

# ICAO Initiatives on Aircraft Noise

Bruno A. C. Silva ICAO Environmental Officer

ICANA Conference Frankfurt, 24 November 2016





## OUTLINE

- What is ICAO?
- ICAO Trends on aircraft noise
- The ICAO Balanced on aircraft noise management around airports
- Community Engagement
- Conclusions



What is ICAO?

• United Nations specialized agency

• Established by the "Chicago Convention" (1944)

• 191 Contracting States and 86 International Organizations





## What is CAEP

- ICAO has been working with environmental issues since 1960s
- Environmental activities are largely carried out through its Committee on Aviation
   Environmental Protection (CAEP), a
   Technical Committee of the ICAO Council
- CAEP has 24 members and 15 observers.
- Assists the ICAO Council in formulating new policies and adopting new Standards and Recommended Practices (SARPS) for aircraft noise and aircraft engine emissions.
- Undertakes specific studies related to control of noise and emissions.

#### **CAEP Brief historical background**

1970	CAN – Committee on Aircraft Noise
1971	First SARPs for aircraft noise, designated as Annex 16 to the Convention on International Civil Aviation
1977	CAEE – Committee on Aircraft Engine Emissions
1981	<ul> <li>Annex 16 expanded to encompass SARPs dealing with the control of aircraft engine emissions</li> <li>Volume I, Aircraft Noise</li> <li>Volume II, Aircraft Engine Emissions</li> </ul>
1983	CAEP superseded CAN and CAEE



### **Environmental Standards**

- Certification standards are defined in Annex 16 to the Chicago Convention.
- Objective: encourage implementation of best technology in aircraft designs.
- Annex 16 is divided in three Volumes:
  - Volume I Aircraft noise
  - Volume II Engine Emissions
  - Volume III CO2 emissions (pending)





Limit or reduce the impact of aviation GHG emissions on global climate

Limit or reduce the number of people affected by significant aircraft **noise**  Limit or reduce the impact of aviation emissions on **local air quality** 

Minimize the adverse effect of global civil aviation on the environment



- ICAO environmental trends basis for decision-making
  - Endorsed at the ICAO 39th Assembly (2016)
  - Possible noise neutral growth in 2030 (in a optimistic technology and operational improvement scenario)



GLOBAL CONTOUR AREA FROM AIRCRAFT NOISE ABOVE 55 DNL







 Doc 9829 - Guidance on the Balanced Approach (updated in 2008)

**ICAO** 

 Objective: address identified noise problems at individual airports with a maximum costeffectiveness in terms of environmental benefits







#### Annex 16 Vol 1 – Noise Standards for Aircraft

- Recent update: Chapter 14 Standard
  - 7 EPNdB relative to Chapter 4
  - Change on the "Flat Limit Zone"
  - Phased Applicability as a function of Maximum Takeoff Mass (MTOM)

Aeroplane type and MTOM	Applicability Date
Subsonic Jets and Propeller-driven Aeroplanes with MTOM 55,000 kg and over	31 December 2017
Subsonic Jets with MTOM less than 55,000 kg	
Propeller-Driven Aeroplanes with MTOM over 8,618 and less than 55,000kg	





**Evolution of Noise Limits** 



## **Reduction of Noise at Source**

- Current Developments: Supersonic Aircraft Noise Standards
- Possible certification of a new Supersonic Aircraft in the 2020-2025 timeframe
- 2 Standards being developed
  - Annex 16, Chapter 12 Landing and Takeoff noise
  - En-route noise evaluation (sonic boom).











#### Technology current status and trends will be evaluated by an Independent Expert Panel

- Panel Members nominated by States
- Review will consider Noise, Fuel Burn and Combustion technologies
- Integrated review Interdependencies will be considered.
- Final report to be available in 2019



TRL 9	System ready for full scale deployment
TRL 8	System incorporated in commercial design
TRL 7	Integrated pilot system demonstrated
TRL 6	Prototype system verified
TRL 5	Laboratory testing of integrated system
TRL 4	Laboratory testing of prototype component or process
TRL 3	Critical function: proof of concept established
TRL 2	Technology concept and/or application formulated
TRL 1	Basic principles observed and reported



- Planning (zoning, easement, etc.)
- Mitigation (building codes, control measures, etc.)
- Financial (tax incentives, charges, etc.).
- Aim is to protect gains in noise reduction.
- Policies contained in several Docs.



Doc 9184 Part 2	Land use and Environmental Control
Doc 9911	Recommended Method for Computing Noise Contours around Airports
Doc 9082	Policies on Charges



#### ICAO's policies on operational procedures are contained in several documents:

Document	Subjects covered
Doc 8168 – PANS-OPS Part I	Noise preferential runways and routes, displaced thresholds, approach and landing operating procedures, Noise Abatement Departure Procedures (NADPs).
Doc 8168 – PANS-OPS Part II	Definition of departure routes (concentration x spreading aircraft noise)
Doc 9931 – CDO operations	Guidance on Continuous Descent Operations
Doc 9993 – CCO operations	Guidance on Continuous Climb Operations
Doc 9888 – NAP research review	Summary of two surveys noise on noise abatement research and development conducted in 2006 and 2008.
Doc 10031 – Environmental Assessment of ATM Changes	Provides environmental assessment guidance to support decision making when analyzing proposed air traffic management (ATM) operational changes.
Doc 9613 – PBN Manual	Guidance on the implementation of PBN procedures



- Defined as any noise-related action that limits or reduces an aircraft's access to an airport.
- Current policy: restrictions shall not to be used as a first resort, but only after consideration of benefits gained from the other three elements of the Balanced Approach.
- Examples:
  - Movement caps;
  - Noise quotas;
  - Non-addition rules;
  - Curfews.

 ONMENT
 Further on Air traffic improvements

- WIDER CONTEXT: Advanced operational procedures are dependent on technology implementation.
- ICAO implementation policy is contained in GANP (Global Air Navigation Plan)\*
  - 15-year rolling methodology which leverages existing technologies and anticipates future developments based on State/industry agreed operational objectives.
  - Based on "Aviation System Block Upgrade" (ASBUs), an approach that allows all Member States to advance their air navigation capacities based on their specific operational requirements.
- PBN implementation is an ICAO priority.







- Block Upgrades are target **availability timelines** for new technologies and procedures.
- Eventually, it will realize a fully-harmonized global air navigation system.
- The technologies and procedures are organized in unique 'Modules'
- States need only to consider and adopt the Modules appropriate to their operational needs.
- Block Upgrades are not deadlines. Implementation is dependent on States.
- Eventually, some Modules may be subject to ICAO-mandated implementation dates.



Modules (actual number of modules per Block/Performance Area may vary)



## Further on Air traffic improvements

#### • Example: APTA module





### Further on Air traffic improvements

#### Module description

#### BO-APTA Optimization of Approach Procedures including Vertical Guidance

The use of Performance-based Navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures to enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of basic global navigation satellite system (GNSS), Baro-vertical navigation (VNAV), satellite-based augmentation system (SBAS) and GLS. The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

#### Applicability

This Module is applicable to all instrument, and precision instrument runway ends, and to a limited extent, non-instrument runway ends.

Benefits	
Access and Equity:	Increased aerodrome accessibility.
Capacity:	In contrast with instrument landing systems (ILS), the GNSS-based approaches (PBN and GLS) do not require the definition and management of sensitive and critical areas. This results in increased runway capacity where applicable.
Efficiency:	Cost savings related to the benefits of lower approach minima: fewer diversions, overflights, cancellations and delays. Cost savings related to higher airport capacity in certain circumstances (e.g. closely spaced parallels) by taking advantage of the flexibility to offset approaches and define displaced thresholds.
Environment:	Environmental benefits through reduced fuel burn.
	Stabilized approach paths.
	Aircraft operators and Air Navigation Service Providers (ANSPs) can quantify the benefits of lower minima by using historical aerodrome weather observations and modelling airport accessibility with existing and new minima. Each aircraft operator can then assess benefits against the cost of any required avionics upgrade. Until there are GBAS (CAT II/III) Standards, GLS cannot be considered as a candidate to globally replace ILS. The GLS business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event.

#### B1-APTA Optimized Airport Accessibility

Progresses further with the universal implementation of Performance-based Navigation (PBN) approaches. PBN and GLS (CAT II/III) procedures to enhance the reliability and predictability of approaches to runways, increasing safety, accessibility and efficiency.

#### Applicability

This Module is applicable to all runway ends.

Benefits		
Efficiency:	Cost savings related to the benefits of lower approach minima: fewer diversions, overflights, cancellations and delays. Cost savings related to higher airport capacity by taking advantage of the flexibility to offset approaches and define displaced thresholds.	
Environment:	Environmental benefits through reduced fuel burn.	
Safety:	Stabilized approach paths.	
Cost:	Aircraft operators and ANSPs can quantify the benefits of lower minima by modelling airport accessibility with existing and new minima. Operators can then assess benefits against avionics and other costs. The GLS CAT II/III business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event. The potential for increased runway capacity benefits with GLS is complicated at airports where a significant proportion of aircraft are not equipped with GLS avionics.	



- In order to assess the environmental impacts of ATM improvements, including on noise, ICAO published Doc 10031 *Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes*
- This current CAEP work programme looks into gathering specific information on PBN implementation challenges, needs and potential solutions in relation to the environment.
- CAEP/10 also agreed on the development of a new Manual "Operational Opportunities to Reduce Aircraft Noise" in order to strengthen the operational pillar of the Balanced Approach. Work is on-going.



- New Circular on Community Engagement approved in CAEP/10 meeting to complement existing Guidance, such as the Balanced Approach.
- It will be available in 2017 free of charge, in all the ICAO 6 languages





Conclusions

• ICAO's role is to provide a global forum to develop commonly-agreed solutions among Member States.

- Consists of a variety of measures
- Harmonized and balanced manner.

• ICAO, through CAEP, will continue to update its noise Standards and Guidance, based on:

- Monitoring research and technology developments;
- Review of the latest technology developments;
- Consideration of the interdependencies.



## Conclusions

• For more information on ICAO activities on Aircraft Noise

#### - ICAO Environmental Report 2016

- http://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf
- Noise page
  - <u>http://www.icao.int/environmental-protection/Pages/noise.aspx</u>





ENVIRONMENTAL







