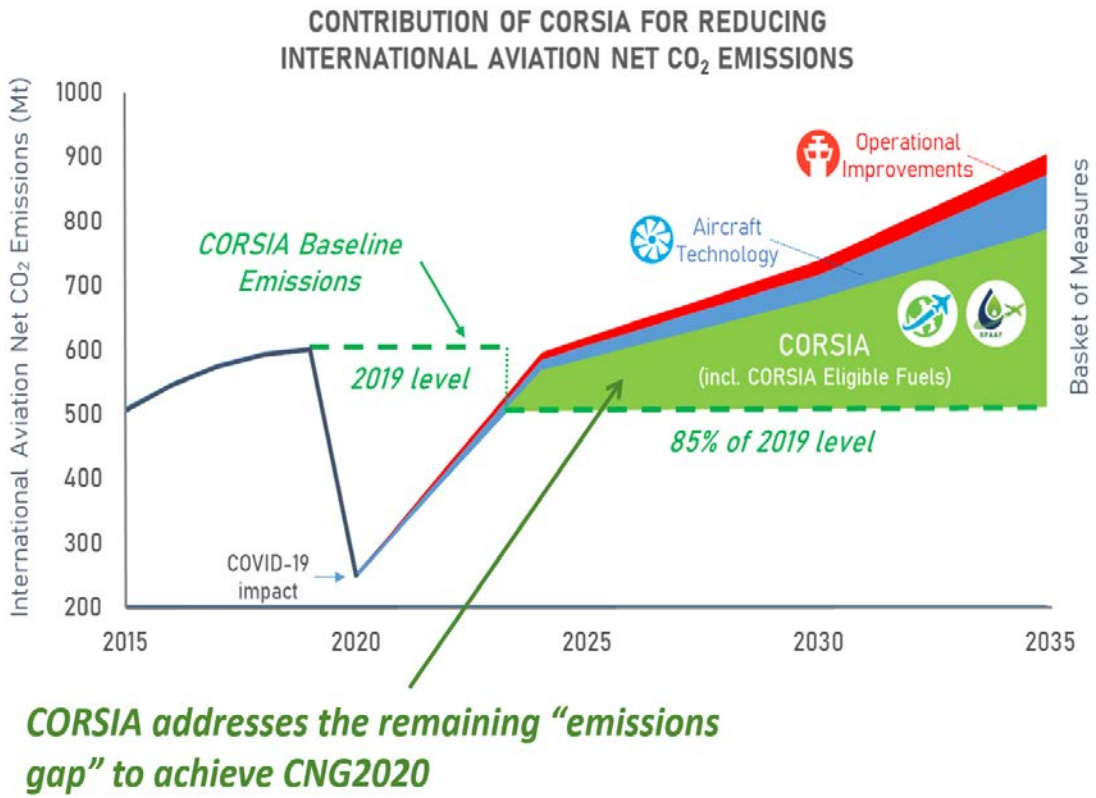
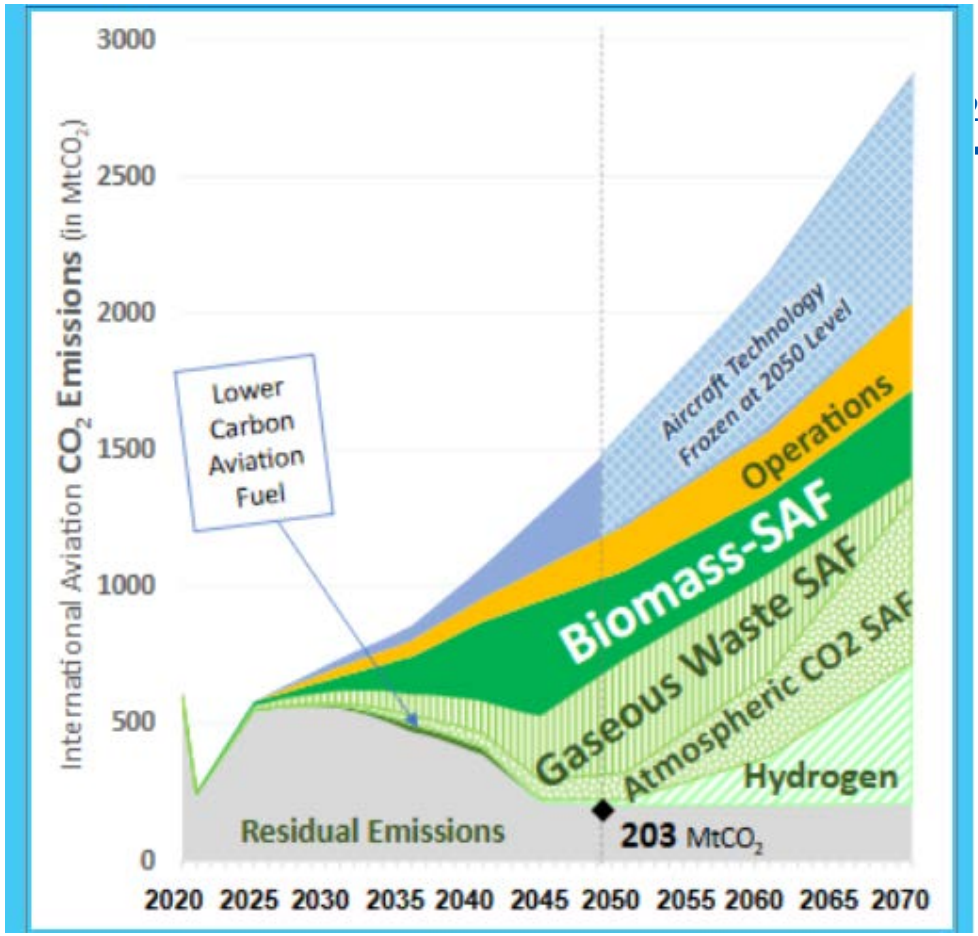
State Action Plan for CO_2 Emissions Reduction from International Aviation

ICAO Goals and scenario





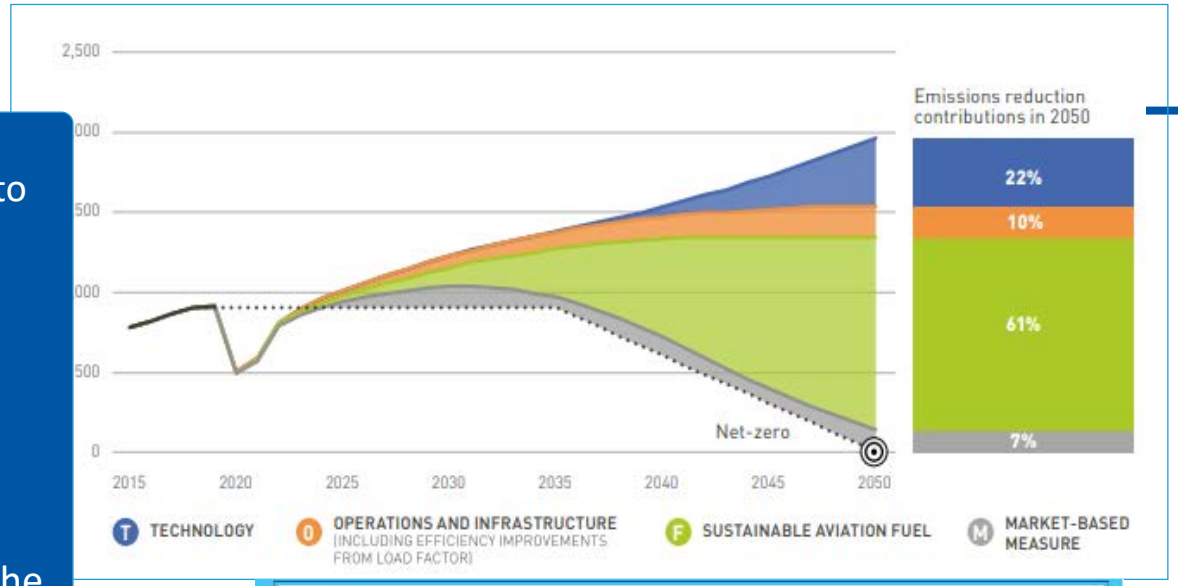
https://www.youtube.com/watch?v=9jj8LyLcu2w

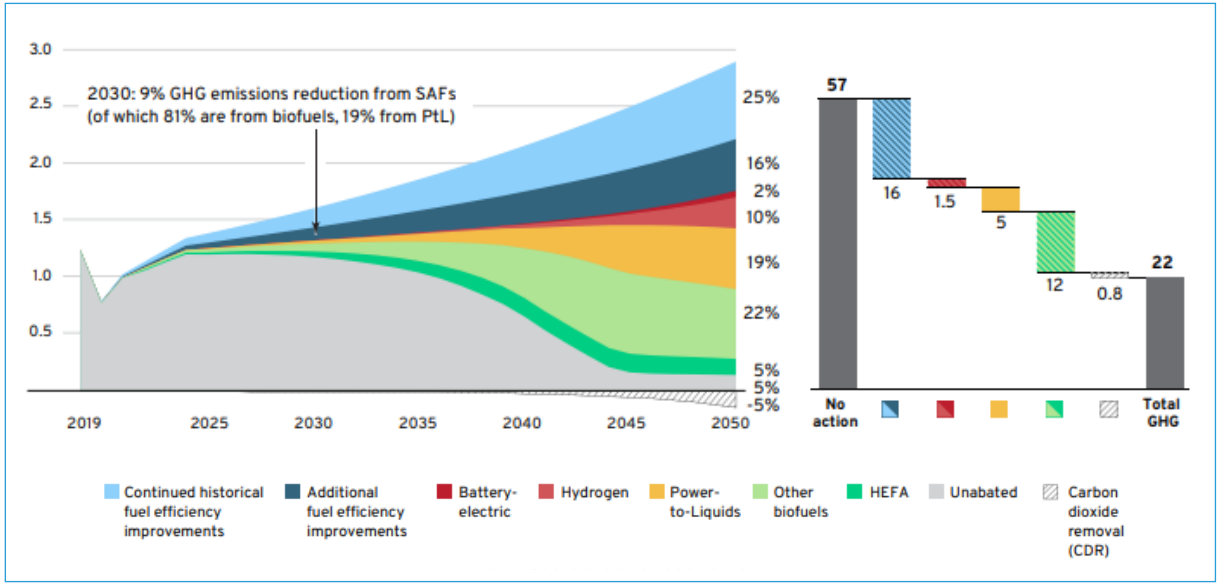
Long-term global aspirational goal (LTAG)

The 41st ICAO Assembly adopted a long-term global aspirational goal (LTAG) for international aviation of net-zero carbon emissions by 2050 in support of the UNFCCC Paris Agreement's temperature goal.

Decarbonisation Scenarios

- Different perspectives, similar conclusions
  - New Fuels (SAF and LCAF) are essential and the biggest contribution to decarbonisation ahead of 2050 and beyond
  - New Technology will make an impact no earlier than 2040
  - Operational improvements (direct savings)
  - Market-based measures will be still necessary to reach net-zero by 2050
- Decarbonisation requires intensive collaboration and high ambitions from all actors (Governments, Industry, R&D, civil society, Finance)
- Need of an orchestrated action plan involving all concerned actors of the State

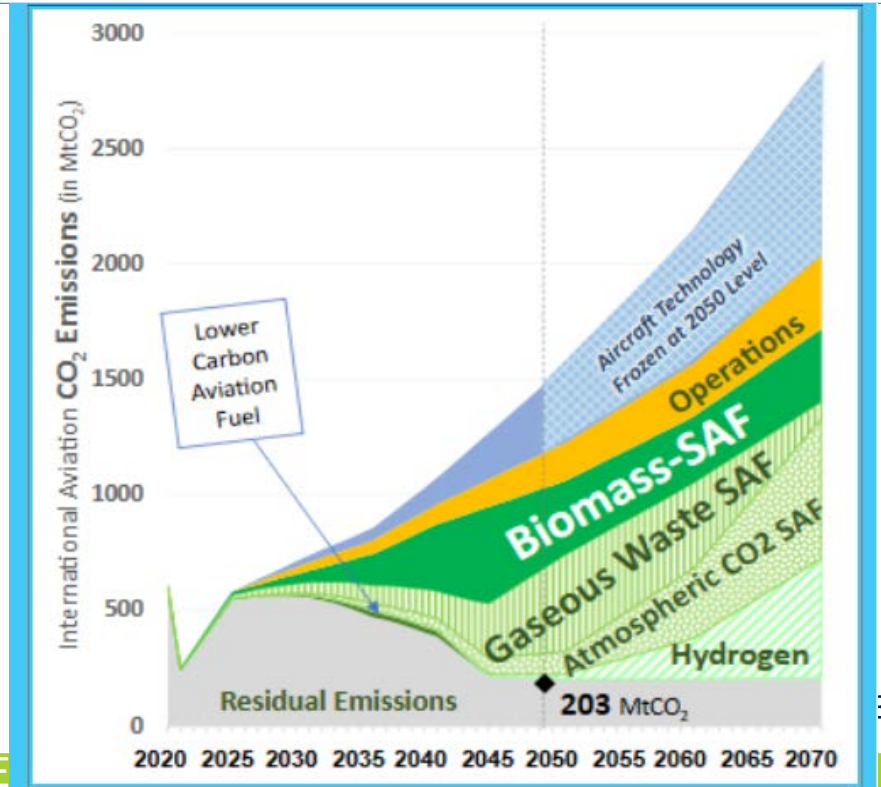




Sources: ICAO LTAG Report, March 2022 – Integrated Scenario 2

WEF, Making Net-Zero Aviation Possible – Prudent Scenario

ATAG, Waypoint 2050 – Scenario 1: pushing technology and operations



Background

- **Resolution A37-19 (2010): *Resolution on Climate change*** established the State Action Plan initiative
- **Resolution A38-18 (2013), Resolution A39-2 (2016) , Resolution A40-18 (2019):** reaffirmed this initiative.
- **Resolution A41-21 (2022) and**
- **Resolution A42-21 (2025): *Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change*** → (…) *Recognizing the need to* ***further develop and update State Action Plans****, including the quantification of CO_2 emissions reduction benefits with practical tools, for sustainable aviation and infrastructure with the focus on environment-driven innovations*;

Further encourages States to submit and update their **voluntary action plans** outlining respective policies, actions and roadmaps, including long-term projections

(A42-21 Para. 12)

Invites States to **prepare or update** action plans to submit them to ICAO **as soon as possible preferably by the end of June 2027** and once every three years thereafter

(A42-21 Para. 13)

Encourages to share information contained in action plans and **build partnerships** with other Member States

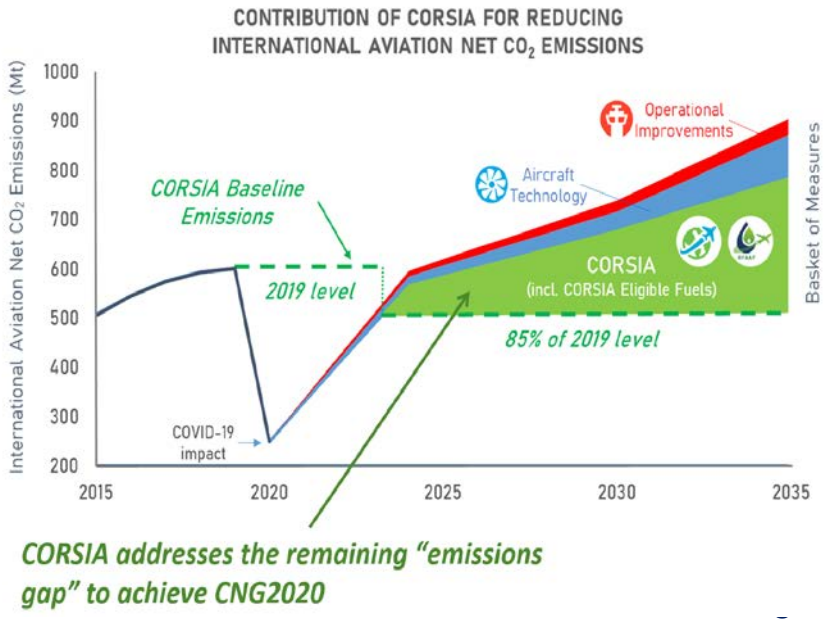
(A42-21 Para. 14)

SAP as an ICAO initiative

ICAO ENVIRONMENT

- The ICAO State Action Plan initiative is one of ICAO's most successful voluntary climate action programmes, demonstrating strong global commitment to aviation decarbonization.
- The quantified information submitted in State Action Plans enables ICAO to compile global progress toward its aspirational climate goals, including:

- **2% annual fuel efficiency improvement**
- **Carbon neutral growth from 2020 onwards (85% of 2019 emissions)**
- **Collective Long-Term Global Aspirational Goal (LTAG) of net-zero carbon emissions by 2050, and**
- **5% reduction in CO2 emissions by 2030 through the use of aviation cleaner energies**



State Action Plans: Key to Achieving LTAG

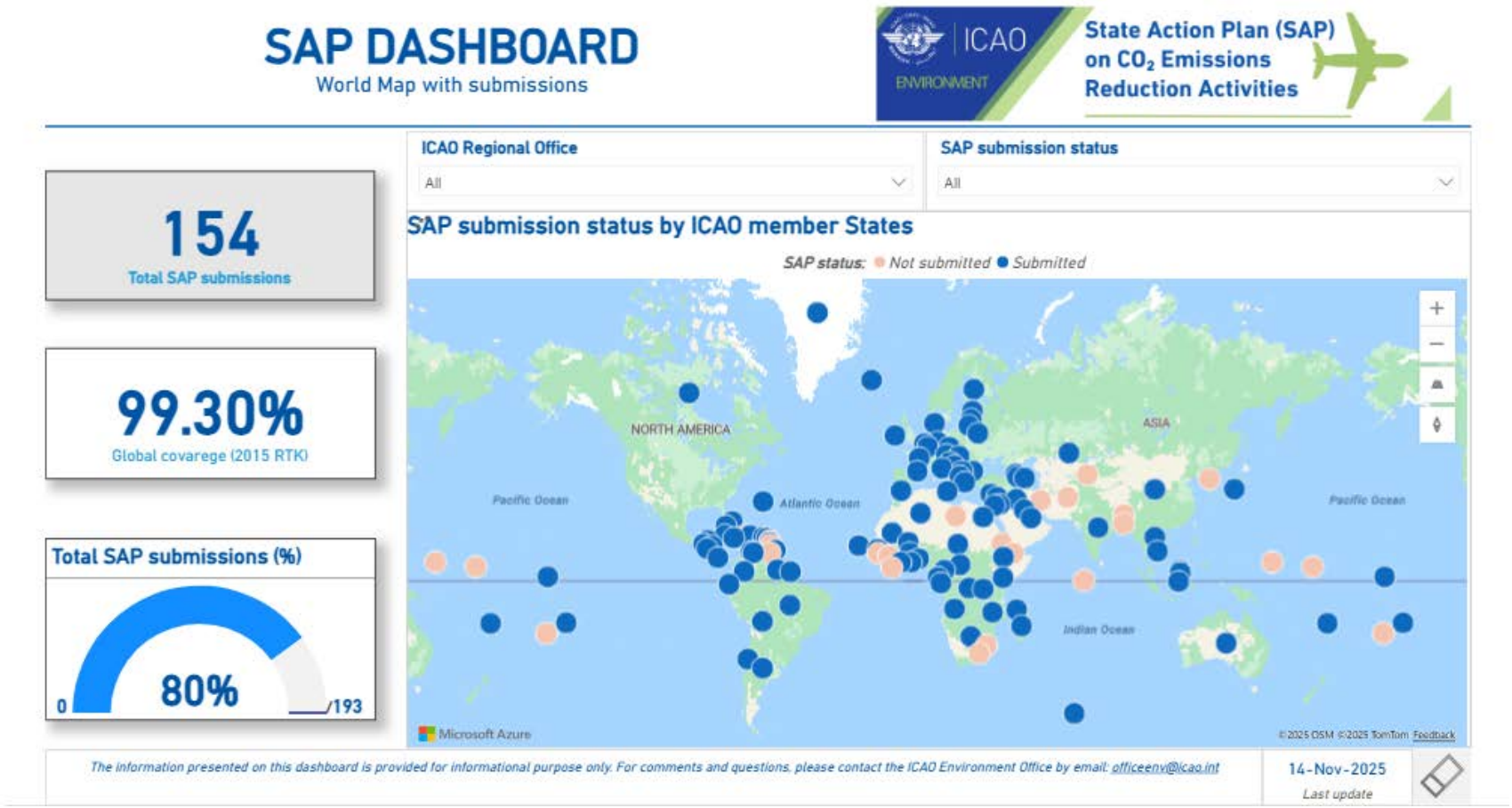
ICAO LTAG
Adopted by ICAO Assembly Resolution A41-21 (2022)
https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A41-21_Climate_change.pdf

State Action Plans are vital for monitoring the progress towards the LTAG of net-zero emissions by 2050.

- **Mandate from ICAO Assembly Resolution A41-21 (Paragraph 9):** ICAO Resolution A41-21 designates SAPs as a key **LTAG monitoring tool.**
- **Transparency & Accountability:** SAPs provide a structured way for States to **report emissions data**, **share mitigation strategies**, and **demonstrate commitment** to achieve aspirational goals.
- **Data-Driven Assessments:** Supports ICAO's data-driven assessments and policy guidance.

ICAO ENVIRONMENT

Latest achievement on SAP submissions



154 States representing **99.30% of global RTK** have voluntarily submitted their State Action Plan

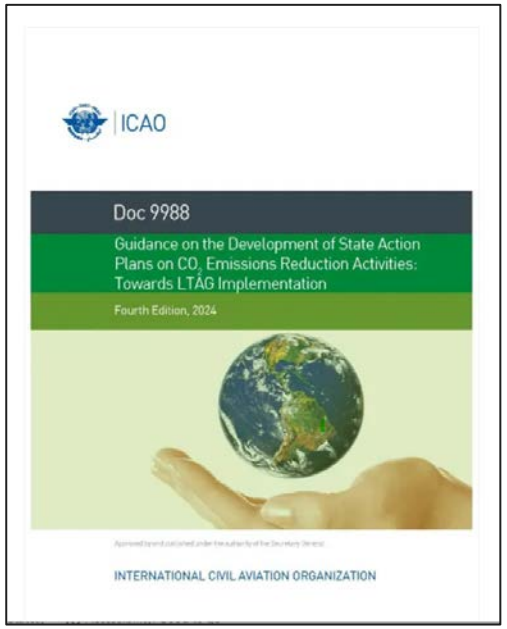
ICAO State Action Plans Website

What is a State Action Plan?

- State Action Plans are a voluntary strategic documents developed by States to outline their national long-term strategies in reducing CO2 emissions from international aviation
- framework for setting emissions reduction targets, selecting mitigation measures, and engaging relevant national stakeholders
- It is a living document to be updated every 3 years

A State Action Plan is a living document that defines a State's actions to reduce their CO_2 emissions from international civil aviation.

Within a State it is a planning and coordination tool, and it provides a clear communication route to ICAO.



Purpose of the State Action Plan

- **State**

  - ✓ to voluntarily report international aviation CO2 emissions to ICAO and develop a better understanding of the projections of international aviation CO2 emissions
  - ✓ to voluntarily outline their respective policies and actions to ICAO
  - ✓ to voluntarily provide information to ICAO on the basket of measures implemented for emission reduction and on any specific assistance needs

Purpose of the State Action Plan

- **ICAO**

✓to compile information and quantified data in relation to the achievement of the global aspirational goals

✓ to facilitate the dissemination of best practices related to the implementation of mitigation measures and economic and technical studies

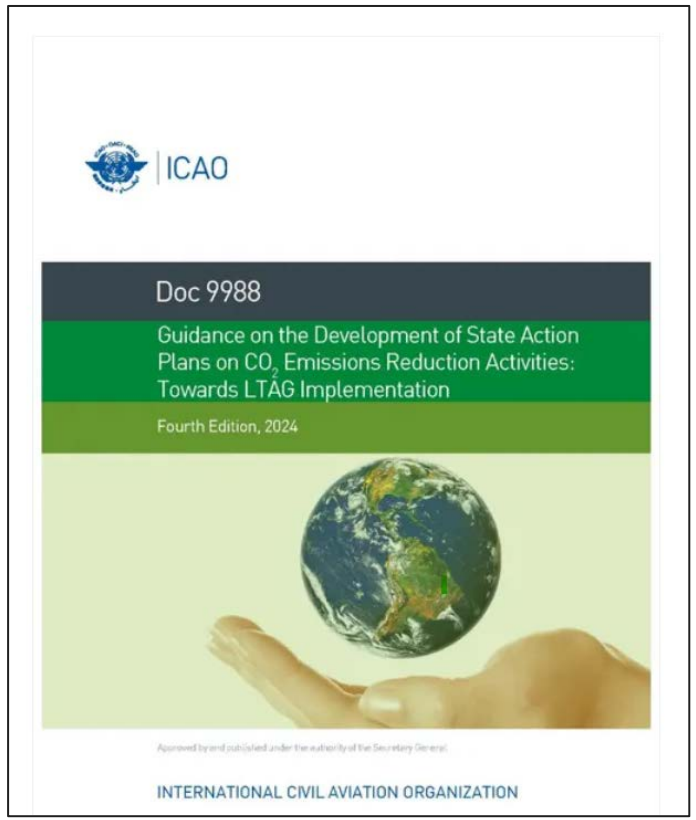
✓ to provide guidance and other technical assistance for the preparation of action plans

✓ to identify and respond to States' needs and provide assistance

SAP as an opportunity for the States

- → Make the decarbonisation commitments visible and quantifiable
- → Outline and showcase the contributions to the achievement of ICAO global aspirational goals
- → Collaborate with other actors to achieve greater reductions in measures out of your reach or to reduce the cost of the measures
- → Discuss and define the most adequate plan (synergies and timelines) for all parties
- → Show robust and credible management of decarbonisation initiatives, easing access to finance

Benefits of developing a SAP for the State



- Better understand the share and projections of international emissions
- Experience enhanced cooperation between all aviation stakeholders
- Identify the most relevant mitigation actions
- Streamline policies
- Enhance stakeholders' support and understanding for policy decisions
- Establish cross-sectoral partnerships
- Promote capacity-building
- Multiply the environmental effects of mitigation measures
- Facilitate technology transfer
- Identify assistance needs for the implementation of mitigation measures
- Share ambitious aviation targets and roadmaps for implementation
- Facilitate access to green financing

What is the process of developing a State Action Plan?

State Action Plan Process

States nominate Focal Point

Focal Point establishes SAP Team with Stakeholders in the State

Choose methodology to account CO2 emissions (ICAO or IPCC)

Collect fuel consumption, CO2 emissions and air traffic data

Establish baseline,

Project fuel consumption and air traffic data based on historical data collected

Select mitigation measures with SAP Team, and estimate annual CO2 emission savings from selected mitigation measure(s)

Estimate Expected results,

projected future fuel consumption, CO2 emissions and traffic data after the implementation of selected mitigation measures

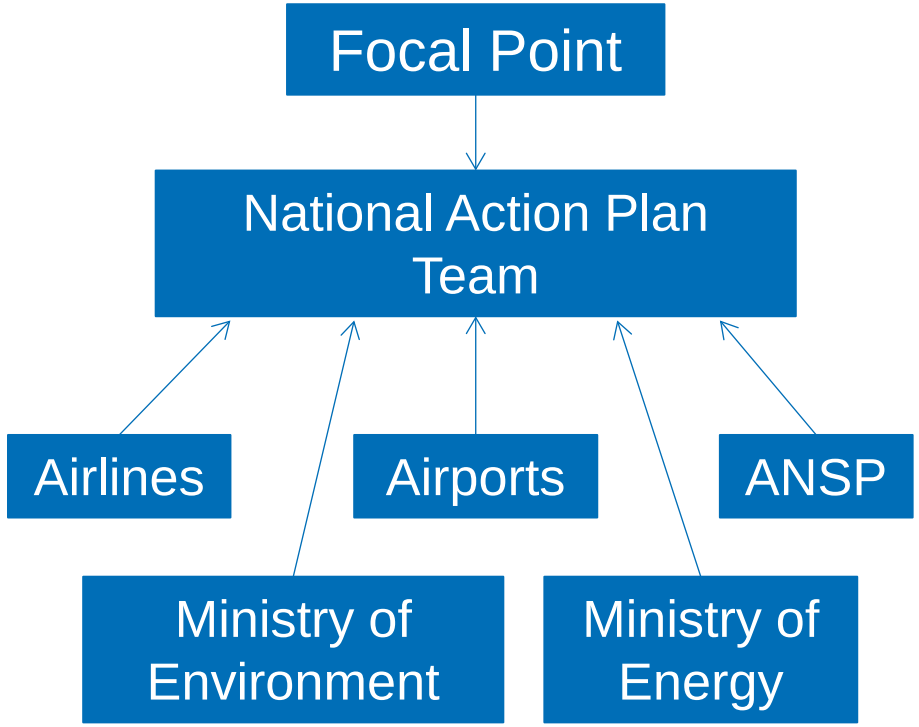
Identify Assistance Needs and include in the action plan

Submit SAP through APER Portal

ICAO

The State Action Plan Process

- **The State**:
  - Designates a State Action Plan Focal Point and communicates their contact information to ICAO
- **The Focal Point:**
  - Coordinates with ICAO
  - Establishes a National Action Plan Team
  - Develops the State Action Plan and submits the document to ICAO



What does a State Action Plan contain?

5 Basic Elements (Minimum Requirements)

1. **Contact Information** of the State Focal Point.
2. **Baseline** (without action) fuel consumption CO2 emissions and traffic (from the latest available year to 2050).
3. **Measures** to mitigate CO2 emissions (deriving from the ICAO Basket of Measures).
4. **Expected results** (fuel consumption, CO2 emissions, and traffic with the implementation of mitigation measures from the latest available year to 2050).
5. **Assistance needs** for example financial, technological or capacity building.

Baseline Scenario

- → The baseline scenario describes the historic **evolution** of fuel consumption, CO_2 emissions, and traffic in the State and the expected **future** evolution **in the absence of action - do nothing scenario**

- → Key points:
  - → Differentiating between international and domestic emissions
  - → Data from all air carriers can be aggregated
  - → Understood to be an estimation only
  - → Not the same as the CORSIA baseline

Doc 9988 Chapter 3

APER, EBT, ICEC

Differentiating between international and domestic emissions

→ **International flight:** the operation of an aircraft from take-off at an **aerodrome of a State** or its territories, and landing at an **aerodrome of another State** or its territories.

→ **Domestic flight:** the operation of an aircraft from take-off at an **aerodrome of a State** or its territories, and landing at an **aerodrome of the same State** or its territories.

Flight	International	Domestic
Between Principal business State and another State	☑	
Between Principal business State and a territory belonging to it.		☑
Between two points in a territory of the principal business State		☑
A multinational carrier operating inside a partner State		☑
Foreign Cabotage traffic	☑	

Annex 16, Volume IV

Doc 9988 Chapter 3

APER, EBT, ICEC

Methodologies to account for the CO2 emissions attributed to international flights

ICAO methodology:

each State reports the CO2 emissions from all international flights, which are operated only by aeroplane operators attributed to the State ;

the attribution of an aeroplane operator to a State shall be determined as per Annex 16, Volume IV, Part II, Chapter 1, 1.2;

all States with registered aeroplane operator(s) are encouraged to follow the ICAO methodology for the accounting of CO2 emissions from international aviation for the purpose of their Action Plans.

IPCC methodology:

each State reports the CO2 emissions from all international flights departing from all aerodromes located in the State or its territories .

Establishing the baseline scenario

Doc 9988 Chapter 3

Define the time horizon and intermediate years → Collect historical activity data and estimate corresponding CO2 emissions → Develop forecasts for air transport activities for related CO2 emissions

The baseline time horizon should correspond to the time horizon set by **ICAO for its aspirational goals** (for example, to 2050 for the LTAG).

States are encouraged to also **provide data for intermediate years** taking into account any relevant decisions by ICAO.

Projections for years beyond the time horizon may also be provided.

Historical fuel consumption and air traffic data is normally **readily available** from aeroplane operators and airport and civil aviation authorities or other national data sources, such as through ICAO Statistics Forms and CORSIA MRV system.

Forecasts for air traffic may be readily available since **many States develop such forecasts for various planning** purposes on a regular basis.

Forecasting emissions may be done using techniques of various levels of complexity.

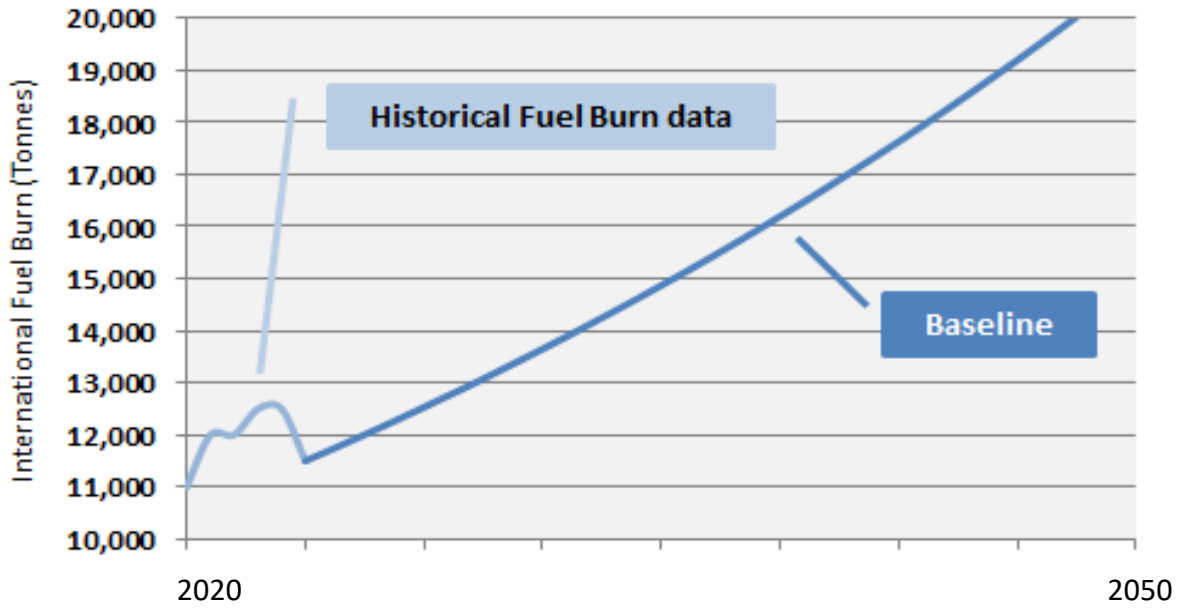
ICAO's Manual on Air Traffic Forecasting (Doc 8991) provides **guidance on air traffic forecasting techniques** and includes some case studies. However, States have the option to select the technique that is suitable to them.

Baseline Scenario example

Doc 9988 Chapter 3

APER, EBT, ICEC

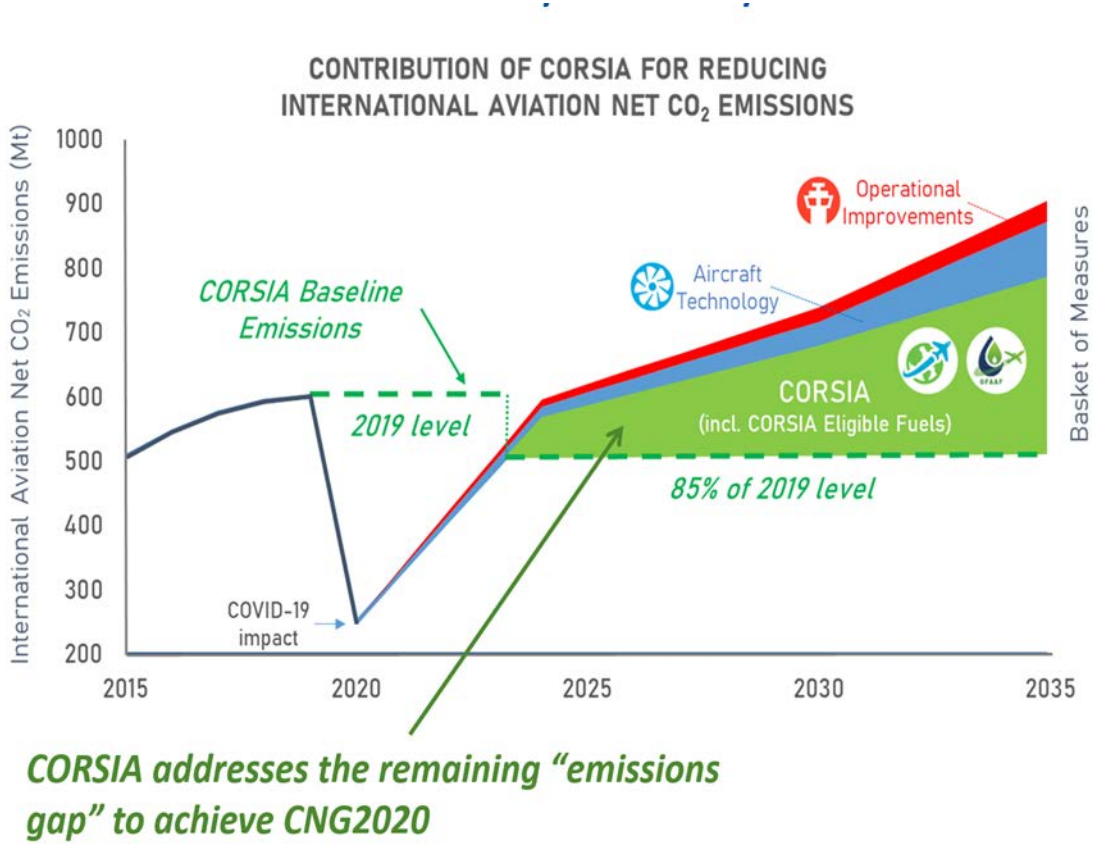
Example			
Year	Historical Data		Fuel efficiency
	RTK * ('000)	Fuel Burn (tonnes)	
2020	25'000	11'000	0.440
2021	30'000	12'000	0.400
2022	32'000	12'000	0.375
2023	33'000	12'500	0.379
2024	32'000	12'500	0.391
2025	30'000	11'500	0.383



*** Revenue-Tonne Kilometre (RTK)** = revenue load (persons and cargo) in tonnes (t) * distance flown in kilometres (km)
RTK represents a measure of the size of air transport

ICAO Basket of Measures

- Aircraft Technology
- Operational Improvements
- Sustainable Aviation Fuels
- Market Based Measures (CORSIA)



Mitigation Measures

Doc 9988 Chapter 4

APER, EBT, ICEC

→ the objective for the State is to describe how CO2 emissions reductions from international aviation will be achieved

→ Selection of measures and quantifying their expected results

- → Review of the basket of measures, their feasibility and emissions reduction potential
- → reflecting respective national capacities and circumstances
- → Prioritization and selection of mitigation measures
- → **Quantifying the effects** on fuel consumption and CO2 emissions from the measures selected

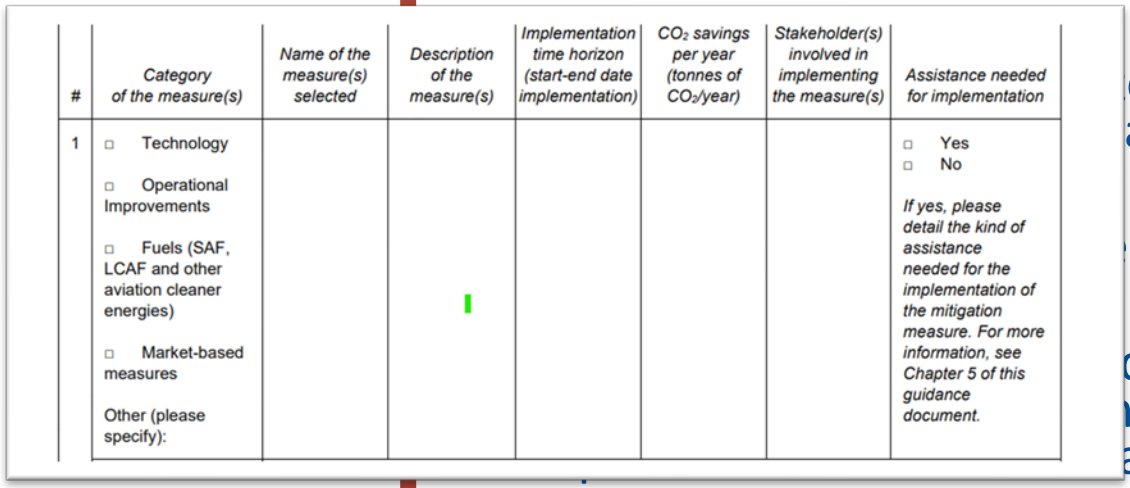
Description of the mitigation measures in the SAP

For each measure in each category

→ an indication of its category (operational, technological, fuels, market-based, etc.)

→ name of the measure as it is known in the State

→ description of the measure



#	Category of the measure(s)	Name of the measure(s) selected	Description of the measure(s)	Implementation time horizon (start-end date implementation)	CO_2 savings per year (tonnes of CO_2/year)	Stakeholder(s) involved in implementing the measure(s)	Assistance needed for implementation
1	☐ Technology ☐ Operational Improvements ☐ Fuels (SAF, LCAF and other aviation cleaner energies) ☐ Market-based measures Other (please specify):						☐ Yes ☐ No *If yes, please detail the kind of assistance needed for the implementation of the mitigation measure. For more information, see Chapter 5 of this guidance document.*

on (start date of full
ate of implementation)

r year from the measure

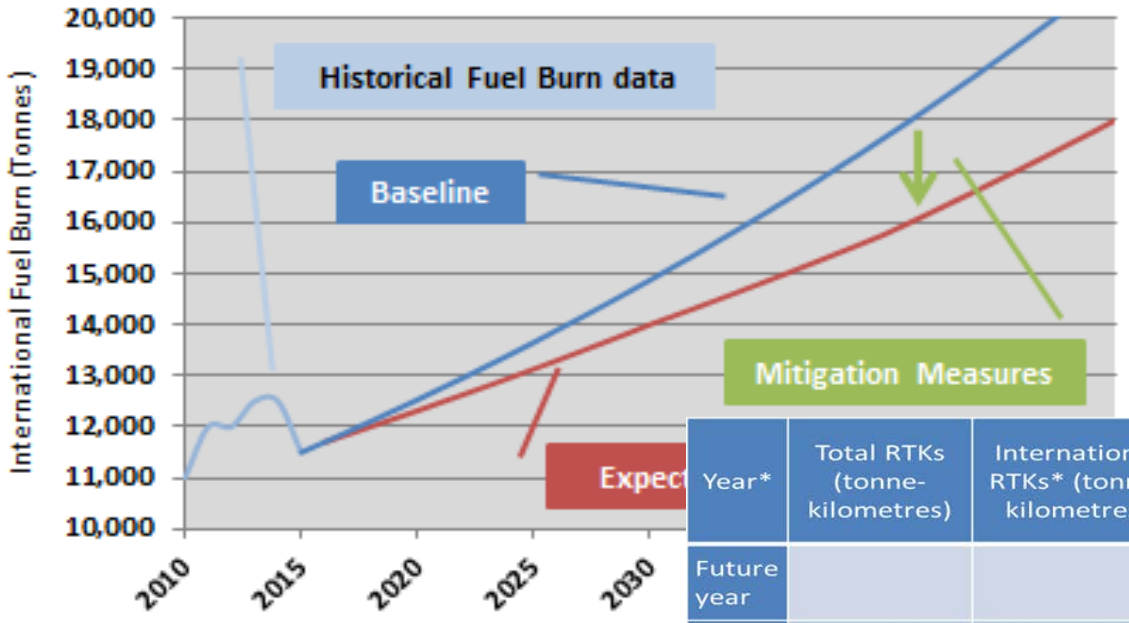
d in the implementation of the
nce needed for the
asure(s)

→ assistance needed for the implementation of the measure(s)

Expected Results

Doc 9988 Chapter 4

APER, EBT



Baseline scenario

List of Mitigation Measures

Expected Results

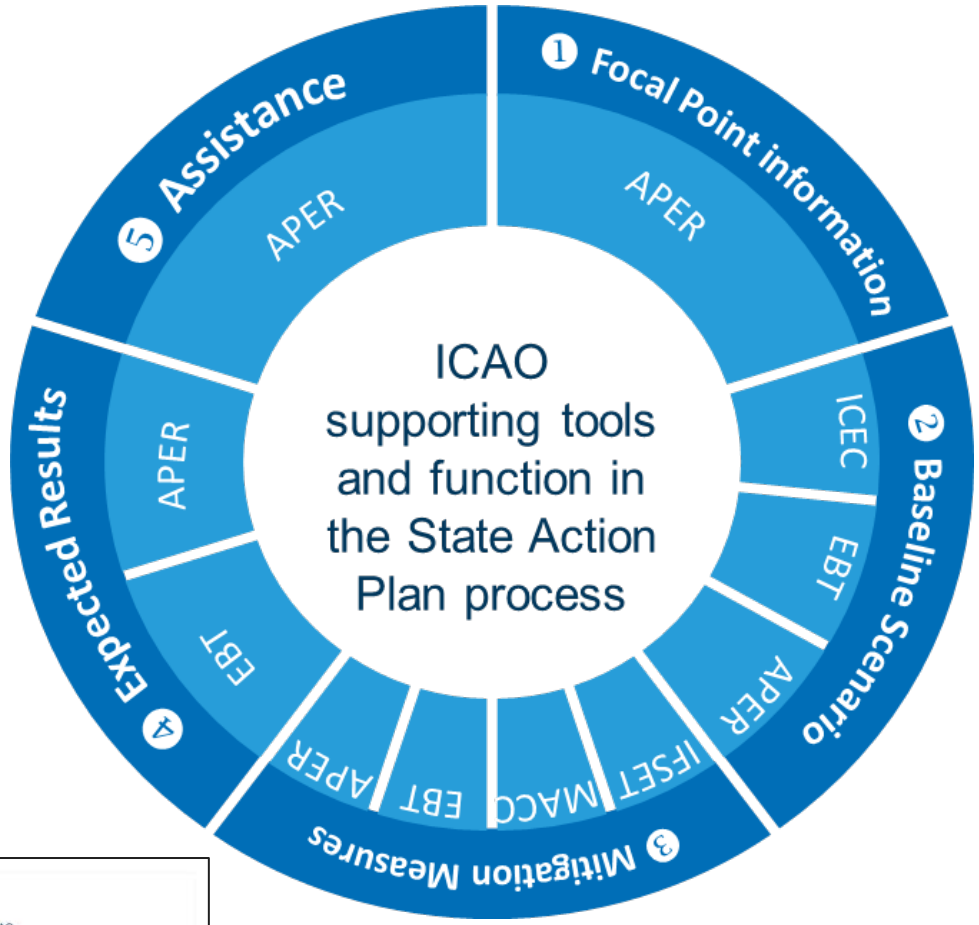
Year*	Total RTKs (tonne-kilometres)	International RTKs* (tonne-kilometres)	Total fuel (litres)	International fuel (litres)*	Total CO_2 emissions (metric tonnes)	International CO_2 emissions* (metric tonnes)
Future year						
2020						
Future year						
2050						

*Minimum data to be entered.

Note: the future years should match the baseline's future years.

Note: the traffic data (RTK) may not be identical to the baseline. Some measures may enable an increase in traffic or aim to reduce demand.

ENV Tools



Action Plan on Emissions Reduction (APER) Website

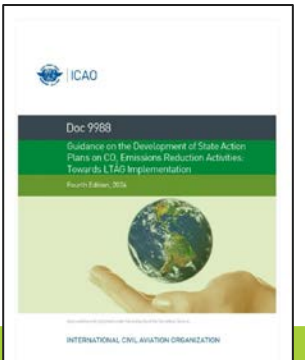
Developed to assist States that want to prepare and submit their State Action Plan to ICAO, providing access to tools that facilitate the SAP development.

- **Environmental Benefit Tool (EBT)**

This tool has been designed by ICAO to assist States in the process of defining a baseline scenario, estimating the quantifiable benefits resulting from the selected mitigation measures, and it provides estimated expected results. This tool can support a State with establishing a quantified State Action Plan, while requiring minimal data inputs. All State Action Plan Focal Points are encouraged to utilize this tool while developing or updating a State Action Plan.

Other supporting tools under APER website:

- **Marginal Abatement Cost (MAC) Curve Tool**
- **ICAO Fuel Savings Estimation Tool (IFSET)**
- **ICAO Carbon Emissions Calculator for States (ICEC)**



APER Website

Welcome to the Action Plan on Emissions Reduction (APER) Portal

Action Plan on Emissions Reduction

This portal has been developed to assist States that want to prepare and submit their State Action Plan to ICAO. State Action Plans enable all ICAO Member States to establish a long-term strategy on climate change for the international aviation sector, involving all interested parties at national level.

Following the agreement at the 41st Session of the ICAO Assembly in 2022 on the long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050, State Action Plans will play a pivotal role in monitoring the progress on the implementation of all elements of the basket of measures towards the achievement of the LTAG (A41-21 operative clause 9).

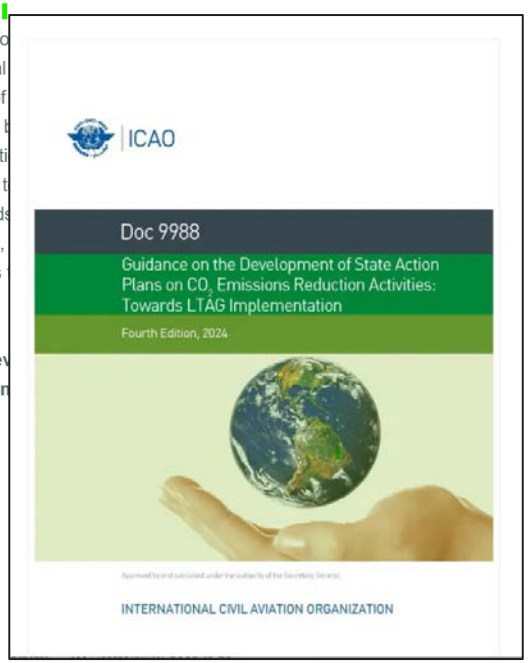
Documents:

*** * * NEW UPDATE – JUNE 2024: Updated ICAO Doc 9988 - Guidance on the Development of State Action Plans on CO_2 Emissions Reduction Activities (Fourth Edition)* * ***

This document is the main resource for developing a State Action Plan. It provides step-by-step guidance, details of the required elements of a State Action Plan and contains a template that can be used to structure a State Action Plan. All State Action Plan Focal Points are encouraged to utilize this document while developing or updating a State Action Plan.

New update (June 2024): This updated version o
Assembly's agreement on a long-term global goal
Action Plans in contributing to the achievement of
monitoring the global progress. It also details the b
aviation fuels (LCAF), and other clean energy opti
CAAF/3. The updated Action Plan template aims t
harmonized manner. This Fourth Edition also adds
building programs, possible financial instruments,
decarbonization projects. It also includes lessons
best practices for CO2 mitigation.

**Updated ICAO Doc 9988 - Guidance on the Dev
Reduction Activities (Fourth Edition) (other lan**
9988_cons_en.pdf

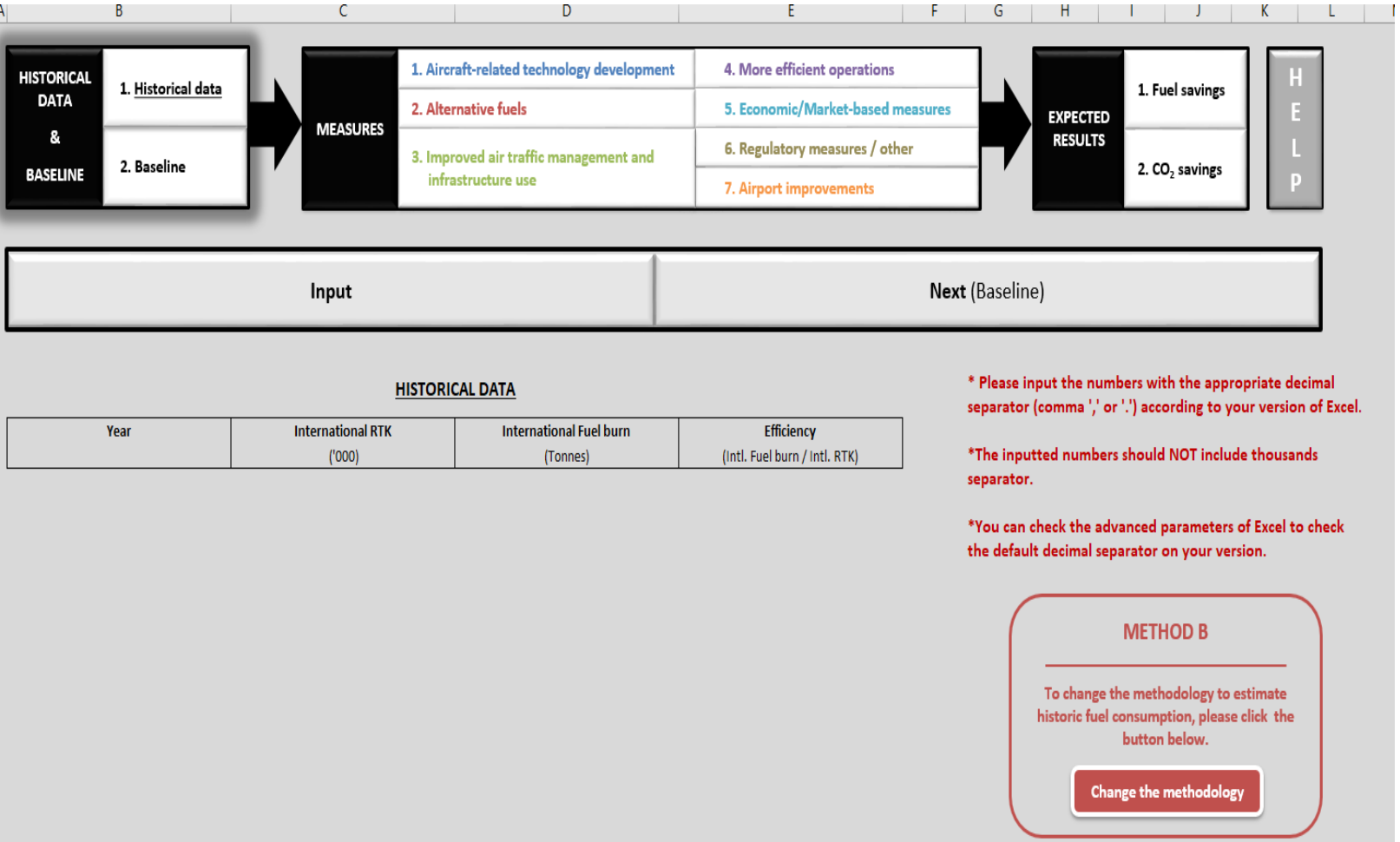


As defined within ICAO Document 9988 (provided below) a complete State Action Plan should contain:

1. **Contact information** for the officially nominated State Action Plan Focal Point, alternate Focal Point (if applicable) and any other person(s) responsible for the compilation and submission of the Action Plan;
2. **Baseline Scenario (scenario without action):** Projected annual fuel consumption, CO_2 emissions and traffic data (from the latest available year until at least 2050) for international aviation;
3. List of **selected measures** proposed for mitigating CO_2 emissions from international civil aviation;
4. **Expected Results (scenario after taking action):** Estimated impact of the selected mitigation measures from the first implementation year to at least 2050 on the baseline scenario (including annual fuel consumption and CO_2 emissions); and
5. Identification of any **assistance needs** (for example financial, technological, training or capacity building) for the State.

EBT Tool

EBT (v2.9) uploaded on APER Website



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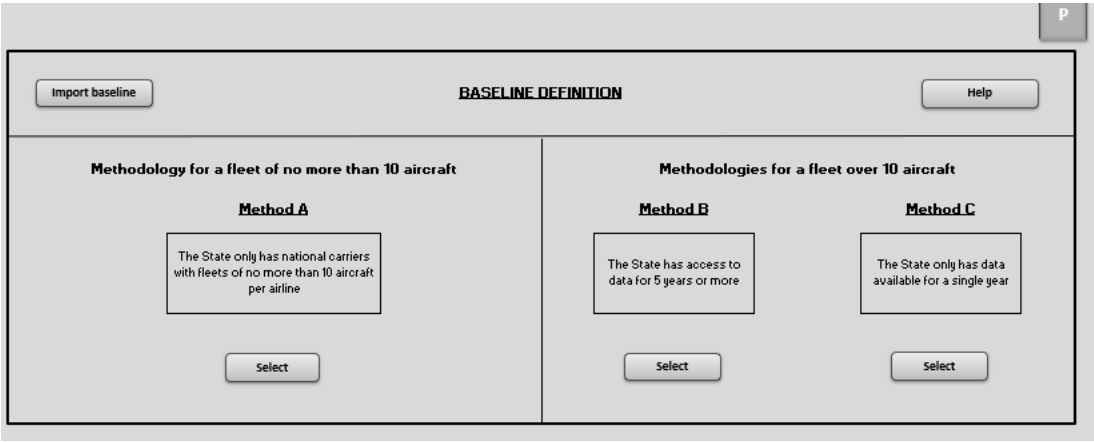
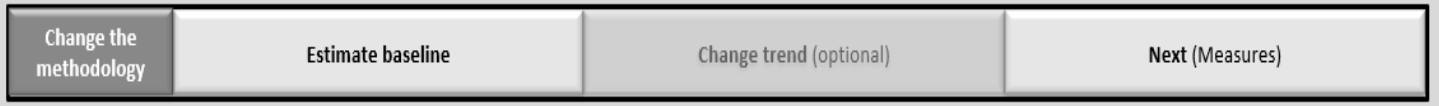
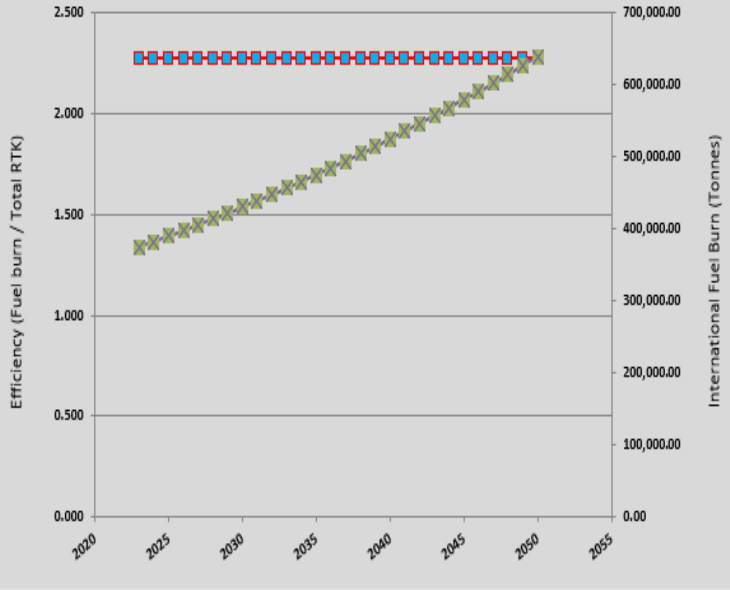
EBT





BASELINE

Year	International RTK ('000)	International Fuel bur (Tonnes)	Efficiency (Fuel burn / RTK)
2023	164,723.00	374,758.00	2.275
2024	168,017.46	382,253.16	2.275
2025	171,377.81	389,898.22	2.275
2026	174,805.37	397,696.19	2.275
2027	178,301.47	405,650.11	2.275
2028	181,867.50	413,763.11	2.275
2029	185,504.85	422,038.38	2.275
2030	189,214.95	430,479.14	2.275
2031	192,999.25	439,088.73	2.275
2032	196,859.23	447,870.50	2.275
2033	200,796.42	456,827.91	2.275
2034	204,812.35	465,964.47	2.275
2035	208,908.59	475,283.76	2.275
2036	213,086.76	484,789.43	2.275
2037	217,348.50	494,485.22	2.275
2038	221,695.47	504,374.93	2.275
2039	226,129.38	514,462.43	2.275
2040	230,651.97	524,751.67	2.275



HISTORICAL DATA

Year	International RTK ('000)	International Fuel burn (Tonnes)	Efficiency (Intl. Fuel burn / Intl. RTK)
2023	164723.00	374758.00	2.275

* Please input the numbers with the appropriate decimal separator (comma ',' or '.') according to your version of Excel.

*The inputted numbers should NOT include thousands separator.

*You can check the advanced parameters of Excel to check the default decimal separator on your version.

Information provided in State Action Plans

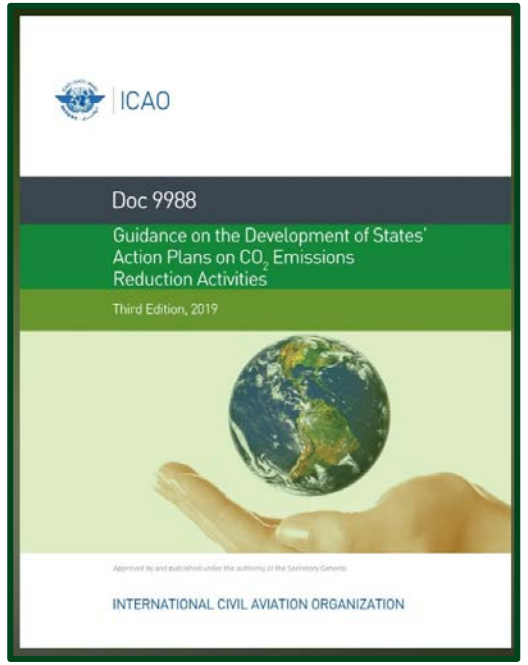
The quantifiable data reported by States within action **plans enables ICAO to assess the collective global contribution of State's individual plan toward the achievement of the global aspirational goals.** For the assessment, ICAO needs to aggregate the quantified data from the action plans. Categorization of action plans:

With Data	Partial Data	No Data
• Quantified data provided for Baseline • Quantified annual fuel burn reduction/CO2 emission reductions from the selected mitigation measure(s) • Quantified data provided for Expected Results	• Only historical data provided • Projected data for only one or two of the following categories: CO_2, fuel burn, and RTK data • With a graphical representation, but without data	• No baseline scenario • No mitigation measures selected • No expected results

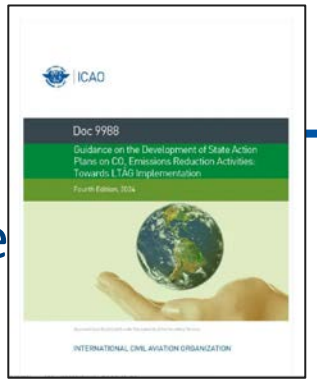
After Submission

The development and submission of an action plan is not the end goal!

- Key points:
  - ✓ The State should set in motion a process to implement the relevant measures in the action plan
  - ✓ Continuous consultation and coordination between the various stakeholders is essential for implementation
  - ✓ The State should monitor the implementation of all activities
  - ✓ The State should continue to work closely with ICAO

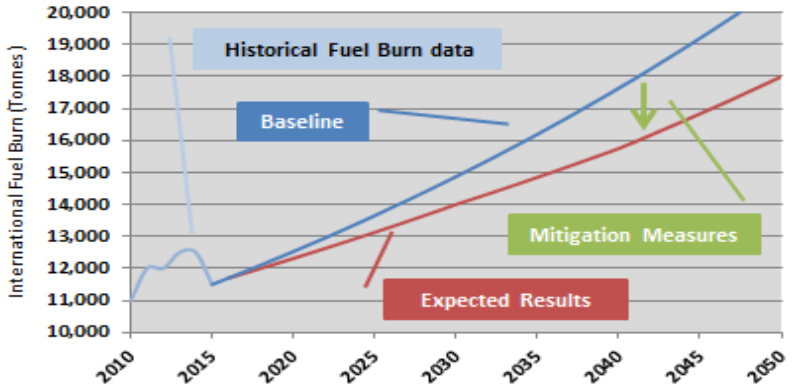


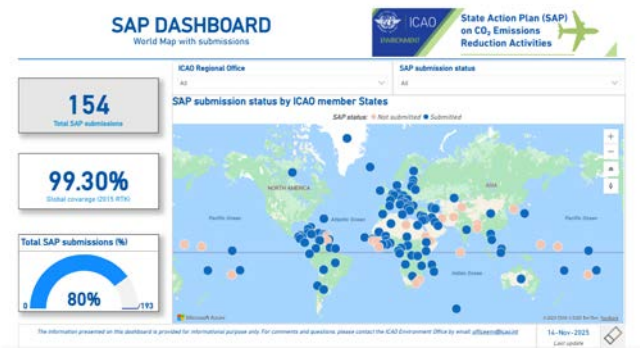
Recap - Information to provide in the SAP



Based on the available data, States voluntarily report all or part of the following information/data in their action plans:

- → **Overview of aviation activity in the State** (air traffic, number of airports, etc.)
- → Summary of **policies and actions in place**
- → **Historical air traffic** (RTK), fuel consumption, CO2 emissions data
- → **Projection of air traffic** (RTK), fuel consumption, CO2 emissions data
- → Information on **mitigation measures implemented**, SAF – clean energy initiatives
- → Estimation of annual fuel burn reduction/CO2 emission reductions from the selected mitigation measure(s)
- → **Quantification/Projection of expected results** from the implementation of selected mitigation measure(s)
- → Assistance Needs



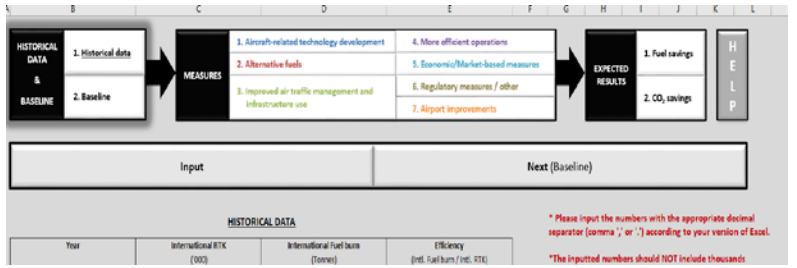


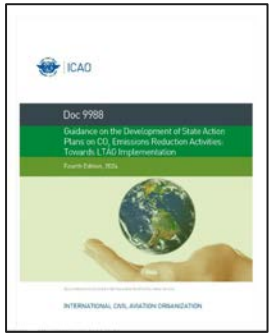
Conclusion and Key Takeaways

- ICAO encourages all Member States to develop a State Action Plan and keep it up-to-date – every 3 years

- Assembly encourages robust and quantified State Action Plans which allow ICAO to assess future progress toward the achievement of ICAO global aspirational goals

- State Action Plans are encouraged to submit information on their use of SAF, LCAF and other aviation cleaner energies as part of their State Action Plan submissions





Thank You

ICAO80

Definition of Revenue Tonne Kilometer (RTK)

→ Key performance metric used to measure the amount of revenue-generating cargo or passengers transported over a certain distance.

RTK = Revenue Payload (in tonnes) × Distance flown (in kilometers)

Revenue Payload: This includes the weight of passengers, baggage, cargo and mail that generates revenue.

Kilometers flown: The actual distance traveled by the aircraft while carrying the revenue payload.

→ RTK is used to:

- ❑ Evaluate the efficiency and productivity of an airline.
- ❑ Compare performance across routes, aircraft types, or time periods.
- ❑ Support financial and operational planning.

Example:

If an aircraft carries 20 tonnes of passengers and cargo over a distance of 1,000 km, the RTK would be:

RTK = 20 tonnes × 1,000 km = 20,000 tonne-kilometers

Calculating fuel efficiency

YEAR	Total Fuel burn (metric tonnes)	Total RTK (tonne kilometres)	Total CO_2 Emissions (metric tonnes)	Annual Fuel Efficiency
2016	14 056 391	44 418 196	30 103 205	0.467
2017	16 924 265	53 480 677	36 409 050	0.465
2018	18 570 453	58 682 631	40 405 721	0.460
2019	21 405 070	67 640 021	46 909 050	0.456

Total $CO_2 = fuel\ burn \times 3.16$

Annual Fuel Efficiency = $fuel\ burn \div RTK$

Projected fuel consumption and CO2

→ Excel or EBT:

- ❑ Apply the forecast RTK growth rates to the historical data to simulate traffic
- ❑ Calculate the projected fuel burn:

average fuel efficiency × forecasted RTK

- ❑ Determine the projected fuel burn for the future (e.g. next 25 years after base year)
- ❑ Consider projection through to 2050