Establishing the Baseline

ICAO Secretariat






Overview

- About the baseline
- Differentiating between international and domestic emissions
- Collecting or estimating historic aircraft activity and fuel consumption data
- Forecasting future baseline traffic and fuel consumption
- Verification of emissions estimates





About the Baseline

- The baseline describes the ***historic*** evolution of fuel consumption, CO_2 emissions, and traffic in the State and the expected future evolution ***in the absence of action***
- It should contain:
  - Annual historic fuel consumption and traffic from international aviation from 2010 or earlier
  - Projected future fuel consumption and traffic to 2020 and if possible to 2050
  - Data for the years 2010, 2020 and if possible 2050 should be provided

International vs. Domestic

- Multiple definitions exist for “international aviation”
  - ICAO: A flight stage with one or both terminals in the territory of a State, other than the State in which the air carrier has its principal place of business
  - IPCC: A flight stage that departs from one State and arrives in another
- In order for ICAO to properly interpret the action plan, the definition used must be specified






Summary of ICAO Definition

Flight	International	Domestic
Between Principal business State and another State	√	
Between Principal business State and a territory belonging to it.		√
Between two points in a territory of the principal business State		√
A multinational carrier operating inside a partner State		√
Foreign Cabotage traffic	√	




"International" for Action Plans

- States are encouraged to use ICAO definition (State of registration basis)
- However, if data already being collected using IPCC definition, State should continue to do so
- Definition used should be stated in the action plan






Steps for Establishing a Baseline

3 steps for establishing a baseline

1. Define time horizon and intermediate years
2. Estimate historical activity data and fuel/emissions
3. Develop forecasts for air transport activity and related fuel/emissions






Collecting Historic Data

- Development of a baseline depends on the availability of historic data
- Reporting of fuel consumption and traffic using ICAO Statistical Form M from 2010 is required
  - Can be aggregated to generate State totals






Form M

FORM M

INTERNATIONAL CIVIL AVIATION ORGANIZATION
AIR TRANSPORT REPORTING FORM
FUEL CONSUMPTION AND TRAFFIC - INTERNATIONAL AND TOTAL SERVICES, COMMERCIAL AIR CARRIERS

Contact person: _____
Organization: _____
Tel: _____
Fax: _____
E-mail: _____

State: _____
Air carrier: _____
Year ended: _____

Aircraft in fleet by type		International scheduled services			International non-scheduled services (excluding on-demand flights)			International total (scheduled and non-scheduled, excluding on-demand flights)			Total services (international and domestic, scheduled and non-scheduled, excluding on-demand flights)			per cent of biofuels (total services)
Manufacturer, Model and Series	Version code 1/	Fuel consumed (tonnes)	Tonne-kilometres performed (thousands)	Tonne-kilometres available (thousands)	Fuel consumed (tonnes)	Tonne-kilometres performed (thousands)	Tonne-kilometres available (thousands)	Fuel consumed (tonnes)	Tonne-kilometres performed (thousands)	Tonne-kilometres available (thousands)	Fuel consumed (tonnes)	Tonne-kilometres performed (thousands)	Tonne-kilometres available (thousands)	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o

- Fuel, tonne kilometres performed, and tonne kilometres available by aircraft type for international and total services
- Also per cent biofuel





Converting to CO_2

- Fuel consumption expressed in kg or tonnes should be multiplied by 3.157 to convert to CO_2





Treatment of Biofuels

- Currently, no international agreement on life-cycle analysis methodologies
- Biofuels will be treated as “0” net CO_2 emissions when action plans are aggregated
- States who conduct a life-cycle analysis of fuel emissions are invited to include the results with their action plan





Forecasting the Future Baseline

- 2 Steps

1. Select a forecast of future activity

2. Apply the forecast to historic data





Selecting the Forecast

- State may have already developed a forecast for another purpose that can be used
  - ICAO's Manual on Air Traffic Forecasting (Doc 8991) provides guidance on air traffic forecasting techniques

- Global and regional long-term forecasts are available from ICAO Circular 313, *Outlook for Air Transport to the Year 2025*

- More detailed long-term regional forecasts are also available from ICAO






Applying the Forecast

- Depending on the amount of historic data available, 3 methods are described in the guidance
  - *Method 1.* The State has access to data for 5 years or more
  - *Method 2.* The State has access to data for the past 2 years
  - *Method 3.* The State only has data available for a single year
- These methods assume past trend in fuel efficiency will be maintained in the absence of additional mitigation measures






Methods 1 and 2

If you have historic fuel consumption and traffic data available for multiple years

1. Obtain historical annual data for fuel consumption (volume of fuel) and traffic (RTK)

2. Divide the fuel consumption by RTK to obtain the fuel efficiency for each past year

3. This is the past trend of fuel efficiency

4. Use this past trend as an approximation of future development of fuel efficiency in the absence of any additional mitigation measures

5. Apply selected forecast to most recently-available RTK figure (future baseline RTK)

6. Projected fuel efficiency (step 4) × forecasted RTK (step 5) = future baseline fuel consumption

Method 3

If you have historic fuel consumption and traffic data available for one year only

1. Obtain historical annual data for fuel consumption (volume of fuel) and traffic (RTK)

2. Divide the fuel consumption by RTK to obtain the fuel efficiency

3. This is the present fuel efficiency

4. Assume fuel efficiency will remain constant in the absence of any additional mitigation measures

5. Apply selected forecast to RTK figure (future baseline RTK)

6. Fuel efficiency (step 4) × forecasted RTK (step 5) = future baseline fuel consumption





Baseline End Result

Year*	Total RTKs (tonne-kilometres)	Total fuel (litres)	Total CO_2 emissions (metric tonnes)	International RTKs* (tonne-kilometres)	International fuel (litres)*	International CO_2 emissions* (metric tonnes)
Historic year						
Historic year						
Future year						
2020						
Future year						
2050						

*Minimum data to be entered





Verification of Emissions Estimates

- Advisable to conduct an internal verification of the fuel consumption and traffic data. Techniques for doing this include:
  - Comparison of current data to historical activity data or modelled results
  - Review of the share of international and domestic traffic and fuel consumption
  - Review of trends in efficiency indicators such as fuel per revenue tonne-kilometre (RTK)
  - Cross-check with other data sources
- Also, ICAO Secretariat will review all data submitted and any inconsistencies will be brought to the attention of the submitter






For More Information

- You will be able to generate a quantitative baseline
- More detail is provided in Chapter 3 of the Guidance, Second Edition