



ICAO Environmental Tools

ICAO Secretariat



- Quantifying fuel consumption from current and future aviation activities can be challenging
- So can quantifying the benefits from measures
- ICAO has developed tools to help
- These tools can do much more than help with an action plan





ICAO Carbon Emissions Calculator

Allows passengers to estimate CO₂ 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 CO₂ emissions from air travel to attend meetings



Estimating aircraft fuel burn and CO₂ emissions:

ICAO Carbon Emissions Calculator



- 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



- **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

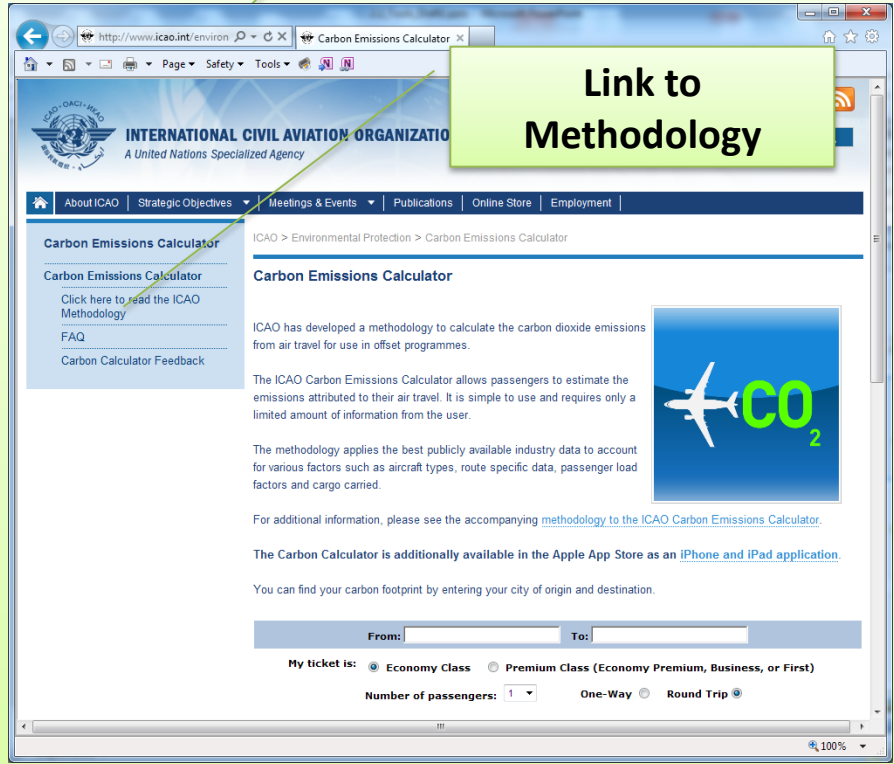


- **Methodology Developed through CAEP**
 - **23 Member States** , global representation
 - **15 Observers**, primary aviation stakeholder representation
- **Expert input provided from**
 - ICAO Secretariat
 - ICAO Member States
 - Universities
 - NGOs
 - International Air Transport Association – IATA (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**



- Transparent
- Easy-to-use
- Publicly available
- Delivers consistent estimates of CO₂ – suitable for use with offset programs
- Available since June 2008

www.icao.int



Link to Methodology



Estimating Fuel Savings from Operational Changes:

ICAO Fuel Savings Estimation Tool



- Need by States 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)



- 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 Plan
- Easy-to-use / minimal data requirements
- Better than the Rules of Thumb



- 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



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

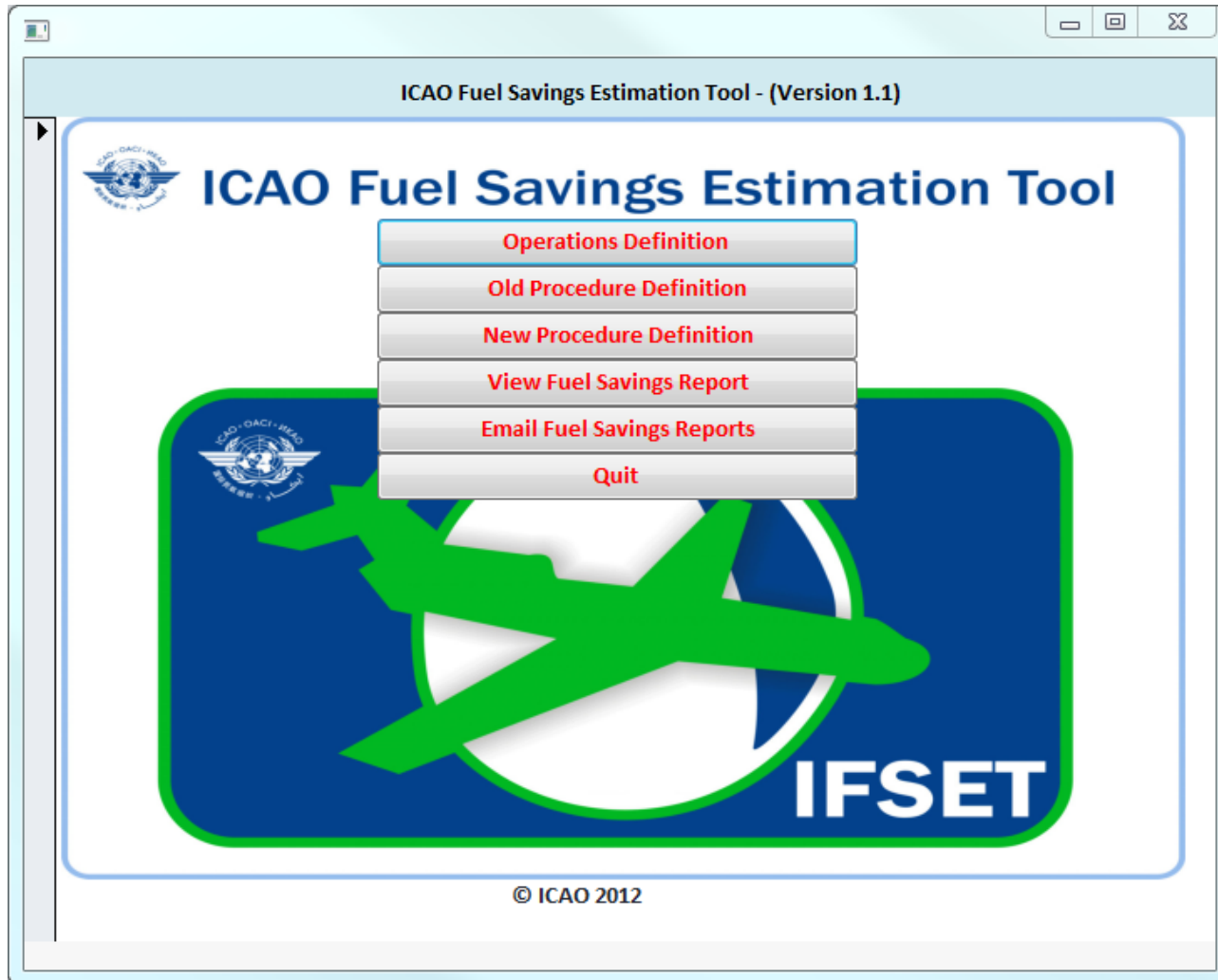


- **AEDT** (CAEP-approved GHG model) used to pre-compute
 - Level, (steady state) climb, and (steady state) descent fuel consumption
 - By aircraft category
 - In 1,000 foot intervals




- 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









STEP 1 - OPERATIONS DEFINITION

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Scenario Name

Aircraft	Base Flights	New Flights	Continuing Old Flights	Remaining Trip (nm)
Single Aisle Jet	4438	4438		1100
Turboprop	4419	4419		740
Business Turboprop	29	29		720
Small Business Jet	20	20		880

Record: 1 of 1



STEP 2 - OLD PROCEDURE DEFINITION
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Scenario Name

Action	From Alt(ft)	To Alt(ft)	Distance(nm)	Time(sec)
Descend	35000	21000		
Level	21000	21000	25	
Descend	21000	11000		
Level	11000	11000	10	
Descend	11000	3000		

Record: 1 of 1 | No Filter | Search



STEP 3 - NEW PROCEDURE DEFINITION

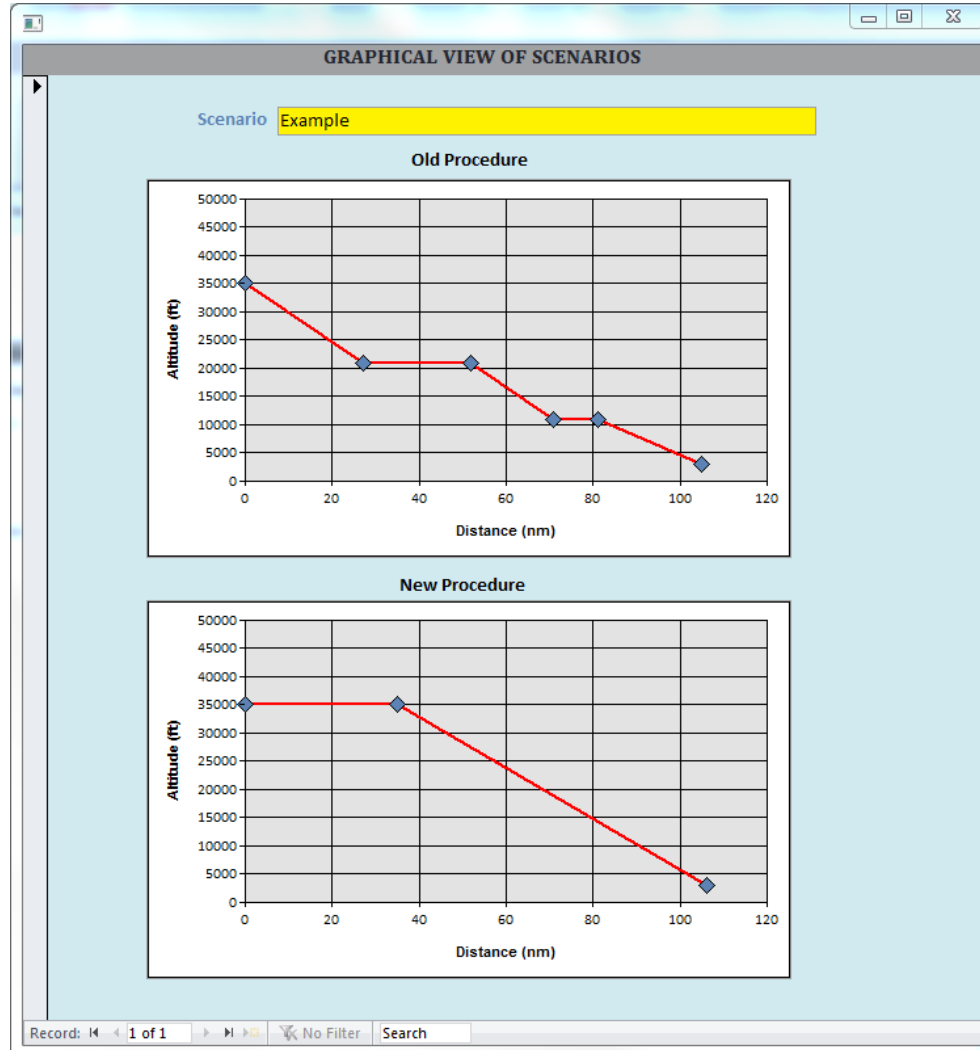
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Scenario Name

Action	From Alt(ft)	To Alt(ft)	Distance(nm)	Time(sec)
Level	35000	35000	35	
Descend	35000	3000		

Record: 1 of 1 | No Filter | Search





Fuel Savings Report

Estimated Fuel Changes Report

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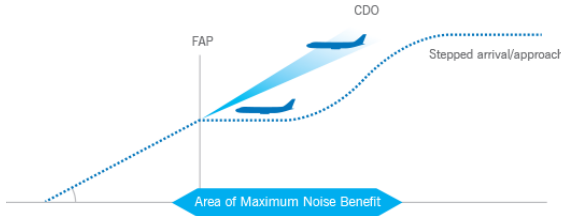
Scenario	Old Fuel Consumption (Kg)	New Fuel Consumption (Kg)	Savings (Kg)	Savings (%)
Example	2186800	1590300	-596500	-27.3

Note - Results are rounded to the nearest 100 Kg.

[Export to Excel](#) [Detailed Fuel Savings Report](#)

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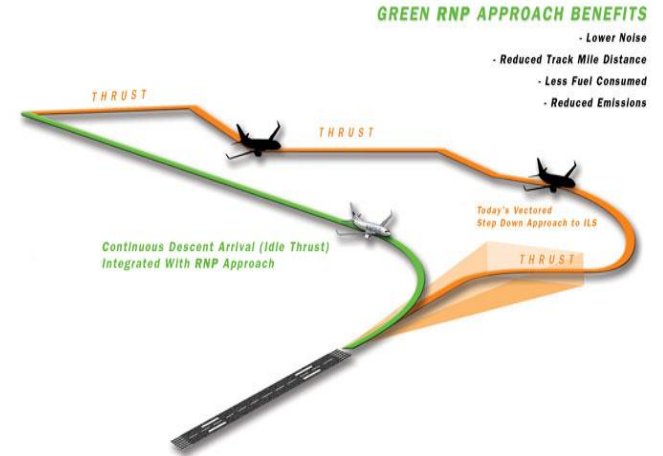
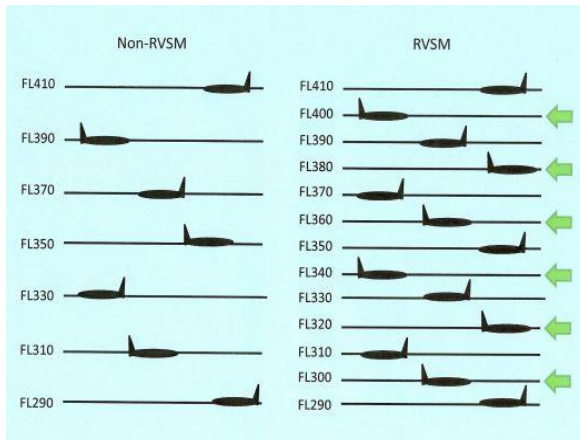
Operational Measure
Implementation
(planned or post)

+

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

=

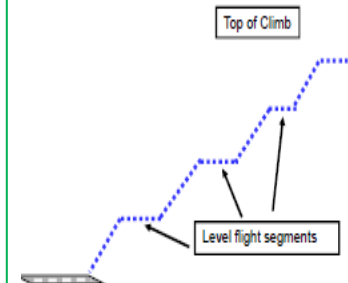
**USE
IFSET**



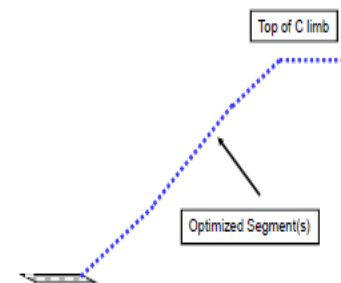
GREEN RNP APPROACH BENEFITS

- Lower Noise
- Reduced Track Mile Distance
- Less Fuel Consumed
- Reduced Emissions

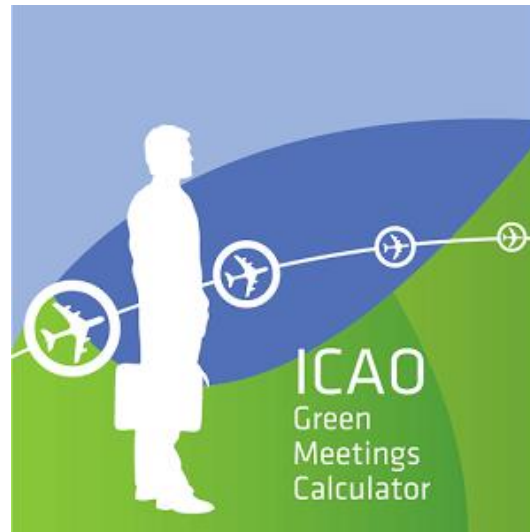
Conventional Departure



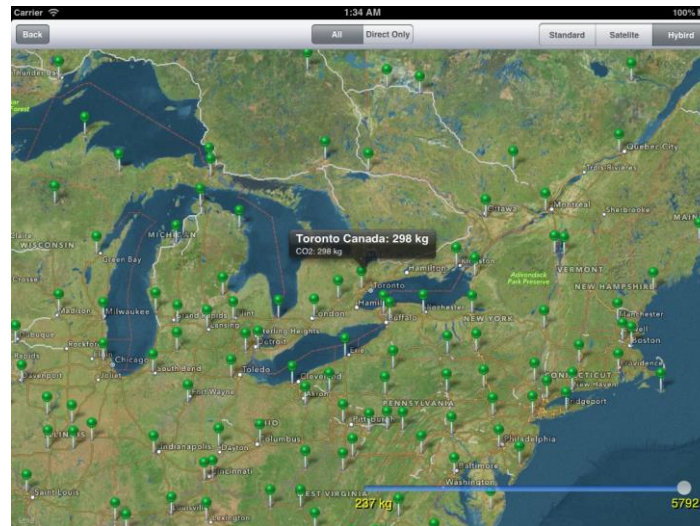
Continuous Climb Operations



Planning Meeting Locations: ICAO Green Meetings Calculator



- Developed in response to request from UN Travel Offices
- Supports decision-making by selecting meeting location with minimum CO₂ footprint from air travel



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

<http://www.icao.int/env>



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

