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# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

RECONNECTING **THE** WORLD



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# State Action Plan Development Process

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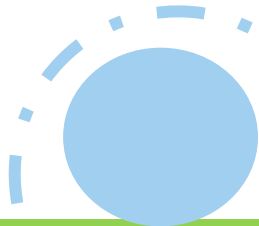
***ICAO-CASSOA-RCAA ENV Workshop***

***Kigali, Rwanda (23-26 May 2023)***

Ms. Chinga Mazhetese

*Regional Officer: Environment/ Meteorology*

*ICAO ESAF Office, Nairobi*



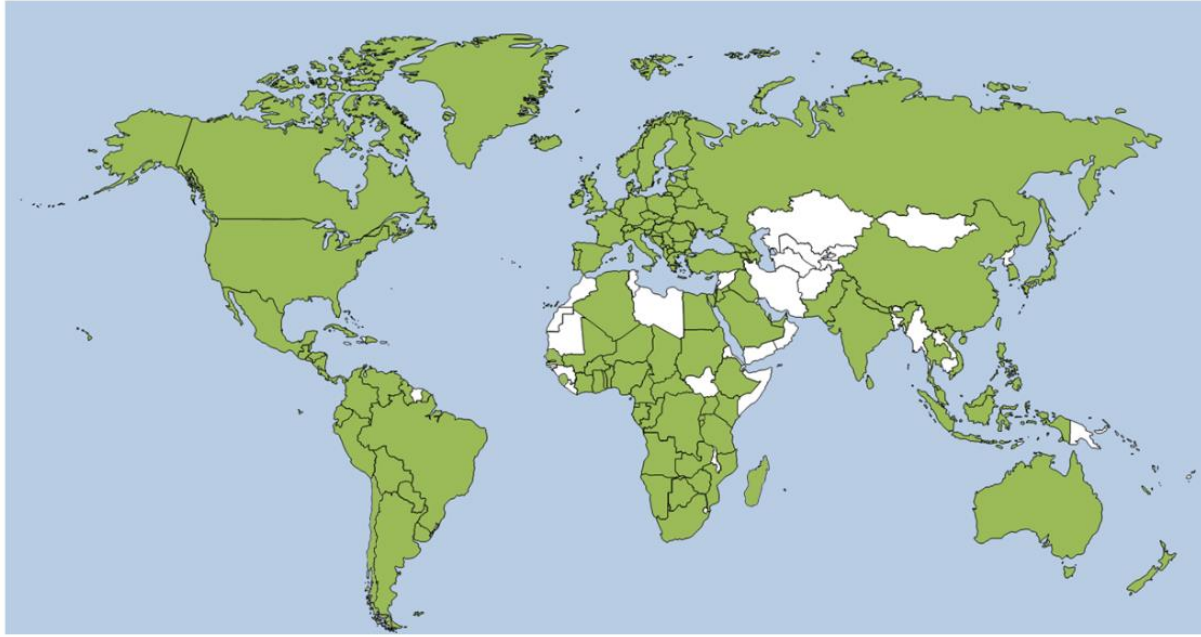


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# Current Status



**138 States**  
representing  
**>98.20%** of global RTK  
have submitted a State  
Action Plan to ICAO

*As of 25 May 2023*





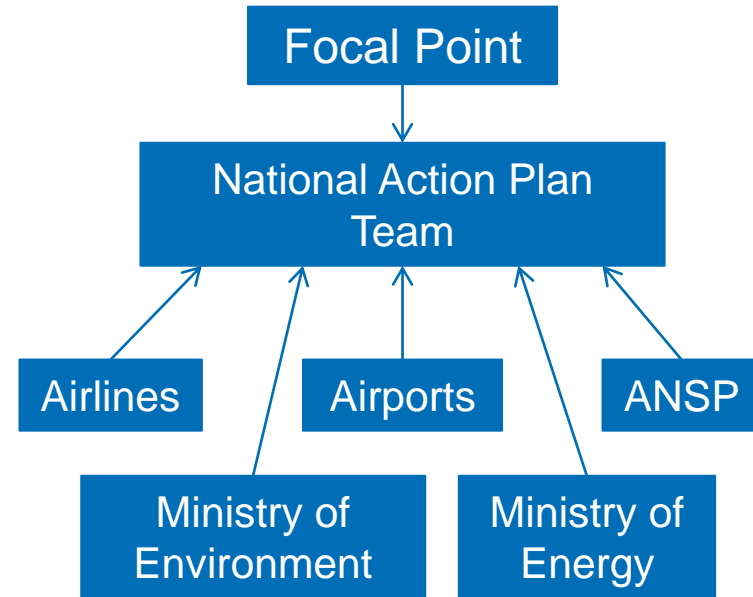
# State Action Plans

- State Action Plans are a voluntary planning and reporting tool for States to communicate information on their activities to address CO<sub>2</sub> emissions from international civil aviation to ICAO
  - A living document that should be updated at least every three years
- To provide a big picture view of the State's activities
- For States
  - Opportunity to identify measures that will improve fuel efficiency and reduce emissions
- For ICAO
  - Assess future progress toward the achievement of ICAO global aspirational goals



# 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





## State Action Plan Minimum Contents

1

State Action Plan Focal Point contact information

2

Baseline scenario – international fuel consumption, CO<sub>2</sub> emissions and traffic data projected to 2050 (without action)

3

List of selected emissions mitigation measures

4

Expected results – international fuel consumption and CO<sub>2</sub> emissions projected to 2050 (with the actions in #3)

5

Assistance needs (if needed)



# Baseline Scenario

- The baseline scenario describes the historic **evolution** of fuel consumption, CO<sub>2</sub> emissions, and traffic in the State and the expected **future** evolution **in the absence of action**
- 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





## Differentiating between international and domestic emissions

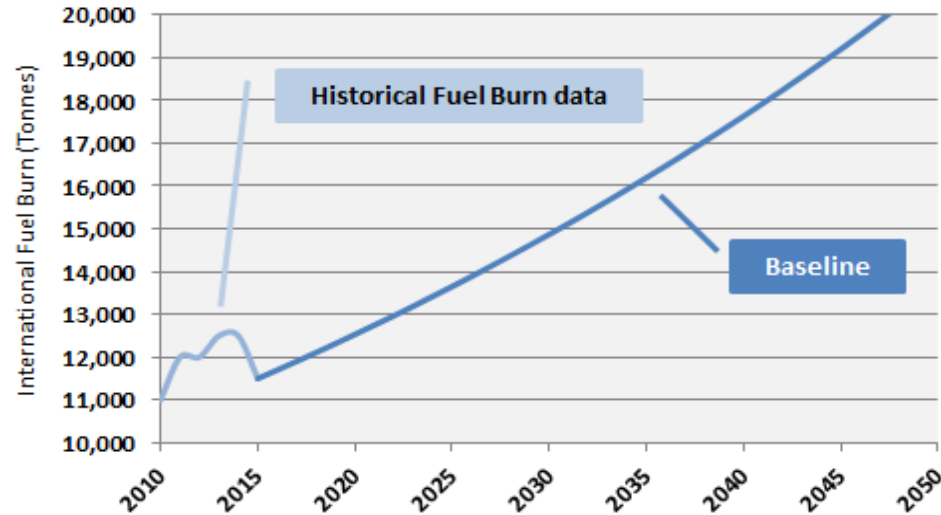
- **International flight:** the operation of an aircraft from take-off at an **aerodrome of a State** or its territories, and landing at an **aerodrome of another State** or its territories.
- **Domestic flight:** the operation of an aircraft from take-off at an **aerodrome of a State** or its territories, and landing at an **aerodrome of the same State** or its territories.
- **Methodologies** to account for the CO<sub>2</sub> emissions attributed to international flights:
  - a) **ICAO:** each State reports the CO<sub>2</sub> emissions from the international flights operated by aircraft registered in the State (**State of Registry**)
  - b) **IPCC:** each State reports the CO<sub>2</sub> emissions from the international flights departing from all aerodromes located in the State or its territories (**State of Origin**)





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

# Baseline Scenario Example



\* **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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# Demonstration of the EBT on the APER Portal

A large passenger airplane is shown from a front-on perspective, flying towards the viewer. The sky is a mix of soft pinks, oranges, and blues, suggesting a sunset or sunrise. Below the plane, a city skyline is visible but heavily blurred, with lights that appear as bokeh. The overall image has a soft, ethereal quality.



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## Mitigation Measures

- Selection of measures and quantifying their expected results
  - 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<sub>2</sub> emissions from the measures selected



## Basket of CO<sub>2</sub> mitigation measures

<b>Aircraft technology</b>	First-ever <b>global CO<sub>2</sub> certification Standard</b> for new types and in-production aeroplanes. <b>Fast-paced innovation</b> (new designs, composite materials, hybrid-electric aircraft, renewable energy sources, etc.).	
<b>Operational improvements</b>	CO <sub>2</sub> benefits from <b>air traffic management; air navigation; green airports; etc.</b>	
<b>Sustainable aviation fuels</b>	<b>Around 200,000 commercial flights with drop-in aviation fuels; 8 conversion processes; 9 airports distributing drop-in aviation fuels</b>	
<b>Market-based measures</b>	<b>Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)</b>	

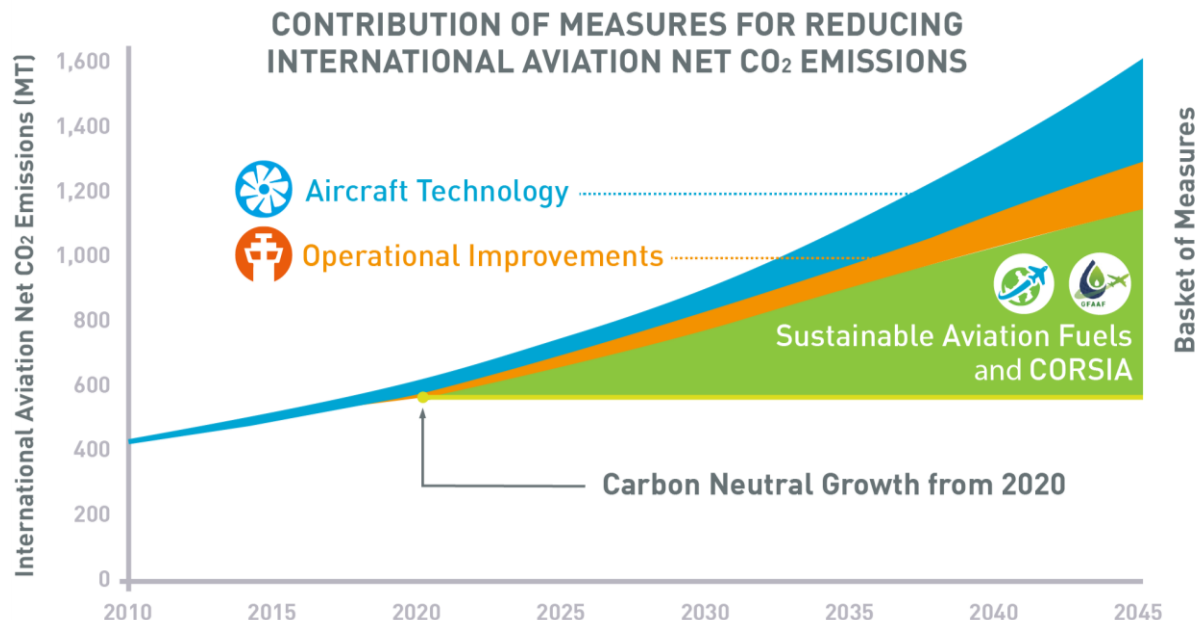


# The Basket of Measures

Doc 9988 Chapter 4

APER, EBT, IFSET, MACC

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

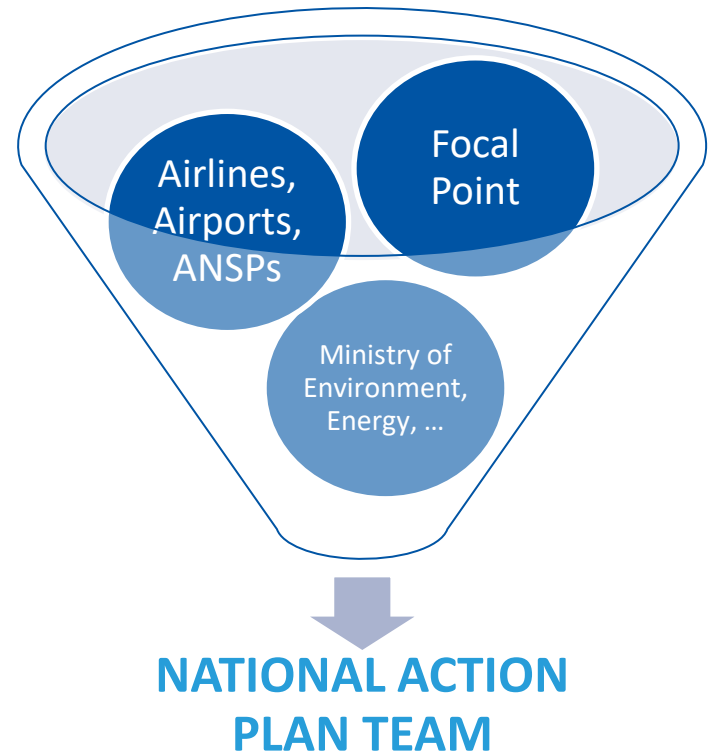


→ Select measures and quantify their expected results: feasibility, emissions reduction potential, prioritization of measures, quantification of fuel & CO<sub>2</sub> reduction results



## Selection of Mitigation Measures

- The Focal Point should always work in collaboration with the **National Action Plan Team**
- **Context** is key for the selection of appropriate mitigation measures







# Selection of mitigation measures

- The selection of Mitigation Measures can be challenging:
  - Cost associated?
  - CO<sub>2</sub> abated?
- To facilitate the selection, ICAO has developed a **Marginal Abatement Cost (MAC) Curve**



# Selection of mitigation measures

## Top-down approach

Decide upon an environmental objective to be reached from the implementation of measures

Identify and prioritize measures

Aggregate expected results of measures selected

Meets intended objective?



## Bottom-up approach

Identify and prioritize measures

Aggregate expected results of measures selected

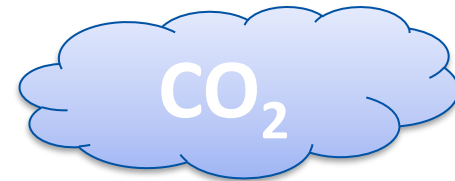


## Prioritization of mitigation measures

- The prioritization of mitigation measures consists of ranking the selected mitigation measures based on criteria, such as:
  - Emissions reductions;
  - Economic feasibility;
- **Example** (for economic feasibility):



Specific Budget



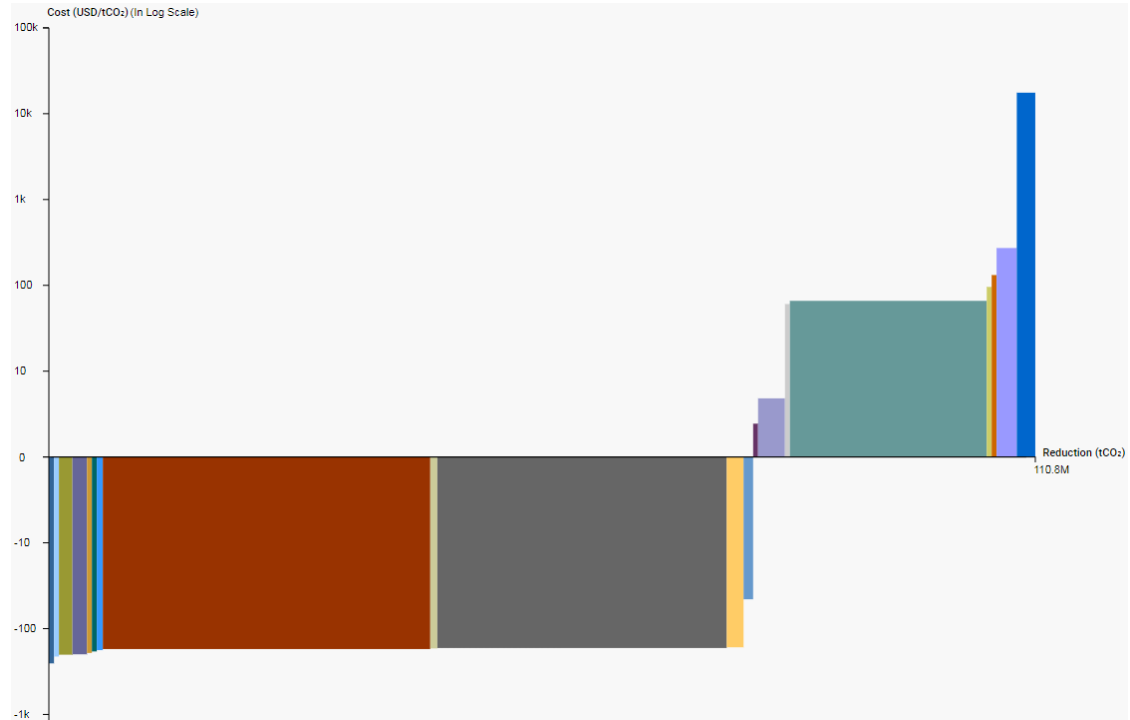
Maximize the CO<sub>2</sub> reduction



# Function and Representation of a MAC curve

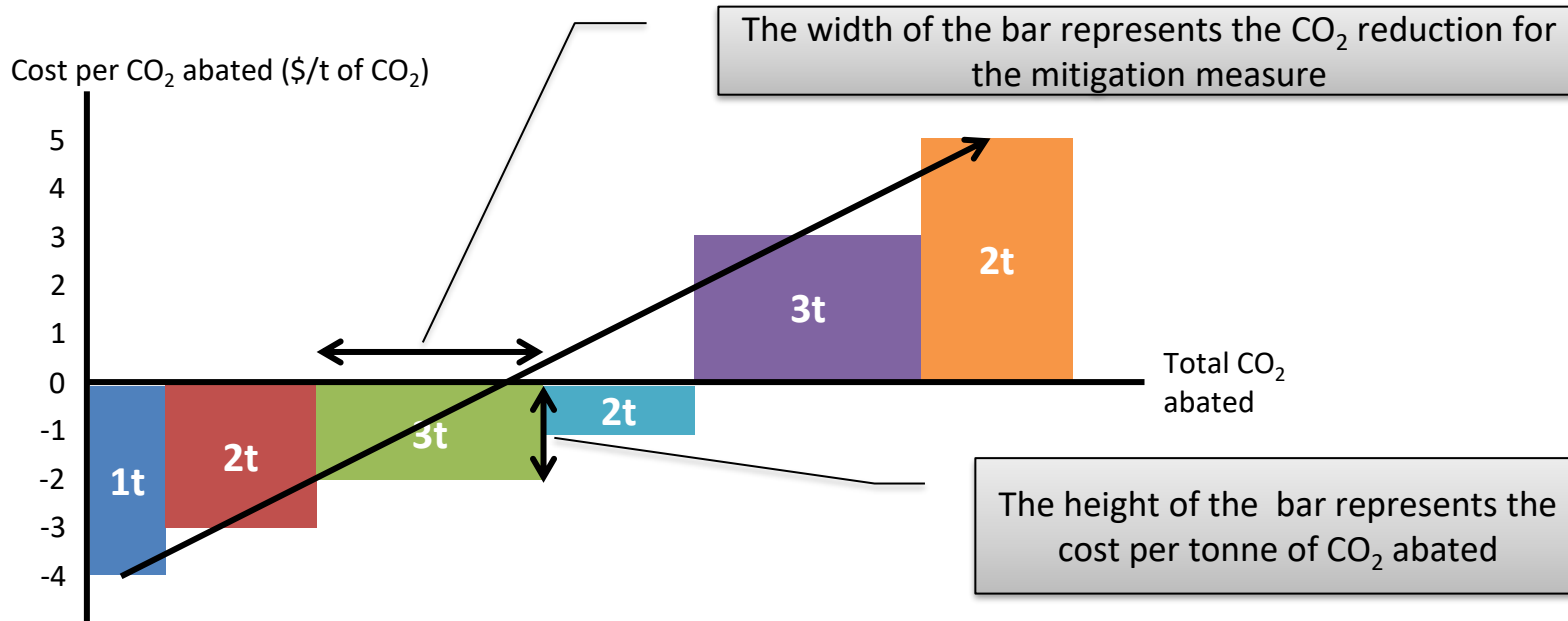
Function: A MAC curve helps to select and prioritize mitigation measures.

Representation: ----->





# How to read a MAC curve?

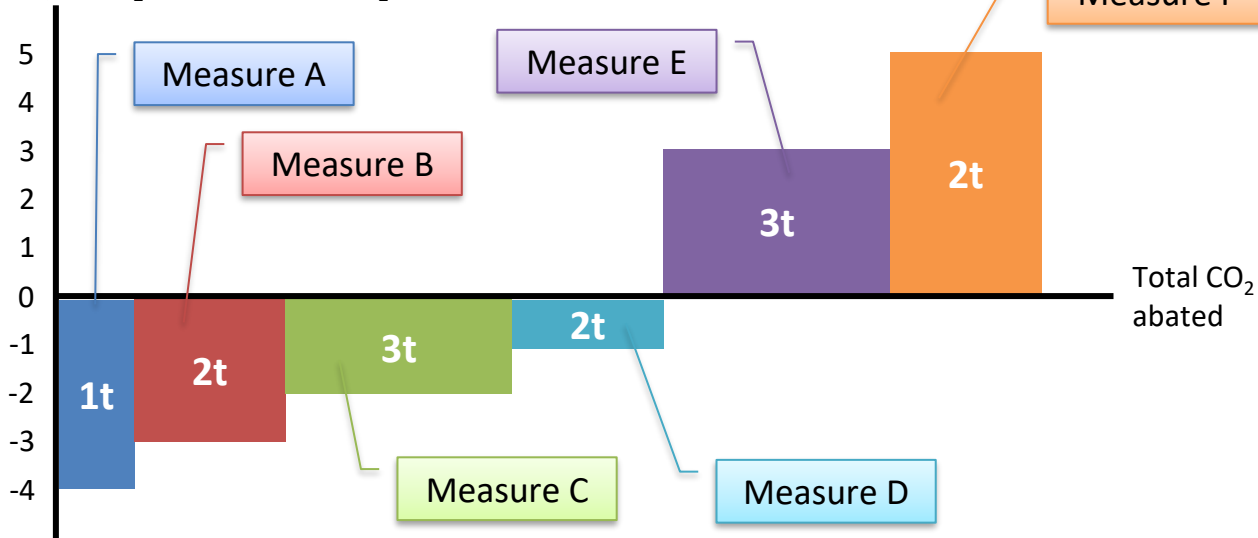




# How to use a MAC curve – Example

**Scenario** Maximize the CO<sub>2</sub> abated by setting the total cost at \$0 or lower

Cost per CO<sub>2</sub> abated (\$/t of CO<sub>2</sub>)



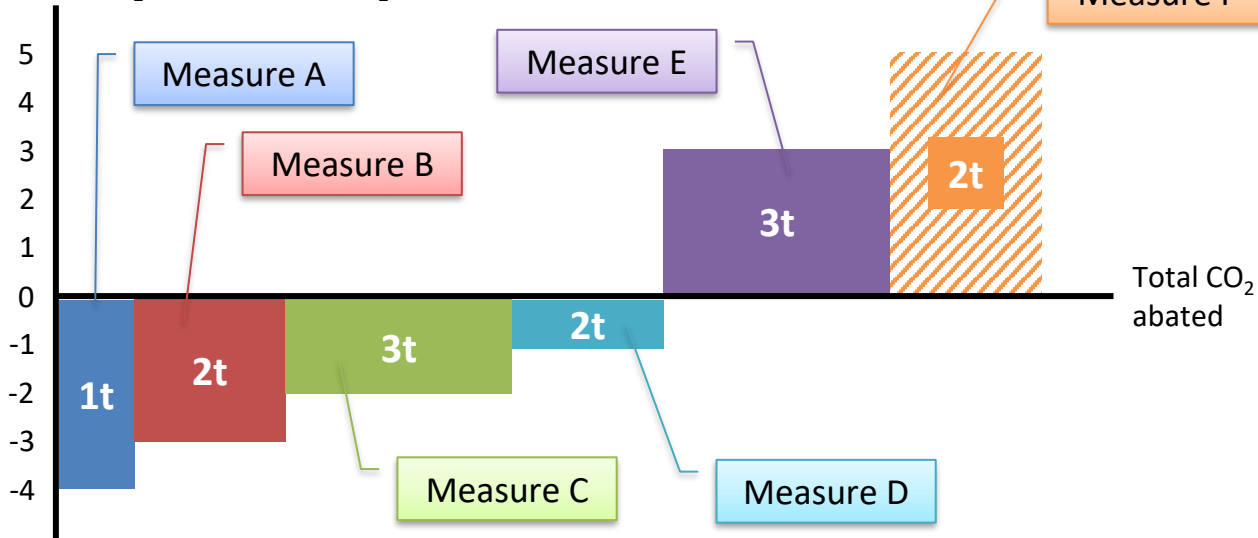
#	Cost per tonne (\$/t)	CO <sub>2</sub> abated (tonne)	Total cost (\$)
A	-4	1	-4
B	-3	2	-6
C	-2	3	-6
D	-1	2	-2
E	3	3	9
F	5	2	10
<b>Total</b>		<b>13</b>	<b>1</b>



# How to use a MAC curve – Example

**Scenario** Maximize the CO<sub>2</sub> abated by setting the total cost at \$0 or lower

Cost per CO<sub>2</sub> abated (\$/t of CO<sub>2</sub>)



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E	3	3	9
<del>F</del>	<del>5</del>	<del>2</del>	<del>10</del>
<b>Total</b>		<b>13 --&gt; 11</b>	<b>1 --&gt; -9</b>





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# Demonstration of the MAC Curve on APER Portal

A white airplane is shown from a front-on perspective, flying towards the viewer. The background is a soft-focus cityscape at sunset or sunrise, with warm orange and yellow light. The sky is a mix of light blue and white. The overall image has a slightly blurred, artistic quality.



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Assistance needs (if needed)

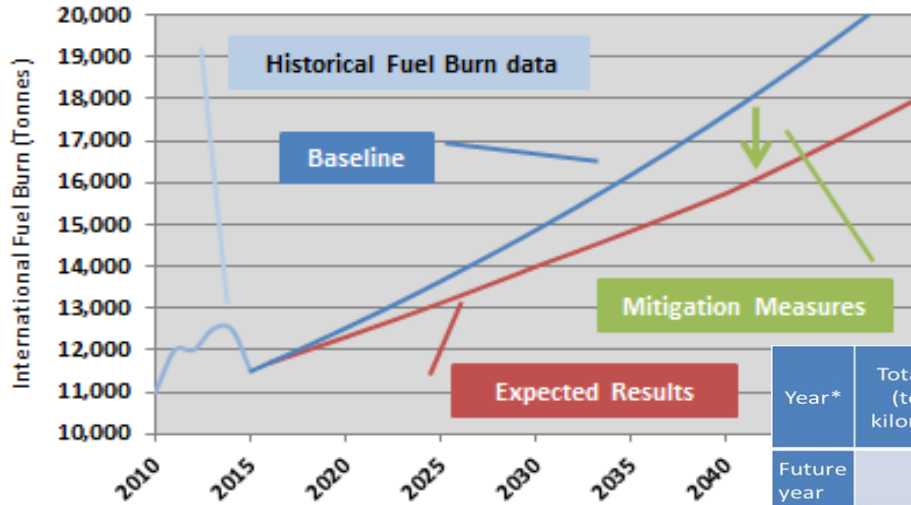


## Expected Results

- The expected results provide the estimated fuel consumption and CO<sub>2</sub> 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.



# Expected Results



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 <sub>2</sub> emissions (metric tonnes)	International CO <sub>2</sub> 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.



## 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<sub>2</sub> 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;



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Assistance needs (if needed)



## Assistance Needs

- 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





## Data confidentiality

- To protect confidentiality, the State may elect not to make certain data publicly available, or aggregate/de-identify the data before including it in the action plan
- In the event that confidential data is collected (e.g., from individual air carriers or on specific international routes), appropriate procedures should be followed by the State for the designation and treatment of such information in accordance with the applicable national legislation and regulations
- A State could improve transparency by explaining in its action plan how confidential information has been treated
- Action plans are submitted to ICAO on a confidential basis. They are **only published on the ICAO public website at the request of the State**
- Assembly Resolution A40-18 *“Encourages States (...) to make the submitted action plans available to the public, taking into account the commercial sensitivity of information contained in States’ action plans;”* , in which case States can anonymize data, e.g. by aggregating/de-identifying the data before including it in the action plan



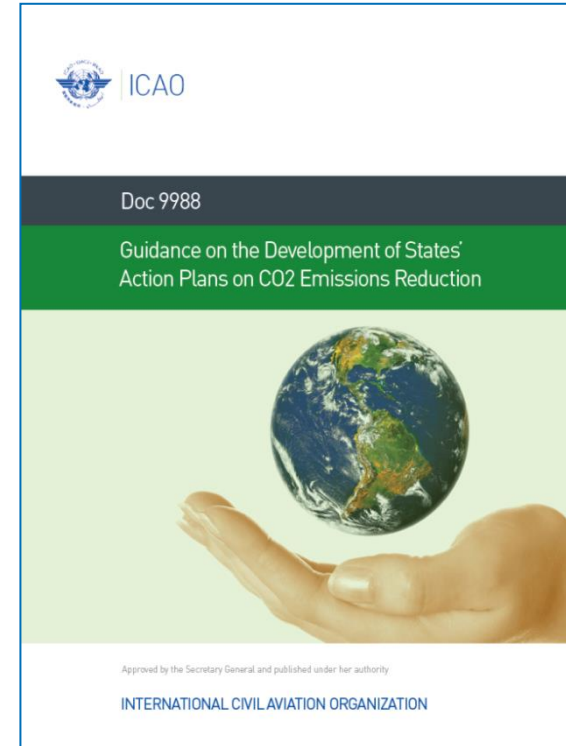
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## ICAO Doc 9988

- *Guidance on the Development of States' Action Plans on CO<sub>2</sub> Emissions Reduction Activities*
  - Describes what a State Action Plan should include and provides a step-by-step guide on how to develop it
- More details about everything presented in this Seminar can be found in this document
  - Overview and introduction
  - Baseline calculation
  - Mitigation measures and expected results
  - Implementation and assistance
  - Appendix with examples and detailed information





## Next Steps

- Further engage with States to support the submission of quantified State Action Plans in 2023.
  - States will be called upon to submit or update their State Action Plans in preparation for assessing global progress towards Carbon Neutral Growth from 2020.
  - This information can also feed into ICAO's work on assessing the feasibility of a long-term aspirational goal for international aviation.
- Continue to explore means to facilitate States' access to financial resources through new possible partnerships.

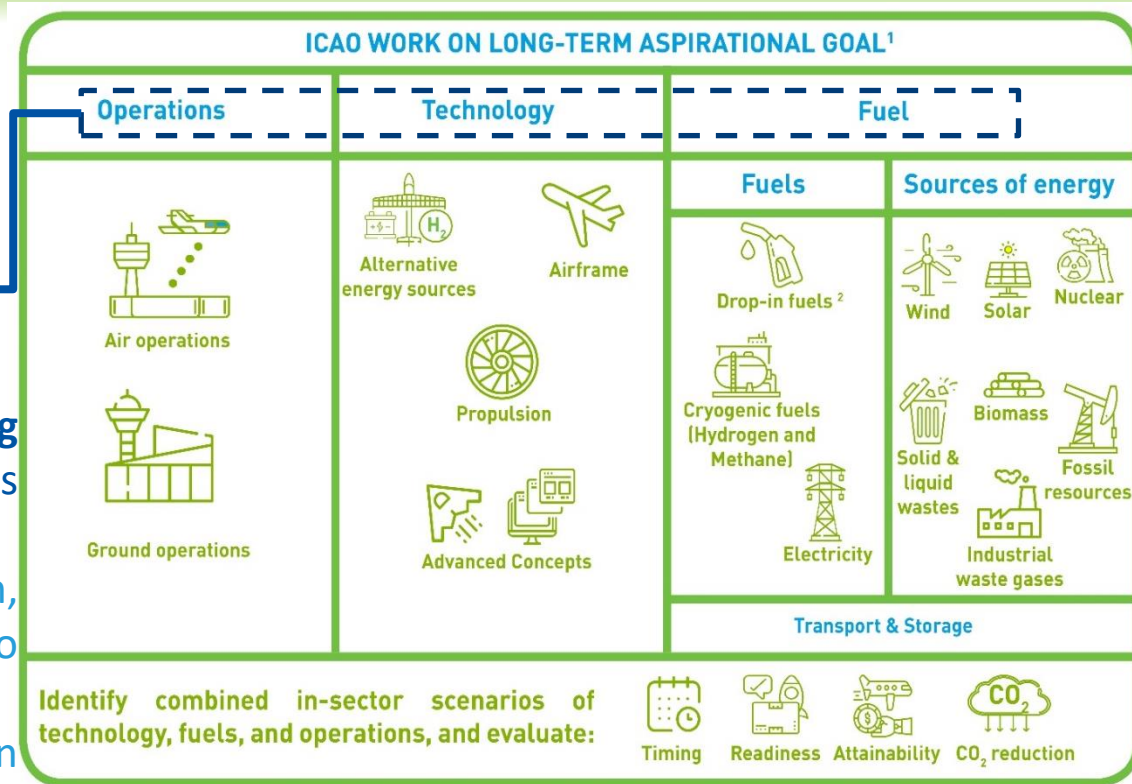
***No Country Left Behind***



## 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)



<sup>1</sup> This work should identify and evaluate existing, foreseen, and innovative in-sector measures in technology, fuels and operations, and their enablers, including information of probable costs. This will assist in identifying gaps, and information and expertise needed, in order to complete a thorough assessment of all in sector CO<sub>2</sub> reductions for international aviation. This should include timing, readiness, attainability and the quantity of CO<sub>2</sub> reduction possible, based on a feasible roll out into the aviation sector.

<sup>2</sup> Sustainable Aviation Fuels (SAF), Low Carbon Aviation Fuels (LCAF), E-Fuels. Icons made by Freepik from www.flaticon.com



# Including New Activities in a State Action Plan

## *Innovation*

- The adoption of new measures or technologies may require coordination with new stakeholders
  - Research organizations and academia
  - Start-up companies
  - Energy suppliers
  - Battery producers
  - New fuel suppliers
  - Waste management companies
  - NGOs and local communities





## Publicly-available State Action Plans

- States that have granted ICAO permission to make their State Action Plan publicly-available are posted on:
  - [https://www.icao.int/environmental-protection/Pages/ClimateChange\\_ActionPlan.aspx](https://www.icao.int/environmental-protection/Pages/ClimateChange_ActionPlan.aspx)
- States are encouraged to make their SAP publicly 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



## In Summary

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





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Thank You