BALPA Interim Position Paper on the Environment and Sustainability

Contents

Introduction

This is an interim position paper not a long-term one for two reasons; firstly, the pace of change in both environmental science and low carbon technology is so rapid that we will need to be ready to adapt. Secondly, 2022 will see the publication of two key reports. The UK government are due to publish their findings from the Jet Zero consultation which will form the backbone of UK's aviation decarbonisation strategy, and IFALPA are due to update their position paper on sustainability which will automatically become BALPA policy unless we choose to publish a difference.

Executive Summary

BALPA wants to see a thriving future for the aviation sector in the UK, one that provides jobs for our members and mobility for our population. Yet we are in the midst of a climate crisis and have a moral and legal obligation to ensure our future is a sustainable one. A careful balance needs to be struck. In the short term, we should focus on issues that quickly improve sustainability without undue burden on a recovering industry (e.g., operational efficiencies, non-CO_2 effects).

To achieve further carbon savings in a timely way an unprecedented rate of change and innovation is required. It is imperative that the UK Government act quickly and decisively to place the UK at the forefront of this change and avert the risk of enforced limits on flying.

While the Jet Zero strategy lays out a credible pathway to decarbonising the aviation sector, one which we support, many unknowns remain. Our key recommendations to UK government are:

- Make very substantial investment, early, to ensure the UK is at the forefront of technological change in aircraft design, power plant design, SAF technology and renewable energy generation.

- Take rapid action in areas that have immediate effects such as contrail avoidance and work with unions to identify airline operational efficiencies.
- Draw upon the massive body of knowledge and practical experience built up by UK's flight crew and use it to inform and improve the Jet Zero strategy.
- Campaign via ICAO to strengthen CORSIA and widen its remit to include non-CO2 effects.
- Work closely with EASA and the EU to ensure our regulations remain compatible with Europe's - and at least as ambitious - to provide security for operators and ensure a level playing field

Background

The UK is a signatory of the Paris Agreement, committing us to act to limiting global warming to 1.5 Celsius – or at least "well below" 2 Celsius. The Paris agreement requires signatory countries to file a "Nationally Determined Contribution" (NDC) to the UN explaining how this will be achieved. The UK's latest NDC was made in December 2020 and commits the UK to an economy-wide reduction in greenhouse gas emissions of 68% by 2030 (compared to a 1990 baseline), and "net zero" by 2050[1].

This target was made legally binding in June 2021, and for the first time the aviation and shipping industries were explicitly included. A further target to cut emissions by 78% by 2035 compared to 1990 levels was also incorporated[2]. The government strategy for aviation to meet these climate targets is called Jet Zero[3]. In September 2021 BALPA made a substantial contribution to the Jet Zero consultation exercise, in the process forming the bulk of this position paper. The final version of the strategy will be published "early next year", but we already know the key points are likely to include:

- Net zero target of 2040 for domestic aviation, coupled with heavy R&D investment, intended to stimulate a global market in small/regional zero-emission aircraft technology.
- "Carrot and stick" approach to sustainable aviation fuels (SAF) for immediate emissions reductions from short and long-haul operations without requiring fleet renewals
- UK emissions trading scheme: Government control of both the "grandfather rights" and overall cap will be used to drive up carbon costs
- No market control measures, no constraints on airport expansion, continued traffic growth allowed (provided targets are met, presumably)
- Significant reliance on offsetting and carbon removal & storage technologies (CCS) to counteract substantial residual fossil fuel emissions even past 2050
- Aspiration of 2% annual efficiency gains from aircraft design, operation, and airspace modernisation
- Investment in liquid hydrogen infrastructure enabling the fuel to power the next generation of regional and short haul aircraft
- Recognition that effective radiative forcing (i.e. global warming effect) from aviation is only

[1] Policy paper: The UK's Nationally Determined Contribution under the Paris Agreement. BEIS Dec 2020. https://tinyurl.com/j7eb4a9a
[2] Press release: UK enshrines new target in law to slash emissions by 78% by 2035. BEIS April 2021. https://tinyurl.com/b46dahpm
[3] Jet zero: our strategy for net zero aviation. Department of Transport. July 2021. https://www.gov.uk/government/consultations/achieving-net-zero-aviation-by-2050

partly from CO_2 emissions, and possible measures to tackle the non-CO_2 effects

The European Union has slightly different targets. Their “green deal” also aims for net zero by 2050 but their interim target is a reduction of 55% by 2030, compared to 1990 levels[4] The strategy to achieve this is called “Fit for 55”[5] and the aviation strategy, in which the ECA is heavily involved, is likely to include:

- “ReFuelEU” – a legally binding SAF blending mandate, with very limited use of biofuels and an emphasis on synthetic fuels, plus a ban on economic fuel tankering
- Introduction of minimum taxation on fossil jet fuel starting from zero in 2023 rising to €10.75/GJ in 2030 [approx £400 per tonne]
- Use of the EU emissions trading scheme (ETS) to further drive up the cost of fossil fuels and reduce price differential to SAFs
- According to EC's aviation department director Filip Cornelius, these measures will increase operators' costs by 8% by 2050[6]

In summary, our industry faces possibly its biggest ever challenge. Moving towards a sustainable operation is no longer an option or 'nice to have,' rather it is a legal necessity. Achieving our emission targets should now be seen as a licence to operate freely in the future.

Undoubtedly the transition will be painful, and at the very least we should expect significant increases in fuel costs, ticket prices and taxation. However, there is still time to shape and influence the transition. BALPA can see its role as maintaining a fair balance. By ensuring that environmental measures are equitable, proportionate, safe and actually achieve their goals we can help protect our members' careers, maintain our industry's reputation, and help steer UK aviation towards a greener future.

Jeremy Thomson.

Chair, BALPA Environment Study Group.

[4] Delivering the European Green Deal. European Commission. https://tinyurl.com/yvu5829n

[5] Fair, just and deliverable: EU's "Fit for 55" climate package success hinges on bringing every city and region on board. European Committee of the Regions. https://cor.europa.eu/en/news/Pages/FIT-FOR-55-PACKAGE.aspx

[6] European Commission estimates “fit for 55” proposals will add 8% to airline costs. CargoVision Bulletin, Oct 20201. https://cloud.3dissue.net/17602/17660/17779/63729/index.html

Net zero 2050 and the trajectory to reach it

BALPA supports a credible pathway to net zero by 2050, and broadly agrees with the 'high ambition scenario' outlined in the UK government's recent Jet Zero consultation[7].

Current emissions will cause far more warming effects than emissions towards 2050 simply because they are present in the atmosphere for longer – hence the need for an ambitious initial trajectory. By acting positively now, the UK will be at the forefront of development of zero-carbon technology, an industry that will be worth trillions of pounds over the next 50 years.

However, key targets within this trajectory should be aligned with benchmarked progress in available technology. For example, the next five years should be used to support and incentivise aircraft manufacturers and supporting industries such as fuel suppliers and airport infrastructure to enable the practical and affordable use of low/zero emission technology. Only when airlines can have confidence that these steps are guaranteed, will they be likely to place substantial orders for the aircraft that will meet these targets.

BALPA has reservations about the Jet Zero strategy's assumed efficiency gains of 2.0% per annum. Both the Climate Change Committee[8] and ICAO[9] estimate a maximum of 1.4% per annum. We do not feel that the 2% figure is justified and risks undermining the credibility of the models.

BALPA feels that a review of the Jet Zero once every five years alone is not sufficient. We propose at least one intermediate review in between the major reviews, and if technological or scientific breakthroughs occur, then reviews could take place on an ad-hoc basis to address them. To maintain credibility, we recommend the Jet Zero programme be regularly and openly assessed by a separate body such as the Environmental Audit Committee.

We look forward to the findings of the Jet Zero consultation, expected in early 2022, and anticipate that they will outline ambitious but achievable interim emissions targets that we can also support.

BALPA is proud to be an active member of the International Federation of Airline Pilots' Associations (IFALPA), and as a part of their Climate Working Group is developing an updated international position on sustainability, which we expect to adopt when published during 2022.

Taxation and investment

Aviation is a force for good and APD "costs" the exchequer more than £1bn every three years it is not abolished[10]. If the stated aim is to raise revenue, APD fails. If the aim is to dampen demand for a polluting activity, then let's address the polluting effects. An allowance for all APD raised which supports the rapid transition to SAF would satisfy the ecological concerns and allow the return of revenue to the exchequer when APD could subsequently be abolished for good fiscal reasons.

BALPA suggests that the UK Government takes a leadership position by allowing a partial or full allowance of APD for airlines who invest that in SAF programmes. This would not allow a reduction in passenger costs – APD would still be charged, but up to 100% of it could be used by the industry to develop sustainable aviation for the future.

[7] Jet zero: our strategy for net zero aviation. Department of Transport. July 2021. https://www.gov.uk/government/consultations/achieving-net-zero-aviation-by-2050

[8] Sixth Carbon Budget – Aviation. Climate Change Committee (2021). https://tinyurl.com/5cuzxjna

[9] Environmental report 2019. ICAO (2019). https://tinyurl.com/26pevu9d

[10] The economic impact of Air Passenger Duty: Analytical update. PriceWaterhouseCoopers 2015. https://tinyurl.com/nn3h5j3m

The aviation industry is being asked to make profound, transformative changes in very short order to meet its emissions targets, which comes with an immense cost. It is right and proper that APD, the industry's largest tax, is used to help fund this challenge; if not by the tax relief suggested above then by ring-fencing the revenue for investment into research, development, and implementation of sustainable aviation.

A forward-looking government would be discouraging inefficient and unproductive 'nods' to 'green' taxes which don't work and instead looking towards the future of both the planet and a great industry, by investing in effective developments which will improve economic performance, reduce environmental impact and develop our understanding and connectivity with the rest of the world.

Sustainable aviation fuel

BALPA, along with the European Cockpit Association and Europe's major airlines, supports the consensus statement on SAFs submitted to the European Commission[11]. The consensus statement recommends rapid utilisation of SAFs but has some significant caveats:

- Biofuels from dedicated cropland should be excluded and other sources audited with great care to avoid undesired environmental damage[12]
- The sustainability of waste-to-fuel schemes are not clear-cut and need careful assessment of their lifecycle sustainability
- Synthetic/electro fuels are genuinely sustainable only if produced with dedicated additional sources of renewable electricity. Controls are needed to ensure investment provides genuinely new, additional sources of sustainable electricity for their production[13]

SAF certification should include a challenging target for particulate emission reduction and the significant cost differential between fossil fuels and SAFs must also be addressed.

We advocate strong incentives for the development and use of SAFs (research funding, industry support, operator tax relief from APD) coupled with a carefully audited SAF blending mandate.

Aligning policy with the European Commission's ReFuelEU initiative[14] would ensure a level playing field across Europe and avoid perverse incentives for operators to tanker fuel.

An opportunity exists for the UK to be a leading producer of SAF, particularly electrofuels, for export. This will require a significant up-scaling of UK renewable energy generation. However, we are in a good position to install significant excess offshore wind generation capacity, and we should exploit this vital natural resource to the maximum possible benefit.

Non-CO_2 effects

The Paris agreement aims to limit global warming and applies to all causes not just CO_2 emissions. Latest research shows that carbon dioxide is not aviation's biggest contribution to effective radiative forcing (global warming), in fact the largest factor is aviation-induced cloudiness (AIC)[15].

[11] Consensus statement on guiding principles for supporting the deployment of sustainable aviation fuels in the EU. Various Authors (2021). https://tinyurl.com/dxb5muzt
[12] Used cooking oil linked to deforestation. Andrew Allen, CIPS (2019). https://tinyurl.com/29th5a46
[13] Assessing the sustainability implications of alternative aviation fuels. ICCT working paper (2021). https://tinyurl.com/j327uyk8
[14] ReFuelEU Aviation. EU European Economic and Social Committee (2021). https://tinyurl.com/sh2uw26u
[15] The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. Lee et al. Atmospheric Environment (2021).

AIC can be greatly reduced, quickly and easily, using existing tools and without change to aircraft or fuel technology. The only cost being an overall fuel burn increase of a few percent[16]. The Royal Aeronautical Society rightly label non-CO_2 effects as the 'low hanging fruit'[17]. The UK is already at the forefront of this work, with Satavia able to provide the required forecasting and flight planning tools[18] and Professor David Lee's team at the Manchester Metropolitan University leading the science[19].

The UK should exploit this position to urgently design and implement a large-scale and meaningful trial of contrail avoidance, noting that aircraft powered by SAF or hydrogen also cause AIC so these measures will be needed long term.

SAF certification should include challenging targets for reduced emissions - especially soot, sulphur and particulates – resulting in both cleaner air and reduced radiative forcing from contrail formation.

Rarely will there be an opportunity to make such a major environmental improvement at such little cost and difficulty. We urge the government to make the necessary funding and resources available to conduct a conclusive trial as soon as possible, and to act on the findings rapidly.

NO_x emissions at altitude are another major contributor to radiative forcing as they inhibit the degradation of methane, a powerful greenhouse gas, but are currently only monitored in the landing/take off phase (LTO), and only at certain airports (in the UK, only Heathrow and Gatwick).

BALPA supports the proposals of an EASA report[20]; adapting NO_x LTO charges to include a cruise distance factor, and also to include NO_x emissions in the UK and EU ETS.

Zero emission flight

We must exploit the UK's world-leading aerospace technology industry to find all possible solutions to the need for net-zero aviation. The UK's dense population and closely located cities make the domestic aviation sector an ideal test bed for new technologies. Globally, the zero-emission aircraft sector will be worth $30bn by 2030 and $200bn by 2040[21]. The UK should be at the forefront of its development.

However, BALPA cautions that while a future for battery powered aircraft is welcome, we must be realistic in our expectations. The Chief Technology Officer of Airbus has stated that "even assuming huge advances in battery technology, with batteries that are 30 times more efficient and 'energy-dense' than they are today, it would only be possible to fly an A320 airliner for a fifth of its range with just half of its payload".

---

https://tinyurl.com/3kmrjazd

[16] Fuel-Optimal Trajectory Generation for Persistent Contrail Mitigation. S E Campbell et al, Aerospace Research Central (2013). https://tinyurl.com/5e8kkrb7

[17] Easy does it for greener skies. Dr John Green, The Royal Aeronautical Society (2021). https://tinyurl.com/c37t5b5f

[18] DecisionX: Net Zero. Satavia (2020). https://tinyurl.com/b96539s4

[19] Mitigation of Non-CO2 Aviation's Climate Impact by Changing Cruise Altitudes, S. Matthes, L. Lim, U. Burkhardt et al., Aerospace 8(2), 36. (2021) https://tinyurl.com/3fyvpdnp

[20] Updated analysis of the non-CO2 climate impacts of aviation and potential policy measures pursuant to the EU Emissions Trading System Directive Article 30(4), S. Arrowsmith, D.S. Lee, B Owen et al. (2020). https://tinyurl.com/rhjb57u

[21] Zero-Emission Aircraft Market by Source, Range, Application and Type: Global Opportunity Analysis and Industry Forecast, 2030–2040. Allied Market Research (2021). https://tinyurl.com/atzwvdp4

Hydrogen fuelled flight

BALPA welcomes research and development into hydrogen-fuelled aircraft but recognises the immense challenge this represents in terms of developing a sustainable and sufficient supply of H_2, distributing it safely and efficiently, and designing safe and effective aircraft given the huge fuel tank volumes required.

Airbus is aiming to demonstrate a H_2-powered short-haul aircraft by 2035[22], an ambitious timetable. Realistically even if this succeeds, and the required infrastructure is available to support it, we do not anticipate H_2 to significantly displace liquid jet fuel before 2040. As such H_2 use is unlikely to contribute to 2035 emissions targets.

'Green' H_2, produced by using sustainable electricity electrolyse water, is truly sustainable but not very efficient[23]. However, we do not currently support the use of 'blue' hydrogen produced from fossil fuels. Even if the resulting carbon dioxide output is captured and stored, current research shows that damage caused by 'fugitive' methane emissions would outweigh any benefit[24].

Ultimately hydrogen is only likely to displace jet fuel as part of a much more substantial and wide-ranging transition to a hydrogen economy. We note and welcome the recently announced government hydrogen strategy[25] but to make a real impact on decarbonisation it needs to be larger scale, such as the plans being formulated by the National Hydrogen Council in Germany[26].

Economic Fuel Tankering

BALPA considers economic fuel tankering to be problematic on both environmental grounds[27] with typically 1.5 – 2.5% of the extra fuel carried being burned per hour to carry the weight of that same fuel[28]. Unfortunately, anecdotal evidence suggests that the practice is not only continuing but becoming more common perhaps due to increased fuel price differentials or operators looking to exploit every cost saving.

However, this is not the only reason to regulate fuel tankering. If a SAF blending mandate is introduced, the resulting higher fuel costs would create a perverse incentive for operators to tanker cheaper non-blended fuel into the UK. This is not only environmentally self-defeating but would also give an unfair commercial advantage to non-UK operators.

To avoid this market distortion the UK should work with the EU to ensure our policies on economic tankering are similar and apply to all companies operating into the UK/EU.

[22] ZEROe: Towards the world's first zero-emission commercial aircraft. Airbus. 2020 https://www.airbus.com/innovation/zero-emission/hydrogen/zeroe.html

[23] Hydrogen technology faces efficiency disadvantage in power storage race. S&P Global. June 2021. https://tinyurl.com/5ax3n9aw

[24] Touted as clean, 'blue' hydrogen may be worse than gas or coal. Cornell Chronicle. August 20201. https://news.cornell.edu/stories/2021/08/touted-clean-blue-hydrogen-may-be-worse-gas-or-coal

[25] UK government launches plan for a world-leading hydrogen economy. BEIS August 2021. https://www.gov.uk/government/news/uk-government-launches-plan-for-a-world-leading-hydrogen-economy

[26] The German National Hydrogen Council Launches 80 Measures to Advance The Hydrogen Economy. Hydrogen Central, July 20201. https://hydrogen-central.com/german-national-hydrogen-council-measures-hydrogen-economy/

[27] BA to review fuel tankering after Panorama revelations. Gwyn Topham. The Guardian (2019) https://tinyurl.com/yda5emxk

[28] Fuel Tankering: economic benefits and environmental impact. EUROCONTROL (2019). https://tinyurl.com/h5d7hapu

Carbon offsetting and Carbon Capture & Storage (CCS)

BALPA recognises that decarbonising the aviation industry is a huge challenge and that residual carbon emissions in 2050 remain likely[29]. While emissions reduction remains the best option, we believe that any residual carbon should be directly removed rather than offset.

Offsetting schemes have been used in an unverifiable and overstated manner[30], as "greenwashing" and they are hard to quantify and verify[31]. In addition, meaningful offsets will be increasingly difficult to find as other sectors reduce their own carbon emissions. If offsets are used, they must be very carefully audited and we recommend they are factored to reduce uncertainty, i.e., two or three tonnes of CO_2 reduction should be offset for each tonne actually emitted. Until offsets schemes are monitored by a governance committee and their validity standardised then their use should be limited.

CCS is likely to be essential for aviation to meet its net zero target in the medium to long term, but the technology is as yet unproven. It must be possible to meet our targets without relying on CCS at least until the mid-point of the programme in 2035, while simultaneously investing heavily in this technology. Any CO_2 removals via CCS credited to the industry must be genuinely additional and not simply displace or recount existing capacity. Again, the UK is well placed to become a world leader in the sector due to its legacy of North Sea oil extraction[32].

Domestic aviation

The UK government has complete regulatory control of domestic aviation, free from market-distorting influences of different regulatory landscapes. It should exploit this position and use the domestic aviation sector as a pioneer of sustainable developments in an environment of fair competition.

Well-funded research and government sponsored (but industry-led) solutions are required to modernise and decarbonise our domestic sector. Very substantial investment through Innovate UK and BEIS (the department for Business, Energy, and Industrial Strategy) in accordance with the UK Research and Development Roadmap is required but should ultimately reap rewards. This is an opportunity to develop new aviation platforms with the potential to become world leaders, generating wealth and jobs for the UK.

While smaller zero-emission aircraft for regional services (either battery or hydrogen/electric) remain a huge technological challenge, they are likely to be feasible well before zero-emission short-haul or long-haul can be developed. The UK should aspire to be a world leader in these technologies, but to achieve this requires a government-coordinated approach with new technology clusters in each area of design and build - akin to the Whittle Lab in Cambridge - each with sufficient funding.

The Future Flight Challenge and the ZeroAvia programme are welcome initiatives but are too small scale. A new aircraft on the scale of the Wright Electric[33] should be the aspiration for investment. It would cost billions – but would result in a net increase in jobs, levelling up and a vibrant exportable opportunity post Brexit.

[29] Residual fossil CO2 emissions in 1.5–2 °C pathways. Luderer et al. Nature (2018). https://www.nature.com/articles/s41558-018-0198-6
[30] Ryanair carbon offset programme "woefully inadequate". University of London (2019). https://tinyurl.com/4wxfft68
[31] What is carbon offsetting and how does it work? Fiona Harvey. The Guardian (2021). https://tinyurl.com/6ww9dzc6

[32] Carbon Capture and Storage (CCS). British Geological Survey. https://tinyurl.com/4y6m8y6w
[33] Wright Electric https://www.weflywright.com/

BALPA does not feel that the argument for a target of 2040 for net zero in domestic aviation rather than 2050 has been made convincingly enough in the Jet Zero consultation document. Although a desirable goal, it will put extra pressure on the domestic market, on which many people living in remote regions and islands in UK rely.

We suggest the 2040 target be an aspirational goal rather than a legally binding one.

Finally, effective, and sustainable integration with road, rail, and sea transportation options, rather than direct competition with them, should be a central principle.

Operational efficiencies

The Covid pandemic has brought with it a requirement to ensure good cabin ventilation whenever passengers are on board, including on the ground. However, the provision of pre-conditioned air (PCA) on aircraft stands is at best patchy at UK airports, forcing crew to run the aircraft's auxiliary power unit (APU) for extended periods.

APU use on the ground contributes significantly to local noise and air quality issues as well as avoidably burning several hundred kilograms of fuel per hour. Ground-supplied PCA should be routinely connected whenever it is available, should be made available on as many stands as possible and should be a required part of plans for all new or modified stands.

The greatly reduced traffic levels have enabled more efficient operation by almost eliminating delays and holding, facilitating direct-route flights, and enabling tactical flight-level changes en-route. New equipment requirements for oceanic routes (ADS-C surveillance and datalink[34]) and low traffic has also made the North Atlantic Track (NAT) system effectively redundant.

As traffic starts to grow, we should work hard to avoid a return to inefficient old practices, specific suggestions include:

- End the requirement to fly over specific waypoints when crossing FIR boundaries, particularly in/out and within Europe (SESAR).
- Review and relax altitude limitations on arrival and departure procedures, and between ATC sectors.
- Participate actively in improving Eurocontrol's flow management system to ensure airborne delays are continually minimised
- Avoid a return to NAT tracks; allow operators to plan optimal routings over the Atlantic.

Market control and customer behaviour

BALPA wants to see a thriving, expanding and affordable aviation sector and not one that has to be forcibly downsized to meet emissions targets. We welcome the fact that the trajectories presented in the Jet Zero consultation all allow for traffic growth from a 2019 baseline, and the fact that the UK government has published no plans to directly limit traffic or growth.

However, we are concerned about the lack of clarity about what action might be taken by the government if emissions targets are missed. If possible mitigation is to include market control measures such as frequent flier levies or traffic limits, it could be highly detrimental to our members.

[34] Termination of temporary accommodation measures in the NAT Data Link Mandate (DLM) airspace due to COVID-19. ICAO, Feb 2021. https://tinyurl.com/338rafmb

BALPA urges the government to work with BALPA in developing an equitable and orderly mitigation or "plan B" strategy that treats the industry and its employees fairly, similar to the transition now being discussed in the UK oil and gas industry[35].

Influencing consumer behaviour ('nudging') is another worthwhile tool, albeit one that is difficult to measure. Equally, the sector needs to learn from our customers and adapt to their priorities, many of whom are increasingly motivated by environmental concerns.

Neither of these things can happen unless customers have easy access to reliable data on the environmental impact of flights. Airlines operating within or into the UK should provide accurate and comparable environmental data alongside the ticket prices. These figures would need to be audited by a third party to ensure accuracy and fairness. An obvious and widely understood metric would be "CO_2e" - the total warming effect of the flight, including non-CO_2 effects, simply expressed as a quantity of CO_2.

We also advocate a central certification system allowing airlines to offer their customers ways to make trustworthy and effective mitigations to their flight's impact. This could be in the form of directly paying for extra SAF to be purchased (already in use by Lufthansa[36]), for an equivalent amount of CO_2 to be removed from the atmosphere by direct carbon capture or via a nationally credited "gold standard" offsetting scheme.

Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

While CORSIA[37] represents a significant achievement in terms of international cooperation, its ambition is limited, it relies on unproven offsets, and it is likely that UK/EU initiatives such as emission trading schemes (ETS) and SAF blending mandates will likely render it redundant in Europe[38]. BALPA would like to see the UK using its membership of ICAO to push for a strengthened version of CORSIA in the future.

The role of BALPA and flight crew in sustainable aviation

The one stakeholder group uniquely placed to offer genuine practical operational expertise and experience across commercial aviation in all weathers, all airports, is the UK's professional flight crew.

Through BALPA's flight safety arm, our members can provide insight into all practical aspects of aircraft operation, procedure design efficiency, ATC practices, flight path optimisation and many more. We urge that the government, through the Jet Zero programme, use this resource at the highest level and allow us to help inform and sense-check all new efficiency initiatives.

BALPA has an important role to play in the sustainable future of aviation and believes that it should have representation on the Jet Zero Council, which it will seek.

[35] https://edm.parliament.uk/early-day-motion/57701/just-transition-campaign-for-offshore-oil-and-gas-workers
[36] Fly CO2 Neutral. Lufthansa Group. https://tinyurl.com/5yxdsrn4
[37] Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). ICAO https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx
[38] Assessment of ICAO's global market-based measure (CORSIA) pursuant to Article 28b and for studying cost pass- through pursuant to Article 3d of the EU ETS Directive. Report for the European Commission (2020). https://tinyurl.com/3w8zbbsa

Appendix – Timescale, efficacy, and cost estimates

This table summarises the various sustainability measures proposed towards aviation's emissions targets together with estimates of the time scale, impact, feasibility, and cost of each. Significant uncertainty exists in many areas and these estimates are provided on a 'best guess' basis only.

Sustainability measure	Timescale to implement	Efficacy	Cost
Tactical contrail avoidance	6-12 months	**High**. Could reduce aviation-induced radiative forcing by up to 50%	**Low**. Some research and set-up costs. Ongoing costs 1-2% additional fuel burn
Economic fuel tankering ban	0-6 months	**Low**. Could reduce fuel burn approx 1-2%.	**Low**. No set up cost, small operating cost increase to airlines.
Sustainable Aviation Fuel blending	2% blend 6-12 months. 10% by 2030. 50% by 2050.	**Medium to high**. Pure SAF can reduce lifecycle CO_2 by 50-85% and contrails significantly. E-fuels most sustainable but most costly	**Medium to high**. Currently SAFs cost 5-8x fossil. Should fall to 2-3x by 2030 (while fossil fuel price increases)
Operation efficiencies – Air Traffic / Airspace	1-2 years	**Low**. Moderate but worthwhile fuel savings 2-5% with no 'downside'.	**Negative**. Already funded and progressing (Airspace Modernisation Strategy in UK, SESAR in EU). Airlines will save costs.
Carbon offsetting	Now	**Medium but uncertain**. Needs careful lifecycle analysis. Does not address non-CO_2 effects.	**Unrealistically low, historically**. Truly effective measures likely to cost more, perhaps £50-£100/t CO_2e.
Carbon removals (CCS)	5-10 years	**Potentially high** but does not address non-CO_2 effects.	**High**. Current cost approx £400/t CO_2e. Likely to drop significantly[39].
Operational efficiencies – aircraft operation	0-1 year	**Low**. Small savings are still possible by better operational practices.	**Negative.** Likely to actually save costs for airlines
UK emissions trading scheme (ETS)	Now	**Low, currently**. Carbon price can be manipulated to control demand.	**Low, but will increase**. Currently around £50/t CO_2, with significant free allowances.
CORSIA	Now	**Negligible**. Likely to be a 'backstop' measure in UK & EU.	**Negligible.** Unlikely to have much effect in UK & EU environment
Fleet renewal / new engine designs	Ongoing	**Low**. Historical improvements of 1-1.5%	**Medium - High**. Airframe costs remain high, but

[39] Carbon Capture methods compared: costs, scalability, permanence, cleanness. Energy Post.EU. https://energypost.eu/10-carbon-capture-methods-compared-costs-scalability-permanence-cleanness/

		per year likely to continue.	renewals already planned.
Hydrogen-fuelled aircraft	10- 20 years	**Low to Medium**. Likely to be small/regional airframes initially, short haul later. Too slow for 2035 targets.	**Very high**. Significant infrastructure investment needed. Airframe costs will be high. Uncertainty.
Electric aircraft	15-30 years	**Low**. Likely to be feasible for small aircraft only, barring a breakthrough on battery tech. Too slow for 2035 targets.	**Very high**. Per-seat costs of airframes likely to be very high, utilisation could be challenging.
Air Passenger Duty	Now	**None**. No evidence that APD influences passenger choice. Not re-invested in aviation or sustainability.	**Medium**. UK APD is above the global and European average.
Direct market/traffic control measures	A few months	**Potentially high**. Impact would be in direct proportion to traffic reduction	**Low** implementation costs, but **high cost and risk** to operators and our members. Social equality issues.
Customer influences / nudges	A few months	**Low**. Customers are mostly influenced by ticket prices.	**Low**. Operators should publish sustainability data – could this trigger a 'race to the greenest'?