EASA
European Union Aviation Safety Agency

Aviation and Climate Change

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EUROPEAN UNION

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Promoting sustainable aviation.
Your safety is our mission.

An Agency of the European Union

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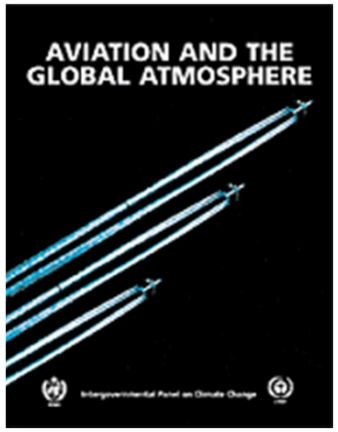
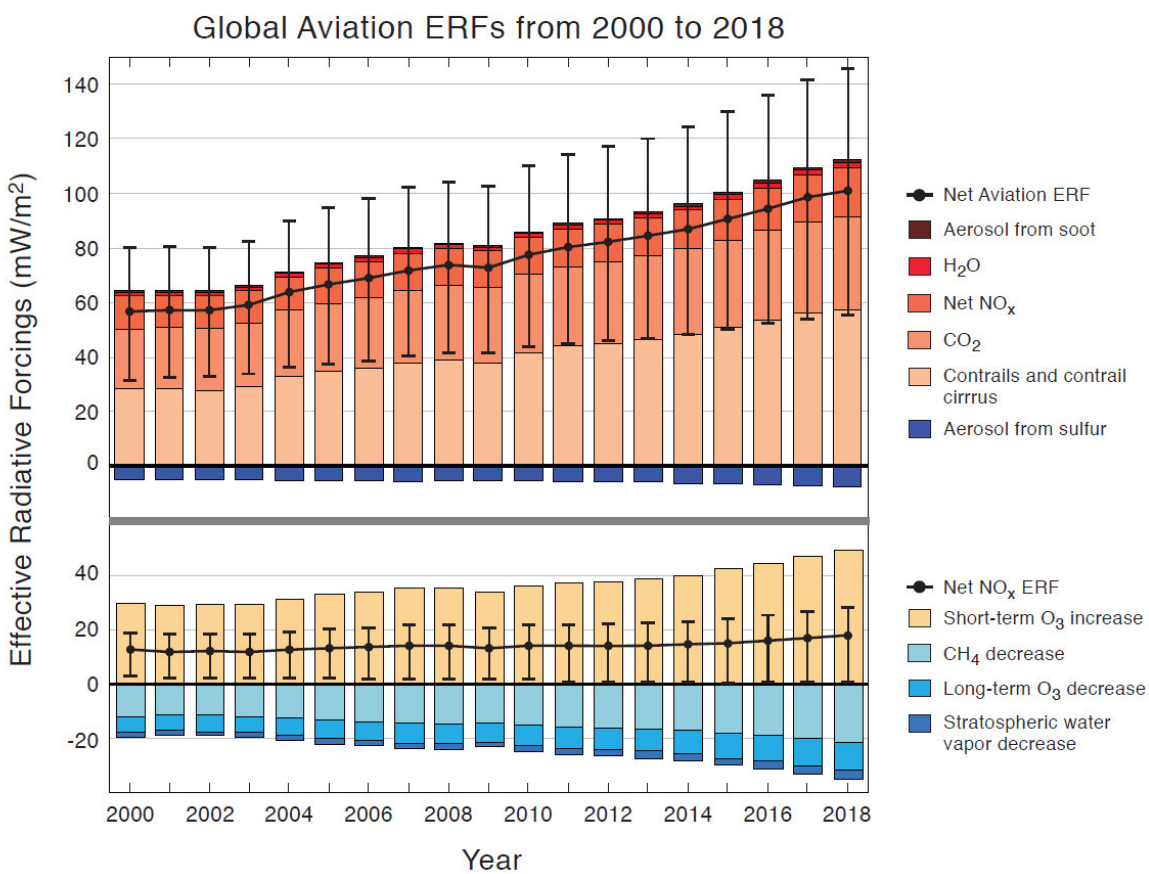
1) Aviation's climate impact

Aviation's Impact on Climate

- According to ICAO, aviation (domestic and international) accounts for approximately **2 % of global CO_2** emissions produced by human activity
- Some recent studies have shown that aviation contributed approximately **4%** to observed human-induced **global warming** to date
- In the EU, aviation was accountable for **5.2%** of the total EU28 greenhouse gas emissions and for 18.3% of the emissions from transport (in 2019)



Non-CO_2 Climate Impact of Aviation



- In addition to CO_2, aviation activities produce non-CO_2 emissions (**oxides of nitrogen** (NO_X), **soot particles**, **oxidised sulphur species** (SO_2, H_2SO_4) and **water vapour**)
- Net climate impact is increasing over time
- Uncertainties remain on the understanding of climate impact from non-CO_2 emissions

Aviation's Impact on Climate

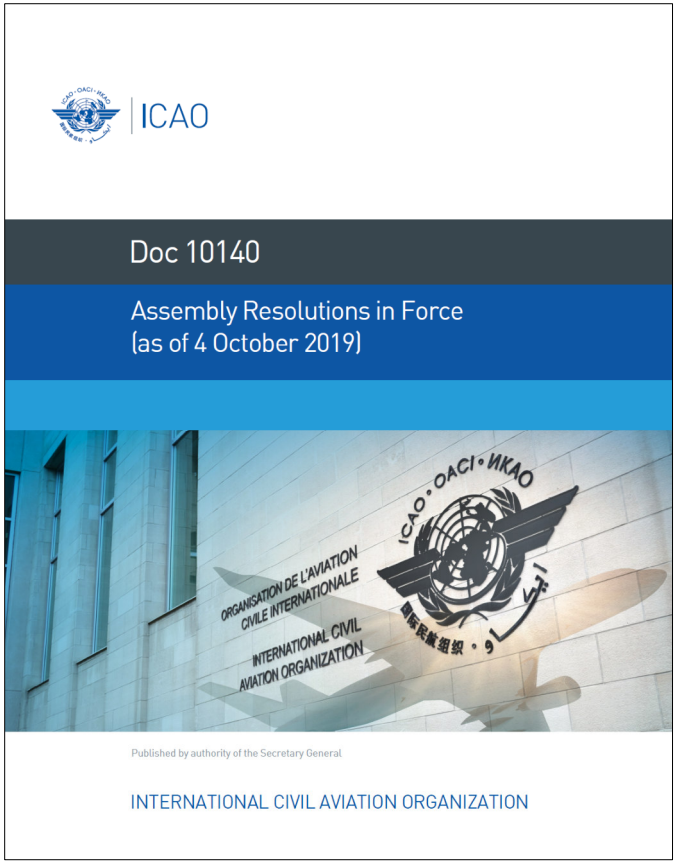
"If aviation only accounts for 2% of the total CO_2 emissions, why are we talking so much about this"?

- → If left unaddressed, aviation emissions are expected to double or triple by 2050, potentially consuming a significant portion of the global carbon budget under the Paris Agreement goals
- → Emissions from flying can contribute a major part of individual's annual emissions and "individual carbon budget"
- → All sectors will need to contribute in achieving Paris Agreement targets

2) Existing policies to address aviation's climate impact

ICAO's Environmental Policy

- ICAO has adopted three major environmental goals:
  - To limit or reduce the number of people affected by significant **aircraft noise**
  - To limit or reduce the impact of aviation emissions on **local air quality**, and
  - To limit or reduce the impact of aviation **greenhouse gas emissions on the global climate**

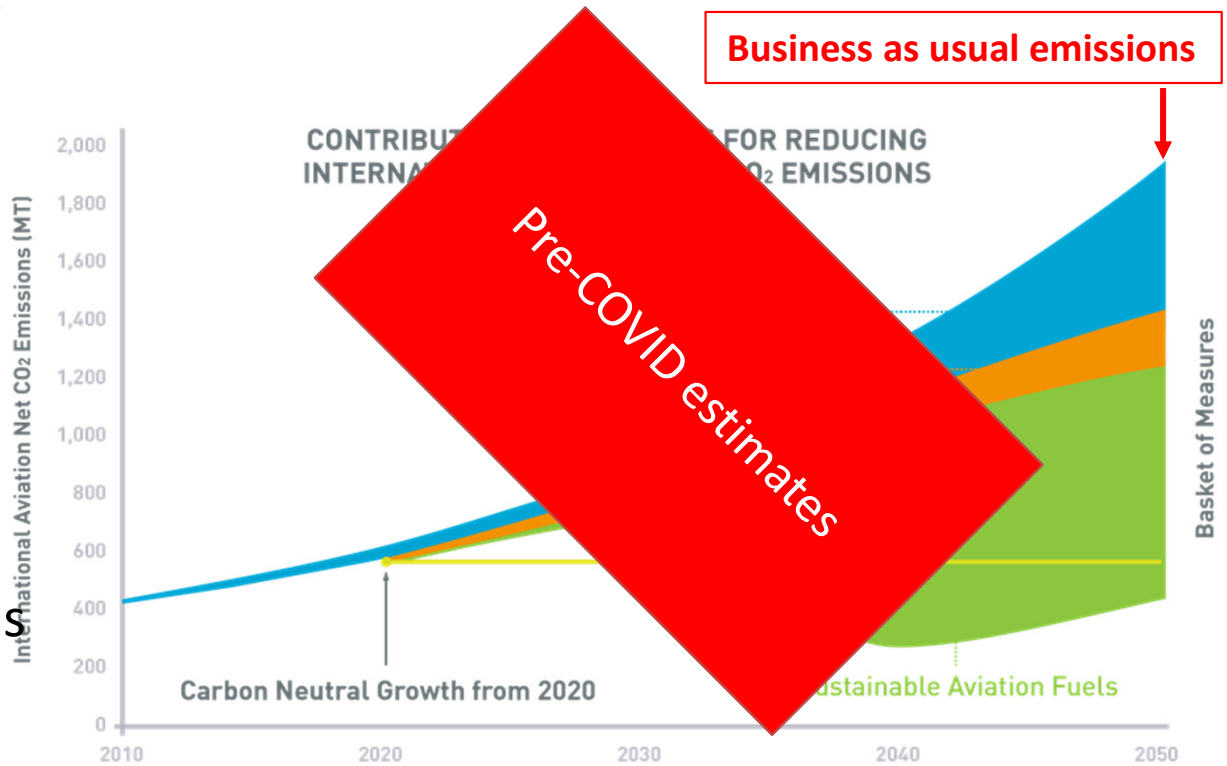


ICAO Global Aspirational Goals

- ICAO has adopted two global aspirational goals on climate change:
  - Global annual average **fuel efficiency improvement of 2 per cent** until 2050
  - Medium-term global aspirational goal of keeping the **global net carbon emissions from international aviation from 2020 at the same level**

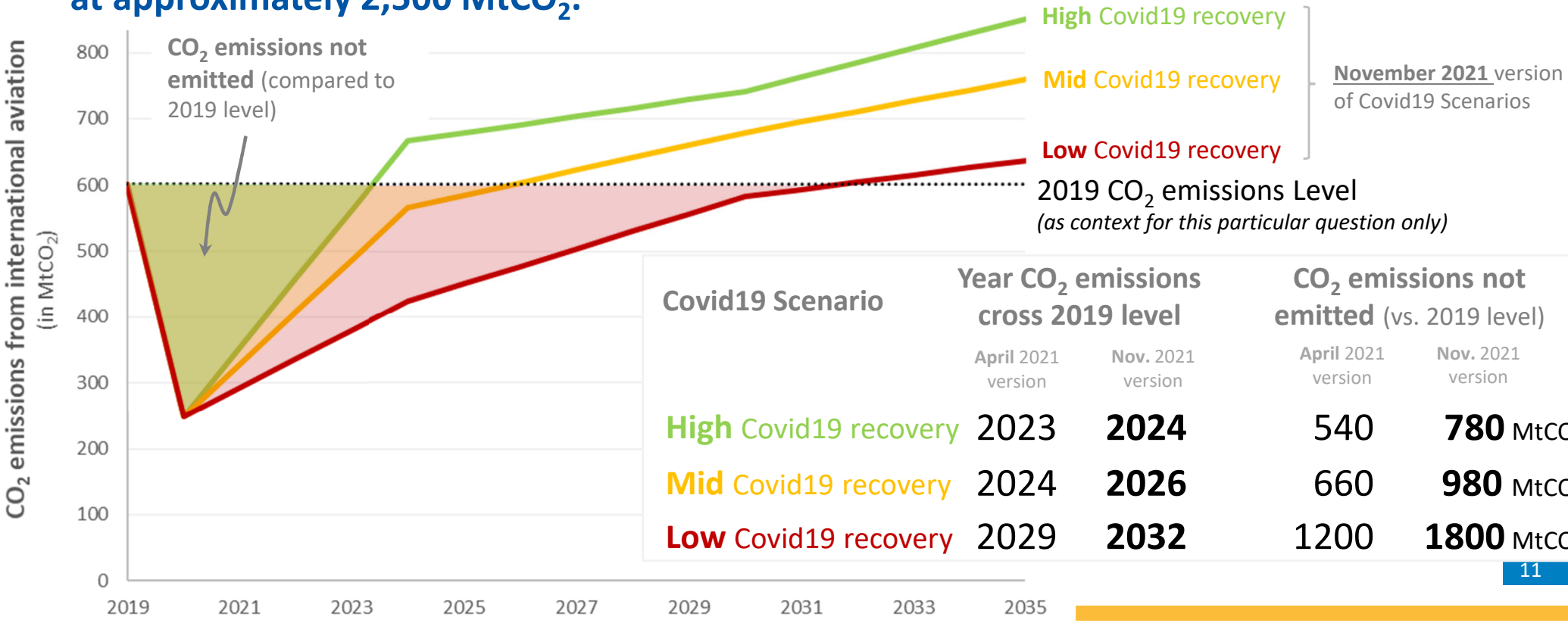
“Basket of Measures” to Achieve Global Aspirational Goals

- “Basket of Measures” includes:
  - Improvements in aircraft technology
  - Operational improvements
  - Sustainable Aviation Fuels
  - Market-based Measures (CORSIA)



COVID-19 Impact on CO_2 Emissions

- **Based on the interim updated scenarios, CO_2 emissions not emitted compared to a 2019 level could range from 780 to 1800 $MtCO_2$ depending on the rate of recovery.**
- **For context, in 2016 (pre-Covid19) offsetting requirements from 2021-2035 were estimated at approximately 2,500 $MtCO_2$.**



Covid19 Scenario	Year CO_2 emissions cross 2019 level		CO_2 emissions not emitted (vs. 2019 level)	
	April 2021 version	Nov. 2021 version	April 2021 version	Nov. 2021 version
High Covid19 recovery	2023	**2024**	540	**780** $MtCO_2$
Mid Covid19 recovery	2024	**2026**	660	**980** $MtCO_2$
Low Covid19 recovery	2029	**2032**	1200	**1800** $MtCO_2$

“Basket of Measures” to Achieve Global Aspirational Goals

- Improvements in aircraft technology
  - Aircraft CO_2 standard (ICAO Annex 16, Volume III)
  - Improved aerodynamics, materials, structures
  - Advanced propulsion systems
- Operational improvements
  - ICAO ASBUs: improvements in horizontal and vertical flight as well as ground efficiency
  - Improved ground and airborne ATM systems
- Sustainable Aviation Fuels
  - Incentivized use of SAF, taking into account life-cycle emissions from SAF feedstocks, production, transportation and use
- Market-based Measures

3) Process towards a long-term aspirational goal

ICAO Work on a Long Term Goal

- In addition the existing goals, work on the feasibility of a **global aspirational long term goal** is ongoing at ICAO towards the 41st General Assembly in September-October 2022

- ICAO's Committee on Aviation Environmental Protection (CAEP) was tasked to gather data, develop combined in-sector scenarios from technology, fuels, and operations based on the data gathering, and to conduct a final analysis of the scenarios to understand those impacts on CO_2 emissions and cost associated with the scenarios

ICAO LTAG Report

- The LTAG Report presents the background, methodologies, results and interpretations of the LTAG feasibility study developed by CAEP

- Report is available on the ICAO webpage: https://www.icao.int/environmental-protection/LTAG/Pages/LTAGreport.aspx

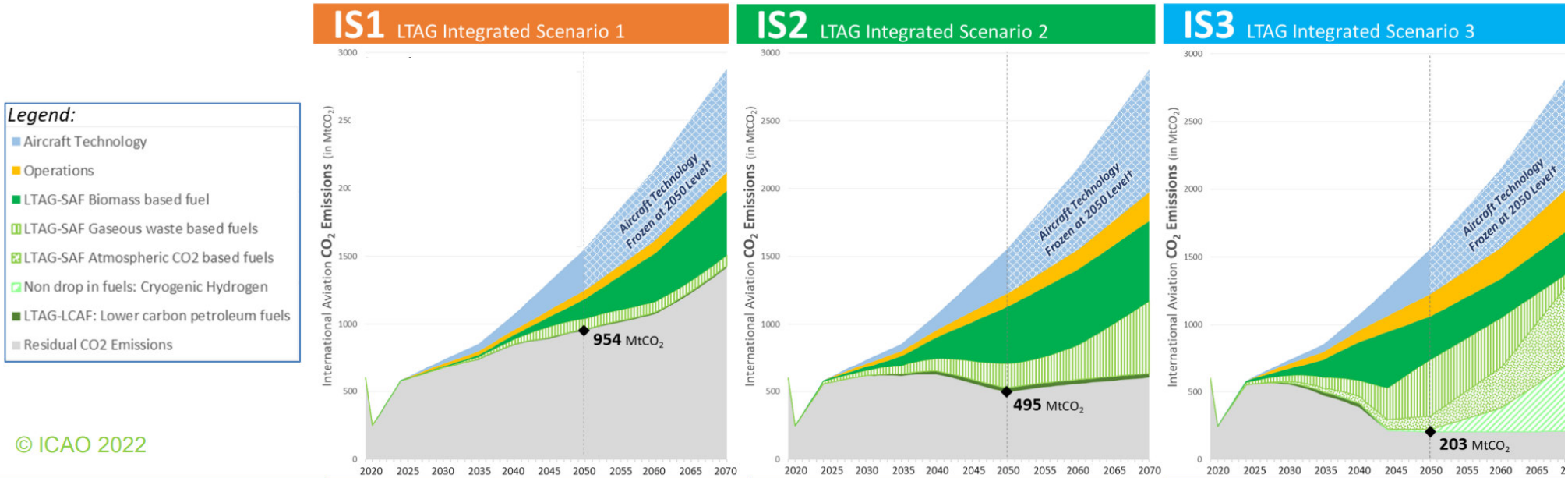
ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT ON THE FEASIBILITY
OF A LONG-TERM ASPIRATIONAL GOAL (LTAG)
FOR INTERNATIONAL CIVIL AVIATION
CO_2 EMISSION REDUCTIONS

ICAO COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION
MARCH/2022

LTAG Scenarios



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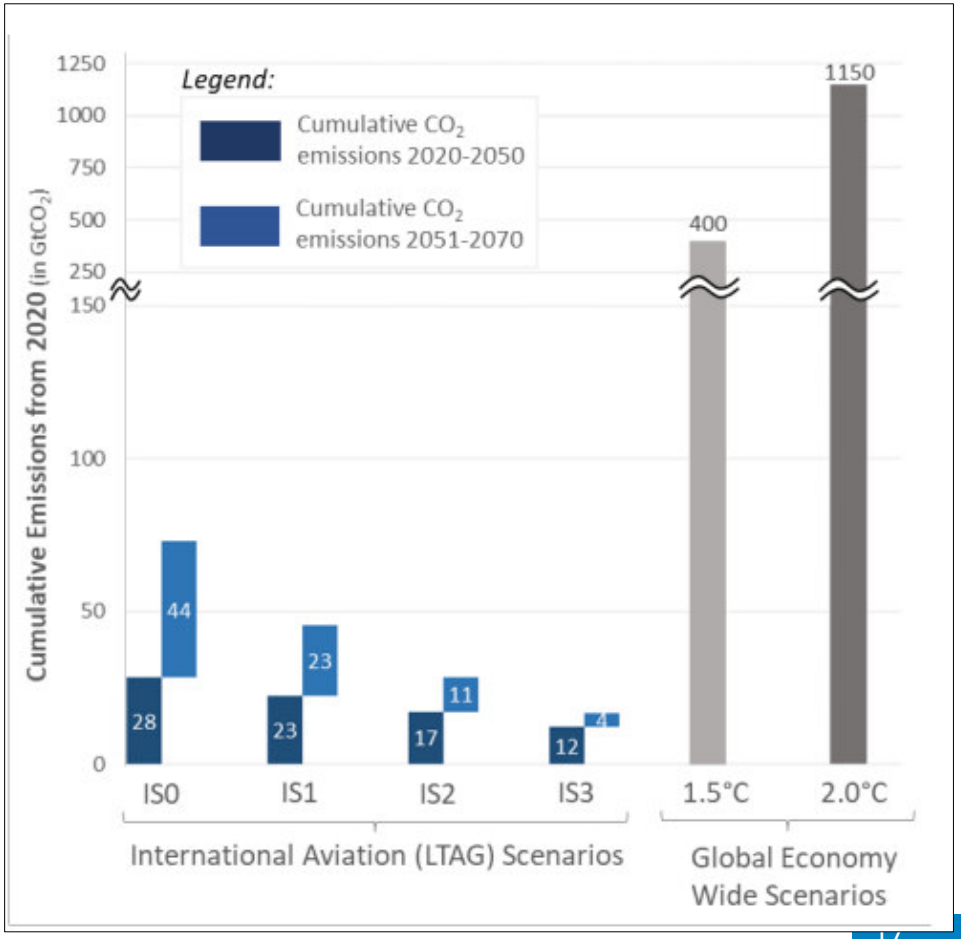
Metrics	IS1	IS2	IS3
CO_2 Emissions in 2050 after Reductions	**≈950 $MtCO_2$** in 2050 *(**160%** of 2019 CO_2 emissions)*	**≈500 $MtCO_2$** in 2050 *(**80%** of 2019 CO_2 emissions)*	**≈200 $MtCO_2$** in 2050 *(**35%** of 2019 CO_2 emissions)*
Reduction in 2050 from the Baseline	**39% total** through: Technologies - 20%, Operations - 4%, Fuels - 15%	**68% total** through: Technologies - 21%, Operations - 6%, Fuels - 41%)	**87% total** through: Technologies - 21%, Operations - 11%, Fuels - 55%
Cumulative residual Emissions from 2020 to 2070	23 $GtCO_2$ (2020 to 2050) 23 $GtCO_2$ (2051 to 2070)	17 $GtCO_2$ (2020 to 2050) 11 $GtCO_2$ (2051 to 2070)	12 $GtCO_2$ (2020 to 2050) 4 $GtCO_2$ (2051 to 2070)

Future International Aviation Emissions in Context

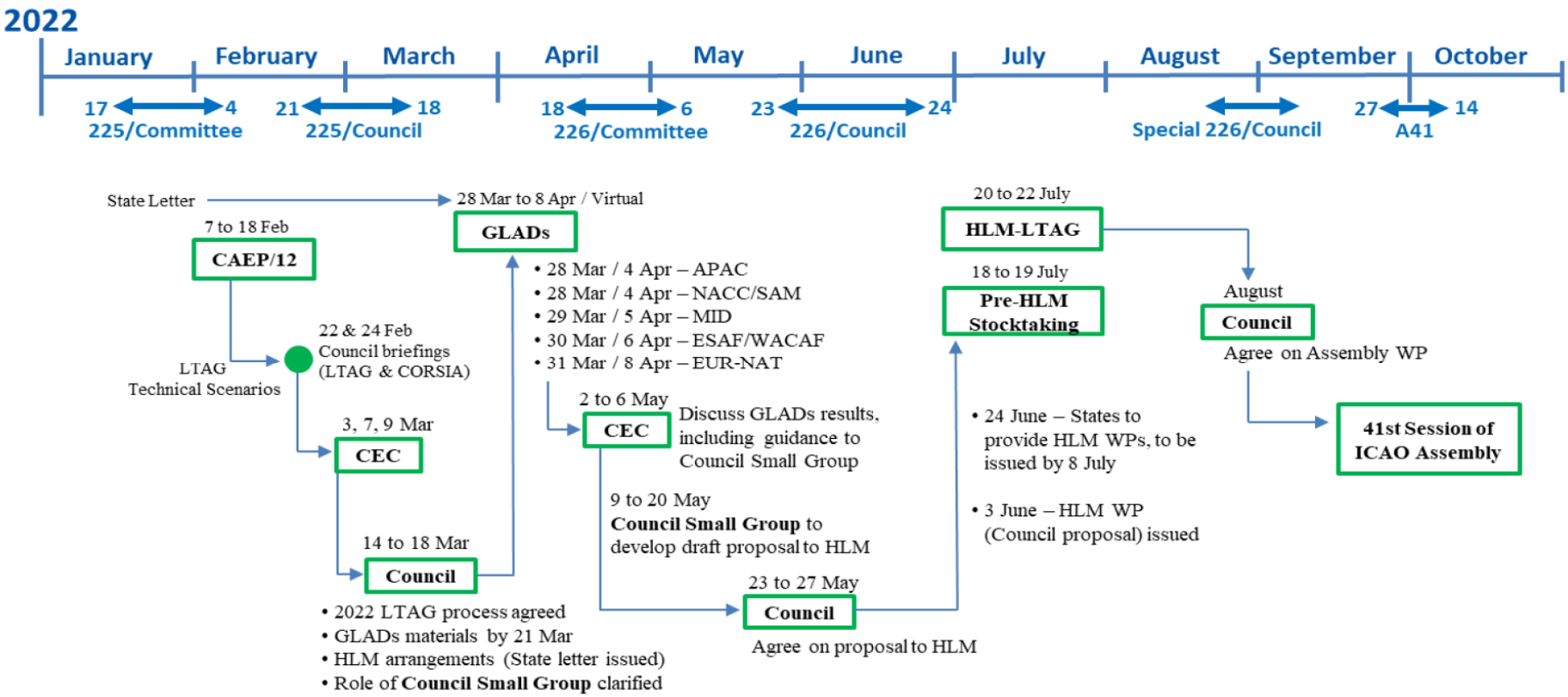
- Scenarios were put into the context of global carbon budgets for limiting global warming to 1.5°C and 2°C
- In 1.5°C scenario, international aviation could represent approximately 4.1 to 11.3% of the total
- In 2°C scenario, international aviation could represent approximately 1.4 to 3.9% of the total



Some Key Conclusions

- → "Residual" emissions occur in all of the three scenarios - LTAG Report only focuses on the in-sector reductions
- → Traffic growth rate has an important impact on the results
- → SAF penetration rate explains the majority of differences between the LTAG scenarios
- → LTAG Report covers international aviation – domestic aviation emissions not covered

LTAG Timeline towards A41



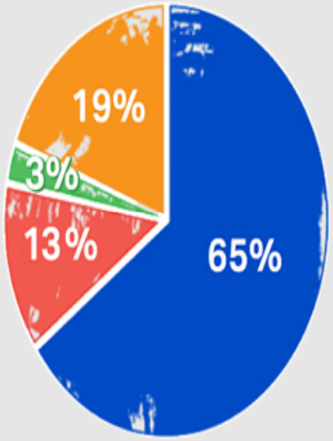
LTAG Questions and Answers

- ICAO has published a compilation of the questions and answers exchanged during the LTAG-GLADs

- Document available on the ICAO webpage: https://www.icao.int/Meetings/2022-ICAO-LTAG-GLADS/Pages/questions-and-answers.aspx

Global Industry Commitments

The net-zero objective will be met through a combination of maximum elimination of emissions at source and the use of approved offsetting and carbon capture technologies.



Emissions reduction strategy key elements

65% usage of Sustainable Aviation Fuel (SAF), sourced from feedstocks that do not degrade the environment or compete with food or water

13% investment in new aircraft technology, including radical new aerodynamic and alternative propulsion (electric or hydrogen) solutions

3% continued improvement in infrastructure and operational efficiency, with a particular focus on improved air traffic management

19% usage of approved offsets including carbon capture and storage technology

Source: IATA

COMMITMENT TO FLY NET ZERO 2050

5 October 2021

As the global community emerges from the pandemic and the aviation sector rebounds from the worst crisis in its history, we will build on the success of previous sustainability efforts to push towards the third era of air transport: net-zero carbon global connectivity.

Scientific consensus shows that the Paris Agreement 1.5°C goal would greatly reduce the severity of climate change damage. It is imperative that all sections of society and business set course to support achievement of this goal. The collective air transport sector raises its ambition with a new long-term climate commitment:

- **Global civil aviation operations will achieve net-zero carbon emissions by 2050, supported by accelerated efficiency measures, energy transition and innovation across the aviation sector and in partnership with governments around the world.**

This goal is ambitious and challenging for air transport. It will require coordinated efforts within the aviation industry and from partners, particularly strong support from governments and the energy sector. The goal will be underpinned by a commitment to joint and cooperative action between all stakeholders. Waypoint 2050 outlines a number of key elements to achieve the decarbonization of air transport, including:

1. Increasing use of sustainable aviation fuels (SAF) and a transition away from fossil fuels by mid-century as part of a wider aviation energy shift including low-carbon electricity and green hydrogen.
2. Research, development and deployment of evolutionary and revolutionary airframe and propulsion systems, including the introduction of electric and / or hydrogen powered aircraft.
3. Continued improvements in efficiency of operations and infrastructure across the system, including at airports and by air navigation service providers.
4. Investment in high-quality carbon offsets in the near-term and carbon removal opportunities to address residual CO_2 emissions in the longer-term. In this regard, the industry reaffirms its full support for the International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) as an effective transitional measure to stabilise net emissions from international aviation.

Across the sector, we are already undertaking a vast range of activities to reduce aviation CO_2 emissions. Our unwavering commitment to respond to the challenge of climate change has not abated despite the crisis we have faced. To achieve net-zero, the sector will require a supportive policy framework from governments focused on innovation rather than cost-inefficient instruments such as uncoordinated taxes or restrictive measures, as well as a robust and full commitment from the energy industry and other stakeholders. As support at the global level is critical, we urge ICAO member states to support the adoption of a long-term aspirational climate goal at the 41st ICAO Assembly in 2022.

Many long-term solutions require an acceleration of activity in the next decade, particularly the deployment of SAF. Some, such as continued efficiency gains, improvements in air traffic management and the implementation of CORSIA, can provide early climate action whilst longer-term measures are developed.

We are committed to ensuring that aviation in 2050 will be able to meet the needs of over 10 billion passengers, connecting the world safely, securely and importantly, sustainably. Further details can be found at www.aviationbenefits.org/FlyNetZero

ATAG

Luis Felipe de Oliveira, Director General

IBAC — Kurt Edwards, Director General

CANSO — Simon Hocquard, Director General; Jan Pie, Chair

IATA — Willie Walsh, Director General

GAMA — Pete Bunce, President and CEO

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Gulfstream — Gulfstream President and CEO

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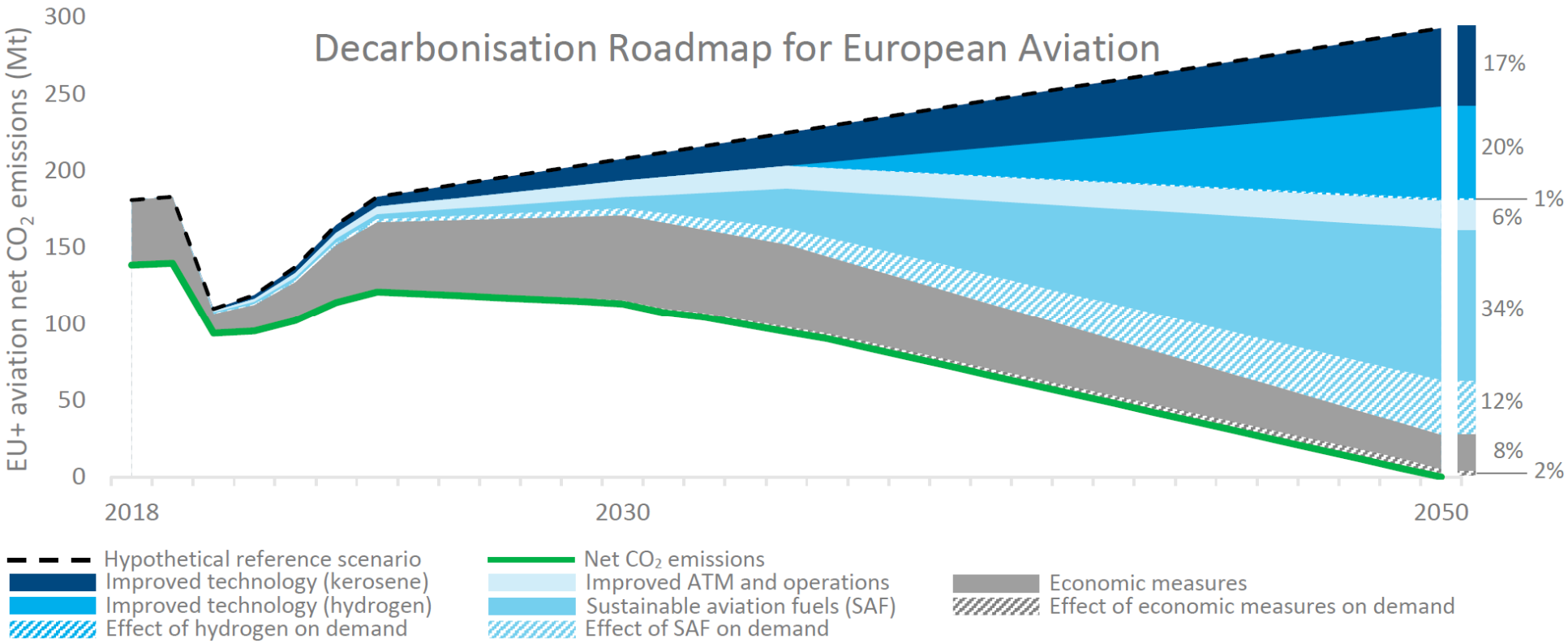
John S. Slattery, President and CEO

Collins Aerospace — Stephen Timm, President

European Industry Commitments ("Destination 2050")



Source: Destination 2050 Report

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Thank you

Questions?

Promoting sustainable aviation.
Your safety is our mission.

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