

2025 Aviation Technology Forum Opening Keynote



Edie Chang, Deputy Executive Officer March 13-14, 2025



California's Targets, Standards, and Mandates

Air Quality, Climate, and Community Air Protection



Federally Regulated Emissions Reductions Fall Short for Mobile Sources When Compared to State-Led Efforts



Emissions From Aircraft Are Increasing

900 800 700 **NOx Emissions** (tons per day 600 500 400 300 200 100 0 2024 2050

California Mobile Source Emissions

Locomotives
(-85% from 2024 to 2050)

On-Road
(-88% from 2024 to 2050)

Aircraft (+30% from 2024 to 2050)

Other Off-Road
(-34% from 2024 to 2050)

 Ocean Going Vessels - 100 nm (-35% from 2024 to 2050)



Certified Aircraft Engines Show Little NOx Reduction Over Time, Despite Federal Standards and Technology Development

Meanwhile aviation activity is expected to grow in the future, which will lead to a rise in aviation emissions.





Health Impacts of Exposure to Jet Fuel and Exhaust

- Jet fuel has been shown to have negative health effects, both burned and un-burned¹
- Jet engine emissions have similar physicochemical properties and health effects as diesel exhaust particulate matter (PM)¹
- Communities near airports and airport workers have expressed concerns and urge actions to be taken to control jet emissions.



Airport Size and type Location and infrastructure Ground support vehicles Use of APU, GAC, and ECS Diurnal, weekly, seasonal, and annual patterns Transit time for passengers

Factors in human exposure risk to aircraft emissions

Engine Engine and fuel type Contamination of fuel Engine wear Lubrication oil Engine lifetime Engine modes and power

Aging and mixing height





Aircraft type - Military - Transport - Commercial Aircraft age and use Aircraft/engine combinations Weight of aircraft

Aircraft

Physics and Chemistry Volatile compounds Non-volatile emissions/particles Particle sizes Metals Carbon type and contents Ambient air processes





Occupation and health Work schedule and job type Job location Health conditions and vulnerability Background exposure Lifestyle Environment and meteorology Near-far weather conditions Wind, humidity, and temperature Season Airport surroundings Contributions from other sources





¹ Bendtsen, K.M., Bengtsen, E., Saber, A.T. *et al.* A review of health effects associated with exposure to jet engine emissions in and around airports. *Environ Health* **20**, 10 (2021). https://doi.org/10.1186/s12940-020-00690-y

Existing Efforts by Airlines and Airports

Great progress has been made to reduce emissions from aircraft/airport sources but still a long way to go to meet CA's air quality and climate goals.



200 million gallons of SAF by 2035 in CA Zero-Emission GSE Policies at Airports Single-Engine Taxiing recommended at airports

Reducing VMT to and from the airports



California's Existing Regulations and Targets at Airports



Parentheses indicate year of final regulatory implementation



Aircraft NOx Emissions Must Be Reduced by 80% to Meet the Federal Ozone Standard

- Based on the 2022 State SIP Strategy
- In the South Coast Air Basin, an 80% reduction is achievable solely by reducing commercial aviation emissions.







Aircraft Commitments in 2022 State SIP Strategy

CARB committed to explore feasibility and authority, and to conduct advocacy to promote the following **federal** actions between 2021-2027:



More stringent aircraft engine standards

Cleaner fuel and visits requirements

Zero-emission ground operations

Airport emissions cap

CARB started informal rulemaking process in December 2024 to reduce criteria pollutant emissions from commercial aircraft **operational practices**.

CARB committed to go to Board no later than **2027** with an update on potential opportunities or strategies to reduce aircraft emissions at State Level



Aviation Technology Forum Goals

- Develop a shared understanding of the urgency to reduce aircraft emissions in California and other jurisdictions.
- Catalyze near-term voluntary actions, such as demonstration projects and evaluations, to begin implementing new emission-reducing operational practices at commercial airports
- Determine actions needed today to enable the ICAO Committee on Aviation Environmental Protection (CAEP) to establish technologyforcing engine NOx standards -- starting with the upcoming CAEP/13 cycle (scheduled for 2025-2028)



Aviation Tech Forum Sessions

Sustainable Aircraft Taxiing

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Moderated by Brett Stone from Utah Valley University

Reducing Emissions at the Gate Moderated by Eric Praske from South Coast AQMD

Zero-Emission Ground Support Equipment Moderated by Sang-Mi Lee from South Coast AQMD

Advancements in Aircraft Propulsion Moderated by Matt Lakin from U.S. EPA

Environmental Considerations for Aircraft Operations and Routing

Moderated by Matt Lakin from U.S. EPA

