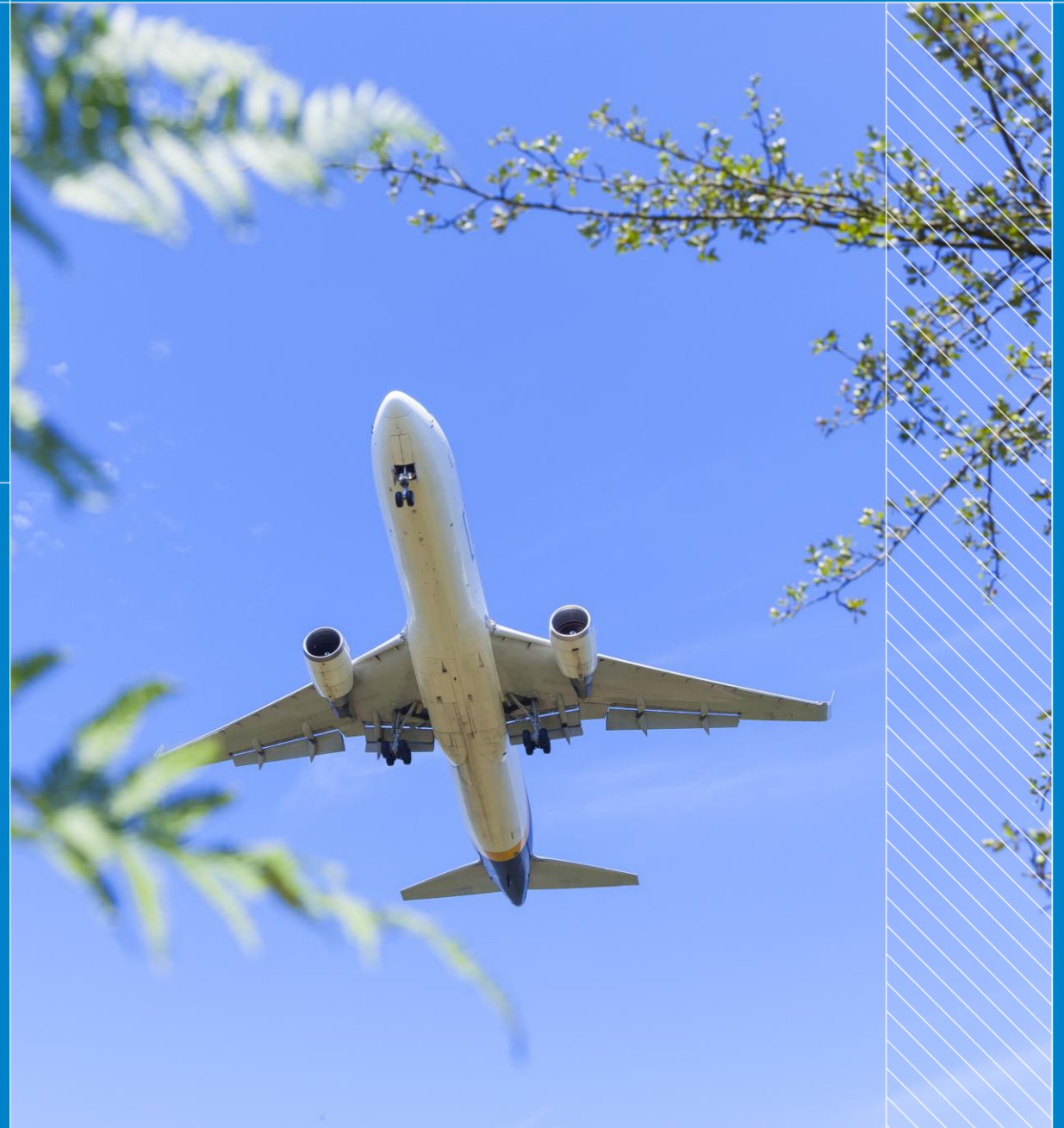


# Environmental Protection

Illimar BILAS  
Section Manager -  
Environment &  
Sustainability



# Content of this presentation

## 1) General Environmental Protection Requirements for product certification

## 2) What's new?

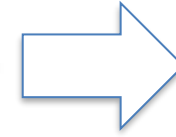
- CO2 certification requirements
- nvPM certification requirements
- Experience with noise certification of all-electric GA planes

## 3) Smart rules for novel technology

- Supersonic Transport – Landing and Take-off noise and CO2 requirements
- UAS/ UAM noise approach

## 4) Implementation of Balanced approach regulation (598/2014)

# 1) Environmental Protection Requirements for product certification



## → **Basic Regulation (EU) 2018/1139**

Article 9 contains direct reference to requirements of ICAO Annex 16

## → **Implementing Regulation (EU) 748/2012** (amended by Reg. (EU) 2019/897)

Paragraph 21.B.85 specifies applicable environmental requirements from Annex 16

## → **EASA Certification Specifications**

CS-34 (engine emissions), CS-36 (aircraft noise), and CS-CO<sub>2</sub> (aeroplane CO<sub>2</sub> emissions)

# 1) Environmental Protection Requirements

- Environmental Protection (EP) Requirements in Europe
- Applicability as stipulated in the Volumes of ICAO Annex 16



Aircraft Noise

ICAO Annex 16 Vol. I



Aeroplane CO<sub>2</sub>

ICAO Annex 16 Vol. III



Engine Emissions

ICAO Annex 16 Vol. II

# 1) Environmental Protection Requirements

→ Dissemination of environmental certification data

The screenshot displays the EASA (European Union Aviation Safety Agency) website. The top navigation bar includes the EASA logo, a dropdown menu for 'EASA Pro', a search bar, and buttons for 'Login' and 'Register'. Below this, a secondary navigation bar lists various sections: Home, The Agency, Newsroom & Events, Domains (highlighted), Regulations, Document Library, and Can We Help You?.

The 'Domains' section is expanded on the left, showing a list of categories: Aerodromes, Air Operations, Air Traffic Management, Aircraft & products, Aircrew & Medical, Civil drones (Unmanned aircraft), Cybersecurity, and General Aviation. The 'Environment' category is selected, leading to a dedicated page.

The 'Environment' page features a green leaf icon and the title 'Environment'. It states: 'EASA's mission is to achieve a high uniform level of environmental protection in the field of aviation. This includes reducing noise, improving air quality and mitigating climate change.' Below this text, there are three main content areas:

- European Aviation Environmental Report**: Accompanied by an image of the report cover.
- Smart environmental standards**: Accompanied by an image of blue cubes with the word 'STANDARD' on them.
- Environmental data**: A section containing a list of links:
  - [EASA Aeroplane CO<sub>2</sub> Emissions Database](#)
  - [EASA Certification Noise Levels](#)
  - [ICAO Aircraft Engine Emissions Databank](#)

A large blue arrow points from the 'Environmental data' section towards the bottom right of the page.

## 2) What's new?

- **CO<sub>2</sub> certification requirements (Aircraft)**
- nvPM certification requirement (Engine)
- Experience with noise certification of all-electric GA aeroplanes

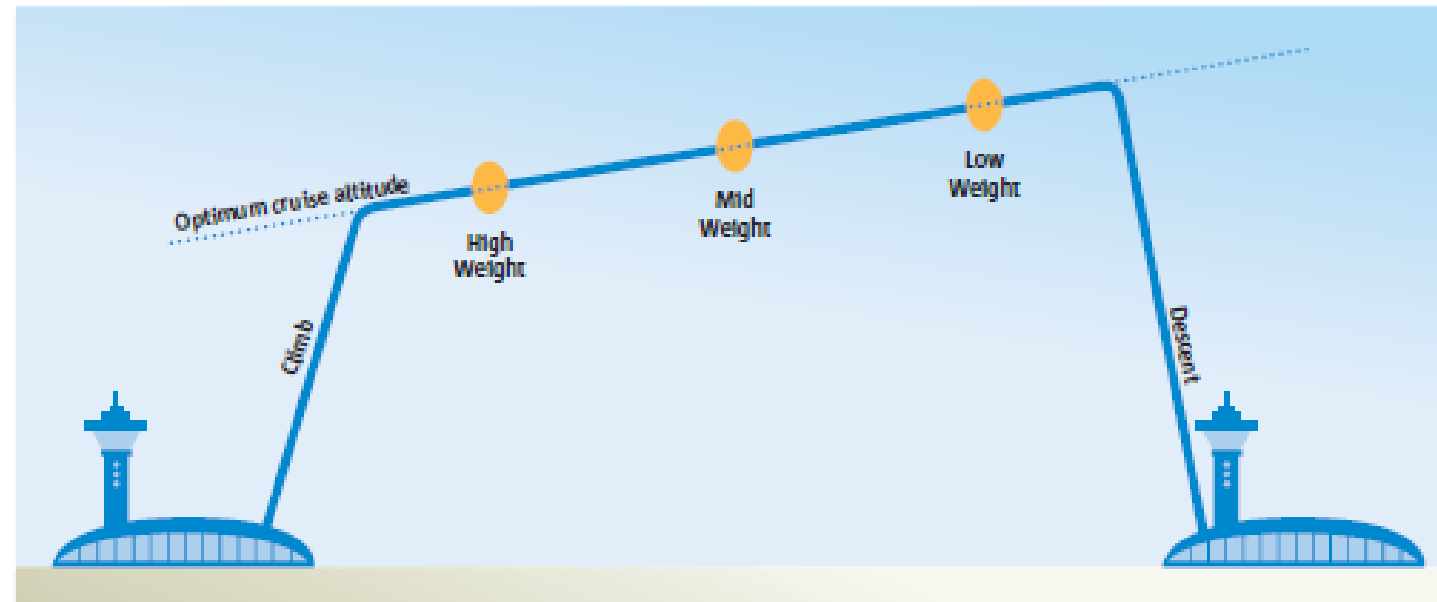
# Aeroplane CO<sub>2</sub> Certification – Basics

CO<sub>2</sub> standard is applicable for **new-types** of large subsonic aeroplanes **since January 2020**.

*In-production types won't fully be covered until 2028.*

CO<sub>2</sub> certification typically involves **flight testing** and **EASA-review of performance data**.

CO<sub>2</sub> metrics is the reciprocal of **Specific Air Range (SAR)** in kg fuel per kilometre averaged for three reference points and **adjusted** to take into account **fuselage size**.



# Aeroplane CO<sub>2</sub> Certification – Affected Products

→ CO<sub>2</sub> standard affects the following aeroplane categories:

- New aeroplanes (subsonic jets > 5.7t, propeller-driven > 8.618t MTOM) affected from January 2020, new business jets from January 2023
- Applicable to derived versions of non-CO<sub>2</sub> certified aeroplanes from 1st January 2023 (*„derived“ = increase of CO<sub>2</sub> > 1.5% or significant CO<sub>2</sub> change*)
- In-production aeroplanes from 1st January 2028



## 2) What's new?

- CO2 certification requirements (Aircraft)
- **nvPM certification requirement (Engine)**
- Experience with noise certification of all-electric GA aeroplanes



# CAEP/11 nvPM compliance demonstration

- All engines in production after the 31st December 2022 need to demonstrate compliance with the new nvPM LTO Standard as described in Annex 16 Volume, Amendment 10.
- Compliance with the new CAEP/11Standard will be recorded in the applicable engine TCDS.

2.5 Environmental Protection Requirements	
All models	ICAO Annex 16 Volume II, second edition, including Amendment 4, effective 04 November 1999, as applicable to turbofan engines. NOx Standard in accordance with Part III, Chapter 2, § 2.3.2, c) (CAEP/4)
CFM56-5B1/3, -5B2/3, -5B3/3, -5B3/3B1, -5B4/3, -5B4/3B1, -5B5/3, -5B6/3, -5B7/3, -5B8/3, -5B9/3	ICAO Annex 16 Volume II, third edition, including Amendment 7, effective 17 November 2011, as applicable to turbofan engines. NOx Standard in accordance with Part III, Chapter 2, § 2.3.2, e) (CAEP/8)

(See note 10)

TCDS No.: E-003  
Issue: 04

CFM56-5B and CFM56-5C series engines

Date: 28 September 2017

## TYPE-CERTIFICATE DATA SHEET

No. E.003

for  
CFM56-5B and CFM56-5C series engines

Type Certificate Holder  
CFM International SA

2, boulevard du Général Martial Valin  
F-75724 Paris Cedex 15  
France

For Models:

CFM56-5B "SAC"	CFM56-5B1, CFM56-5B1/P, CFM56-5B1/3, CFM56-5B2, CFM56-5B2/P, CFM56-5B2/3, CFM56-5B3/P, CFM56-5B3/P1, CFM56-5B3/3, CFM56-5B3/3B1, CFM56-5B4, CFM56-5B4/P, CFM56-5B4/P1, CFM56-5B4/3, CFM56-5B4/3B1, CFM56-5B5, CFM56-5B5/P, CFM56-5B5/3, CFM56-5B6, CFM56-5B6/P, CFM56-5B6/3, CFM56-5B7, CFM56-5B7/P, CFM56-5B7/3, CFM56-5B8/P, CFM56-5B8/3, CFM56-5B9/P, CFM56-5B9/3
CFM56-5B "DAC"	CFM56-5B1/2P, CFM56-5B2/2P, CFM56-5B3/2P, CFM56-5B3/2P1, CFM56-5B4/2P, CFM56-5B4/2P1, CFM56-5B6/2P, CFM56-5B9/2P
CFM56-5C	CFM56-5C2, CFM56-5C2/P, CFM56-5C2/G, CFM56-5C2/A, CFM56-5C2/F4, CFM56-5C2/GA, CFM56-5C2/P, CFM56-5C3/P, CFM56-5C3/F4, CFM56-5C3/G, CFM56-5C3/GA, CFM56-5C3/P, CFM56-5C4, CFM56-5C4/P, CFM56-5C4/L, CFM56-5C4/LP

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## 2) What's new?

- CO2 certification requirements (Aircraft)
- nvPM certification requirement (Engine)
- **Experience with noise certification of all-electric GA aeroplanes**

# Noise certification of all-electric GA planes

- EASA certified the fully electric Velis Electro (SW128) about a year ago against ICAO Chapter 10.4b noise requirements
- Results and lessons learnt were presented to ICAO CAEP
- Main conclusions so far:
  - Prop noise is still of high relevance
  - Helical tip Mach number correction needs to take into account the slightly reducing RPM over the duration of the test
  - Overall - Chapter 10 seems fit for purpose also for all-electric aeroplanes

### 3) Smart rules for novel technology

- For non-Annex 16 products the basic regulation contains the mandate to establish EPR
- Bridging the gap until rules are established globally & harmonized
- Strategic objectives
  - Environmental certification is innovative and cost-effective, facilitating new technologies
  - Environmental standards are smart, proportionate and contribute to the competitiveness of industry

### 3) Smart rules for novel technology

#### → Supersonic transport aircraft (SST)

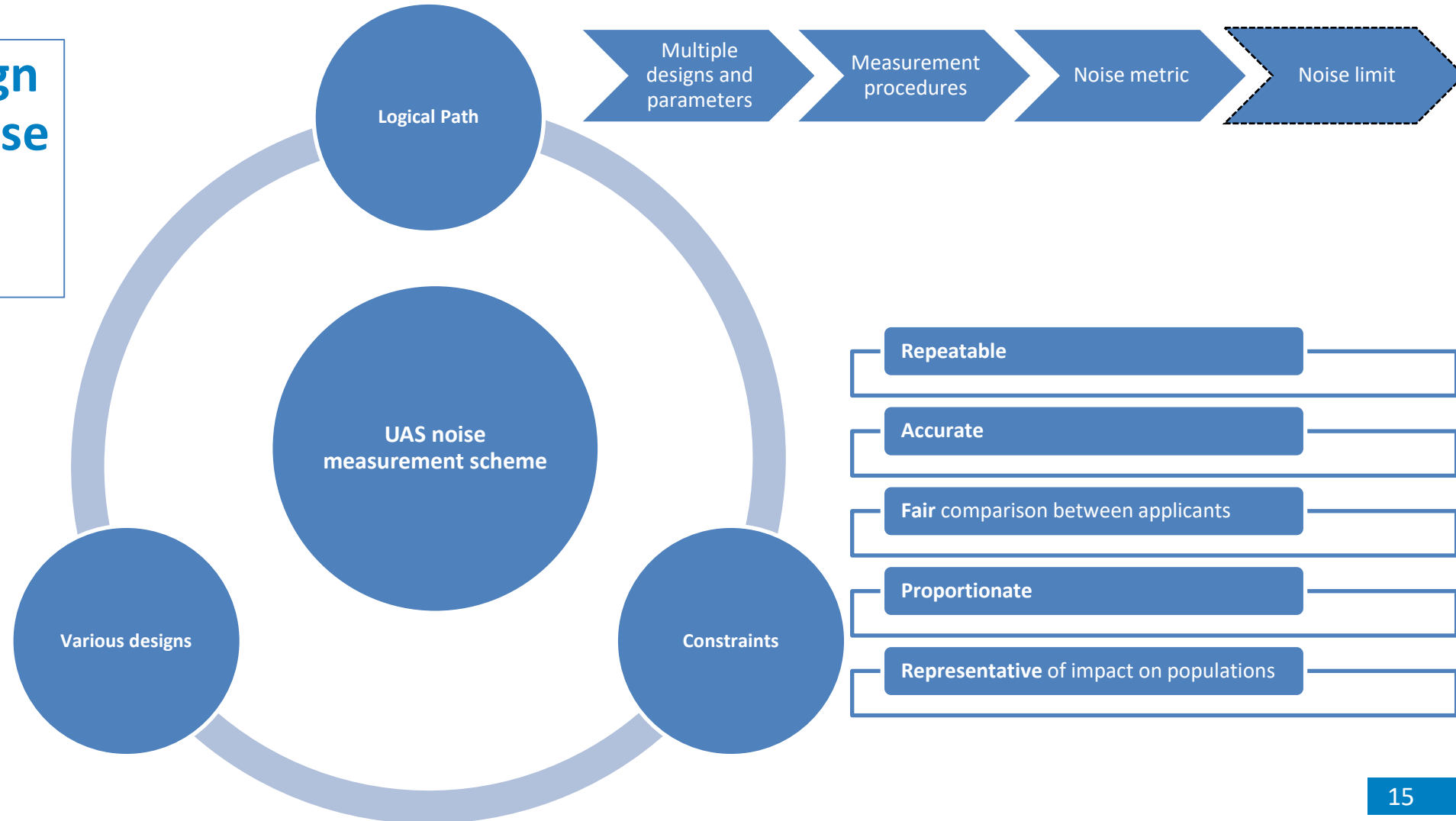
- Implement a comprehensive regulation to restrict civil flights above Europe to speeds below M 1.0
- Developing environmental protection requirements applicable to SST in the areas of:
  - Landing and Take-Off noise
  - Aircraft CO2 emission



# 3) Smart rules for novel technology

## → UAS/UAM noise requirements

**Objective: to design an appropriate noise measurement scheme.**



## 4) Implementation of Balanced Approach Reg

- Regulation (EU) No 598/2014 “Establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach”
- According to Article 7 of the Regulation, EASA has a specific role to fulfill
  1. Collect, verify and make available Aircraft Noise and Performance (ANP) Data\*
    - **ANP Database**
  2. Collect and make available noise documentation of individual aircraft (e.g. A/C noise certificates) – **ANC Database**

This work has links with the A/C Noise Certification





# THANK YOU

