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# State Action Plan on $CO_2$ Emissions Reduction

ICAO ENVIRONMENT

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# ICAO Global Aspirational Goals – Relationship with SAP

- **ICAO aspirational goal - Carbon neutral growth (CNG) from 2020 onwards.**
- To be achieved with a "basket of measures" for $CO_2$ reduction

Selecting mitigation measures from the **basket of measures** and quantifying their expected impacts (expected results) are required elements of a State Action Plan

2% fuel improvement per year

Carbon neutral growth from 2020


- ICAO utilizes the information submitted in all States' Action Plans to assess global progress towards the ICAO **global aspirational goals**
- Results are presented in an aggregated manner

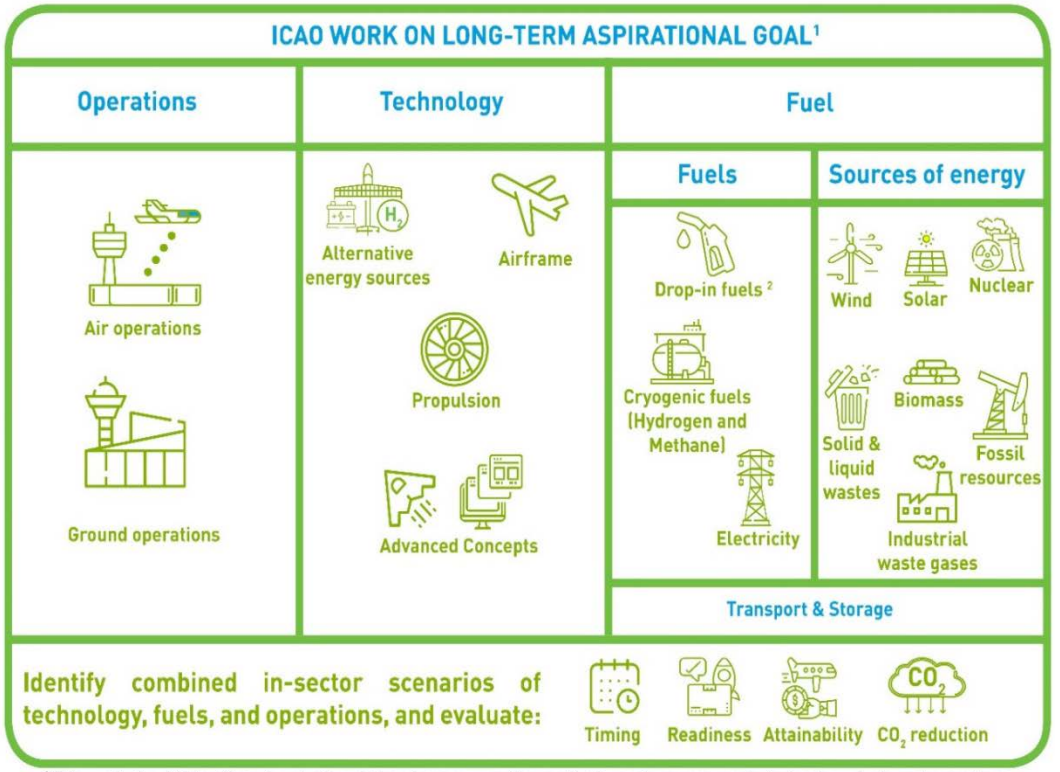
# Interactions between Long-Term Aspirational Goal (LTAG) & State Action Plan (SAP)



"In-sector" measures from the basket of measures

LTAG work is assessing both **existing and innovative in-sector** emissions reductions measures.

- **SAP → LTAG**: source of information, experiences and good practices to be shared (bottom up)
- **LTAG → SAP**: source of inspiration for you to build **your next State Action Plan** (top down)

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[2] *Sustainable Aviation Fuels (SAF), Low Carbon Aviation Fuels (LCAF), E-Fuels.* *Icons made by Freepik from www.flaticon.com*


**Range of $CO_2$ reductions from Sustainable Aviation Fuels (SAF)**

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# State Action Plans (SAPs)

Every 3 years – before the ICAO Assembly

- A State Action Plan is a living document that defines a State's actions to reduce their CO2 emissions from international civil aviation.
- Within a State it is a planning and coordination tool, and it provides a clear communication route to ICAO
- Provide a picture of the State' activities: Opportunity to identify measures that will improve fuel efficiency and reduce emissions
- ICAO : Assess future progress toward the achievement of ICAO global aspirational goals

# Purpose of the State Action Plans



- State
  - ✓ to report international aviation CO2 emissions to ICAO
  - ✓ to outline to ICAO their respective policies and actions
  - ✓ to provide information to ICAO on the basket of measures considered for the emission reduction and on any specific assistance needs

- ICAO
  - ✓ to compile information in relation to the achievement of the global aspirational goals
  - ✓ to facilitate the dissemination of economic and technical studies and best practices related to aspirational goals
  - ✓ to provide guidance and other technical assistance for the preparation of States' action plans
  - ✓ to identify and respond to States' needs and provide assistance

# Benefits of Developing State Action Plan



## State

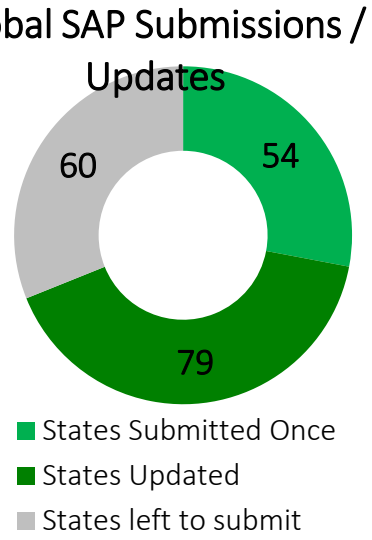
Action Plans give ICAO Member States the ability to:

- ✓ Promote cooperation
- ✓ Establish partnerships
- ✓ Facilitate technology transfer
- ✓ Obtain assistance
- ✓ Submit a plan which highlights their commitment to addressing environmental challenges
- ✓ Outline their respective policies and actions

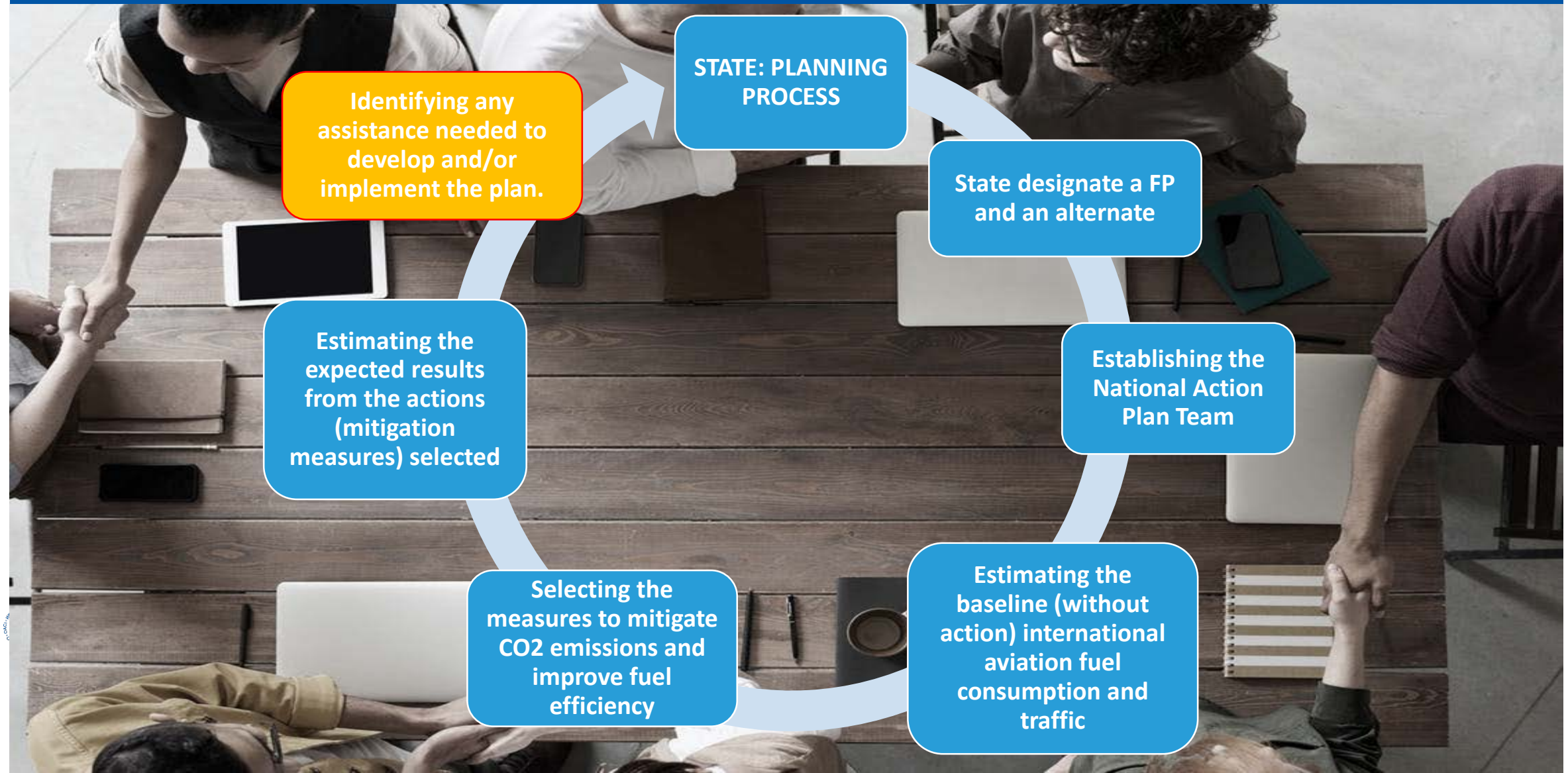
**133 States** representing

**>98% of global RTK**

have submitted a State Action Plan to ICAO



# State Action Plan Process



# State Action Plan Minimum Contents

1. State Action Plan Focal Point contact information
2. Baseline scenario – international fuel consumption, $CO_2$ emissions and traffic data projected to 2050 (without action)
3. List of selected emissions mitigation measures
4. Expected results – international fuel consumption and $CO_2$ emissions projected to 2050 (with the actions in #3)
5. Assistance needs (if needed)

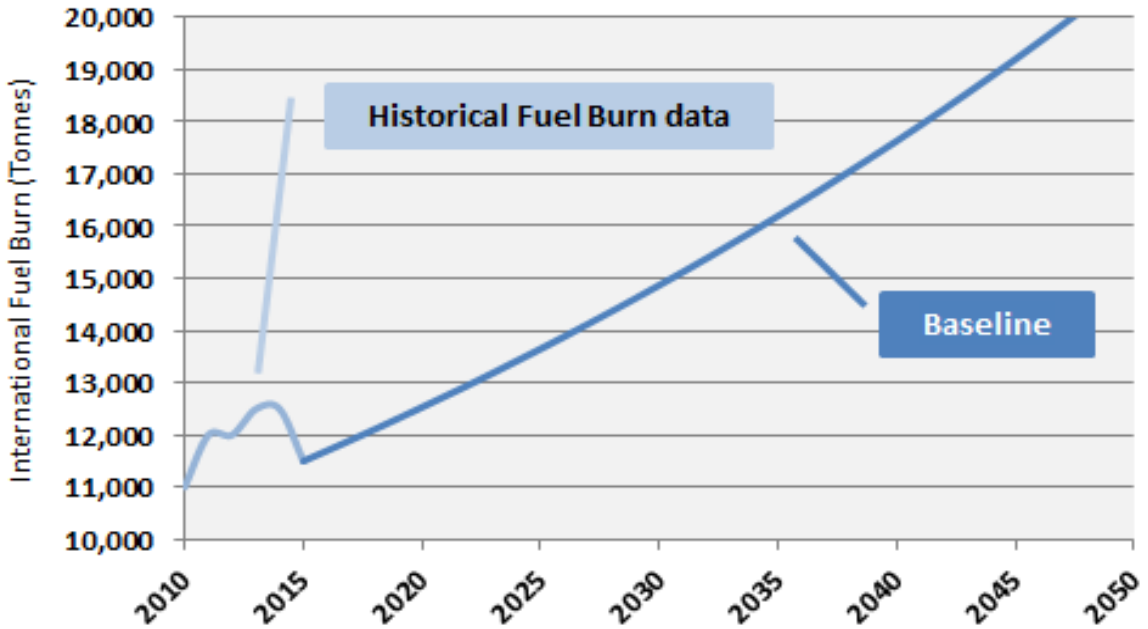
# Baseline Scenario Example



**Doc 9988 Chapter 3**

**APER, EBT, ICEC**

| Example | | | |
|---|---|---|---|
| Year | Historical Data | | Fuel efficiency |
| | RTK * ('000) | Fuel Burn (tonnes) | |
| 2010 | 25'000 | 11'000 | 0.440 |
| 2011 | 30'000 | 12'000 | 0.400 |
| 2012 | 32'000 | 12'000 | 0.375 |
| 2013 | 33'000 | 12'500 | 0.379 |
| 2014 | 32'000 | 12'500 | 0.391 |
| 2015 | 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

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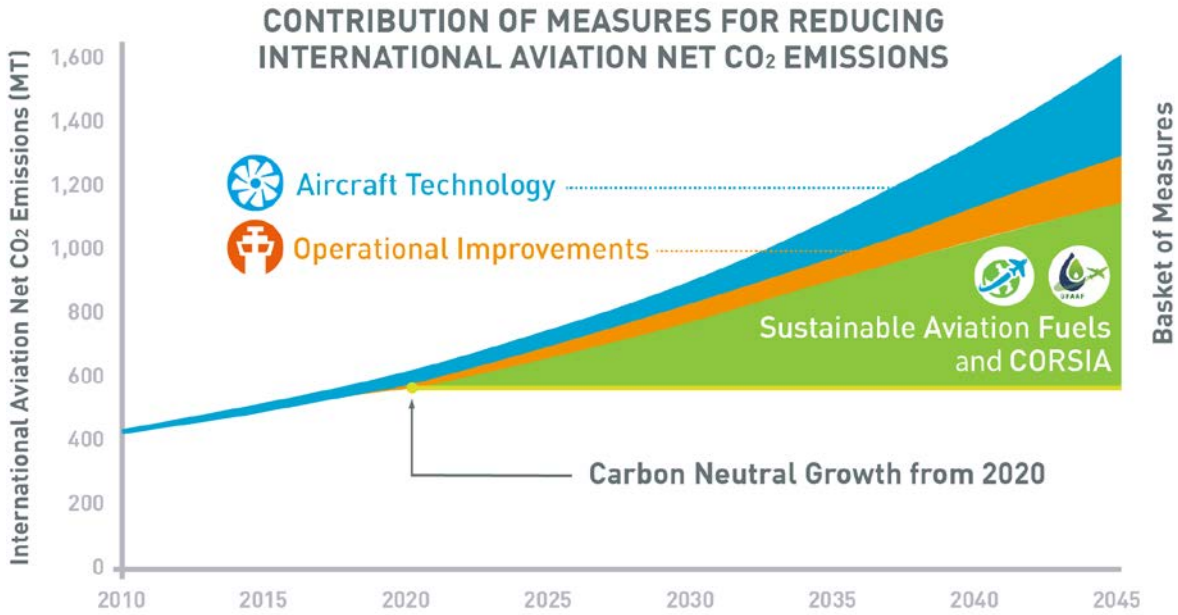
# The Basket of Measures

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

**Doc 9988 Chapter 4**

**APER, EBT, IFSET, MACC**




→ **Select measures and quantify their expected results:** feasibility, emissions reduction potential, prioritization of measures, quantification of fuel & CO2 reduction results

# Mitigation Measures

Selection of measures and quantifying their expected results

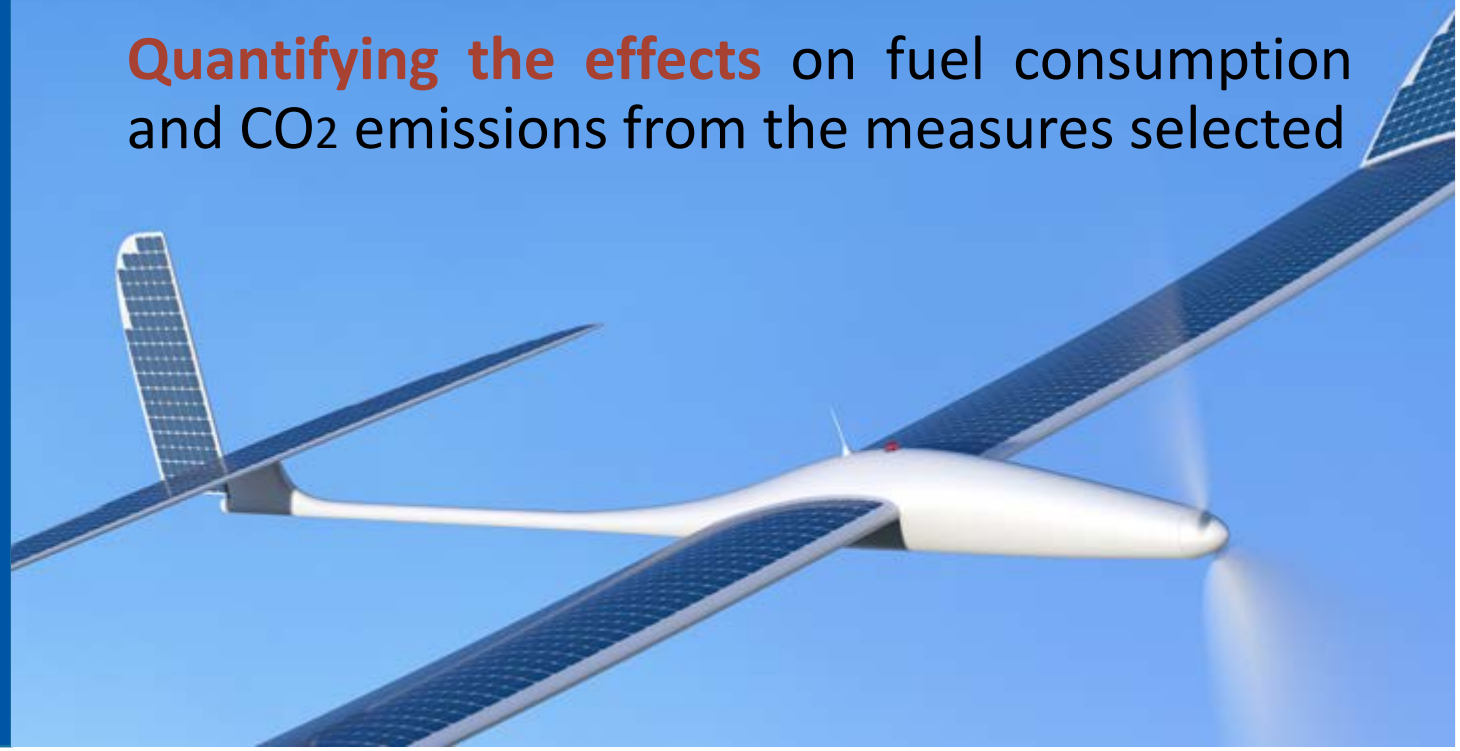
**Doc 9988 Chapter 4**

**APER, EBT, ICEC**

Review of the basket of measures, their feasibility and emissions reduction potential

Prioritization and selection of mitigation measures

**Quantifying the effects** on fuel consumption and $CO_2$ emissions from the measures selected



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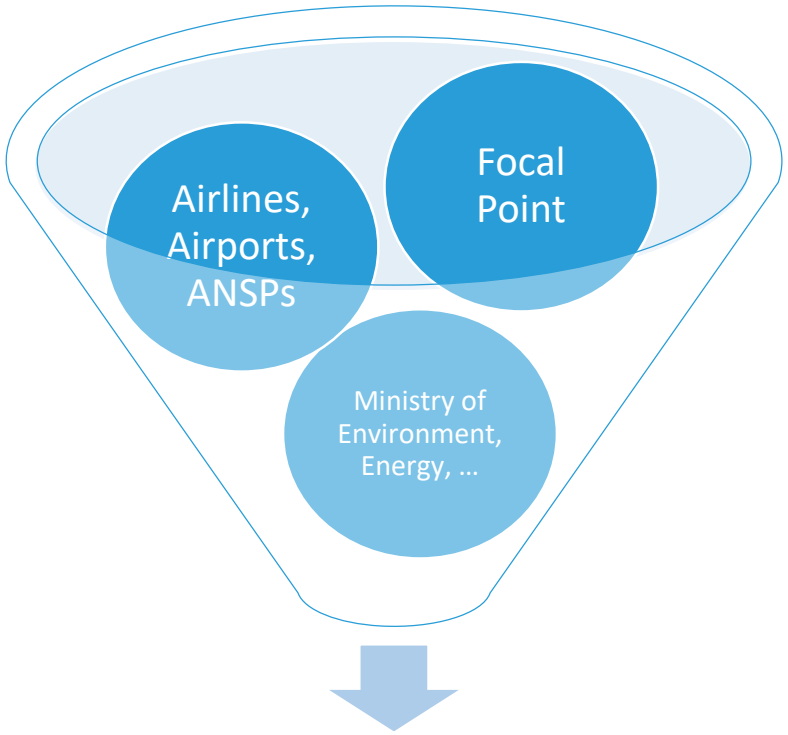
# Selection of Mitigation Measures

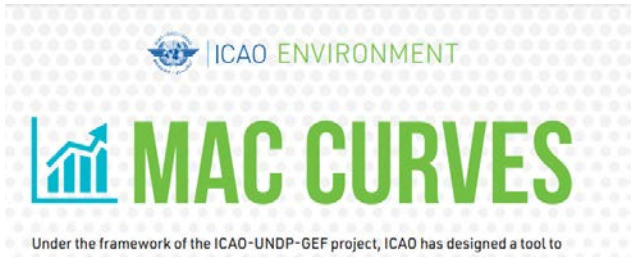
**Doc 9988 Chapter 4**

**EBT, MACC**

- The Focal Point should always work in collaboration with the **National Action Plan Team**

- **Context** is key for the selection of appropriate mitigation measures

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# Implementation of Performance Based Navigation (PBN) in Nigeria

- ✓ improve air navigation facilities and air traffic management systems
- ✓ reduced flight times, terminal delays, fuel consumption, and distance flown
- ✓ increase in flight efficiency and reduction in fuel burn and CO2 emissions

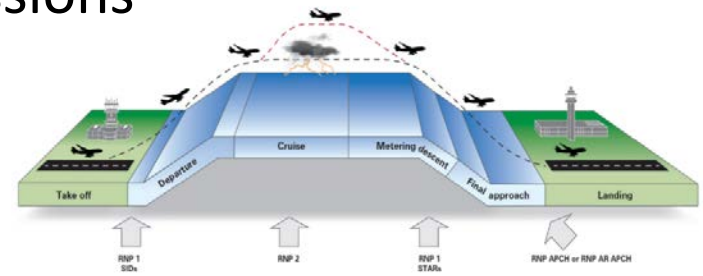


FIGURE 1: Application of PBN in the Nigerian Airspace

TABLE 1: New PBN RNARV10 Routes with Savings in Distance, Fuel and Emissions

| S/No | Route Designator | Type of Route | Routing | FIRs Involved | Distance Savings (nm) | Fuel Savings (kgs) | $CO_2$ Savings (kgs) |
|---|---|---|---|---|---|---|---|
| 1 | UQ300 | New Route RNAV10 IATA Request | KOKAM – NLY – ILBAS – EDGOT | Brazzaville, Kano | 29 | 179 | 566 |
| 2 | UY604 | RNAV10 New, Nigerian Request | POT-BIPIV | Kano, Brazzaville | 30 | 193 | 610 |
| 3 | UQ181 | New Route RNAV10 IATA Request | BIPIV - TENTU | Brazzaville, Kano, Accra | 44 | 550 | 1750 |
| 4 | UQ400 | New Route RNAV10 IATA | BIPIV – NANOS | Brazzaville, Kano, Niamey | 30 | 179 | 566 |
| 5 | UQ324 | New Route RNAV10 IATA Request | NY-GULEN-KELAK | Niamey, Kano, Ndjamena, Khartoum | 50 | 618 | 1953 |
| 6 | UY333 | RNAV10 New, Nigerian request | KIGRA-OPDOL-UBEVA | Kano, Niamey, Algiers Tunis | 44 | 550 | 1730 |
| 7 | UY87 | New Route RNAV10 | TYE-KIDKI | Kano, Accra, Abidjan | 15 | 91 | 287 |
| 8 | UY57 | New Route RNAV10 ACCRA Request | LIREX-SESIG | Kano, Accra, Abidjan | 7 | 39 | 123 |
| 9 | UQ200 | New Route RNAV10 IATA Request | ADDIS – LAGOS (GWZ - GADUV | Addis, Khartoum, Ndjamena, Brazzaville, Kano | 95 | 950 | 3002 |
| 10 | UY87 | New Route RNAV10 | TYE-KIDKI | Kano, Accra, Abidjan | 15 | 91 | 287 |

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# Capital Infrastructure of Kotoka International Airport phase 3 development project in Ghana

- ✓ use of renewable energy sources in the upgrade of airport facilities
- ✓ use of LED energy serving for electrical facilities
- ✓ installing equipment at gates to reduce the use of auxiliary power units

# SAF Production in Madagascar

- ✓ the New Energy Policy (NPE) is oriented towards the massive distribution of renewable energies
- ✓ regional potential
- ✓ Would support the reduction of national and international emissions

| REGIONS | SUPERFICIE TOTALE (ha) | ZONES A EXCLURE (ha) | ZONES EXPLOITABLES SOUS CONDITION (ha) | ZONES EXPLOITABLES (ha) |
|---|---|---|---|---|
| ALAOTRA-MANGORO | 2 739 447 | 1 495 130 | 533 481 | 710 836 |
| AMORON'I MANIA | 1 653 974 | 495 266 | 257 404 | 901 304 |
| ANALAMANGA | 1 732 802 | 692 365 | 288 444 | 751 993 |
| ANALANJIROFO | 2 182 659 | 2 146 667 | 2 911 | 33 081 |
| ANDROY | 1 872 739 | 985 417 | 628 019 | 259 303 |
| ANOSY | 2 963 548 | 1 031 393 | 330 234 | 1 601 922 |
| ATSIMO-ANDREFANA | 6 672 468 | 3 826 473 | 1 615 735 | 1 230 260 |
| ATSIMO-ATSINANA | 1 654 642 | 844 390 | 387 840 | 422 412 |
| ATSINANANA | 2 205 407 | 1 362 156 | 661 919 | 181 331 |
| BETSIBOKA | 2 953 465 | 509 602 | 650 175 | 1 793 688 |
| BOENY | 3 030 371 | 1 172 364 | 1 666 583 | 191 424 |
| BONGOLAVA | 1 798 294 | 134 601 | 927 470 | 736 223 |
| DIANA | 2 008 227 | 1 140 243 | 394 854 | 473 131 |
| HAUTE MATSIATRA | 2 088 330 | 495 929 | 929 569 | 662 831 |
| IHOROMBE | 2 610 774 | 702 455 | 529 779 | 1 378 539 |
| ITASY | 644 416 | 196 526 | 133 991 | 313 899 |
| MELAKY | 4 088 130 | 943 711 | 2 145 615 | 998 805 |
| MENABE | 4 901 656 | 1 701 624 | 1 883 893 | 1 316 139 |
| SAVA | 2 373 566 | 1 915 979 | 299 178 | 158 409 |
| SOFIA | 5 125 808 | 2 533 665 | 1 595 819 | 996 324 |
| VAKINANKARATRA | 1 805 046 | 569 394 | 472 698 | 762 954 |
| VATOVAVY-FITOVINANY | 2 074 179 | 684 830 | 1 052 283 | 337 066 |
| TOTAL | 59 179 951 | 25 580 181 | 17 387 895 | 16 211 876 |

Table 8:"Area potential by region"1


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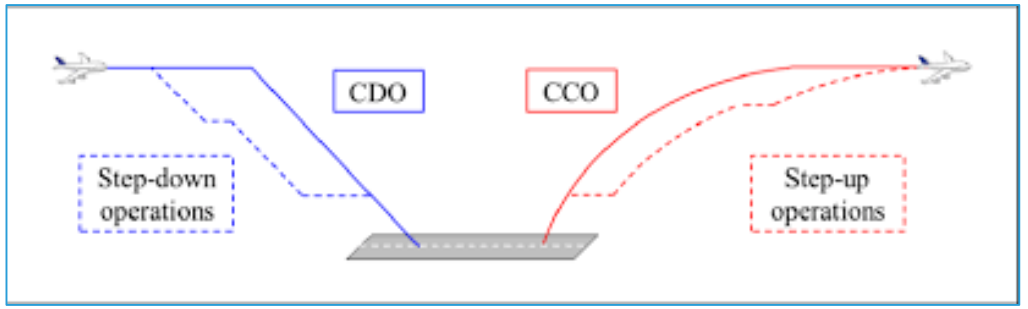
# Fuel-Efficient Departure and Approach Procedures in Cabo Verde

Design and implementation of CCO and CDO procedures at all international airports

- ✓ allow the operators to fly a profile that is as close as possible to the optimum profile with continuous climb or descent during their approach for the international airport
- ✓ enables to attain initial cruise climb FL at an optimum air speed and engine thrust reducing fuel burn and emission and noise reduction

# Implementation of measures to exploit the full capacity of Mali's airspace

This measure aims to implement measures to fully exploit the capacities of the airspace to allow aircraft to optimize their performance according to the ergonomics of the airspace and the flexibility offered by it.

✓ fuel savings: 2096.45 tonnes / year

# Solar Energy at Kenyan Airports

- ✓ cut CO2 emissions by switching to renewable energy
- ✓ focus on solar energy for lighting purposes
- ✓ replacement of electricity water pump with a solar water pump
- ✓ solar power plant at JKIA will save 25% in terms of revenue expenditure on electricity

| International Airports | Power Consumption in kW/h per month | Power Consumption in kW/h per Year | Expected solar power generation (mw) |
|---|---|---|---|
| 1. Jomo Kenyatta International Airport (JKIA) | 2,600,000 | 2,600 | 3.00 |
| 2. Moi International Airport (MIA) | 350,000 | 350 | 2.00 |
| 3. Wajir International Airport (WIA) | 12,000 | 12 | 0.50 |
| 4. Eldoret International Airport (EIA) | 60,000 | 60 | 1.00 |
| | | | 6.50 |

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# Expected Results

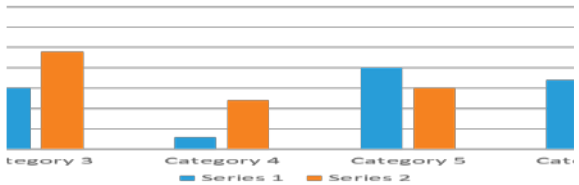


**Doc 9988 Chapter 4**

**APER, EBT**

- The expected results provide the estimated fuel consumption and $CO_2$ emissions **with the implementation of the selected mitigation measures** from the latest available year to 2050.

- It should:
  - Project fuel consumption, emissions, and traffic for the same future years provided in the baseline scenario; and
  - Quantify the effect of the selected mitigation measures.

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# Quantification within State Action Plans

- Including quantified information within State Action Plans ensures that:
  - Your State develops a **clear understanding** of the share and projections of international aviation $CO_2$ emissions
  - ICAO can **assess progress towards the global aspirational goals**

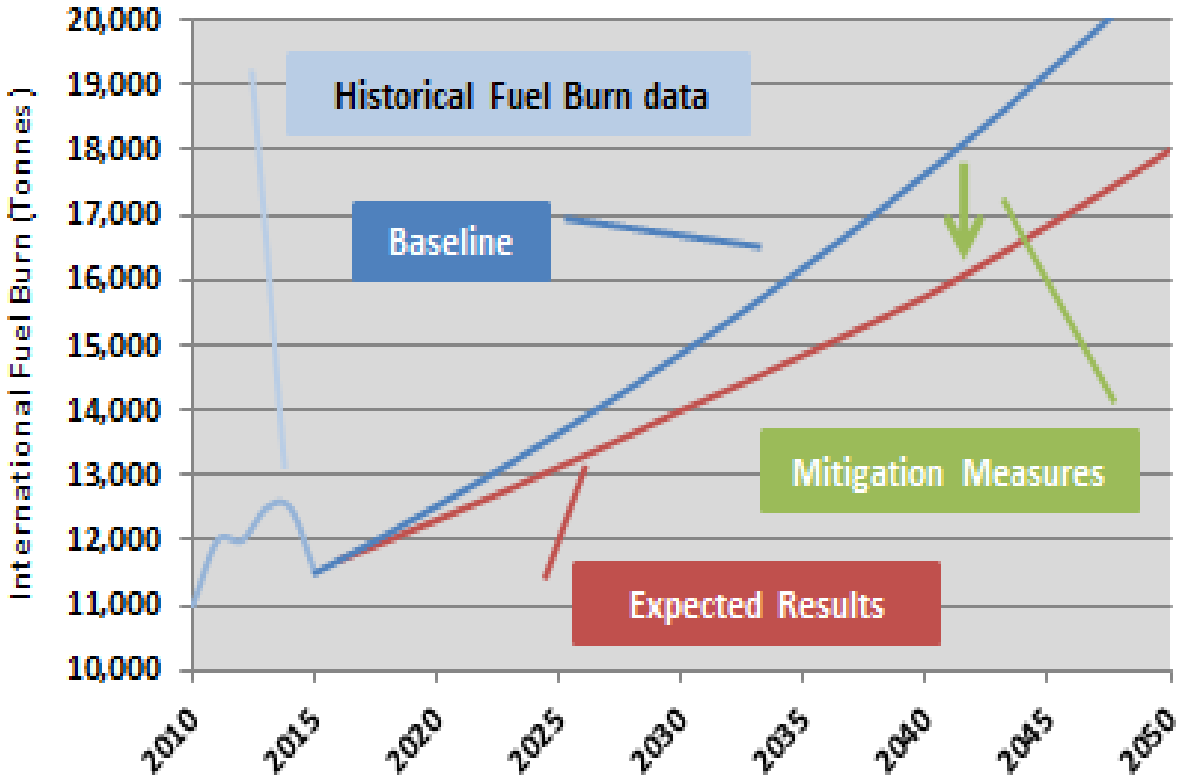
- ICAO has developed a range of tools to support the quantification of the State Action Plans


**A40-18, para 11 –** … **the action plans should include** information on the basket of measures considered by States, reflecting respective national capacities and circumstances, **quantified information** on the expected environmental benefits from the implementation of the measures chosen from the basket, and information on any specific assistance needs;

# A quantified SAP

**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.

What is next after Action Plan Submission?

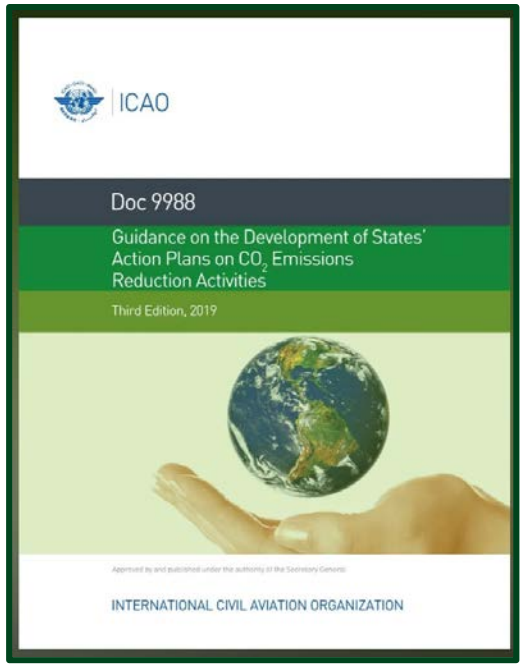
IMPLEMENTATION AND ASSISTANCE

# What is next after the submission of State Action Plan?



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

- Key points:
  - ✓ State need to 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
  - ✓ State need to monitor the implementation of all activities
  - ✓ State need to continue to work closely with ICAO



# State Action Plan Process as a Source Of Assistance



Action plans create the possibility of:

- ✓ partnerships, cooperation, capacity building, technology transfer and assistance

External organizations are creating potential funding opportunities

SAPs can be used to demonstrate States' commitment to the implementation of climate change policies and mitigation measures

# Assistance Needs

Doc 9988 Chapter 5

Clearly define the assistance needed to implement mitigation measures and to achieve the expected results :

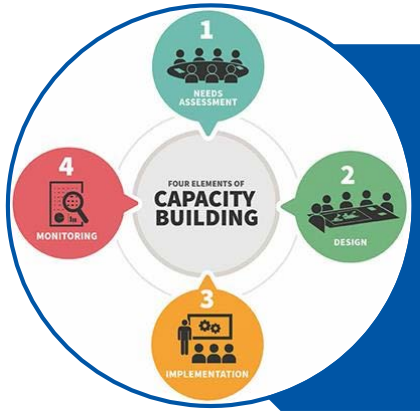
- Technical, financial, research, training/capacity building

Could facilitate support from other government entities, financial institutions, potential future ICAO assistance projects

# ICAO's Assistance and Support



**ICAO developed an integrated and comprehensive strategy to support States**



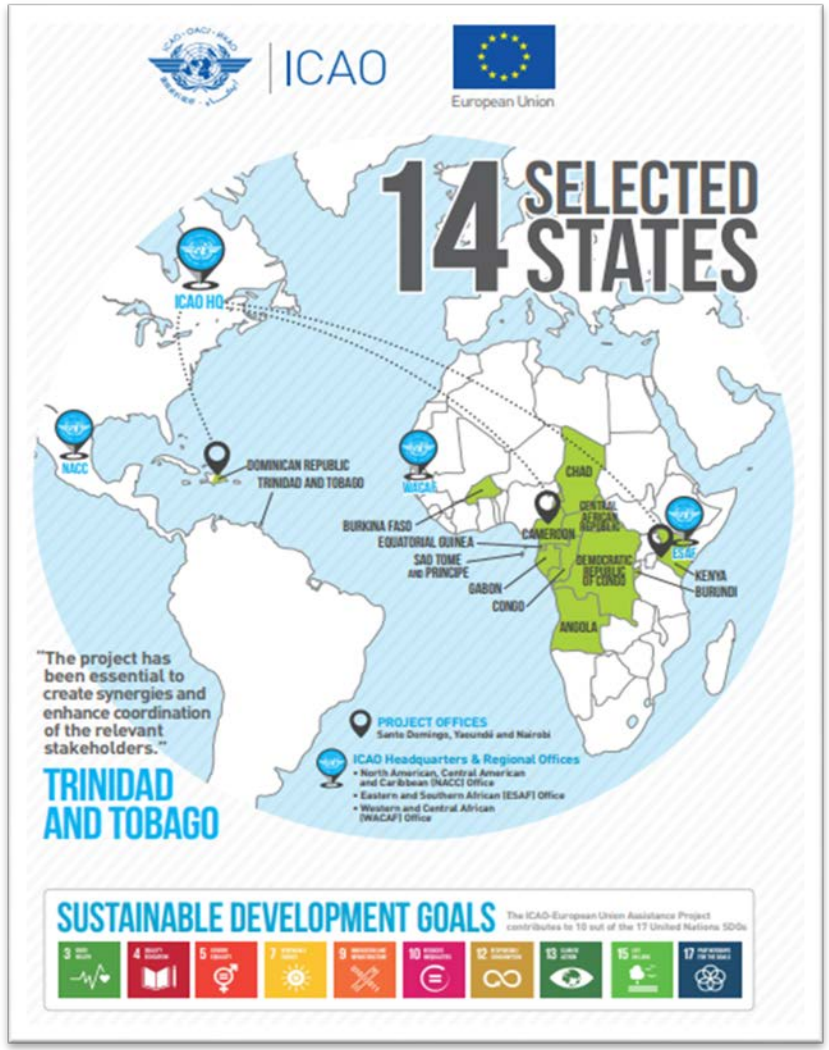

**facilitate access to financial resources**

**build partnerships,**

**develop guidance documents,**

**technical material, and capacity building activities**

# ICAO Capacity Building and Assistance Projects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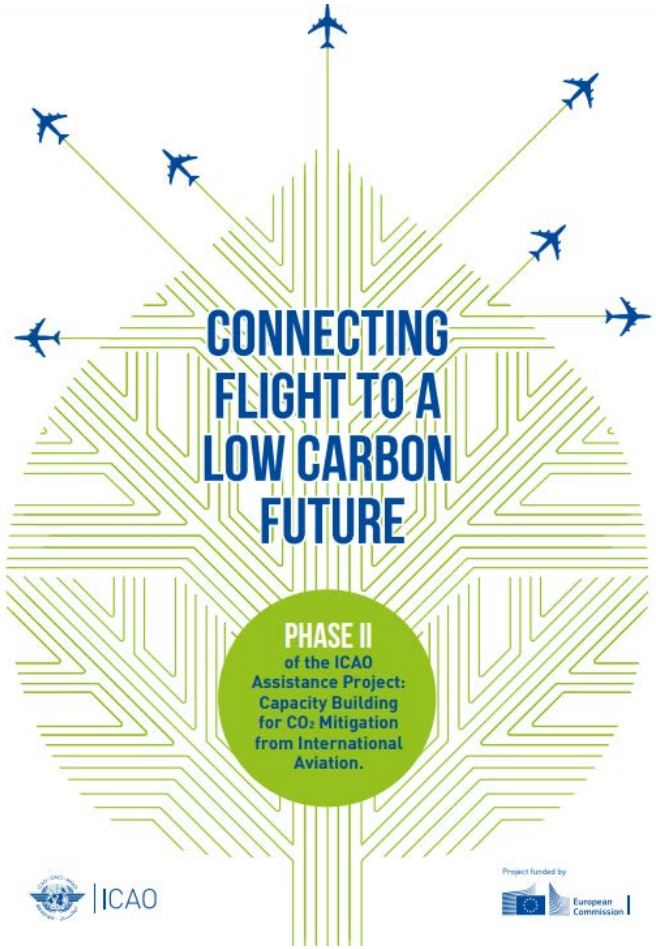
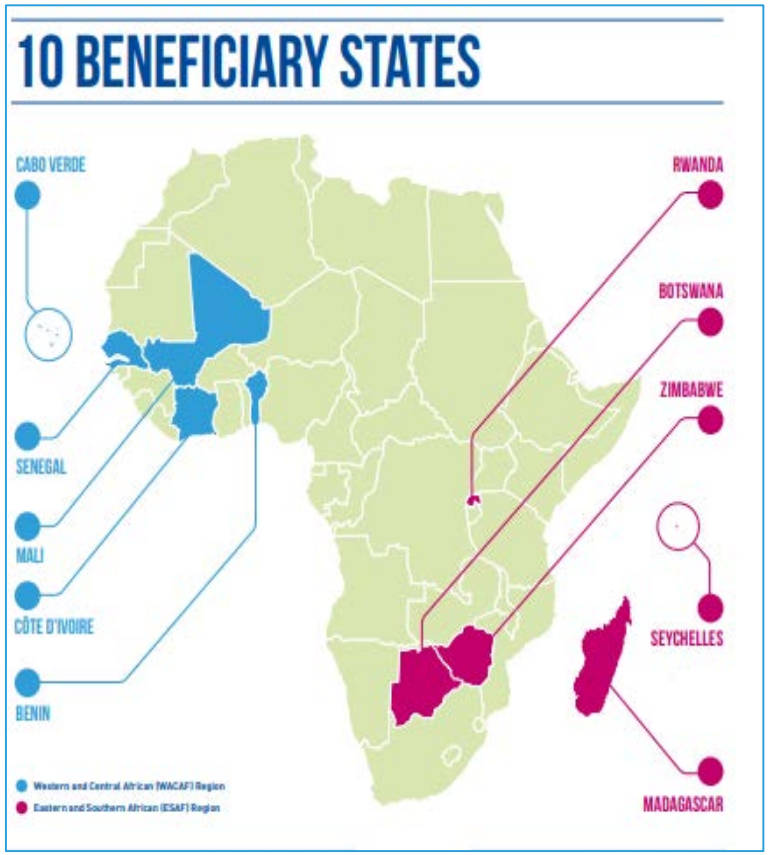
# ICAO Capacity Building and Assistance Projects




## 3 MAIN OBJECTIVES

**OBJECTIVE 1**

**Capacity building**

Improve national capacity of the participating States to develop, update and implement their Action Plans on CO2 emissions reduction from international aviation in accordance with ICAO recommendations

**OBJECTIVE 2**

**Action Plans Development**

Assist the participating States in developing and submitting their State Action Plans on emissions reduction.

**OBJECTIVE 3**

**Implementation of Mitigation Measures**

Assess the mitigation measures selected by the participating States and evaluate their feasibility.

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# Publically-available State Action Plans

States are encouraged to make their SAP publically available

- Showcases your State's commitment to environmental actions
- Provides an example for States that have not yet developed a SAP
- Ensures that your State's information will be considered within ICAO Work on the Feasibility of a Long-Term Aspirational Goal (LTAG) for International Aviation

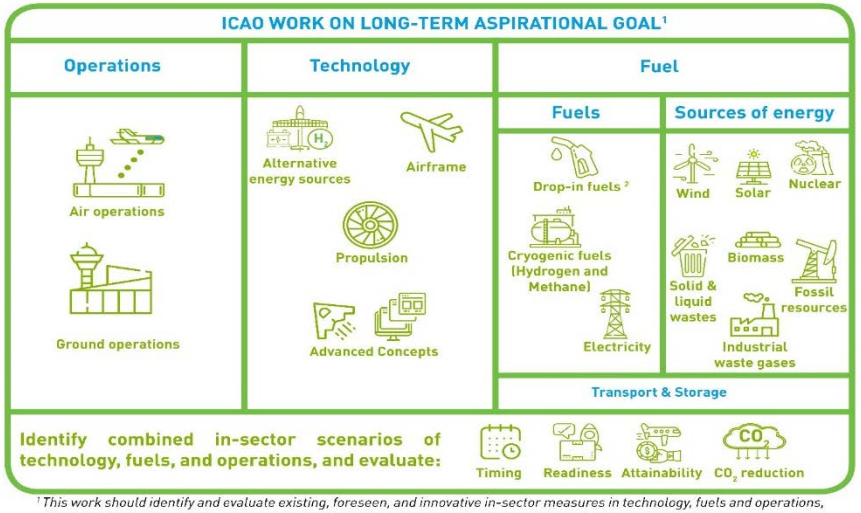
https://www.icao.int/environmental-protection/Pages/ClimateChange_ActionPlan.aspx

# Next Steps

## State

To consider new innovative measures within the ICAO Basket of Measures

- **activities are arising which could further reduce aviation emissions**
- **Focused on assessing the three in-sector emissions reductions measures**

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[2] Sustainable Aviation Fuels (SAF), Low Carbon Aviation Fuels (LCAF), E-Fuels. Icons made by Freepik from www.flaticon.com

## ICAO

To further engage with States to support the submission of quantified State Action Plans

- **State Action Plans could also fed into ICAO's work on long-term aspirational goal (LTAG) for international aviation for implementation**

Update ICAO Doc 9988, the APER website and the other ICAO tools.

Continue to explore means to facilitate States' access to financial resources through new possible partnerships

# In Summary



- ICAO encourages all Member States to develop a State  Action Plan and keep it up-to-date – every 3 years – **NEXT UPDATE 2023**
- State Action Plans provide States an opportunity to identify measures that will improve fuel efficiency and reduce emissions
- Assembly encourages robust and quantified State Action Plans allow ICAO to assess future progress toward the achievement of ICAO  global aspirational goals
- Prompt the exchange of information between national stakeholders to facilitate the implementation of mitigation measures

# Conclusions

The **10-year SAP anniversary** was an opportunity to encourage all States to develop and update their **fully quantified** State Action Plans

Robust State Action Plans could provide an opportunity for States to access **green financing**

ICAO will continue to pursue the establishment of additional **assistance projects**

ICAO will continue to explore **innovative green measures** for use in State Action Plans


# Thank You!

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# Three “in-sector” measures aligned with the Global Coalition for Sustainable Aviation

Updates on recent **in-sector** aviation $CO_2$ emissions reduction initiatives is continuously monitored through the Tracker tool

## In-sector aviation CO2 emissions reduction initiatives - Tracker tool


The main objective of the ICAO Global Coalition for Sustainable Aviation is to promote the sustainable growth of international aviation.

As part of the Coalition, the **ICAO in-sector aviation $CO_2$ emissions reduction initiatives tracker tool** provides a variety of information related to initiatives to reduce the environmental footprint of aviation, including details on past and ongoing measures and initiatives.

The tracker tool has **three main streams: Technology, Operations and Sustainable Aviation Fuels.**

Technology

Operations

Sustainable Aviation Fuels

www.icao.int/ENV

# Stocktaking Process

- **Questionnaires**
- **Open and inclusive**

- All ICAO Member States and relevant stakeholders are invited to submit a Stocktaking Questionnaire to share information on measures they implement or plan to implement

# LTAG work

- **1 - Data Gathering**

- All publically-available SAPs will be assessed within the context of the LTAG work

BOTTOM UP APPROACH

State Action Plans

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# Stocktaking Process

# LTAG work

- **Questionnaires**
- **Open invitation**

- **1 - Data Gathering**

TOP DOWN APPROACH

- Work on LTAG and Stocktaking: great source of inspiration for you to **build your next State Action Plan**
- Submitted questionnaires from stakeholders in your State may also provide new or updated quantified information that may be relevant for the State Action Plan

  → important role of the SAP Focal Point in coordinating with national Stakeholders

State Action Plans

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