ We assess the CO₂ emissions of European and US airlines relative to traffic, revenue and in terms of their rate of improvement
- ◆ The environmental performances are shaped by business structure, stage length, aircraft size and fleet age
- ◆ European low cost airlines perform well on traffic-based KPIs, but less well on revenue and improvement metrics

Airline environmental performance

We reviewed the emissions performance of the five largest European airlines, Air France-KLM, easyJet, IAG, Lufthansa and Ryanair and the four largest US airlines, American, Delta, Southwest and United. We also include SAS in the analysis, as it operates in Scandinavia, the most environmentally sensitive market in Europe.

We argue that it is important to consider a range of different KPIs as, across different measures, there are very different relative rankings.

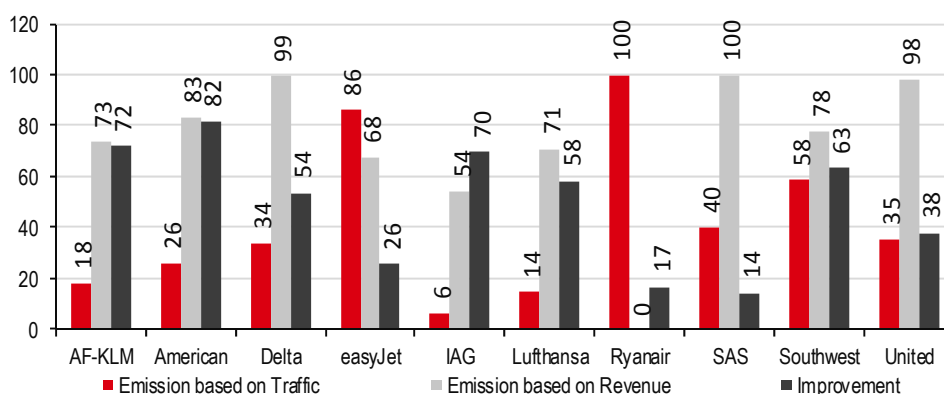
All KPIs are shaped by the nature of the company business models. The emissions metrics show correlations with the share of premium seats, average aircraft size, and average stage length as well as fleet age.

The European low cost carriers, easyJet and Ryanair, are the lowest polluting airlines in this review on the basis of CO₂ per revenue passenger kilometre (RPK) or per passenger. However, they are among the worst performing businesses considering CO₂ emissions relative to revenue. Since the fares paid by passengers offer an indication of the value placed on the flight, we think CO₂ per EUR of revenue is certainly a relevant metric.

We also think it is important to assess the rate at which airlines are improving their emissions performance. We therefore review the rate of change from 2014 to 2018 across our three metrics of CO₂ per RPK, CO₂ per passenger and CO₂ per EUR of revenue. Legacy carriers perform better than low cost carriers on this metric.

We think it is misleading to focus on any one single measure. The chart below therefore shows the relative performance of the carriers across the three key metrics, indexed, with 100 being the best performance and zero the worst.

Chart 7: Environment Indices – 100 is good, zero bad



Source: Company data, HSBC
 Sorted in alphabetical order

For illustrative purposes, we present an emissions performance index, which includes these three metrics evenly weighted into a single measure:

- ◆ CO₂ emissions per traffic unit, averaging the performance per RPK and passenger
- ◆ CO₂ per EUR of revenue
- ◆ The improvement of the companies from 2014 to 2018 averaged across the measures of CO₂ relative to traffic and revenue.

It is notable that the aggregate index shows Ryanair as the worst performing airline of the group across the three measures, despite being the best on the CO₂ per traffic unit measure. We imagine that this finding may seem controversial, but this highlights how poorly Ryanair performs with regard to CO₂ per EUR of revenue and also how its environmental performance has improved more slowly than peers. We further note that the growth in CO₂ emissions is far faster at low cost airlines than legacy airlines.

The combined index shows the strongest performance from Southwest. (Chart 8)

Policy implications

The shifting attitudes towards the environment will force change across all industries. The airline industry finds itself in a particularly challenging situation in this regard. The extreme nature of range anxiety when experienced at an altitude of 30,000 feet does make electrification challenging. And this does pose existential questions for the airline industry which, in our view are disproportionately relevant for low cost airlines.

Communications strategy

As the previous section of this report discussing the frequency of environmental discussion in company earnings calls shows, individual airlines are starting to focus on the issue. However, the low level of commentary on the issue until recently clearly signals that the communication strategy is still notably immature.

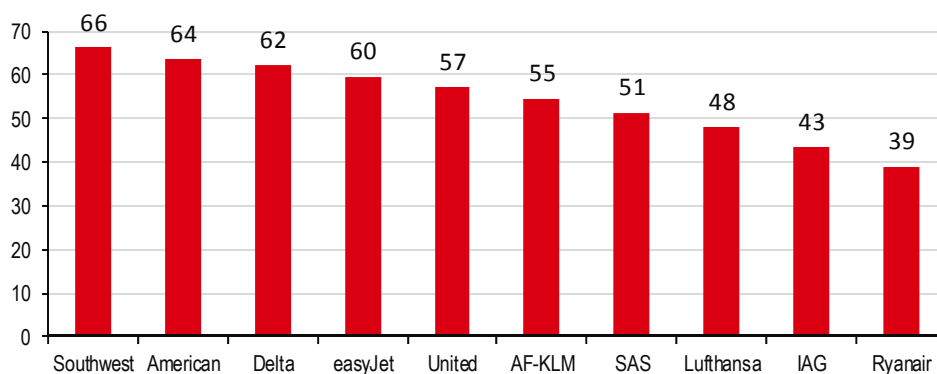
Low cost air travel challenged

Most commentary on climate change and aviation currently focusses on CO₂ emissions per RPK. We think the focus will evolve to take into account the value ascribed to the flight by consumers. In the fashion industry, the environmental debate focuses on the challenge of disposable fashion, such as the environmental cost of the GBP1 bikini. We see EUR10 flights as vulnerable to similar challenges in the future.

Growth challenged

The aviation industry takes growth for granted. Historically, aviation has grown at around 2 times GDP, growing faster in developing economies and slower in developed economies. Airline, airport and aircraft OEMs assume these metrics will continue. The ICAO work underpinning CORSIA is predicated on the 5% annual growth rate in international aviation volumes. The business models of low cost airlines in particular are predicated on this continuing. We think changing attitudes will see governments increase taxes on the aviation industry. We also think the growth in consumer demand for air travel will slow.

Chart 8: Environment Index - Average of CO₂ per traffic / revenue and improvement



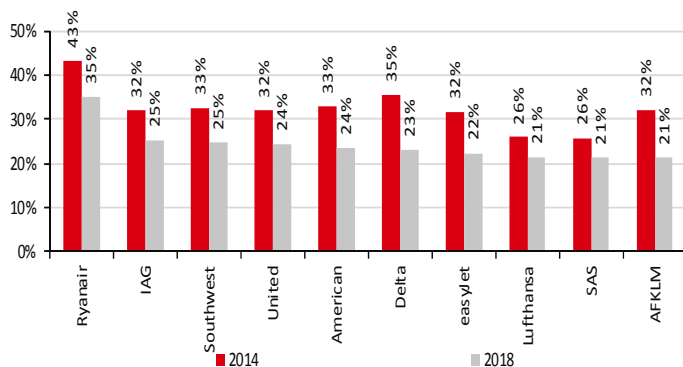
Source: Company data, HSBC

Airlines already care about fuel efficiency

Airlines operate with narrow profit margins and fuel is the largest or second largest cost item, depending on labour structures. All airlines therefore focus on minimising fuel consumption. Higher fuel prices, in absolute terms and with increasing carbon costs, encourage greater efficiency efforts.

And lower fuel consumption means less emissions, so there is a strong economic-environmental co-beneficial dynamic here.

Chart 9: Fuel as % of total cost



Source: HSBC, Company data

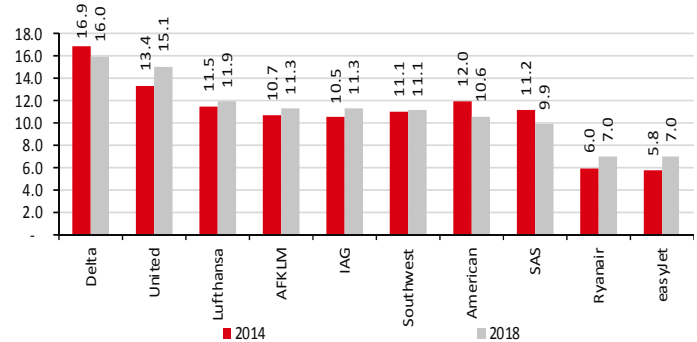
That said, periods of lower fuel prices, as seen in 2015-16 for example, do delay aircraft retirement plans. Faced with lower fuel costs, airlines increase capacity, and hence emissions, by retaining aged aircraft that would otherwise have been retired and by flying more services in off-peak periods.

Fleet modernisation is thus a key issue for all airlines, with regional airlines moving to larger and more modern aircraft types, low cost airlines taking on re-engined narrowbodies, and legacy businesses moving to modern narrowbodies and updated long haul aircraft. (Chart 10)

We do think that the most significant opportunities to change the long-term environmental impact from aviation will come from the industrialisation of biofuels and from an acceleration in technological developments.

It is not obvious that airlines themselves will be able to bring about faster biofuel development. As the CEO of SAS, Rickard Gustavsson recently argued, this is a policy area that will require government intervention and incentivisation.

Chart 10: Fleet age by listed group



Source: HSBC, Company data

Airline environmental performance

As the public, media and political focus has increased in the past 12 months – and with the CORSIA regulations setting 2020 as the peak-and-plateau year for aviation emissions – the airline industry has changed its media approach to the issue, seeking, in our view, to highlight the improving environmental performance of the industry in an effort to influence public and political opinion.

How to measure environmental performance?

We do not think there is one simple measure that captures airline environmental efficiency. Since different metrics deliver very different rankings, we are very cautious about identifying best and worst carriers from an emissions perspective.

We think the commonly held view that low cost airlines are better for the environment than legacy carriers is flawed. Low cost carriers perform better than legacy carriers on measures that consider emissions relative to physical output. They seek to present themselves as the most environmentally friendly airlines. Yet considering emissions relative to revenue, this ranking broadly reverses. Moreover, the European low cost airlines are seeing the highest growth in absolute emissions.

In the future, we think environmental performance will be also measured by the improvement in emissions, across both traffic and revenue measures. We also think airlines will be judged on the increase in net emissions, bringing focus to the use of biofuels and moderating growth.

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Chart 11: Comparison of rankings across different measures

_Absolute metrics 2018 _			Improvement 2018 vs 2014			_____ Drivers 2018 _____			
Traffic measures		Revenue measure	Traffic measures		Revenue measure				
CO ₂ /RPK	CO ₂ /Pax	CO ₂ /EUR	CO ₂ /RPK	CO ₂ /Pax	CO ₂ /EUR	Stage length (long to short)	Fleet age (young to old)	Share Four engined aircraft (lowest to highest)	Long haul aircraft seat density
Best	Ryanair easyJet United Southwest AF-KLM Delta SAS American IAG	Ryanair easyJet Southwest SAS Delta American Lufthansa United IAG	SAS Delta United American Southwest AF-KLM Lufthansa easyJet IAG	AF-KLM IAG Lufthansa American Southwest easyJet Ryanair SAS Delta United	American Southwest Delta united AF-KLM IAG Lufthansa SAS delta easyJet Ryanair	AF-KLM IAG United Delta Lufthansa American SAS Ryanair Southwest easyjet	easyJet Ryanair SAS American Southwest AF-KLM Lufthansa United Delta	SAS AF-KLM IAG Lufthansa United Lufthansa IAG	Delta American AF-KLM SAS United Lufthansa IAG
Worst	Lufthansa	AF-KLM	Ryanair	United	SAS				

Source: HSBC, Company data

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*A stock was classified as volatile if its historical volatility had exceeded 40%, if the stock had been listed for less than 12 months (unless it was in an industry or sector where volatility is low) or if the analyst expected significant volatility. However, stocks which we did not consider volatile may in fact also have behaved in such a way. Historical volatility was defined as the past month's average of the daily 365-day moving average volatilities. In order to avoid misleadingly frequent changes in rating, however, volatility had to move 2.5 percentage points past the 40% benchmark in either direction for a stock's status to change.

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