Airbus fello’fly

Reducing fuel consumption up to 10%

With the promise of reducing fuel consumption by up to 10% per follower flight, Airbus’s cutting-edge fello’fly project is currently one of the most exciting aviation sustainability projects. Inspired by the flight of migratory birds, which fly together to save energy, two aircraft are set to meet and fly in formation. The follower aircraft will retrieve the energy lost by the wake of a leader aircraft, by flying in the smooth updraft of air it creates and thereby significantly reducing emissions on long-haul flights. If the fello’fly demonstrator project were to be put into operational use and all wide-body aircraft were equipped with wake energy retrieval technology, it is estimated that fello’fly could eliminate over 3.5 million tons of industry CO₂ emissions annually. Considering that the long-haul aviation segment is the most difficult to decarbonise, this would be a significant achievement.

Read our top story on page 3
Welcome to the first issue of the EUROCONTROL Aviation Sustainability Briefing that aims to provide answers on how we can make aviation sustainable together. From our unique position at the centre of European aviation, we see many concrete achievements and initiatives that address the issues of climate impact, noise and air quality.

This briefing is part of EUROCONTROL’s initiative to provide key information to guide decisions that will improve aviation’s environmental footprint, both at policy and industrial level. Its outreach is not just for those of you working in aviation. It includes everyone who is concerned about aviation’s impact on the environment and wants to know more about the possibilities and trends of the future.

At EUROCONTROL we are working on a number of sustainability services to reach the shared vision of a carbon-neutral industry by 2050. We operate the Emissions Trading Scheme and CORSIA Support Facilities to help competent authorities and aircraft operators to meet their obligations. We develop innovative environmental impact assessment tools like IMPACT and OPEN-ALAQS. We participate in innovation projects within the scope of SESAR, and also with operational stakeholders. We contribute to a better understanding of environmental performance by providing data, action plans and recommendations, and by developing (e)-trainings and webinars.

Aviation is transitioning to carbon neutrality; many solutions are developed and being implemented by our partners in the industry. I am excited that our first edition features two of these partners with trailblazing solutions for the reduction of aviation’s carbon footprint: Airbus’ fello’fly project and NESTE’s sustainable aviation fuels.

Enjoy the reading and please let us have your feedback on this newsletter!

Marylin Bastin
Head of Aviation Sustainability
EUROCONTROL

Contact:
sustainability-briefing@eurocontrol.int

"Providing answers on how we can make aviation sustainable together"
Airbus fello’fly

reducing fuel consumption up to 10%

Airbus’s revolutionary fello’fly concept aims at reducing emissions and fuel consumption, with estimated efficiency gains of up to 10%. Inspired by the flight of migratory birds - which fly together to save energy - two aircraft are set to meet and fly in formation.

The follower aircraft will retrieve the energy lost by the wake of a leader aircraft, by flying in the smooth updraft of air it creates and thereby significantly reducing emissions on long-haul flights. If the fello’fly demonstrator project were to be put into operational use and all wide-body aircraft equipped with wake energy retrieval technology, it is estimated that fello’fly could eliminate over 3.5 million tons of industry CO₂ emissions annually. Considering that the long-haul aviation segment is the most difficult to decarbonise, this would be a significant achievement.

“The theory about wake energy retrieval has been around for a long time. However it is only fairly recently that flight testing by numerous aerospace organisations proved the size of the benefits. In 2016, at Airbus we performed our first flight tests and found over 10% instantaneous fuel and emissions reductions.” says Nick Macdonald, fello’fly Project Leader at Airbus.

Airbus completed 2020 with a number of exciting achievements, including some key advances on the on-board technology side and a lot of progress in drafting a first concept of operations for oceanic airspace. These activities will continue in 2021, with further flight testing to allow a level of maturity to perform a demonstration in Atlantic airspace together with the collaborating airlines and air navigation service providers. “However, fello’fly remains a technology demonstrator” emphasizes Nick Macdonald. “Plans for the future, in particular regarding making the technology commercially available, depend entirely on the outcomes of these demonstrations.”

Fello’fly is a demonstrator project set to boost the environmental performance of aircraft and help the industry towards its target to reduce CO₂ emissions by 50% by 2050. The reduction in engine thrust for follower aircraft results in reduced fuel consumption. Instantaneous fuel burn reductions of over 10% in certain cruise configurations have been shown possible. Trip fuel savings for a typical wide-body mission are expected to be around 5% and upwards.
But how complex will it be to put fello’fly into place technically, operationally and commercially?

“The big strategic issue here is all about the speed at which our industry can innovate, by which I mean move technology into real airline operations” says Nick. “There are two aspects to this challenge, which are first that the regulatory framework is available to support the use of technology, and second that the operational players are able to use it.

At this stage, we are looking primarily at the transatlantic flow, as a starting point. At a later stage, it will be necessary to study implementation in other regions in order to prepare global deployment. Then on the regulatory side, there is a challenge to have the regulations in place to allow the new regulatory minima for two aircraft flying 3km apart, and with a new division of responsibility for maintaining their separation. Assuming we demonstrate the viability, we anticipate the technology could be available around 2025. We would need regulations to be updated in advance to support this timeline, and the environmental contribution that fello’fly can make.”

The EUROCONTROL Network Manager is proud to be part of fello’fly, working alongside Airbus, airlines and air navigation service providers to assess its operational viability. Together with colleagues from Airbus, airlines and air navigation service providers (ANSPs), EUROCONTROL is playing a key role in the team, bringing extensive operational experience to the project assessing how such a new kind of operation can be integrated into today’s network infrastructure.

”There are two aspects to this challenge, which are first that the regulatory framework is available to support the use of technology, and second that the operational players are able to use it.”

Nick Macdonald
fello’fly Project Leader at Airbus
As the vast majority of fuel and emissions reductions would be achieved on flights made by wide-body aircraft, the focus of the project is on traffic flows between global regions. The fello'fly CONOPS addresses transatlantic traffic, but could be easily transposed to other oceanic airspaces. The full potential of emissions savings will depend on the degree of commercial adoption, and could deliver even greater environmental gains with further extension of the concept, e.g. to flight formations involving more than two aircraft.

The fello'fly CONOPS unites EUROCONTROL, two airlines (SAS, Frenchbee) and two ANSPs (DSNA, NATS). The CONOPS aims at inserting fello'fly flights into existing traffic while preserving the fuel efficiency enabled by the fello'fly concept, without compromising on safety. The operational conditions of fello'fly are unique and require a creative ATM approach:

- There are already many 'natural' pairs of flights which can be observed. These are created by airlines having similar departure schedules and the concentration of traffic into track systems.

- EUROCONTROL plays a significant role by providing crucial traffic flow information to help identify the most probable pairs in real-time, and by facilitating on-time departures of aircraft planning to take advantage of wake energy retrieval.

Significant effort is still required before operations could start in 2025

2021 will be a busy year for the fello'fly team, with a number of flight tests taking place to develop and test the on-board systems technology. The intention is that if the systems development is successful, a demonstration of the CONOPS will take place in transatlantic airspace in the last quarter of the year with the involvement of EUROCONTROL and other industry collaborators. Additionally, the regulatory and commercial frameworks necessary to support the technology and its operations are also being assessed. On the airline side, the main investments necessary to start using the technology will be in pilot training, whilst for ANSPs, air traffic control systems upgrades will be needed so that they can display aircraft performing wake energy retrieval operations on controller radar screens. To distribute worldwide the fello'fly information contained in the flight plans filed by airlines, EUROCONTROL will also have to modify its Integrated Initial Flight Plan Processing System (IFPS).

“Increasing the sustainability of air traffic is a key priority for us in the EUROCONTROL Network Manager to support the sector in reducing aviation emissions by 50% by 2050. We are working with all partners in the aviation ecosystem on innovative solutions for the future and I’m excited to support and be fully part of the fello’fly project.”

Iacopo Prissinotti,
Director Network Management EUROCONTROL
Can sustainable aviation fuels help us decarbonise aviation?

Along with future hybrid, electric or hydrogen-powered aircraft, Sustainable Aviation Fuels (SAF) represent one of the most promising solutions for aviation as the sector looks to transform itself towards a more sustainable future. SAF are estimated to generate 80% less carbon emissions than conventional kerosene, and have the potential to reduce emissions considerably if uptake and production of SAF increase. However, there are a number of obstacles to overcome before this can become a reality, such as a strong business case and the emergence of a supportive policy framework. One way of kick-starting the SAF revolution, as EUROCONTROL think paper on taxing aviation argues, could be to ring-fence taxation to support aviation decarbonisation measures including SAF.

Pioneering SAF initiatives across Europe

1 According to SAF producer NESTE Global - when measuring their full life cycle from production to combustion
But what do we mean when we talk about SAF?

SAF are a cleaner substitute for fossil jet fuels. They fall into two categories: biofuels or synthetic fuels. Biofuels are produced from biomass (e.g. plants and wood products) or residues (e.g. used oils and waste).

The latter are more sustainable and address the ethical concern of competition within the food chain of local populations (e.g. crops). Synthetic fuels - also called electrofuels, efuels or power-to-liquid (PtL) - are produced from two basic ingredients: carbon dioxide and water, but require large amounts of electricity. Synthetic fuels can be zero-carbon, if renewable electricity is used in the production process, and CO₂ captured from the air. Already today, SAF are compatible with current aircraft and can be blended with kerosene up to 50% using existing engines and the existing fuel supply chain at the airport. They comply strictly with fuel specifications through certification.

SAF also improve air quality as they reduce direct emissions: particulate matter by up to 90% and sulphur by 100%, compared to conventional jet fuel. This makes SAF an asset also to address the challenges of non-CO₂ emissions.

Using SAF: At what stage is the industry?

Today SAF account for less than 1% of total EU aviation fuel consumption – in part because SAF from biomass cost about three times more than kerosene, efuels even eight times more. Ramping-up the production of SAF at competitive prices will be necessary to unleash their full potential to decarbonise aviation. Nevertheless, more and more airlines and airports are in the process of offering SAF to their customers: Oslo Airport became the first international airport to offer SAF as part of their fuel mix in 2016.

On their role as trailblazer Arvid Løken of Avinor - the company that operates Oslo airport - says:

“It is quite simple, really, and has been clear for Avinor for more than a decade: We have to reduce the carbon emissions from our industry significantly over the coming years. SAF is a turnkey solution and will work with today’s hardware. But prices have to come down, and production must be scaled up.”

SAF initiatives are now spreading across Europe. For instance, SAF became available in Switzerland for the first time in 2020 when Zurich Airport drove the initiative to provide it to business jets during the World Economic Forum Annual Meeting in Davos. Lufthansa Cargo and logistics company DB Schenker undertook their first CO₂-neutral freight flights from Frankfurt to Shanghai and back in November 2020.
The companies also announced their intention to offer CO\(_2\)-neutral air freight as a regular product for the shipping industry from the 2021 summer flight schedule onwards.

**SAF is high on the agenda of policy-makers**

At global level, the International Civil Aviation Organization (ICAO) advocates SAF as a top priority option for reducing CO\(_2\) emissions by 2035. It has also set a complementary economic measure - the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), through which airlines can buy carbon credits to offset their own CO\(_2\) emissions, and fund decarbonisation projects around the world.

In Europe, the European Union agreed one year ago to aim for climate neutrality by 2050. The European Commission proposed tougher climate goals for 2030 and set off an extensive review of all EU policies ranging from energy to transport and agriculture – an ambitious agenda known as the European Green Deal. As part of this agenda, the European Commission is expected to adopt the so-called ‘ReFuelEU Aviation’ proposal, which aims to boost the supply and demand for sustainable aviation fuels in the EU and is also about to amend the Renewable Energy Directive (RED) along the same direction in 2021. Several policy options setting obligations for minimum delivery of SAF (or a minimum reduction in CO\(_2\) emissions) are currently under debate. Obligations may be set on suppliers, on airlines or on both sides. In 2021, the European Commission also plans to review the EU European Trading Scheme (ETS) Directive, a legally binding mechanism capping emissions for the industry, including aviation, to align it with the ‘ReFuelEU Aviation’ initiative.

In January 2021 KLM operated the first commercial passenger flight from Amsterdam Airport Schiphol to Madrid using an admixture of 500 liters of sustainable synthetic kerosene.

CEO Pieter Elbers said

“Fleet renewal contributed significantly to the reduction of CO\(_2\) emissions, but the upscaling of production and the use of sustainable aviation fuel will make the biggest difference for the current generation of aircraft. That is why we teamed up with various partners some time ago, to stimulate the development of sustainable synthetic kerosene. This first flight on synthetic kerosene shows that it is possible in practice and that we can move forward.”
As the aviation industry aims for greater efficiency and sustainability and to reduce its climate impacts, sustainable aviation fuels (SAF) are expected to play an increasingly significant role in enhancing aviation sustainability – but for now, their European market share remains below 1% of all jet fuel purchased.

To get an insider view on what the future holds for this exciting sector, and how SAF can help aviation ‘build back better’ from the pandemic, we touched base with Jonathan Wood, Vice-President Neste Renewable Aviation, one of the largest global SAF providers.

How large do you think the market for SAF will be in Europe in the next decade, and which type of SAFs look the most promising in terms of market share?

Over the long term we anticipate that SAF will be a large market and a very material share of all aviation fuel used. This is confirmed by most industry commentators, including the International Air Transport Association (IATA) and the recent ATAG report (note of the editor: the Air Transport Action Group is a non-for-profit association representing all sectors of the air industry). In Europe a target SAF share of 10% of all aviation fuel demand by 2030 is feasible, ramping up from 5% in 2025.

As a society we need to move fast in all sectors to reduce emissions now, in order to follow a path which could enable us to meet the 2015 Paris Climate Change Conference goal of limiting temperature increases to 1.5°C. It is essential we start now in increasing the uptake of lower emission solutions - waiting a few years for the perfect solution increases the scale of the challenge. Most of the SAF production capacity in the 2020s will be based on the so-called HEFA technology*, which is commercial today, with a growing contribution from 2025 onwards from technologies utilising other raw materials such as municipal solid waste, biomass waste, and crops from degraded/unused land. In the long term, we see so-called Power to Liquids technology making a big contribution.

How have aviation stakeholders evolved their views about SAF in recent years in Europe, especially in light of the ‘Green Deal’?

There has been a visible change in public opinion manifested by support for Greta Thunberg: concrete actions are now expected from aviation to make flying more sustainable.

How is this visible: passengers are asking airlines to do more; companies are responding to consumer preferences for low-emission products and services, and thus governments are now pushing for policies which reduce flying-related emissions. As a result we see the EU targeting to reduce emissions by 55% by 2030, and individual national targets being set to reach net-zero emissions by 2050 (or earlier in some cases in Europe). In aviation, offsetting is no longer seen as sufficient; we see increased support for a requirement for at least a certain proportion of aviation fuel to be SAF.

Jonathan Wood, Vice-President Neste Renewable Aviation
What tend to be the decisive elements for aviation to start using SAF, and what remain the biggest obstacles to greater SAF uptake?

Cost is the main challenge: SAF is more expensive than fossil jet fuel, and is expected to remain so for the foreseeable future. However, let’s put this into perspective - the extra cost of 10% of all fuel being SAF is no more than what the passenger might spend on a coffee and a coke at the airport.

Regulatory intervention is needed. Requiring a growing share of all fuel to be SAF, through a so-called blending obligation or mandate, is the simplest policy tool to grow the market for SAF. Norway was the first country to implement such a mandate in 2020, and several other countries have committed to follow that path (e.g. Sweden, Netherlands and France). The European Union is also currently exploring the potential to implement a mandate for SAF as part of the European Green Deal.

What should airlines and airports do now to meet future SAF demand and secure adequate SAF supplies?

Actions to create certainty in demand growth are key for the investments required to grow SAF production capacity and become more efficient. Airlines and airports need to show commitment for the required transition, engage and make it easy for their customers to opt to travel using SAF, right from when they make a decision to buy a ticket. Airports can adjust landing and take-off fees to favour flights where SAF is used. The airline industry as a whole needs to take concrete steps towards the long-term goal of reducing aviation emissions by 50% by 2050 (as per the IATA long-term emission reduction target).

To what degree has the COVID-19 pandemic delayed SAF uptake in terms of willingness to invest in transitioning to SAF?

The industry, including Neste, is investing in growing SAF production capacity for the long-term. COVID has not changed that. There is even as a result of COVID a more heightened awareness of the need to take action to mitigate the negative effects of man-made emissions. Where COVID clearly has had an impact is at the level of aviation travel and the financial capability of airlines to invest upfront in SAF. We see this more as a temporary postponement.

What can aviation actors, from airspace users to airports, to policy-makers and EUROCONTROL, do to make aviation more sustainable faster?

Firstly, make it as attractive and as easy as possible to choose the more sustainable, i.e. lower emission, way - be that airlines making it easy for customers to choose SAF when booking a flight, airports rewarding airlines when they use SAF, or policy-makers putting in place incentives and mandates progressively increasing the use of SAF.

EUROCONTROL has a key role to play to ensure that routes are optimised, hence minimising fuel consumption. EUROCONTROL is also a great source of data to inform a fact-based policy debate. In summary, all players have a role, to move aviation forward to a more sustainable future.

“We see the EU targeting to reduce emissions by 55% by 2030 and individual national targets being set to reach net-zero emissions by 2050”

*HEFA, or hydroprocessed esters and fatty acids, are produced from oils and fats to derive diesel from biomass.*
ETS Support Facility now extended to Switzerland and the UK

The EUROCONTROL Support Facility for the EU Emissions Trading System for aviation supports over 500 aircraft operators to fulfil their obligations in monitoring, reporting and verifying their emissions, while reducing compliance cost. In 2020, the ETSSF was extended to support Switzerland, following the entry into force of the linkage between the EU and Swiss emissions trading systems. The service was also adapted to continue supporting the United Kingdom as of 1 January 2021 and is now capable of supporting other States in the implementation of national market based measures.

EUROCONTROL supplies new CORSIA support service

EUROCONTROL is now offering two new services as part of its support to States for the implementation of ICAO’s Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) - the global scheme to address aviation’s impact on climate change. As part of the Environmental Management Information Service (EMIS) the CORSIA Reporting Tool (CRT) was developed on request - and with the financial contribution - of the European Commission and was deployed in June 2020. The CRT is used by EEA States to ensure their timely submission to ICAO of the State aggregated CORSIA emissions report. In January 2021, the CORSIA Support Facility (CSF) was deployed to support States in the review and acceptance of the CORSIA emissions reports delivered to them by aircraft operators.
Close cooperation with European partners on the third edition of the European Aviation Environmental Report 2022

EUROCONTROL is working closely with the European Union Aviation Safety Agency (EASA), the European Environment Agency (EEA), the European Commission and the Joint Research Centre on the third edition of the European Aviation Environmental Report (EAER). The report, an independent overview of the environmental performance of European aviation, will be published in July 2022 in time for the ICAO 41st General Assembly. EUROCONTROL is contributing expertise as well as its unique data sources to the report.

Co-chairing the ATM/ANS Environmental Transparency Working Group

The objective of this new working group, co-Chaired by EASA, NATS and EUROCONTROL, is to develop proposals on how ATM/ANS providers can increase environmental transparency and demonstrate their efforts to support the industry in reducing negative environmental impacts.

If you are an ANSP and you want to get involved, please contact sustainability-briefing@eurocontrol.int

Think Paper “Does taxing aviation really reduce emissions?”

Our recent Think Paper concluded that any tax on aviation should be ring-fenced to support decarbonisation measures such as sustainable aviation fuels. It finds that economic output is the main factor influencing demand, and hence higher or lower CO₂ emissions – and underlines that as long-distance air traffic dominates aviation emissions, efforts must be targeted on this segment if a reduction in CO₂ emissions is to be achieved.
EUROCONTROL Data Snapshot on CO₂ emissions from flights in 2020

Our EUROCONTROL data snapshot on CO₂ emissions from flights showed CO₂ emissions declined by 57% in 2020, but with considerable variations between States depending on differences in the local fleet, flight distances, mix of market segments, and by the extent of the COVID-19 decline in flights.

https://www.eurocontrol.int/publication/eurocontrol-data-snapshot-co2-emissions-flights-2020
In 2020, some 6% of flights from European airports were long-haul, crossing more than 4000km. Longer distances naturally mean longer duration flights, and mostly by larger aircraft. That has a significant cost in terms of CO$_2$. In 2020, more than half of European aviation’s CO$_2$ emissions were from this tiny proportion of the overall number of flights.

[Diagram showing distribution of CO$_2$ emissions by flight distance]

6.2% of flights create 51.9% of CO$_2$
30.6% of flights create 4.3% of CO$_2$

Source: EUROCONTROL

[Link to the full report]
https://www.eurocontrol.int/publication/eurocontrol-data-snapshot-co2-emissions-flight-distance
Aviation Sustainability
Developments from around the world

Europe’s aviation sector launches plan to reach net zero CO2 emissions by 2050

On 11 February 2021 the European aviation sector launched its flagship sustainability initiative “Destination 2050 – A Route to Net Zero Aviation.” Driven by a new, independent report, it provides a vision for meaningful CO2 emission reduction efforts in Europe and globally. According to the new report, there is an opportunity to reach net zero CO2 emissions by 2050 through a combination of four key measures, subject to securing the required supporting policy and financing framework at EU and national level. These four measures comprise:

- Improving aircraft and engine technologies, which could achieve emission reductions of 37%
- Using sustainable aviation fuels (SAFs), which could achieve emission reductions of 34%
- Implementing economic measures, which could achieve emission reductions of 8%
- Improving air traffic management (ATM) and aircraft operations, which could achieve emission reductions of 6%.

The initiative follows climate commitments announced by the sector in November 2020 in the Round Table Report on the Recovery of European Aviation, which called upon institutional stakeholders to join the sector in an EU Pact for Sustainable Aviation by the end of 2021 – a call reiterated today.

Find out more under [www.destination2050.eu](http://www.destination2050.eu)

Boeing says it will make planes able to fly on 100% biofuel by 2030

Boeing has set an ambitious target to advance the long-term sustainability of commercial aviation, committing that its commercial airplanes are capable and certified to fly on 100% sustainable aviation fuels by 2030. The company has previously conducted successful test flights replacing petroleum jet fuel with 100% sustainable fuels to address the urgent challenge of climate change.
Air France KLM Martinair Cargo and Bolloré Logistics Team Up to Launch First Low-carbon Airfreight Route between France and the United States net zero CO2 emissions by 2050

Bolloré Logistics has joined the Sustainable Aviation Fuel (SAF) programme of Air France KLM Martinair Cargo (AFKLMP Cargo) for its 2021 shipments between Paris Charles de Gaulle and New York John F. Kennedy airports. This first of its kind collaboration illustrates the ambition of these two historical partners to tackle the environmental challenge of airfreight transportation.

British Airways invests in sustainable aviation fuel producer LanzaJet

British Airways is investing in sustainable aviation fuel (SAF) technology provider and SAF producer LanzaJet as the company builds its first commercial scale plant in Georgia, USA. British Airways will purchase SAF from LanzaJet’s US plant to power a number of the airline’s flights from late 2022.