Briefing for Mobile Sources Technical Review Subcommittee

May 5, 2015

# Aircraft Emissions

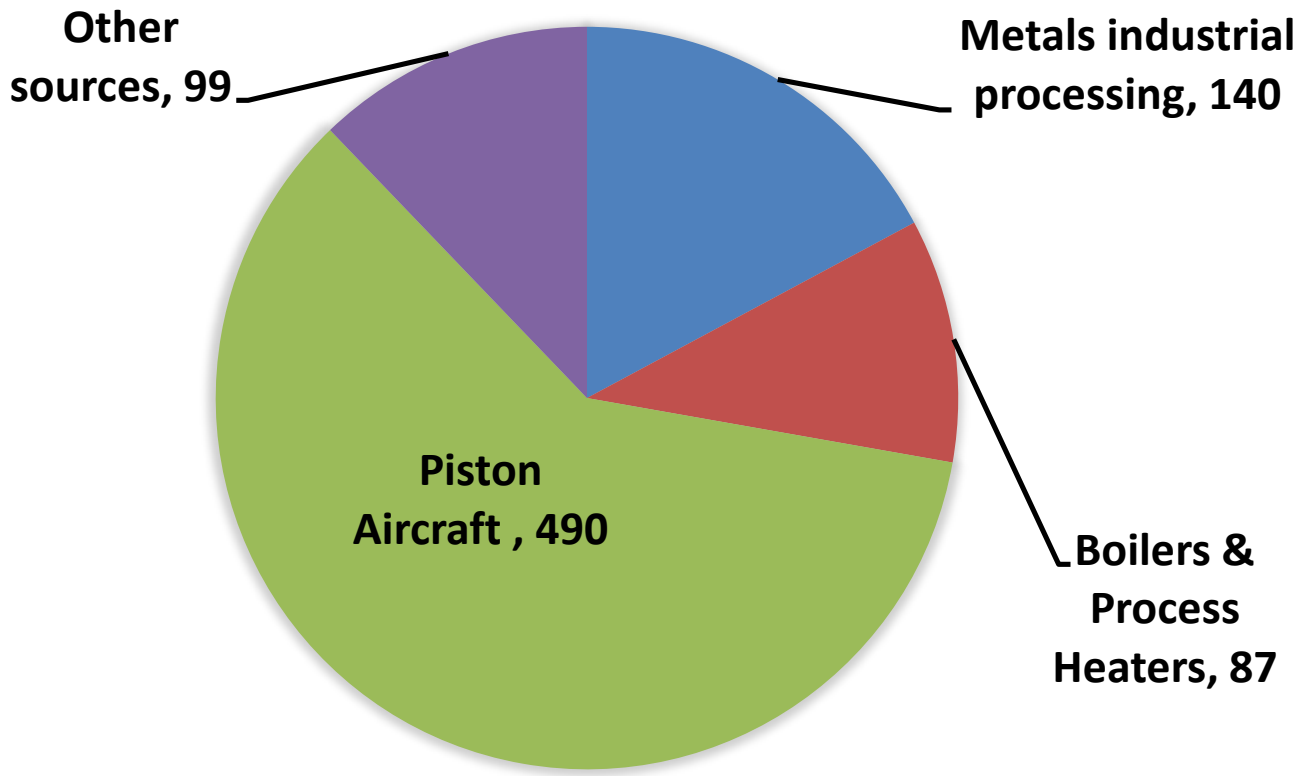
# Summary

- Lead Emissions from Piston Aircraft Operating on Leaded Fuel
- $CO_2$ Standard Development
- PM Standard Development

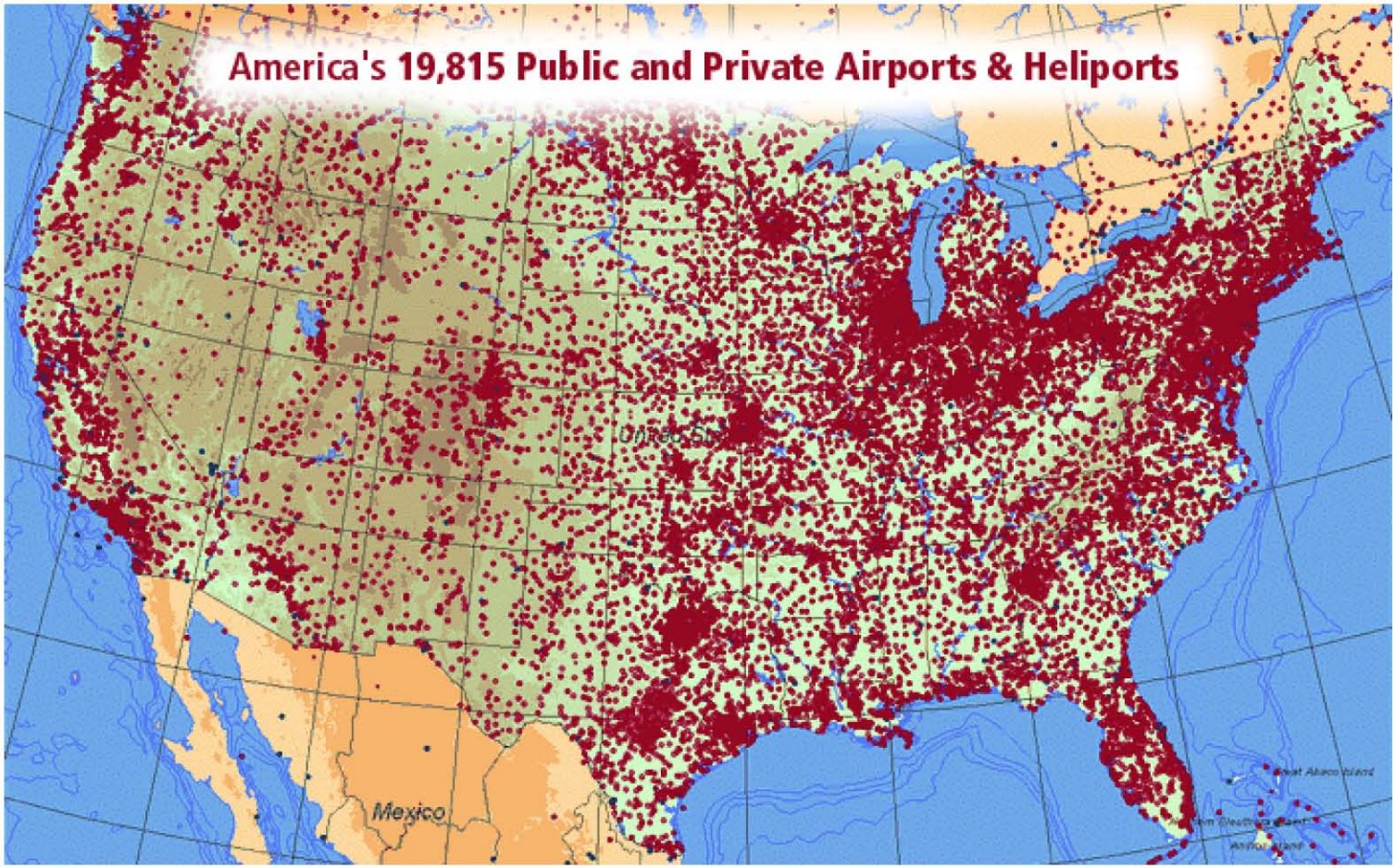
# Aircraft Lead Emissions

2011 Lead Emissions to Air in Tons

Piston-engine Aircraft, 60%



# Airports Serving Piston Aircraft




- 3,600 general aviation airports are significant for national transportation

- Millions of people live in close proximity to these airports

# EPA's Authority and Actions - Lead

- The Clean Air Act provides EPA with the authority to set emissions standards if we find that lead emissions from aircraft contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.
  - Developing nationwide estimates of lead concentrations near airports
  - Conducting a demographic analysis of people living within 500 meters of all airports

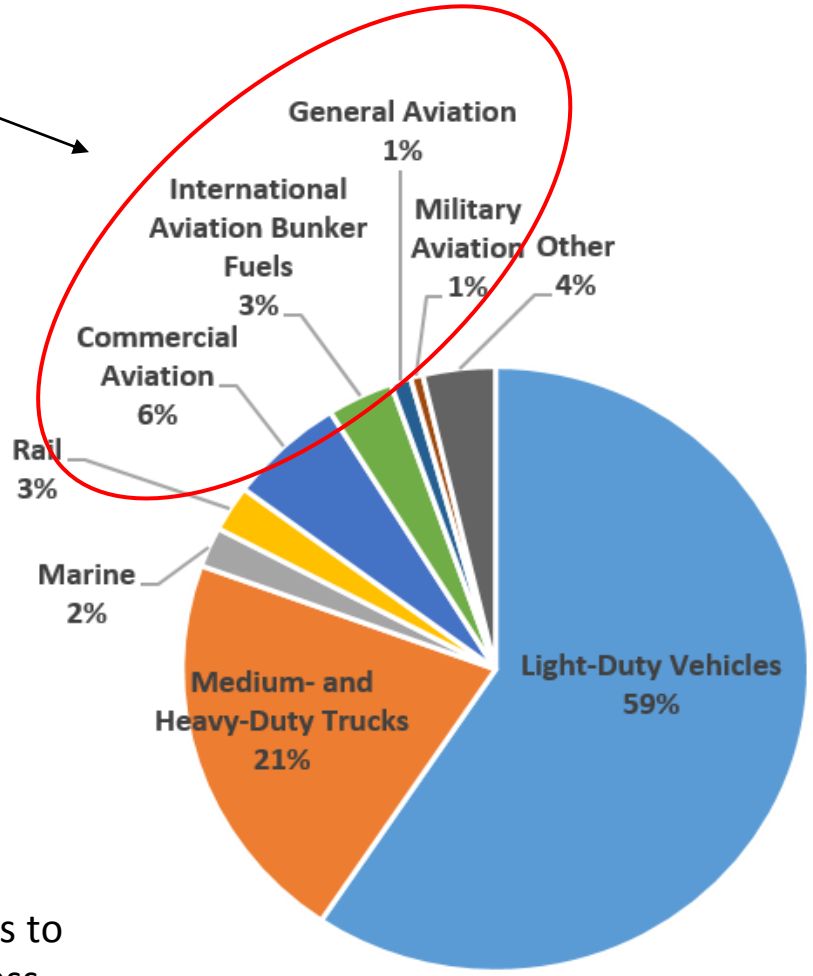
- Timing:
  - Proposed endangerment finding in 2017 followed by public notice and comment.
  - Final endangerment finding in 2018.

# EPA & FAA Authority - Lead

- The Clean Air Act requires us to consider emission standards if we make a positive finding of endangerment.
  - FAA has regulatory authority of fuel composition for fuel that is used exclusively in aircraft.
- We consult with FAA on aircraft emission standards
  - EPA shall not change emission standards if it would significantly increase noise and adversely affect safety.
  - Regulation takes effect after the period of time determined necessary to permit the development and application of the requisite technology, considering cost.
- FAA is evaluating fuels to identify unleaded alternatives
  - FAA is targeting 2018 to identify certifiable unleaded replacement fuel(s) that meet safety, operability, and environmental requirements

# Aircraft GHG Emissions Contribution

- Aircraft sector contributes ~11% of U.S. transportation GHGs
  - Largest remaining transportation category not yet regulated for GHGs.
  - 3% of total U.S. GHG emissions (not pictured). Total transportation is about a third.
- The aircraft categories covered by ICAO* comprise the vast majority of aviation sector GHG emissions (U.S. > 90%).




Source: Inventory of U.S. GHG Emissions and Sinks: 1990-2012

*International Civil Aviation Organization (ICAO) proposes to regulate subsonic jet aircraft with a maximum takeoff mass (MTOM) greater than 5,700 kg and subsonic propeller drive aircraft (e.g., turboprops) with a MTOM greater than 8,618 kg.

# Aircraft GHG Endangerment

- Center for Biological Diversity (CBD) petitioned the Agency to make an endangerment finding for aircraft GHGs, while also raising concerns about the climatic effects of aircraft emissions of NOx and water vapor (Dec 2007).

- In subsequent lawsuit for unreasonable delay, D.C. District Court ruled that the CAA required EPA to make a final decision on endangerment for aircraft, but did not put EPA on a schedule.

- EPA issued a Response to Aircraft Petition in June 2012, which stated our intention to move forward with an endangerment finding for GHGs, and that it would take a minimum of 22 months to complete.

- EPA intends to make a proposal for aircraft GHG endangerment by the end of May. In the same package, EPA also plans to issue an ANPR requesting public comment on CO2 standards for aircraft.

# CO2 Standard Approach

- We are working within the International Civil Aviation Organization (ICAO) to establish global CO2 standards for aircraft
  - Developed NOx standards using this approach
  - Also working on PM standards for engines at ICAO
- ICAO is a specialized agency of the U.N., is a global organization that brings together States, manufacturers, NGOs, and industry organizations
  - Sets standards and regulations necessary for aviation safety, security, efficiency and regulatory, as well as for aviation environmental protection.
  - The environmental protection organization is the Committee on Aviation Environmental Protection (CAEP)
- The US Delegation to ICAO is led by the Federal Aviation Administration (FAA)
  - EPA acts as an advisor to FAA and contributes independent analysis to the working groups

# $CO_2$ Standard Approach

- ICAO is expected to finalize $CO_2$ standards for aircraft in February 2016.
- ICAO standards are not self-implementing, but rather must be implemented through domestic regulation.
- EPA, in consultation with FAA, has responsibility for issuing air pollution standards for aircraft engines under CAA§231.

- FAA, under CAA§232, has responsibility to prescribe regulations to ensure compliance with the emissions standards.

# CO2 Standard Status

- What has been done?
  - Metric system
  - Certification procedures

$$\frac{(1/SAR)_{AVG}}{RGF^{0.24}}$$

- What needs to be decided by 2016?
  - Applicability (new types vs. in-production)
  - Timing
  - Level of standards

# PM Standards

- ICAO's CAEP is also developing PM standards for aircraft engines.
- ICAO is expected to finalize test procedures for measurement of PM from aircraft engines in February 2016.
- A PM data collection campaign is underway to characterize PM emissions from a set of representative engines.
- ICAO is expected to finalize PM standards for aircraft in February 2019.