EUROCONTROL

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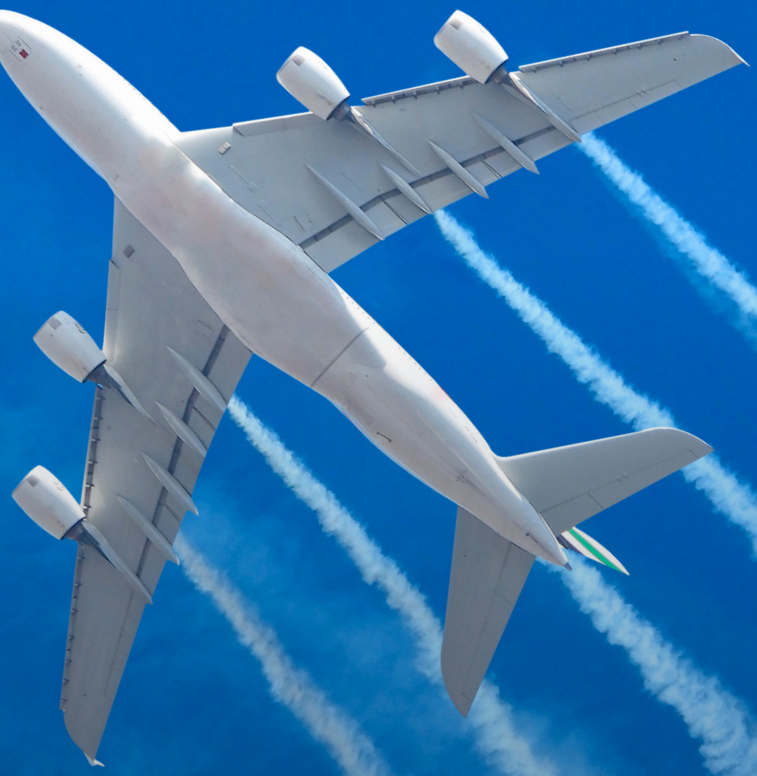
AVIATION SUSTAINABILITY BRIEFING

News and views on how we can **make aviation sustainable together**



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Editor's note

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Dear readers,

This 9th edition of the EUROCONTROL **Aviation Sustainability Briefing** comes to you while our team is still processing the amazing insights from our successful **EUROCONTROL-CANSO Sustainable Skies Conference: Contrails in Focus**.

EUROCONTROL-CANSO Sustainable Skies Conference: *the speakers from Day 1*

Moving from the concept of a green trajectory to a climate trajectory is one of the biggest challenges our aviation industry will have to face in the coming years. What do I mean by that? By bringing researchers, scientists, the aviation sector and policy-makers to one table, our EUROCONTROL-CANSO conference has demonstrated how strong the momentum is to move beyond the reduction of CO_2 emissions and fuel towards seriously tackling non-CO_2 emissions from aviation. What is clear is that more research and more reliable data are needed. I firmly believe that we make our best decisions when they are firmly grounded in data and research – something we are wholeheartedly dedicated to as our continuous contribution to SESAR 3 shows.

With ContrailNet - the new network to create a common repository of contrail observation data we want to support the aviation sector's efforts to reduce the climate impact of non-CO_2 aviation emissions –working closely with our partners Airbus, Thales and everyone else who would like to contribute.

Decarbonizing the aviation sector will require a mix of technologies, each of which has a different potential for reducing CO_2 emissions. Groningen Airport Eelde's full-scale hydrogen ecosystem that is currently under development is a bold and exciting solution fostering sustainability and I am grateful to CEO Meiltje de Groot and her team for sharing their insights into this fascinating project in this edition. Also in this edition, our article on EUROCONTROL MUAC's ECO service to airlines - a tangible approach to promoting environmentally more responsible routes.

From 1 January 2025 onwards aircraft operators will need to monitor and report the non-CO_2 effects from each aircraft. I am glad we were able to include an interview with Beatriz Yordi from DG CLIMA of the European Commission in this edition and I thoroughly recommend it to you. The good news is that we are in this journey together and as we are learning together, we will and must adapt our initiatives and programmes. Like Michelle Bishop said at the EUROCONTROL-CANSO Sustainable Skies conference: "we will need the collective effort from the entire sector" and that holds particularly true as policy and rules change and new technologies are being established that will have a wide reaching impact on the aviation ecosystem. Let's make sure we "walk the talk" to fill this notion of collaboration with meaning.

Contrails in Focus

***Philippe Merlo**, EUROCONTROL European Green Sky Director opening the EUROCONTROL-CANSO Sustainable Skies Conference*

From 7-8 November the EUROCONTROL- CANSO Sustainable Skies Conference: Contrails in Focus brought together over 2,000 scientists, researchers, aviation representatives, policy makers and others to enhance the understanding of contrails and contrail-induced cirrus clouds, their impact on the climate, and to explore potential mitigation measures to minimise their occurrence.

"*In the face of climate crisis, action is crucial. Our mission is to lay out a comprehensive path forward based on research, innovation and collaboration. We want to reduce contrail effects but also ensure that aviation remains an enabler of global connectivity, driving economic & societal progress.*" EUROCONTROL European Green Sky Director Philippe Merlo said in his opening statement to the conference.

Michelle Bishop, Director Programmes at CANSO echoed the importance of cooperation for aviation to achieve its climate goals and tackle the challenge of non-CO_2 emissions: "*The mitigation of aviation's impact on the climate will take the collective efforts of all of us,*" she said. "*It is part of the larger challenge of ensuring our industry's future and our planet's future.*"

"We want to reduce contrail effects but also ensure that aviation remains an enabler of global connectivity, driving economic & societal progress."

***Philippe Merlo**,*
EUROCONTROL European Green Sky Director

Following the keynote introductions, **Matthieu Plu** from Météo-France and **Klaus Gierens** from DLR explained to the audience what contrails and contrail-induced cirrus clouds are, how and under which meteorological conditions they form, their physical properties and how they impact the climate. The many questions following the first session underlined that contrails are a subject the aviation sector and others are still trying to fully comprehend. What became clear is that new technology aircraft while significantly reducing CO_2 emissions actually may – under specific circumstances - produce more contrails.

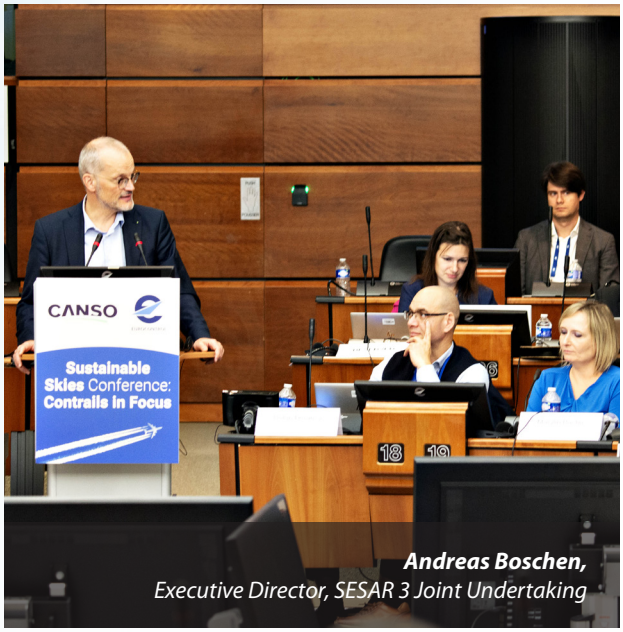
So, one of the key challenges the sector is faced with is to find the right solutions that tackle the reduction of CO_2 emissions and non- CO_2 emissions while not reinforcing the other.

The session on critical aspects of contrail avoidance with **Keith Shine** and **Nicolas Bellouin**, both from Reading University and **David S. Lee**, Manchester Metropolitan University demonstrated that the understanding of contrail climate effects is evolving but that for the moment, there is no guarantee that anticipated avoidance manoeuvres will not have a greater impact on the climate.

State-of-the-art methods for detecting and monitoring contrails and the technical challenges were discussed with a wide range of experts from Google, Massachusetts Institute of Technology (MIT), Airbus, EUROCONTROL, DLR and Thales demonstrating more research is needed to gain knowledge. It is one of the reasons why EUROCONTROL has launched ContrailNet- the new network to create a common repository of contrail observation data to advance the aviation sector's efforts to reduce the climate impact of non-CO_2 aviation emissions, in particular contrails.
The data repository will be made available to existing and future research initiatives for them to develop their own contrail identification and evaluation algorithms.

***Michelle Bishop**, Director Programmes, CANSO*

Besides EUROCONTROL's contrail prevention trials and our contrail observatory, this technical project is another component in EUROCONTROL's strategic work on non-CO_2 climate impacts. **Philippe Very** and **Gabriel Jarry**, both from EUROCONTROL, announced the new initiative during the EUROCONTROL-CANSO Sustainable Skies Conference.



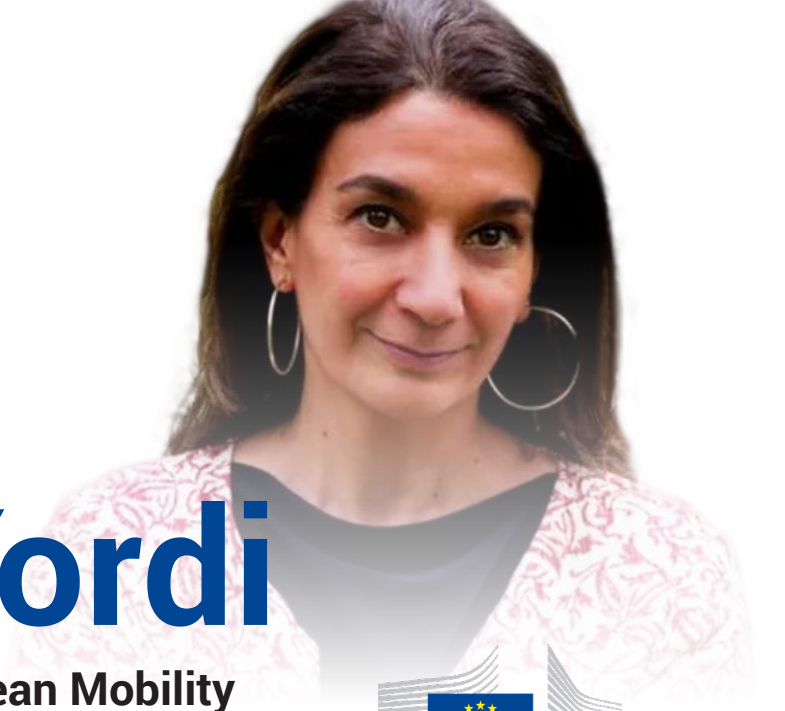
Andreas Boschen,
Executive Director, SESAR 3 Joint Undertaking

Experts from Météo-France, Air France, German National Meteorological Service (DWD), DLR, Imperial College and Google shared insight into the current methods and technologies for predicting the formation of contrails and estimating their impact on the climate. The conference also gave an overview on ongoing contrail research projects and how they contribute to addressing unanswered questions. "*Our projects into contrails cover both exploratory and industrial research. A core objective of these projects is to investigate how to obtain MET services capable of predicting the eco-sensitive areas and then monitor the evolution in real time,*" **Andreas Boschen**, Executive Director at SESAR 3 Joint Undertaking summarised SESAR 3 research priorities on contrails. He stressed further: "*Sustainability is our focus. Our aim is to make Europe the most efficient and environmentally friendly sky to fly in.*"

Laurent Donceel *(Airlines for Europe),* ***Patrick Arpino*** *(European Cockpit Association),* ***Steven Moore*** *(EUROCONTROL),* ***Jo Dardenne*** *(Transport &Environment),* ***Dimitar Nikov*** *(European Commission),* ***Vincent De Vroey*** *(ASD),* ***Vincent de Haes*** *(To70),* ***Marylin Bastin*** *(EUROCONTROL)*

Dimitar Nikov from DG CLIMA at the European Commission presented the plan for establishing a Monitoring, Reporting and Verification (MRV) scheme of aviation's non-CO_2 effects, in support of the preparation of implementing legislation defined in the EU ETS Directive. The session set the scene for the following panel discussion on MRV which brought operational challenges into focus as rerouting aircraft to avoid regions favourable to persistent contrails formation may help the climate, but would add extra traffic to already congested airspace - causing additional delay and possibly more emissions. Yet, the discussion also stressed that the challenge of non-CO_2 can be an opportunity for aviation. The conference discussions have been assembled in one document outlining the latest advancements in contrail science and mitigation. It will be made available together with the presentations and the recording of the conference on the event's webpage: https://www.eurocontrol.int/event/sustainable-skies-conference-contrails-focus.

INTERVIEW



Beatriz Yordi

Director Carbon Markets and Clean Mobility
at the Directorate-General for Climate Action
of the European Commission

The European Commission has a series of legislative proposals on how it aims to achieve climate neutrality in the EU by 2050. What are currently the priorities for DG CLIMA that impact aviation and how will they affect the sector in the years to come?

The main priority for the upcoming months is to ensure swift implementation of the adopted 'Fit for 55' texts setting in law all sectors' contributions to the EU target of reducing net greenhouse gas emissions by at least 55% by 2030. DG CLIMA focuses on the implementing legislation for the Emissions Trading System, most notably: (i) the operationalisation of the 20 million allowances of support for the uptake of eligible clean aviation fuels, (ii) the detailed implementation of ICAO's CORSIA scheme (Carbon Offsetting and Reduction Scheme for International Aviation) through the ETS Directive - for example, the quality and eligibility criteria of international offset units for aviation in relation to CORSIA - and (iii) the establishment of a world premiere with the implementation of a monitoring, reporting and verification framework for the non-CO_2 effects of the sector.

The EU ETS also provides financing opportunities for the decarbonisation of the aviation sector. Since the latest revision of the Directive, 100% of the revenues collected by Member States within the EU ETS framework shall be used for climate related purposes. In addition, the Innovation Fund that is funded by the EU ETS supports highly innovative technologies and flagship projects that can bring about significant emission reductions. It is about sharing the risk with project promoters and putting the spotlight on first-of-a-kind, highly innovative projects. This includes technologies for the production of low and zero-carbon fuels to decarbonise aviation, electrification and other measures that reduce the overall climate impact of aviation, which includes its non-CO_2 impacts.

Although CLIMA does not lead on these other files, the revision of the Energy Taxation Directive and an agreement on a minimum taxation rate for fossil jet fuel would also contribute to decarbonisation. The coming years will also be fundamental for the implementation of ReFuelEU Aviation.

DG CLIMA has a plan for establishing a Monitoring, Reporting and Verification system for aviation's non-CO2 effects. Can you give our readers more insight into this?

While the task is new, the topic itself is more than 20 years old, with the IPCC (the UN's Intergovernmental Panel on Climate Change) identifying the importance of aviation non-CO_2 effects in 1999. It is about taking into account the full climate impact of the flights in emissions reporting, notably by monitoring the persistent contrails production and the Nitrogen Oxides effects on climate from the exhaust. Our approach takes the uncertainties linked to the complexity of those effects into due account, while still acting upon them.

EUROCONTROL has just hosted a conference to improve the understanding of the formation and characteristics of contrails and contrail-induced cirrus clouds, together with their impact on climate. What were your main take aways from the event?

The EUROCONTROL-CANSO conference was a true eye-opener on what can be achieved using evolving science and raised awareness of the aviation impacts on environment. Our main takeaway is that there is enough knowledge to demonstrate that contrail avoidance - and thus a significant reduction of aviation's climate impact - is possible, and that further research helps improve understanding and modelling results. From the Commission side, we are at the monitoring and reporting stage and don't want to prejudge any of the mitigation options, although the Innovation Fund is already able to support actions in this area.

The Commission hosted a workshop on non-CO2 and contrails from 13-14 December 2023. Can you tell us more about that?

This workshop was initiated by DG Research and involving different Commission services (DG ENV, DG CLIMA and DG MOVE). The event - together with the consultation meeting that was organised by DG CLIMA on 1st December, focused solely on work on the monitoring, reporting and verification of non-CO_2 effects and helped gather input to better progress the topic including its operational, technology and purely research sides.

"Reducing aviation's climate impacts should be seen more as an opportunity rather than as a constraint."

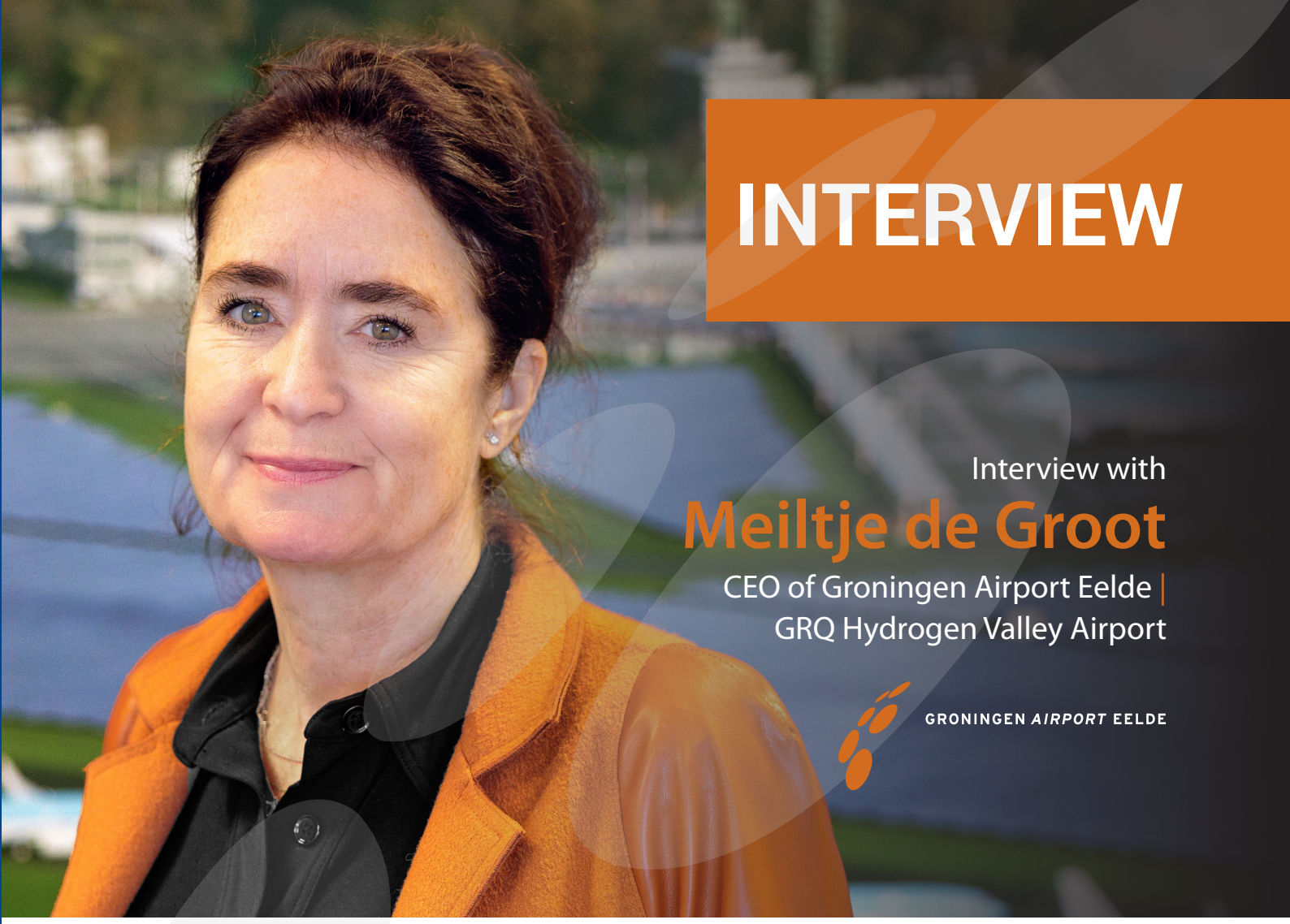
Beatriz Yordi
Director Carbon Markets and Clean Mobility, DG CLIMA, European Commission

EUROCONTROL supports national authorities and aircraft operators in meeting their obligations under (or in the implementation of) the EU Emissions Trading System and ICAO's CORSIA. We are also providing support to DG CLIMA through a cooperation agreement. Could you describe why this support is important for the Commission?

Indeed, we have had an excellent relationship with EUROCONTROL for many years now. EUROCONTROL really facilitates fulfilling the legal obligations laid down in the ETS Directive, like providing the tool that significantly eases the reporting tasks for small aircraft operators and compiling the list of all aircraft operators with their administering Member States. EUROCONTROL also provided invaluable information during the negotiations of the recent amendment to the ETS Directive on aviation. Furthermore, EUROCONTROL's expertise and the participation of their experts in different fora largely contribute to the proper implementation of the provisions of the ETS Directive, and to the day-to-day operation of the system.

Last but not least, in your view what can aviation actors, from airspace users to airports, to policymakers and EUROCONTROL, do to make aviation more sustainable faster?

Reducing aviation's climate impacts should be seen more as an opportunity rather than as a constraint. Having a cap on emissions incentivises innovation and higher competitiveness for the EU industry. On this topic, the tools provided by EU Member States and the Commission, like the ETS Innovation Fund, should be further promoted. The sector demonstrated its capacity for adopting sound international ambition on CO_2 with the adoption of the Long Term Aspirational Goal (LTAG) in ICAO. Building on this, we should now look towards strengthening it and covering aviation's overall climate impact, in Europe and also internationally, in line with the comprehensive contribution of all sectors to meeting the Paris agreement's temperature goals.



INTERVIEW

Interview with

Meiltje de Groot

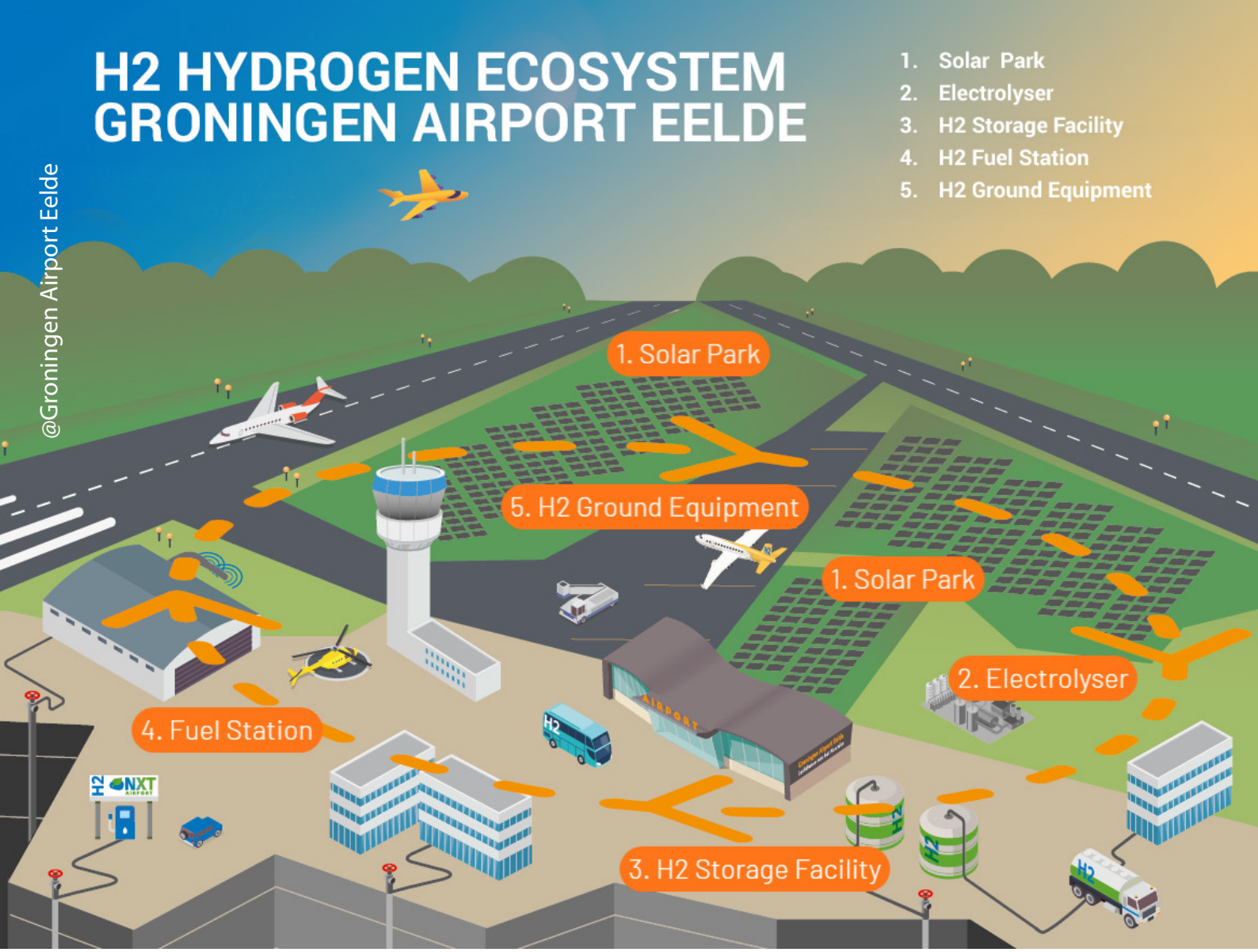
CEO of Groningen Airport Eelde |
GRQ Hydrogen Valley Airport

GRONINGEN *AIRPORT* EELDE

Groningen Airport Eelde (GRQ) in the Netherlands is a frontrunner when it comes to innovative and sustainable solutions that will reduce the environmental impact of airport operations. In our EUROCONTROL Aviation Sustainability Briefing interview **Meiltje De Groot**, CEO of Groningen Airport Eelde and Chairman of the Dutch Association of Airports shares insight into what makes the regional airport for the northern Netherlands stand out.

The world's first hydrogen-powered commercial aircraft are expected to enter the market only by 2035. Yet already today Groningen Airport Eelde is developing a full-scale hydrogen ecosystem with its ambitious "Hydrogen Valley Airport" strategy. Could you please tell us more about your strategy and the planned timeline?

At GRQ, Europe's first 'Hydrogen Valley Airport' will be developed. The full-scale hydrogen ecosystem will involve production of green hydrogen, distribution, and utilisation. The starting point is its existing 22MW solar park, the largest airside solar field in operation at any operative commercial airport, with 63,000 solar panels, operational since February 2020. The airport is located in Europe's first Hydrogen Valley, which is being built by the Fuel Cells and Hydrogen Joint Undertaking (FCH-JU) and is supported by the HEAVENN project of the New Energy Coalition and a €9 billion hydrogen regional investment agenda. The four- to five-year project includes research, development and realisation of an electrolyser by utilising the solar park, a hydrogen refuelling station that serves both land- and airside, hydrogen power ground service equipment and both gaseous and liquid H2 storage and distribution.



We recently were able to announce to the press two milestones; the world's first proof-of-concept Hydrogen Ground Power Unit (H2-GPU) and an innovative electrolyser. Yet, we also believe in electric regional air mobility/ transport: we are an active partner in the 'Power Up' initiative and will carry out tests with electric flying, aiming to introduce the first passenger flights between airports in the Netherlands within five years. We are furthermore teaming up with parties such as Evia Aero and Electron Aviation to prepare for a future in which (hydrogen) electric flying -being a completely new modality- connects smaller European regions with each other, supporting regional European economies.

Based on your experience what are the main challenges for the Hydrogen Valley Airport so far and what's your approach to them?

One of the main challenges is funding. That is why we build coalitions of the willing with primarily regional partners, that include companies from the energy and aviation sectors, educational institutions and (regional) governments. Whilst working together, we are better able to attract funding in the form of subsidies and investments. We as an airport offer our highly secure premises as a scalable testbed and demonstration location and learned that this has a high value for our partners. Legislation forms another challenge; it is for example complex to certify ground service equipment (GSE) that runs on hydrogen as this is a very new technology applied in an airport environment. Our approach here is to connect to industry partners and OEMs to address the issue together and try to obtain some funding to get us through certification processes.

GRONINGEN *AIRPORT* EELDE

Groningen Airport Eelde was established in 1931 and is an international airport with connections to Greece, Spain, Turkey, Scandinavia and the UK. The majority of passengers travel on holiday charter flights. Groningen Airport Eelde is also an important airport for medical and training flights; it is the home of the KLM Flight Academy.

What do you think are the main assets of your Hydrogen Valley Airport project? What would be the take-aways for your peers?

We would advise other airports to build consortia. Connect to companies, educational and governmental institutions. Preferably regional partners that benefit from each other. We learned for example that companies value their regional airport as a testbed and demonstration location but also for its high public visibility (PR value). We work a lot with SME's who often have short decision-making processes, just like ourselves. Thus, avoiding unnecessary lead time delays. Last but not least, and that is what we did, build your own team to lead the airport to a more sustainable future. A hands-on team that consists of people with knowledge of (renewable) energies, project management, networking and -of course- aviation!

Looking ahead, what would be needed to further support the take-off of zero-emission aircraft and the related airport infrastructure developments, e.g. from a policy or economic perspective?

Besides (project) funding to boost innovation, the industry would benefit from simplified and clear legislation, e.g. in terms of certification. We also need the continuous cooperation of the energy sector. Airports will need a sufficient and uninterrupted, timely supply of green electricity, (liquid and gaseous) green hydrogen and SAFs in order to serve future aircraft. At the right price level.

In your opinion, what can aviation actors, from airspace users to airports, to policymakers and EUROCONTROL, do to make aviation more sustainable faster?

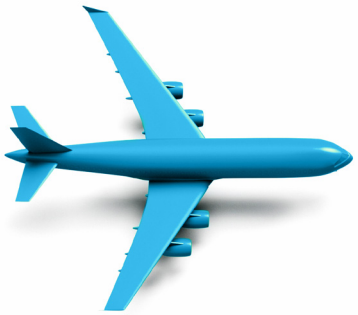
Cooperate, act and support. Cooperate in consortia that are able to invest in and/or subsidize projects that, starting with research activities, always lead to concrete outputs, tangible, visible and useable. Prioritize to be able to speed up certification processes to allow new technologies to enter the market far more quickly than currently possible.

EUROCONTROL Maastricht Upper Area Control Centre (MUAC) offers a new service to airlines for environmentally more responsible routes

John **Santurbano**
Director of MUAC

EUROCONTROL Maastricht Upper Area Control Centre (MUAC) launched the ECO Service which proposes more environmentally responsible routes through the Maastricht Upper Area Control Centre's (MUAC) managed airspace.

The service is a new addition to the Pre-Flight Check (PFC) process deployed three years ago, to improve punctuality and flight efficiency. The ECO Service targets all greenhouse gas emissions while also taking into account reserved airspace for military activities, network constraints and flight schedules. The environmental data is estimated by the Advanced Emissions Model (AEM) developed and maintained by EUROCONTROL's Aviation Sustainability Unit in the EUROCONTROL Innovation Hub (Brétigny/France). Through advanced algorithms, AEM processes flight trajectories on a flight-by-flight basis to estimate the amount of fuel burn and related exhaust emissions including carbon dioxide, carbon monoxide, water vapour, the oxides of nitrogen and sulphur, unburnt hydrocarbons and particulate matters. This identifies the routes with a smaller environmental impact, enabling MUAC to propose these to participating airlines on a daily basis, taking care to exclude those that conflict with other network priorities.



"*Airlines are welcoming the initiative and uptake is currently around 25% of the opportunities we propose.*" says John Santurbano, Director of MUAC. Reduced flight emissions are frequently associated with a shorter flight duration and lower costs which also helps to promote the concept. Still in trial phase and yet to achieve full coverage and resourcing, the MUAC ECO Service has already generated more than 5,500 eco proposals, each generating flight emissions savings. The goal is to expand participation in the ECO Service from today's 120+ airlines to serve all aircraft operators and share route opportunities with each of them.

Adding more data is another objective, for example working with Computerised Flight Plan Service Providers and airlines to expand aircraft performance information. In addition to aircraft type, MUAC is looking to include aircraft mass, speed, way points and other predictions going forward. "*We have started working on the integration of more frequent weather updates from our German weather partner,*" says Santurbano. "*We include wind predictions and expect to add more precise weather data.*"

TACTICAL OPPORTUNITIES

On top of more eco-friendly flight planning, enhanced data will help MUAC's ambitions to enable air traffic controllers to offer more environmental trajectories during tactical flight phases. As it is important to know the arrival runway and the likelihood of that changing, a model to predict runway usage has been developed and, if this information is known six hours in advance, MUAC can propose a more optimal route. Air traffic controllers can then plan more efficient smooth descent paths in place of stepped operations for example, to reduce emissions.

MUAC already identifies environmental opportunities not yet available to other stakeholders as a result of the existing collaborative network. Integration of civil and military operations at MUAC supports efficient cross-border civil-military services in the upper airspace of Germany and the Netherlands. "*Contact with the military zones in our airspace is direct, either to the operations room or central supervisor,*" explains John Santurbano.

"*Thanks to the Dutch Flexible Use of Airspace Cell based at MUAC and the direct link with the military authorities in Belgium and Germany, we immediately know when an area becomes available and can directly coordinate delivery of routes through these deactivated areas with the aircraft operators (both tactically and in the pre-flight phase). The direct contact enables adjustment of their flight plan according to the latest situation which results in cost and environmental benefits.*"

"Thanks to the Dutch Flexible Use of Airspace Cell based at MUAC and the direct link with the military authorities in Belgium and Germany, we immediately know when an area becomes available and can directly coordinate delivery of routes through these deactivated areas with the aircraft operators (both tactically and in the pre-flight phase). The direct contact enables adjustment of their flight plan according to the latest situation which results in cost and environmental benefits."

Latest news on EUROCONTROL's

work on sustainability

EUROCONTROL launches ContrailNet

a new network to create a common repository of contrail observation data

EUROCONTROL, in collaboration with Airbus and Thales, seeks to set up ContrailNet - a new network of European research experts to create a common repository of contrail observation data to advance the aviation sector's efforts to reduce the climate impact of non-CO_2 aviation emissions. The aim is to make available the common repository of annotated observation data to existing and future research initiatives for them to develop their own contrail identification and evaluation algorithms. Besides EUROCONTROL's contrail prevention trials and our contrail observatory, this technical project is another component in EUROCONTROL's strategic work on non-CO_2 climate impacts. The new initiative was announced during the EUROCONTROL-CANSO Sustainable Skies Conference in Brussels. For more information or to register your interest in joining ContrailNet, please contact: ContrailNet@eurocontrol.int

EUROCONTROL-CANSO Sustainable Skies Conference:

reducing contrails and their non-CO_2 effects on global warming through operational mitigation

At the EUROCONTROL-CANSO Sustainable Skies Conference experts from EUROCONTROL's Maastricht Upper Airspace Control Centre (MUAC) shared lessons learned from the world's first live contrail prevention trial and real-time simulations. MUAC's live contrail prevention trial and real-time simulations show that contrail formation and their harmful impact towards climate change can be avoided with relatively small vertical deviations from the flight plan. As long as air traffic is low also the impact of contrail prevention operations on capacity is low. However, in moderate traffic conditions, capacity reductions in the range of 20% can already be expected for safety reasons. The 2023 real-time simulations in MUAC airspace have provided valuable results and will lay the foundation for the smooth and safe introduction of contrail prevention in ATC operations.

Raising the Bar for aviation sustainability:

development has started for EUROCONTROL's platform of green services, FlyingGreen

EUROCONTROL has joined forces with 240 representatives from across the aviation sector to set up its flagship project for aviation sustainability: FlyingGreen. FlyingGreen is a strategic priority in EUROCONTROL's corporate "Raising the Bar" programme, and is designed to support ECAC Member States and operational stakeholders in their decarbonisation efforts and climate change adaptations. The users of EUROCONTROL's 'green' services –a integrated platform offering a NetZero toolkit, green fuel calculators and much more – come from across EUROCONTROL's Member States and the aviation sector and will play a pivotal role in shaping the future of these services.

Sustainability developments from around the world

The TUI Airline Group implements machine-learning tech by SITA to cut fuel burn on climb-out Sustainable Aviation Fuel

The TUI Airline Group has fully implemented the SITA OptiClimb® solution across all five of its airlines as part of the group's sustainability agenda to reduce airline emissions. The wider deployment of SITA's technology follows the success of its partial deployment, saving up to 200 kg of fuel and 600 kg of CO_2 per aircraft per day. Aircraft climb is the most fuel-intensive phase of a flight. SITA OptiClimb® is an innovative predictive analytics solution that uses machine learning to build tail-specific performance models. Fed with 4D weather forecasts and operational flight plan inputs, these models predict fuel burn scenarios. The solution then provides pilots with customized climb speeds and acceleration levels specific to each tail and flight to optimize fuel without compromising flight times.

Boeing and U.S. Government Launch Initiative to Advance Sustainable Aviation Fuel among APEC Economies

Boeing and the United States are launching an initiative to catalyse the development and use of Sustainable Aviation Fuel (SAF) among Asia-Pacific Economic Cooperation (APEC) member countries. SAF, which significantly reduces the lifecycle carbon emission of jet fuel, is key to achieving goals set by the International Civil Aviation Organization (ICAO) and the civil aviation industry to achieve net-zero carbon emissions by 2050.

Rolls-Royce successfully completes 100% Sustainable Aviation Fuel test programme

Mid-November Rolls-Royce announced that it has successfully completed compatibility testing of 100% Sustainable Aviation Fuel (SAF) on all its in-production civil aero engine types. This fulfils a commitment, made in 2021, to demonstrate there are no engine technology barriers to the use of 100% SAF. Testing has involved a variety of ground and flight tests to replicate in-service conditions. All the tests confirmed the use of 100% SAF does not affect engine performance.

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