# 3. ICAO Supporting Tools - Publicly available

ICAO Secretariat

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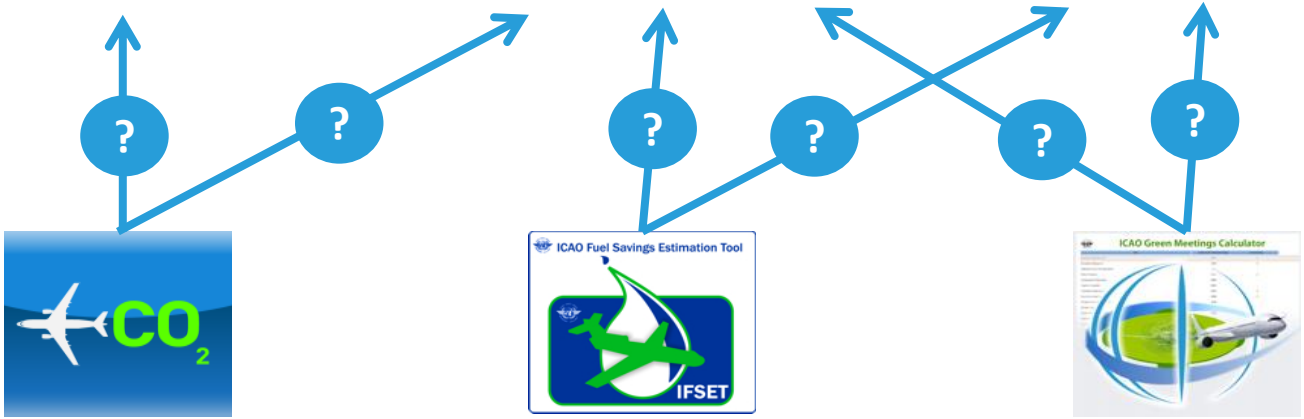
# Introduction

**Baseline** → **Mitigation Measures** → **Expected Results**

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# ICAO Environmental Tools Suite

## ICAO Carbon Emissions Calculator

Allows passengers to estimate $CO_2$ emissions from their air travel

## ICAO Fuel Savings Estimation Tool (IFSET)

To assist States in estimating fuel savings from operational improvements

## ICAO Green Meetings Calculator

To support decision making in minimizing $CO_2$ emissions from air travel to attend meetings

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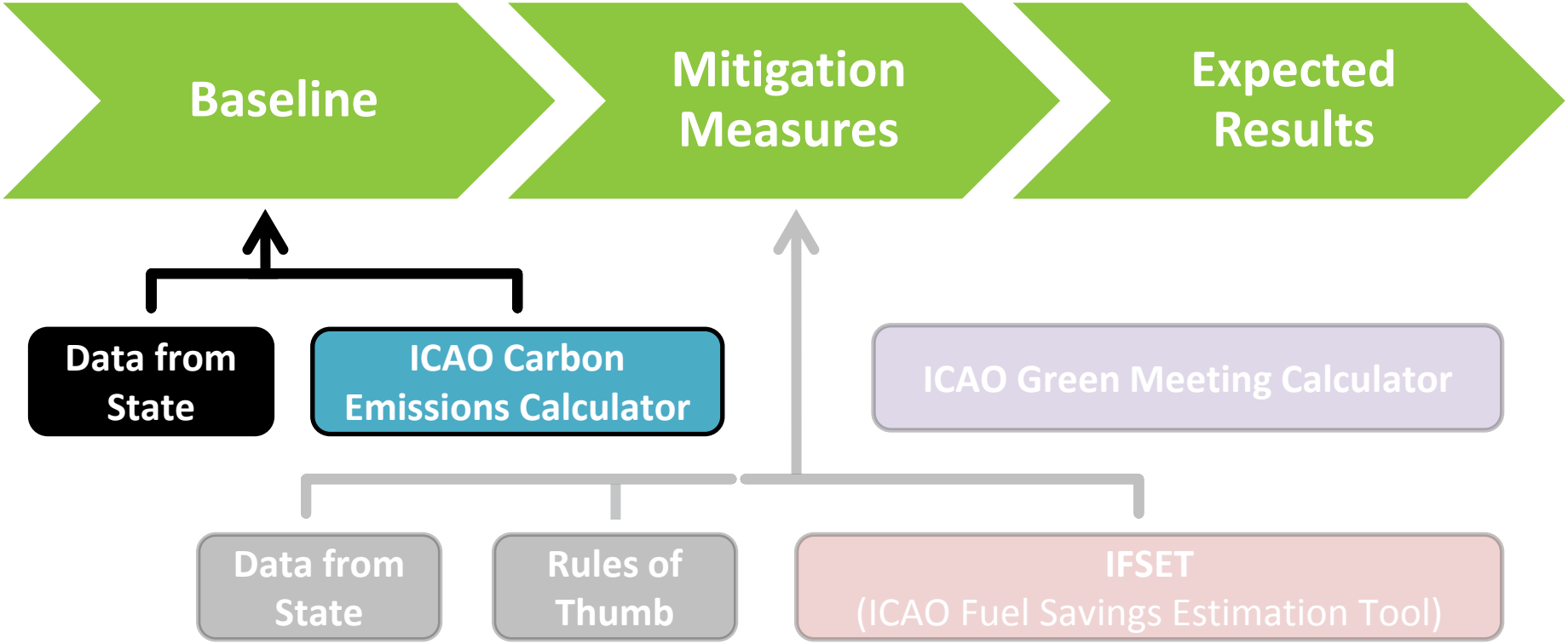
# ICAO Carbon Emissions Calculator

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# Estimating aircraft fuel burn and $CO_2$ emissions:

# ICAO Carbon Emissions Calculator

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# ICAO Carbon Emissions Calculator Background

- Proliferation of tools for calculating “carbon footprint” from aviation
  - Results differ by factor of 4 or more!
  - Unknown data sources and methodologies (black box)
  - Inconsistent basis for offsetting

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# ICAO Carbon Emissions Calculator Methodology

- **Objectives**
  - User-friendly, unbiased, tool to compute carbon emissions from air travel
  - Suitable for use with offset programmes
  - Best publicly available data (**transparency**)
  - Fully documented

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# ICAO Carbon Emissions Calculator Methodology (cont.)

- **Methodology Developed through CAEP**
  - **24 Member States ,** global representation
  - **15 Observers,** primary aviation stakeholder representation
- **Expert input provided from**
  - ICAO Secretariat
  - ICAO Member States
  - Universities
  - NGOs
  - International Air Transport Association – IATA (Airlines)
  - International Coordinating Council of Aerospace Industries Associations – ICCAIA (Manufacturers)
- **Methodology is internationally recognized and accepted**
- **All UN air travel GHG inventories are prepared using the ICAO Calculator**

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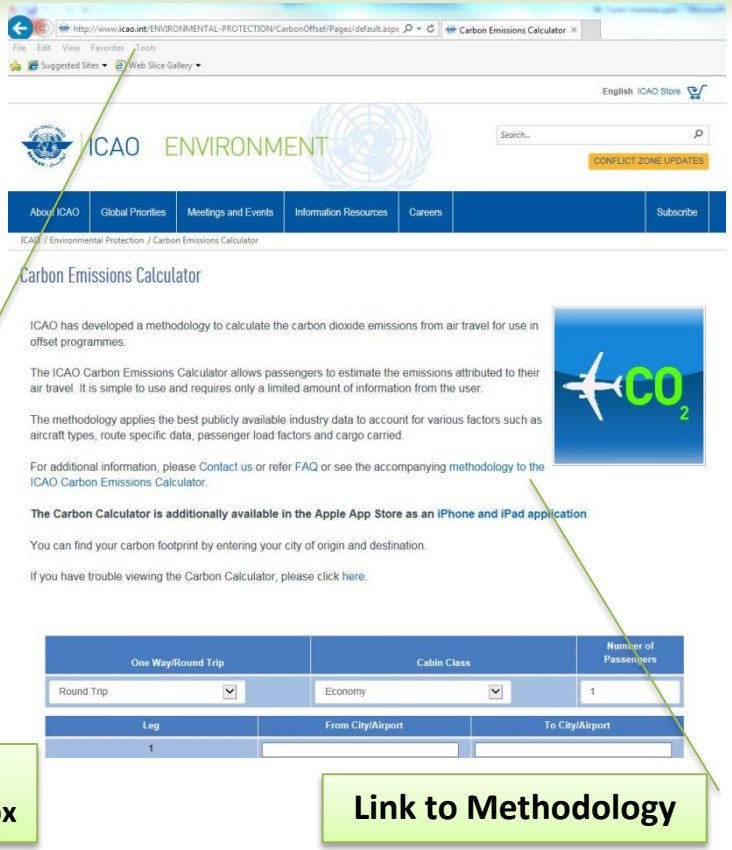
# ICAO Carbon Emissions Calculator Public Interface

- Transparent
- Easy-to-use
- Publicly available
- Delivers consistent estimates of $CO_2$ – suitable for use with offset programs
- Available since June 2008




**http://www.icao.int/ENVIRONMENTAL-PROTECTION/CarbonOffset/Pages/default.aspx**

**Link to Methodology**

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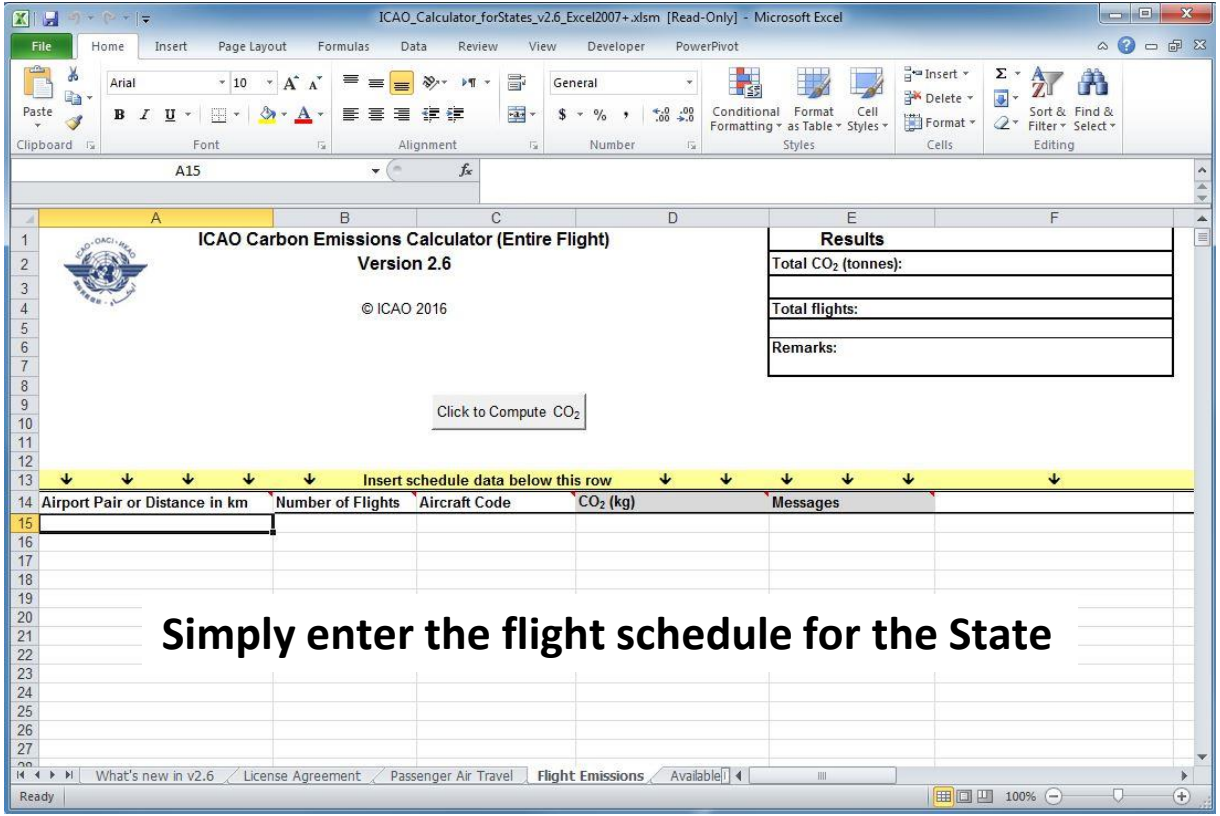
# ICAO Carbon Emissions Calculator
# User Interface for Action Plans

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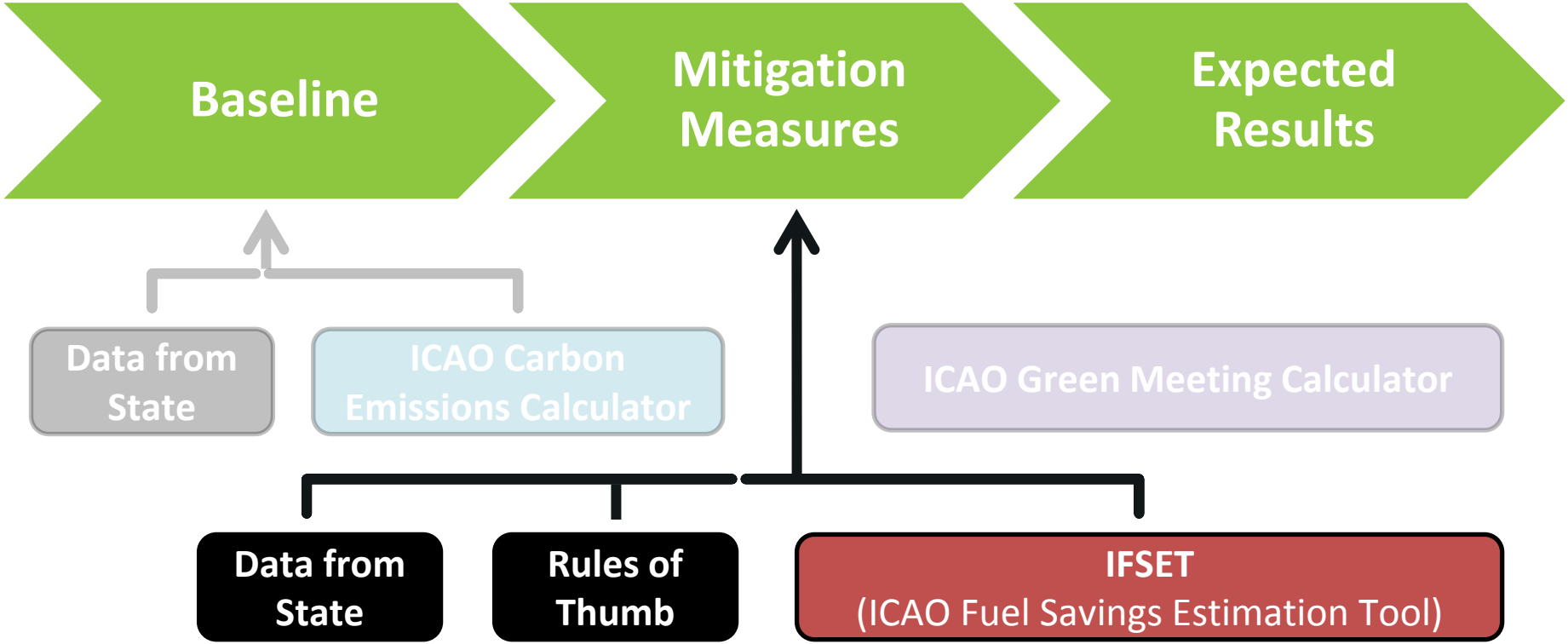
# ICAO Fuel Savings Estimations Tool (IFSET)

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# Estimating Fuel Savings from Operational Changes:

# ICAO Fuel Savings Estimation Tool (IFSET)

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# IFSET Background

- States' needs to compute the fuel savings from operational improvements

- Previous ICAO guidance - Rules of Thumb (2006)
  - Avg. fuel burn per minute
  - Avg. fuel burn per nautical mile
  - Avg. fuel burn per change in flight level
  - Better suited for assessing changes in cruise (e.g. RVSM)

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# IFSET
## What it Does

- Allows those States without modelling and/or measurement capabilities to estimate fuel savings from operational improvements
- Consistent with CAEP-approved GHG models
- Consistent with Global Air Navigation Plan
- Easy-to-use / minimal data requirements
- Better than the Rules of Thumb

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# IFSET
## What it Does (cont.)

- The tool can estimate:
  - Effects of shortening / eliminating level segments on departure and approach
  - Effects of shorter routes (either in time or distance)
  - Effects of cruising at different altitudes
  - Effects of reduced taxi times

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# IFSET
# What it Doesn't Do

- The tool **does not**:
  - Replace detailed modelling or measurement of fuel consumption
  - Estimate fuel consumption from airborne holding
  - Compute other elements than fuel consumption / $CO_2$ emissions

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# How it Works: Underlying Data

- **AEDT** (CAEP-approved GHG model) used to pre-compute
  - Level, (steady state) climb, and (steady state) descent fuel consumption
  - By aircraft category
  - In 1,000 foot intervals
- **Result:** Robust database

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# IFSET
## How it Works: User Input

- Fleet mix defined for baseline and post-implementation scenario
  - Aircraft category
  - Aircraft remaining trip distance (optional parameter that will increase accuracy for departures)
- User selects “elements” to define the baseline and “new” procedure
- Tool estimates the change in total fuel consumption between the 2 scenarios

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# IFSET Example

## Objective

Operational measures are one of the instruments available to States to improve fuel efficiency and reduce CO2 emissions. The ICAO Fuel Savings Estimation Tool (IFSET) has been developed by the Secretariat with support from States and international organizations to assist the States to estimate fuel savings in a manner consistent with the models approved by CAEP and aligned with the Global Air Navigation Plan.
The ICAO Fuel Savings Estimation Tool (IFSET) is not intended to replace the use of detailed measurement or modelling of fuel savings, where those capabilities exist. Rather, it is provided to assist those States without such facilities to estimate the benefits from operational improvements in a harmonized way.

User Guide: IFSET Ver 2.1 User Guide

**Please note that all the information saved in this web tool can be seen by the public. Therefore you should delete the event when you have finished using the tool.**

New Scenario

Saved Scenario

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# IFSET
# Example (cont.)

## Step 1 - Define New Scenario

**Scenario Name** Example

| ID | Aircraft | Base Flights | New Flights | Continuing Old Flights | Remaining Trip (nm) |
|---|---|---|---|---|---|
| 1 | Single Aisle Jet | 1000 | 1000 | 0 | 1160 |
| 2 | Turboprop | 500 | 500 | 0 | 740 |

Back | Aircraft Category Map | Add | Delete | Save | Next Step

Save any change on the page by clicking "Save" before clicking "Next Step".

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# IFSET
# Example (cont.)

## Step 2 - Saved Old/New Procedure Definition

**Scenario Name:** Example

Old Procedure Definition

| ID | Action | From Alt (ft) | To Alt (ft) | Distance (nm) | Time (sec) |
|---|---|---|---|---|---|
| 1 | Taxi | | | | 1200 |
| 2 | Climb | 3000 | 20000 | 37 | |
| 3 | Level | 20000 | 20000 | 20 | |
| 4 | Climb | 20000 | 25000 | 20 | |

Add Delete

New Procedure Definition

| ID | Action | From Alt (ft) | To Alt (ft) | Distance (nm) | Time (sec) |
|---|---|---|---|---|---|
| 1 | Taxi | | | | 1000 |
| 2 | Climb | 3000 | 25000 | 57 | |
| 3 | Level | 25000 | 25000 | 20 | |

Add Delete

Back Reset Save Calculate

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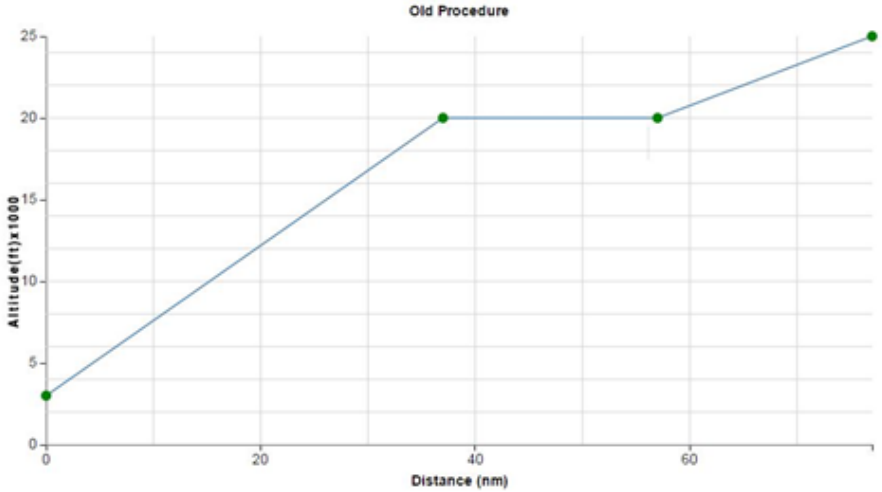
# IFSET
# Sample Graphical View

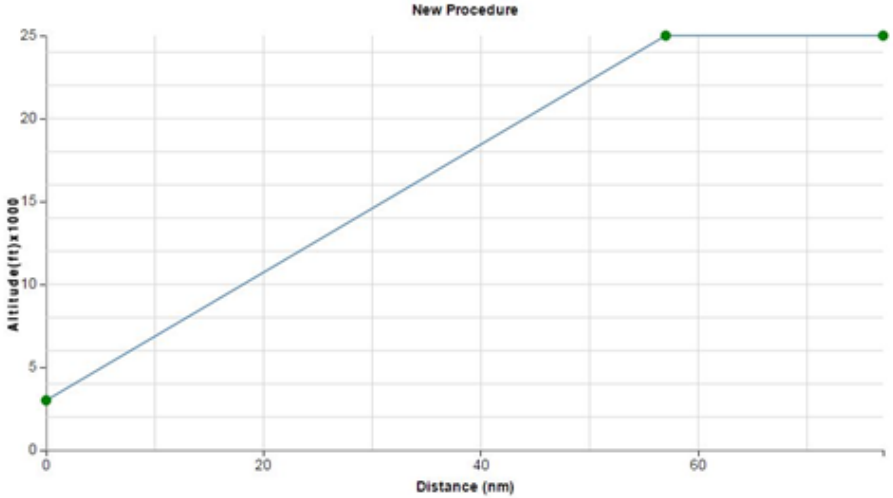
## Step 3 - Estimated Fuel Changes Report

**Scenario Name:** Example

| Distance (nm) | Altitude (ft) |
|---|---|
| 0 | 3000 |
| 37 | 20000 |
| 57 | 20000 |
| 77 | 25000 |

| Distance (nm) | Altitude (ft) |
|---|---|
| 0 | 3000 |
| 57 | 25000 |
| 77 | 25000 |

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# IFSET
# Example Results

Estimated Fuel Changes Report

| Scenario Name | Old Fuel Consumption (KG) | New Fuel Consumption (KG) | Savings (KG) | Savings (%) |
|---|---|---|---|---|
| Example | 1337600 | 1283000 | -54500 | -4.10 |

Estimated Detailed Fuel Changes Report

| Old Climb Fuel (KG) | New Climb Fuel (KG) | Climb Savings (KG) |
|---|---|---|
| 923000 | 921000 | -2100 |

| Old Descent Fuel (KG) | New Descent Fuel (KG) | Descent Savings (KG) |
|---|---|---|
| 0 | 0 | 0 |

| Old Level Fuel (KG) | New Level Fuel (KG) | Level Savings (KG) |
|---|---|---|
| 155800 | 146400 | -9400 |

| Old Taxi Fuel (KG) | New Taxi Fuel (KG) | Taxi Savings (KG) |
|---|---|---|
| 258800 | 215600 | -43100 |

Back

Export to Excel

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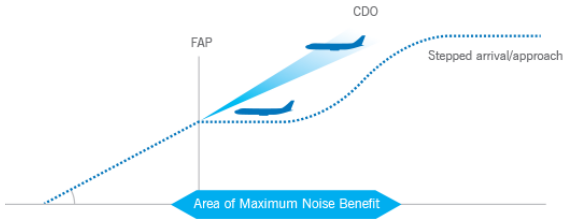
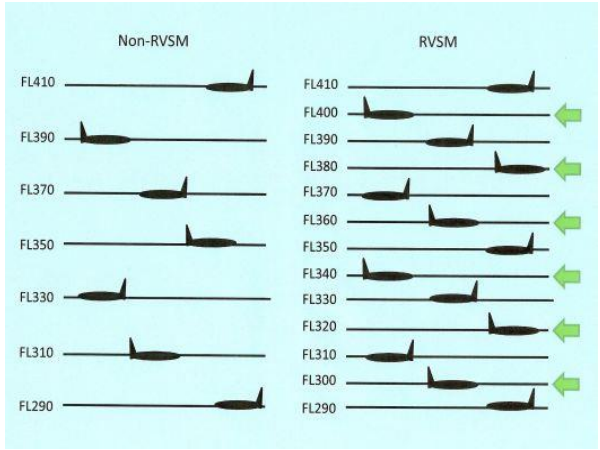
# IFSET
# In Summary



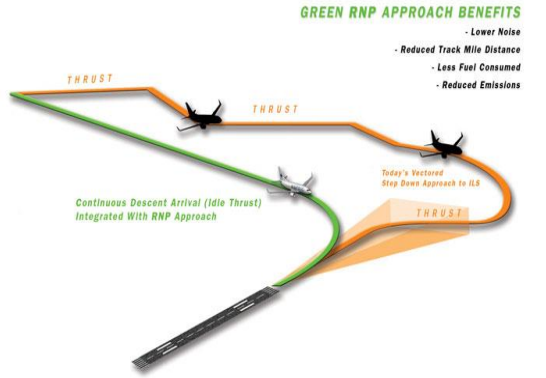

Operational Measure Implementation (planned or post)

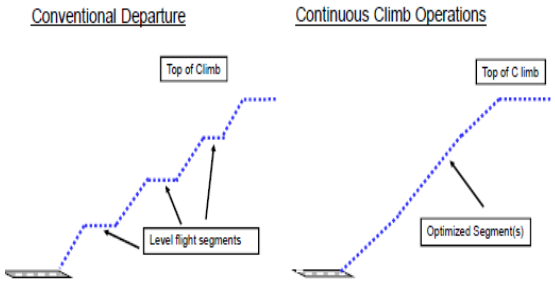
+

Need to quantify change in fuel consumption, but don't have the tools?

=

USE IFSET

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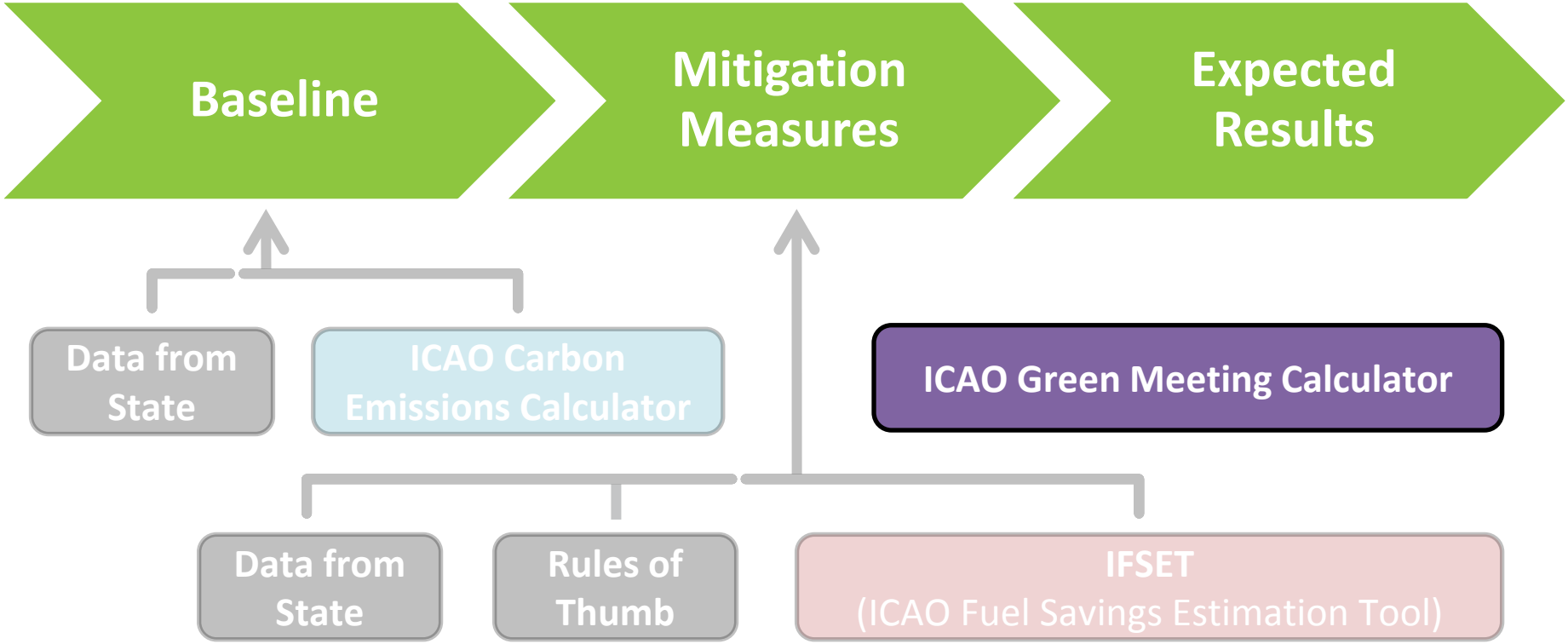
# ICAO Green Meetings Calculator

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# Planning Meeting Locations:

# ICAO Green Meetings Calculator

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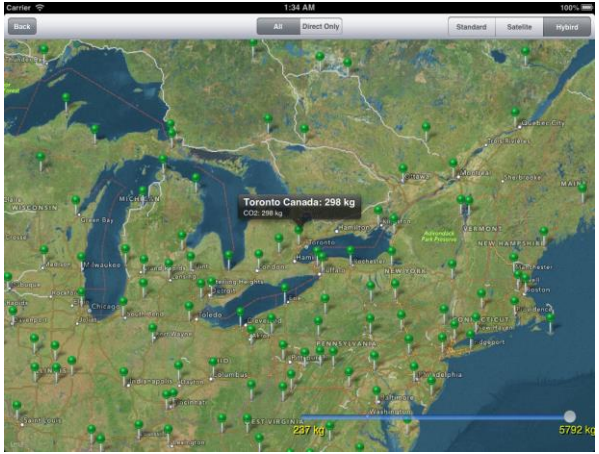
# ICAO Green Meetings Calculator Overview

- Developed in response to request from UN Travel Offices
- Supports decision-making by selecting meeting location with minimum $CO_2$ footprint from air travel



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# ICAO Green Meetings Calculator
# Additional information

All of ICAO's environmental tools are available free of charge from:

**http://www.icao.int/env**

Designed for Windows 7, Vista, XP

Available on the App Store

Available on the Android App Store

Designed for Windows 7, Vista, XP

Designed for Windows 7, Vista, XP

Available on the App Store

Available on the Android App Store

**The special interface to the ICAO Carbon Emissions Calculator is available through the APER portal.*

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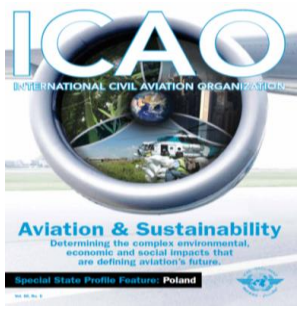
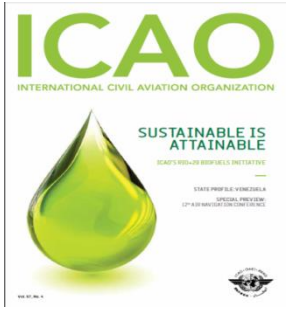
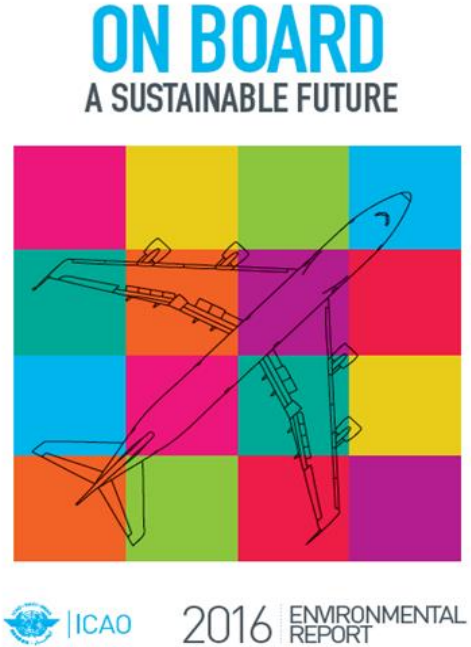
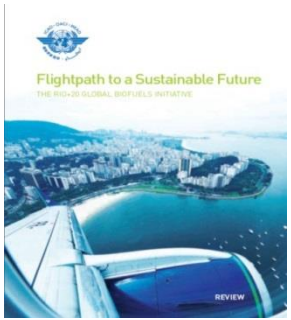
# Additional information








For more information on our activities, please visit: **http://www.icao.int/env**

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