



**Proposed Rule:
Control of Air Pollution From Aircraft
Engines - Particulate Matter Emission
Standards and Test Procedures**

Presentation for NACAA

Mobile Sources and Fuels Committee Meeting

January 31, 2022

- International Civil Aviation Organization (ICAO)
- EPA and FAA Roles
- Affected Industry
- Emissions Inventory
- ICAO PM Standards & Timing
- EPA Proposed PM Standards



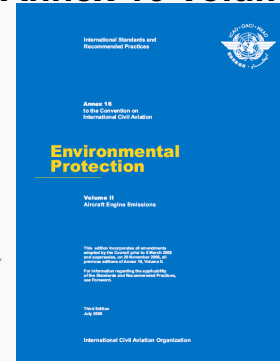
Where Do Engine Emission Regulations Come From?



United Nations:
International Civil
Aviation
Organization (ICAO)



Annex 16 Volume II



Creates technology-based international standards...


United States:
Environmental
Protection Agency
(EPA)



Sets regulatory levels...

Title 40
Code of
Federal
Regulations
Part 87, 1031

United States:
Federal Aviation
Administration
(FAA)



Federal Aviation
Administration

Enforces regulatory levels...

Title 14
Code of
Federal
Regulations
Part 34



- International Civil Aviation Organization (ICAO) is a specialized agency of the U.N.; a global organization that brings together States, manufacturers, NGOs, and industry organizations
 - The US Delegation to ICAO is led by Federal Aviation Administration (FAA)
 - EPA acts as advisor to FAA and contributes analysis to the working groups
- ICAO emissions standards are not self-implementing, but must be implemented through domestic regulation -- via section 231 of the CAA in the U.S.
- U.S. standards need to be at least as stringent as ICAO standards for U.S. to meet its treaty obligations
 - Treaty: *Convention on International Civil Aviation* (known as Chicago Convention) signed in 1944

EPA and FAA Roles



EPA, in consultation with Federal Aviation Administration (FAA), issues air pollution standards for aircraft engines under CAA section 231

- *“The Administrator shall, from time to time, issue proposed emission standards applicable to the emission of any air pollutant from any class of aircraft engine ... which in his judgement causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare.”*
- EPA considers technology, cost, lead time, and safety in establishing such standards
- Emission standards must not cause a significant increase in noise or adversely effect safety



FAA, under CAA section 232, prescribes regulations to ensure compliance with the emissions standards

- FAA traditionally starts its certification rulemaking (historically via a Direct Final Rule) after EPA publishes its FRM

Affected Industry

- Aircraft Engine Manufacturers

U.S.:

- General Electric
- Pratt and Whitney
- Honeywell
- Rolls-Royce North America
(Indianapolis)

International:

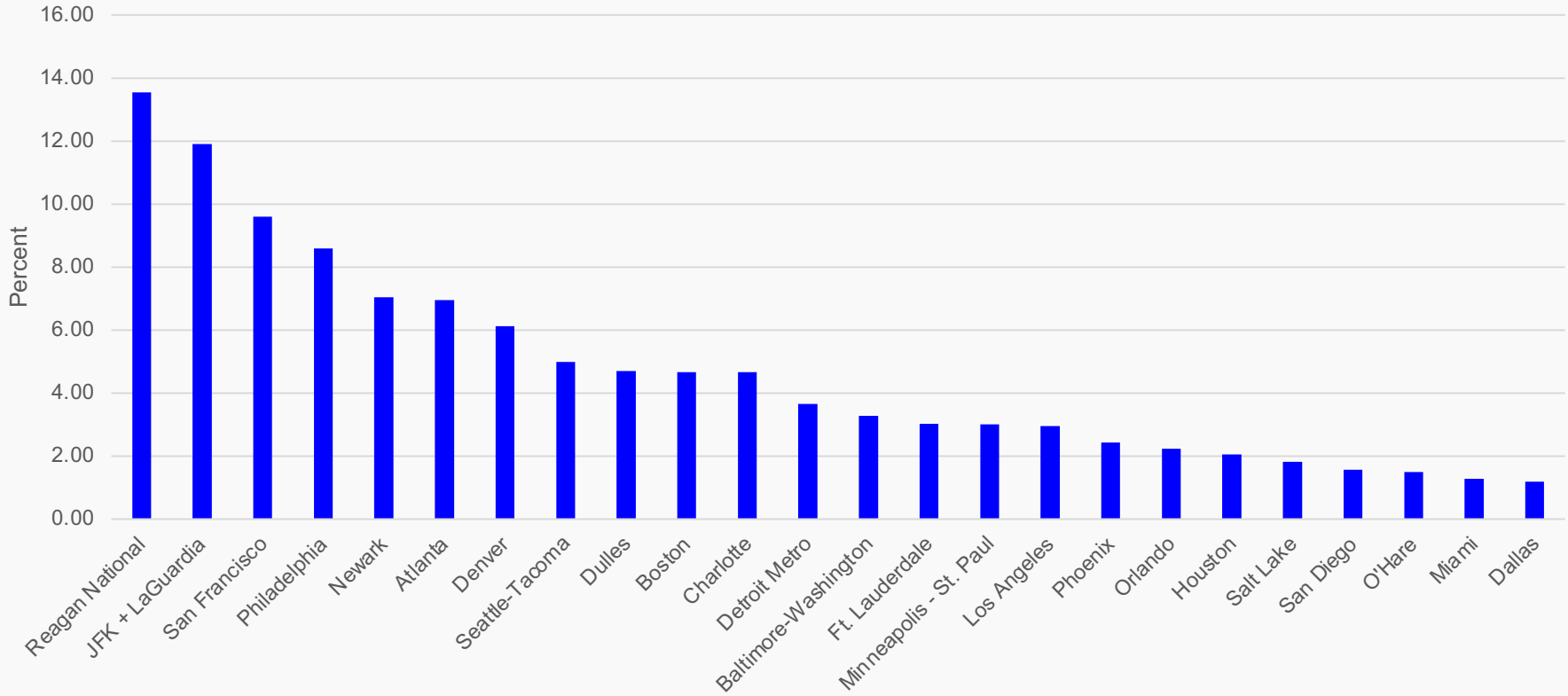
- Pratt and Whitney Canada
- Rolls-Royce (U.K. and Germany)
- Safran (France)
- Aviadvigatel (Russia)
- KKBM (Russia)
- Motor Sich (Ukraine)





Aircraft PM Emissions Inventory

**2017 Turbine Aircraft >26.7 kN PM2.5 as a Percent of All Mobile PM2.5 for the County or Counties in Which the Airport Resides
25 Largest Carrier Operations**

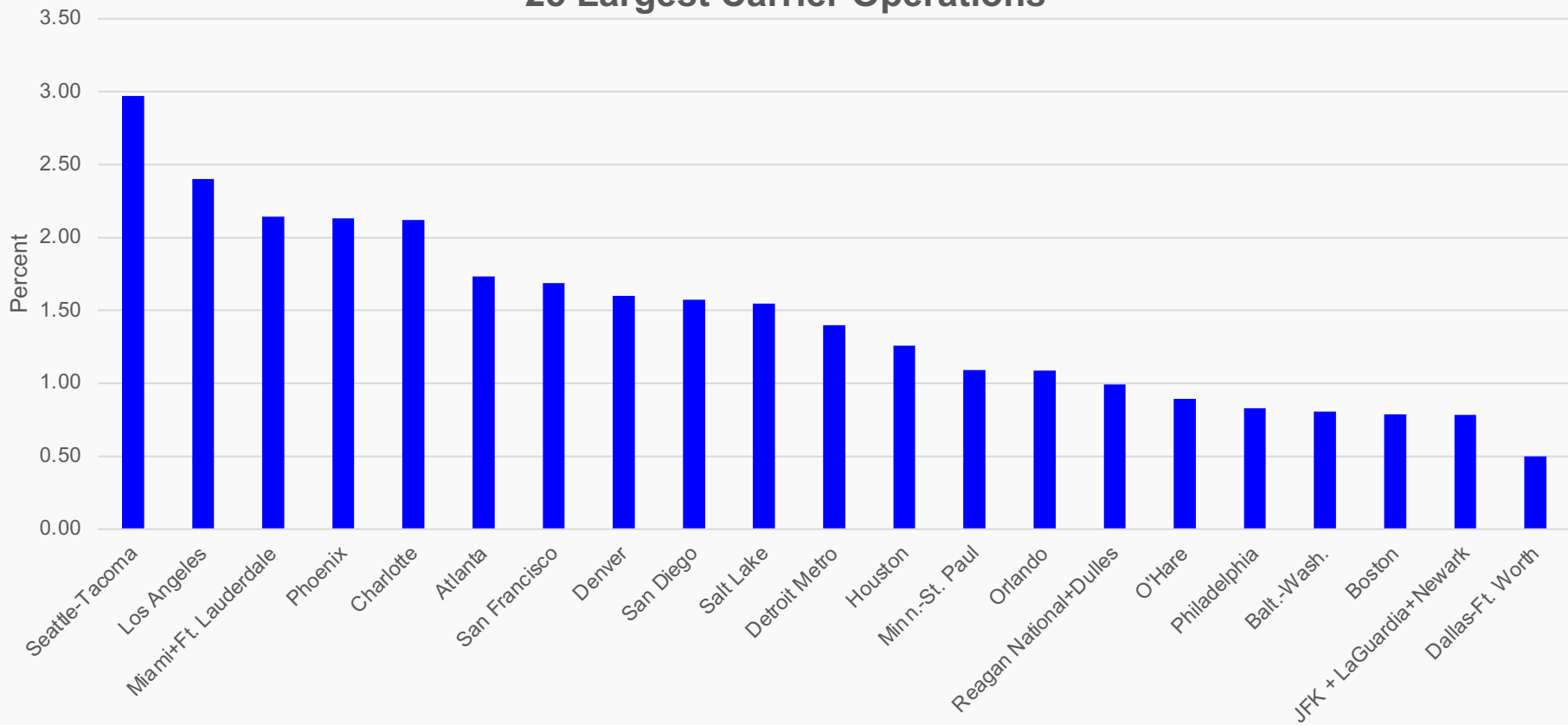


Source: 2017 NEI

Aircraft PM Emissions Inventory (cont.)



**2017 Turbine Aircraft >26.7 kN PM_{2.5} as a Percent of All Mobile PM_{2.5}
for the MSA in Which the Airport Resides
25 Largest Carrier Operations**





ICAO 2016: Visibility Standard

- In 2016, ICAO agreed to transition the visibility standards from smoke-based to nonvolatile PM-based measurement
- ICAO adopted a maximum nonvolatile PM (nvPM) mass concentration standard for jet engines (primarily engines on commercial aircraft)
- Provides equivalent visibility control as existing ICAO/EPA smoke visibility standard
- In-production (InP) engine standard with effective date of 1/1/2020
- All in-production engines meet standard: no costs or benefits
- Collection of nvPM data for all InP engines starting in 2020
 - In December 2018, EPA issued information collection request (ICR) to domestically implement this ICAO requirement
 - We are working on renewing this ICR



- In 2019, ICAO agreed on nvPM mass and number standards with effective date of 1/1/2023 (does not supersede visibility standard)
- All pass in-production standards (all in-production engines meet standards)
- Anti-backsliding new type standards (nearly all in-production engines meet the standards)
- Standards have no costs or benefits
- Monitor technology development by Feb 2022 and may consider revisiting nvPM standards during CAEP cycle ending in Feb 2025

EPA Proposed Aircraft PM Standards



- On December 17, 2021, the EPA Administrator signed a proposed rule to adopt the ICAO standards
 - Visibility (mass concentration)
 - Mass
 - Number
- Proposed to migrate aircraft engine regulations to new part 1031 of Code of Federal Regulations (CFR)
- ICAO effective date for mass & number standards is January 1, 2023

EPA Proposed Aircraft PM Standards (cont.)



- Proposing to adopt ICAO standards into U.S. law would:
 - Prevent aircraft engine PM levels from increasing beyond current levels
 - Ensure international consistency and acceptance of U.S. manufactured engines worldwide
 - Help U.S. meet its treaty obligations under the Chicago Convention
- International uniformity and regulatory certainty are important elements of these proposed standards
- International cooperation on aircraft emissions brings substantial benefits overall to the U.S.
 - The U.S. played a significant role & invested substantial effort to develop these stds & obtain international consensus for ICAO to adopt these stds
 - A U.S. decision to deviate from these stds might undermine future efforts by the U.S. to seek international consensus on aircraft emission stds

EPA Proposed Aircraft PM Standards (cont.)



- In the absence of U.S. standards implementing the ICAO PM standards, the U.S. would not be able to certify aircraft engines to the PM standards
 - U.S. aircraft engine manufacturers could be forced to seek PM certification from a certification authority of another country to market and operate their engines internationally
- These previous considerations have historically led EPA to adopt international standards developed through ICAO
- The proposed PM standards change our approach to regulating aircraft PM from past smoke measurements to measurement of nvPM mass and number for the first time

Further Information



- NPRM is expected to be published soon
- Comment period ends 60 days after publication
- Virtual public hearing will occur on Feb 17, 2022 at 1:00 p.m. eastern time (ET)
- For more information on the NPRM and virtual public hearing:

<https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-control-air-pollution-aircraft-engines>



APPENDIX

Aircraft PM Mass Concentration Standards

