



**ICAO EUR/NAT and ACI EUROPE**

**REGIONAL GREEN AIRPORTS SEMINAR**

**Hosted by the Ministry of Transport  
Republic of Kazakhstan**

# Day 2 - Implementing Sustainability Strategies *Sustainable Operations and Infrastructures*



ICAO



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David Brain

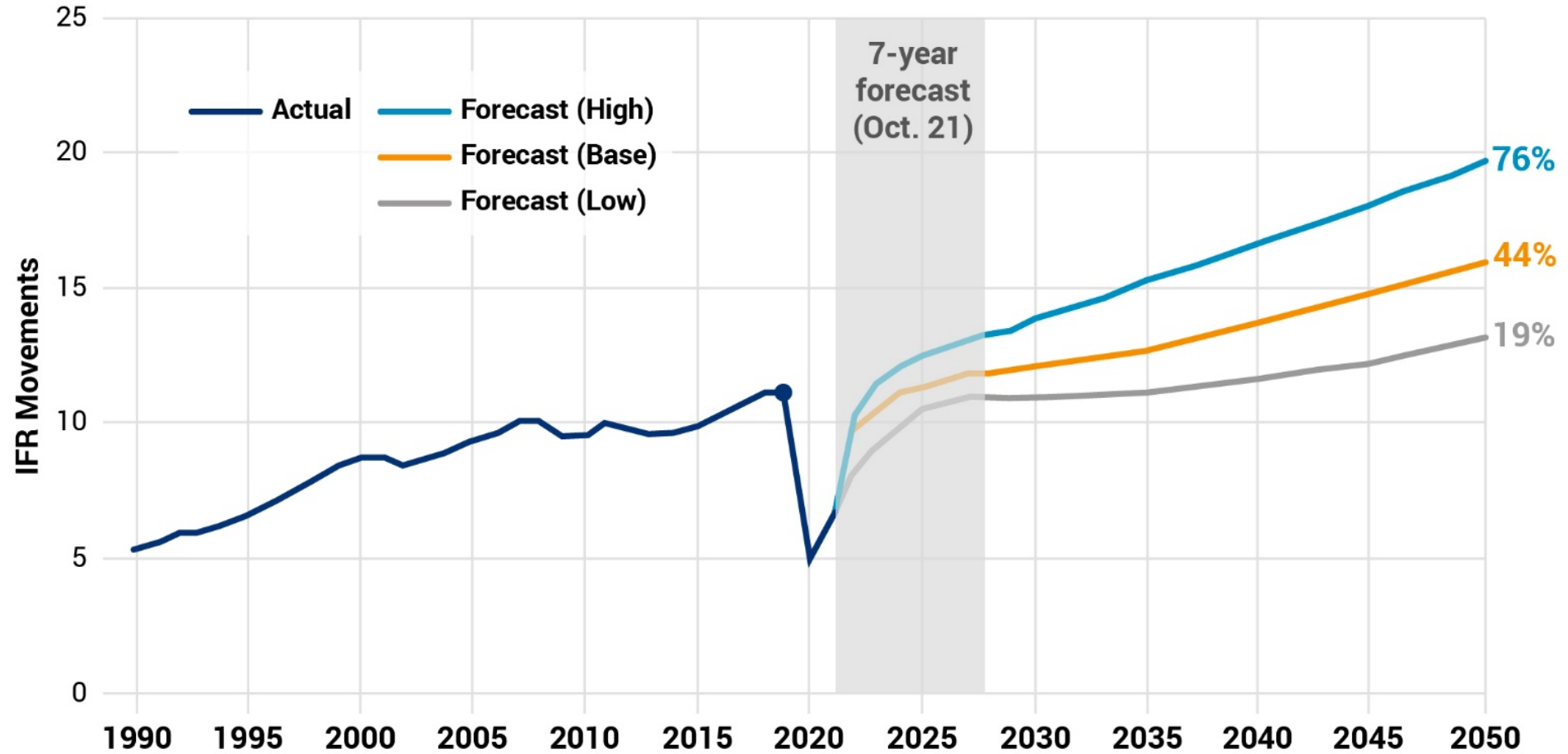
*ICAO Coordinator, EUROCONTROL*

# The Challenge Ahead for Sustainable Growth

2050  
IFR Movements

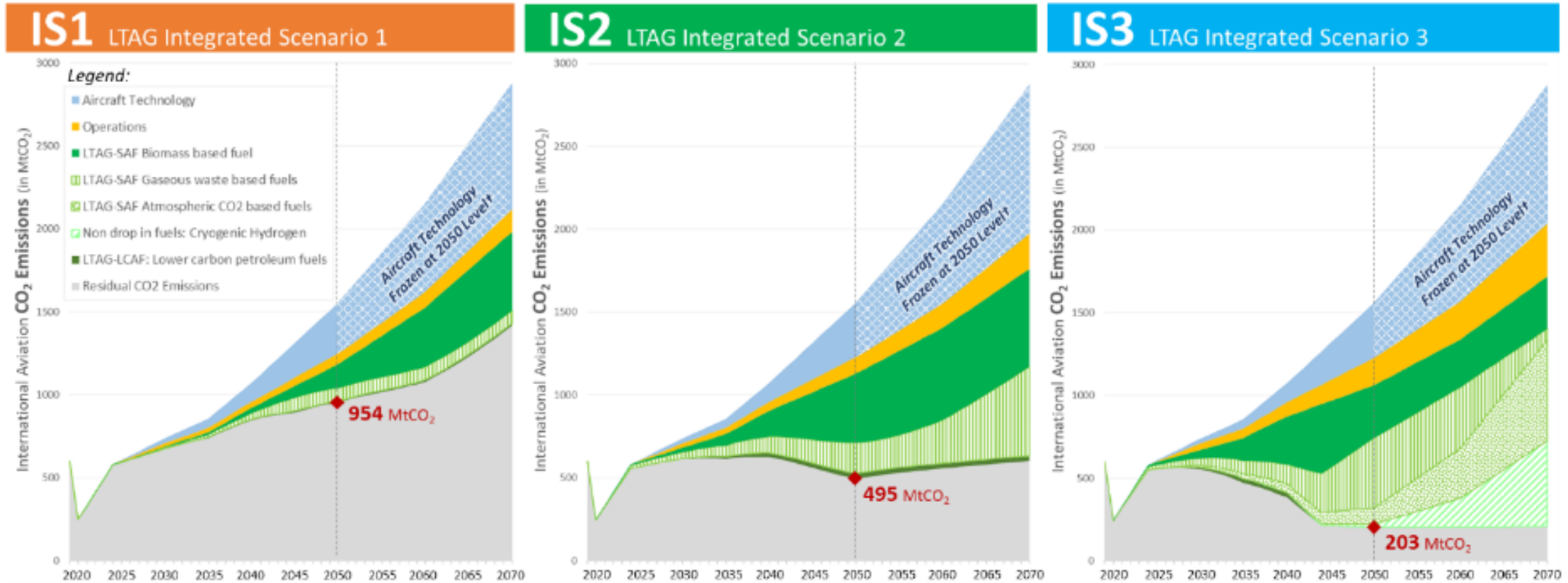
**16 million flights**  
ECAC

**+44%**  
vs. 2019  
Source: Eurocontrol



©EUROCONTROL - [www.eurocontrol.int/forecasting](http://www.eurocontrol.int/forecasting)

# ICAO LTAG Report results



† Caution required with the interpretation of absolute CO<sub>2</sub> emissions levels after 2050 due to modelling assumptions e.g., frozen aircraft technology after 2050. Under these assumptions, CO<sub>2</sub> emissions are higher than in an alternative scenario (and modelling approach) where aircraft technology would continue to improve after 2050.

**Figure 1. CO<sub>2</sub> emissions from international aviation associated with LTAG Integrated Scenarios**

[https://www.icao.int/environmental-protection/LTAG/Documents/REPORT%20ON%20THE%20FEASIBILITY%20OF%20A%20LONG-TERM%20ASPIRATIONAL%20GOAL\\_en.pdf](https://www.icao.int/environmental-protection/LTAG/Documents/REPORT%20ON%20THE%20FEASIBILITY%20OF%20A%20LONG-TERM%20ASPIRATIONAL%20GOAL_en.pdf)

# ATM contribution by 2030 – Objective Skygreen

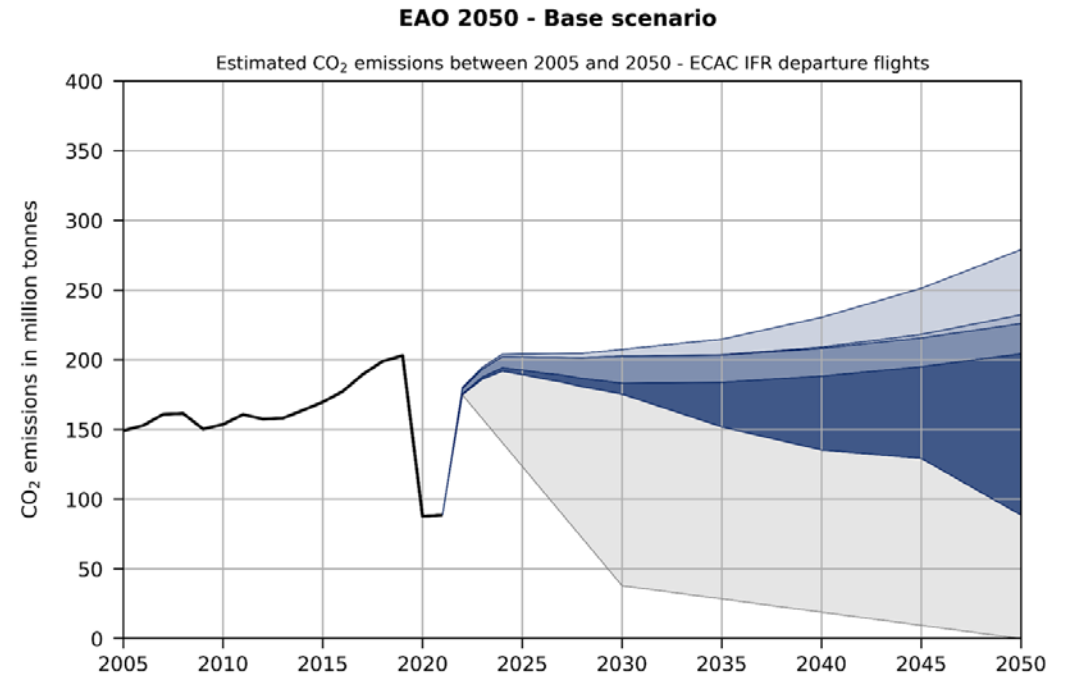
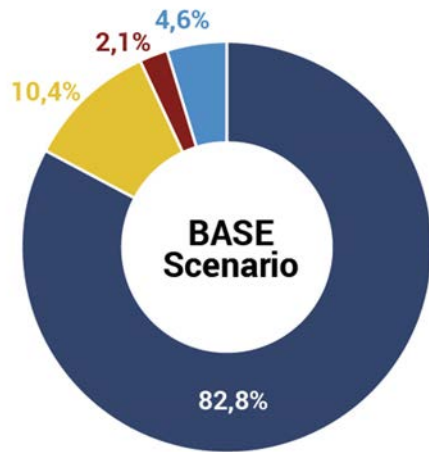
- EU proposing an intermediate target of a 55% CO<sub>2</sub> reduction by 2030 compared to 1990 levels.

● ATM improvements

● Fleet upgrades

● SAF

● MBM (ETS + CORSIA)



Source - <https://www.eurocontrol.int/publication/objective-skygreen-2022-2030>

# ATM / Operations – no silver bullet



### Bio-inspired Sharkskin

Revolutionizing Airplane Surfaces for Greener Skies

**Riblet Processing**

Riblet processing imitates shark skin by creating microscopic grooves on surfaces to reduce resistance in water or air.

 2%	 +260 km/h	 80%	 30%
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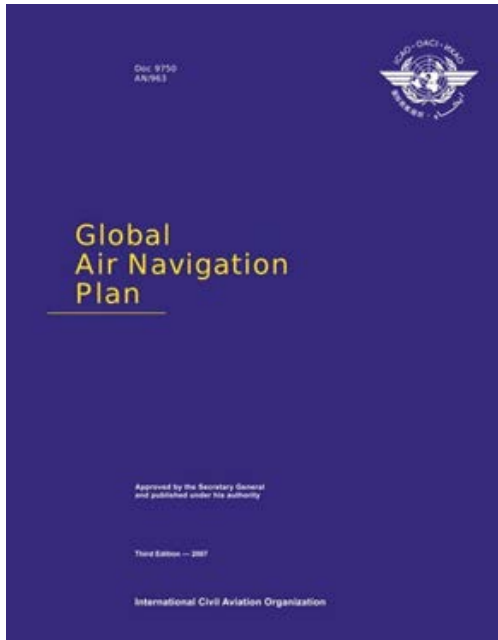
Aircraft with riblet films attached

Riblet film



# What are “OPERATIONS”?

## ATM



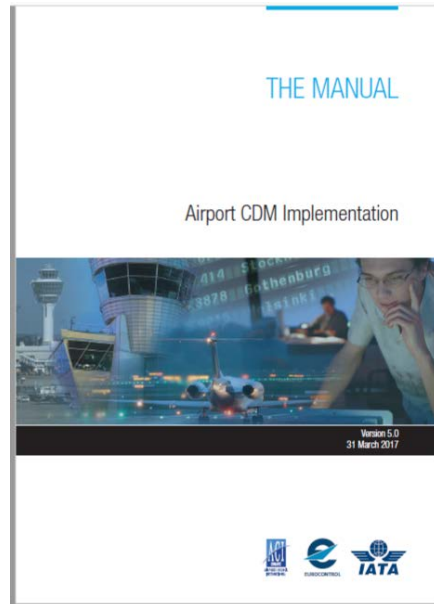
## Aircraft operator actions



## Airspace design



## Ground operations



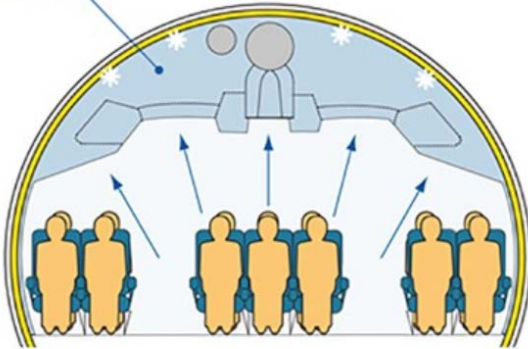
## Flight planning activities

# Aircraft Operator / CFSP actions

## Water on the plane

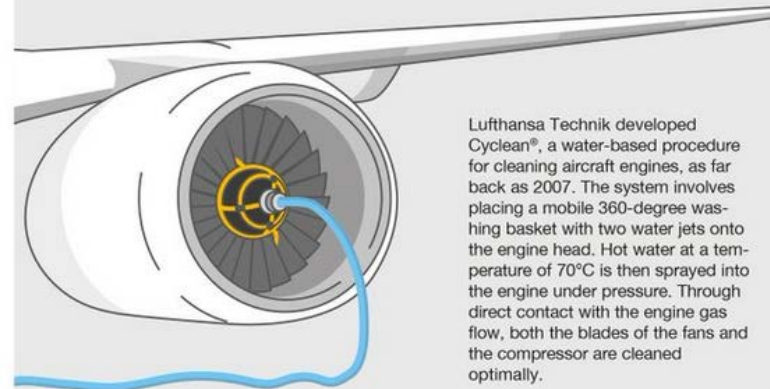
### Condensation During Flight

- Rain in the plane
- Extra weight
- Electrical failures
- Corrosion
- Aircraft reliability
- Increased costs
- Safety concerns



Humid air from passengers (blue arrows) condensate out in form of frost on the cold fuselage structure and skin. The frost melts during descent and water is partly accumulated in the insulation

## Cycleclean® – the efficient engine cleaning system from Lufthansa Technik



Lufthansa Technik developed Cycleclean®, a water-based procedure for cleaning aircraft engines, as far back as 2007. The system involves placing a mobile 360-degree washing basket with two water jets onto the engine head. Hot water at a temperature of 70°C is then sprayed into the engine under pressure. Through direct contact with the engine gas flow, both the blades of the fans and the compressor are cleaned optimally.



**1% less kerosene consumption**

Through regular cleaning, the engines function more thermally efficiently at the same level of performance.

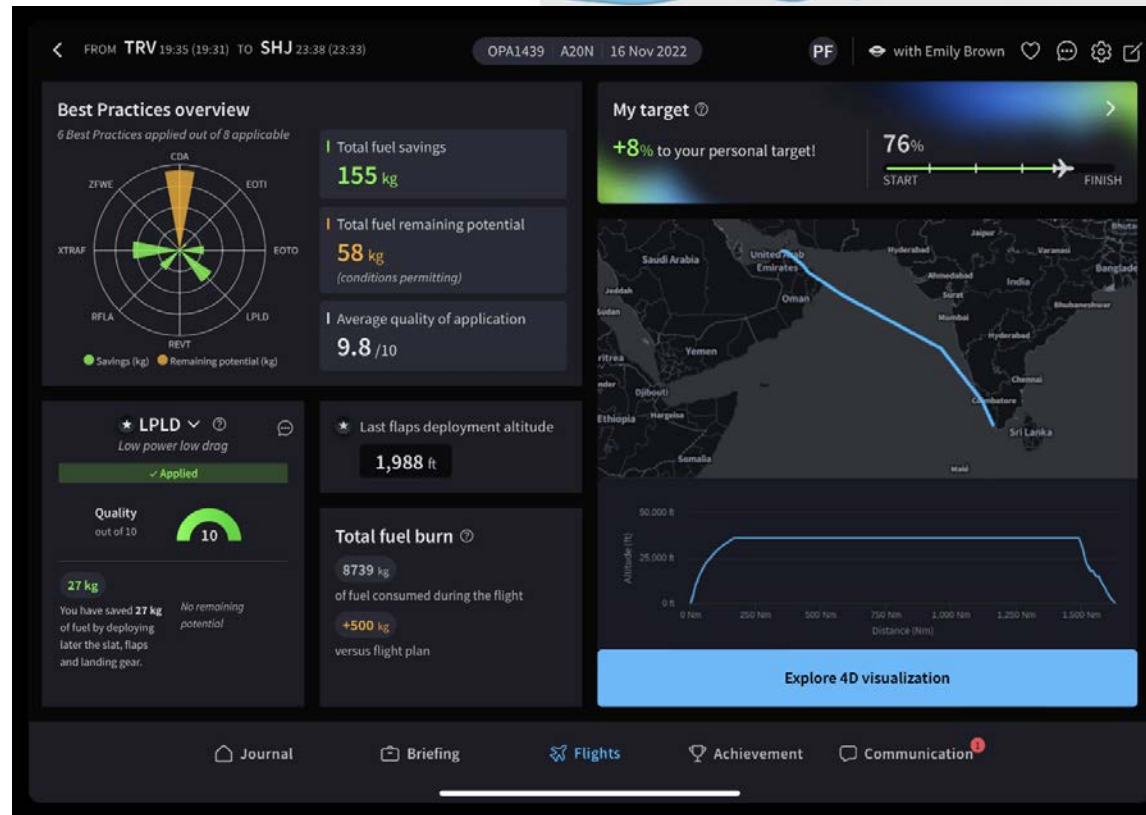


**over 60 airlines worldwide** use this efficient engine cleaning system.



**over 80,000 engines cleaned** to date with the Cycleclean® system.

Lufthansa Group



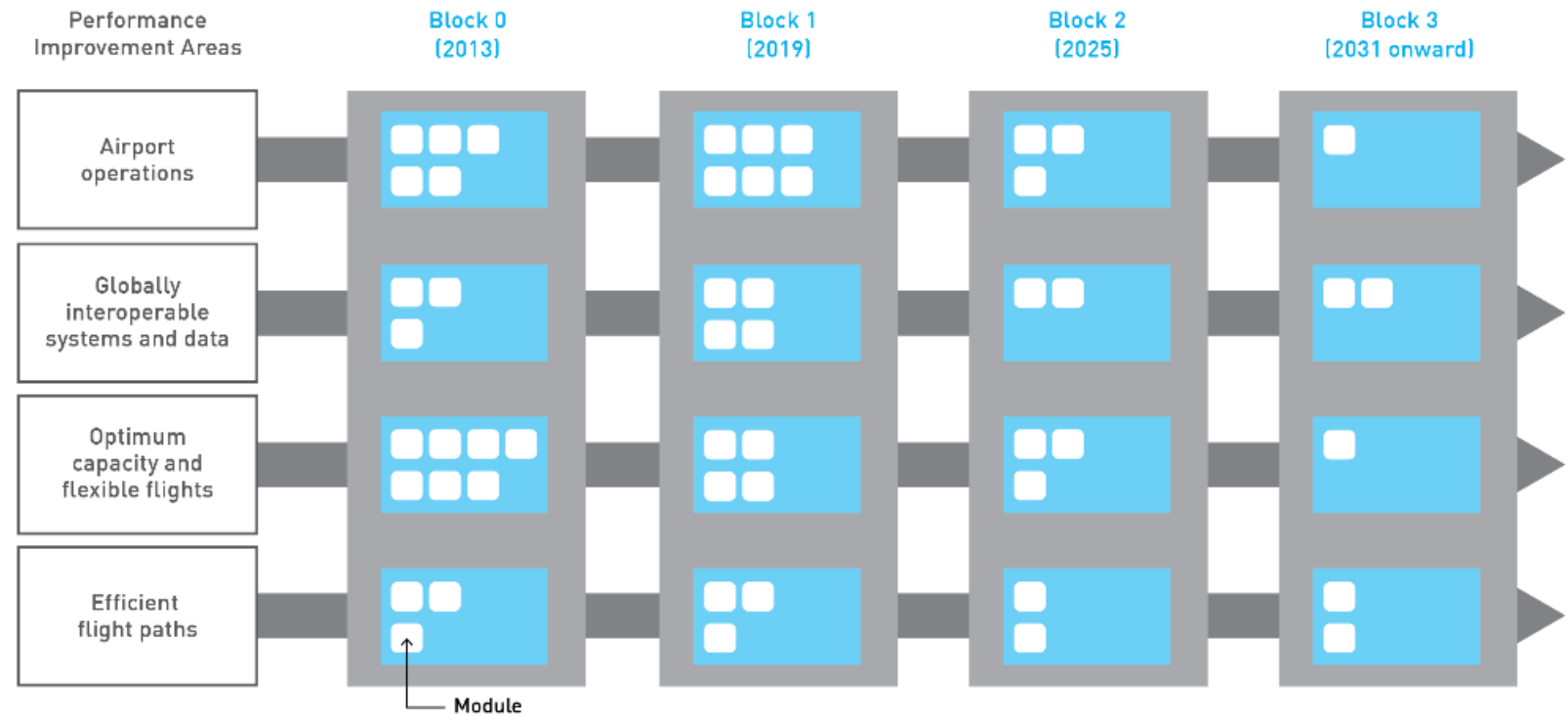


# Air Traffic Management (ATM)

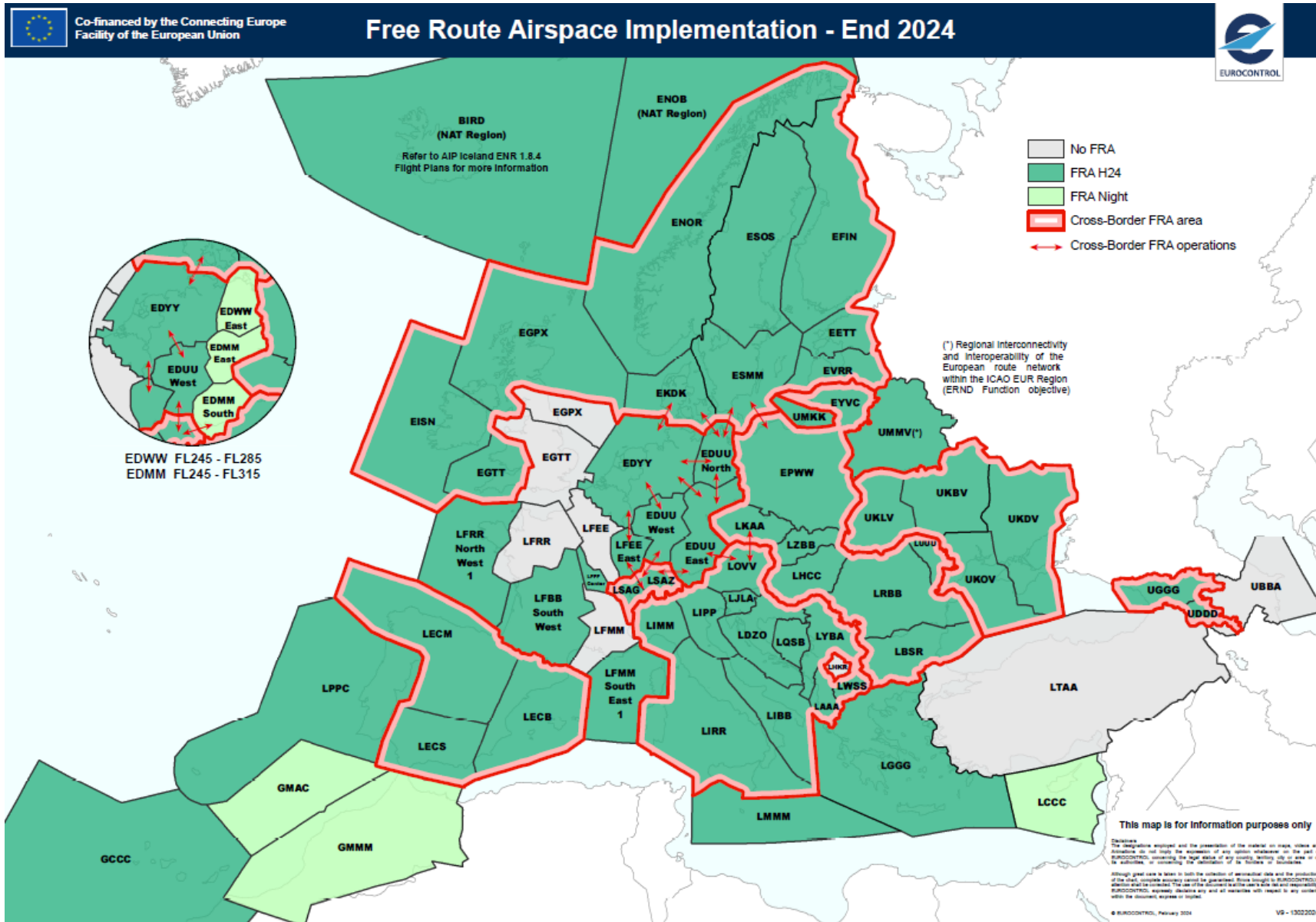
ICAO initiated the Aviation System Block Upgrade (ASBU) initiative as a programmatic framework that:

- Develops a set of Air Traffic Management (ATM) solutions or upgrades
- Takes advantage of current equipage
- Establishes a transition plan, and
- Enables global interoperability

Outlined in *ICAO Global Air Navigation Plan (Doc. 9750)*

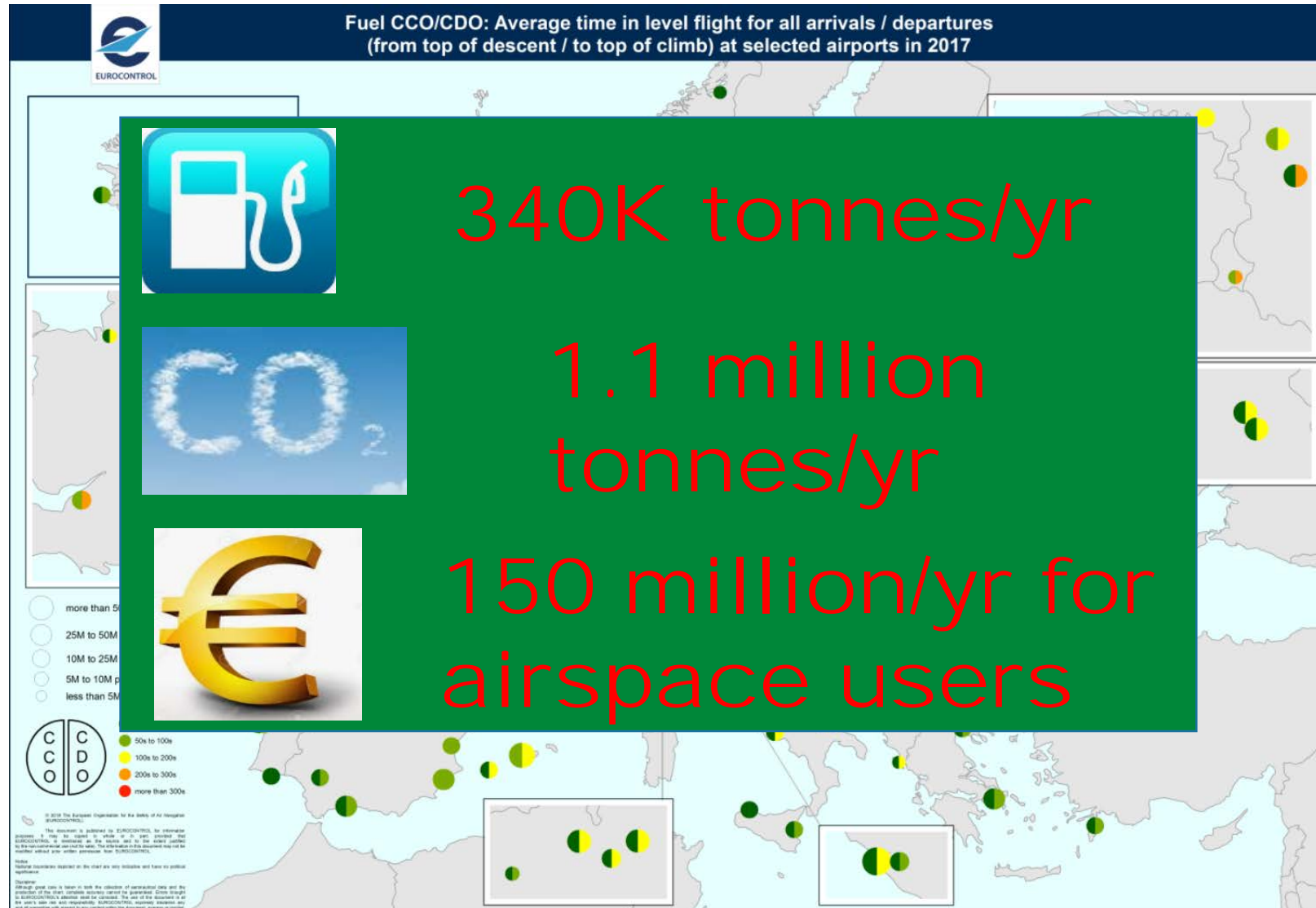


# Free Route Airspace (FRA)



# Continuous Descent Operations (CDO)

European CCO / CDO TF



# Continuous Descent Operations (CDO)



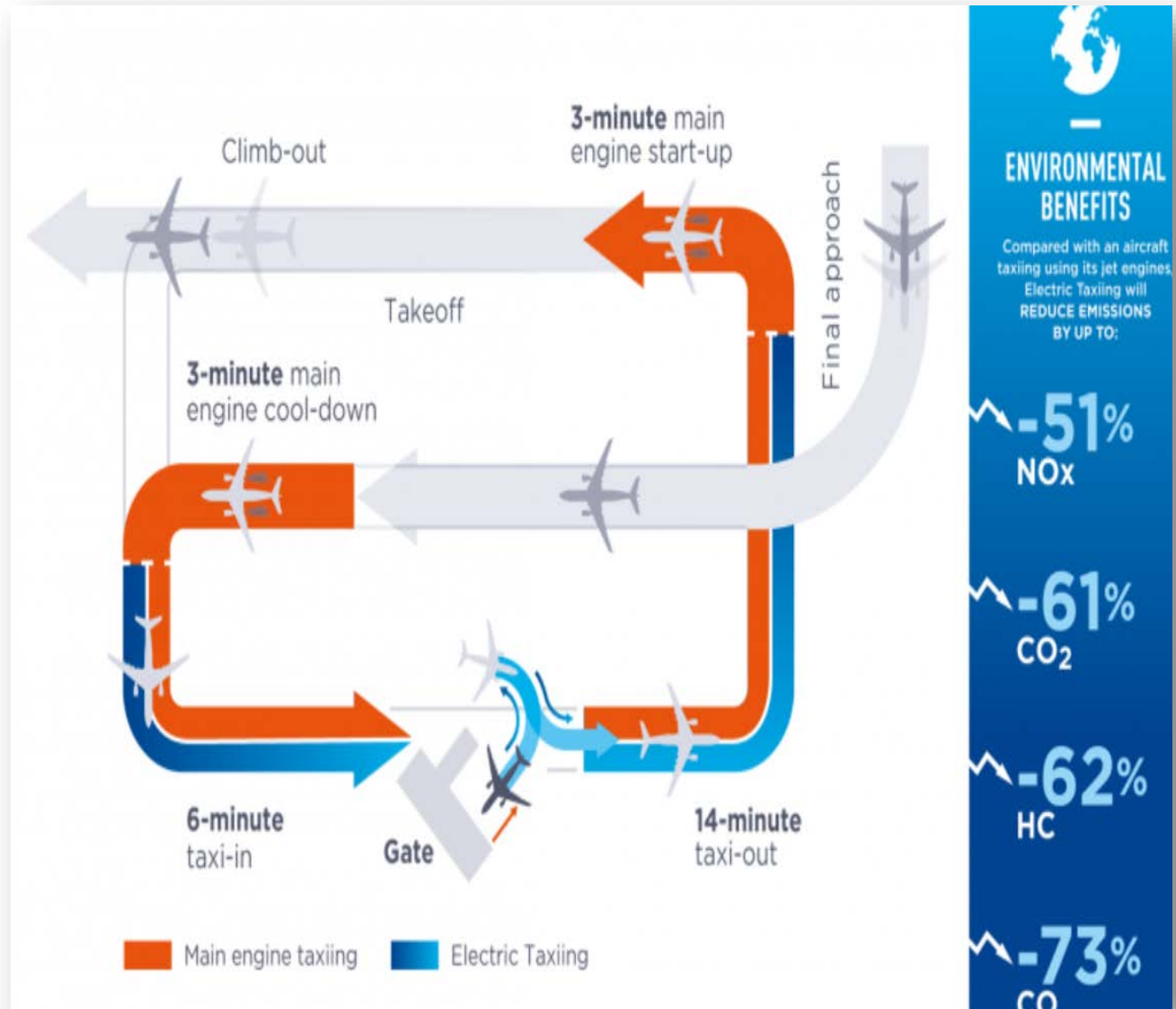
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<https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations#action-plan>

# Airport Operator actions



# Future ATM – Trajectory Based Operations

ADS-C EPP  
operational @  
MUAC

Showcase flight  
efficiency benefits

1. ToC display → earlier direct routing – earlier clearance to RFL – CCO: 12-35 kg of fuel savings / ft



2. ToD & optimum descent profile display → more miles at cruising level – optimum descent – CDO: 10-24 kg of fuel savings / ft



# Future concepts – Formation flight

The infographic features a teal background. On the left, a white airplane is shown in flight, leaving a trail of white circles that form a cone behind it. A line connects this cone to a second white airplane flying below it, which is also leaving a trail of white circles. To the right of the second airplane, three yellow arrows point upwards, indicating the lift provided by the upwash. The text 'fello'fly' is written in large white letters at the top left, with 'Wake energy retrieval demonstrator' below it. The Airbus logo is in the bottom right corner.

**fello'fly**  
Wake energy retrieval demonstrator

Inspired by the flight technique of migrating birds

Using air upwash to lift a follower aircraft

- Lightbulb icon: fello'fly project to prove safe technical and operational principles
- Wings icon: Industry collaboration with airlines, Air Traffic Control providers & regulators
- Fuel pump icon: 5% to 10% fuel savings on long-haul trips
- Leaf icon: Significant emissions reduction

**AIRBUS**

# New chall



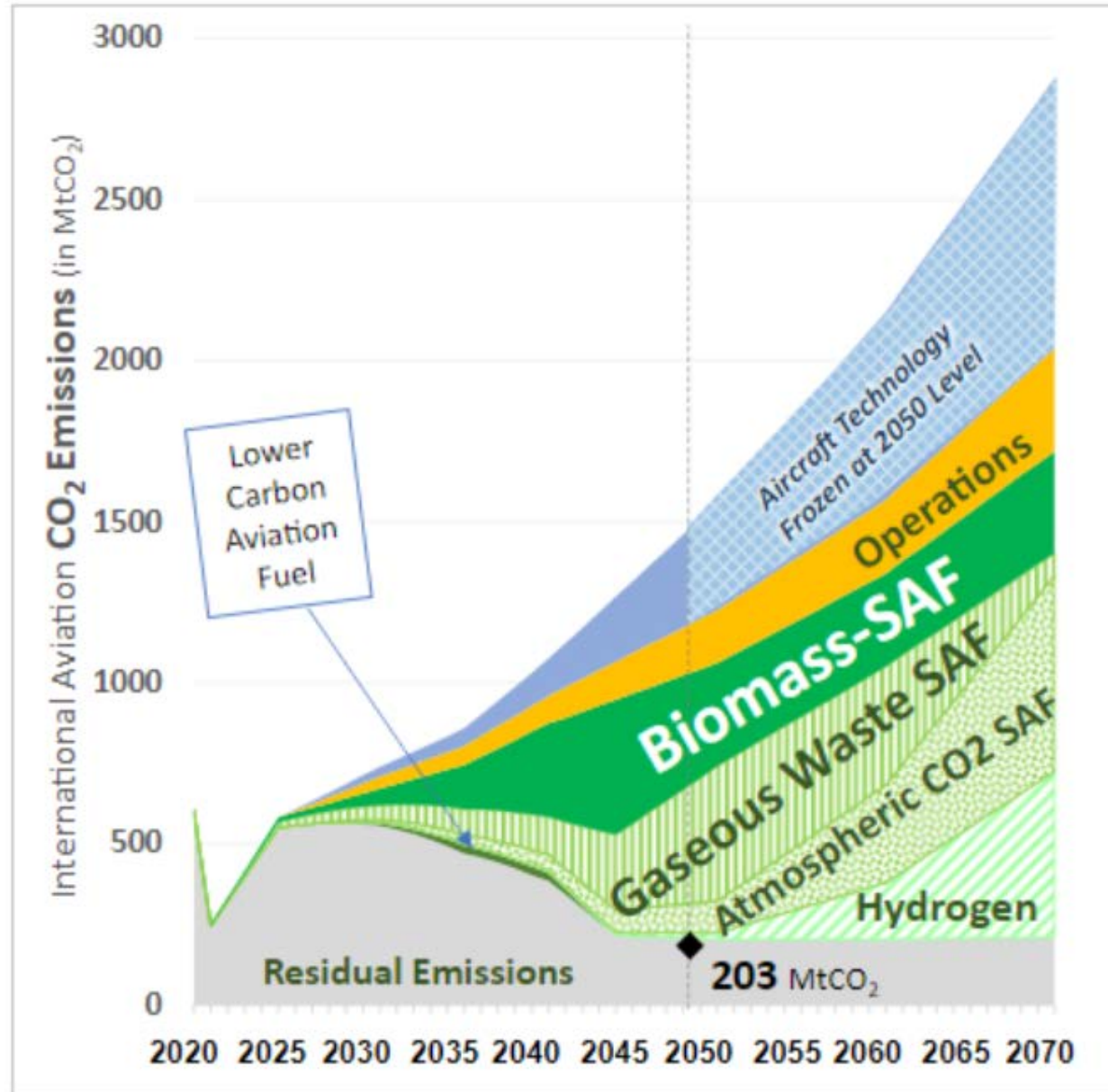
## Concept of Operations for the Introduction of Electric, Hybrid-electric and Hydrogen-powered Zero Emission Aircraft

23 January 2024





# Operational mitigations



# Collaboration and partnership to deliver the pool of benefits



# SUPPORTING EUROPEAN AVIATION



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# Thank You

