

Aviation Green Transition

Chartering a path to
sustainable flying future



H2



ICAO

Foreword



Aviation Green Transition - Foreword

The intensification of the climate crisis in recent years is demanding faster and bolder actions from the international community. Responding to that, ICAO has been giving special attention to initiatives related to the mitigation of international aviation's impact on the global climate.

The ICAO Assembly at its 40th Session in 2019 adopted Resolution A40-18, which reiterated two global aspirational goals for the international aviation sector: 2% annual fuel efficiency improvements, and carbon neutral growth from 2020 onwards, as established at the 37th ICAO Assembly in 2010.

To contribute to the achievement of these goals, 121 Member States have already developed and submitted their State Action Plans, incorporating a basket of CO₂ mitigation measures to reduce CO₂ emissions from international aviation,

including aircraft technologies, operational improvements, and the use of sustainable fuels.

To complement these aviation in-sector CO₂ reduction measures and ensure the achievement of carbon neutral growth goal, a global market-based measure – Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) was established and the Scheme is globally implemented by Member States.

While a concrete mechanism is already put in place to achieve the existing goals, ICAO is also working on the feasibility of a long-term global aspirational goal (LTAG) for international aviation, and progress on this work will be presented to the 41st Session of the ICAO Assembly that will take place in September 2022. Good progress has been achieved due to an intensive and rigorous efforts of States, industry, civil society and other stakeholders participating in this LTAG process.

While CO₂ emissions from international aviation are addressed through ICAO and not covered by the Nationally Determined Contributions (NDCs) under the Paris Agreement, an ambitious outcome at the COP26 conference may further encourage ICAO and its Member States to take an ambitious decision for international aviation at the ICAO Assembly next year, complementing the achievement of the Paris Agreement objectives.



ICAO Climate Global Aspirational Goals

To be achieved with a 'Basket of Measures' for CO₂ reduction

2% fuel efficiency improvement per year

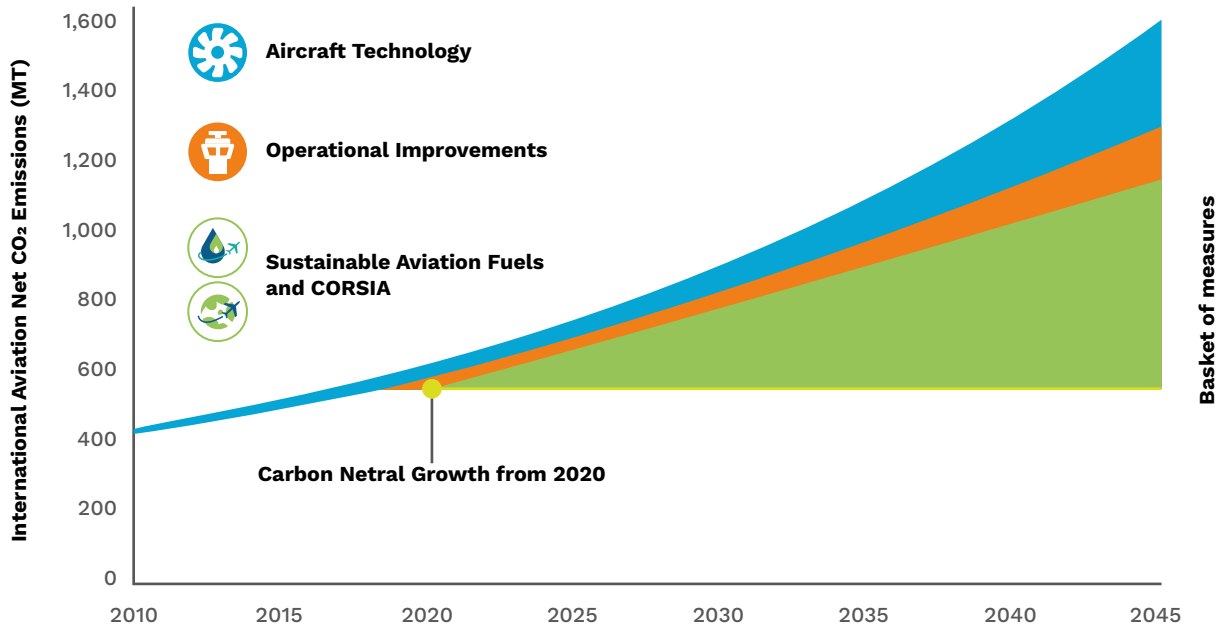
Carbon neutral growth from 2020



Basket of measures
Complemented by

CORSIA

State Voluntary Action Plans



40th ICAO Assembly: Explore the feasibility of a Long-term Aspirational Goal (LTAG)

ICAO State Action Plans

Planning and reporting on initiatives
to reduce aviation CO₂ emissions



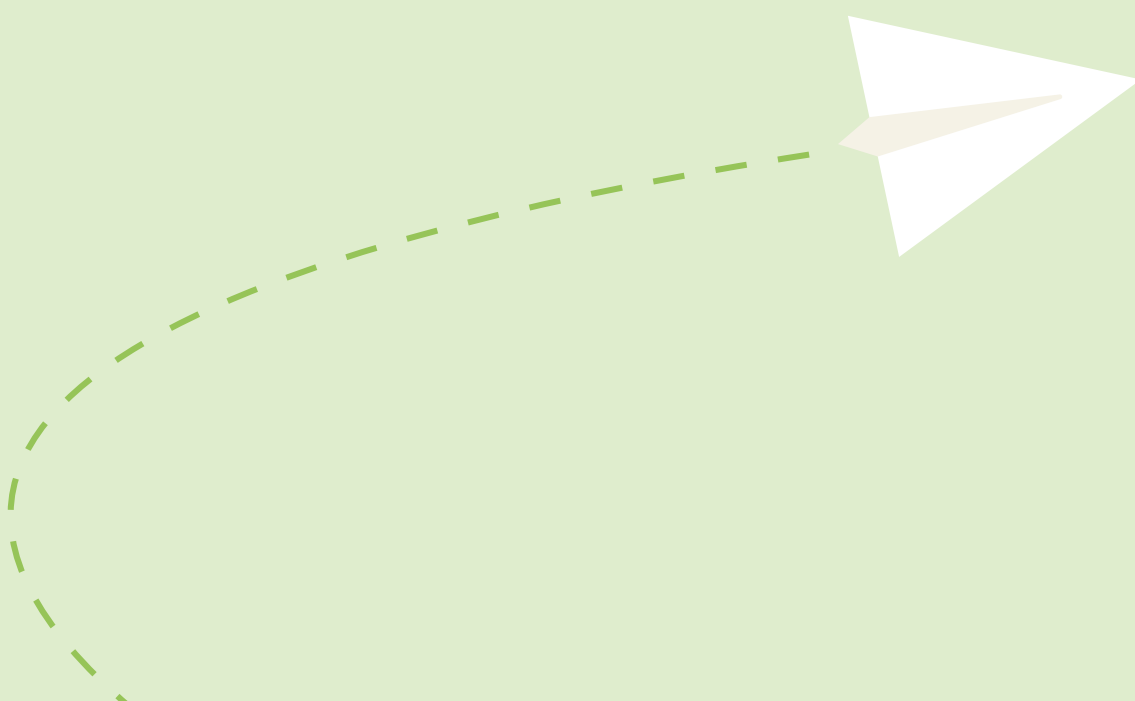
Aviation Green Transition - ICAO State Action Plans

Since the beginning of ICAO's journey to progress in terms of policy development and standards setting to limit and reduce the impact of aviation on the global climate, Member States expressed interest in taking action and advancing initiatives on environmental protection. However, not all of them had the human, technical and financial resources to do so. To overcome this challenge, ICAO launched the State Action Plan initiative in 2010 as a means to provide States with the capacity and tools to take action.

The ICAO State Action Plans initiative enables all Member States to establish a long-term strategy on climate change for the international aviation sector, involving all interested parties at national level. These parties are encouraged to work together to define a quantified baseline scenario, select appropriate CO₂ mitigation measures from ICAO's basket of measures, and calculate the expected results of implementing those measures. The level of detail submitted within State Action Plans will ultimately enable ICAO to determine the global progress made towards

meeting the global aspirational goals. States are encouraged to update their State Action Plans every three years, so that ICAO can continue to compile the quantified information submitted.

As of October 2021, 121 Member States (representing 97.52% of the global international aviation traffic in Revenue Tonne Kilometres (RTK)) voluntarily developed and submitted their action plans to ICAO.



121 States representing 97.52% of global international aviation traffic have voluntarily submitted their State Action Plan to ICAO



In order to support Member States with the development and update of their State Action Plans, ICAO has regularly organized seminars in all ICAO regions, and developed a series of guidance documents and quantification tools. To facilitate the dissemination of resources to States for the development of their action plans, ICAO also implemented two capacity building and assistance projects, in partnership with the

European Union (EU), and with the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF). Both projects have successfully delivered a series of outcomes, leading to the submission of quantified State Action Plans and the development of guidance material. More information on these projects is available on the [Capacity Building and Assistance](#) page under the ICAO website.

CORSIA

The first global market-based measure that applies to an industrial sector



CORSIA Implementation

The ICAO's agreement on Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) – the first-ever global market-based measure addressing carbon emissions of any industry sector, reflects many years of intensive efforts by ICAO and its Member States in cooperation with the aviation industry.

The timely implementation of CORSIA has been a top priority for ICAO since the scheme's adoption, at the 39th Session of the ICAO Assembly in 2016. Despite the challenges of the COVID-19 pandemic on international aviation, the joint efforts of ICAO Member States have made possible the implementation of CORSIA according to its established schedule.



Milestones for CORSIA Implementation

- In June 2018 – less than 2 years from the adoption of CORSIA – the ICAO Council adopted the Standards and Recommended Practices that put in place the concrete and robust CO₂ emissions Monitoring, Reporting and Verification (MRV) framework of CORSIA;
- In July 2018, ICAO launched the Assistance, Capacity-building and Training for CORSIA (ACT-CORSIA) programme to assist the implementation of the Scheme in partnerships with Member States;
- On 1 January 2019, the results of these concerted efforts enabled aeroplane operators to start monitoring, collecting and reporting to their States CORSIA-specific data; and States started reporting CORSIA-specific information and data through the ICAO CORSIA Central Registry on an annual basis. As of 1 November 2021, 117 States had reported 2019 CO₂ emissions data (representing about 97 per cent of emissions), while 100 States had reported 2020 data;
- 1 January 2021 was another key date for the Scheme, as it heralded the beginning of the CORSIA pilot phase and the onset of calculating CO₂ offsetting requirements, which aeroplane operators need to meet through the use of CORSIA eligible fuels and CORSIA eligible emissions units;
- In this regard, prior to 2021, all necessary CORSIA Implementation Elements had been put in place to facilitate the smooth operation of the Scheme. The ICAO Council approved the sustainability criteria, life-cycle CO₂ reduction values and methodologies, and certification schemes for CORSIA eligible fuels (i.e. sustainable aviation fuel and lower carbon aviation fuel) that are used during the CORSIA pilot phase (2021 to 2023). The ICAO Council also approved eight emissions unit programmes that can supply CORSIA eligible emissions units for the pilot phase. Work is continuing to provide updates on these two elements, including their application after the pilot phase;
- The number of Member States that decided to voluntarily participate in the offsetting requirements of CORSIA has increased from 88 States for 2021, to 107 States for 2022. More participating States brings ICAO closer to meeting the global aspirational goal of carbon neutral growth for international aviation; and
- In October 2021, on the 5th anniversary from the adoption of CORSIA, ICAO organized the CORSIA Forum, which provided an overview of the “state of play” in CORSIA implementation, and served as a platform for States to share success stories and lessons learned regarding CORSIA implementation. The Forum also provided information on the process and progress for the 2022 CORSIA periodic review and the analysis of the impact of COVID-19 on CORSIA and recovery scenarios, with a view to ensuring a solid information base for the discussions at the 41st Session of the ICAO Assembly in 2022.

ACT-CORSIA (Assistance, Capacity-building and Training for CORSIA) Programme

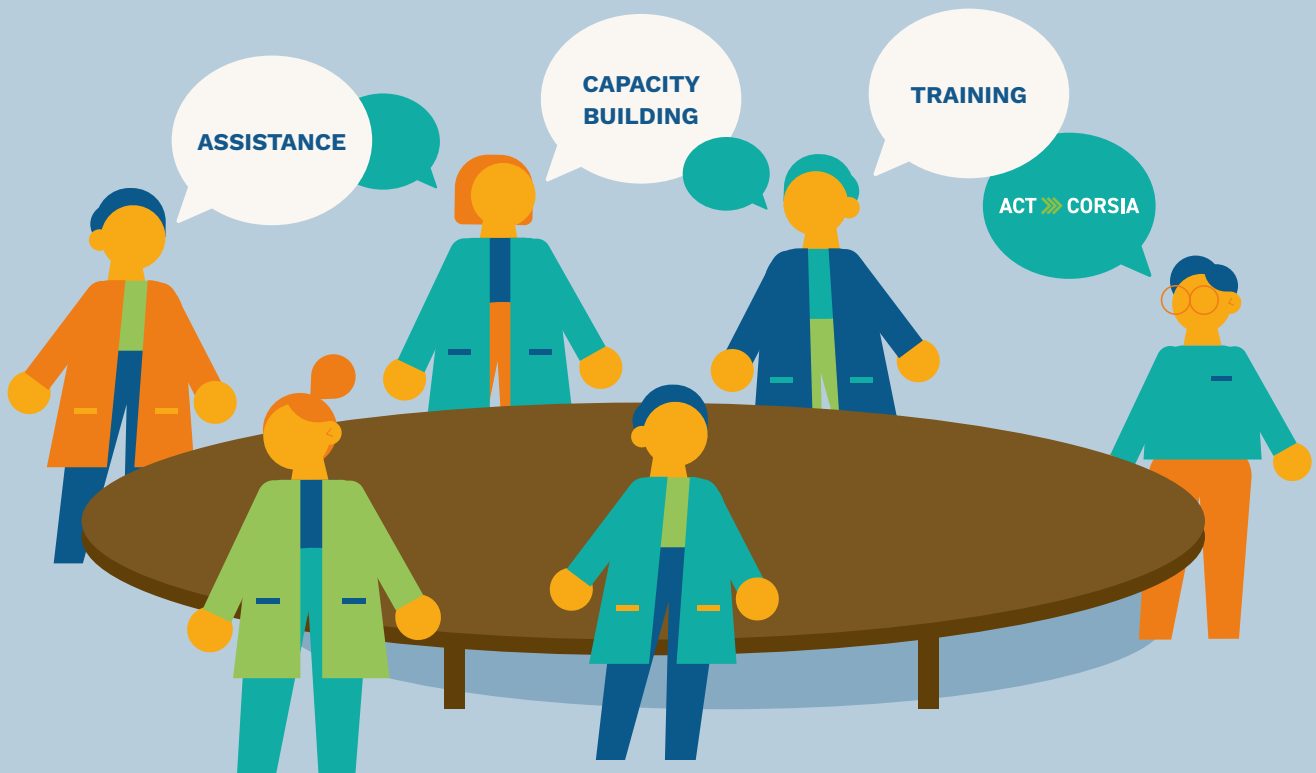
In July 2018, ICAO launched the ACT-CORSIA (Assistance, Capacity-building and Training for CORSIA) programme as part of the ICAO's No Country Left Behind initiative, with the aim to assist all Member States with the implementation of CORSIA. The 2019 Assembly emphasized the importance of a coordinated approach under the ACT-CORSIA to harmonize and bring together all relevant actions and promote coherence to capacity building efforts.

The Buddy Partnerships among States are the cornerstone of the ACT-CORSIA programme, currently involving 16 supporting States and 118 requesting States. Through such partnerships, supporting States offer experts on CORSIA to provide individual training and undertake the necessary follow-up with the CORSIA focal points of the requesting States, in close coordination with the ICAO Secretariat. In this regard, those

experts from supporting States have been trained by ICAO to provide harmonized training to the requesting States.

The ICAO ACT-CORSIA became one of the most successful capacity-building programmes for climate change, actively involving more than 130 States, and a live example of the spirit of ICAO's "No Country Left Behind" initiative.

Recognizing the importance of providing continued support to States for CORSIA implementation, ICAO Secretariat has also organized a series of seminars/webinars and training sessions, which focused on the verification of CO2 emissions from international aviation, and hands-on training for the use of CORSIA Central Registry.



ACT >>> CORSIA Phase III Assistance, Capacity-building and Training on CORSIA

AUSTRALIA 1. BRUNEI DARUSSALAM 2. INDONESIA 3. NAURU 4. PAPUA NEW GUINEA 5. SRI LANKA 6. THAILAND	KENYA 1. RWANDA 2. SEYCHELLES 3. SOUTH SUDAN 4. UGANDA
BRAZIL 1. ANGOLA 2. CABO VERDE 3. MOZAMBIQUE 4. SAO TOME AND PRINCIPE	NEW ZEALAND 1. FIJI 2. SAMOA 3. SOLOMON ISLANDS 4. VANUATU
CANADA (Facilitated by CASSOS) 1. ANTIGUA AND BARBUDA 2. BARBADOS 3. GUYANA 4. HAITI 5. JAMAICA 6. SURINAME 7. TRINIDAD AND TOBAGO	NIGERIA 1. GAMBIA 2. GHANA 3. LIBERIA 4. SIERRA LEONE 5. SUDAN
CANADA / FRANCE 1. BENIN 2. BURKINA FASO 3. BURUNDI 4. CAMEROON 5. CENTRAL AFRICAN REPUBLIC 6. CHAD 7. COMOROS 8. CONGO 9. DJIBOUTI 10. D. R. OF CONGO 11. GABON 12. GUINEA 13. MADAGASCAR 14. MALI 15. MAURITANIA 16. MAURITIUS 17. NIGER 18. SENEGAL 19. TOGO	REPUBLIC OF KOREA 1. LAO PEOPLE'S D. R. 2. MONGOLIA 3. PAKISTAN 4. PHILIPPINES 5. VIETNAM
FRANCE (* Facilitated by ACAO) 1. ALGERIA * 2. COTE D'IVOIRE 3. MOROCCO * 4. SAUDI ARABIA * 5. TUNISIA *	QATAR 1. BAHRAIN 2. IRAN 3. IRAQ 4. KUWAIT 5. LIBYA 6. OMAN
GERMANY 1. ALBANIA 2. ARMENIA 3. AZERBAIJAN 4. BELARUS 5. GEORGIA 6. KAZAKHSTAN 7. NORTH MACEDONIA 8. REPUBLIC OF MOLDOVA 9. SERBIA 10. TAJIKISTAN 11. TURKMENISTAN	SINGAPORE 1. COOK ISLANDS 2. KIRIBATI 3. MARSHALL ISLANDS 4. PALAU 5. TONGA 6. TUVALU
ITALY 1. BAHAMAS 2. COLOMBIA 3. ERITREA 4. ETHIOPIA 5. PARAGUAY 6. SOMALIA 7. UNITED REPUBLIC OF TANZANIA	SOUTH AFRICA 1. BOTSWANA 2. ESWATINI 3. LESOTHO 4. MALAWI 5. NAMIBIA 6. ZAMBIA 7. ZIMBABWE
JAPAN 1. AFGHANISTAN 2. BANGLADESH 3. BHUTAN 4. CAMBODIA 5. MALAYSIA 6. MYANMAR	SPAIN (* Facilitated by COCESNA) 1. BELIZE * 2. BOLIVIA 3. COSTA RICA * 4. CUBA 5. EL SALVADOR * 6. EQUATORIAL GUINEA 7. GUATEMALA * 8. HONDURAS * 9. MEXICO 10. NICARAGUA * 11. PERU 12. URUGUAY
	USA 1. ARGENTINA 2. DOMINICAN REPUBLIC 3. ECUADOR 4. PANAMA
	
16 SUPPORTING STATES 118 REQUESTING STATES	

2022 CORSIA Periodic Review

The ICAO Council has initiated its work on the 2022 CORSIA periodic review as requested by the 40th Session of the ICAO Assembly. This process serves as an important basis for the Council to consider whether it is necessary to make adjustments to CORSIA in the future, and to recommend such adjustments to the ICAO Assembly for its decision in 2022.

In March 2021, the Council agreed on the process and methodology for the CORSIA periodic review toward 2022, and on the framework for the consideration of inputs from its technical bodies. A consultation process with Member States

through a questionnaire was also undertaken during the third quarter of 2021, and the Council has been considering the replies of Member States, during its ongoing 224th Session.

As part of the 2022 CORSIA periodic review, the Council has also been examining the impact of COVID-19 on CORSIA covering various issues, including the impact on the CORSIA baseline emissions and associated cost impacts in its future phases. Any recommendations by the Council as result of the CORSIA review will be considered by the 41st Session of the ICAO Assembly in September 2022.

Feasibility of a Long-term Global Aspirational Goal for International Aviation

Looking into the future



Aviation Green Transition - Long-term Global Aspirational Goal for International Aviation

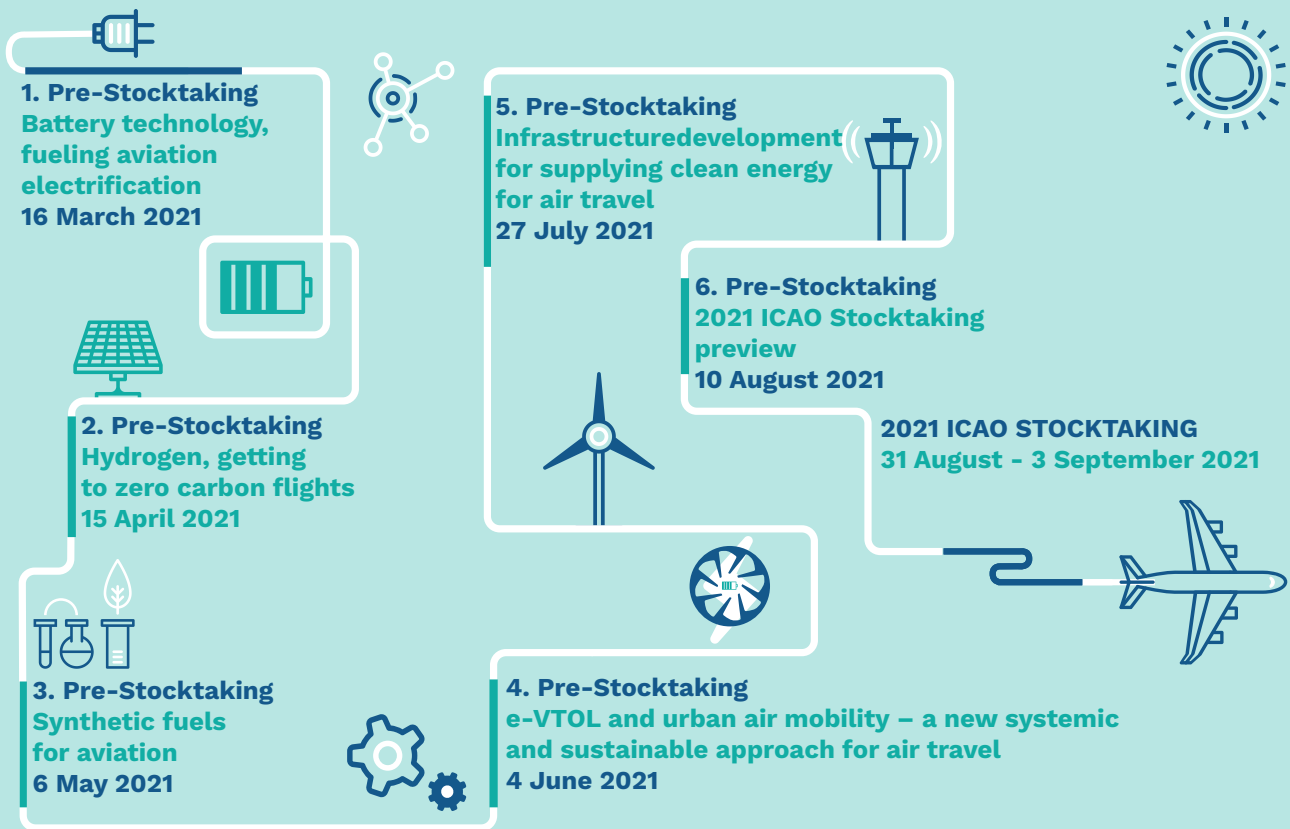
The 40th Session of the ICAO Assembly requested the ICAO Council to assess the feasibility of a long-term global aspirational goal (LTAG) for international aviation. It requested that this work be carried out through conducting detailed studies assessing the attainability and impacts of any goals proposed, including the impact on growth as well as costs in all countries, especially developing countries. The ICAO Assembly requested that the progress of the work to be presented to the 41st Session of the ICAO Assembly in 2022.

Data Collection and Stocktaking

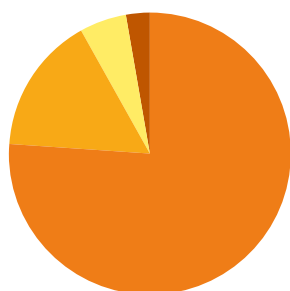
Data collection on CO₂ emissions reductions from green technologies and innovations is a key component for this LTAG work. In 2020 and 2021, ICAO organized Stocktaking Seminars in order to bring together Member States, industry leaders, researchers, innovators and civil society advocates, and to share information on their ambitious plans, solutions and policies for decarbonizing international aviation, including measures from technology, operations and fuels.

For example, evolutionary aircraft technologies may introduce approximately 20% improvements in fuel efficiency to each new generation of aircraft by the middle of the century. In addition, the aviation sector will likely see more radical changes in technologies, such as the introduction of electric/hybrid and hydrogen powered aircraft serving regional, short-haul, and perhaps medium-to long haul routes. These are currently the object of concrete R&D projects.

Sustainable fuels and clean energy sources can play a major role in reducing aviation emissions. The main advantage of drop-in aviation fuels is that they do not require changes to the aircraft or its fuel infrastructure, and more than 40 airports worldwide have already distributed sustainable fuels on their regular operations. While liquid fuels may remain necessary for air transport, these fuels may undergo a full transition to sustainable low carbon sources. Fuels today can be made from various waste types, like Municipal Solid Waste, forestry and agricultural residues, and even from CO₂ recycled or directly captured from the atmosphere.



ICAO Global Coalition for Sustainable Aviation and and Tracker Tools



Coalition partners distribution

- Industry **76.3%**
- Academia **15.8%**
- Non Governmental Organization **5.1%**
- Government **2.6%**

Aviation Green Transition - Long-term Global Aspirational Goal for International Aviation

Recently in October 2021, the global air transport industry adopted a long-term climate goal of net-zero carbon emissions by 2050, confirming the commitment of the world's airlines, airports, air traffic management and the manufacturers of aircraft and engines to reduce CO2 emissions. ICAO has been collecting information on aviation in-sector CO2 emissions reductions activities through the ICAO Tracker Tools, focusing on three streams of activities: technology, operations and sustainable fuels, as well as aviation net zero initiatives.

ICAO has also been working to bring together the ICAO Global Coalition for Sustainable Aviation to facilitate the development of green innovative technologies and to accelerate the implementation of such innovative solutions to reduce greenhouse gas emissions at source.

Within the ICAO Committee on Aviation Environmental Protection (CAEP), a dedicated Task Group on LTAG was established to provide technical support to the Council. The main activities of the CAEP group are related to data gathering, scenario development, and analysis of the generated scenarios including the cost impacts estimation. CAEP aims to finalize its technical work on LTAG at the CAEP/12 meeting in February 2022.



LTAG Global Aviation Dialogues (GLADs) and High-level Meeting

To ensure a transparent and inclusive process through consultation among Member States, ICAO organized a series of regional Global Aviation Dialogues (GLADs) dedicated to LTAG in 2021. The dialogues raised awareness on the ICAO's work on LTAG, and enabled the exchange of views among Member States. Due to high interest to receive more information, in particular on the outcome of CAEP's technical work in February 2022, a second round of GLADs is planned from March to April 2022.

ICAO is currently considering the convening of a High-level Meeting on LTAG in mid-2022 to facilitate convergence of the views of Member States on the long-term CO₂ emissions reduction scenarios and options for LTAG, as well as on the means for the realization of the LTAG. These dialogues and meetings will inform the ICAO Council to make any recommendation on LTAG, for consideration by the 41st Session of the ICAO Assembly in September 2022.

ICAO LTAG Work General Timeline



UNFCCC – Climate finance

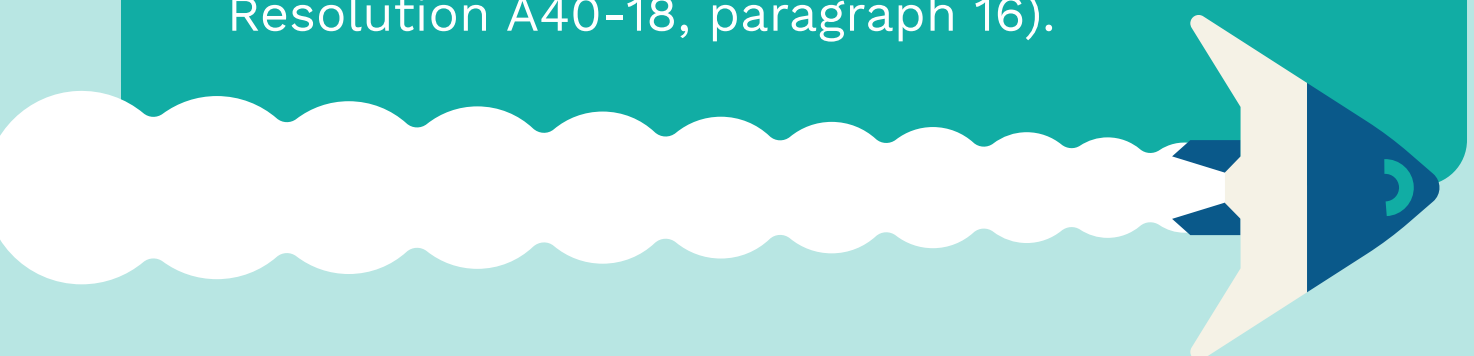
While the Paris Agreement and associated COP21 decision did not include a reference to international aviation, one of the key elements in the Agreement is that developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, with a concrete roadmap to achieve the goal of jointly providing USD 100 billion annually for mitigation and adaptation.

It should be highlighted that in 2010, ICAO Member States adopted global aspirational goals for the international aviation sector of improving the sector's fuel efficiency by two per cent per year and keeping its global CO₂ emissions from 2020 at the same level (carbon neutral growth from 2020), and these

aspirational goals were affirmed by the 38th (2013), 39th (2016) and 40th (2019) Sessions of the ICAO Assembly. In addition, ICAO Member States have been exploring the feasibility of a long-term global aspirational goal for international aviation.

The achievement of the ICAO global aspirational goals requires adequate financial resources within the sector itself, enabling it to effectively respond to the global climate change challenge. The growing commitment of ICAO partners to support ICAO's capacity-building and assistance efforts also demonstrates how critical these activities and resources are to the achievement of ICAO's global aspirational goals.

In this regard, the 40th Session of the ICAO Assembly urged that “ICAO and its Member States express a clear concern, through the UNFCCC process, on the use of international aviation as a potential source for the mobilization of revenue for climate finance to the other sectors, in order to ensure that international aviation would not be targeted as a source of such revenue in a disproportionate manner” (refer to Assembly Resolution A40-18, paragraph 16).





ICAO