

# Make Green Aviation a reality by 2023.

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# Social & environmental concerns



within an unprecedented crisis for Aviation...

# Environment is a priority

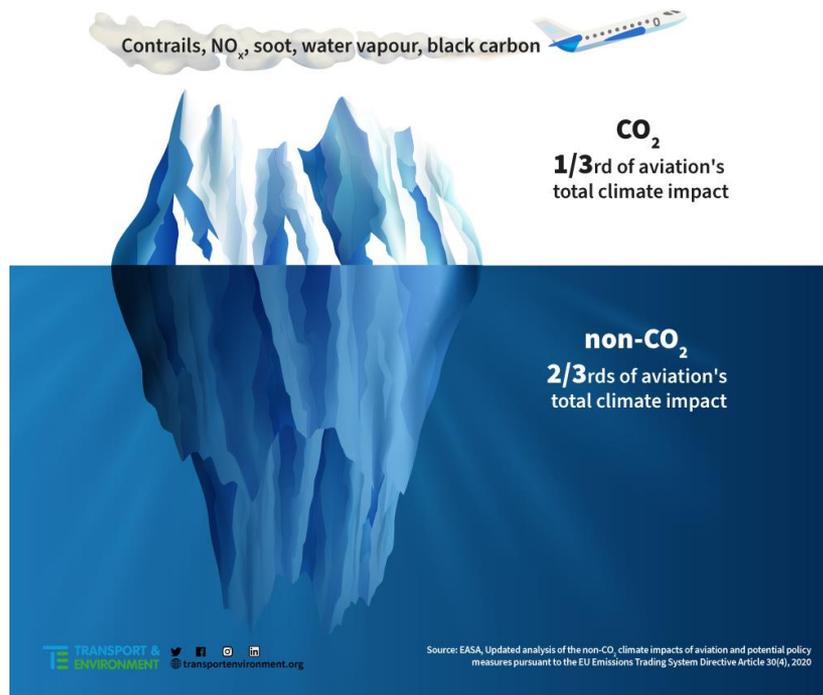


**Vision from the industry :**  
Aviation is “only” responsible for 3% of worldwide CO2 emissions



**Vision from the citizen :**  
One long haul flight can represent up to 15% of her/his yearly carbon footprint

# Non-CO2: the hidden side of aviation's climate impact



**Source:** EASA, updated analysis of the non-CO<sub>2</sub>, climate impacts of aviation and potential policy measures pursuant to the EU Emissions Trading System Directive Article 30(4), 2020

Reducing CO<sub>2</sub> emissions is a first step

Next step includes the reduction of aviation GWP (Global Warming Potential)

# Make Green Aviation a reality by 2023

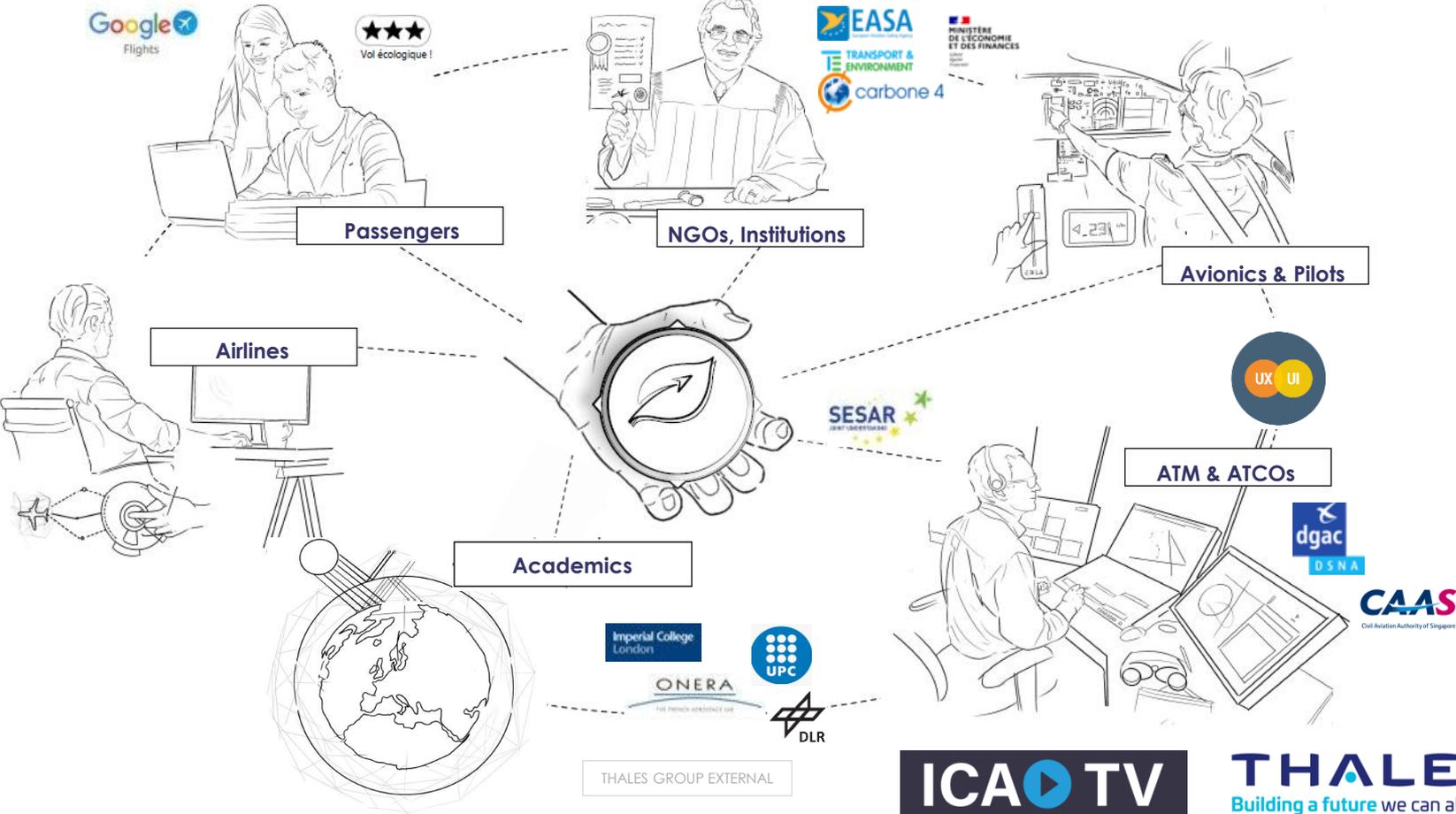
Thales has committed to support a 10% reduction leveraging its expertise on board and on the ground

'Green operations' is the only lever we can activate for short term results

Thales approach: Continuous improvement in using digital technologies & agile methodology through a virtuous cycle

Objective for today:  
Exchange and share with you  
our work performed with some partners

# Engaging all stakeholders



THALES GROUP EXTERNAL



# Environmental Transition of operations is a process, not a product

1. Permanently evaluate the environmental footprint of each actor



3. Experiment locally to assess benefits



4. Large scale deployment if viable



2. Explore new ground / flight optimisation strategies

Exploring with **local ecosystems** (ANSP, airlines...)  
how to develop **innovative approaches** to implement these savings **fast**

# Permanently evaluate the environmental footprint of each actor

## A Single Source of Truth for Whole Civil aviation Community

- Shall allow not only to **measure** but also to **simulate** the impact of any new strategy
- Shall allow assessing **any type of climate impact** (*CO<sub>2</sub> to start*)
- Shall support **all stakeholders**: airlines, ANSP, OEMs, governments, NGO, researchers...
- Shall be **independent** from social, business and moral considerations
- Shall be independent of the **aircraft technologies** (H<sub>2</sub>, electric...)
- Shall be **applicable to all**

## Based on Scientific Evidence, the Most Relevant Measure Is...

- A measure of the **CO<sub>2</sub>**  
*(that could then be extended to eqCO<sub>2</sub>/GWP<sub>100</sub>)*
- On **any segment** of any flight  
*(so that it could then be aggregated by flight, by geographic area, by control area)*

Ongoing **discussion with EASA & research institutes**  
about how to “certify” the relevance of this measure

Environment efficiency of a flight plan change, of a flight, of a fleet

Airline-related KPI

A single source of truth

PAX-related KPI

ANSP-related KPI

Environment efficiency of PAX behavior *(comparing different travel options...)*

Environment efficiency over a sector, a control area, a country...

## Starting with a non-collaborative assessment (“better than nothing”)

Not relying on any proprietary data  
ADS-B trajectory / radar plots + weather

## Improving data collection as stakeholders start participating

Airlines: QAR, operational data  
OEM: aircraft models

## Develop dedicated onboard sensors (“GreenBox”)

Collect emission data  
Monitor non-CO2 effects (eg. contrails creation)

Key is to implement this Single Source of Truth  
ASAP and then to improve it over time



HELLO & WELCOME TO

# Flights Footprint

THALES

CO2 GWP 100 Variation



25%

*Edinburgh-London*

**13.8** ktons CO2

Mean CO2 GWP100 Per Flight  
*Edinburgh-London*

**26.6** ktons CO2eq

Mean Total GWP100 Per Flight  
*Edinburgh-London*

Total GWP 100 Variation



42%

*Edinburgh-London*



AF1461 - 12/18/2019

LFBO TOULOUSE → LFST STRASSBOURG

38.11 € Eq CO2 GWP20	13.95 € Eq CO2 GWP100	6.03 € CO2	1.97 nK Climate Change Functions
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**Weather Layers**

Wind

Contours

Legend

0.9 1 1.1 1.2

Winds

AF1461 - 12/18/2019

LFBO TOULOUSE → LFST STRASSBOURG

<b>38.11 €</b> Eq CO2 GWP20	<b>13.95 €</b> Eq CO2 GWP100	<b>6.03 €</b> CO2	<b>1.97 nK</b> Climate Change Functions
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 Weather Layers ^

Wind

Legend



# Join the Flights Footprint community!

## #FlightsFootprint

- A prototype system developed by **Thales**
- Based on the latest **research results**  
*(DLR aCCF, TU-Delft OpenAP...)*
- Available **freely** to the community  
*(researchers, industrial partners...)*

## Available freely to the community

- **Early Bird Program** (limited seats)
- Available in **April 2021**

Engage with our experts:

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HELLO & WELCOME TO  
**Flights Footprint**

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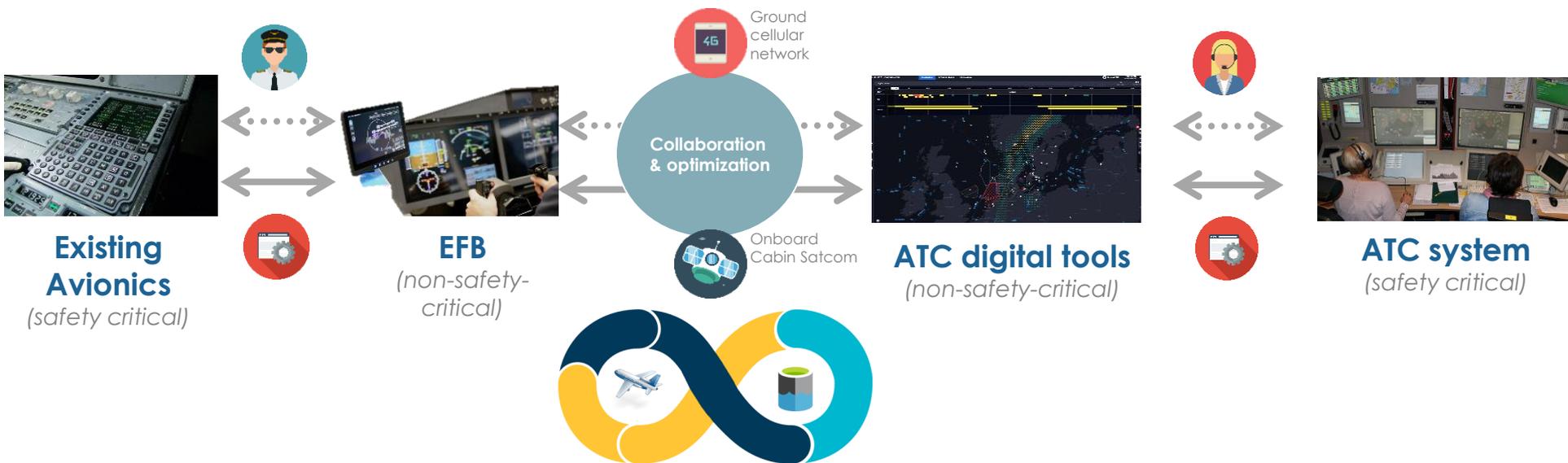


GET STARTED!



## 2 Act fast through new strategies and concepts

MERGING KNOWLEDGE AND INTENTIONS FROM DIFFERENT PERSPECTIVES THANKS TO AN ENHANCED COLLABORATION



Using digital tools allows to ease **experiment & deployment** to **existing** aircraft and control centers



# New Optimization Strategies

1

Continuously identify and enable green opportunities from different perspectives: airspace, flows, flight

2

From optimization at flight/aircraft level to traffic optimization

3

Start small, think scalable to enable green procedure also during peak hours

4

Pragmatic enough to make trade-off

5

Reach a tangible & significant reduction of the climate impact of the traffic

1

### Green optimisation whenever possible

An ATC centre defines 4D blocks declared as Green Flag in which ATC is available to implement green procedures in collaboration with the pilot

2

### A change of mindset

Green becomes a priority aside with safety

3

### Increase usage of known green procedures & facilitate new ones

Leverage new technologies to provide an array of green procedures & associated tools

4

### Reconciliate local optimisation of a flight with global optimisation of flights within a given airspace

5

### Green Flag as a concept is deployable worldwide





The Green Flag is defined and published

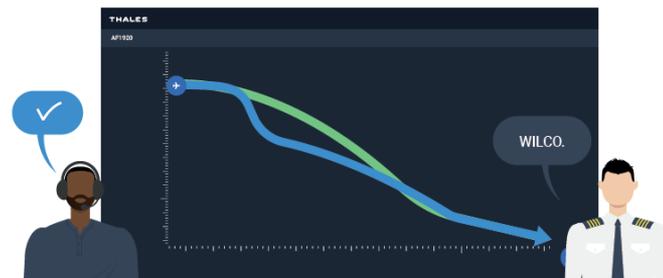
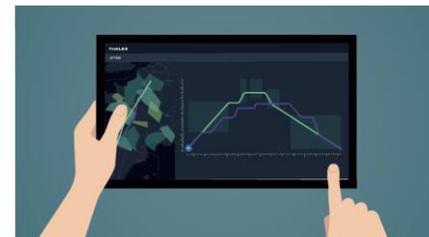


During Green Flag the pilot may request an alteration of his trajectory for environmental performance

H -2



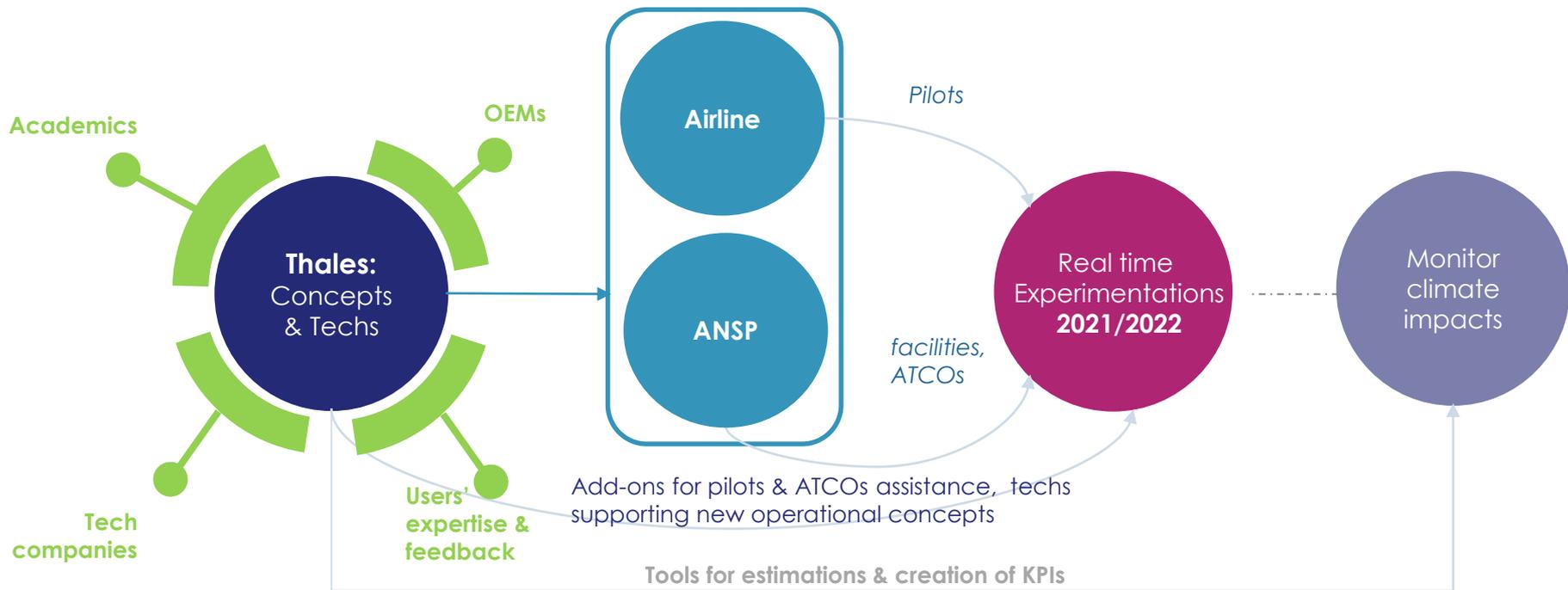
Before his flight, the pilot compares the filed flight plan with the green optimized trajectory and may share portions of it with ATC



The optimized descent profile is sent to ATC who accommodates the green request and proposes an optimised trajectory compatible with the traffic

# 3 Experiment locally to assess benefits

## Experiment eco-friendly operations



1

The final objective is the **sustainability of aviation** and the reduction of its impact on climate and environment

2

Start local and in favorable operational context allows to assess on real traffic **operational & technical impact** of a concept and prepare for its full deployment

3

Grow wider through experimentations at regional/continental level to ensure **interoperability** and **seamless operations**

4

Finally present to **ICAO members** the outcomes of those experimentations in order to set up new standards supporting **green aviation at global level**

Thank you for your attention !

# Questions & Answers

Join us:



ThalesAerospace



@ThalesAerospace

Engage with our experts:

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Better  
Skies  
Together