# ICAO Tools to Support the State Action Plan Process

By ICAO Secretariat

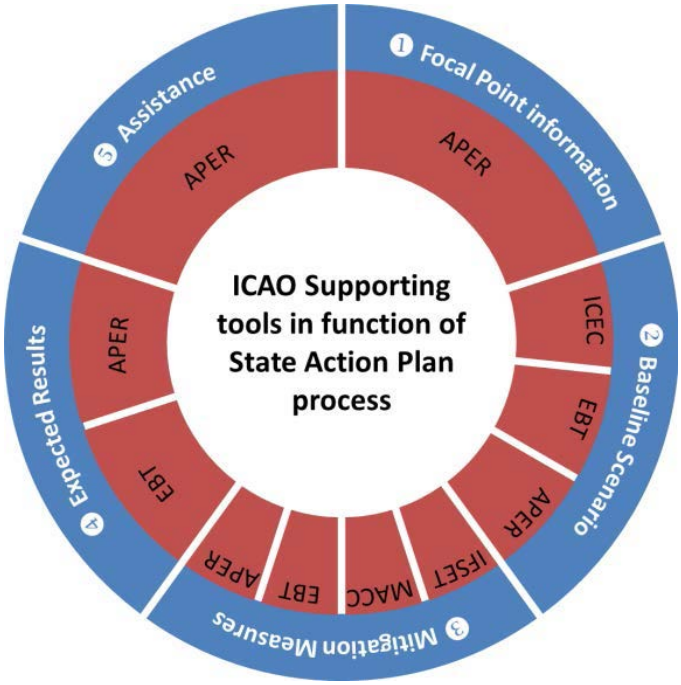
## INTRODUCTION

In 2010, the 37th Session of the ICAO Assembly agreed to Assembly Resolution A37-19, which encouraged States to submit their action plans outlining their respective policies and actions, and annual reporting on international aviation $CO_2$ emissions to ICAO. Over the past nine years, ICAO Member States have actively engaged in the State Action Plan initiative, making it one of the most successful ICAO capacity-building programmes, and a cornerstone of the Organization's environmental Programme. Recognizing the need for States to continue submit new and updated Action Plans to ICAO, Member States have reaffirmed the commitment to the State Action Plan initiative in each subsequent Assembly, through Assembly resolutions A38-18 and A39-2. State Action Plans provide an opportunity for States to showcase specific policies and measures that have been implemented to mitigate $CO_2$ emissions from international civil aviation activities, and are intended to be individualized and reflective of the specific national circumstances of each ICAO Member State. In order for ICAO to continue to monitor progress achieved by States toward the sector's global aspirational goals of 2 per cent annual fuel efficiency improvement and carbon neutral growth from 2020, States are encouraged to submit an updated State Action plan every three years in order to assess the benefits resulting from the measures implemented.

A State Action Plan should consist of the following five elements in order to be considered complete: **1) Focal Point information**; **2) Baseline Scenario**; **3) list of mitigation measures**; **4) Expected Results**; and **5) Assistance needs** (if required).

Since the launch of the State Action Plan initiative in 2010, ICAO has embarked on a comprehensive and robust capacity-building and assistance strategy to support ICAO Member States to develop their Action Plans and to implement measures to reduce emissions from aviation activities. As part of this strategy and to facilitate States' actions, ICAO has published guidance material, namely, Doc 9988, *Guidance on the Development of States' Action Plan on $CO_2$ Emissions Reduction Activities*, which describes the process for developing or updating an Action Plan, and a series of tools to support the preparation of State Action Plans. Figure 1 summarizes how each tool can be used in the process to develop a State Action Plan.

**FIGURE 1:** ICAO Tools and State Action Plan development process




The following paragraphs describe how each ICAO tool support which part(s) of the State Action Plan development process.

## TOOLS

**Action Plan on Emissions Reduction (APER) website** – To facilitate the State Action Plan development process, all State Action Plan focal points have been granted access to the APER website, a secured, web-based platform that can be used to interact with ICAO, upload administrative and quantified information related to State Action Plans, and consult guidance material, such as Doc 9988, and tools, including the Environmental Benefit Tool (EBT).

**ICAO Carbon Emissions Calculator (ICEC)** – The ICAO Carbon Emissions Calculator[1] was developed to avoid the proliferation of different tools for calculating the carbon footprint of air travel, which provided inconsistent results, and lacked a clear and transparent methodology that would be necessary to facilitate understanding of the calculations underpinning the tools and the results. Thus, individuals or organizations planning to offset their air travel emissions had to do so on the basis of inconsistent and often inaccurate calculations.

In this context, ICAO embarked on developing a tool that would be user friendly, unbiased and compatible for use with offset programmes. The tool would rely on the best publicly available data and be fully documented, meaning that all calculations would be transparent. The methodology for the calculator was developed through the ICAO Committee on Aviation Environmental Protection (CAEP).

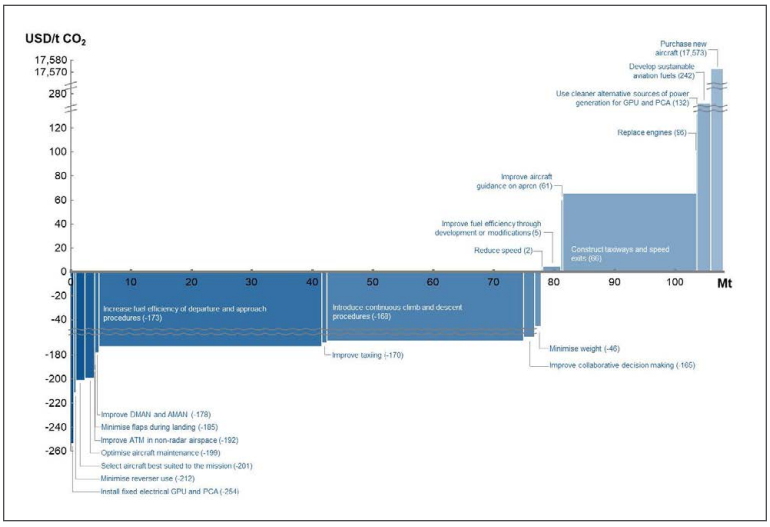
The methodology team in CAEP included experts from the ICAO Secretariat, ICAO Member States, universities, non-governmental Organizations (NGOs), the airlines, and the manufacturers. As a result, the methodology developed is internationally recognized and accepted. Since 2009, the ICAO Carbon Emissions Calculator has been used by the entire UN system for computing their annual air travel emissions inventories in support of the UN Climate Neutral UN initiative. Since 2008, the general public has also had access to the ICAO Carbon Emissions Calculator and in fact it becomes the most popular ICAO tool being daily consulted by the traveling public. The ICAO Carbon Emissions Calculator is available free of charge on the ICAO website.

In order to support States in the preparation of their Action Plans, ICAO has developed a standalone application allowing State Action Plan Focal Points to generate a State-level emissions inventory by simply importing batches of flights containing the airport pair, the number of flights in the year, and the aircraft type. This application uses the same methodology than the one underpinning the ICAO Carbon Emissions Calculator available on the ICAO public website.

As a next step, ICAO is working on the development of a new version of the calculator by offering the possibility of estimating carbon footprint not only for passengers by also for the air freight. This new version of the calculator will also be available on iOS and android.

**Marginal Abatement Cost Curve** – In 2014, the International Civil Aviation Organization (ICAO) established a partnership with the United Nations Development Program (UNDP) to support Member States' requests for assistance for reducing $CO_2$ emissions from international aviation. Financing for the partnership came from the Global Environment Facility (GEF). This project

**FIGURE 2:** Global Margin Abatement Cost Curve for the year 2020




1 https://www.icao.int/ENVIRONMENTAL-PROTECTION/CarbonOffset/Pages/default.aspx

had multiple objectives (for more information, see Chapter 9) and one of them was the development of Marginal Abatement Cost (MAC) Curves for the years 2020, 2030, 2040 and 2050 based on a total of twenty mitigation measures selected from across all elements of the ICAO Basket of Measures. For more information on how to read and use a MAC Curve, see Chapter 9. In addition to developing the four global MAC Curves, ICAO has developed an interactive interface embedded into the APER website, where State Action Plan focal points, together with their relevant stakeholders, can customize multiple MAC Curves at the national level in order to obtain more precise and reliable information for assessing the selection and prioritization of mitigation measures.


**ICAO Fuel Savings Estimation Tool (IFSET)** – Operational improvements offer an opportunity to reduce fuel consumption and emissions by improving Air Traffic Management (ATM) system efficiency. In support of the performance-based approach of the ICAO Global Air Navigation Plan (GANP), States needed a means to calculate the fuel savings associated with the proposed operational changes.

One of the important elements of the ICAO Basket of Measures for reducing emissions and improving efficiency are operational improvements. Some examples of the specific actions that could be taken under this measure are the implementation of new arrival or departure procedures, reduced separation minima, or reduced taxi time. Some States found it challenging to model such improvements, so in 2006, ICAO provided a series of Rules of Thumb that could be used to estimate the magnitude of the fuel savings associated with such changes. The Rules of Thumb were expressed in terms of fuel burn per minute or mile, and provided a very rough approximation of the benefits.

In 2012, ICAO expanded beyond the Rules of Thumb to develop an easy-to-use tool, known as the ICAO Fuel Savings Estimation Tool (IFSET)[2] to help States refine their estimates. IFSET allows those without modelling and/or measurement capabilities to estimate fuel savings from operational improvements. It is consistent with the ICAO CAEP-approved greenhouse gas models and the ICAO GANP. This tool includes an easy-to-use interface, requires minimal data, and is an improvement over the Rules of Thumb.

Using IFSET, users can estimate the effects of shortening/eliminating level segments on departure and approach, the effects of shorter routes (either in time or distance), the effects of cruising at different altitudes, and the effects of reduced taxi times as part of a process to quantify $CO_2$ reduction benefit from operational measures selected in the State Action Plan.

**Environmental Benefit Tool (EBT)** – The EBT could be considered as the transformation of Doc 9988 into an interactive, structured and easy-to-use tool. As mentioned earlier, a State Action Plan consists of five key elements. The EBT allows, with a minimum of input from the State Action Plan Focal Point, to generate a baseline scenario in terms of fuel burn and $CO_2$ emissions up to 2050, estimate the fuel and $CO_2$ savings from the implementation of the mitigations measures and finally, evaluate the expected results.

The generation of the baseline scenario is initially based on historical data (i.e. international fuel burn and international revenue tonne kilometres (RTK) from previous years) provided by the user, from which past annual fuel efficiencies are derived. Fuel efficiency is then forecasted by using different regression functions. On the basis of statistical information computed by the tool, the best trend is automatically selected by the EBT for the generation of the baseline scenario.

Once the baseline scenario is completed, EBT users can (again with a limited number of inputs) assess the benefit either in terms of fuel burn or $CO_2$ emissions from the implementation of the mitigation measures selected. All the Rules of Thumb available in Doc 9988 are embedded in the EBT, therefore minimizing errors from calculations, as all measures are automatically computed by combining a user's input and the Rules of Thumb.

At the end of the process, expected results are generated by subtracting $CO_2$ savings from the baseline scenario.

2 https://applications.icao.int/ifset

The Environmental Benefit Tool (EBT) is a great tool for State Action Plan Focal Points with no or limited statistical/mathematical background. The tool allows generating a robust and complete State Action Plan with a minimum of information provided by the users.

**Other tools –** Two other tools have to be mentioned for a complete overview of the environmental tools developed by ICAO. The first tool is the ICAO CORSIA $CO_2$ Estimation and Reporting Tool (CERT) used as a simplified compliance procedure in the context of CORSIA. For more information on this tool, see Chapter 6.

The second tool is the Aviation Environmental System (AES) developed under the ICAO-European Union Project. This tool helps States involved in this project to collect and consolidate $CO_2$ emissions from international aviation in order to generate insights. See Chapter 9 for more information on this system.

## NEXT STEPS

ICAO is always striving to develop and enhance its tools in order to improve users' experience. In this regard, ICAO has started improving the connectivity between tools and platforms by implementing exporting/importing data functionalities within each tool. For example, a State Action Plan Focal Point will easily generate a historical fuel burn dataset by using the ICAO Carbon Emissions Calculator and then will export the dataset as a CSV file, which will be imported into the EBT. The same approach is being applied to the MAC Curve tool, whereby users may import results into the EBT where it will automatically populate the information as fuel savings. Finally, users will soon be able to upload the baseline scenario, quantified mitigation measures, and expected results into the APER website, with a single click.