Second Arab Forum for Environmental Protection in the Arab Civil Aviation Industry

Session IV: Airports, Operations and Infrastructures

The role of ATM/Operations in achieving the LTAG: Focus on Europe

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EUROCONTROL: ICAO Coordinator

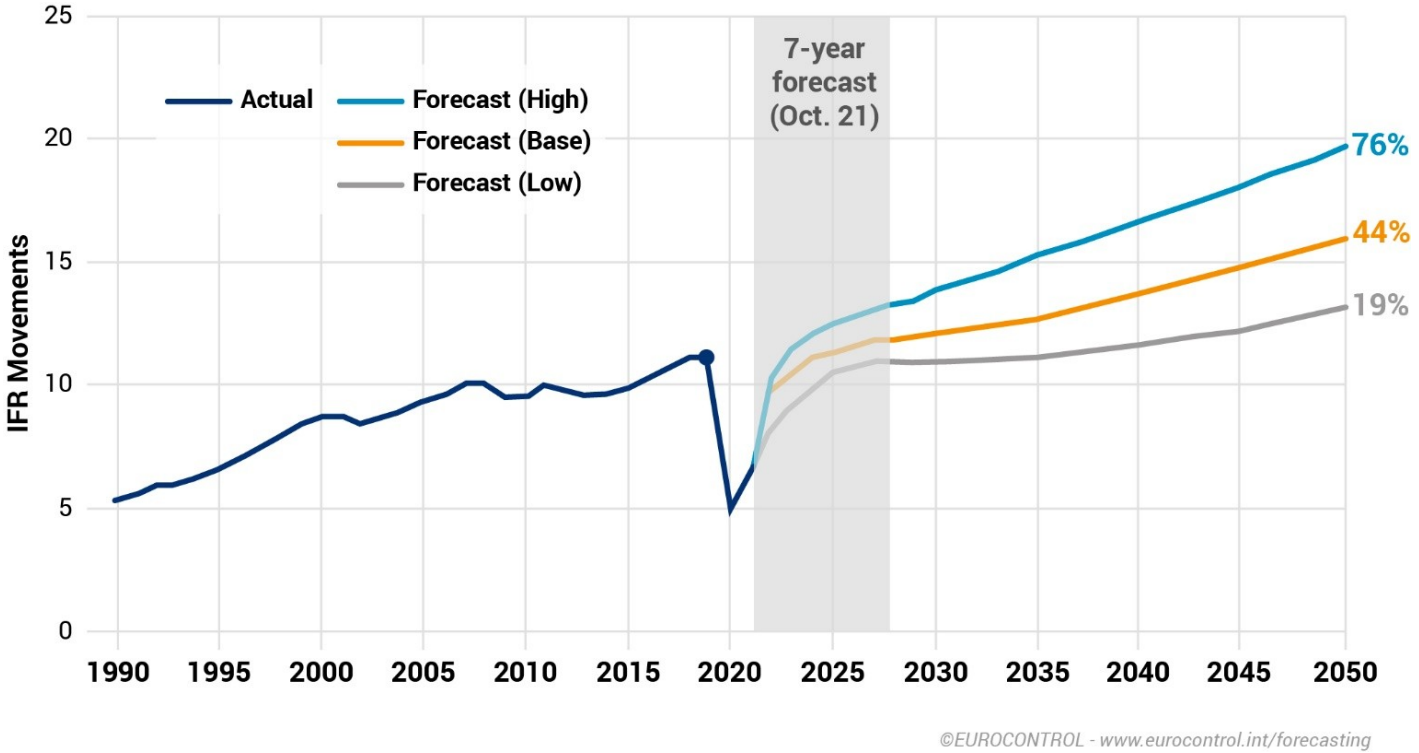
Marrakech, 26th & 27th February 2024

The Challenge Ahead for Sustainable Growth

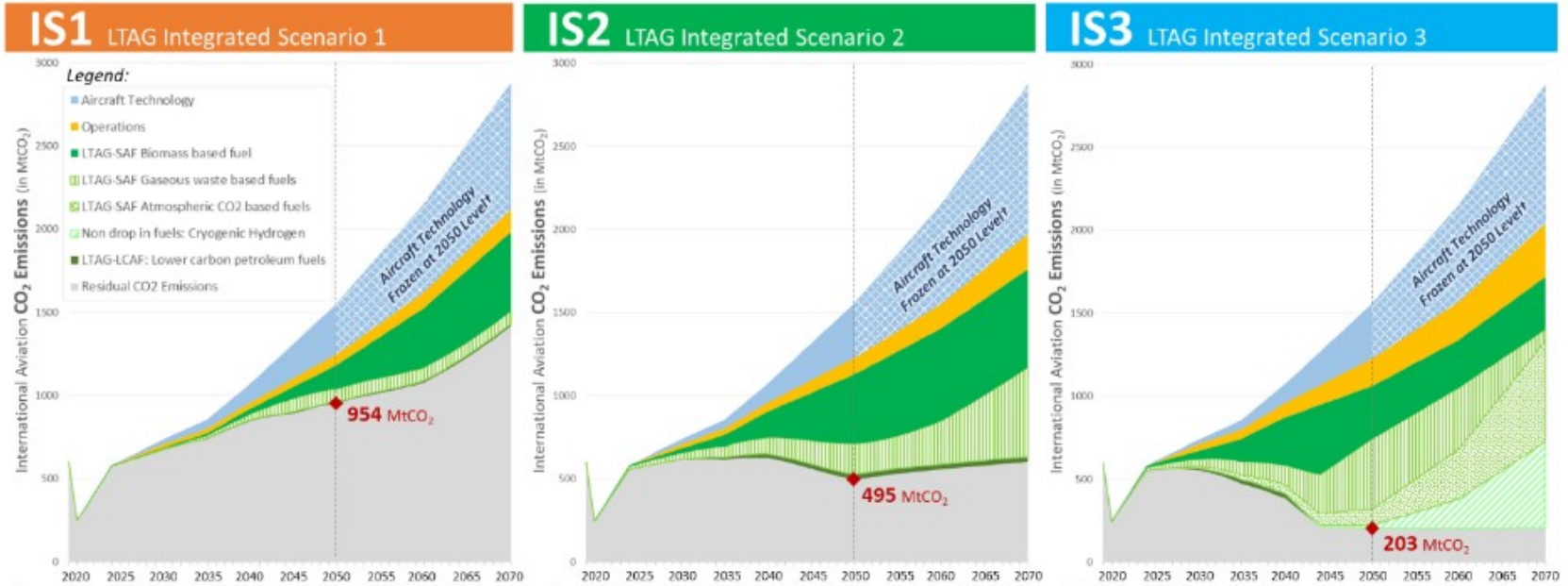
2050
IFR Movements

16 million flights
ECAC

+44%
vs. 2019
Source: Eurocontrol



ICAO LTAG Report results



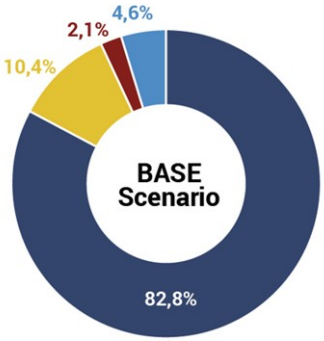
† Caution required with the interpretation of absolute CO_2 emissions levels after 2050 due to modelling assumptions e.g., frozen aircraft technology after 2050. Under these assumptions, CO_2 emissions are higher than in an alternative scenario (and modelling approach) where aircraft technology would continue to improve after 2050.

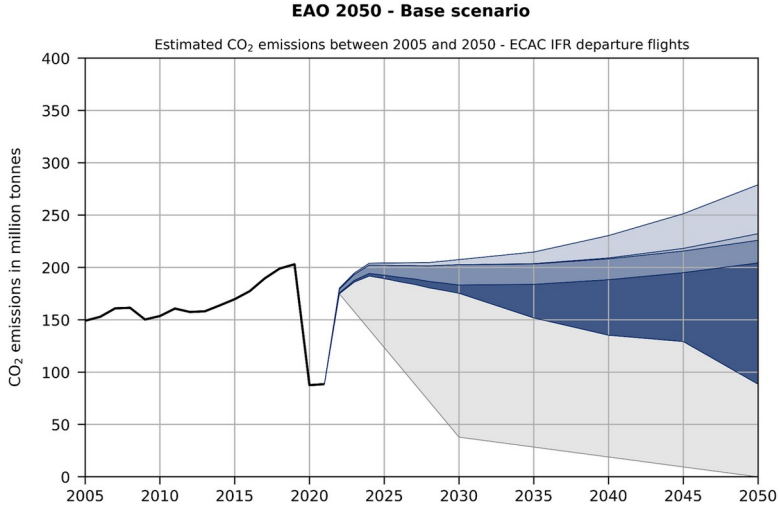
Figure 1. CO_2 emissions from international aviation associated with LTAG Integrated Scenarios

https://www.icao.int/environmental-protection/LTAG/Documents/REPORT%20ON%20THE%20FEASIBILITY%20OF%20A%20LONG-TERM%20ASPIRATIONAL%20GOAL_en.pdf

ATM contribution by **2030** – Objective Skygreen

- EU proposing an intermediate target of a 55% CO_2 reduction by 2030 compared to 1990 levels.

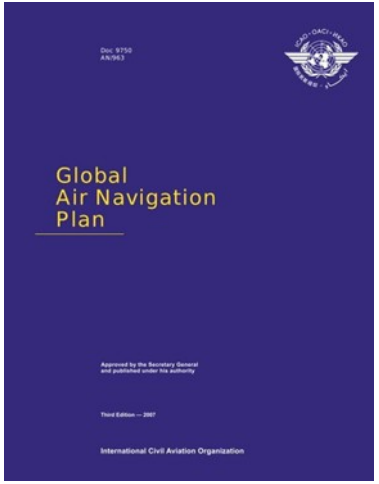




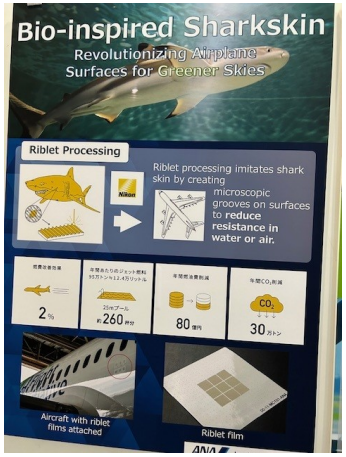
Source - https://www.eurocontrol.int/publication/objective-skygreen-2022-2030

What is the ‘operational’ wedge?

ATM



Aircraft operator actions

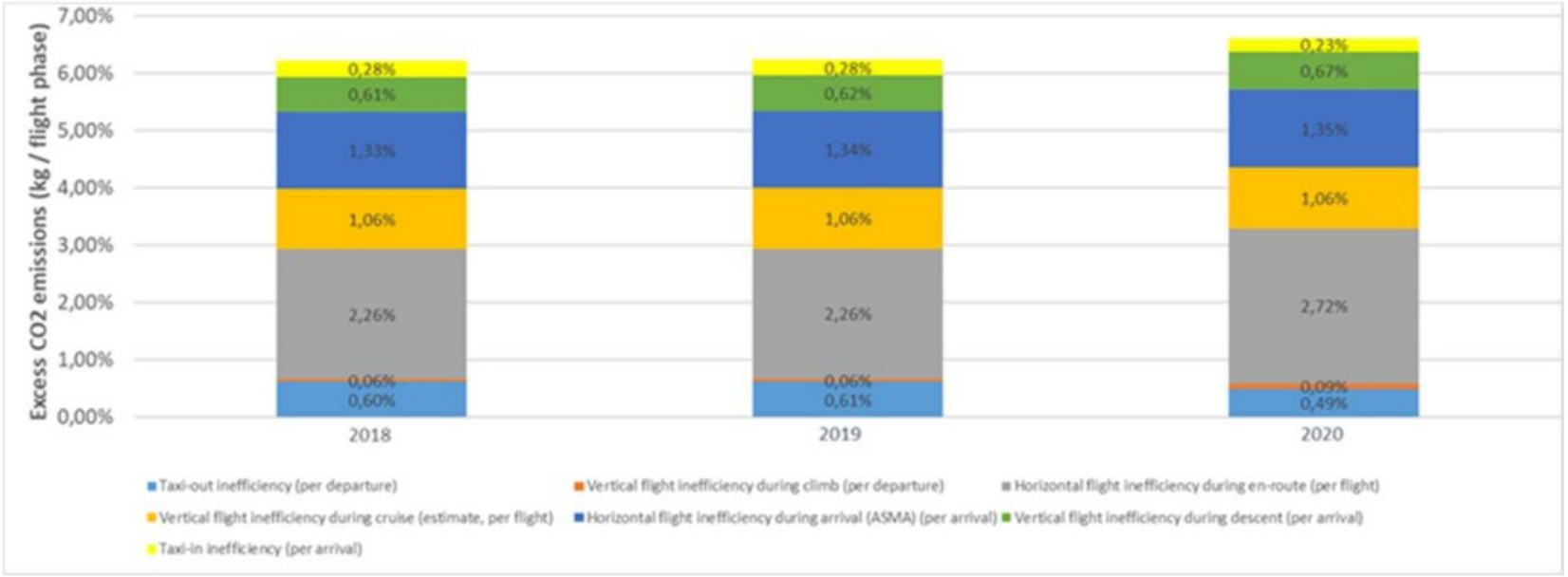


Airspace design

Ground operations

Flight planning activities

How much inefficiency is in the network?



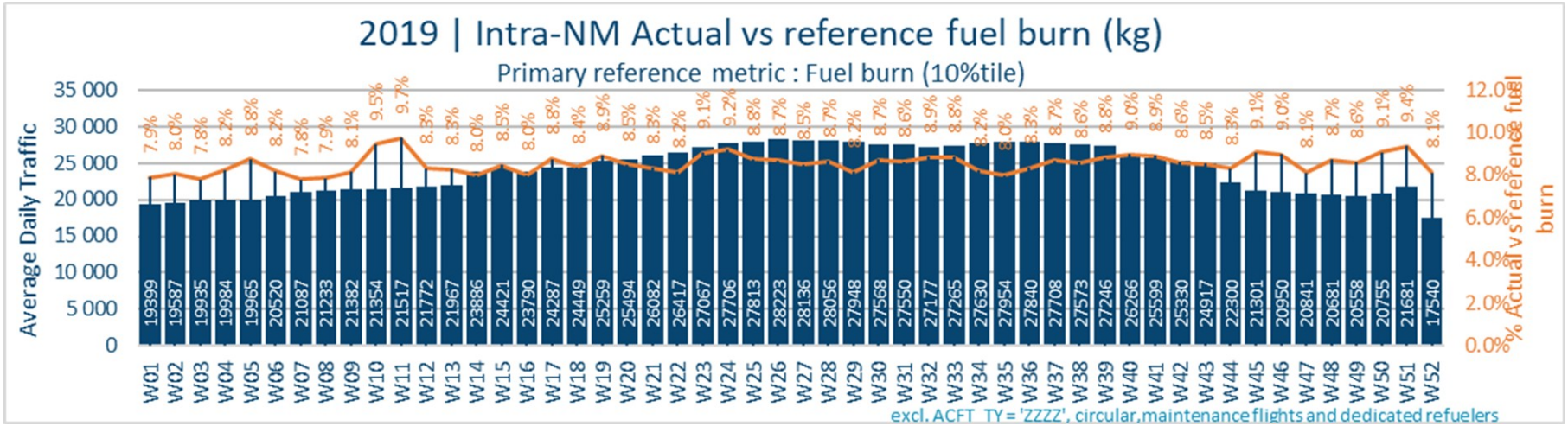
Source: EUROCONTROL Objective Skygreen report

Excess fuel burn in the network - intra-NM flights

Excess fuel burn

2019
10th percentile: 8.6% **5th**
percentile: 11.2%

2020
10th percentile: 3.5%



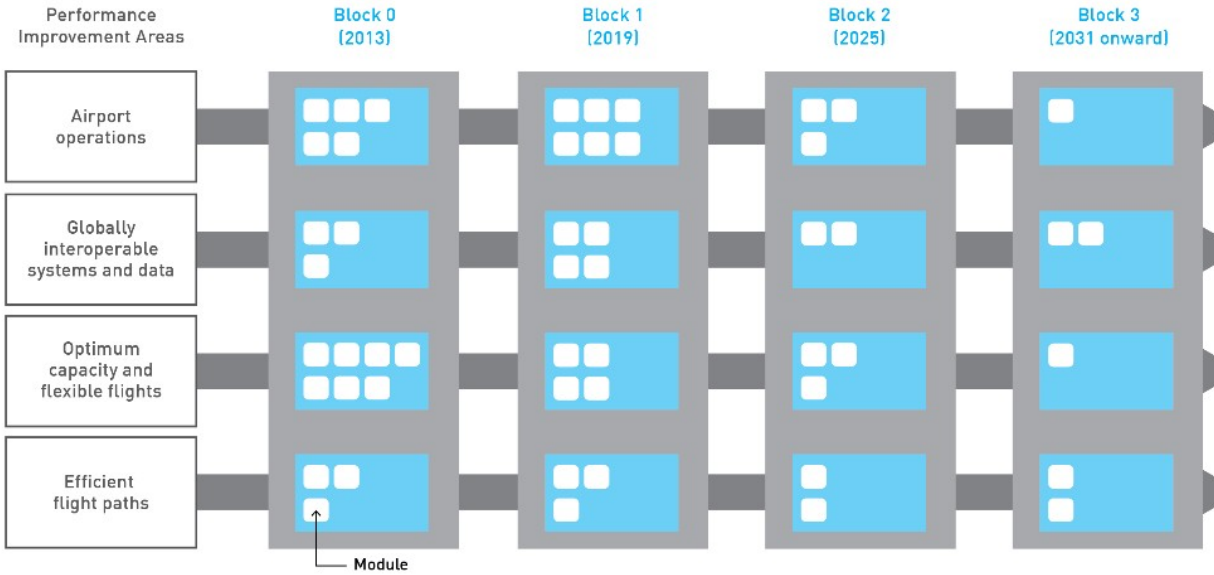
ATM / Operations – no silver bullet

2019 – ICAO global ASBU environmental benefits analysis

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**

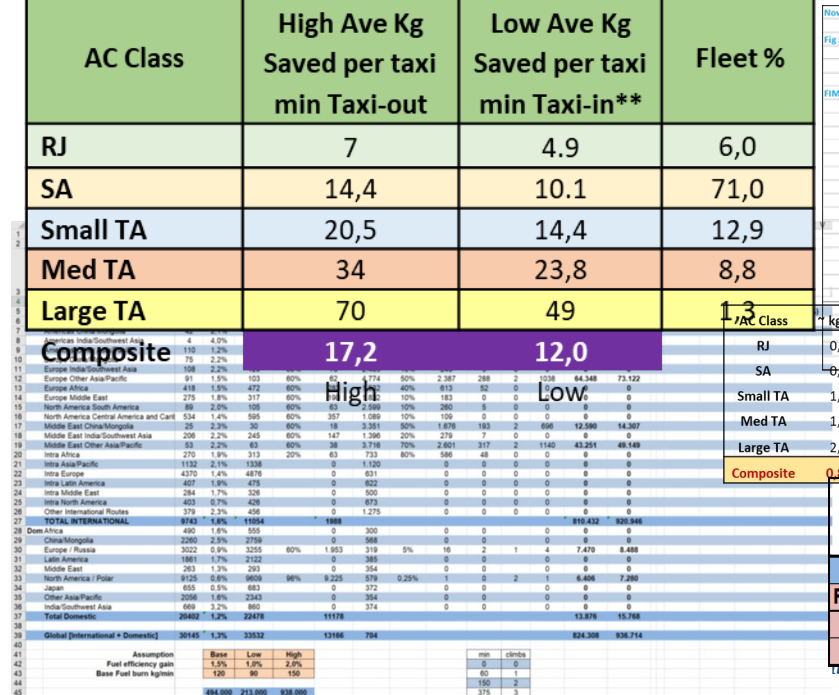
Outlined in *ICAO Global Air Navigation Plan (Doc. 9750)*

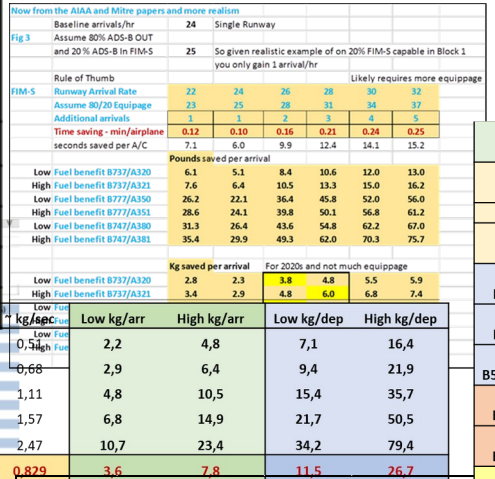


ASBU analysis – ENV benefits rules of thumb

53 rules of thumb (RoT) were developed for ASBU B0 / B1 generic implementations

AC Class	High Ave Kg Saved per taxi min Taxi-out	Low Ave Kg Saved per taxi min Taxi-in**	Fleet %
RJ	7	4.9	6,0
SA	14,4	10.1	71,0
Small TA	20,5	14,4	12,9
Med TA	34	23,8	8,8
Large TA	70	49	1,3
Composite	17,2	12,0	
	High	Low	





AC Class	kg/sec	Low kg/arr	High kg/arr	Low kg/dep	High kg/dep
RJ	0,51	2,2	4,8	7,1	16,4
SA	0,68	2,9	6,4	9,4	21,9
Small TA	1,11	4,8	10,5	15,4	35,7
Med TA	1,57	6,8	14,9	21,7	50,5
Large TA	2,47	10,7	23,4	34,2	79,4
Composite	0,829	3,6	7,8	11,5	26,7

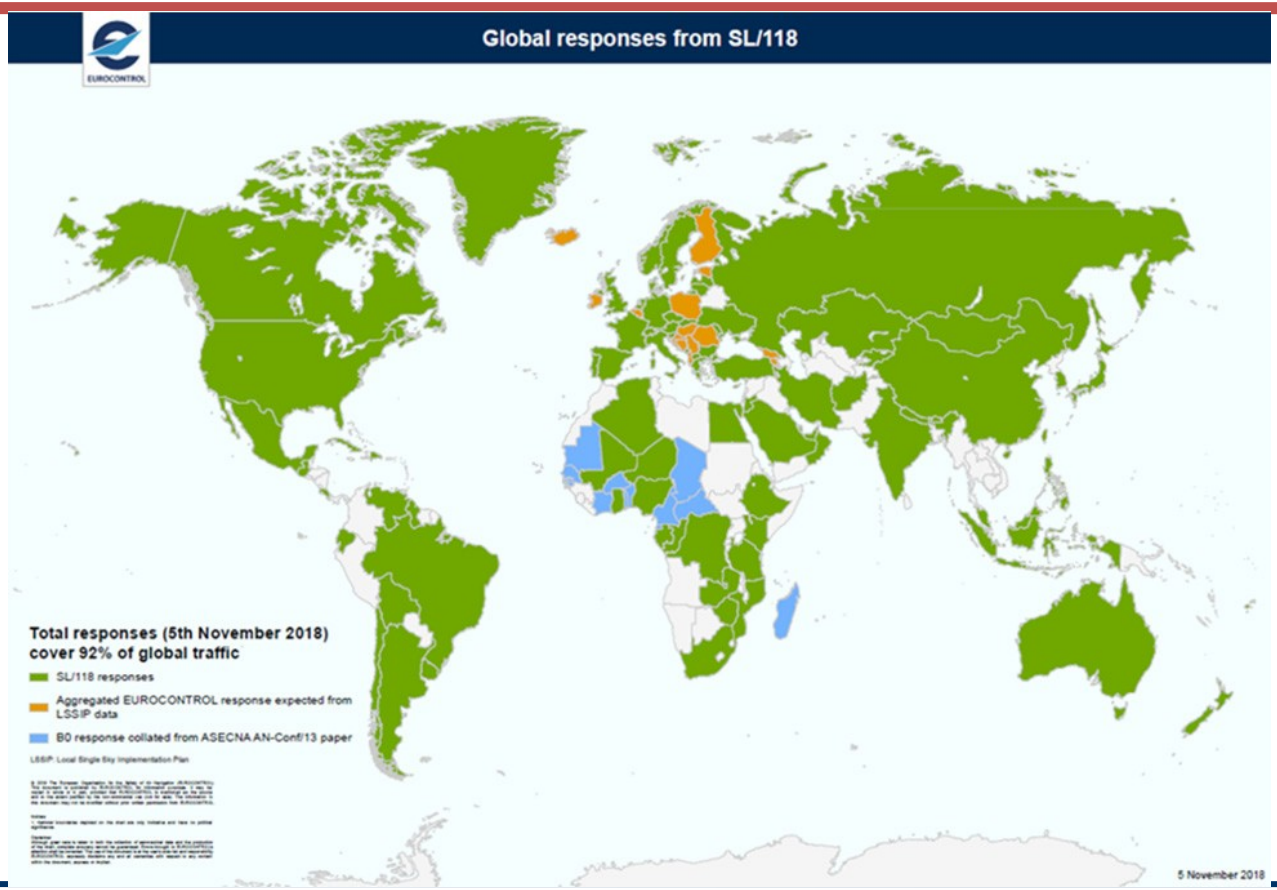
AC Class	Ave Kg Saved per flight	Modified Fleet %
SA	21,0	74,0
Small TA	89,3	13,4

RJ	900-1220	4030	1832	30,53	0,509	1832	31	0,51	6
SA	900-1220	5815	2643	44,05	0,734	2460	41,0	0,68	71
SA	1900	5357	2435	40,58	0,676				
SA	4000-5500	5060	2300	38,33	0,639				
Small WB-1 B57/67-A33/34	900-1220	8580	3900	65,00	1,083	4009	66,8	1,11	12
Small WB-1 B57/67-A33/34	1900	7883	3583	59,72	0,995				
Small WB-2 B57/67/87-A33/34	4000-5500	9995	4543	75,72	1,262				
Medium WB B777-A340/350	4000-5500	11865	5393	89,88	1,498	5642	94,0	1,57	8
Medium WB B777-A340/350	9000-14000	12960	5891	98,18	1,636				
Large WB 747/A380	4000-5500	17279	7854	130,90	2,182	8887	148,1	2,47	1
Large WB 747/A380	9000-14000	21824	9920	165,33	2,756				
						2986	49,8	0,829	1

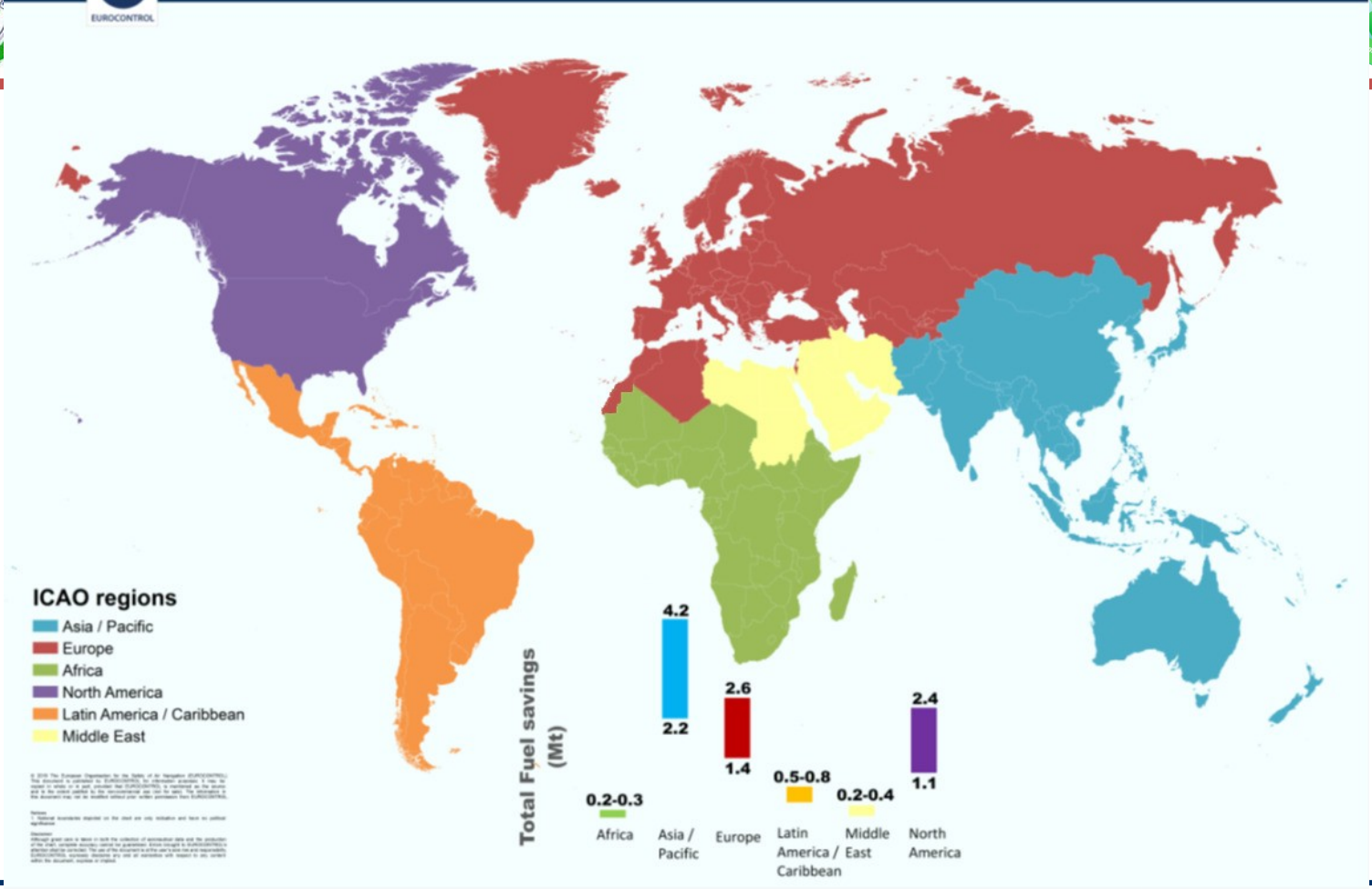
Fuel Savings (kgs) per Flight from R
Setting Enabled by Performance E

Aircraft Class >>>	Savings (kgs)	Distance Savings (NM)
Range:		
RoT low	11-95	1-5
RoT high	40-187	17-27

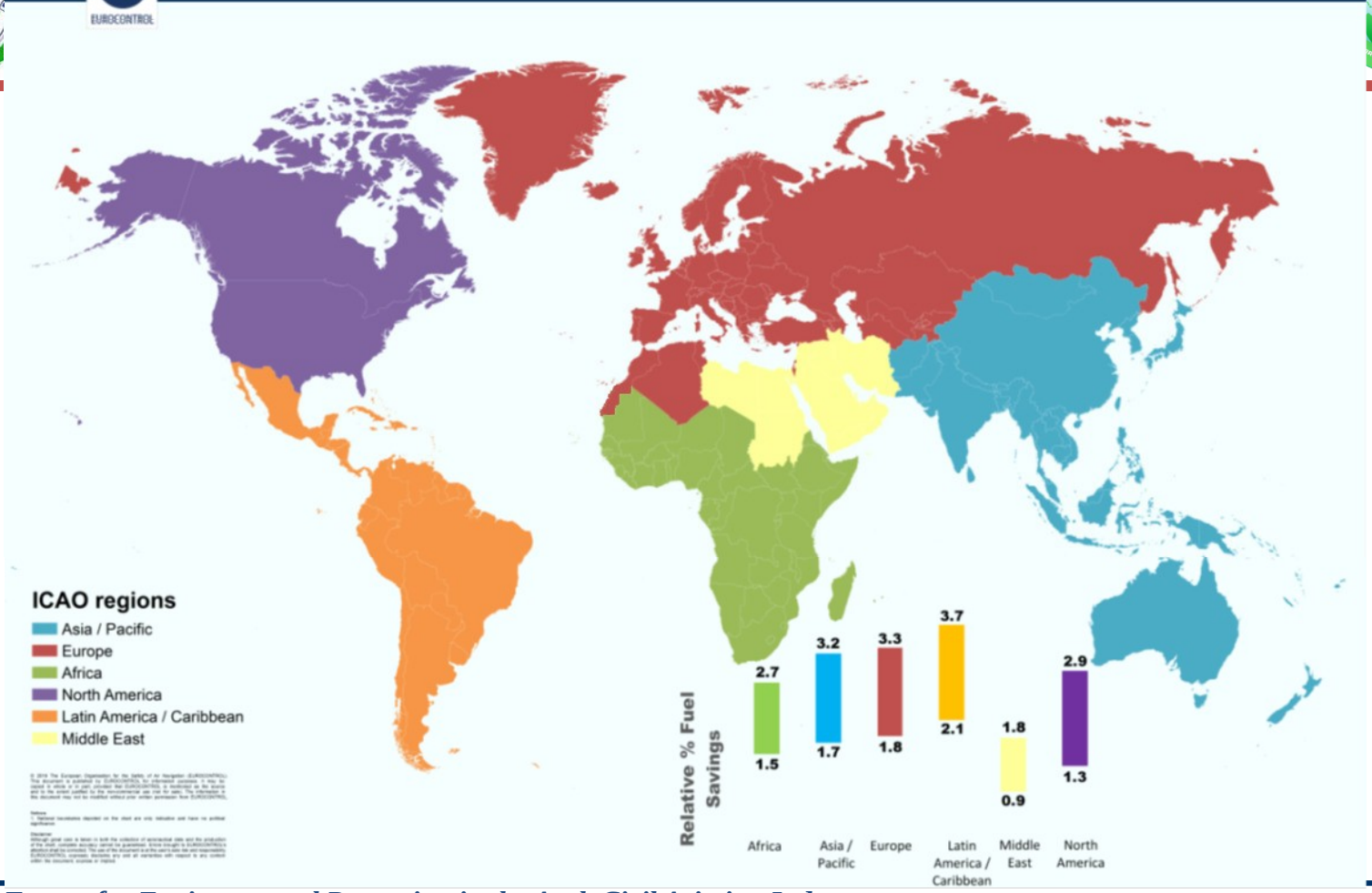
ASBU ENV analysis - SL118/2018 response



Range of estimated block 0/1 fuel savings (from 2015-2025 implementation) per ICAO region (Mt)



Range of estimated block 0/1 fuel savings (2015-2025 implementation) per ICAO region relative to total 2025 regional fuelburn (%)



ASBU ENV analysis - key findings (1)

Globally, 4 ASBU modules (CDO, ASUR, TBO and CCO) provide close to 60% of the higher range of fuel and CO_2 savings;

CDO – Continuous Descent Operations
ASUR – Space-based ADS-B surveillance
TBO – Trajectory-Based Operations
CCO – Continuous Climb Operations

ASBU ENV analysis - key findings (2)

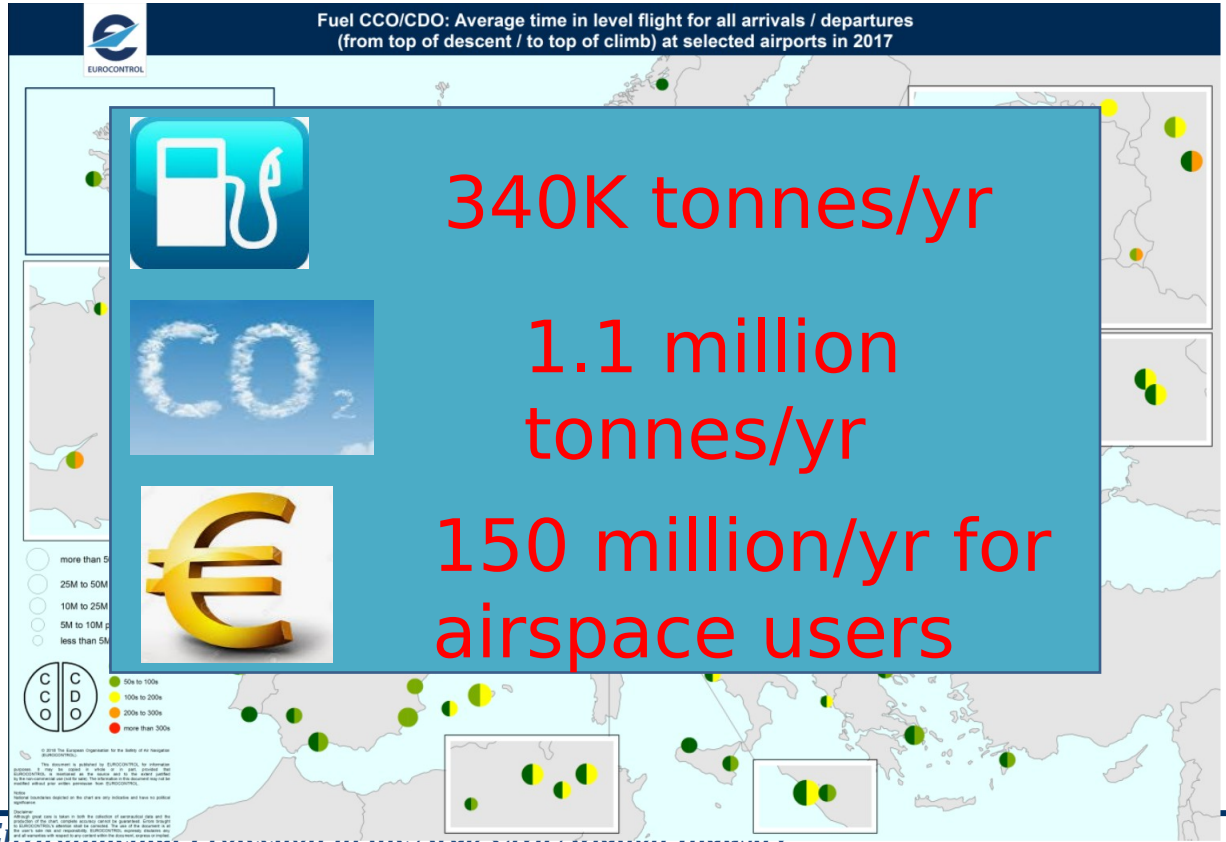
further 6 ASBU modules (RSEQ, ACDM, APTA, FRTO, AMET
nd NOPS) provide an additional 37% of savings;

RSEQ – Runway sequencing (AMAN / DMAN)
ACDM – Airport Collaborative Decision Making
APTA – Performance Based Navigation
FRTO – Free Route Airspace / FUA
AMET - enhanced MET information
NOPS – Air Traffic Flow Management

ny local initiatives that can be highlighted e.g. flex routes?

Average time in level flight for all DEPS / ARRS in Europe in 2017

European CCO / CDO TF



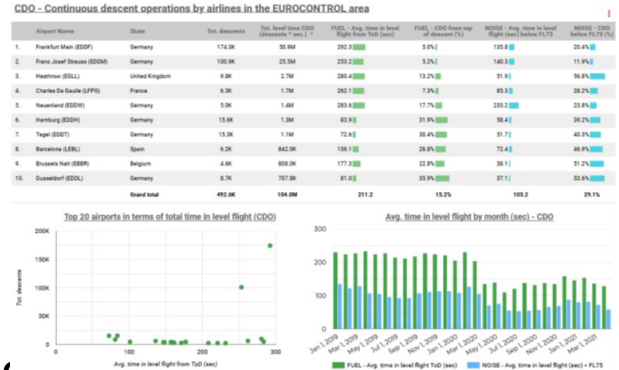
European CCO / CDO Task Force

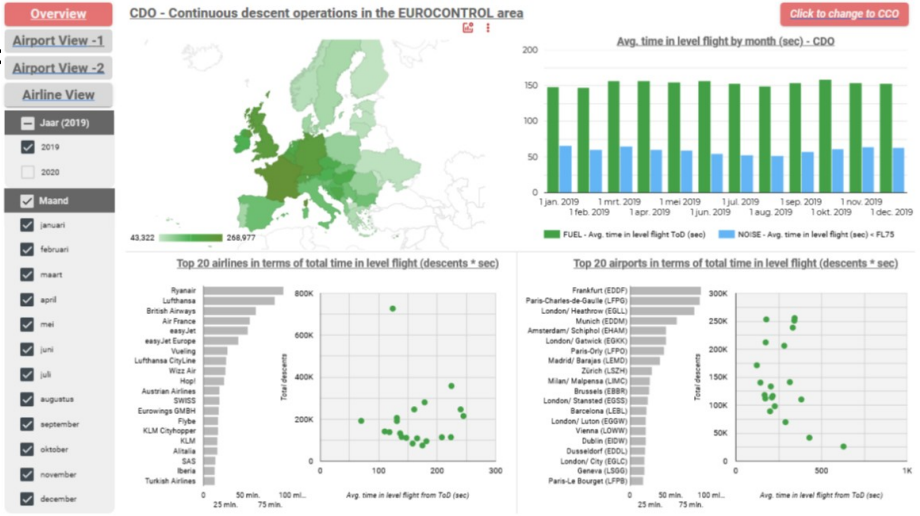
APPENDICES:

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

Deliverables (2) - **CCO / CDO performance dashboard**

- All airports in Europe*
- All airlines flying in Europe*





* Subject to data availability - https://www.ansperformance.eu/efficiency/vfe/

European CCO / CDO Task Force

Deliverable (3) - **CCO / CDO Tool Kit**

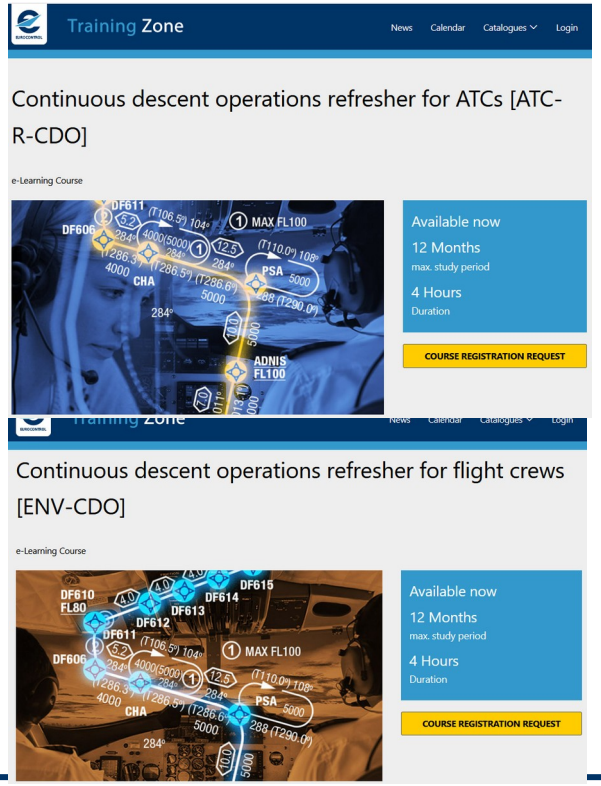
- https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations

Deliverable (4) - **ATCO refresher training on aircraft energy management**

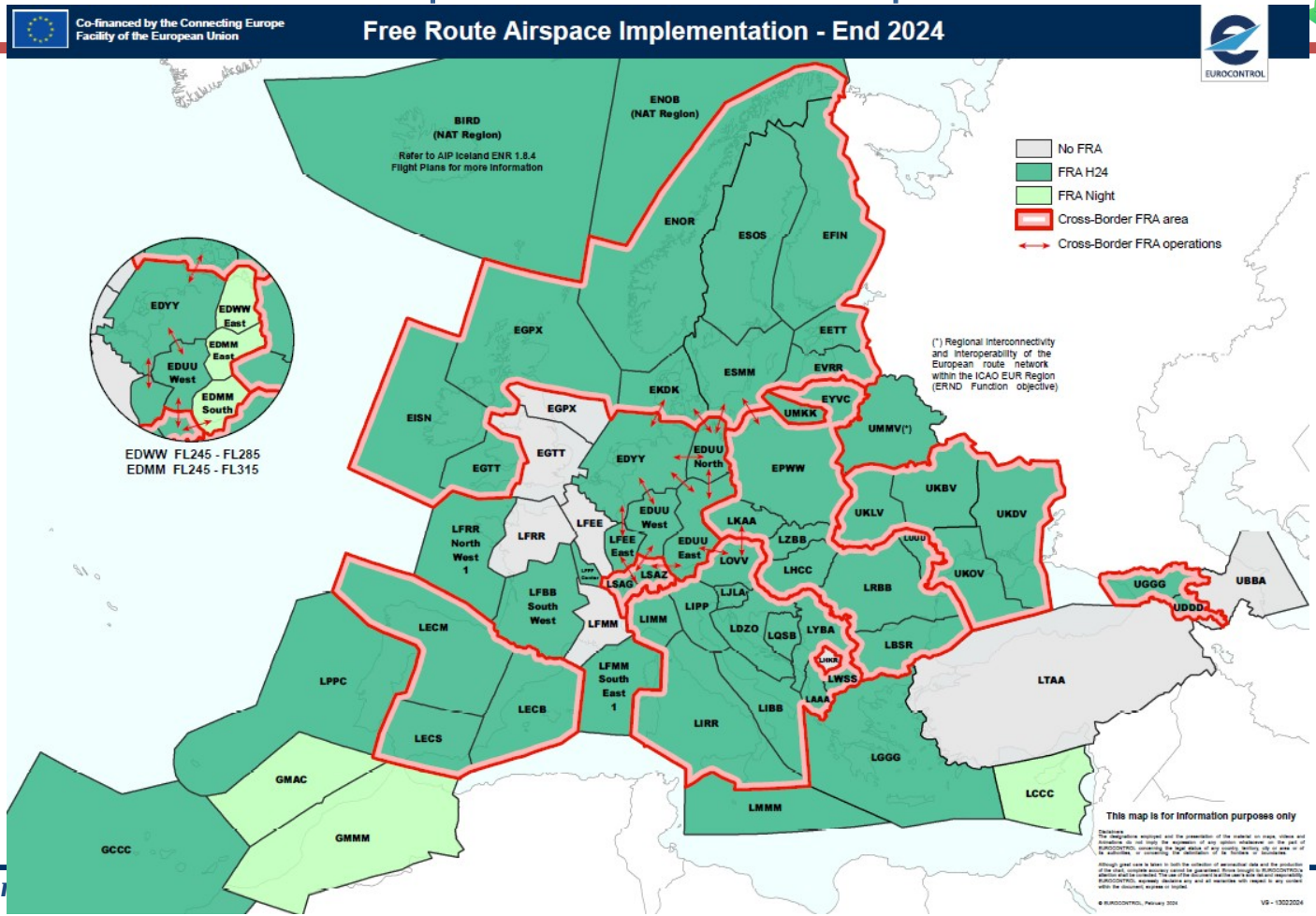
- https://trainingzone.eurocontrol.int/ilp/pages/coursedescription.jsf?courseId=8619678&catalogId=232380

Deliverable (5) - **Flight Crew CBT on CCO / CDO**

- https://trainingzone.eurocontrol.int/ilp/pages/coursedescription.jsf?courseId=9178064&catalogId=896425

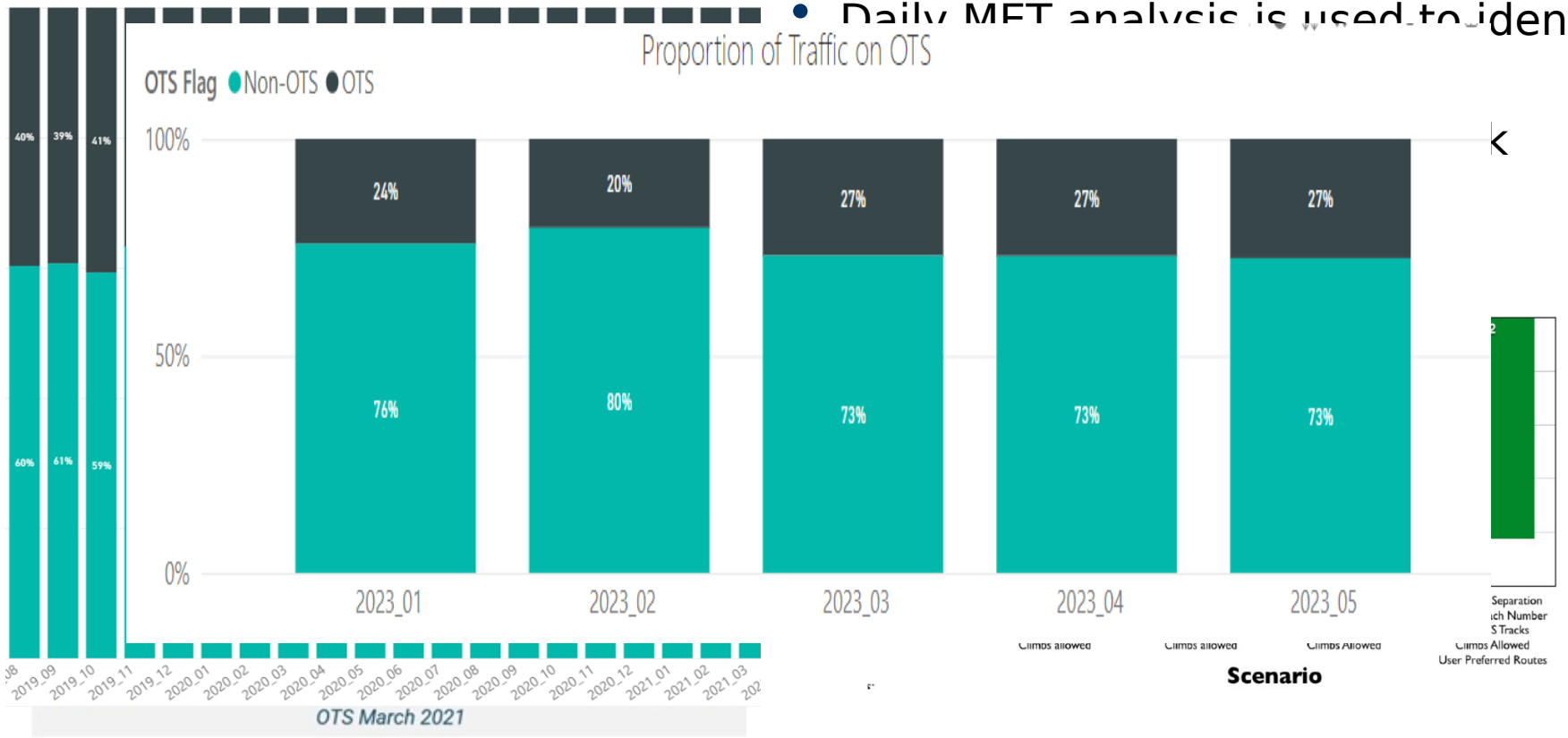


Free route airspace (FRA) – Europe status end



North Atlantic tracks UPRs (with SB-ADS-B)

- Daily MET analysis is used to identify



On the path to TBO: FF-ICE

- FF-ICE: Flight and Flow Information for a Collaborative Environment
- European mandate - CP1 mandates all Airspace Users operating in the European airspace to adopt FF-ICE and start filling eFPL by 31/12/2025
- FF-ICE will facilitate CDM and the sharing / negotiation of the planned trajectory
- Results in better knowledge of aircraft capabilities, operator choices and ATM constraints facilitating efficiency improvements and better planning

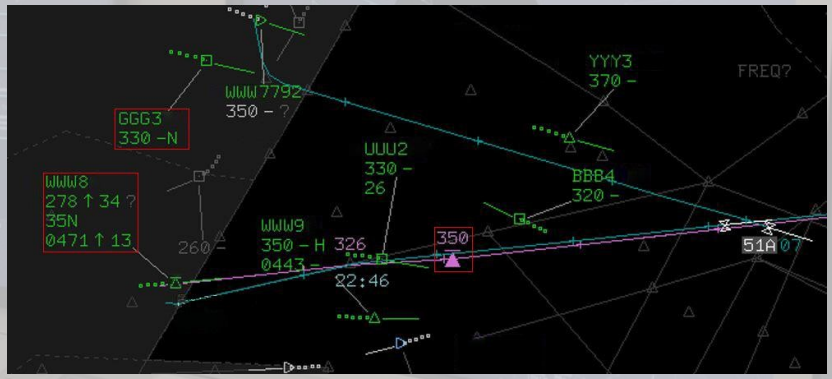
On the path to TBO: ADS-C EPP

ADS-C EPP operational @ MUAC

Showcase flight efficiency benefits

1. ADS-C can identify whether a flight can exit a non-active military area before it becomes active → shortest route

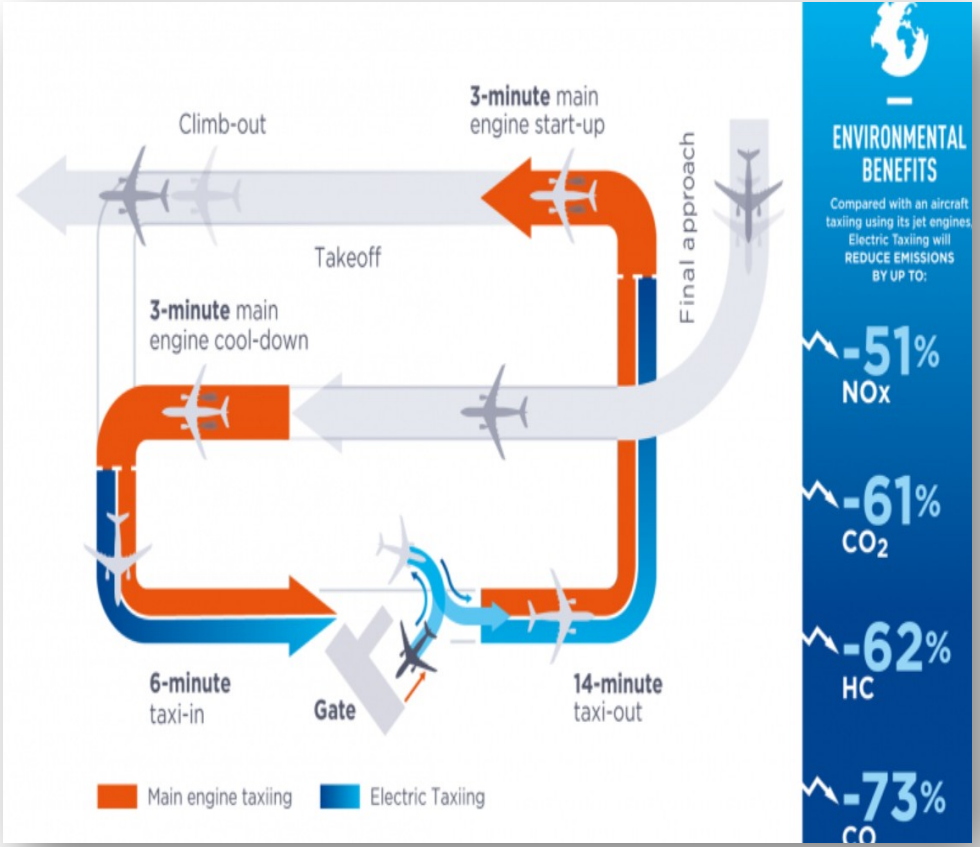
2. ToC display → earlier direct routing – earlier clearance to RFL – CCO: 12-35 kg of fuel savings / flt



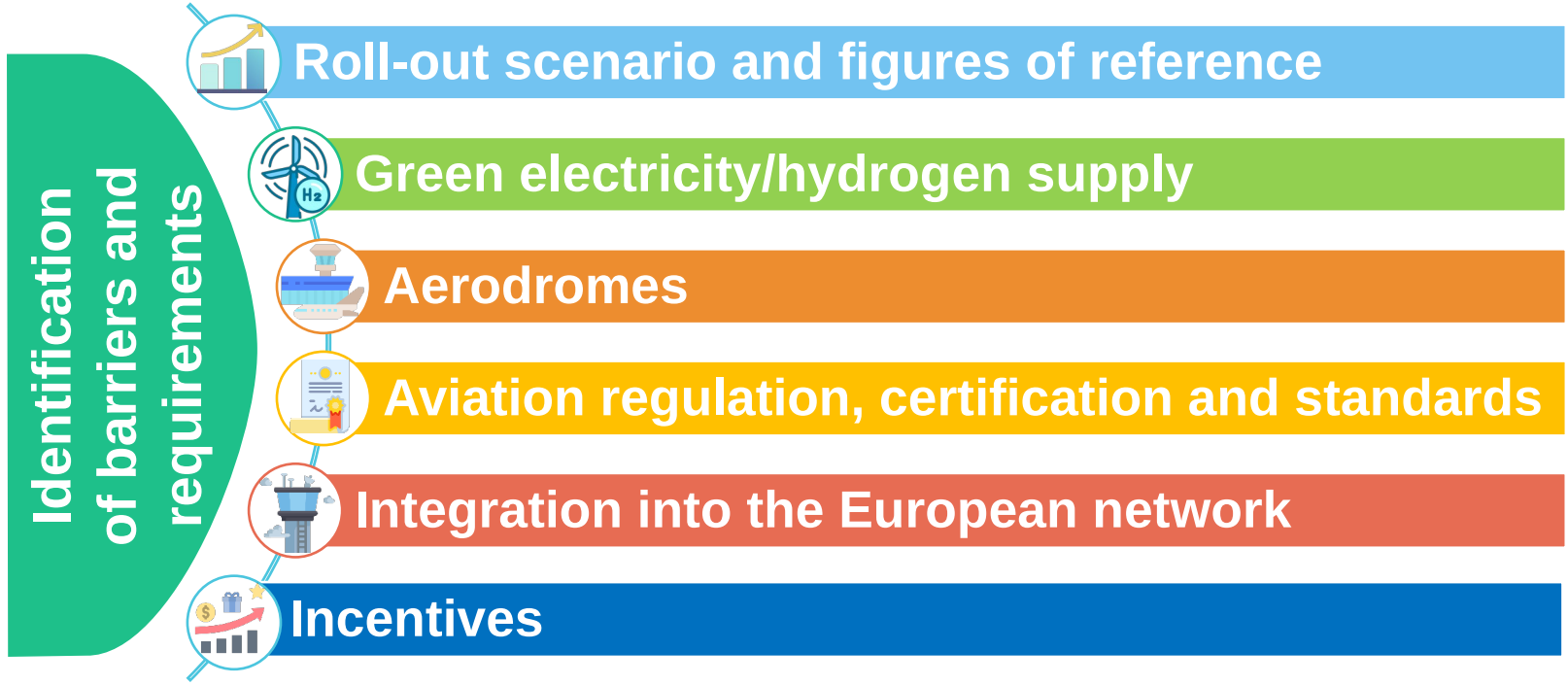
3. ToD & optimum descent profile display → more miles at cruising level – optimum descent – CDO: 10-24 kg of fuel savings / flt

Next steps – removing emissions: e.g. formation flying

Next steps – removing emissions: e.g. e-taxi solutions



New challenges - AZEA



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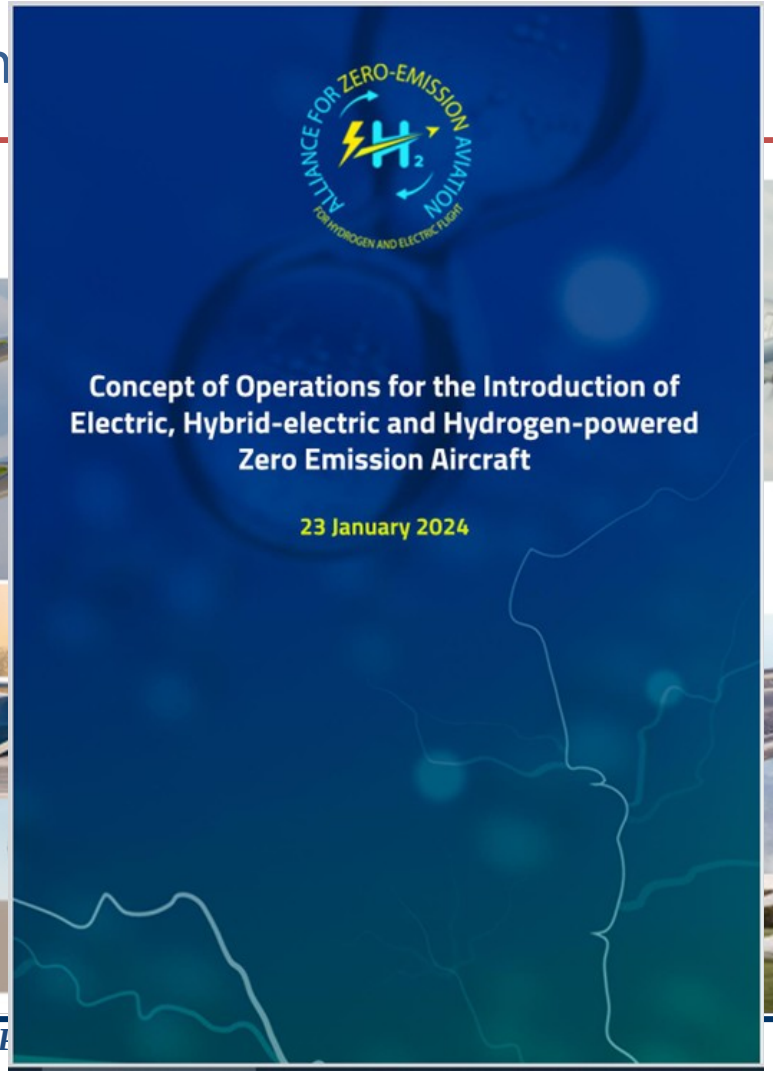
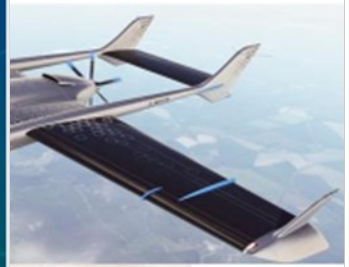

ALLIANCE FOR ZERO-EMISSION AVIATION
FOR HYDROGEN AND ELECTRIC FLIGHT
Concept of Operations for the Introduction of Electric, Hybrid-electric and Hydrogen-powered Zero Emission Aircraft
23 January 2024

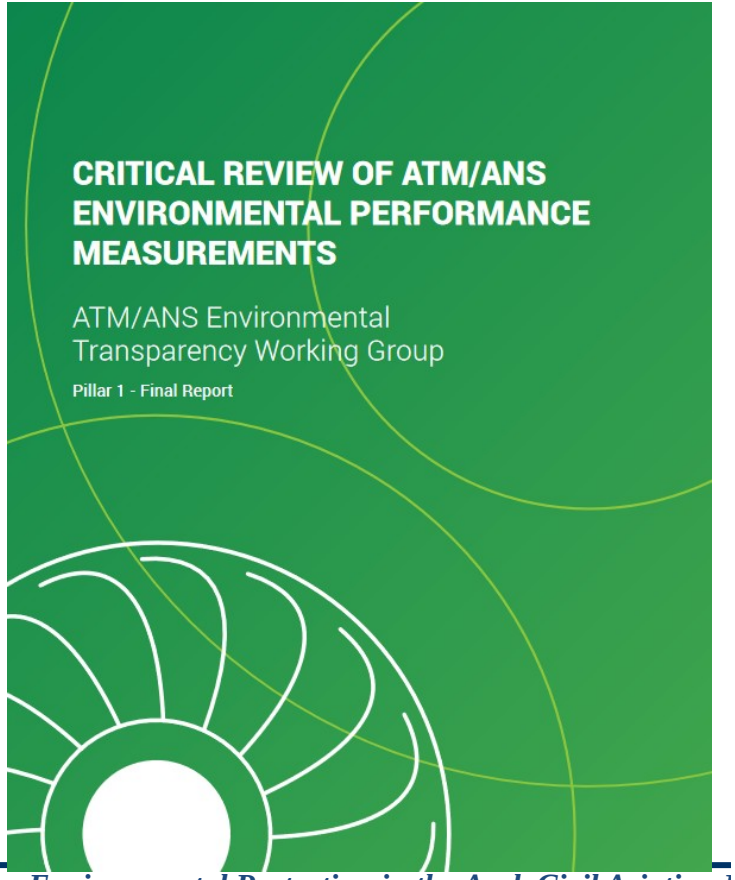


EUROCONTROL – Flying Green

- ECAC States
- EC
- OEMs
- Operational Stakeholders
- Fuel suppliers
- Energy producers
- Financial institutions

Contact:
aviation.sustainability@eurocontrol.int

Performance measurement is vital



CAEP-SG/20232-IP/04
15/09/23
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COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION (CAEP)

STEERING GROUP MEETING

Takamatsu, Japan, 16 to 20 October 2023

Agenda Item 2: Developments since the 2022 Steering Group Meeting

UPDATE OF THE ENVIRONMENT KEY PERFORMANCE AREA IN THE GLOBAL AIR NAVIGATION PLAN

(Presented by the ICAO Secretariat)

1. INTRODUCTION

1.1 Since the endorsement of the sixth edition of the GANP during the 40th session of the ICAO Assembly, the GANP is presented in an electronic format available at Home - ICAO GANP Portal and its content is organized into four levels: two global levels (strategic and technical), a regional level and a national one. The 41st session of the ICAO Assembly endorsed the seventh edition of the Global Air Navigation Plan. The Global Air Navigation Plan is performance-driven and service oriented.

2. PERFORMANCE IN THE GANP

2.1 The Global Air Navigation Plan (GANP) contains, the GANP performance framework, composed of a series of performance ambitions, focus areas, performance objectives and key performance indicators (KPIs) within the eleven key performance areas (KPAs) [1] matching the global performance expectations outlined in the *Global Air Traffic Management Operational Concept* (Doc 9854).

2.2 The Performance Ambitions, contained in the global strategic level of the GANP, are qualitative statements, defined in the eleven ICAO KPAs, whose goal is to provide global priorities on the performance evolution of the global air navigation system. The performance ambitions should not be regarded as targets to continuously monitor and report performance against, but rather as a catalyst for change.

Note – More information on the GANP Performance Ambitions is available at: https://www4.icao.int/ganpportal/GanpDocument#/lessons/mR-NvTw42AWIArqUwLYarQFkoUGNX_h?_k=h8tv8t

1 The eleven ICAO KPAs: safety, security, environmental impact, cost effectiveness, capacity, flight efficiency, flexibility, predictability, access and equity, participation by the ATM community and global interoperability.

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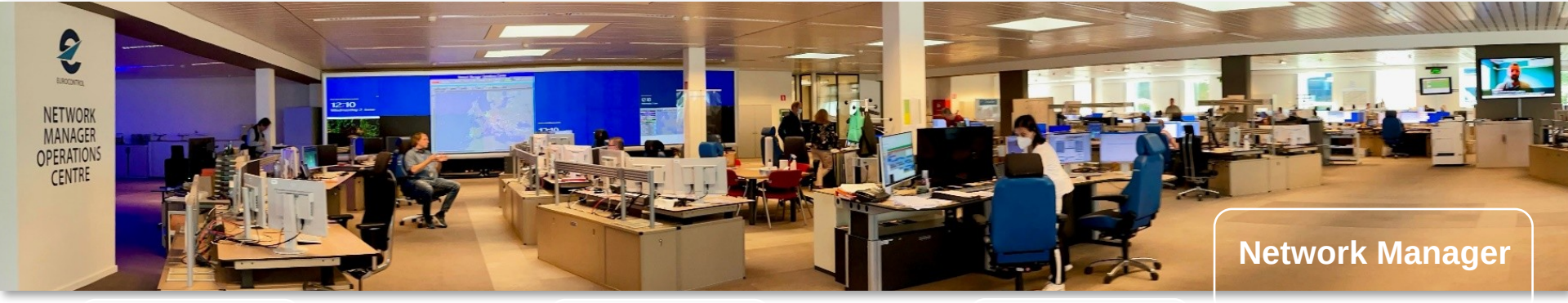
Collaboration and partnership to deliver the pool of benefits



SUPPORTING EUROPEAN AVIATION