Aircraft Noise Technology and International Noise Standards

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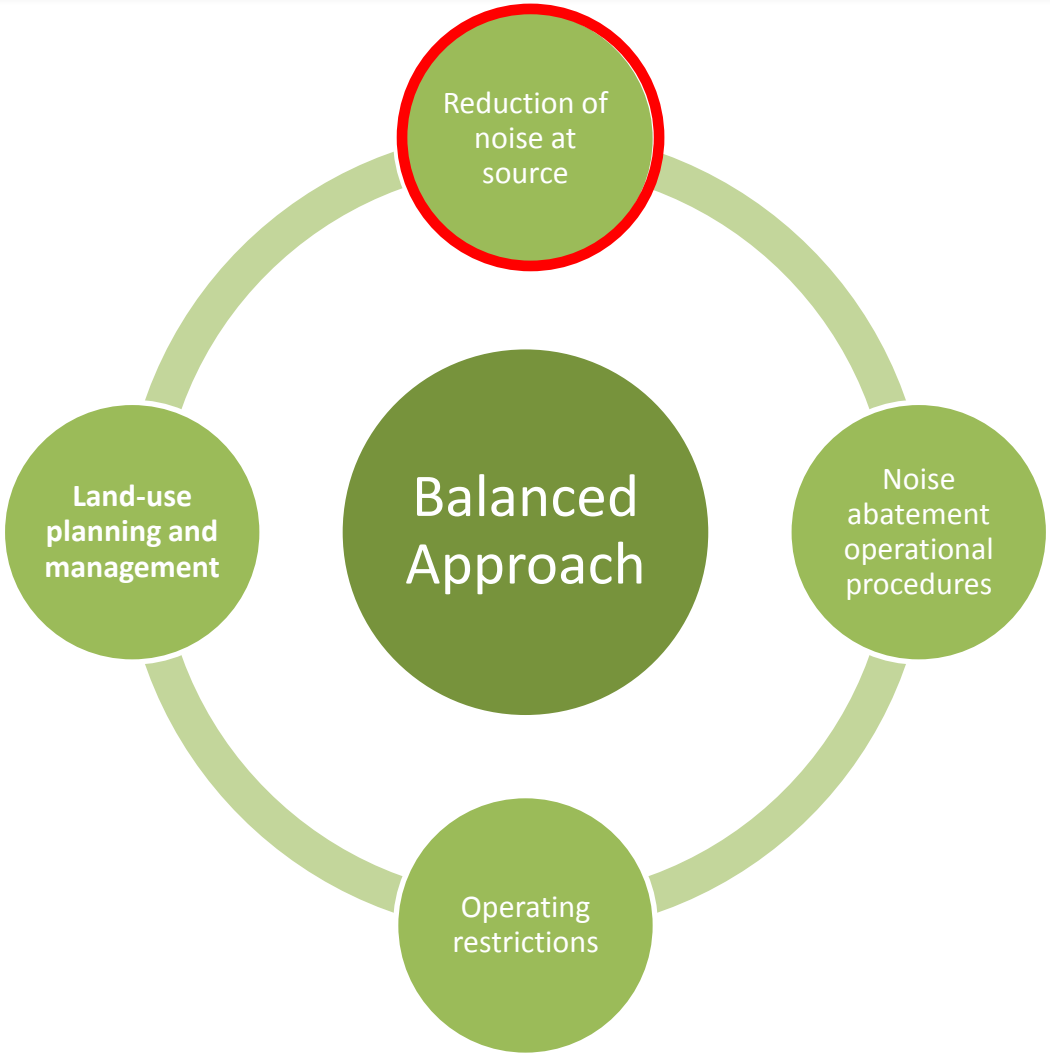
- The ICAO Noise Standards
- ICAO Noise Goals
- Overview and current work





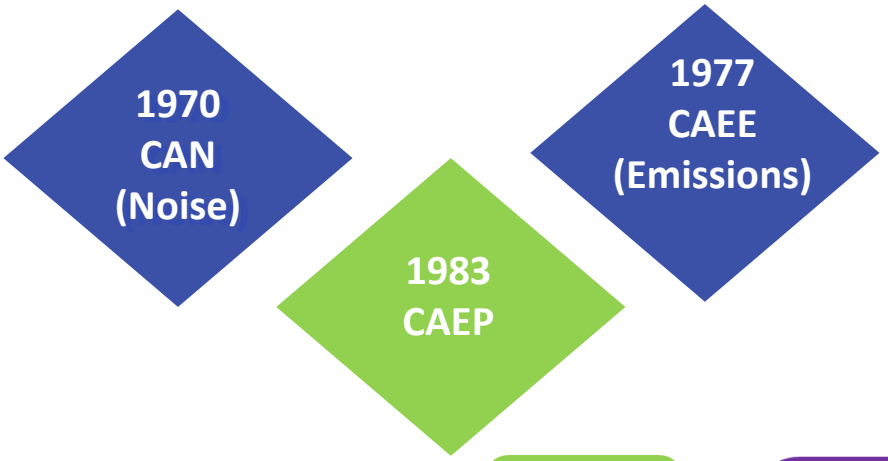
A Balanced Approach to noise management



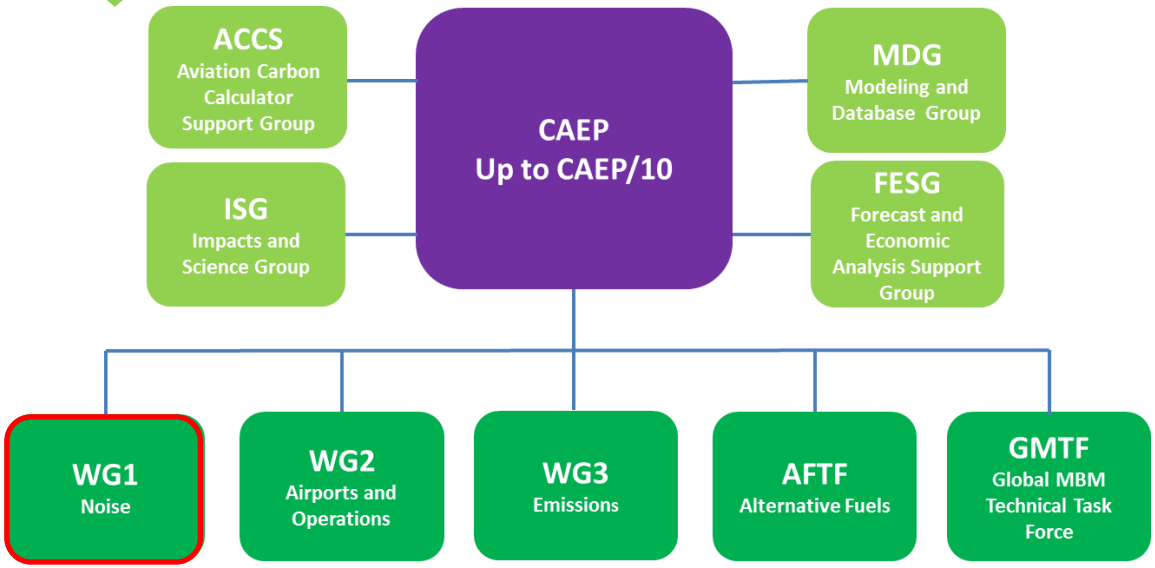




Committee on Aviation Environmental Protection (CAEP) – Working Group 1 – Noise



- **Established by the ICAO Council in 1983**, superseding the Committee on Aircraft Noise (CAN) and the Committee on Aircraft Engine Emissions (CAEE)



- ICAO adopted its first noise Standard in 1972

Annex 16, Chapter 2
ICAO adopts noise standard for new subsonic jet aeroplanes (1972)

Extraordinary session of ICAO Assembly adopts phase-out of Chapter 2 aeroplanes (1990)

Annex 16, Volume I, Chapter 4
ICAO adopts more stringent noise standard for new subsonic jet and heavy propeller-driven aeroplanes (2001)

Annex 16, Volume I, Chapter 14
CAEP recommends an increase in stringency in the noise standard for new subsonic jet and heavy propeller-driven aeroplanes (2013).

1970 1975 1980 1985 1990 1995 2000 2005 2010 2013

Annex 16, Chapter 3
ICAO adopts more stringent noise standard for new subsonic jet and propeller-driven aeroplanes (1977)

Phase-out of Chapter 2 aeroplanes begins (1995)

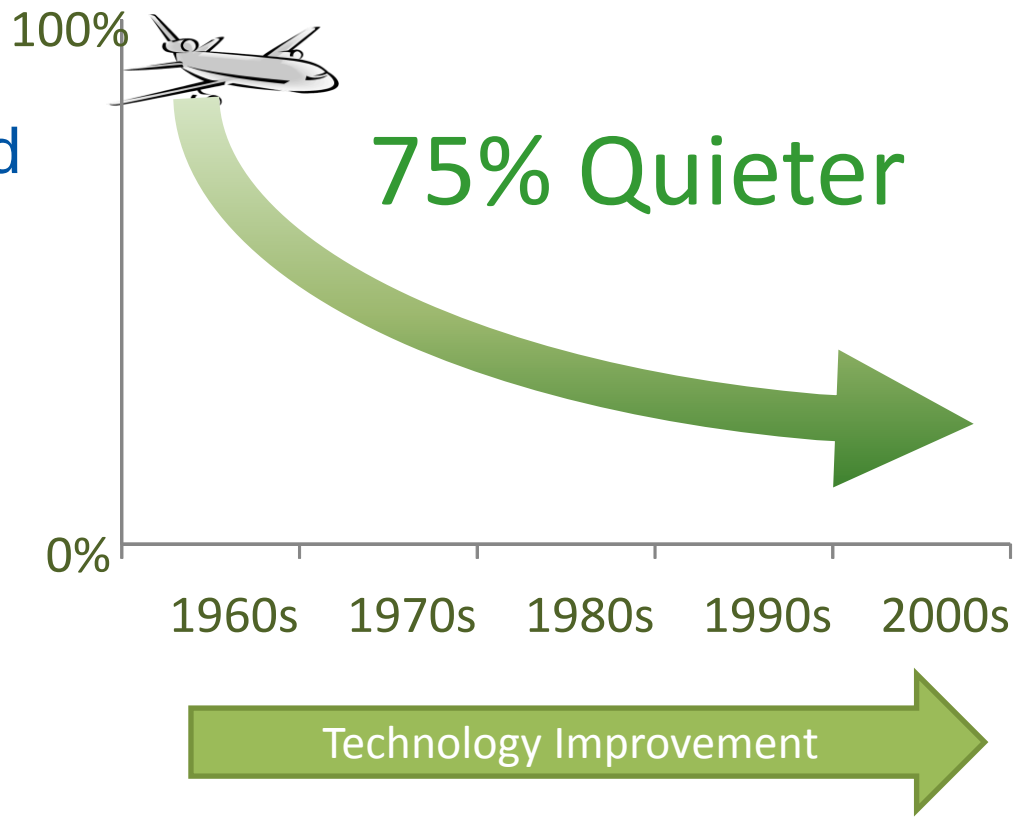
ICAO 33rd Assembly adopts the Balanced Approach to Noise Management (2001)





Reduction of noise at source

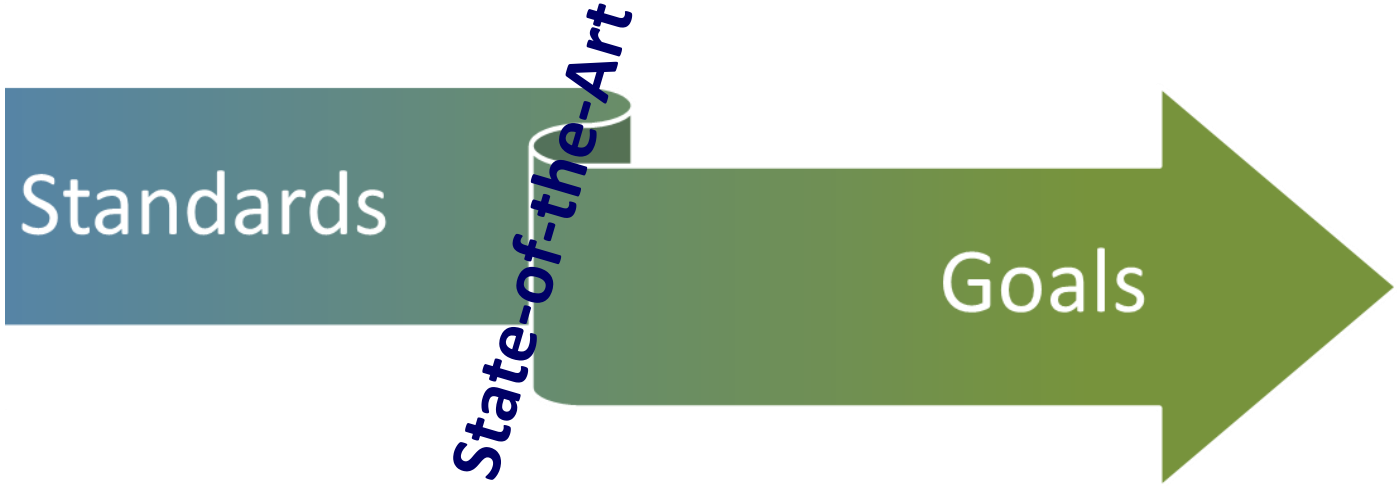
- Manufacturers' new technologies have produced significant noise reductions.
- Noise certification is based on aircraft performance (airframe + engine).
- ICAO Annex 16, Volume I contains the aircraft noise Standards.
- Environmental Technical Manual (Doc 9501) contains the procedures for noise certification of aircraft.







Noise Standard Principles



Establishing Technology Standards

ICAO Noise Standards

Annex 16, Volume I

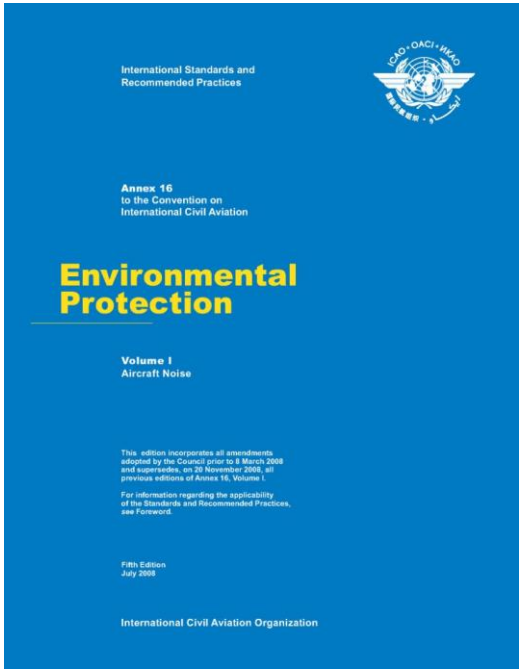





Noise Standard Principles

"The prime purpose of noise certification is to ensure that the latest available noise reduction technology is incorporated into aircraft design demonstrated by procedures which are relevant to day to day operations, to ensure that noise reduction offered by technology is reflected in reductions around airports."

The seventh meeting of the Committee on Aviation Environment Protection (CAEP/7), 2007

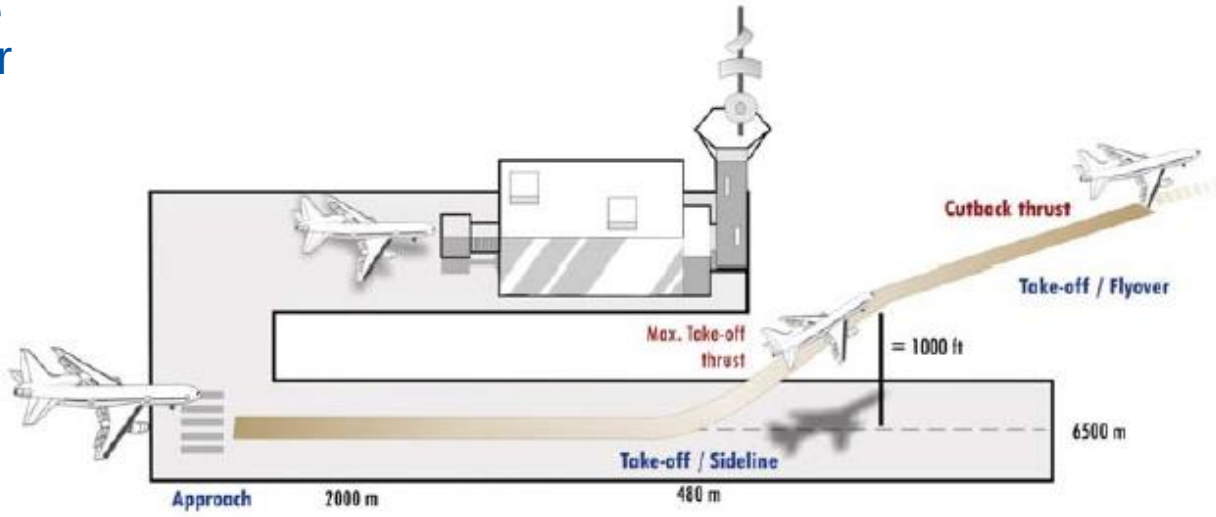


Aircraft Noise Certification

Noise Certification Reference Points

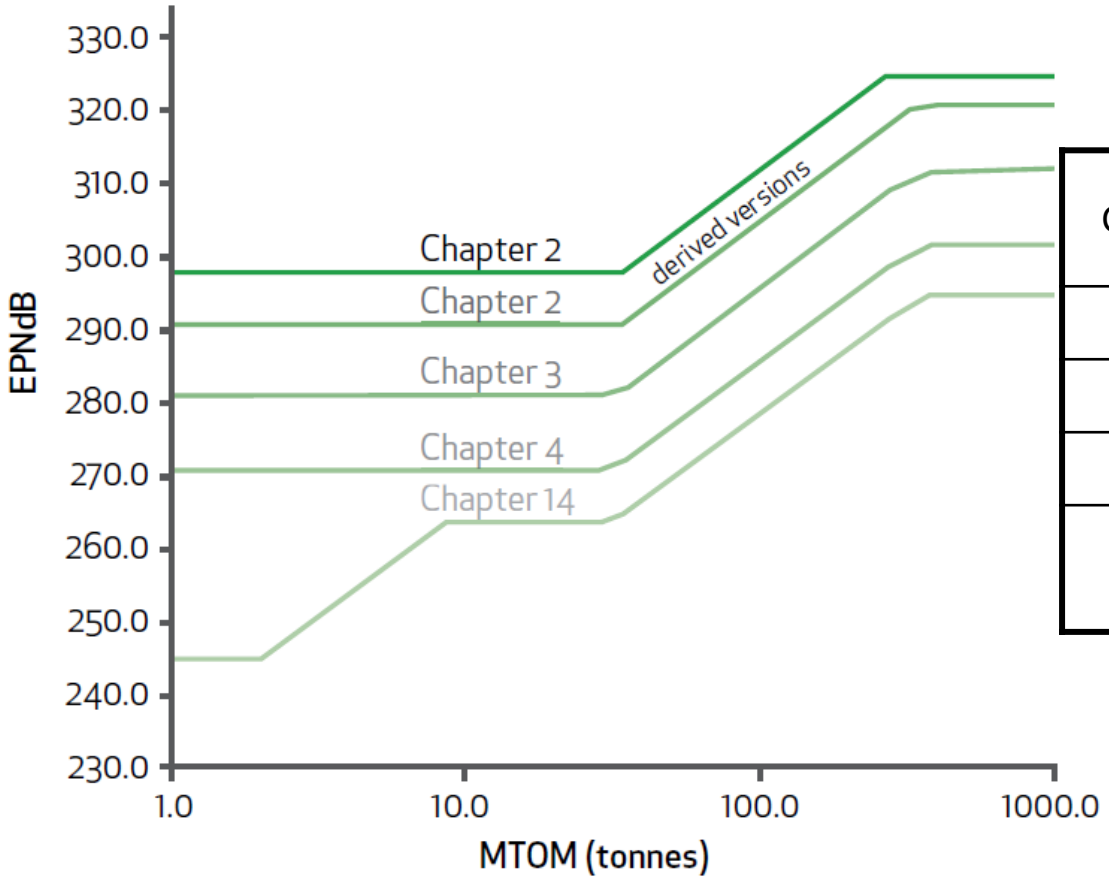
Aeroplane acoustic certification involves measuring the noise level of an aircraft in Effective Perceived Noise Level (EPN) dB at three reference points:

- **Fly-over**: 6.5 km from the brake release point, under the take-off flight path;
- **Sideline**: the highest noise measurement recorded at any point 450 m from the runway axis during take-off;
- **Approach**: 2 km from the runway threshold, under the approach flight path.



Cumulative levels are defined as the arithmetic sum of the certification levels at each of the three points.

Aircraft Noise Certification



Chapter	Applicable Year	Cum Margin (EPNdB)
2	1972	Ch. 3 ~-16
3	1978	0 (Ref)
4	2006	Ch. 3 +10
14	2017 & 2020	Ch. 3 +17 (Ch. 4 +7)

Aircraft Noise Certification

- Annex 16, Volume I also contains:
  - Standards for Propeller Driven Aeroplanes, Helicopters and Tilt-rotors;
  - Details on: noise monitoring, airport noise assessment and the Balanced Approach to Noise Management;
  - Appendices on the evaluation methods for noise certification;
  - Guidance material on the calculation of noise limits, APU noise, noise documentation administration and land use planning.

ICAO Noise Goals

Independent Experts Review on Noise Technology



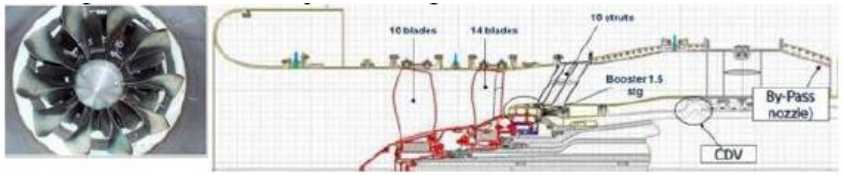


ICAO Noise Goals - Independent Experts Review on Noise Technology

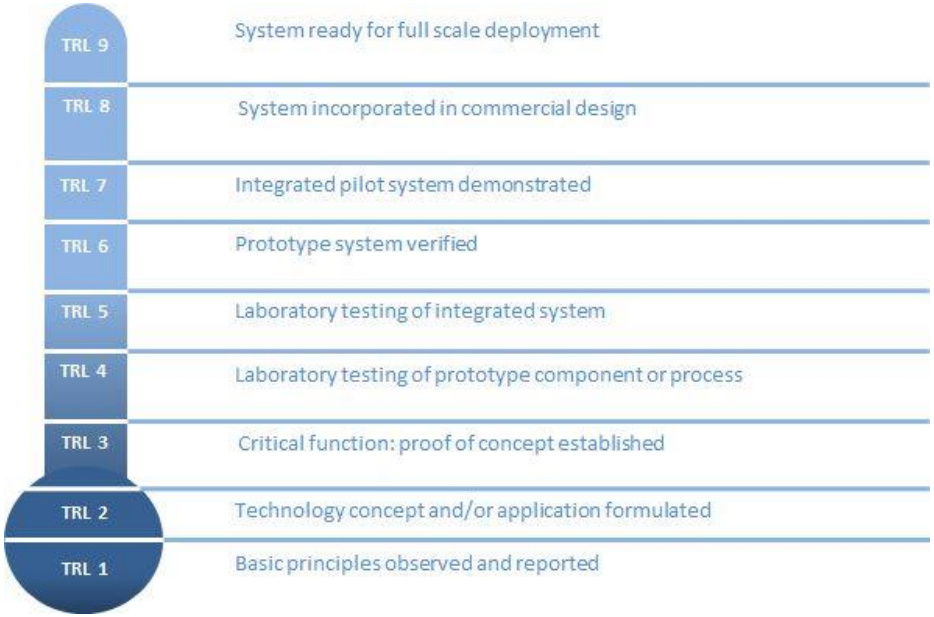
- Summarised the status of new technological advances (novel aircraft and engine concepts):
  - Looking at 2020 and 2030 time horizons (e.g. open rotor, geared turbofan, blended wing body, etc)

NACRE Proactive Green Concept

Silent Aircraft Initiative: SAX-40 concept

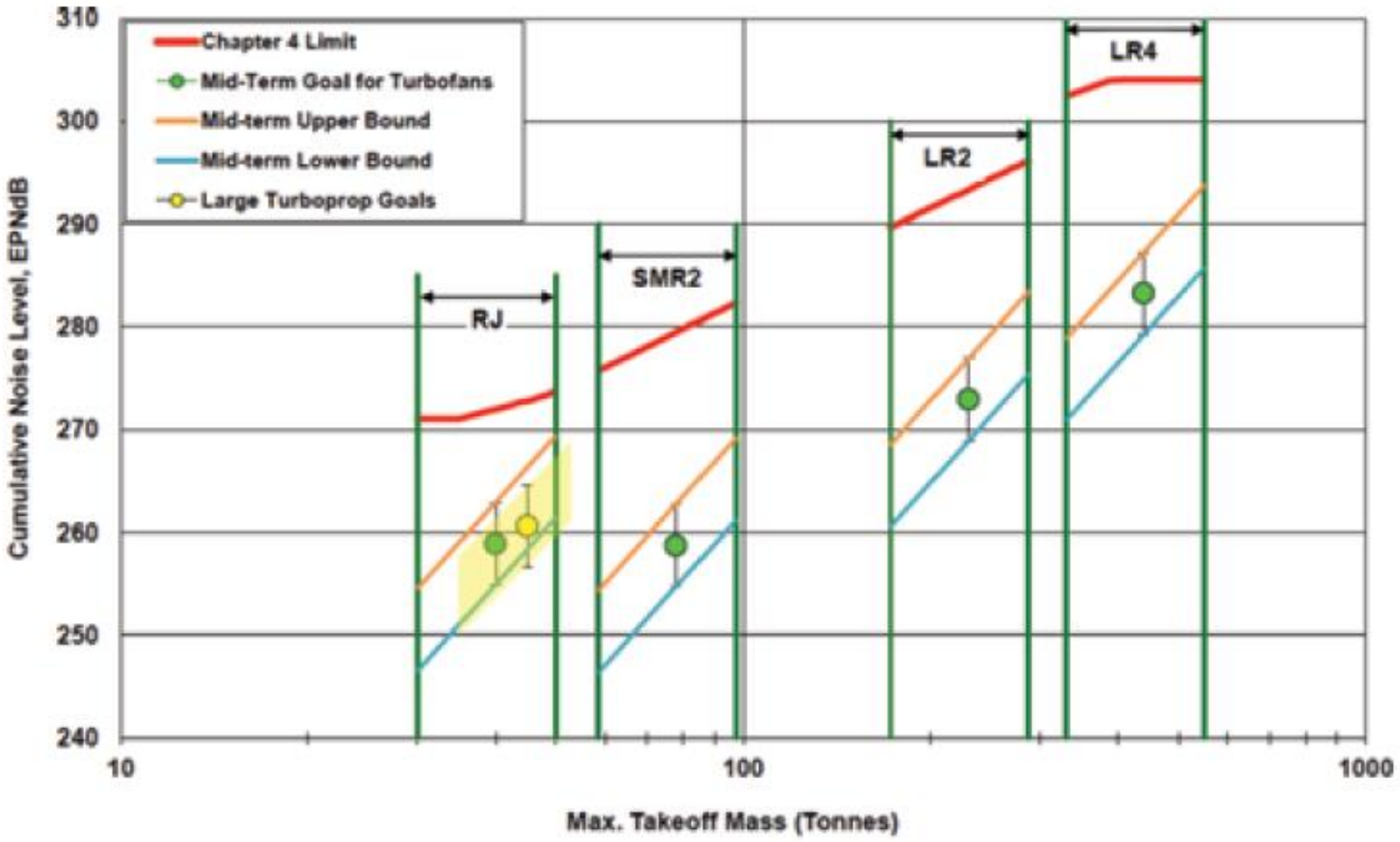


Front view and sketch of the reference Ducted Counter Rotating Fan (CRTF)



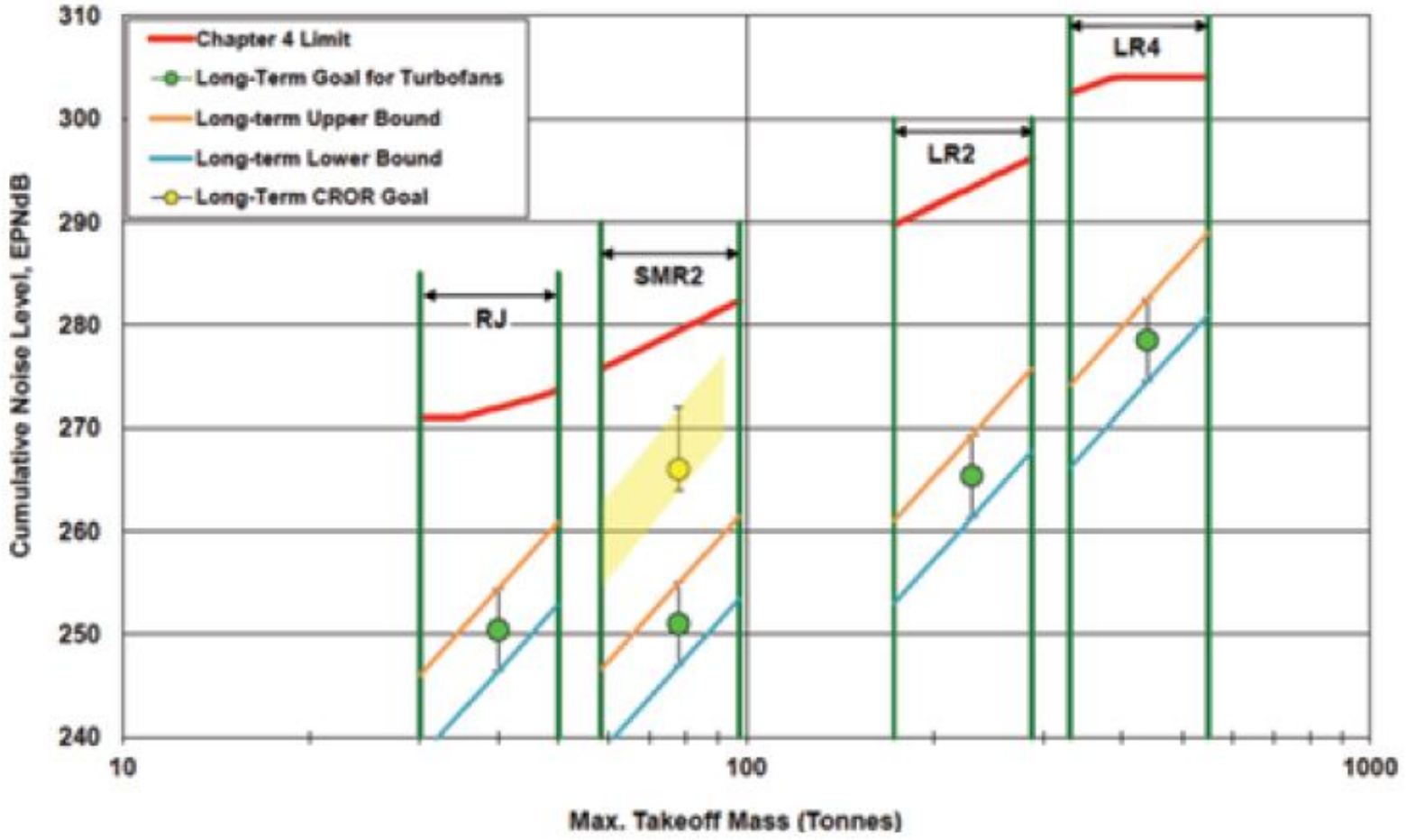
Setting ICAO Noise Goals - Independent Experts Review on Noise Technology

Mid-Term (2020) Cumulative Noise Goals at TRL8 (including Large Turboprops).



Setting ICAO Noise Goals - Independent Experts Review on Noise Technology

Long-Term (2030) Cumulative Noise Goals at TRL6 (including CROR for SMR2).



Second IE review on noise technology published as ICAO Doc 10017

ICAO Current Noise Work

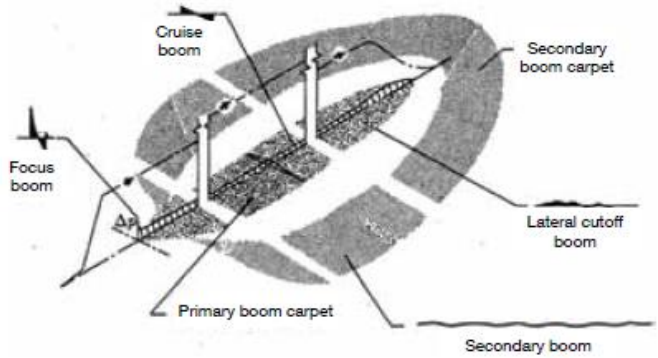
2013-2016






Current Work – Noise Standards

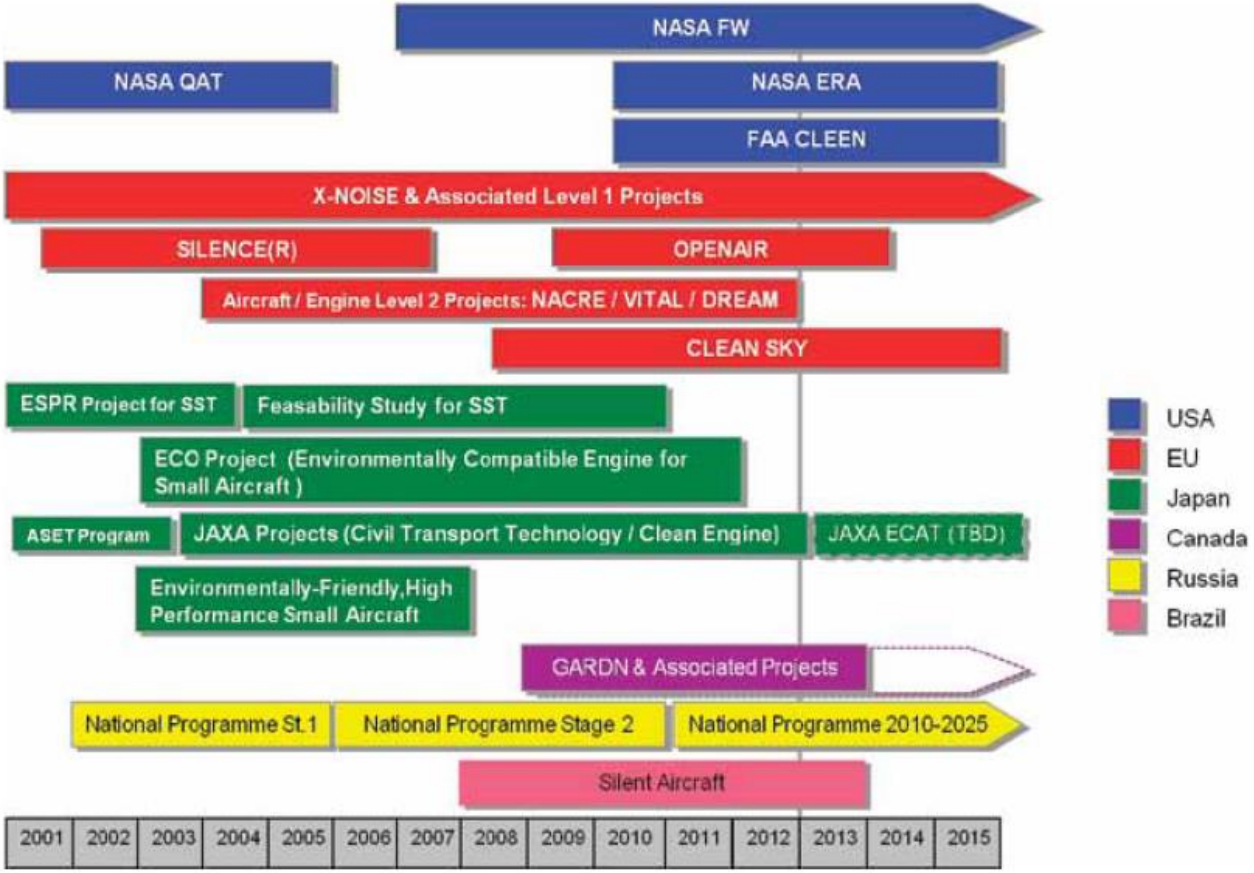
- CAEP (through WG1) continues to maintain and work towards updating Annex 16 during the CAEP/10 cycle.
- Work on interdependencies related to noise and emissions standards.
- Continue to work on noise certification standards for supersonic aircraft.
- Develop a new certification scheme for future supersonic aircraft.



Main Components of the Sonic Boom Carpet (from Maglieri and Plotkin, 1991).

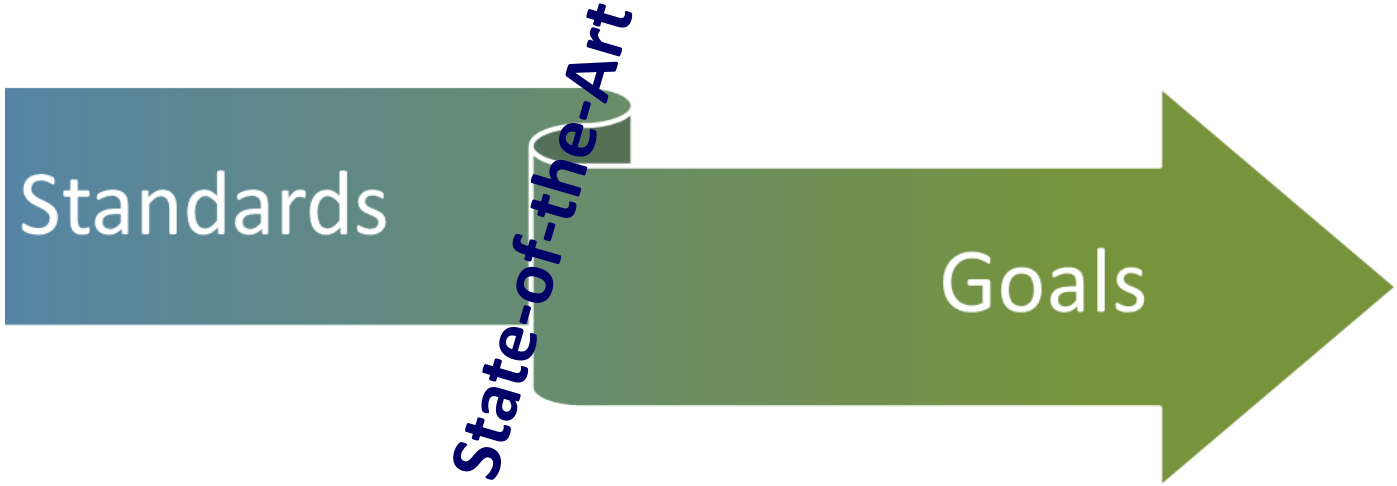
Current Work – Noise Technologies

- Monitor research and report on various national and international research programmes.



Committed Major National and Regional Initiatives as of the end of 2012.

Noise Standard Principles



Establishing Technology Standards

In conclusion……

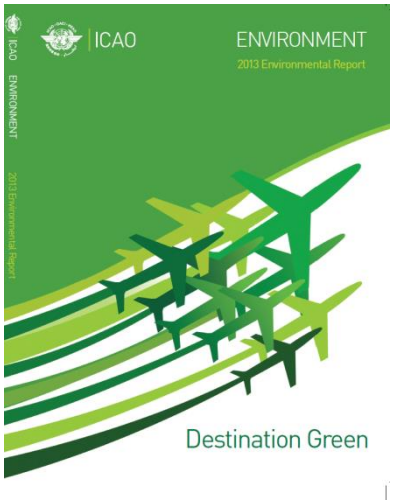
- **ICAO's role is to provide a global forum to develop a commonly-agreed solution among Member States:**
  - Consists of a variety of measures
  - Harmonized and balanced manner.

- **ICAO, through CAEP, will continue to update the Standards for noise in Annex 16, involving:**
  - Monitoring research and technology developments;
  - Review of the latest technology developments;
  - Consideration of the interdependencies.





For more information on ICAO activities on Aircraft Noise…



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