



# LTAG Monitoring and Reporting:

## A briefing

Dr. Alejandro Block,

Environment Officer, LMR

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- **Background:** From the LTAG report to the methodology
- **The methodology:** Time and complexity
- Sources of **information**
- How will moving towards Net Zero affect the **development of the sector?**
- **Next steps**, summary, and questions





LTAG Report

2019 2022 2023 2025

**A40-18** request to explore the feasibility of a LTAG.



LTAG Report

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2022

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LTAG resolution & Request to **monitor** **A41-21**.



LTAG Report

Development  
of the LMR Methodology

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CAEP Steering Group created the LTAG Monitoring and Reporting Task Group (LMR-TG).

LTAG resolution & Request to monitor **A41-21**.



## LTAG Report

Developed by the LTAG-Task Group

## LTAG monitoring & reporting methodology

Developed by the LMR Coordination Group

## Implementation of the LMR Methodology

By the LMR- Task Group

2019

**A40-18** requests to explore the feasibility of a LTAG.

2022

**A41-21** LTAG resolution & request to monitor progress

2025

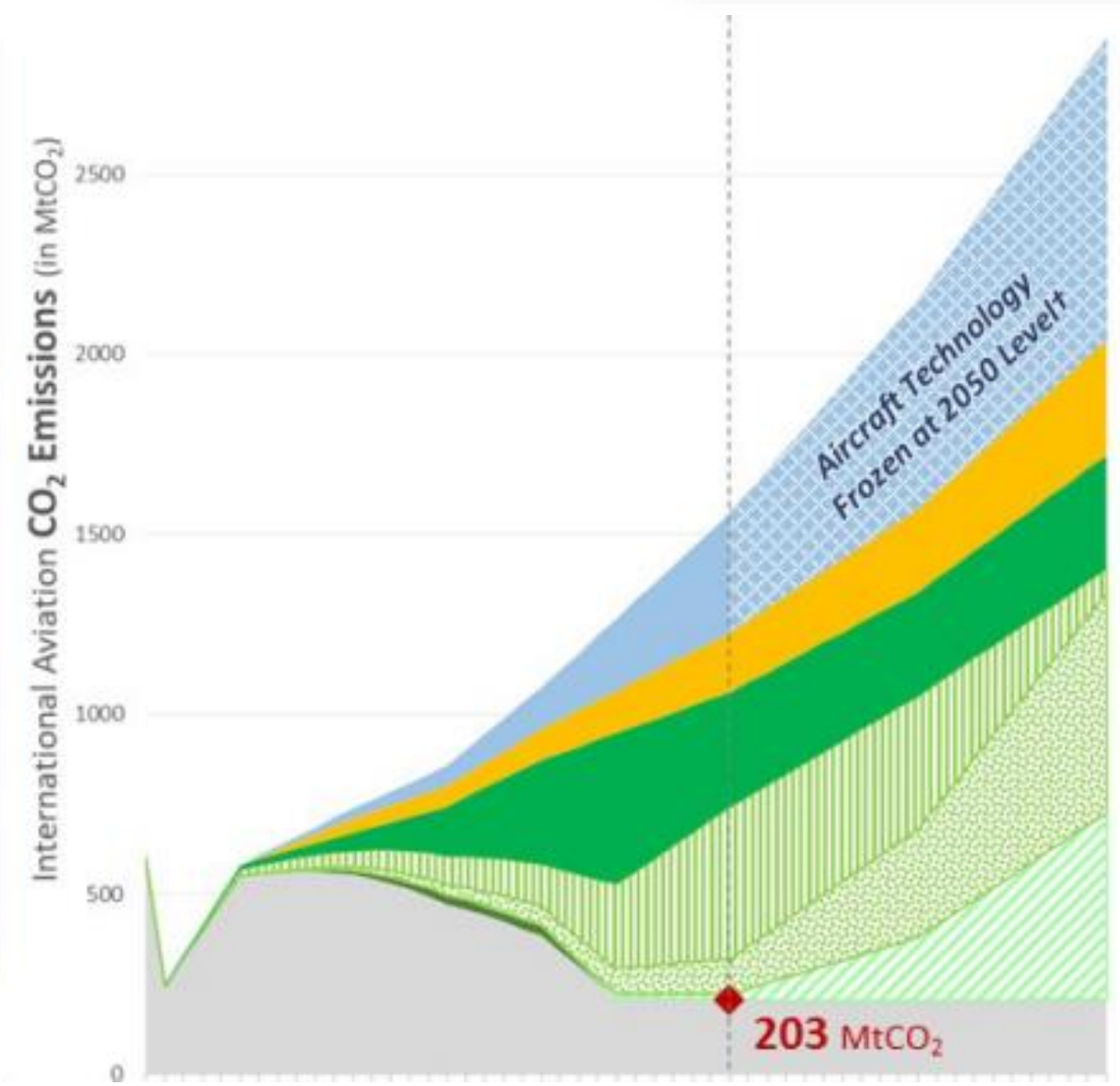
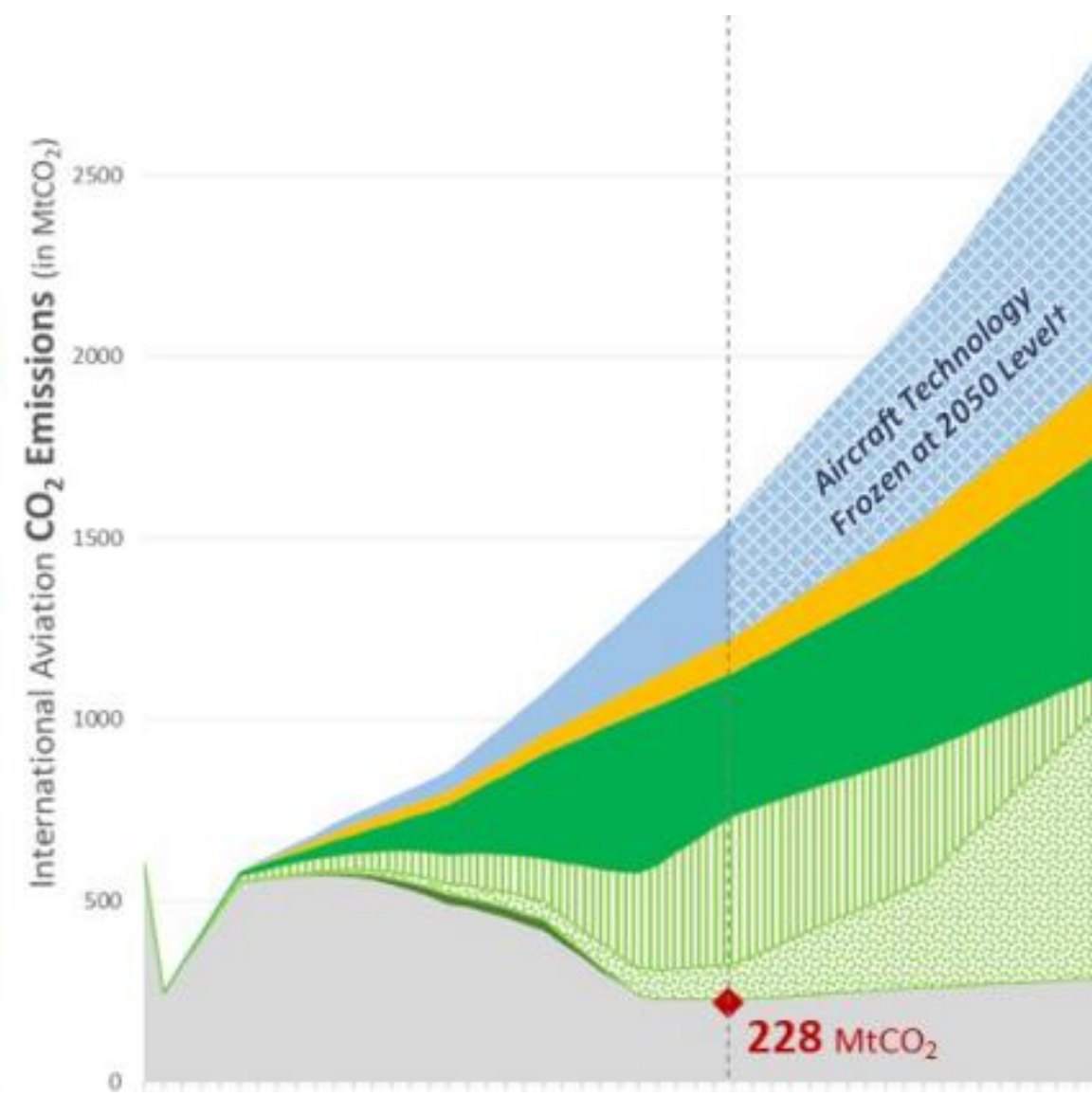
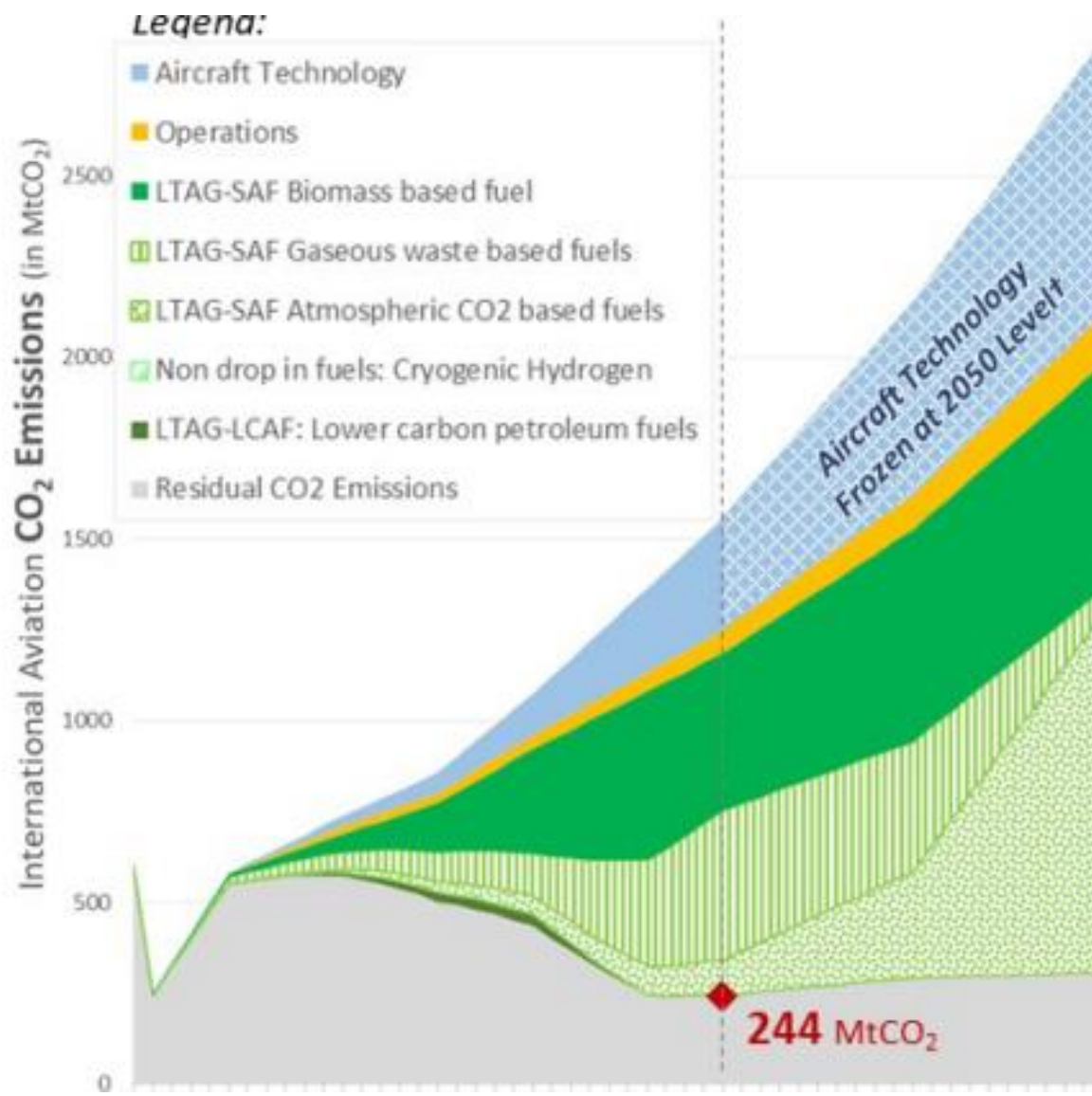
**A42-21** requests the Council, to implement the LMR methodology.



## 2019: A40-18\*

9. *Requests* the Council to continue to explore the feasibility of a long-term global aspirational goal for international aviation, through conducting detailed studies assessing the attainability and impacts of any goals proposed, including the impact on growth as well as costs in all countries, especially developing countries, for the progress of the work to be presented to the 41st Session of the ICAO Assembly. Assessment of long-term goals should include information from Member States on their experiences working towards the medium term goal;

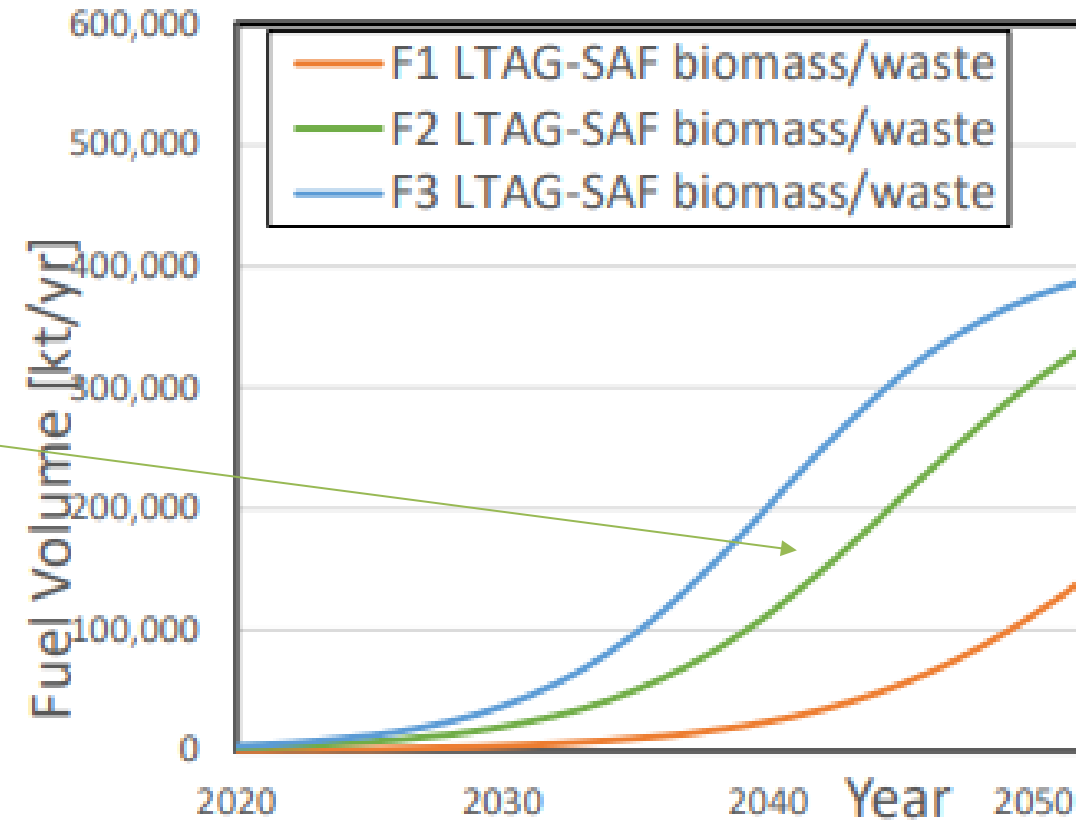
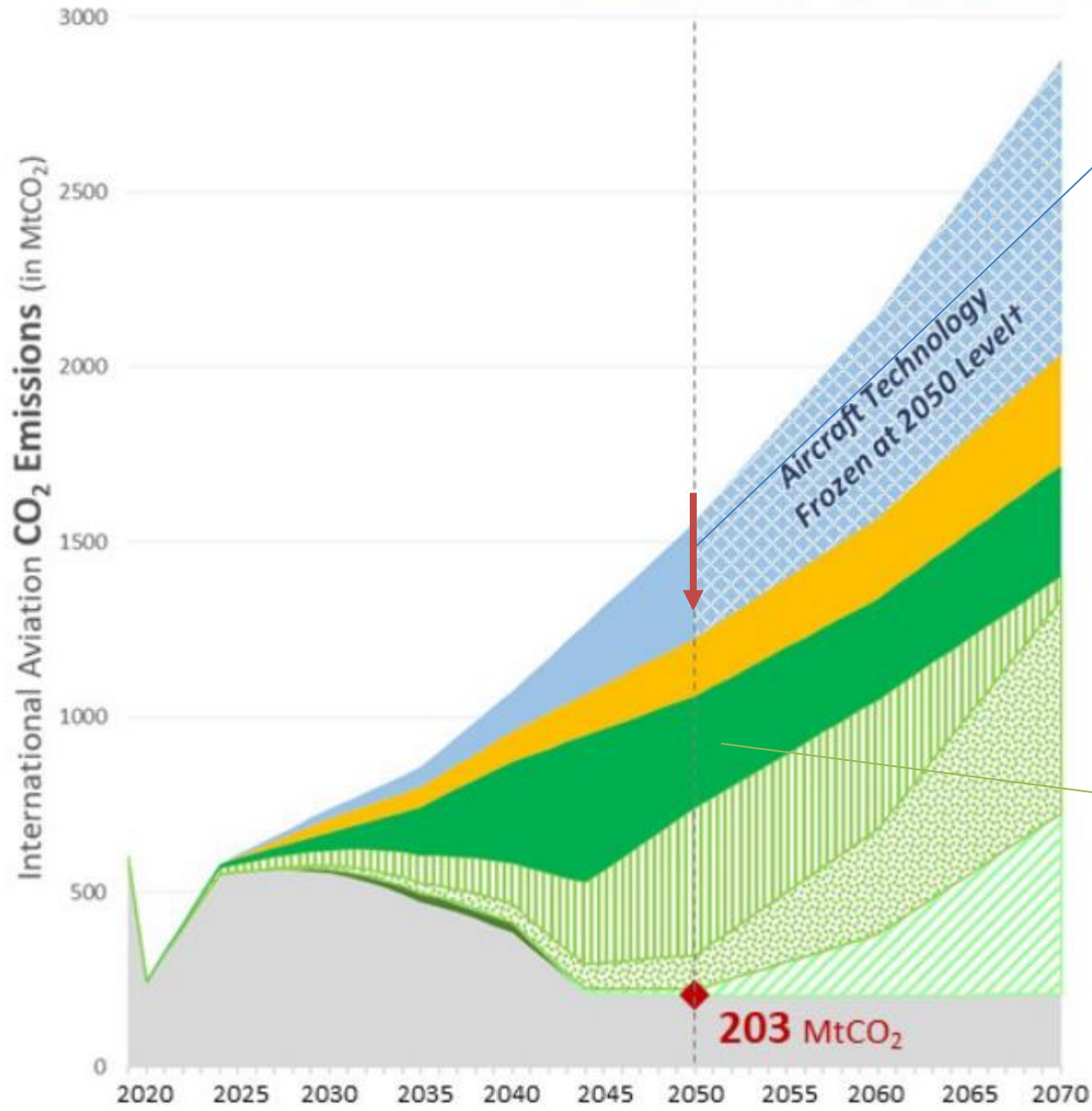
# Background: The LTAG Report (2022)



# Background: The LTAG Report (2022)

## IS3 LTAG Integrated Scenario 3

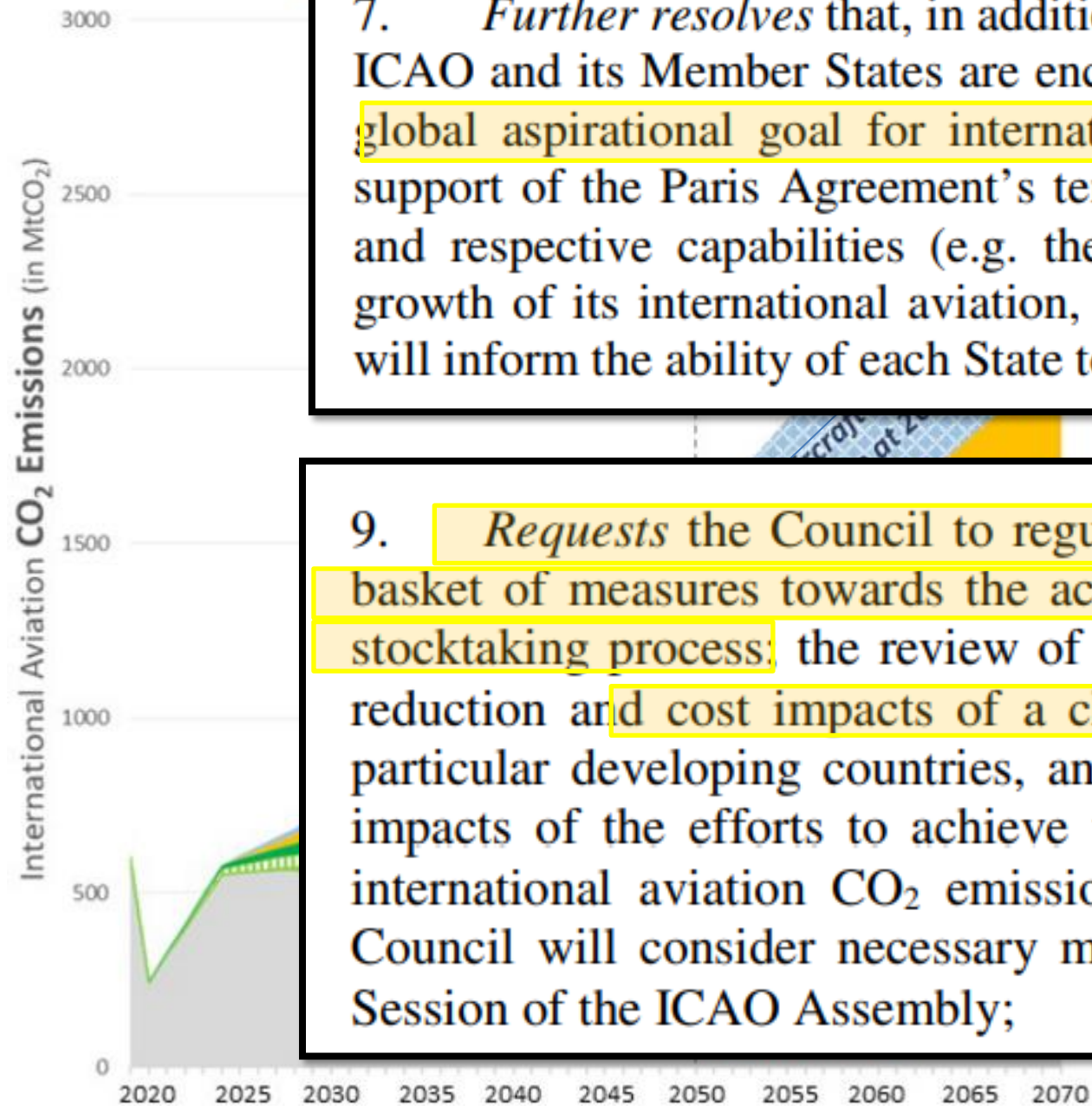
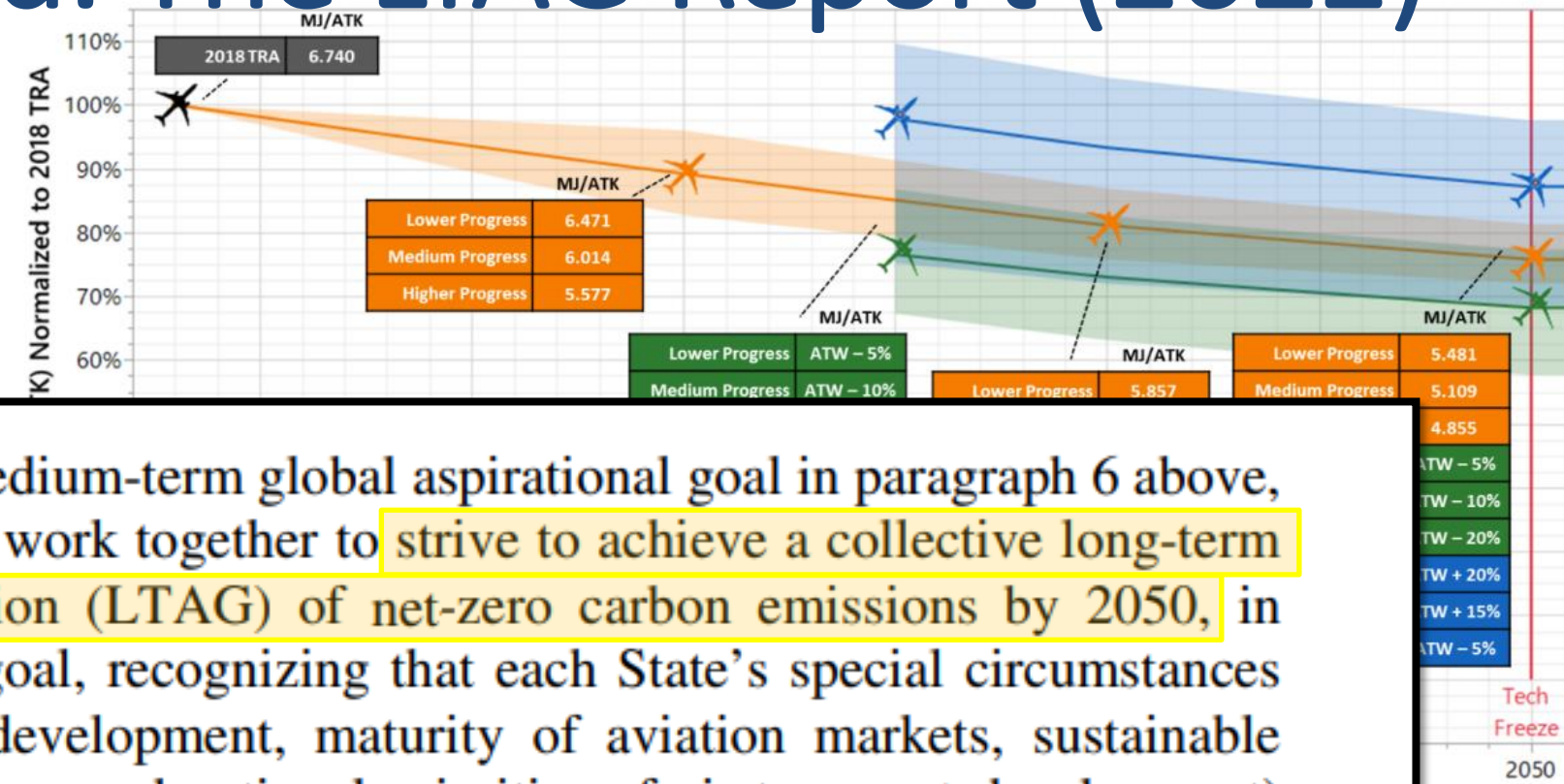
Technology **T3**    Operations **O3**    Fuels **F3**



# Background: The LTAG Report (2022)

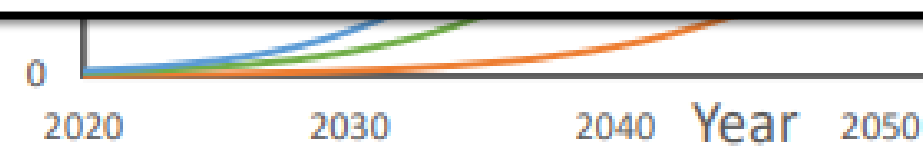
IS3 LTAG Integrated Scenario 3

2022: A41-21



7. Further resolves that, in addition to the medium-term global aspirational goal in paragraph 6 above, ICAO and its Member States are encouraged to work together to strive to achieve a collective long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050, in support of the Paris Agreement’s temperature goal, recognizing that each State’s special circumstances and respective capabilities (e.g. the level of development, maturity of aviation markets, sustainable growth of its international aviation, just transition, and national priorities of air transport development) will inform the ability of each State to contribute to the LTAG within its own national timeframe;

9. Requests the Council to regularly monitor progress on the implementation of all elements of the basket of measures towards the achievement of the LTAG, including through: the ICAO environment stocktaking process; the review of the ICAO Vision for SAF; further assessment of the CO<sub>2</sub> emissions reduction and cost impacts of a changing climate on international aviation, regions and countries, in particular developing countries, and the impact on the development of the sector, as well as the cost impacts of the efforts to achieve the LTAG; monitoring of information from State Action Plans for international aviation CO<sub>2</sub> emissions reduction; and means of implementation. To this purpose, the Council will consider necessary methodologies for the monitoring of progress, and report to a future Session of the ICAO Assembly;



## Request for monitoring progress ->

October 2022, A41-21\* 



- How do we **monitor** progress?
- Where can the **data** come from?
- How often do we **report**?
- How much will it **cost**?
- How will this affect the **development of the sector**, particularly in developing States?
- How will **climate change impact** aviation?

\*ICAO, Resolution A41-21: Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change, available at: [www.icao.int/environmental-protection/Documents/Assembly/Resolution\\_A41-21\\_Climate\\_change.pdf](http://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A41-21_Climate_change.pdf)

LTAG Report

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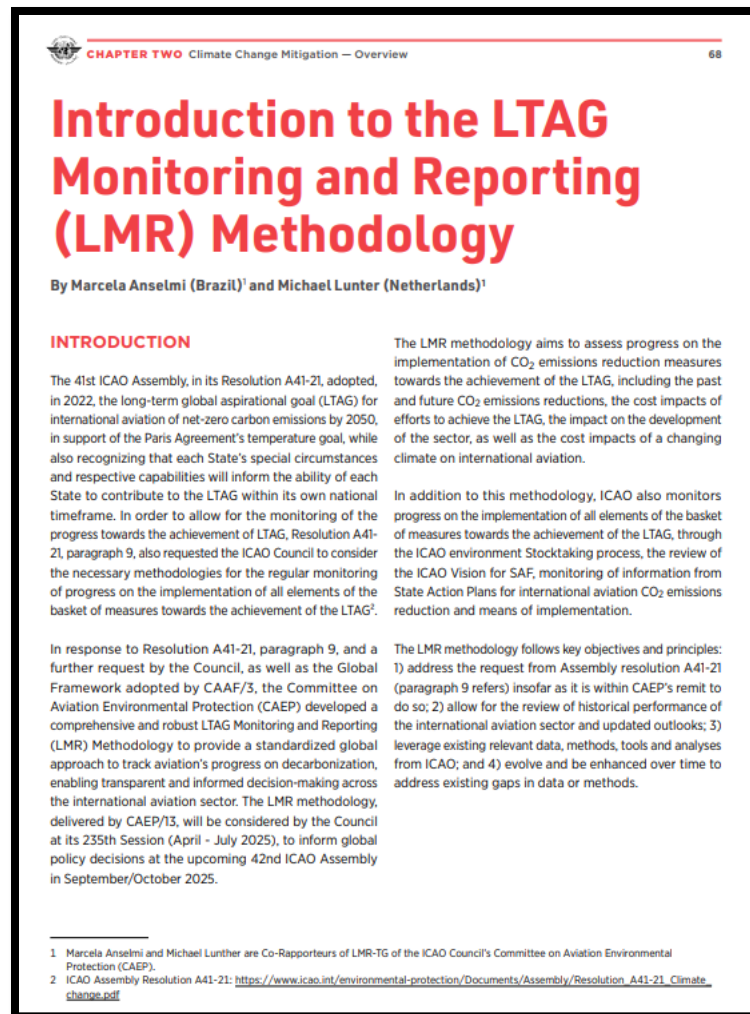
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LTAG of net zero CO<sub>2</sub> emissions by 2050 adopted by the **A41-21**.



### Themes & Metrics:

**CO<sub>2</sub> Emissions**

including: **Aviation Activity**

**Costs impacts  
of efforts to achieve LTAG**

**Impacts on Development**

# The LTAG monitoring & reporting methodology

**CHAPTER TWO** Climate Change Mitigation – Overview

## Introduction to the LTAG Monitoring and Reporting (LMR) Methodology

By Marcela Anselmi (Brazil)<sup>1</sup> and Michael Lunter (Netherlands)<sup>2</sup>

**INTRODUCTION**

The 41st ICAO Assembly, in its Resolution A41-21, adopted, in 2022, the long-term global aspirational goal (LTAG) for international aviation of net-zero carbon emissions by 2050, in support of the Paris Agreement's temperature goal, while also recognizing that each State's special circumstances and respective capabilities will inform the ability of each State to contribute to the LTAG within its own national timeframe. In order to allow for the monitoring of the progress towards the achievement of LTAG, Resolution A41-21, paragraph 9, also requested the ICAO Council to consider the necessary methodologies for the regular monitoring of progress on the implementation of all elements of the basket of measures towards the achievement of the LTAG<sup>2</sup>.

In response to Resolution A41-21, paragraph 9, and a further request by the Council, as well as the Global Framework adopted by CAAF/3, the Committee on Aviation Environmental Protection (CAEP) developed a comprehensive and robust LTAG Monitoring and Reporting (LMR) Methodology to provide a standardized global approach to track aviation's progress on decarbonization, enabling transparent and informed decision-making across the international aviation sector. The LMR methodology, delivered by CAEP/13, will be considered by the Council at its 235th Session (April - July 2025), to inform global policy decisions at the upcoming 42nd ICAO Assembly in September/October 2025.

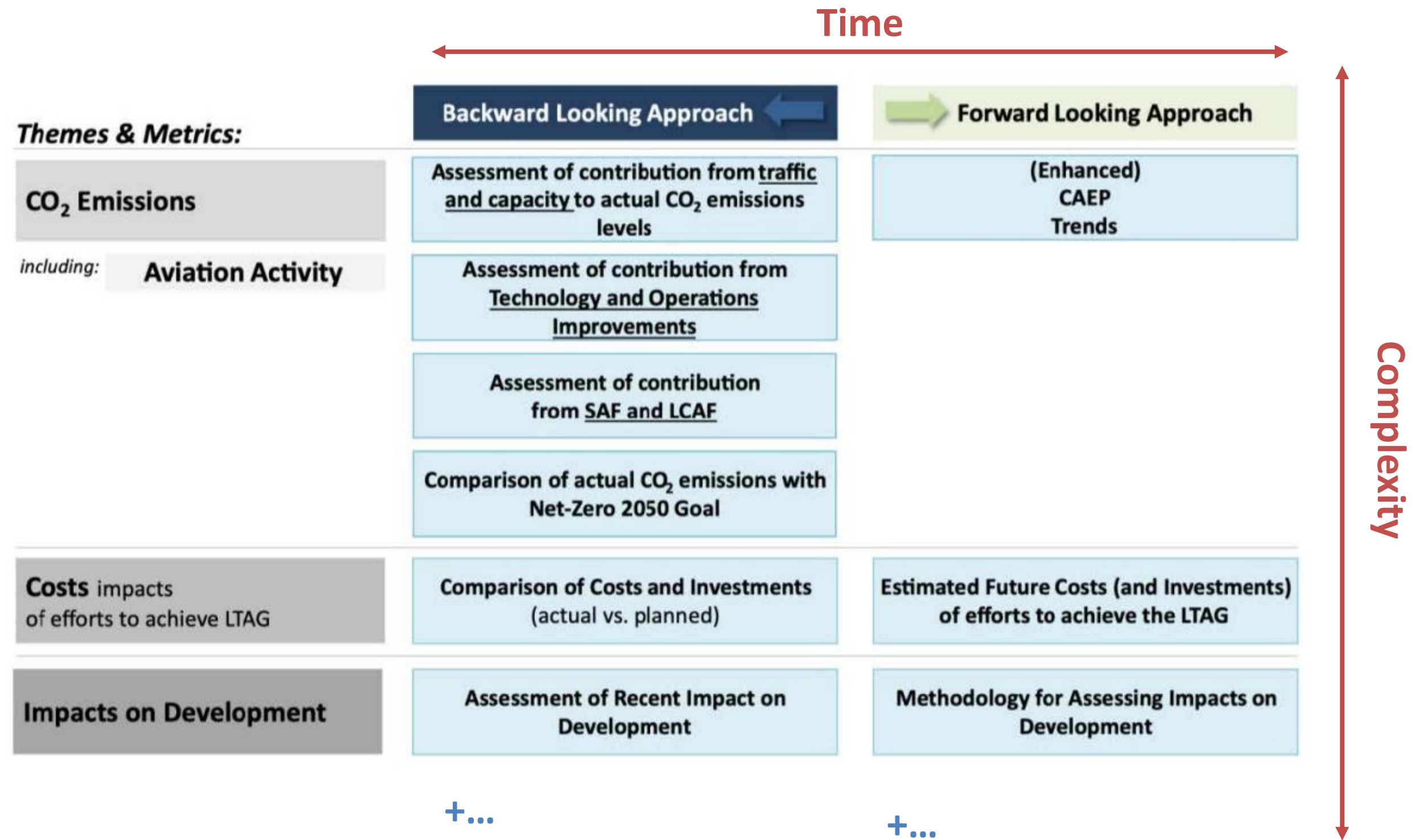
The LMR methodology aims to assess progress on the implementation of CO<sub>2</sub> emissions reduction measures towards the achievement of the LTAG, including the past and future CO<sub>2</sub> emissions reductions, the cost impacts of efforts to achieve the LTAG, the impact on the development of the sector, as well as the cost impacts of a changing climate on international aviation.

In addition to this methodology, ICAO also monitors progress on the implementation of all elements of the basket of measures towards the achievement of the LTAG, through the ICAO environment Stocktaking process, the review of the ICAO Vision for SAF, monitoring of information from State Action Plans for international aviation CO<sub>2</sub> emissions reduction and means of implementation.

The LMR methodology follows key objectives and principles:

- 1) address the request from Assembly resolution A41-21 (paragraph 9 refers) insofar as it is within CAEP's remit to do so;
- 2) allow for the review of historical performance of the international aviation sector and updated outlooks;
- 3) leverage existing relevant data, methods, tools and analyses from ICAO; and
- 4) evolve and be enhanced over time to address existing gaps in data or methods.

<sup>1</sup> Marcela Anselmi and Michael Lunter are Co-Rapporteurs of LMR-TG of the ICAO Council's Committee on Aviation Environmental Protection (CAEP).  
<sup>2</sup> ICAO Assembly Resolution A41-21: [https://www.icao.int/environmental-protection/Documents/Assembly/Resolution\\_A41-21\\_Climate\\_change.pdf](https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A41-21_Climate_change.pdf)





## T1

### *Descriptive approach*

- CO<sub>2</sub> - CCR
- Cleaner Energies Use – CCR
- Compare vs existing CAEP trends
- Basic costs
- Impact on sector's development
- Tech & Ops together (CO<sub>2</sub>/ATK)
- Global analysis

## T1

### *Descriptive approach*

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## T2

### *Explanatory approach, T1+...*

- Fill identified gaps
- Data sources: CCR + others
- Tech & Ops separate
- Bottom-up assessments

## T3

### *Explanatory approach, T2+...*

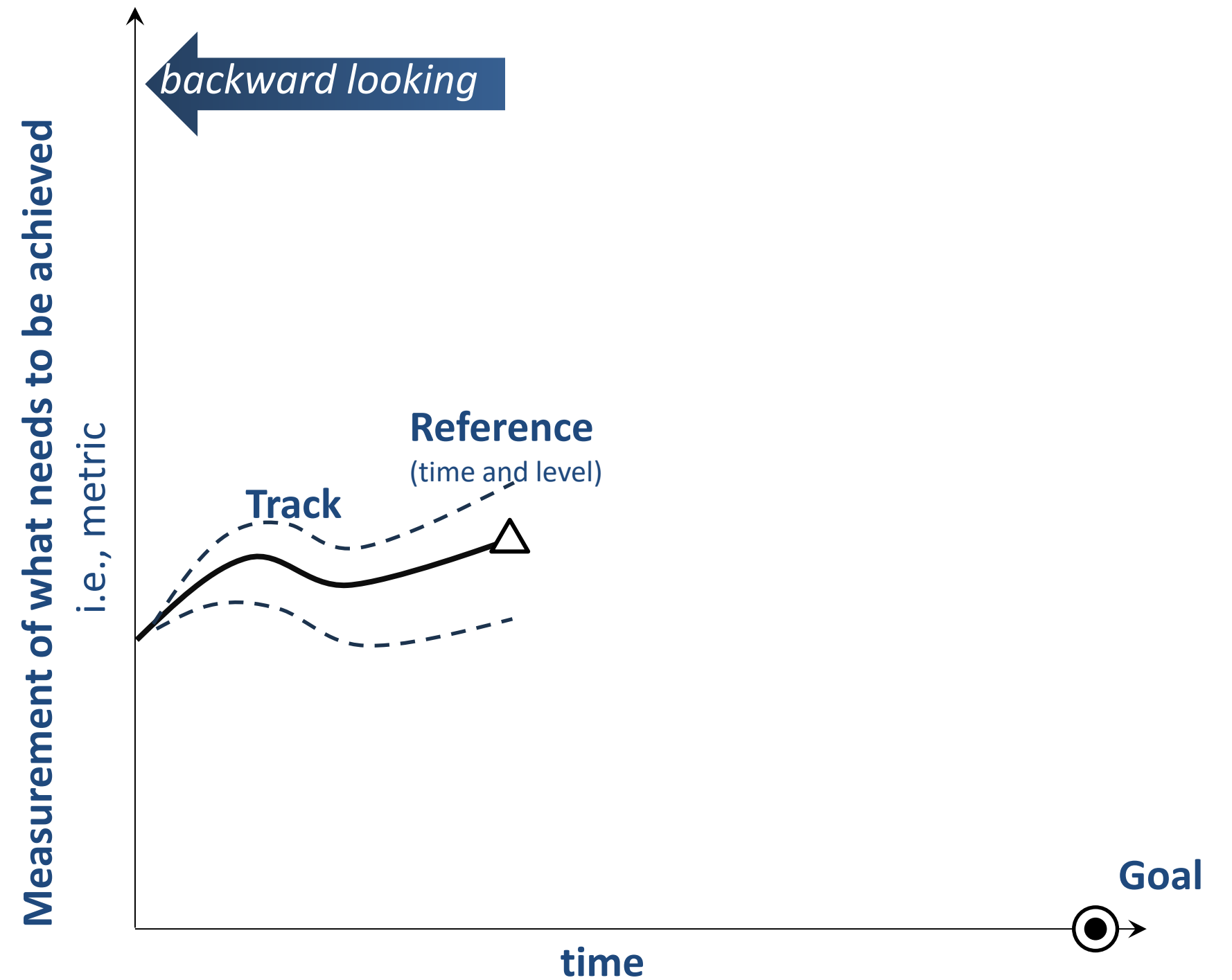
- Details on H<sub>2</sub> & electric
- Regional analysis
- Electricity and H<sub>2</sub> supply

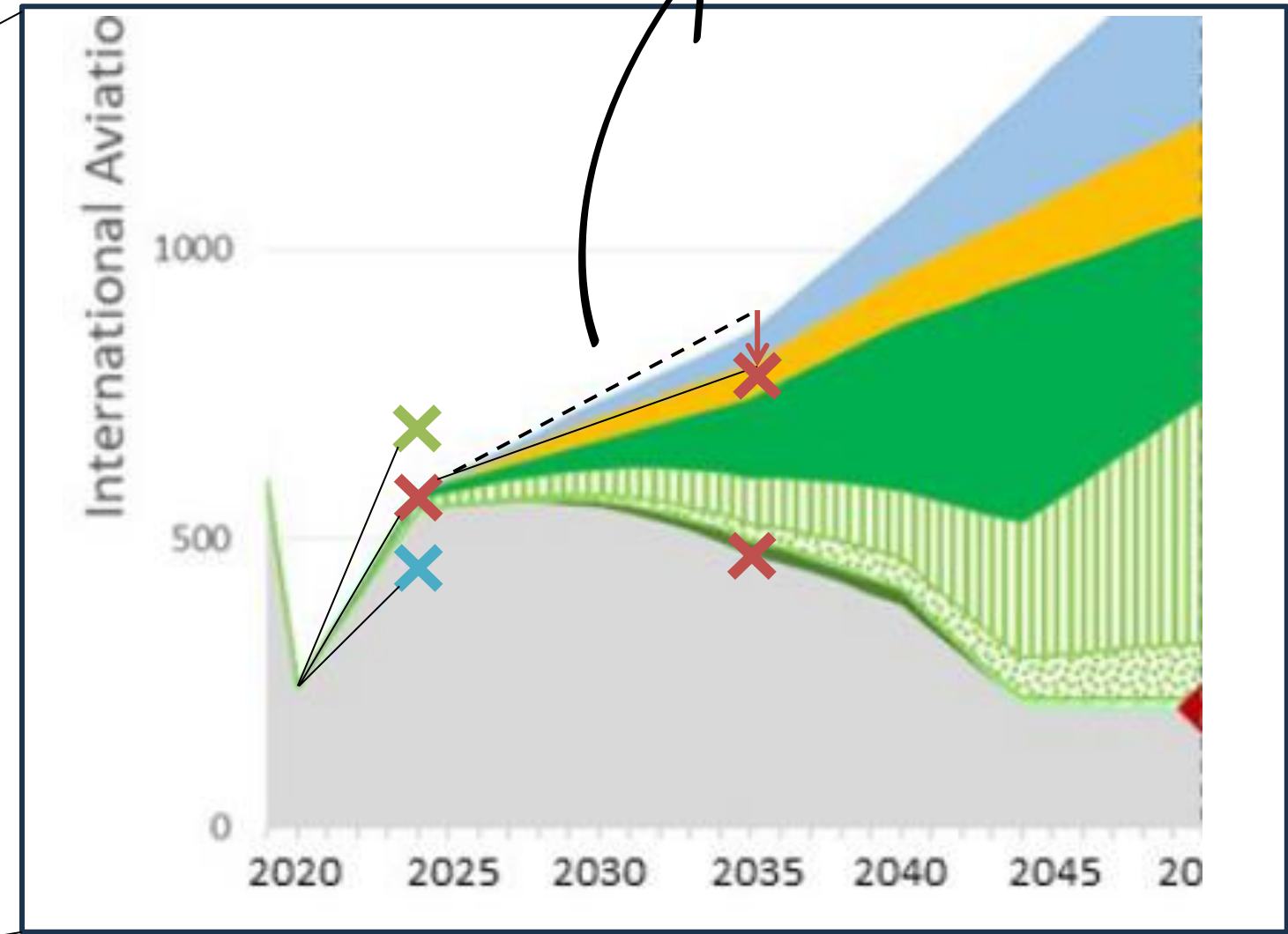
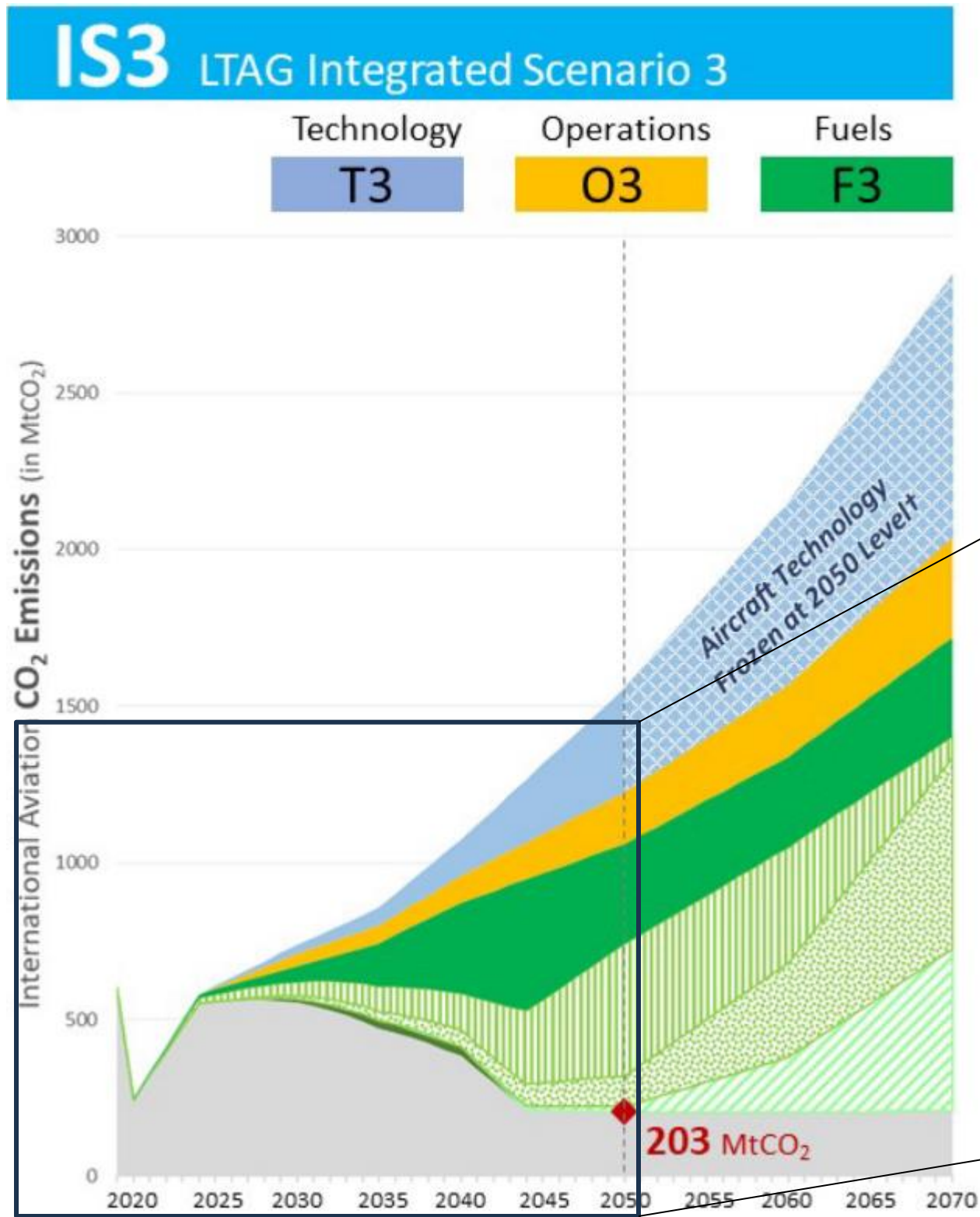
Increased complexity



## Backward-looking assessments:

- Compare actual performance to previously projected paths to the net zero 2050 goal





**Tier 1:** Compares CO<sub>2</sub> calc. vs actual  
**Tier 2:** Explains reductions Tech/Ops



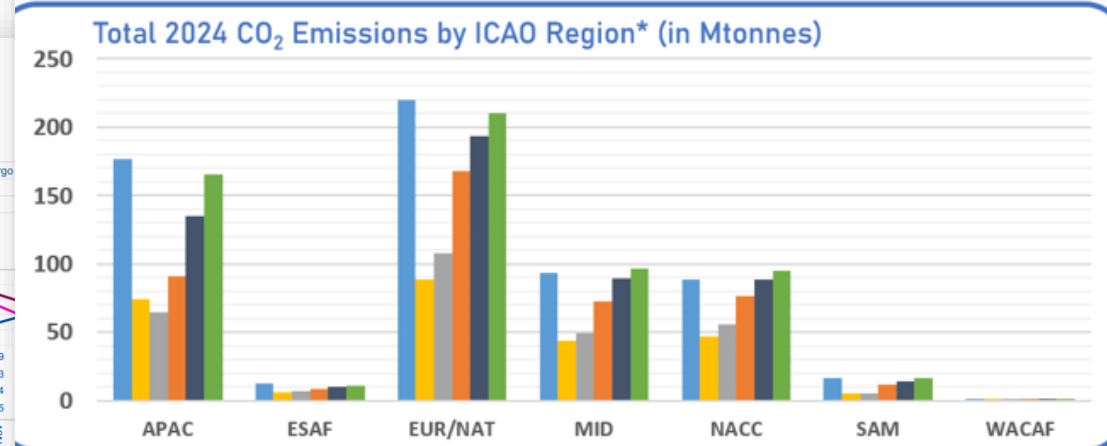
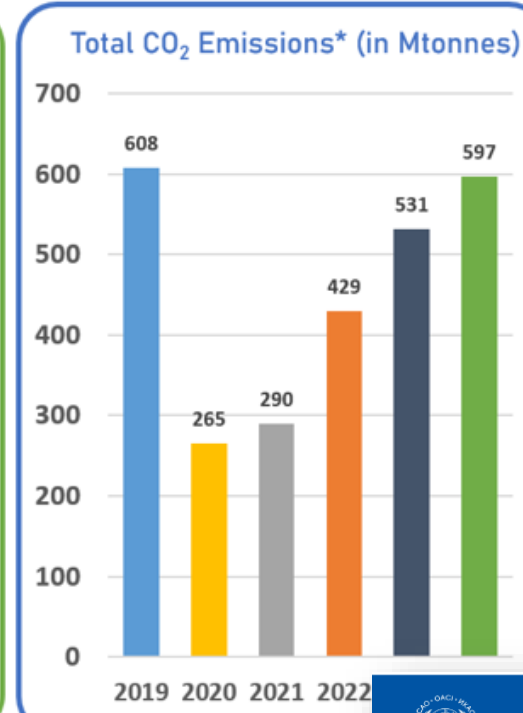
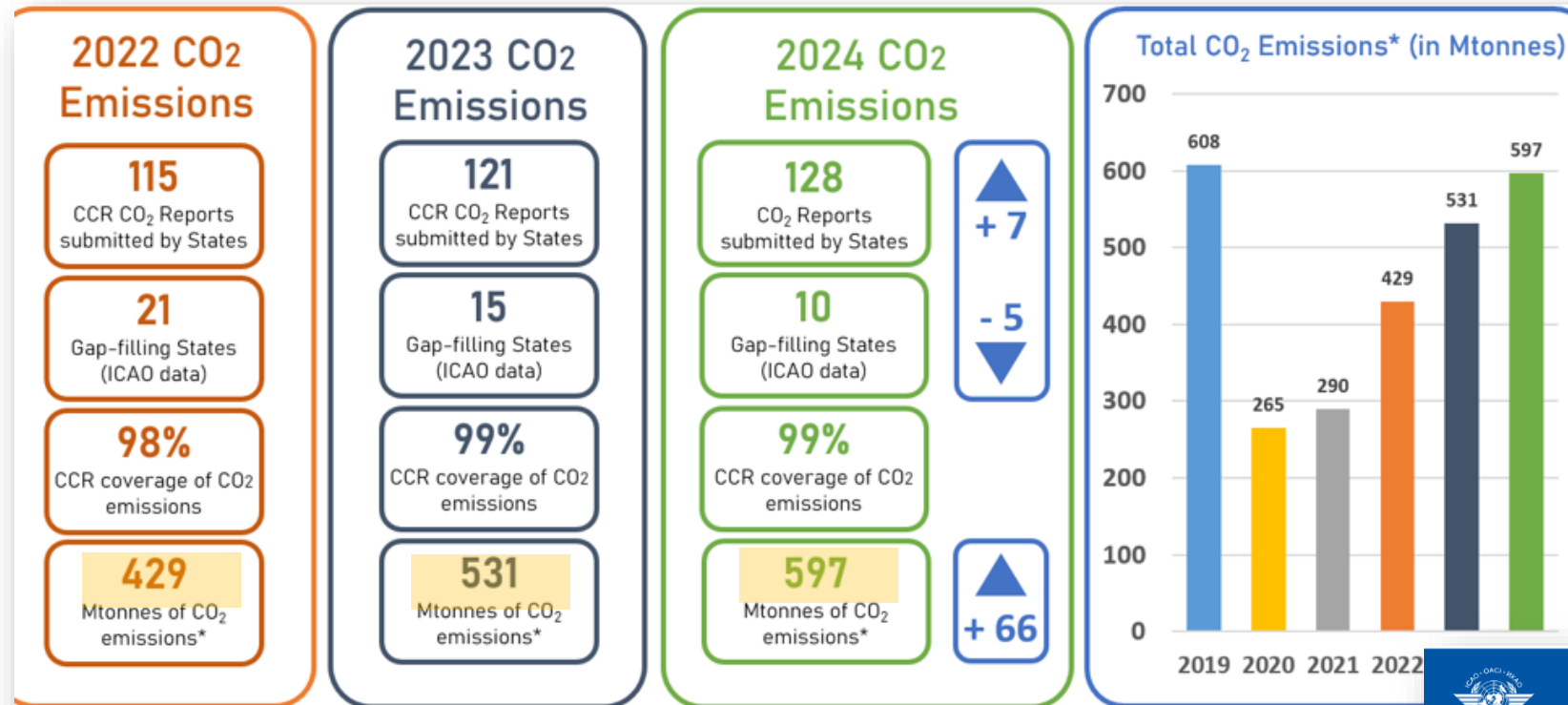
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# The LTAG monitoring & reporting: Tier 1=existing data

## CO<sub>2</sub> Emissions

Traffic

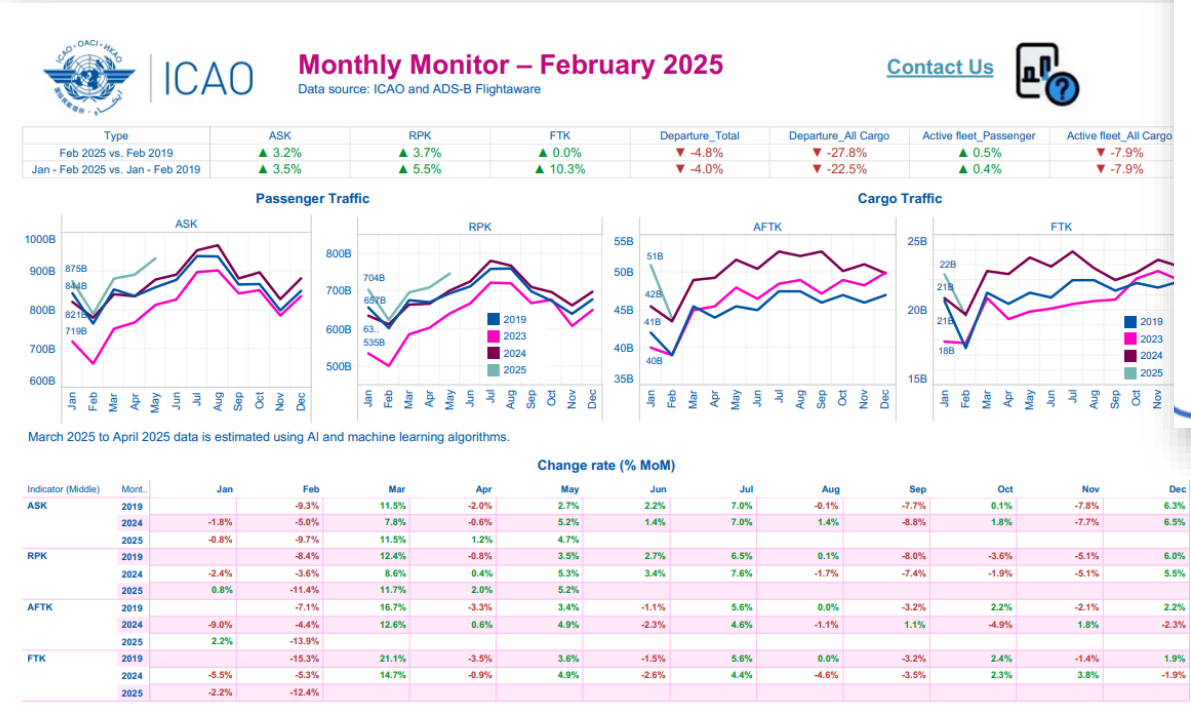
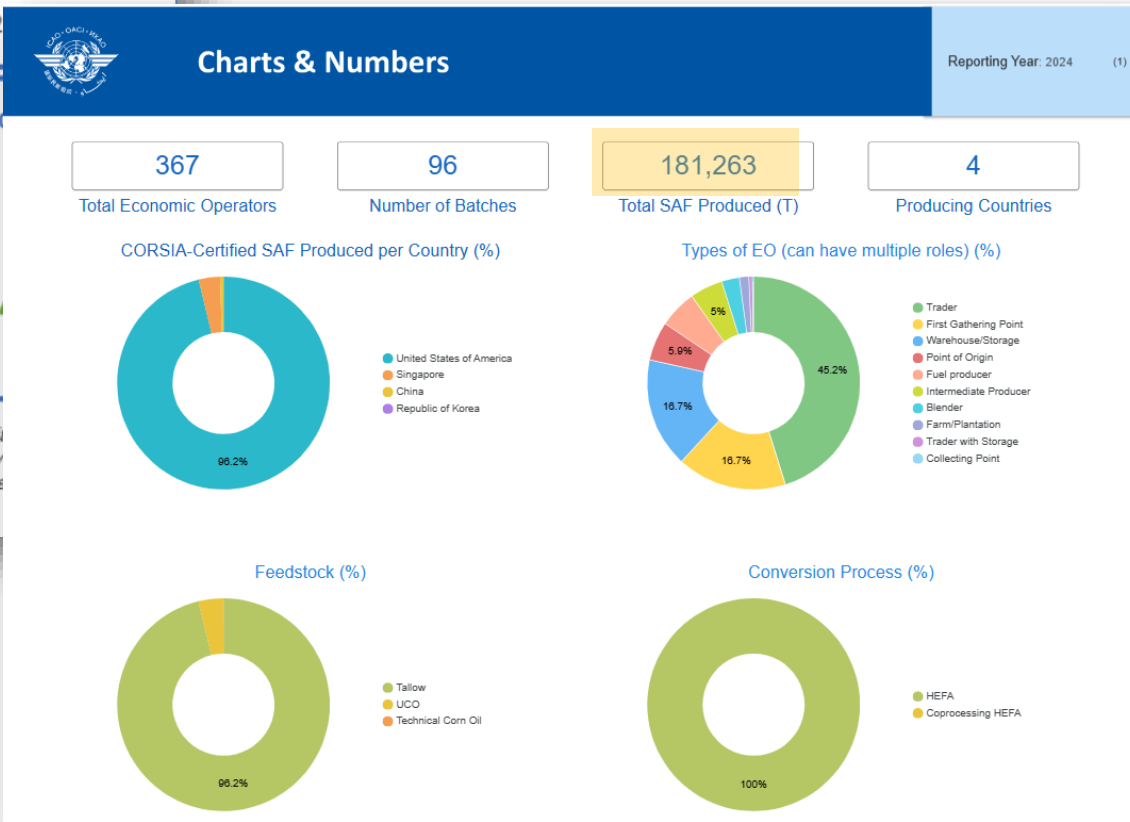


Sectoral Growth Factor (SGF)

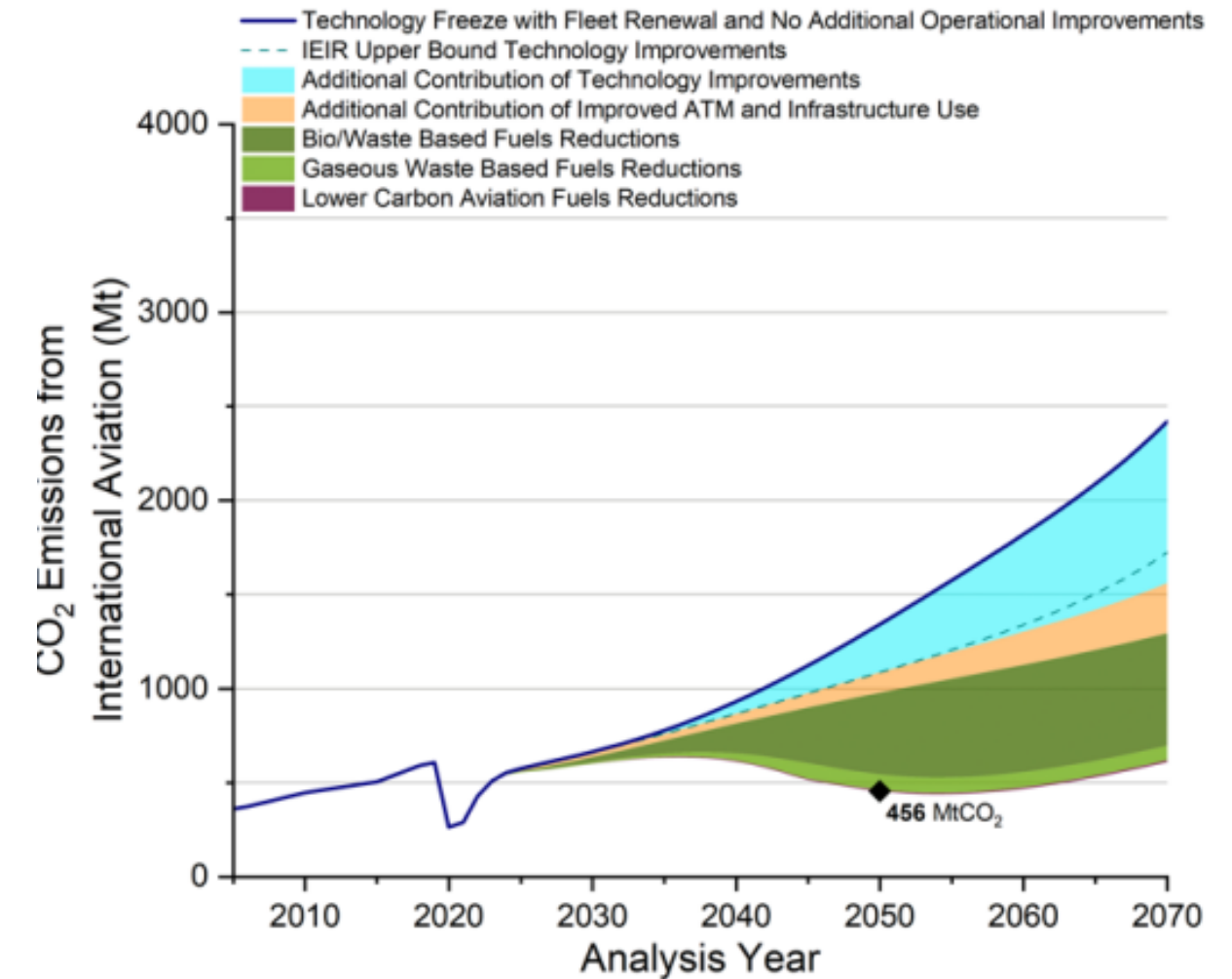
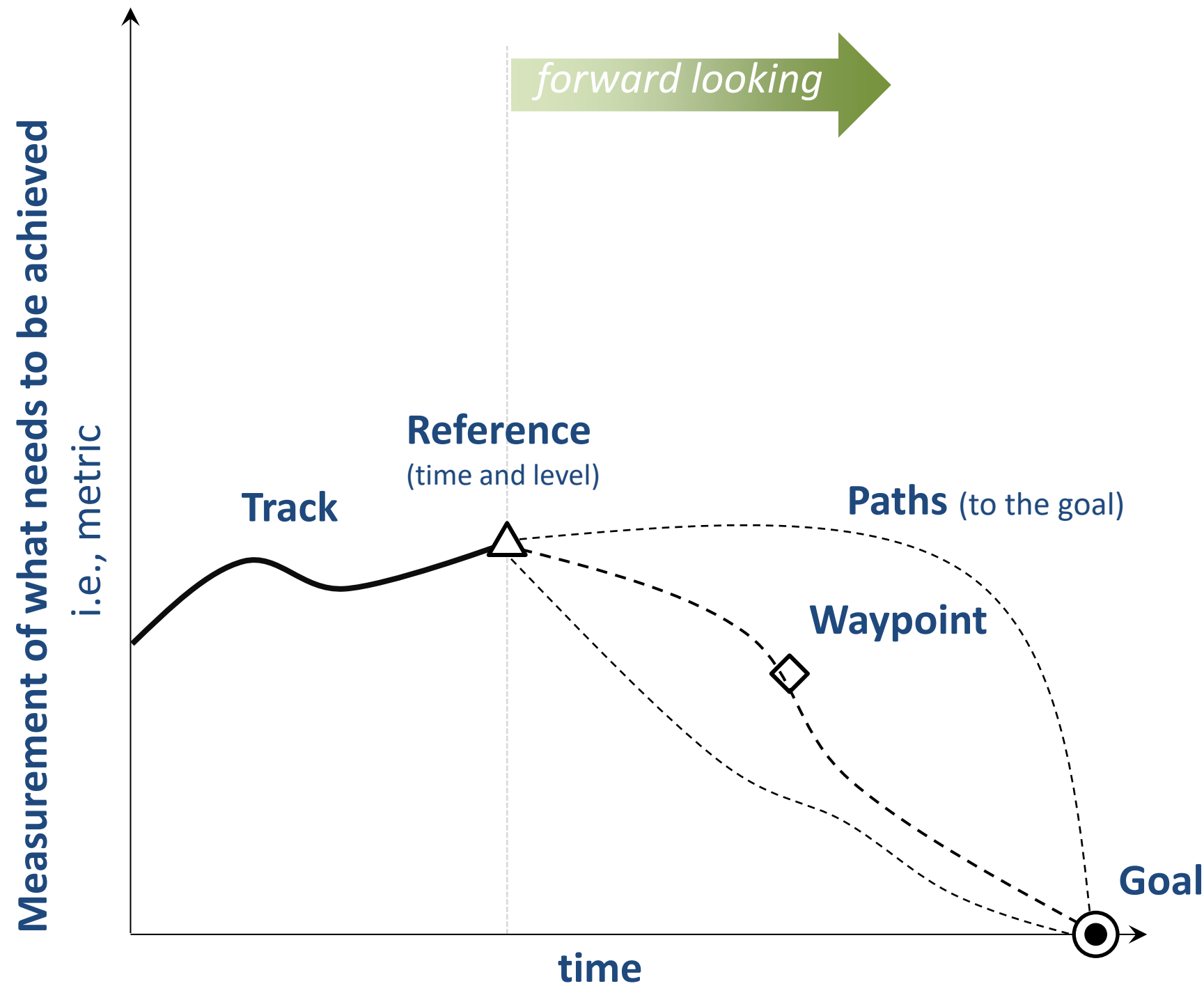
2021-2023 SGF: 0.159

2024 SGF: 0.159

\*Totals include CO<sub>2</sub> emissions submitted through the CORSIA Central Registry and emissions provided by ICAO to fill the gaps.



Update the forward-looking assessments to generate “new/updated” projections towards the **2050 goal** based on the latest historical data available at the time.



Note: Results were modeled for 2005, 2006, 2010, 2015 (Prior CAEP work cycles); 2019, 2020, 2021, 2022 (ICAO CCR); 2018, 2025, 2030, 2040, 2050, 2060, 2070 (CAEP/13).

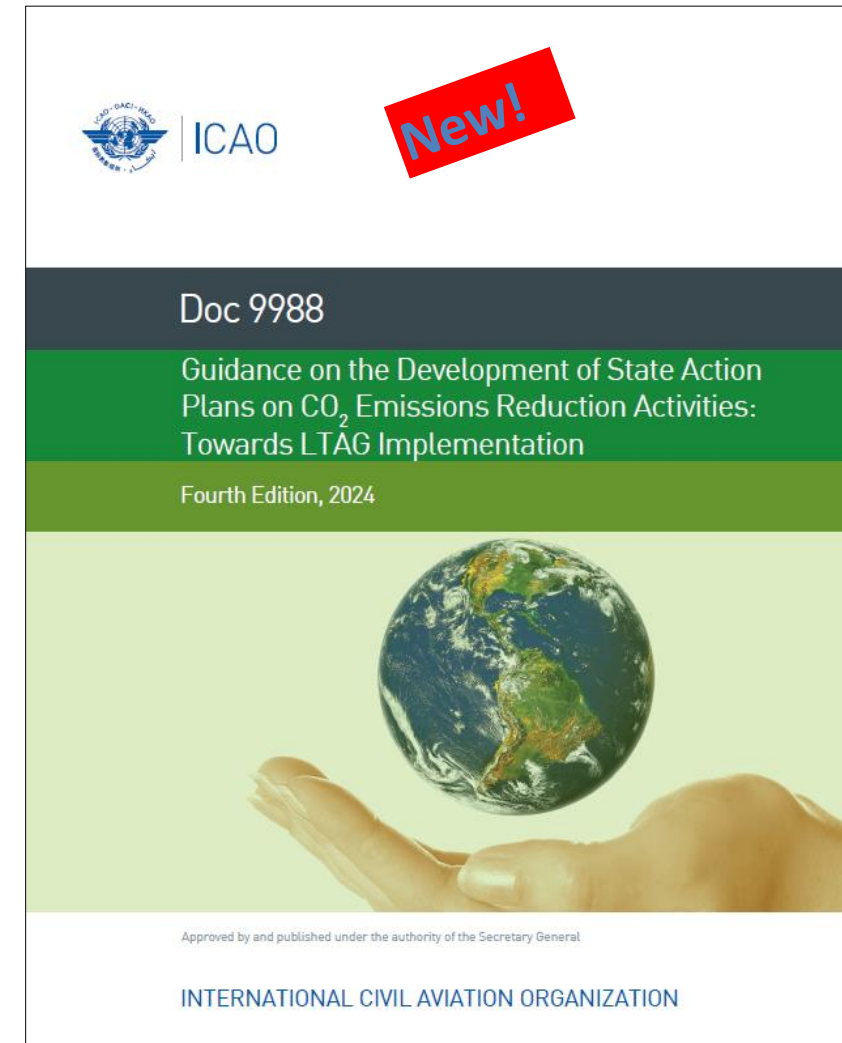
**Figure 2. Combustion CO<sub>2</sub> Emissions from International Aviation, 2005 to 2070, Including Life Cycle Emissions Reductions from SAF, LCAF and other aviation cleaner energies.**



ICAO

ENVIRONMENT

# Other sources of information: State Action Plans and ICAO environment events

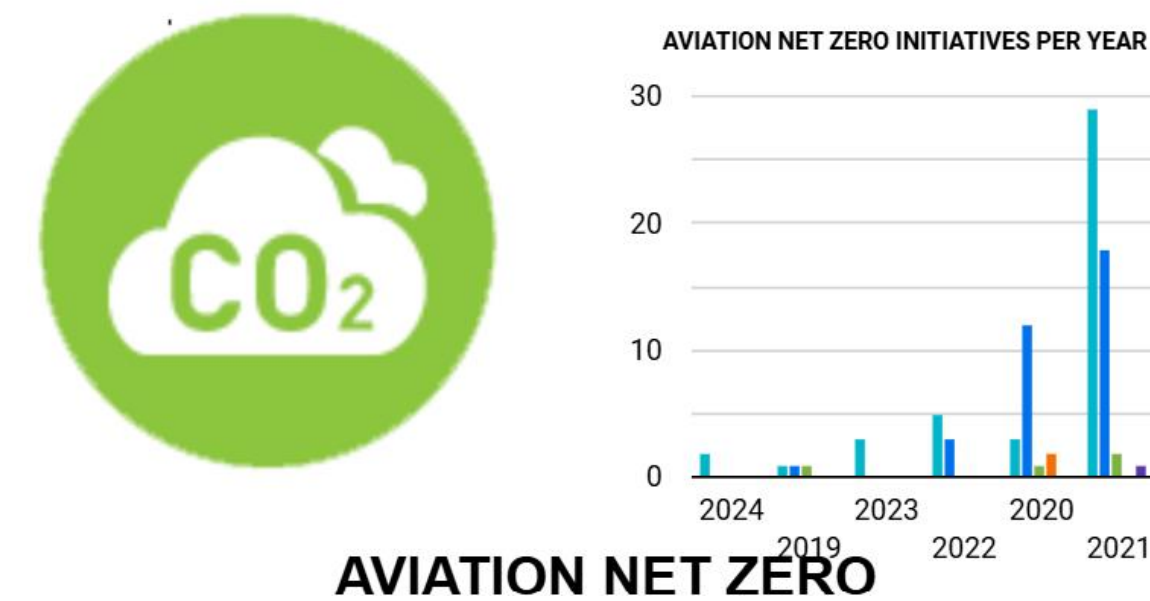
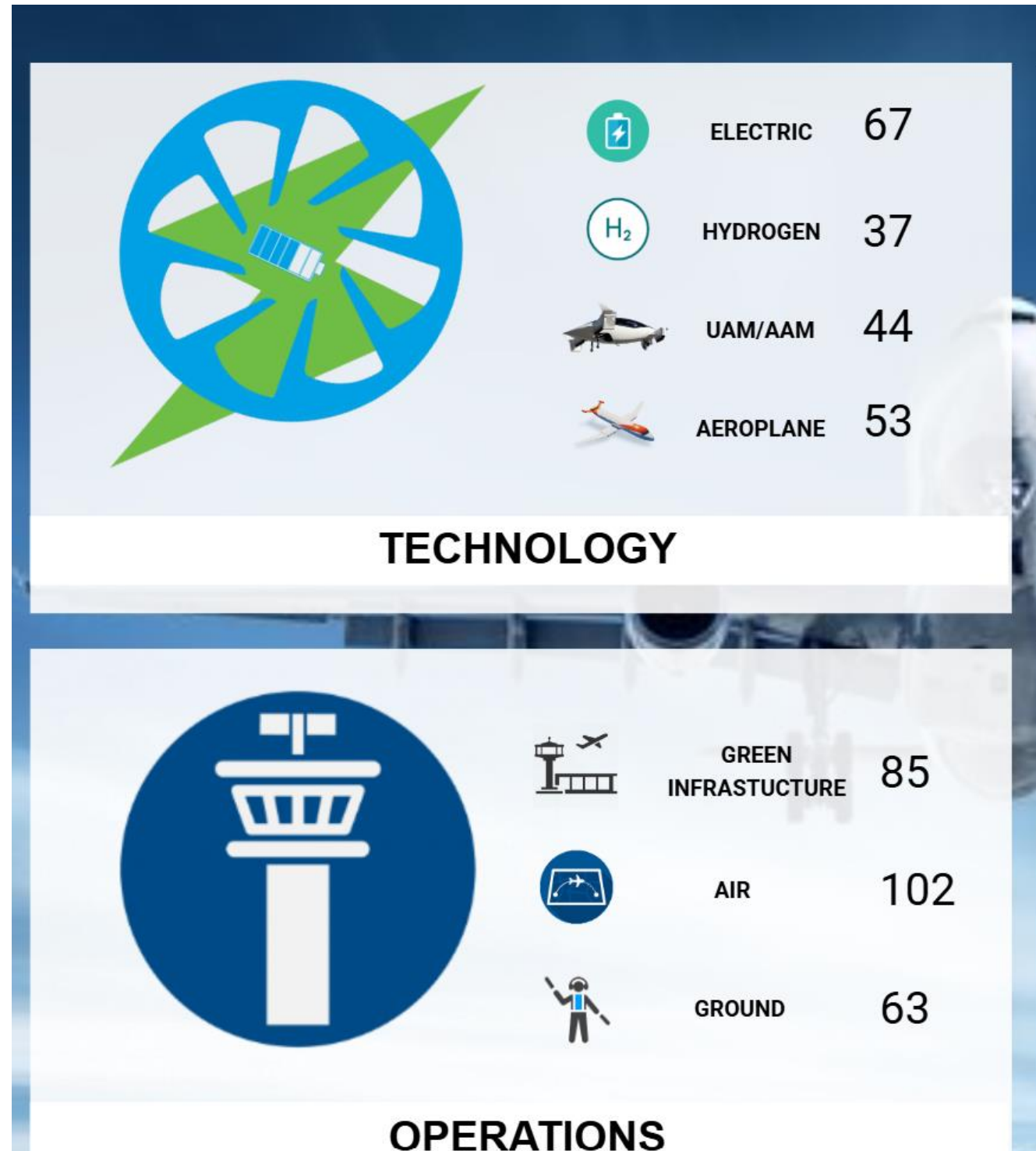


Baseline calculation

Mitigation measures and expected results

Implementation and assistance

Appendix with examples and detailed information

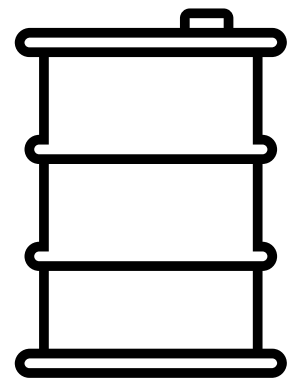


**2022: A41-21**

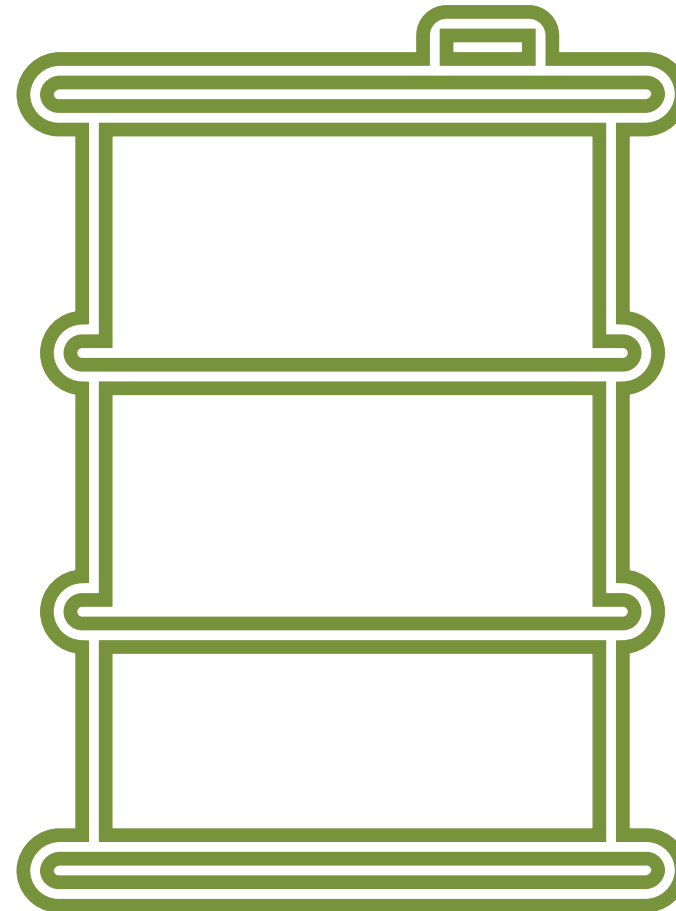
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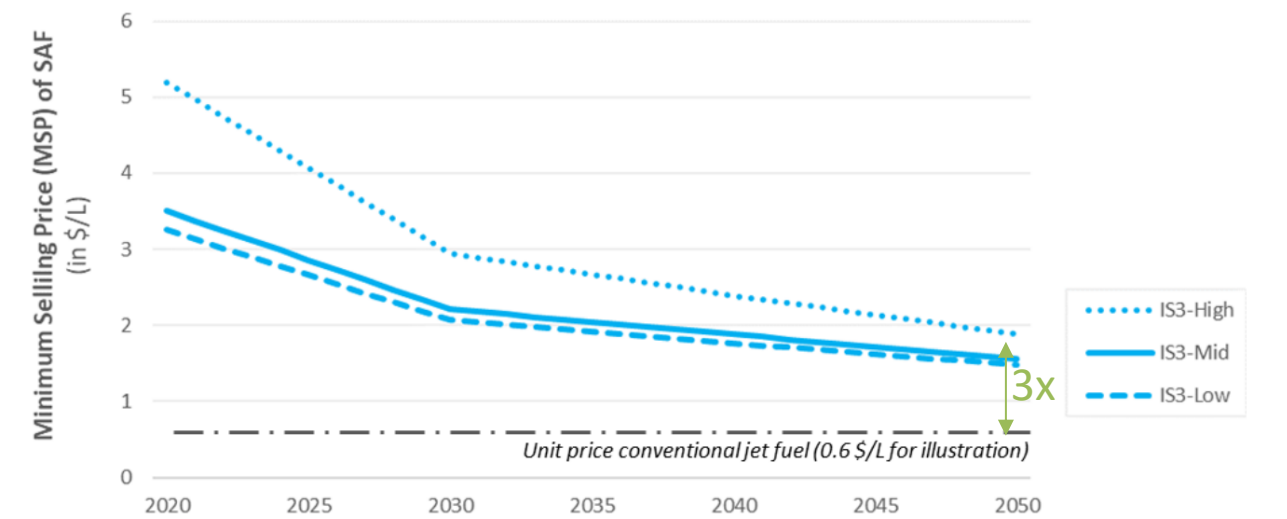
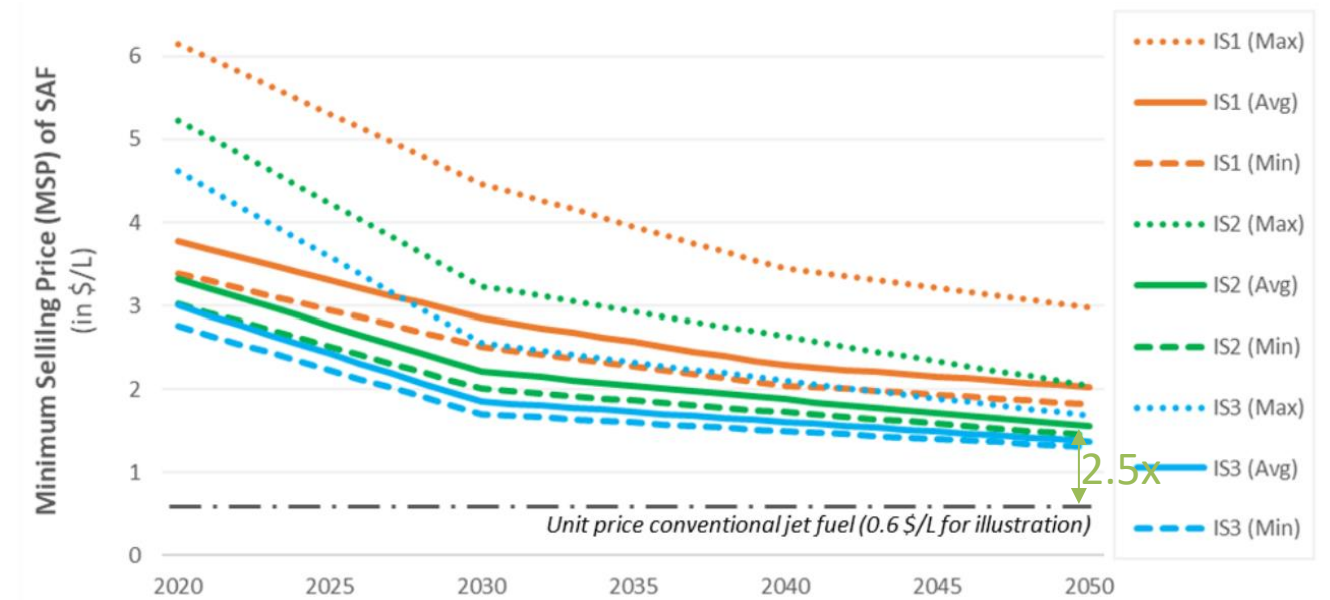
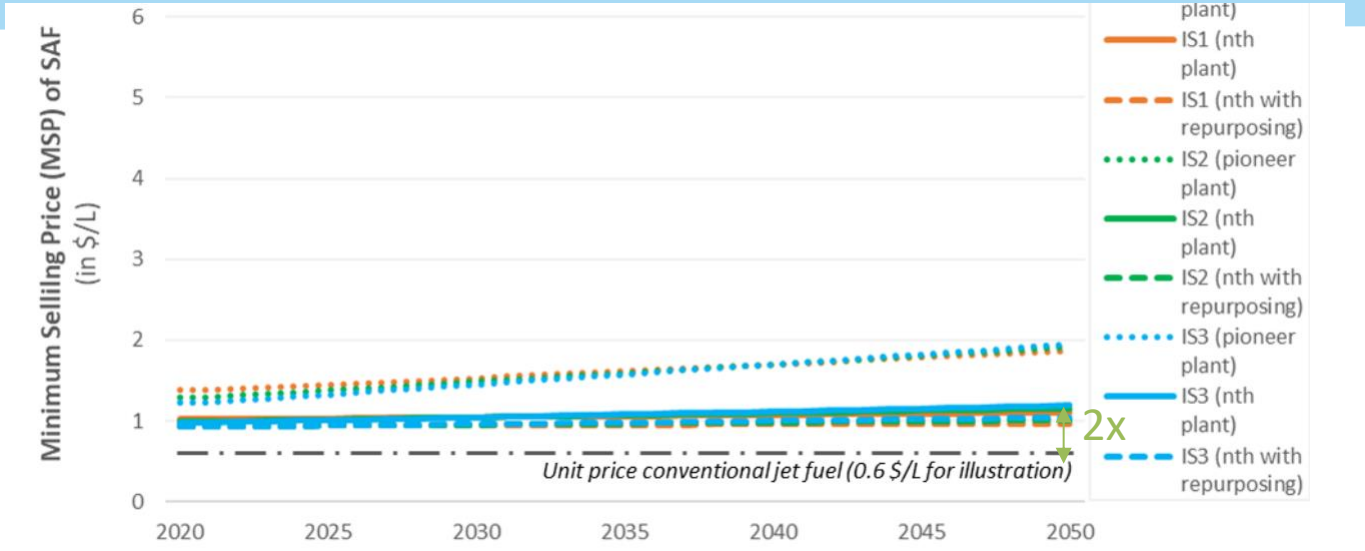
# Impact on the development of the sector



Jet fuel = X USD/t



SAF = up to **3 X USD/t<sup>1</sup>**



1: <https://www.easa.europa.eu/en/newsroom-and-events/press-releases/easa-publishes-report-sustainable-aviation-fuel-scale-progress>

## Guiding Questions

To what extent is air travel demand sensitive to the incremental costs introduced by achieving ICAO's LTAG?

- How does this differ between developing vs developed States?
- How do increases in costs get passed through to consumers and how does this affect demand?





# From the LTAG to the monitoring of the LTAG

## LTAG Report

## Development of the LMR Methodology

## Implementation of the LMR Methodology

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LTAG of net zero CO<sub>2</sub> emissions by 2050 adopted by the **A41-21**.

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**Feb. 2025:** CAEP/13 recommended the LMR Methodology. LMR-TG became a permanent task group.

Oct. 2025: **A42-21** requested the Council, with the technical contribution of CAEP, to implement the LMR methodology.

**June 2025:** Council (235) reviewed and approved the methodology.



# So... where are we now?

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**2025: A42-21**

10. *Requests* the Council, with the technical contribution of CAEP, to implement the LTAG Monitoring and Reporting (LMR) methodology to assess progress on the implementation of CO<sub>2</sub> emissions reduction measures towards the achievement of the LTAG, while the LMR will be supported by information from annual ICAO LTAG Stocktaking, ICAO Tracker Tools, State Action Plans for international aviation CO<sub>2</sub> emissions reduction and other information sources, including the monitoring of progress on means of implementation support and financing. The LMR also incorporates the monitoring and review of the global aspirational Vision and the ICAO Global Framework on SAF, LCAF and other Aviation Cleaner Energies, including through the annual ICAO LTAG Stocktaking and the convening of CAAF/4 no later than 2028 with a view to updating the ambition on the basis of market developments in all regions. In this regard, the Council will present necessary updates on the LMR, for consideration by the 43rd Session of the ICAO Assembly;

**A42-21, 13th preamble:**

*Recognizing* that the ICAO *Report on the Feasibility of a Long-Term Aspirational Goal for International Civil Aviation CO<sub>2</sub> Emission Reductions*, which assessed the global-level technical feasibility of various aviation in-sector CO<sub>2</sub> emissions reduction scenarios, served as the basis for the consideration and adoption at the 41st Session of the ICAO Assembly of the *collective long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050* ...

**A42-21, 15th preamble:**

*Recognizing* the *LTAG Monitoring and Reporting (LMR) methodology* developed by the Council, with the technical contribution of the Committee on Aviation Environmental Protection (CAEP), *to assess progress on the implementation of CO<sub>2</sub> emissions reduction measures towards the achievement of the LTAG*, including the past and future CO<sub>2</sub> emissions reduction and the cost impacts of efforts to achieve the LTAG, the impact on the development of the sector, as well as the cost impacts of climate change on international aviation;

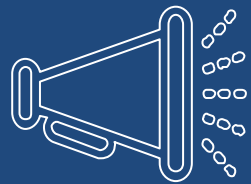
**A42-21, operative paragraph 10:**

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- The “LMR” is the process by which ICAO will monitor progress to the **Net-Zero CO<sub>2</sub> by 2050** goal, and the **global framework** for cleaner energies (5% less CO<sub>2</sub> by 2030 through aviation cleaner energies).
- The LMR-TG is successfully **progressing towards implementing** the methodology (tier 1)
- The group will work to **consider additional sources** of information (SAP, trackers, stocktaking), as these most likely belong to Tier 2, Tier 3 implementation and more qualitative.



Want to know more?



Check out A42-WP/25!

Appendix C

Questions?



International Civil Aviation Organization

A42-WP/25  
EX/12  
16/07/25

WORKING PAPER

ASSEMBLY — 42ND SESSION

EXECUTIVE COMMITTEE

Agenda Item 16: Environmental Protection – International Aviation and Climate Change

CLIMATE CHANGE – GLOBAL FRAMEWORK FOR SAF, LCAF AND OTHER AVIATION  
CLEANER ENERGIES  
(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

This paper reports on progress made by ICAO since the 41st Session of the Assembly relating to international aviation and climate change, focusing on the implementation of the long-term global aspirational goal for international aviation (LTAG). It highlights the outcomes arising from the Third ICAO Conference on Aviation and Alternative Fuels (CAAF/3) held in Dubai, United Arab Emirates in November 2023, namely the ICAO Global Framework for Sustainable Aviation Fuels (SAF), Lower Carbon Aviation Fuels (LCAF) and other Aviation Cleaner Energies, and the ICAO Roadmap for the implementation of the CAAF/3 outcomes and the LTAG, with four interdependent Building Blocks: 1) policy and planning; 2) regulatory framework; 3) implementation support; and 4) financing.

**Action:** The Assembly is invited to:

- a) acknowledge the substantial progress achieved by the Organization since the 41st Session of the Assembly on international aviation and climate change, including the adoption of the ICAO Global Framework for SAF, LCAF and other Aviation Cleaner Energies by CAAF/3, and the approval of the ICAO Roadmap for the implementation of the CAAF/3 outcomes and the LTAG by the Council;
- b) recognize the development and implementation of the LTAG monitoring and reporting methodology (LMR) and progress on the ICAO State Action Plans on CO<sub>2</sub> Emissions Reduction Activities initiative, LTAG stocktaking events and Tracker Tools;
- c) reiterate that CORSIA sustainability criteria, sustainability certification, and the methodology for the assessment of life cycle emissions used for CORSIA eligible fuels, should be used as the accepted basis for the eligibility of SAF, LCAF and other aviation cleaner energies used in international aviation, in order to provide regulatory transparency, certainty, stability and assurances of environmental integrity to feedstock producers, fuels producers and financial institutions;
- d) encourage States to further engage in the ICAO activities to accelerate the analysis and approval of life cycle values for new fuel sources and pathways, and their sustainability certification;
- e) recognize the progress on implementation support and financing to aviation decarbonization measures, including through the ICAO Assistance, Capacity-building and Training for Sustainable Aviation Fuels (ACT-SAF) programme, operationalization of the ICAO Finvest Hub, and consideration of the establishment of a climate finance initiative or funding mechanism under ICAO;
- f) recognize the urgency and importance of scaling-up the financing to aviation decarbonization measures, and request the Council to take urgent action for implementation of the near-term recommendations identified in Appendix G to enhance the existing framework and schemes on funding and financing initiatives to further support the progress towards achieving and implementing the LTAG and the Global Framework on SAF, LCAF and other Aviation Cleaner Energies, in particular for developing countries and States having particular needs;