ICAO ENVIRONMENT

ICAO Environmental Symposium 2019

DESTINATION GREEN: THE NEXT CHAPTER

ICAO Standards and Recommended Practices on Local Air Quality

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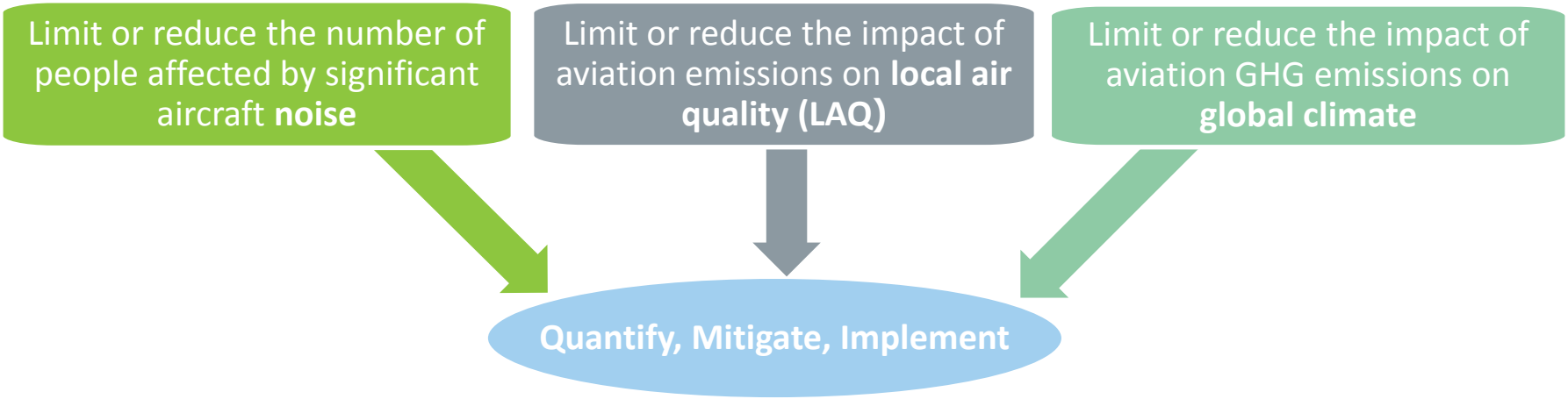
Chief, Environmental Standards

ICAO

ICAO Environmental Goals



ICAO Strategic Objective on Environmental Protection:

Minimize the adverse effect of global civil aviation on the environment

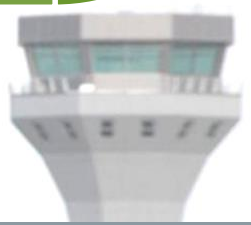
ICAO Standard Setting Principles

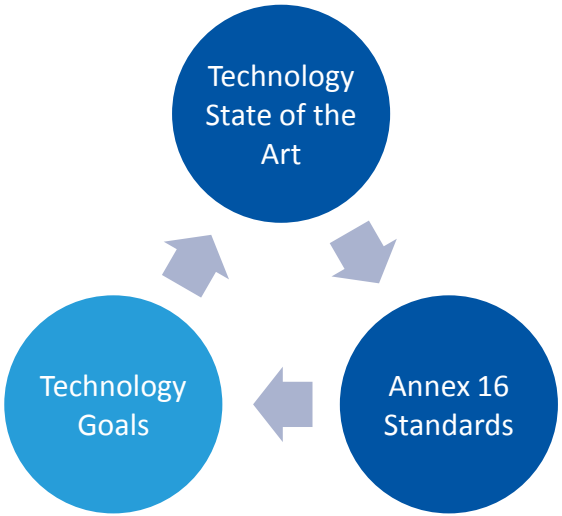
Technical feasibility

Economic reasonableness

Environmental benefit

Interdependence of measures





Purpose of Standards

- SARPs are part of ICAO policies to mitigate environmental impacts:

"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."

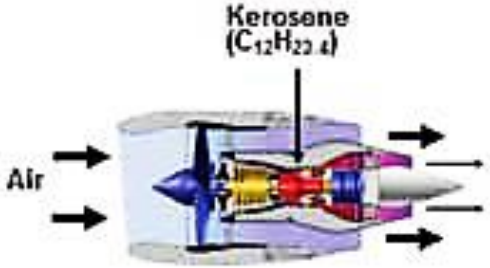
The seventh meeting of the Committee on Aviation Environment Protection (CAEP/7), 2007

ICAO Technology Standards – Annex 16

- Volume I – Aircraft Noise
- Volume II – Engine Emissions
  - Includes SARPs on: HC, CO, NO_x, Smoke, nvPM;
  - Focuses on emissions released below 3,000 feet in order to manage Local Air Quality (LAQ) near airports;
- Volume III – Aeroplane CO_2 Emissions

Aircraft Engine Emissions

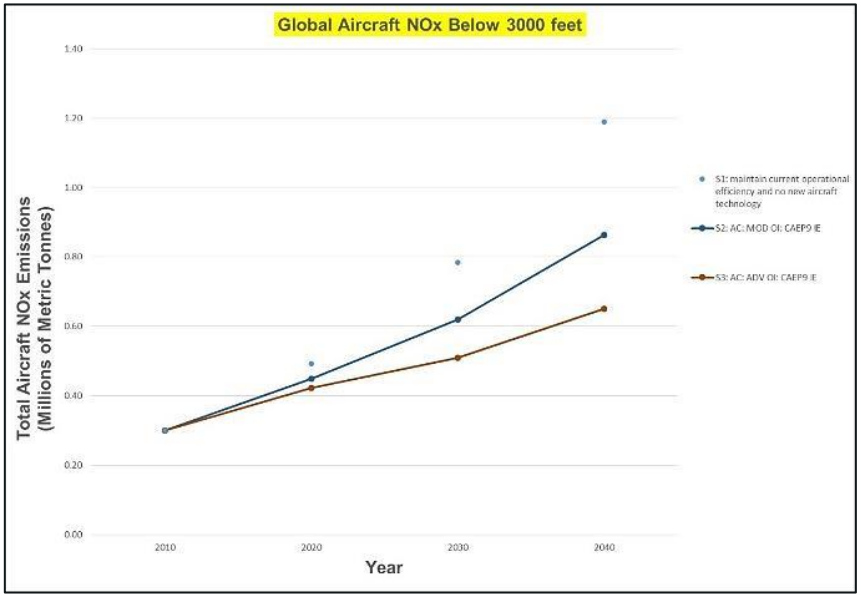
Typical Emissions from an Aero Engine at Cruise

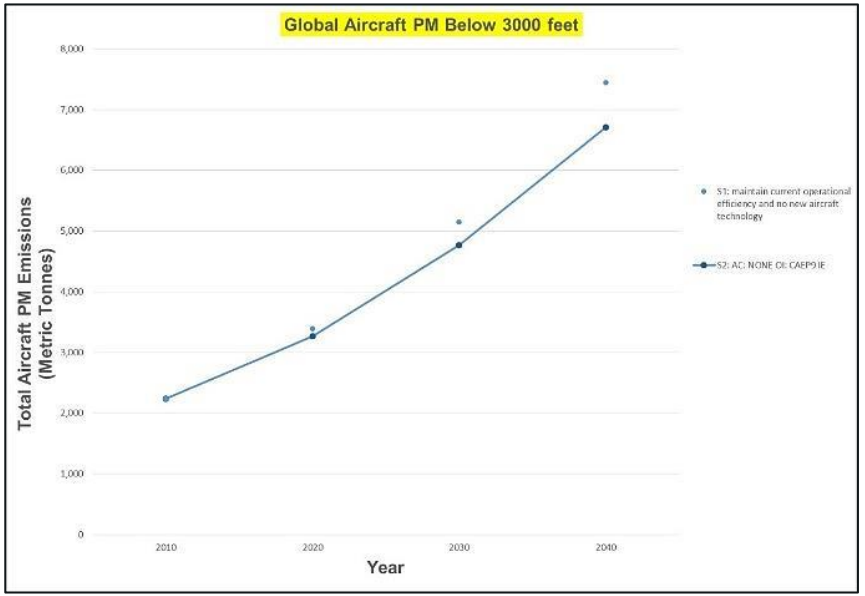


Emission	From 1 Kg fuel
CO_2	3160 g
H_2O	1290 g
NO_x	15 g
SO_x	1.2 g
CO	< 0.6 g
Hydrocarbons	< 0.01 g
Particulates	< 0.05 g
Air	lots

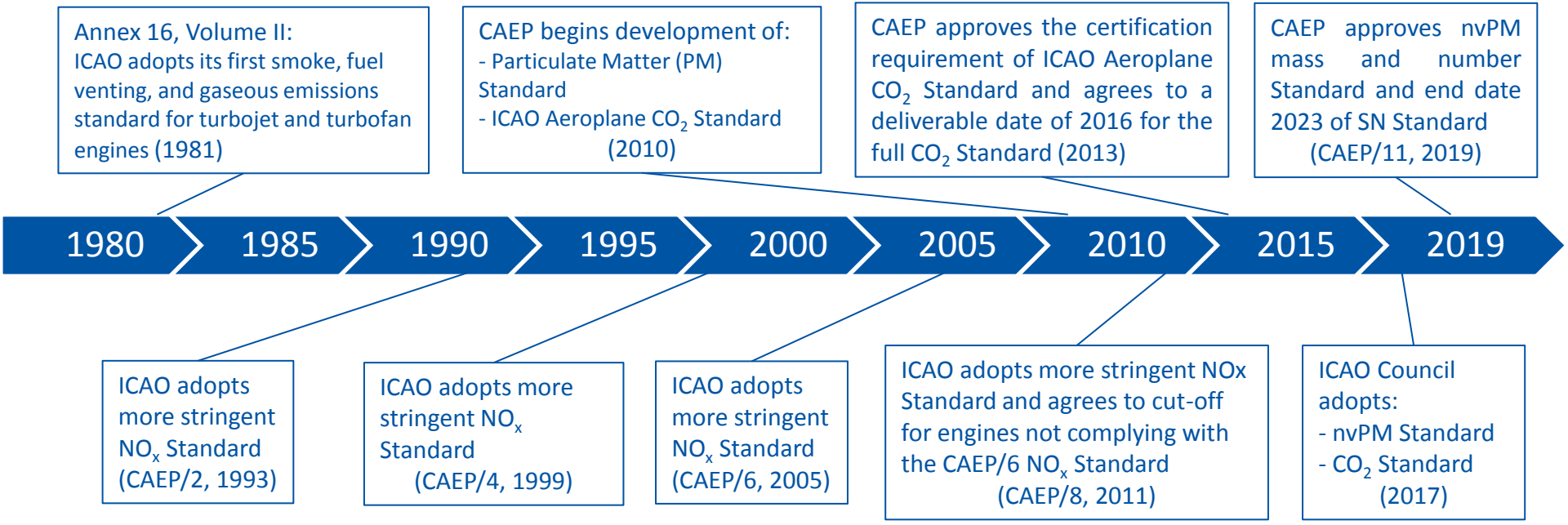
Around airports NOx is important, smoke (non-volatile particulate matter), and to a lesser extent UHC and CO all contribute to LAQ concerns.

LAQ NOx and nvPM Trends



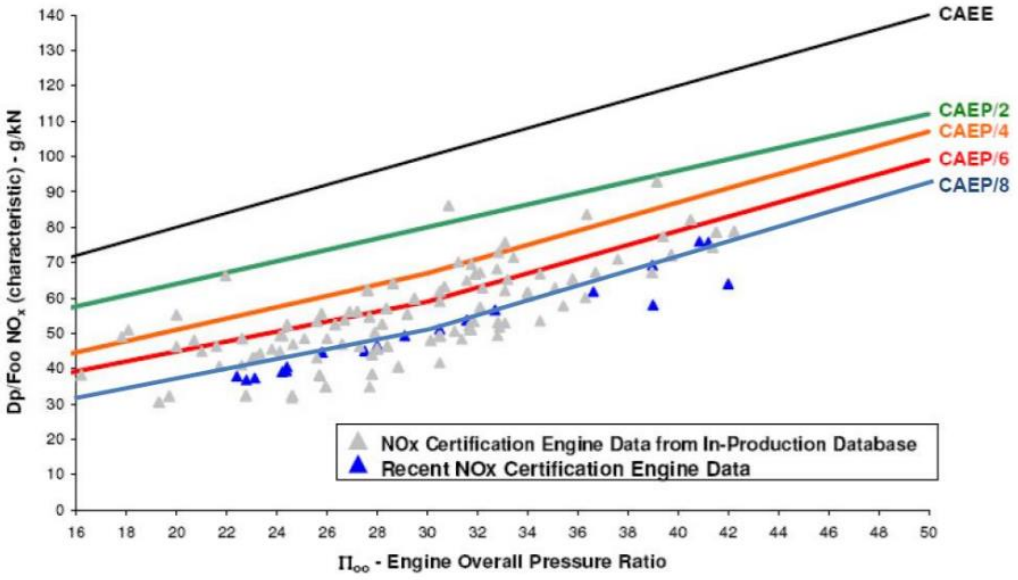


History of Engine Emission SARPs



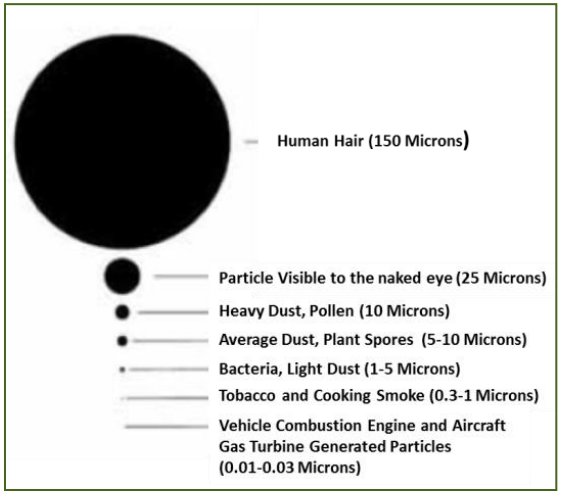
Evolution of NOx Standard

- Focus has been put on reducing NOx emissions from engines;
- Technological innovations continue to lead the way towards achieving ICAO's environmental goals;
- CAEP developed with assistance of independent experts panel mid-term technology goal:
  - -54% of CAEP/8 for 2027



Development of nvPM Standard

- CAEP/10 recommended the first nvPM mass Standard for aircraft turbofan/turbojet engines with rated thrust >26.7 kN (from 1 January 2020);
- ICAO Council adopted nvPM mass SARPs, 2017;
- CAEP/11 recommended the nvPM mass and number Standards for in-production and new type aircraft turbofan/turbojet engines with rated thrust >26.7 kN (from 1 January 2023);



CAEP/11 Work on LAQ SARPs

- Updated LAQ trends assessment, which include PM and NOx;
- New engine NOx emission technology goals;
- Agreed as Annex 16 Volume II Chapter 4:
  - *New regulatory limits for nvPM mass and number;*
  - *Applies to both in-production and new engine types from 1 January 2023;*
- End Smoke Number Standard applicability for engines of rated thrust beginning 1 January 2023;
- Updates to ICAO Doc 9889 Airport Air Quality Manual;
- CAEP/12 work plan to update Annex 16, Volume II, Part III Chapter 3 LTO emissions SARPs for supersonic aircraft engines.

Conclusions

- ICAO completed a suite for Engine Emissions SARPs with development nvPM mass and number Standard;
- Successful development of LAQ SARPs facilitates the ICAO Strategic Objective on Environmental Protection;
- Future ICAO work addresses LAQ SARPs.

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THANK YOU