

# ALBATROSS

Delivering efficient flight operations

# SESAR 2020 SHOWCASE

# The project

A Gate to Gate holistic approach implementing mature solutions for quick wins improvements



## ALBATROSS

The most efficient flight

Multiple combined solutions for **greener flight operations**

- Continuous climb and descent operations
- Flight trajectory optimization with real-time transmission of four-dimensional trajectory data
- Sustainable Aviation Fuels as an alternative of fossil fuels
- Hybrid "TaxiBot" assistance on ground operations

**ALBATROSS actors**

**Air Navigation Service Providers:** EUROCONTROL, LFV, AUSTRONAV, DSNA

**Airports:** Stockholm, Schiphol, Vienna

**Airlines:** Lufthansa, SWISS, WIZZ, NOVAIR, AIR FRANCE, WIZZAIR

## ALBATROSS GOALS:

- ✈️ Reduce aviation's environmental footprint
- ✈️ Demonstrate operational mature solutions and processes allowing greener flights
- ✈️ Make changes permanent
- ✈️ Provide measurable and traceable results showing the impact of the solutions applied

# The Consortium

A large Pan-European Consortium gathering 5 Airlines, 2 Airports, 4 ANSPs and many industrials

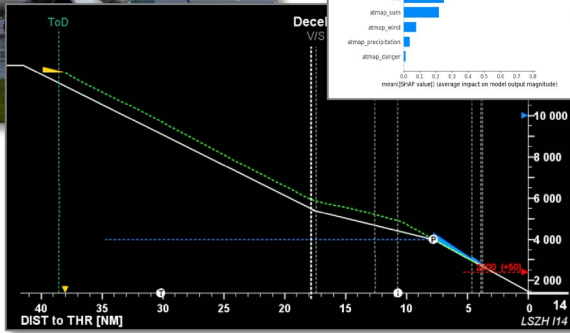
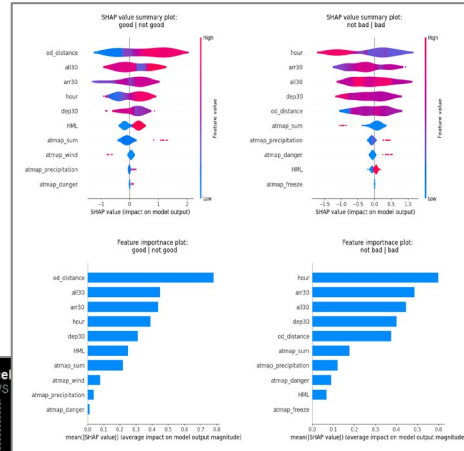
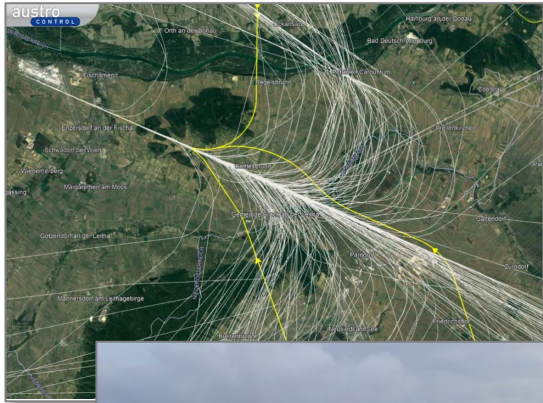


<b>Airlines</b> novair AIRFRANCE Lufthansa Wizz SWISS	<b>ANSP / Airspace</b> LFV austro CONTROL DSNA	<b>ANSP / Airport platforms</b> swedavia SWEDISH AIRPORTS Schiphol Amsterdam Airport
<b>A/C Manufacturer</b> AIRBUS	<b>EUROCONTROL NM</b> EUROCONTROL	<b>Research / Support and Taxibot</b> SAS SMART AIRPORT SYSTEMS DLR
<b>System &amp; Services suppliers</b> THALES NAVBLUE		

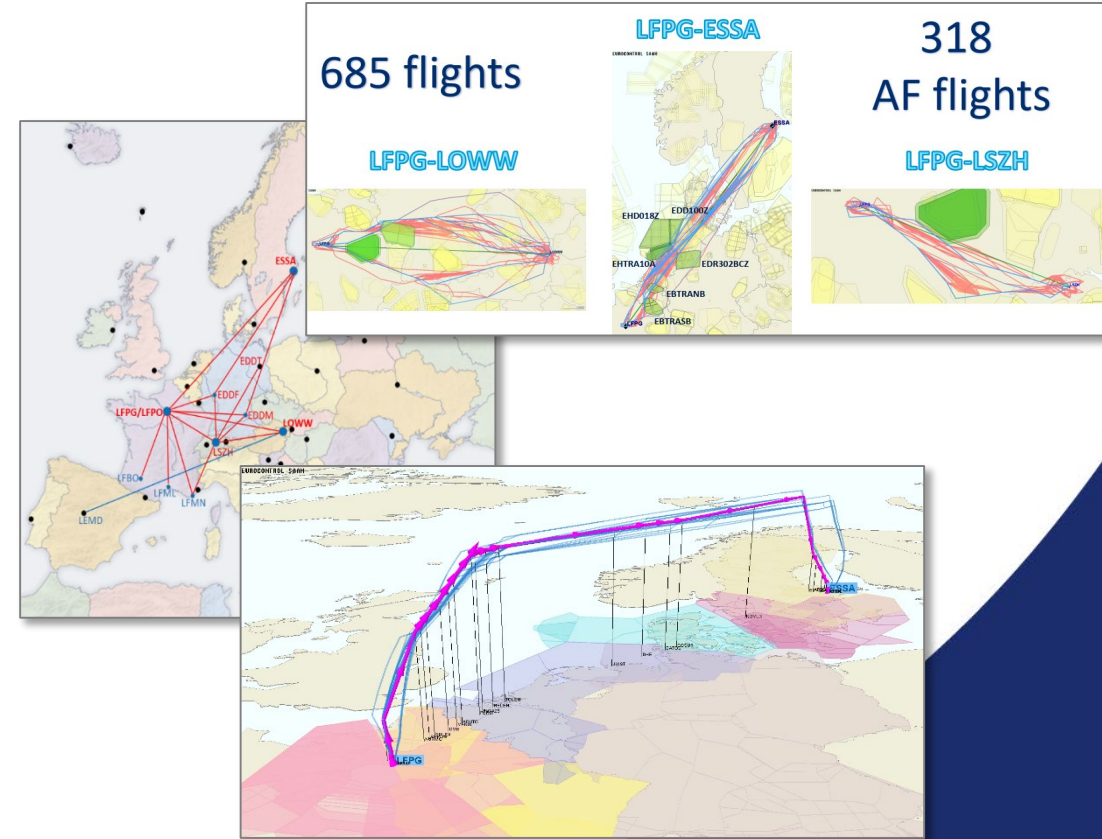


# The project approach

## The Local Exercises



## The "Gate-to Gate"



## The Local Exercises

# PBN to ILS

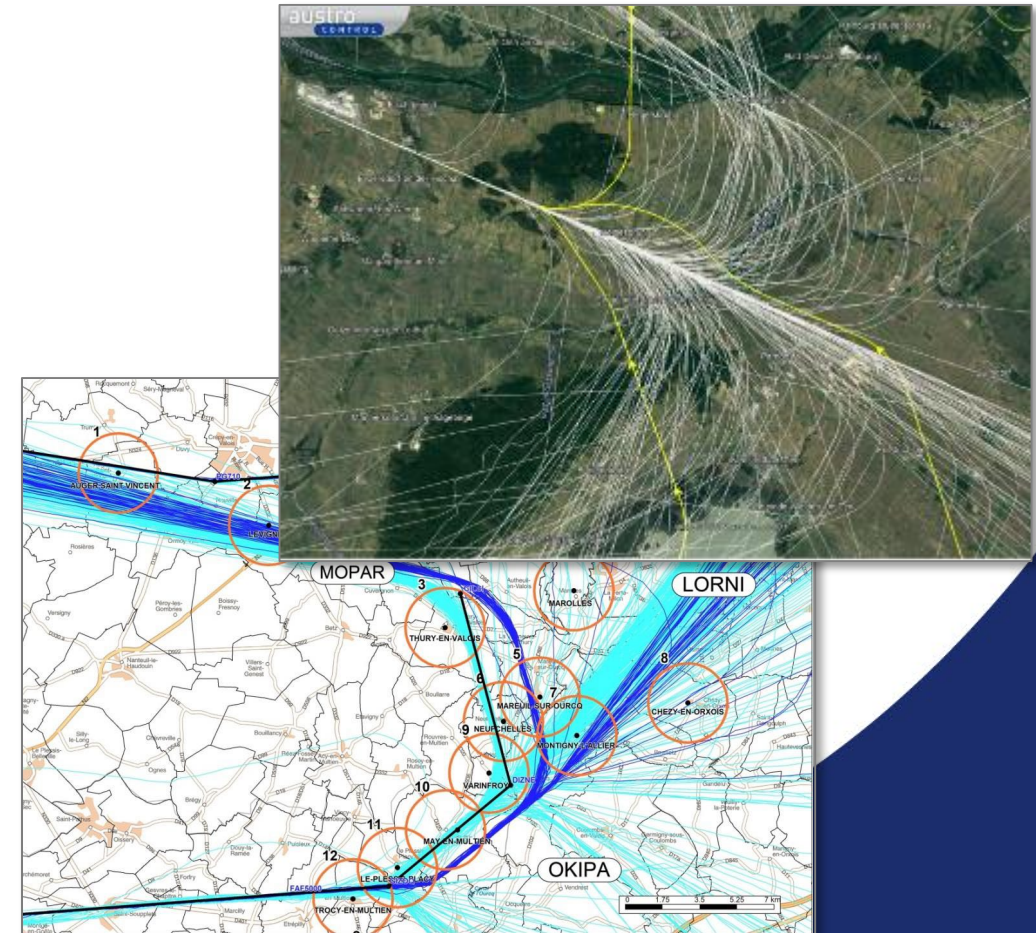
- Reduction of fuel and emissions from reduced track miles and improved flight efficiency
- Minimize noise exposure and avoid noise sensitive areas
- Assess the operational efficiency/capacity of this procedure

### *At Vienna Airport*

- PBN to ILS Procedure for RWY 29 published in the AIP
  - Active H24 for all traffic (rwy used in off-peak periods or on request)
  - All flights following the new procedure are considered “demo flights”
- Curved Procedures (radius-to-fix) enabled by RNP to the interception of the final approach (ILS CATII/III or LOC)

### *At Paris-CDG Airport*

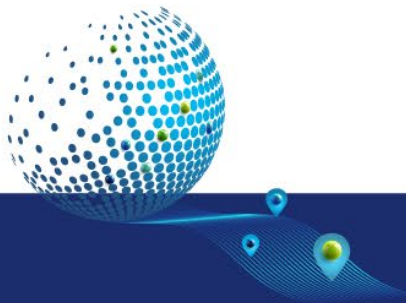
- evaluation of the north-facing west-facing doublet system, part of the PBN to ILS/RNP project in Paris-Charles-De-Gaulle



## The Local Exercises

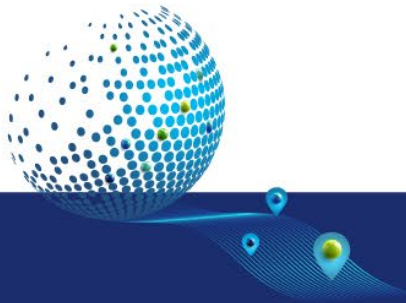
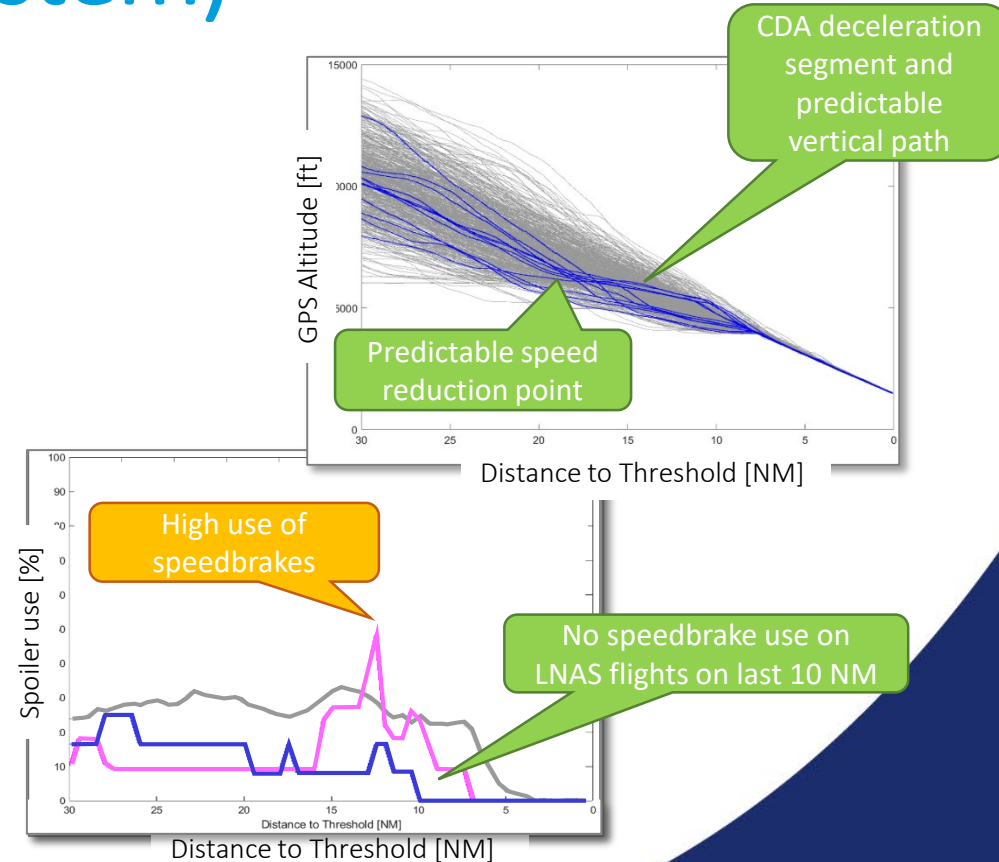
# Taxi Bot

- Draft CONOPS for standard Sustainable Taxiing operations with narrow bodies
- Updated design of the TaxiBot, including relevant subsystems
- Improved training materials and actual training of pilots & tug drivers
- Development and realization of several infrastructural modifications to allow for TaxiBotting operations to and from the Polderbaan
- Operational showcase on December 6th 2022
- *Savings expected at ground level: 50% - 85%*



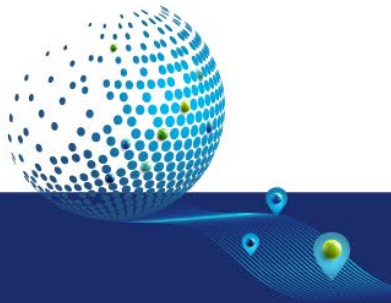
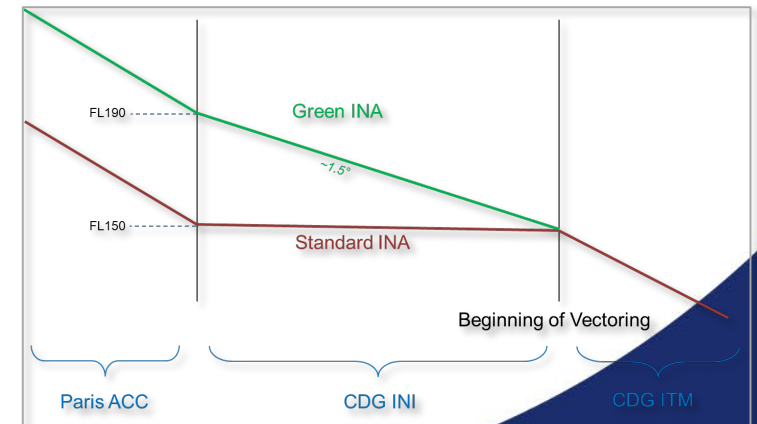
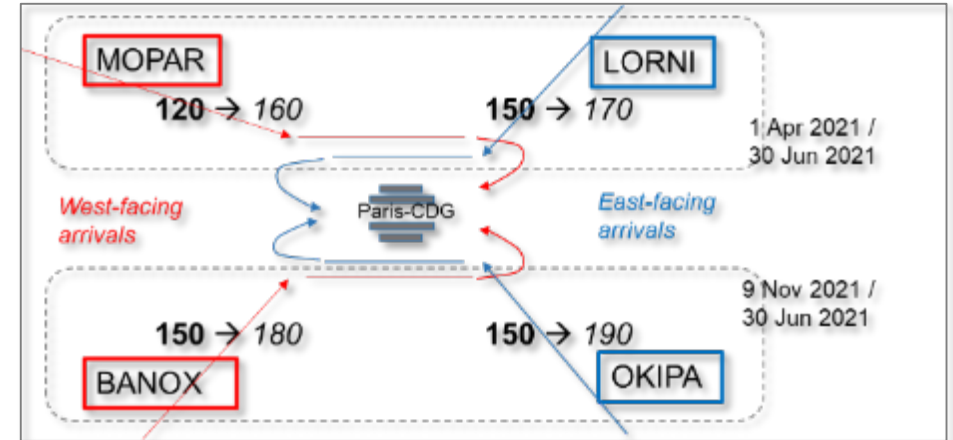
# LNAS (Low Noise Augmentation System)

- Objective: to evaluate the benefits of a closed-path PBN-to-ILS procedure with and without a CDA Energy Management Pilot Assistance System (LNAS) compared to Radar Vectoring to the same runway.
- Flights along the PBN-to-ILS trajectory conducted with vs. without LNAS aircraft energy management support resulted in:
  - Significantly more predictable vertical and airspeed profiles
  - Lower use of speed brakes particularly at low altitudes
  - Lower average thrust settings
  - 6 % fuel and CO2 savings on last 30 NM (compared to Baseline)



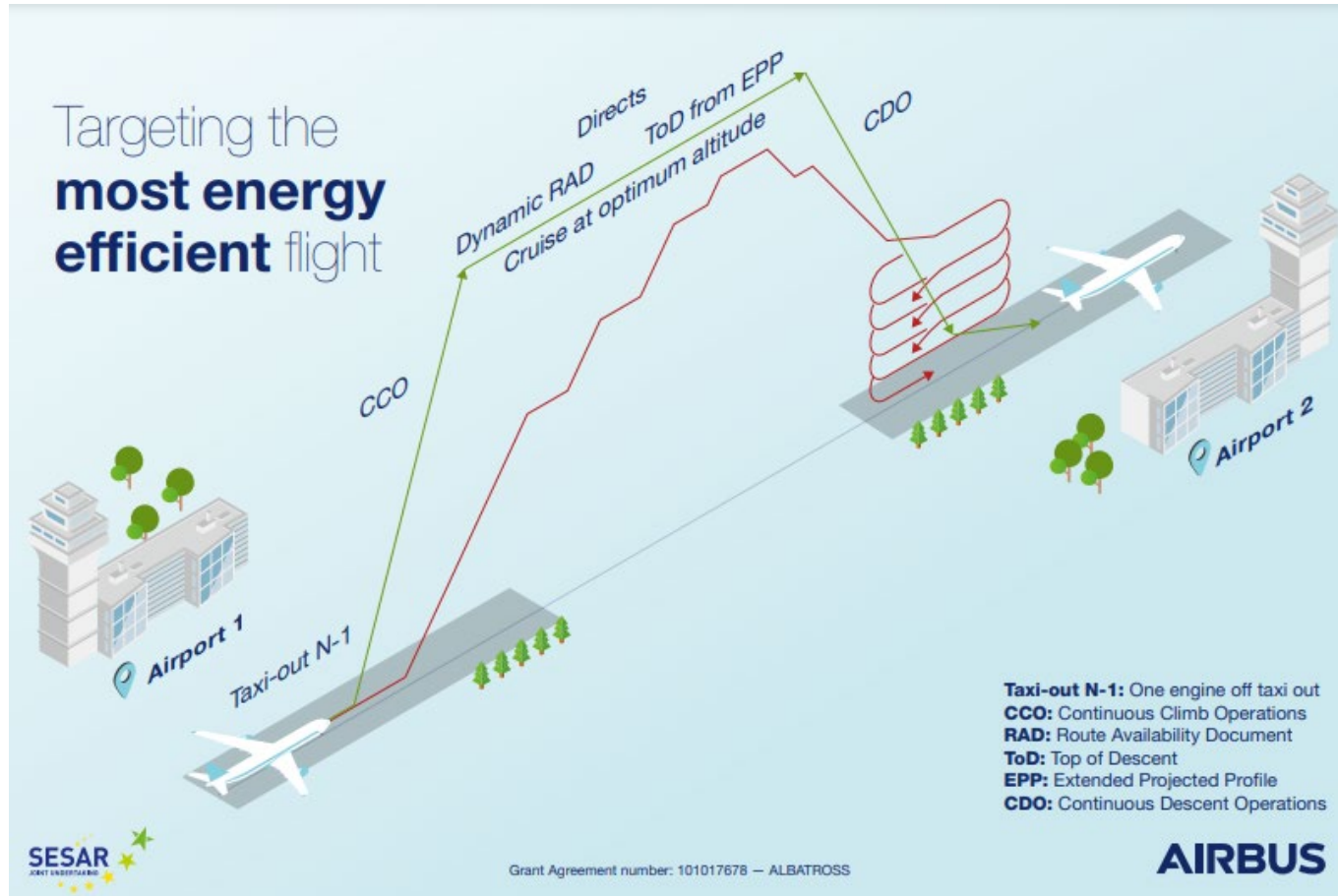
# Optimized Descents on CDG

- Optimized descents in the Paris area, in specific traffic conditions
- Improved coordination between control centers allows to "relaxed" certain interfaces : "altitudes at the IAFs raised in low traffic conditions" (~4 hours per day) for the downwind arrivals
- Enables less or shorter level-offs, performed a higher flight levels
- Multiple rounds of trials resulted in **semi-permanent activation** via an AIP-SUP (permanent publication may follow soon)
- *Between 50kg and 150kg of fuel saved per approach (Depending on the aircraft type)*
- *Number of improved flights estimated at more than 5 000*





# The “Gate to Gate” approach



## Identification of City Pairs

Aircraft Operators, Airport Authorities, ATM service providers confirm availability NM's and military support

## Calculation of Optimum Flights

## Identification of ATM constraints

RAD restrictions (level-cap), Military Areas, Ground or TMA operations, ATFM measures, ATC instructions, Airspace Design, LoA's, Route Charges

## Solutions towards the Optimum Flight

RNP, xBAS, ADS-C, air-ground information exchange, data analytics tools, etc.

## Finalization of the preparatory phase

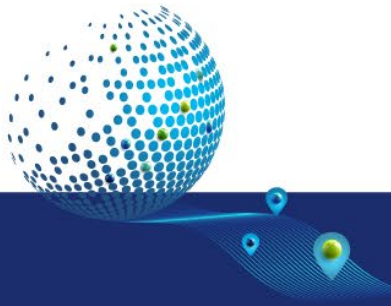
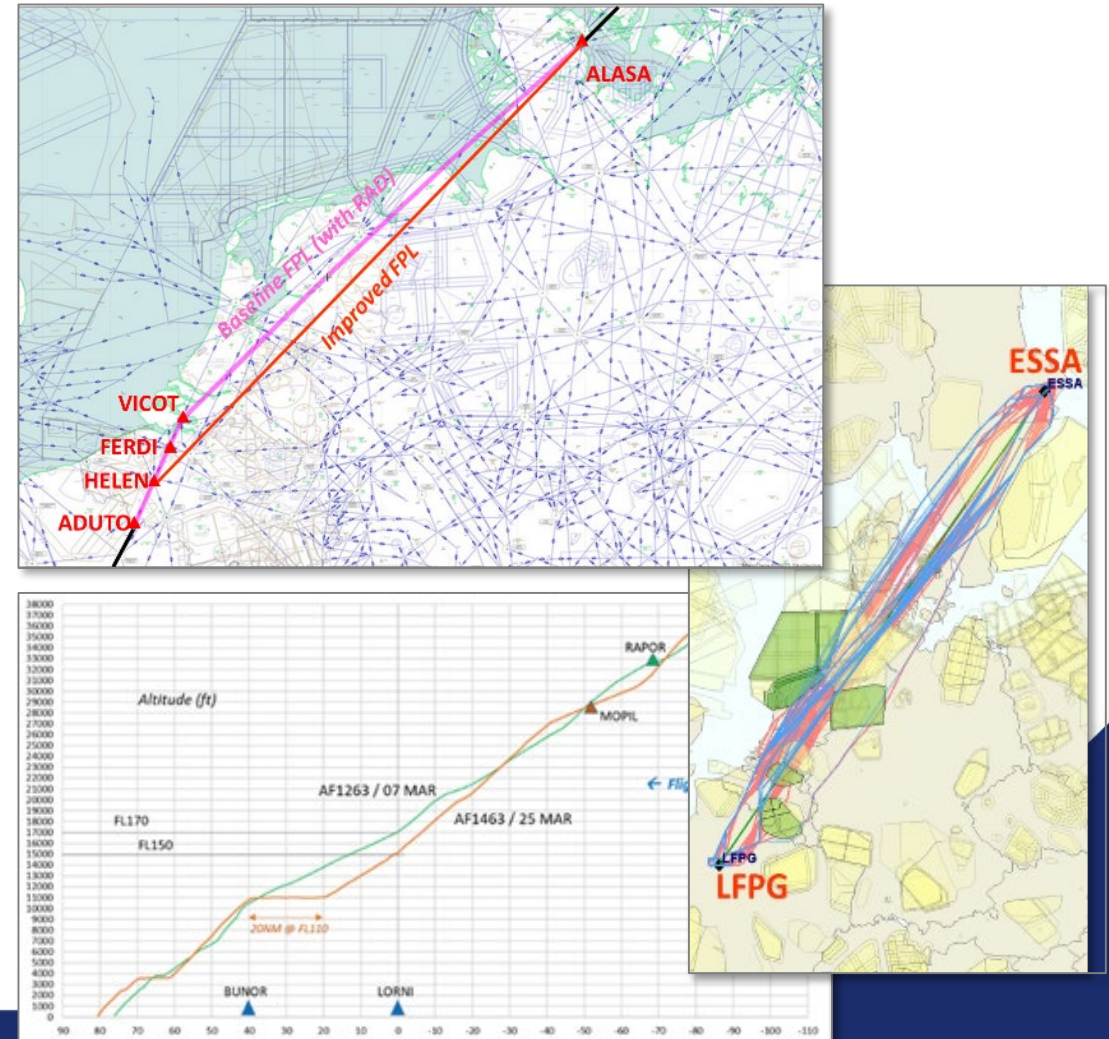
Operational Instructions, safety assessments, trainings, publications (NOP, AIS, Bulletins)

## Trials Planning & Execution

## The “Gate to Gate”

# Stockholm (and Vienna, Zürich) G2G

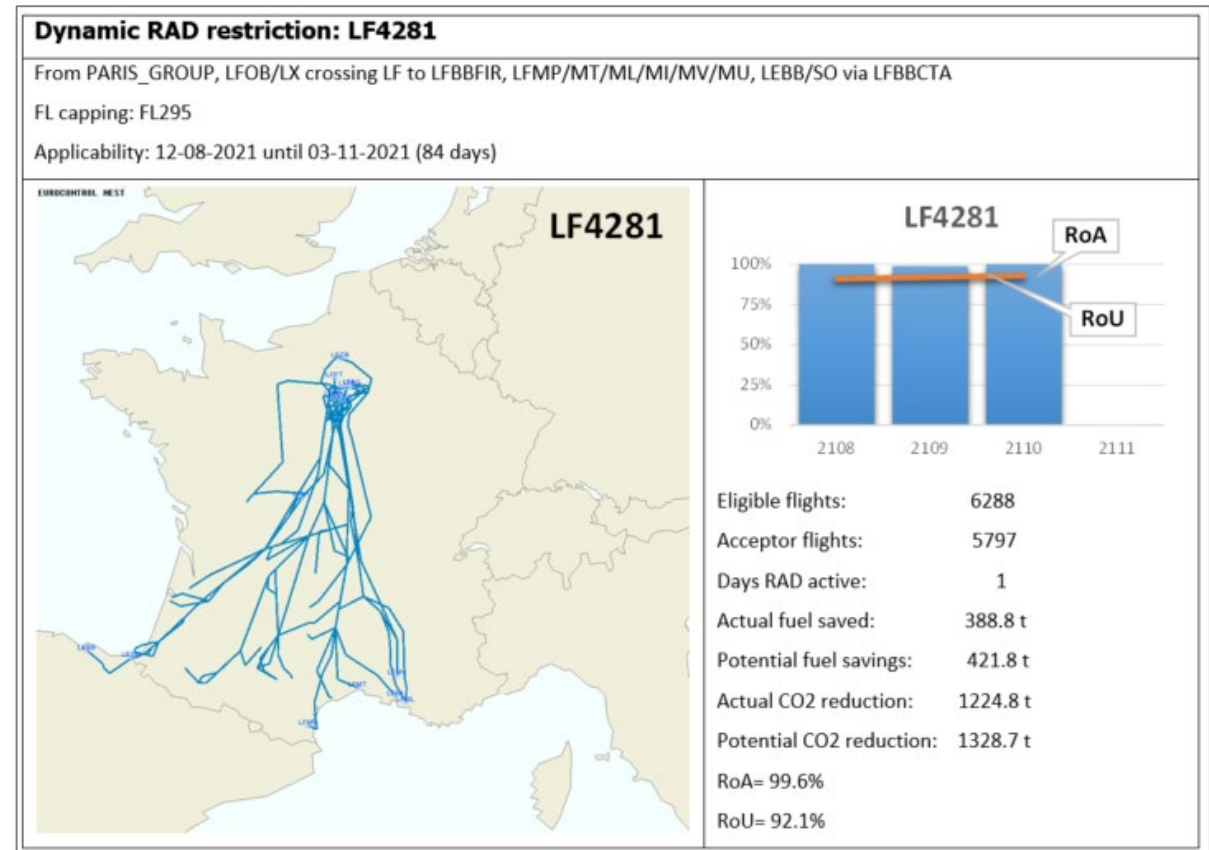
- Sorted by the coverage available to facilitate CDM process required to apply the G2G Methodology
- MUAC to Paris-ACC interface raised to FL310
- MUAC FMP identified greener trajectories and sent the re-route proposal (RRP) to the AOs
- MUAC offered to alleviate the mandatory waypoint VICOT, allowing an earlier turn to the north-east at FERDI.
- DSNAs allowed, under specific circumstances, a less constraining altitude (FL170 instead of FL150) on the IAF point "LORNI"
- The flights took advantage of the FRA in Swedish Airspace



## The “Gate to Gate”

# The Dynamic RAD trials

- Purpose: Introduce more flexibility in the management of RAD restrictions
- Promote flight efficiency, avoiding unnecessary traffic constraints in case of sustainable demand
- Freedom of the ANSPs to decide whether to apply the concept and which restrictions could be eligible for a dynamic management
- To measure the potential and actual benefits, two indicators were defined, applicable to each restriction:
  - **Rate of Availability (RoA):** duration of RAD restriction suspension within 24 h. It can be calculated daily or for the AIRAC
  - **Rate of Uptake (RoU):** portion of the eligible flights that have accepted the restriction relaxation according to the FPL information



# Conclusion & Recommendations

- Being a SESAR "Very Largescale Demonstration", the project focused on **concepts having sufficient maturity to quickly become ready** for real operations, and bring immediate benefit.
- The exercises demonstrated the **sustainability of operations on the long term**, and aimed to offer improvements as far as available.
- **Many hundreds of flights took benefits of the ATM improvements** whenever available: the target was not to execute a single special flight, in exceptionally protected conditions.



More than 1000 flights were performed and 5000 Tons of CO2 saved!

