3. ICAO Supporting Tools – Not publicly available

ICAO Secretariat

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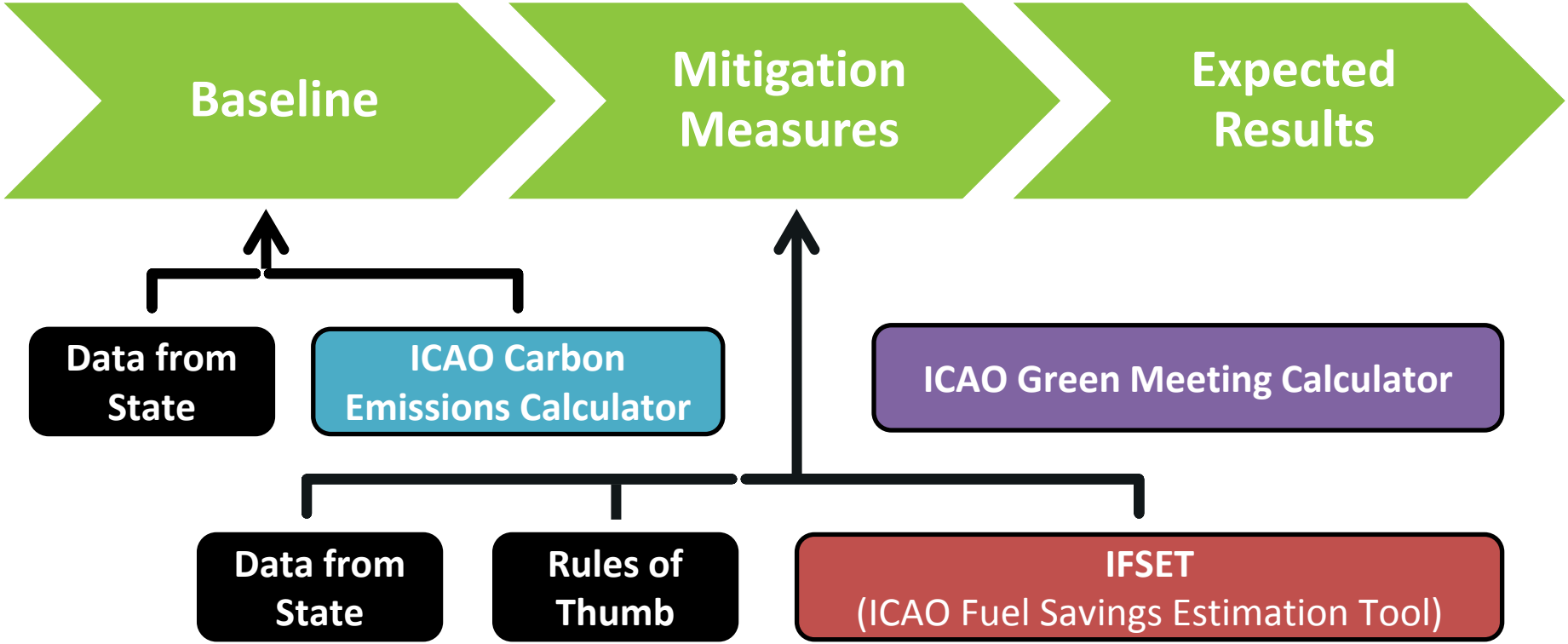
Environmental Benefits Tool (EBT)
Background



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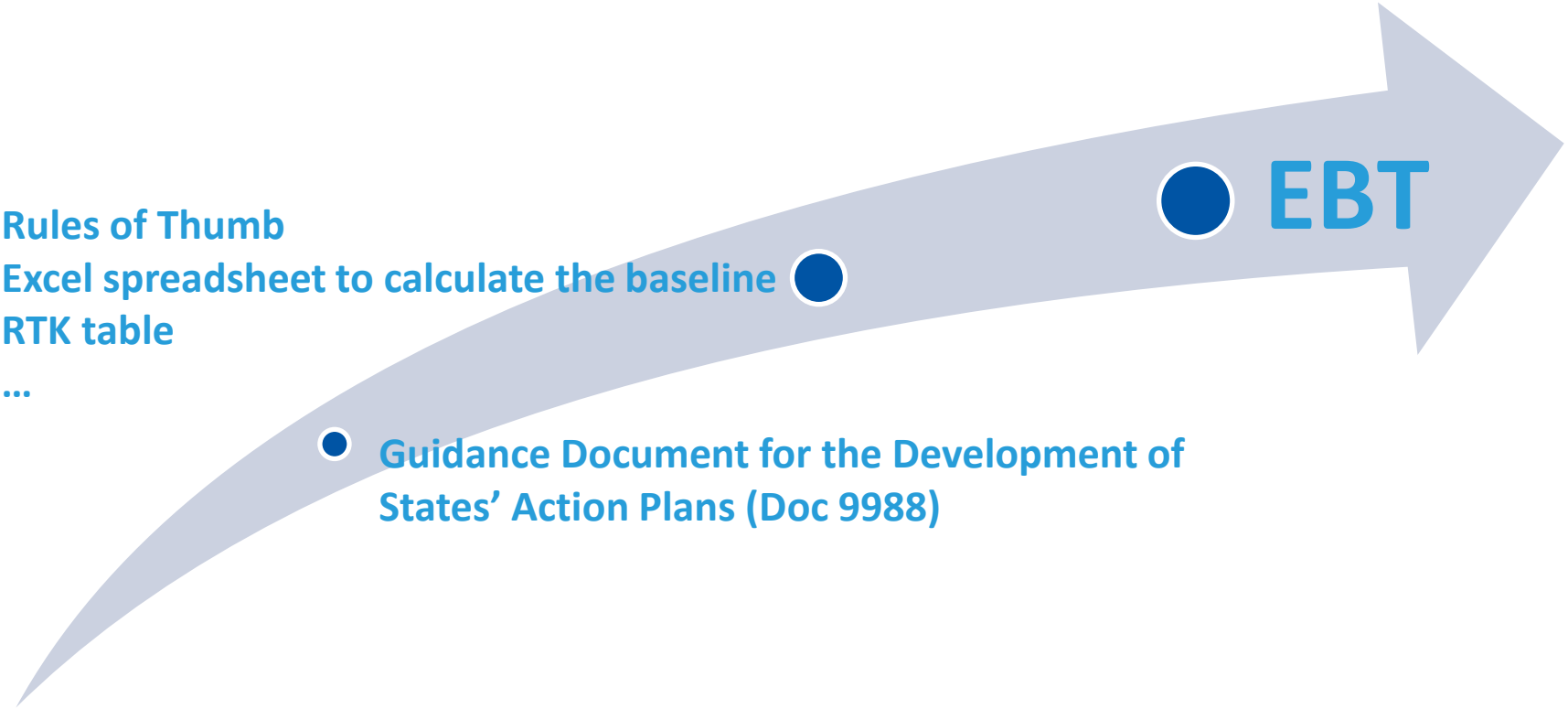
Environmental Benefits Tool (EBT)
Background



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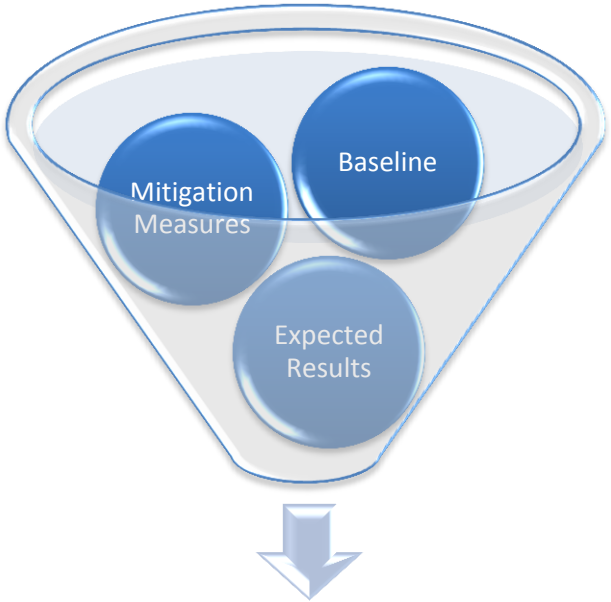
What EBT does…

- Helps to develop the **Baseline**
- Helps to estimate the **Mitigation Measures**
- Helps to generate the **Expected Results**



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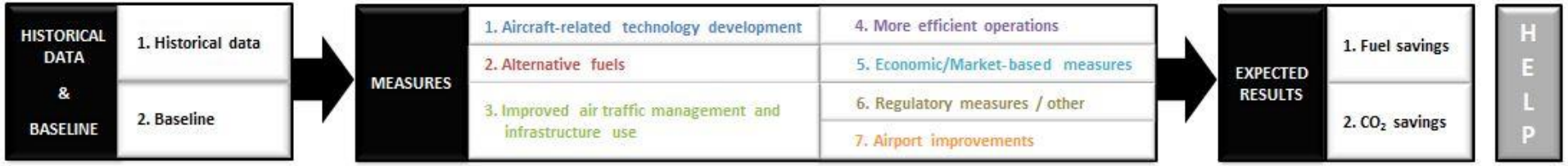
Environmental Benefits Tool (EBT) Framework



Part 1 : Historical Data & Baseline

1. Select baseline methodology:
   - *Method A* – The main national air carrier of the State has a fleet of no more than 10 aircraft
   - *Method B* – The State has access to data for 5 years or more
   - *Method C* – The State only has data available for a single year
2. Generate the baseline up to 2050

Part 2 : Mitigation Measures

Calculate the impacts of the mitigation measures based on Rules of Thumb, IFSET or State data

Part 3 : Expected Results

Generate the expected results by combining baseline and mitigation measures information

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Environmental Benefits Tool (EBT)
Part 1: Historical Data

Example based on Method B - The State has access to data for 5 years or more

HISTORICAL DATA

Year	International RTK ('000)	International Fuel burn (Tonnes)	Efficiency (Intl. Fuel burn / Intl. RTK)
2007	500,000.00	200,000.00	0.400
2008	550,000.00	215,000.00	0.391
2009	650,000.00	250,000.00	0.385
2010	700,000.00	260,000.00	0.371
2011	850,000.00	325,000.00	0.382
2012	900,000.00	345,000.00	0.383
2013	1,100,000.00	415,000.00	0.377
2014	1,100,000.00	414,000.00	0.376
2015	1,350,000.00	490,000.00	0.363

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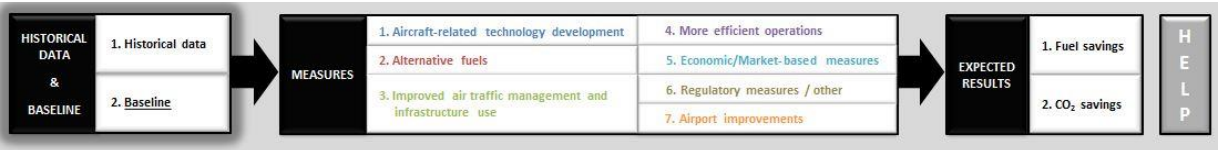
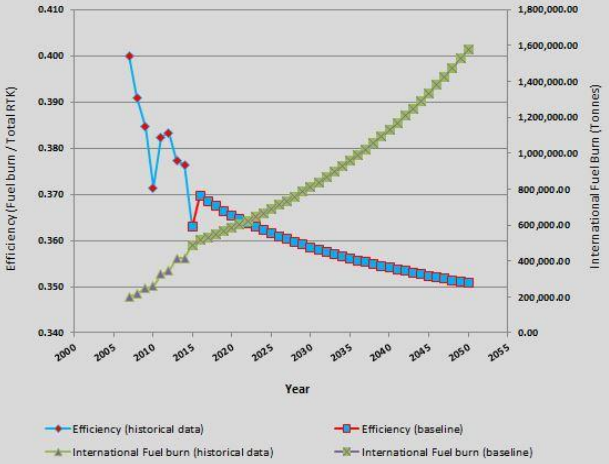
Environmental Benefits Tool (EBT)
Part 1: Baseline

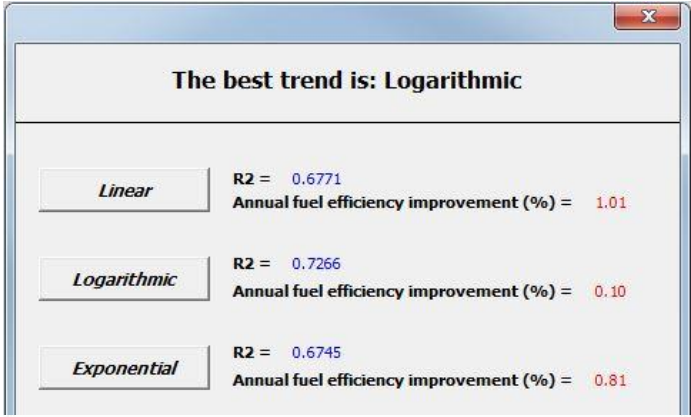


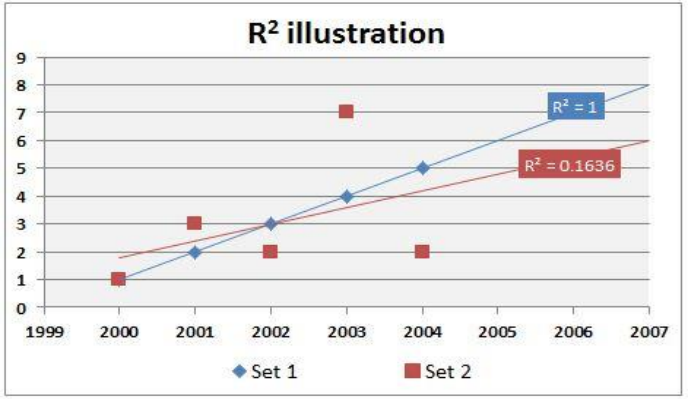
Change the methodology | **Estimate baseline** | **Change trend** (optional) | **Next** (Measures)

BASELINE

Year	International RTK ('000)	International Fuel burn (Tonnes)	Efficiency (Fuel burn / RTK)
2015	1,350,000.00	490,000.00	0.363
2016	1,397,250.00	516,659.80	0.370
2017	1,446,153.75	532,979.97	0.369
2018	1,496,769.13	549,968.52	0.367
2019	1,549,156.05	567,631.44	0.366
2020	1,603,376.51	585,978.77	0.365
2021	1,659,494.69	605,023.62	0.365
2022	1,717,577.00	624,781.65	0.364
2023	1,777,692.20	645,270.58	0.363
2024	1,839,911.43	666,509.95	0.362
2025	1,904,308.33	688,520.90	0.362
2026	1,970,959.12	711,326.08	0.361
2027	2,039,942.69	734,949.48	0.360
2028	2,111,340.68	759,416.46	0.360
2029	2,185,237.61	784,753.62	0.359
2030	2,261,720.92	810,988.84	0.359
2031	2,340,881.15	838,151.22	0.358
2032	2,422,811.99	866,271.12	0.358
2033	2,507,610.41	895,380.17	0.357
2034	2,595,376.78	925,511.23	0.357
2035	2,686,214.97	956,698.47	0.356
2036	2,780,232.49	988,977.39	0.356
2037	2,877,540.63	1,022,384.78	0.355







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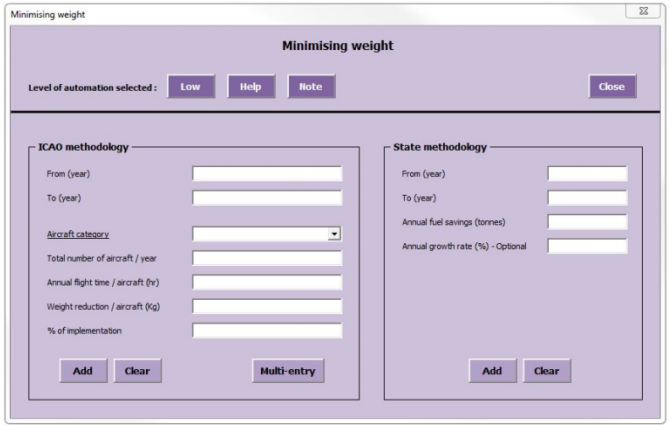
Mitigation Measures

Front end



Back end

```
Dim ctrl As Control
For Each ctrl In Me.Frame1.Controls
    If TypeOf ctrl Is msforms.TextBox Or TypeO
        If ctrl.Text = "" And ctrl.Enabled = T
            MsgBox "Please fill the form entir
            Exit Sub
        End If
    End If
Next
```

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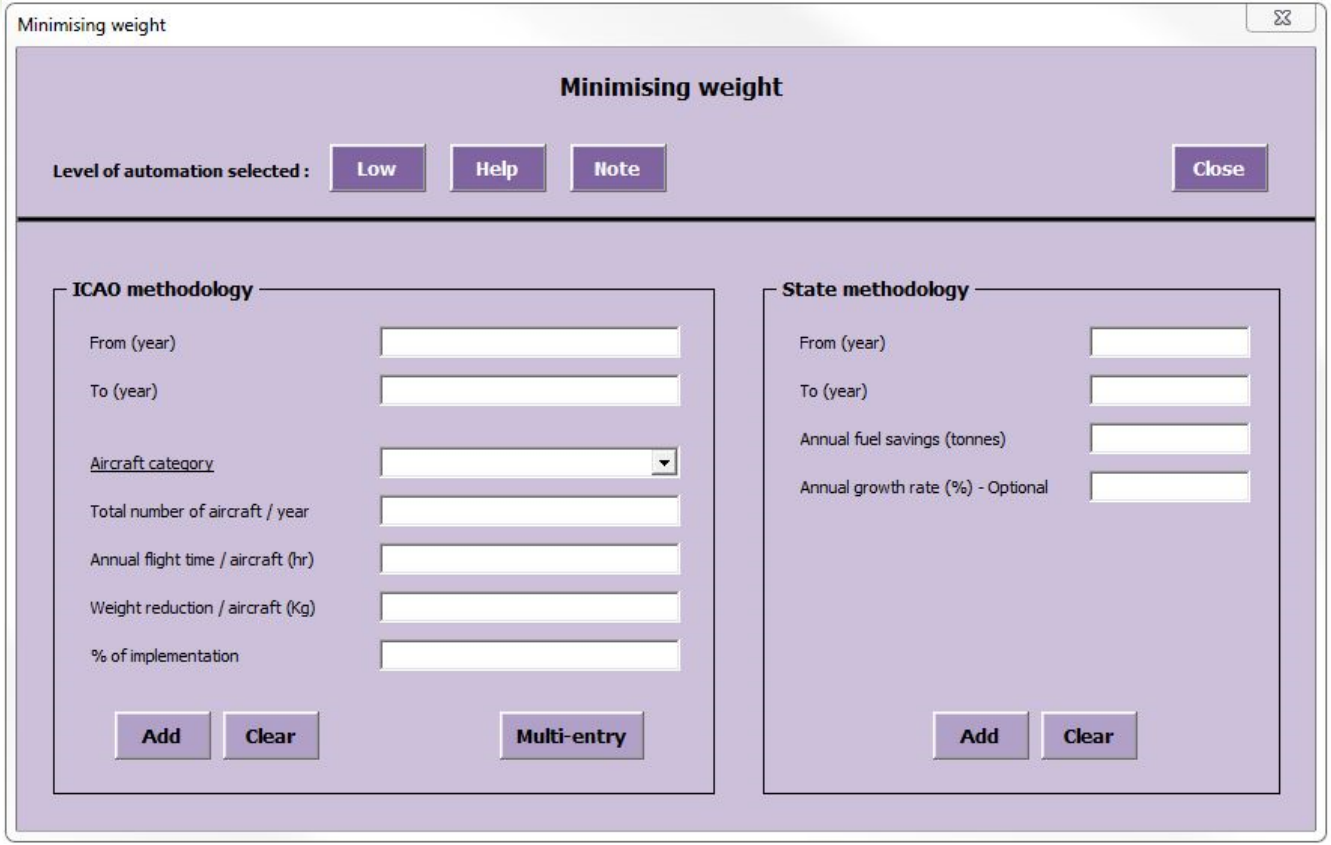
Environmental Benefits Tool (EBT)
Part 2: Mitigation Measures – Front end



Minimising weight

Inputs from State:

- *Time period (from, to)*
- *Aircraft category*
- *Total number of aircraft per year*
- *Annual flight time per aircraft*
- *Weight reduction per aircraft*
- *% of implementation*

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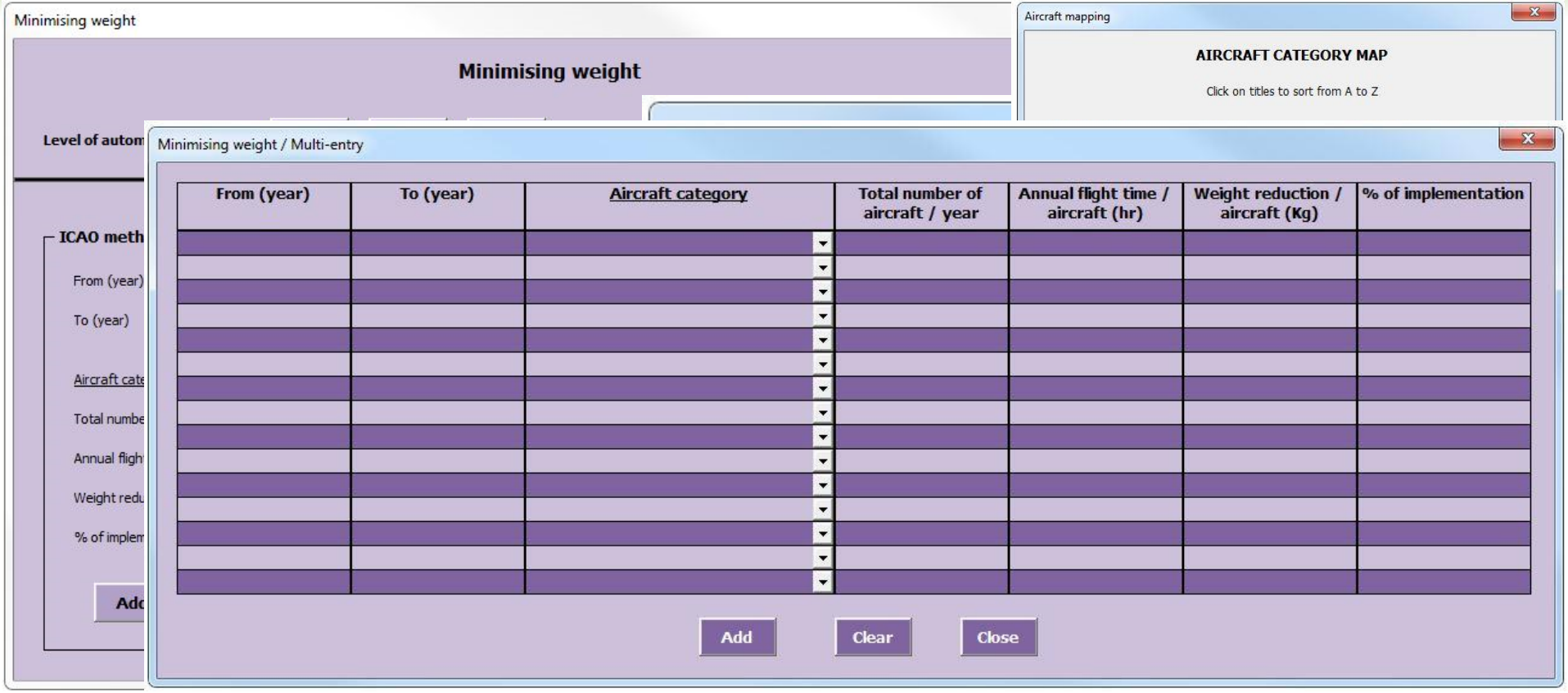
Environmental Benefits Tool (EBT)
Part 2: Mitigation Measures – Front end (cont.)



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What are the Rules of Thumb ?

"Method or procedure derived from practice or experience, rather than theory or scientific knowledge."

(Oxford English Dictionary)

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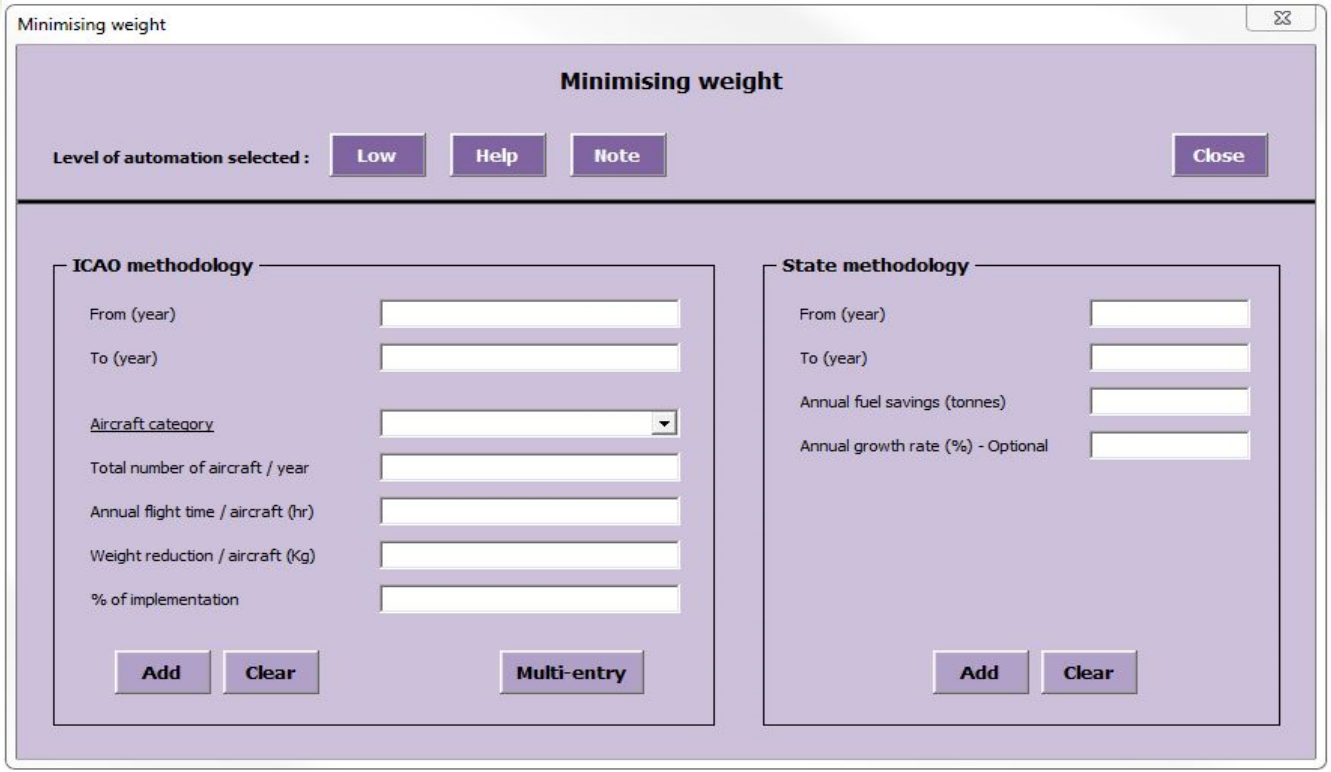
Environmental Benefits Tool (EBT)
Part 2: Mitigation Measures – Back end (cont.)



Minimising weight

Inputs from State:

- *Time period (from, to)*
- *Aircraft category*
- ***Total number of aircraft per year***
- ***Annual flight time per aircraft***
- *Weight reduction per aircraft*
- *% of implementation*

Annual Fuel Savings = Weight reduction factor * Annual flight time * Weight reduction * Number of aircraft

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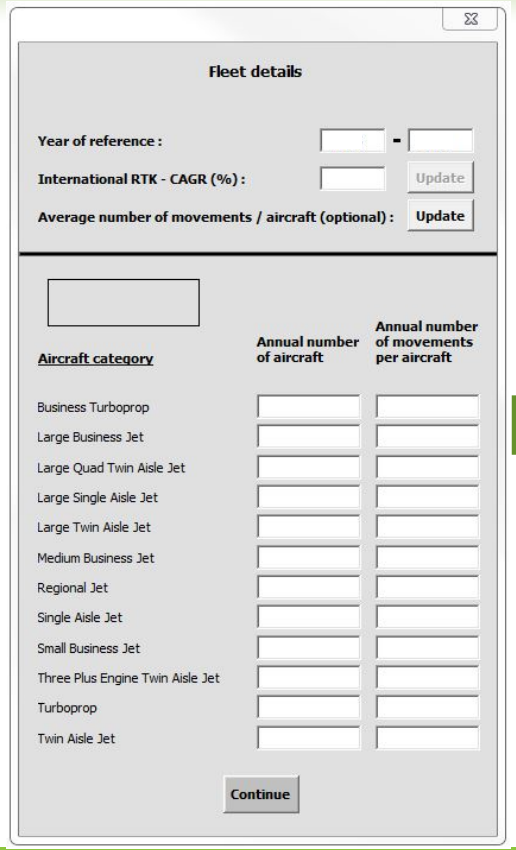
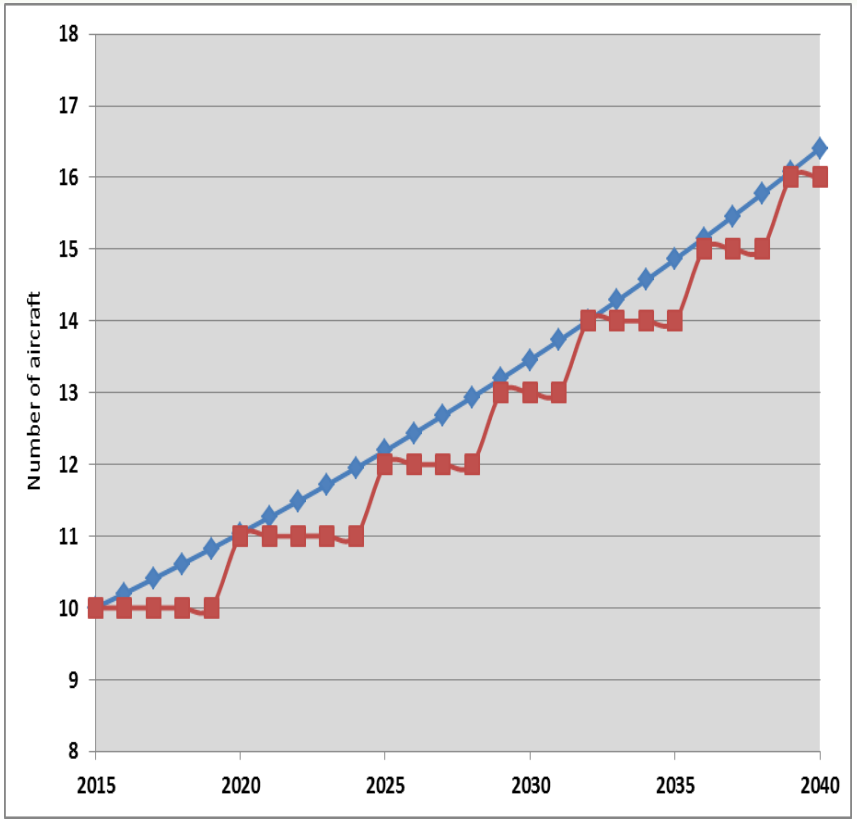
Environmental Benefits Tool (EBT)
Part 2: Mitigation Measures – Back end (cont.)



Year	CAGR	Rounded
2015	10.00	10
2016	10.20	10
2017	10.40	10
2018	10.61	10
2019	10.82	10
2020	11.04	11
2021	11.26	11
2022	11.49	11
2023	11.72	11
2024	11.95	11
2025	12.19	12
2026	12.43	12
...	...	...



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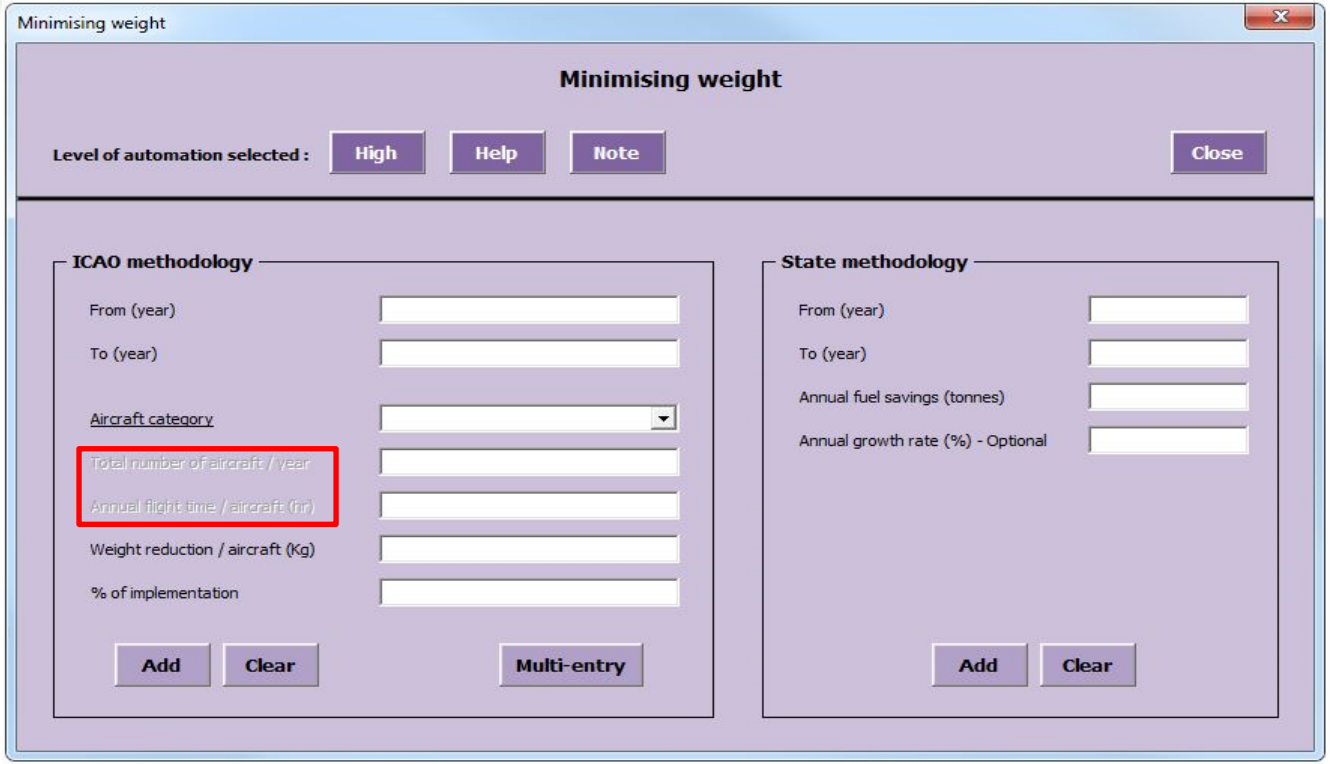
Environmental Benefits Tool (EBT)
Part 2: Mitigation Measures – Back end (cont.)



Minimising weight

Inputs from State:

- *Time period (from, to)*
- *Aircraft category*
- ***Total number of aircraft per year***
- ***Annual flight time per aircraft***
- *Weight reduction per aircraft*
- *% of implementation*

Annual Fuel Savings = Weight reduction factor * Annual flight time * Weight reduction * Number of aircraft

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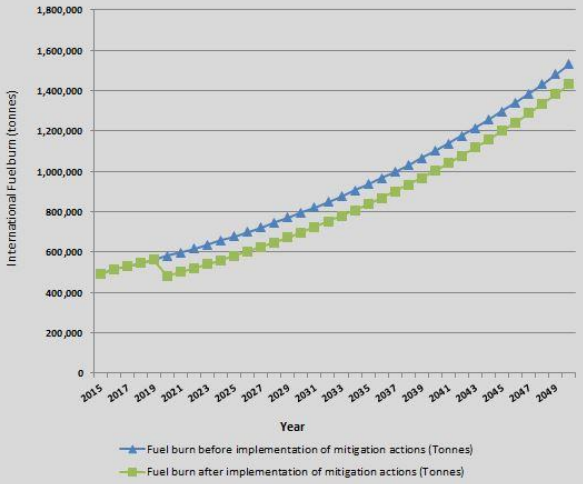
Environmental Benefits Tool (EBT)
Part 3: Expected Results

Details | **Download Results**

EXPECTED RESULTS : FUEL SAVINGS

Year	Annual Fuel burn before implementation of mitigation actions (Tonnes)	Annual Fuel burn after implementation of mitigation actions (Tonnes)	Annual Fuel savings (Tonnes)	Change Fuel savings (%)
2015	490,000.00	490,000.00	0.00	0.00
2016	514,412.91	514,412.91	0.00	0.00
2017	530,004.55	530,004.55	0.00	0.00
2018	546,242.61	546,242.61	0.00	0.00
2019	563,133.25	563,133.25	0.00	0.00
2020	580,685.96	482,992.08	97,693.88	-16.82
2021	598,912.90	501,219.03	97,693.88	-16.31
2022	617,828.49	520,134.61	97,693.88	-15.81
2023	637,449.04	539,755.17	97,693.88	-15.33
2024	657,792.58	560,098.70	97,693.88	-14.85
2025	678,878.64	581,184.77	97,693.88	-14.39
2026	700,728.20	603,034.33	97,693.88	-13.94
2027	723,363.55	625,669.68	97,693.88	-13.51
2028	746,808.25	649,114.38	97,693.88	-13.08
2029	771,087.11	673,393.24	97,693.88	-12.67
2030	796,226.14	698,532.27	97,693.88	-12.27
2031	822,252.56	724,558.68	97,693.88	-11.88
2032	849,194.77	751,500.89	97,693.88	-11.50
2033	877,082.38	779,388.51	97,693.88	-11.14
2034	905,946.23	808,252.36	97,693.88	-10.78

Annual Fuel efficiency improvement before implementation of mitigation actions : 0.19%
Annual Fuel efficiency improvement after implementation of mitigation actions : 0.37%



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Future developments

1. Migrate EBT from Excel-based tool to Application (.exe)
2. Integrate the ICAO Carbon Emissions Calculator methodology and IFSET methodology into EBT
3. Provide more flexibility to users to import their own data into EBT
4. Improve connection between EBT and the APER website
5. **AND YOUR INPUTS (officeenv@icao.int)**

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Aviation Environmental System (AES)

ICAO-European Union Project

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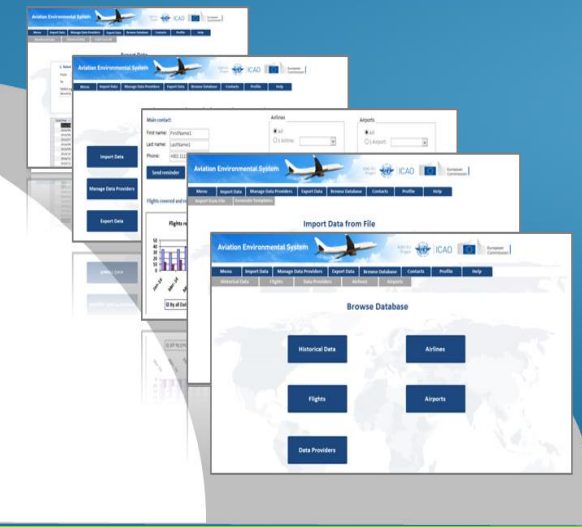
Aviation Environmental System (AES)

A tool developed in the scope of the ICAO-European Union Joint Assistance Project

AES – Installed in the 14 beneficiary States



OBJECTIVES

1. Provide a user-friendly tool to allow Civil Aviation Authorities (CAA) to monitor CO_2 emissions from international aviation at the State level
2. Enforce the adoption of a single uniform format (Form ENV1) for data collection in all States
3. Automatize the data reporting to ICAO

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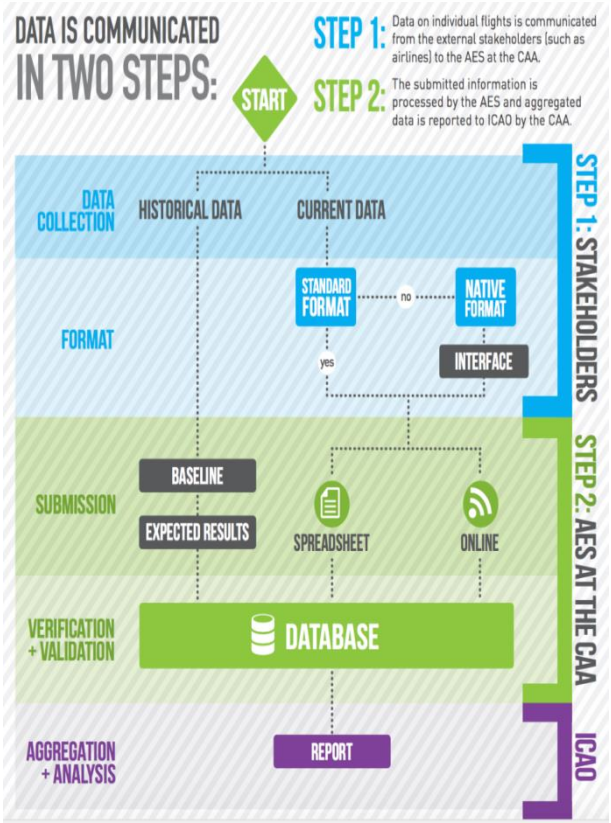
Aviation Environmental System (AES)



Step 1: Stakeholders report data on individual flights to the Civil Aviation Authority (CAA), where it is imported into the AES.

Step 2: The CAA submits to ICAO aggregated data automatically generated by the AES.

For more information: icao-eu-project@icao.int

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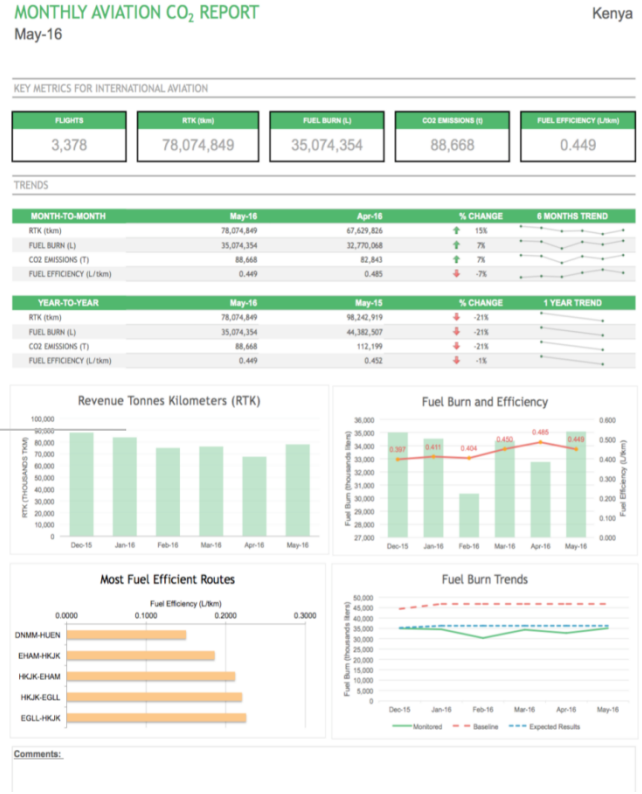
Aviation Environmental System AES

States are able to create **Monthly Reports** of CO_2 emission by routes, flights or airlines



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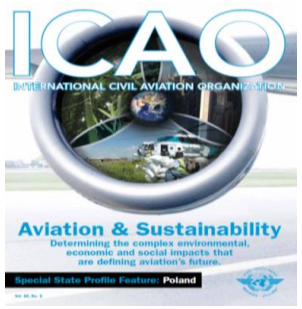
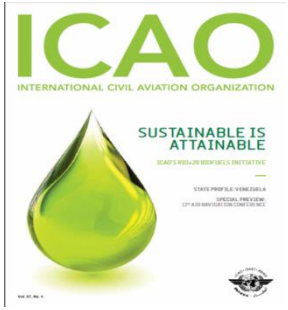
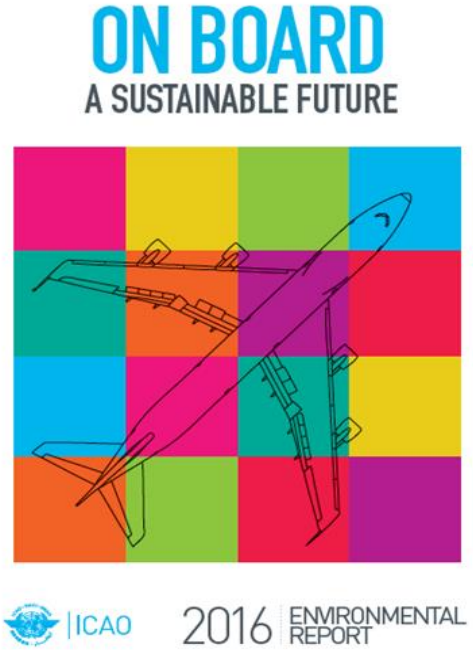
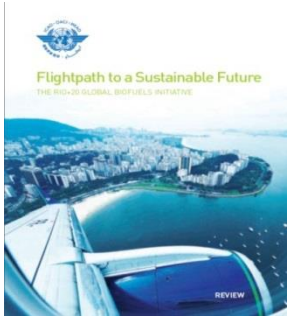
Additional information









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