CALIFORNIA
AIR RESOURCES BOARD

2025 Aviation Technology Forum

Final Plenary

David Quiros

CALIFORNIA
AIR RESOURCES BOARD

South Coast AQMD

Closing Plenary - Overview

Urgency of Emission Reductions

Highlights and Barriers

Moving Forward

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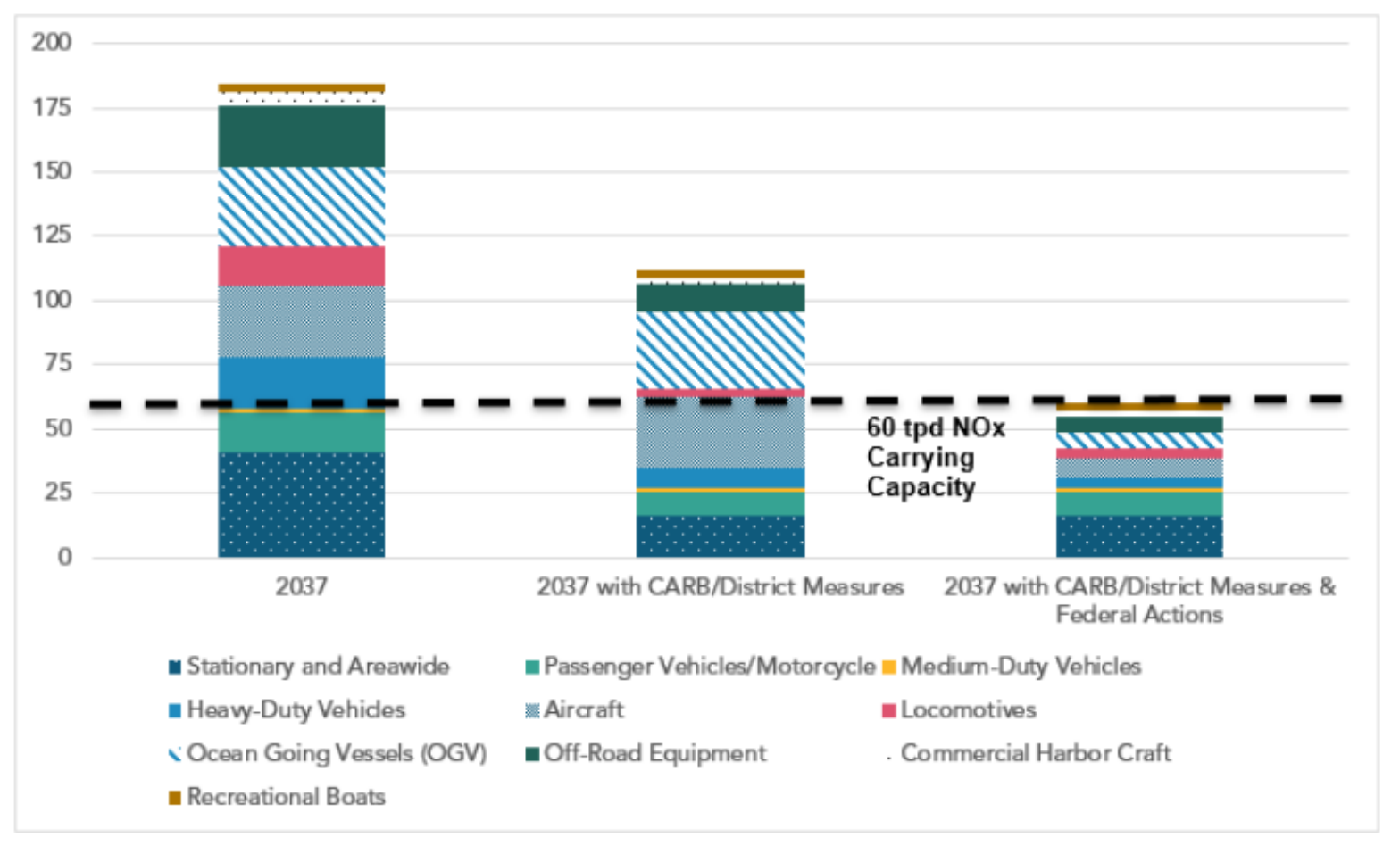
NOx Reductions to Meet the Ozone Standard by 2037 in the South Coast Air Basin



2022 Strategy for the State Implementation Plan

8-hour ozone standard (2015): 70 ppb

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NOx = oxides of nitrogen

Commercial Aircraft and NOx South Coast Air Basin in 2037

26.4 tons per day

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Based on a commercial aircraft baseline of 26.4 tons per day (tpd) NOx in 2037

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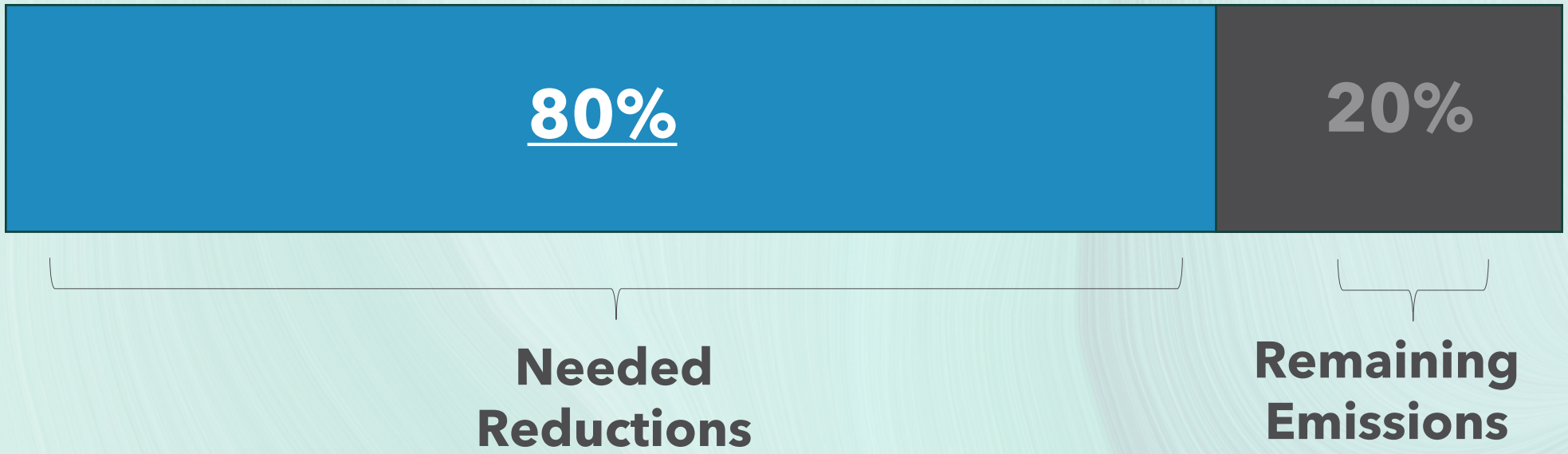

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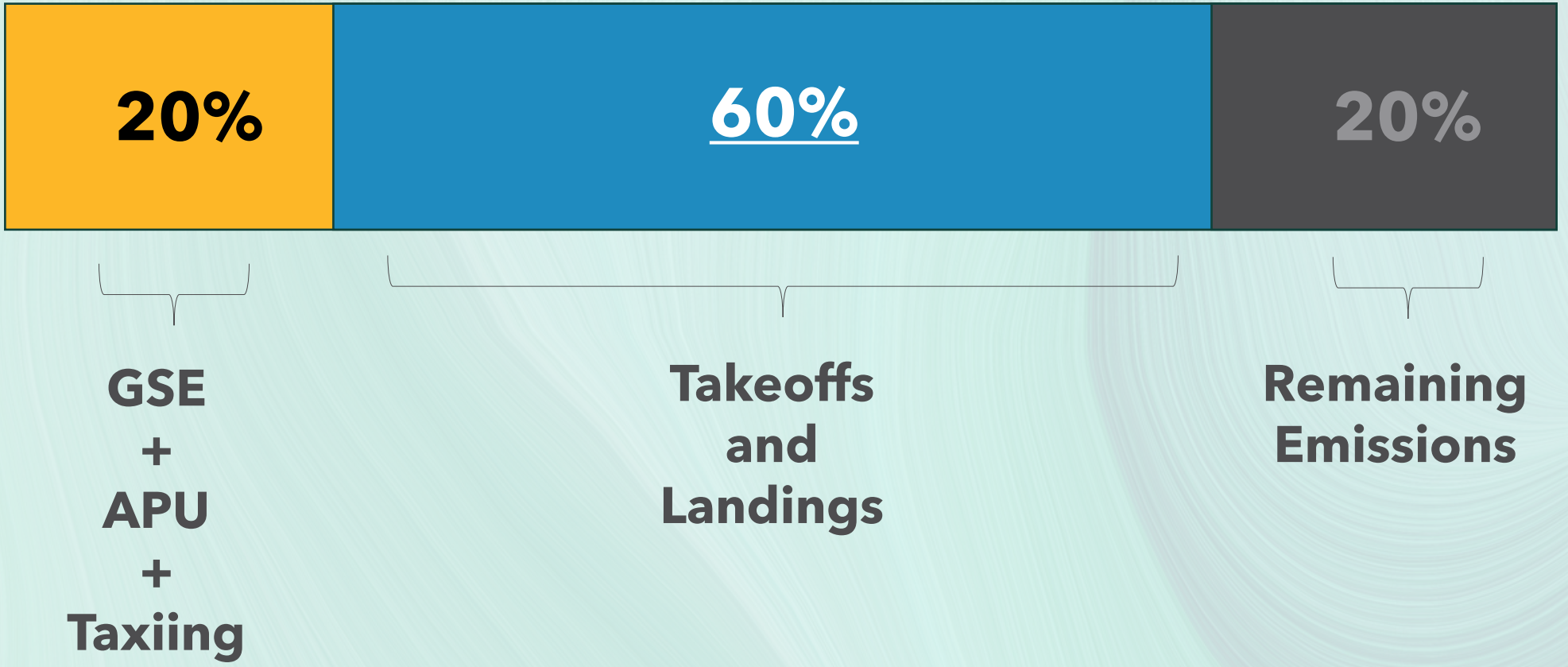

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Greenhouse Gas Emissions

- **2022 Scoping Plan**
  - 20% ZE aviation by 2045
  - 80% Sustainable Aviation Fuel (SAF)

- **SAF Partnership** with Airlines for America (A4a):
  - 200 million gallons by 2035

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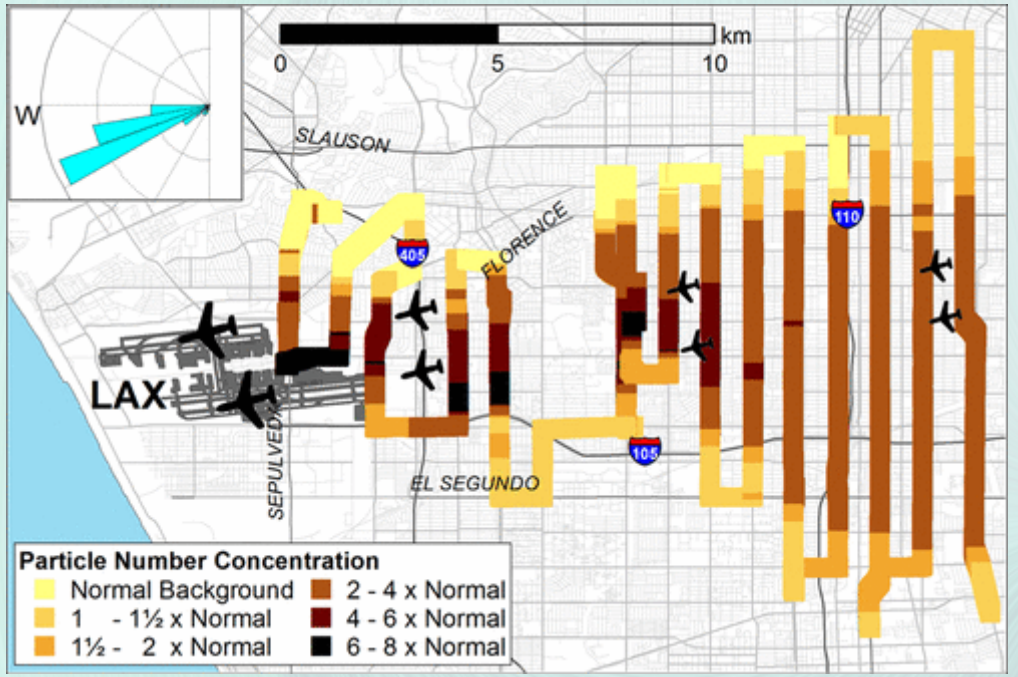
Particulate Matter

- 9 and 12 ug/m3 annual PM2.5 standards
- Worker, passenger, and community exposure
- Ultrafine particle (UFP, <100 nm) emissions elevated near airports
- 65% reduction in PM with 50% blends of SAF



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Neelakshi Hudda, Tim Gould, Kris Hartin, Timothy V. Larson, and Scott A. Fruin, *Environmental Science & Technology* **2014** *48* (12), 6628-6635. DOI: 10.1021/es5001566

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Sustainable Taxiing

"Zero" emission technologies exist today – with more tomorrow. Deployment saves money for most operations. Near-term targeted deployments at California airports will pave road to further reduce taxiing emissions.

Ongoing Work

- Expanding product development
- FAA approval
- Airport space constraints
- Electrical charging capabilities at airports
- Identifying partners and funding for an initial deployment with passengers

Preconditioned Air (PCA) and Ground Power

95% of gates are hardware equipped, but use varies by airline and is ***not used two-thirds of the time***. Hardware and software exist to monitor use. Need enforced policies empowering airports by 2026.

Ongoing Work

- Aircraft/gate incompatibilities
- Hardware reliability and durability
- Resources for policy enforcement
- Flight Operations Quality Assurance (FOQA) data sharing
- Electrical supply and permitting

Zero-Emission Ground Support Equipment

Airport policies with teeth should transition fleets to zero by 2033. Rapid influx of new conversion kits and new build equipment. Transition requires coordination within and between organizations (airport to ground service providers)

Ongoing Work

- Charger standardization
- Thermal event risk management
- Mobile charging deployment
- Improving battery chemistry
- Minimizing international dependence

Advancements in Aircraft Propulsion

An 80% reduction below CAEP/8 is needed, which is technically challenging and may require "systems approach". CLEEN III may achieve a 70% reduction for some engines.

Ongoing Work

- ICAO – CAEP/13 and beyond
- How to accelerate investment cycles?
- Modifying aircraft body designs?
- Cleanest only technologies in new airframes?
- Lean pre-mixed, pre-vaporized (LPP) combustion for "single digit" NOx levels?
- Interactions with ZE propulsion + taxiing
- Reductions from general aviation

Operational Practices & Economics of Aircraft Routing

Based on economic theory and success European airport landing fees, California may be able to achieve up to 40% NOx reduction by simply redirecting today's aircraft, and more by using fewer, larger aircraft filled to capacity

Ongoing Work

- Identifying the economically "balanced" fee amounts for aircraft
- Tracking fees to maintain revenue neutrality
- Identifying who and how to set emissions-based landing fees
- Optimize routes beyond FAA NextGen
- Community engagement

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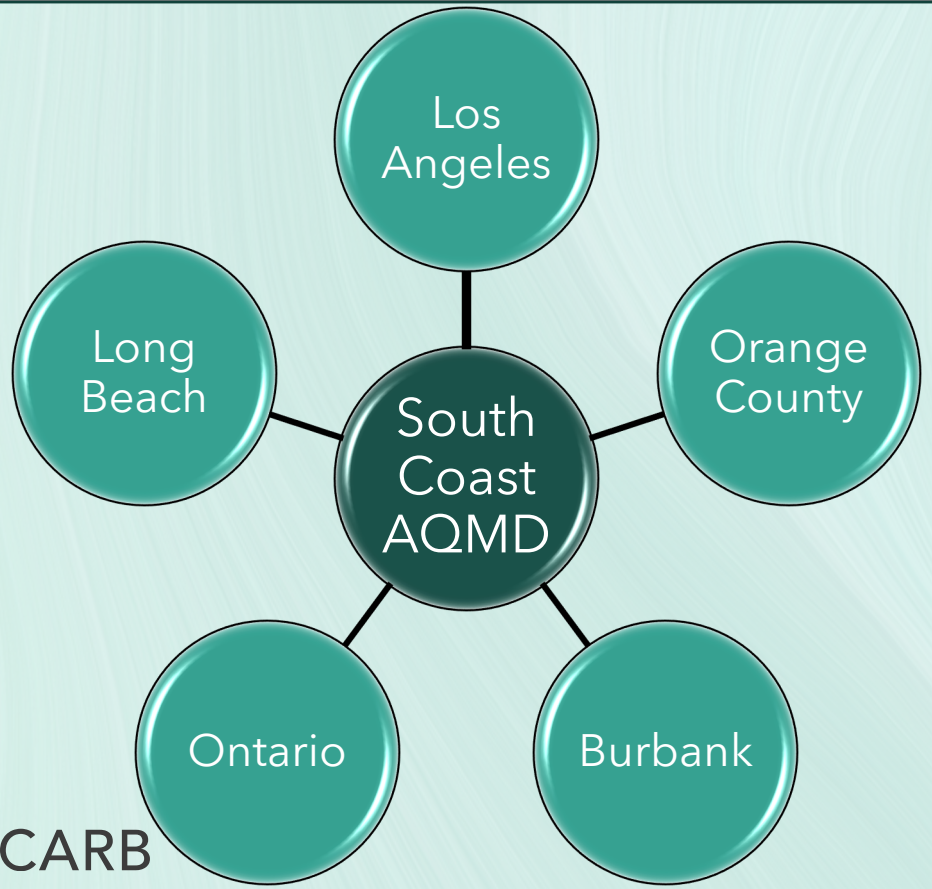
Next Steps - South Coast AQMD MOU with Commercial Airports

South Coast Air Quality Management District and five commercial airports signed MOUs in 2019 to reduce emissions from non-aircraft mobile sources related to airport operations



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CARB's Path to Reporting to Board by 2027

- Engagement and partnership (industry, government, community)
- Public workshop process
- Partnering on a zero-emission taxiing demonstration project

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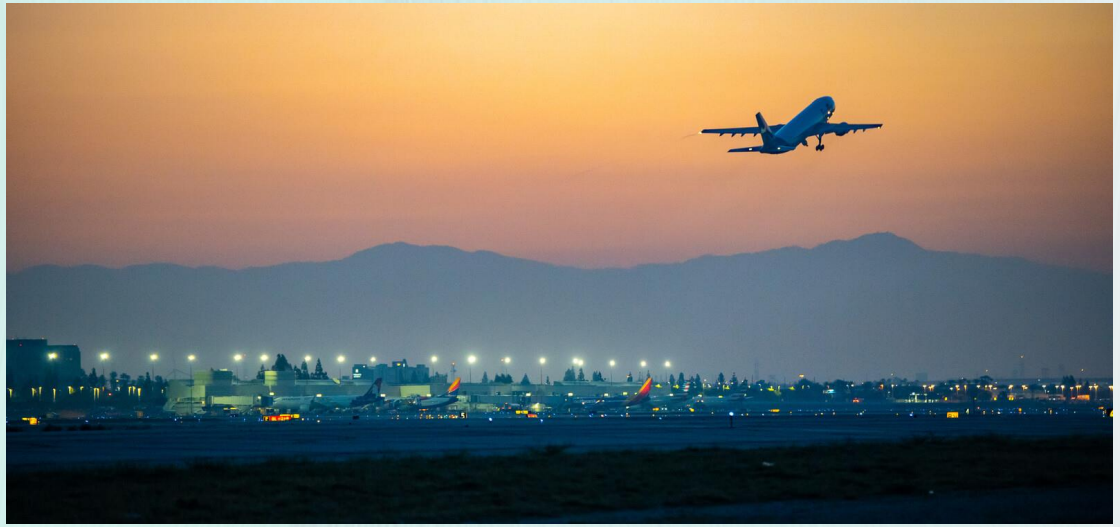
AT A CROSSROADS



Continue Current Practices

Actions to Reduce Emissions

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Contact Information

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