



Non-CO₂ – an airline's role, responsibilities and needs in the aviation ecosystem





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Our non-CO₂ impact

Why we are taking action

Operate 800 flights/day

Network concentrated around contrail hotspots (EUR, North-America)

Initial analysis suggests ~5% flights responsible for ~80% climate impact

Our geographic ecosystem

Critical public in NL – permission space limited

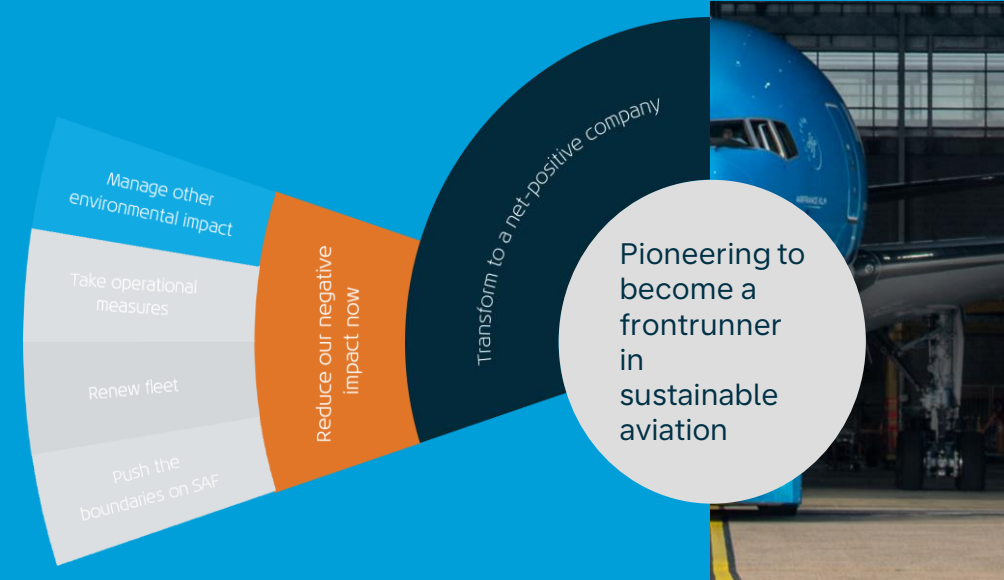
Political ecosystem

- NL National Policy Approach (Q1 2023)
- EU MRV obligation

Our KLM strategy

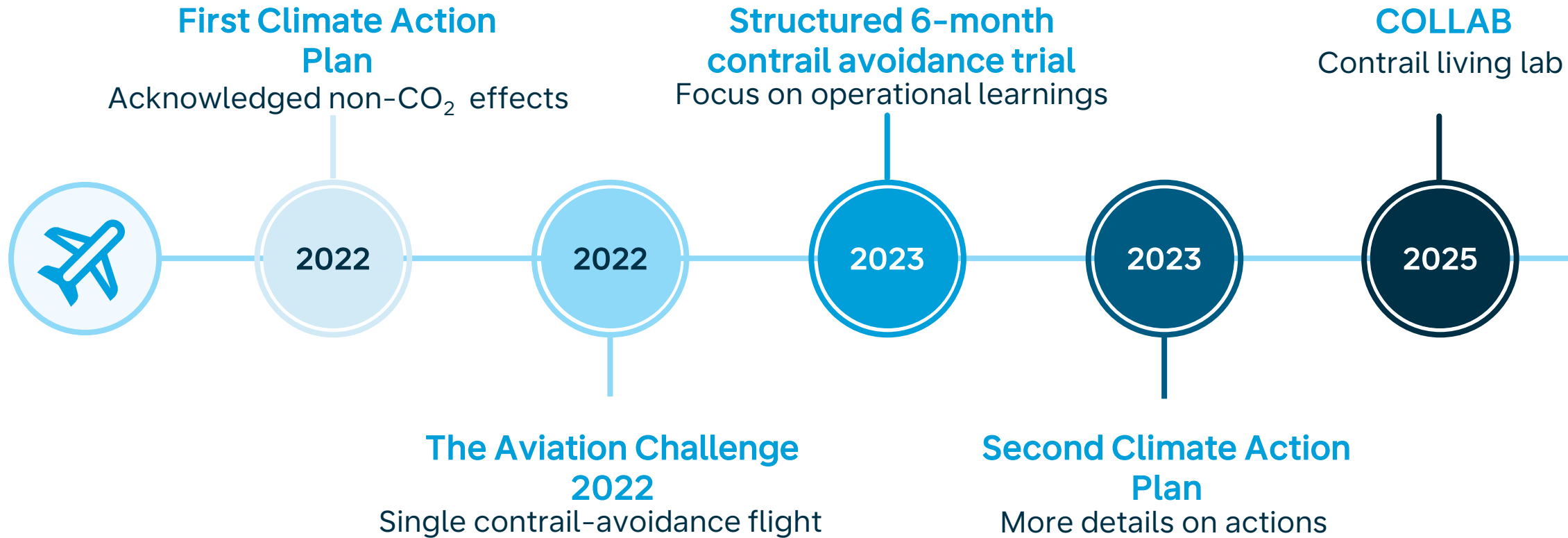
Identity to pioneer, also in field of sustainability

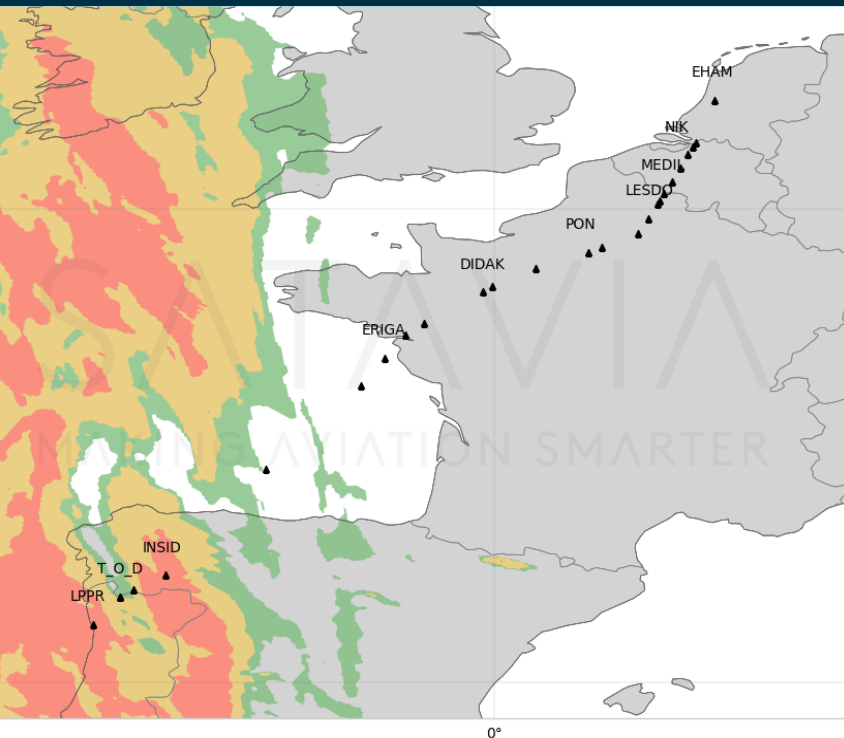
Non-CO₂ effects not currently part of our SBTi goal, but considered in our strategy



Our timeline

What we have done & where we are going





ISSR forecast

KL1713 AMS-OPO

Contrail forecast at different FL

Vertical profile

Planned descent would have crossed contrail forming region

Continuous descent approach to avoid

Cockpit observation

Flight in front flew initial planned approach resulting in “counterfactual” contrail observation

6-month trial

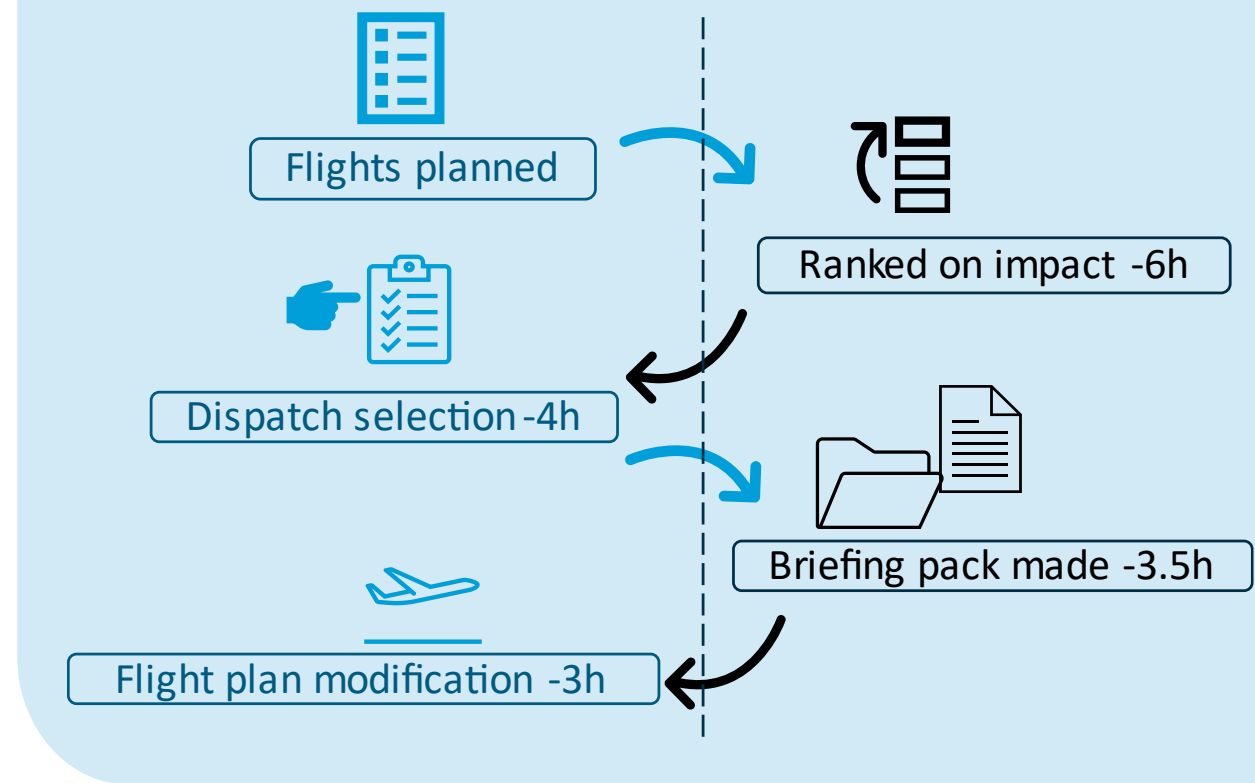
Focus on operation, not result

Feb – Sept 2023 – 1 day per week EUR

Project goals

- Insight in process flow
- Workload for Dispatch
- Cockpit crew engagement
- Operational constraints
- Insights in training & communication requirements

Please specify: Vertical profile; Flightplan was filed at FL310 because optimal FL330 was not available according dispatch. At FL310 there was much more CO2-emission. So we decided to ask for FL350. This request was granted. But also early descents were issued, so we had to penetrate the contrail-area. Visually checking other aircraft at FL310-350 we saw no contrails at all in the area. So I guess the prediction model is not always accurate. Horizontal profile was followed to the best of my knowledge.



Results

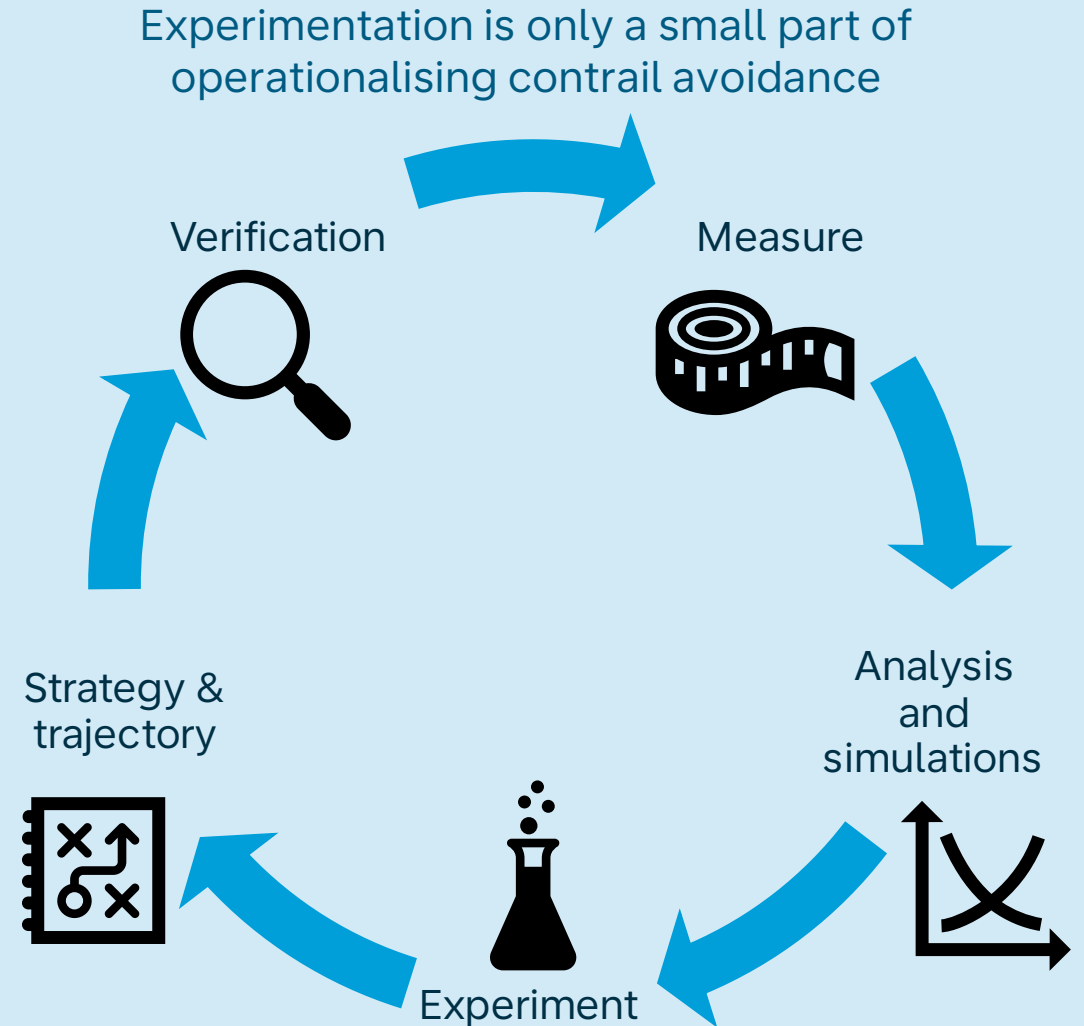
Over 14,000 flights were in scope, but actual mitigation extent depended on a lot of factors:

- Phase of mitigation – climb & descent vs cruise
- Trajectory different on the day than planned
- Some days are big hitters
- ATC restrictions, strikes, military exercises
- Dispatch & pilot modifications

Key learnings

Big gap between theory & practice

- Automation is needed to keep workload for Dispatch manageable
 - Integrated Flight Planning tools with accurate computation of CO₂/non-CO₂ climate impact
- Validation of action is key
- Ideal process is avoidance planned prior to flight by OCC, limited tactical changes
- Cockpit crew communication is key & their feedback is very valuable
- Contrail risk areas that could not be avoided require changes to fuel



What we need from you

Clarity on the “rules of the game”

One clear
metric

ATC

Weather

Validation

What we need from you

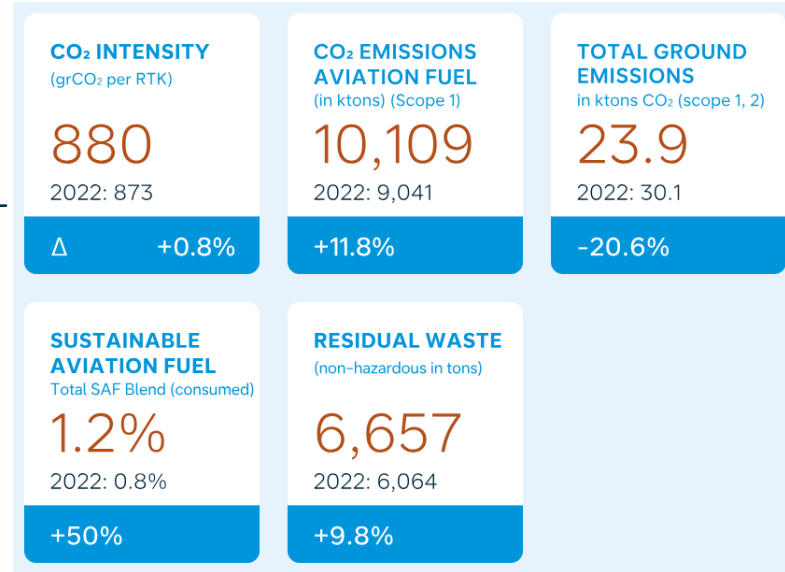
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One clear metric

Transparency & decision-making in operation

Reporting non-CO₂ effects in multiple units/time horizons is:

1. confusing for customers
2. complicates operational decision-making on whether avoidance is “worth it”



This is a political choice airlines cannot make themselves



15:20
AMS

Direct
7h30

16:50
YUL

[Details](#)

Average CO₂ emissions for direct flights in Economy Class: 392 kg. ⓘ

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Multiple requests in saturated airspace

Rules on who gets to change flight level

Should airlines be penalised if they want to avoid contrails but cannot?

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Weather

Forecasts aren’t perfect

Predictions can be wrong, avoid a non-existent contrail or generate one on alternate route
How should airlines take into account forecast inaccuracies?

Could harm airline willingness to try given public scrutiny

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Validation

Validation vs verification

Ground-based, in flight or satellite-based validation to calculate whether our action was worth it

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• Thank you
for your attention