

Submitted electronically

Clerk of the Board California Air Resources Board 1001 I Street Sacramento, CA 95814

Re: Airlines for America[®] Comments on CARB's Reducing Emissions from Operational Practices of Commercial Aircraft

Dear Sir/Madam:

Airlines for America[®] ("A4A"), the trade association for the leading U.S. passenger and cargo airlines,¹ appreciates the opportunity to comment on the California Air Resources Board's (CARB) Reducing Emissions from Operational Practices of Commercial Aircraft dated December 10, 2024 (Draft Concepts). A4A and our members are dedicated to addressing the environmental impacts associated with aviation, while also acknowledging the associated safety, economic and technical challenges.

A4A and our members have a very strong record that demonstrates our commitment to reducing environmental impacts even as we continue to provide air transportation services critical to maintaining the growth and vitality of the national, California and local economies. In California, according to the most recent Federal Aviation Administration (FAA) analysis, civil aviation accounts for about 5 percent of jobs (over 1.15 million in 2016) and drives over 4 percent of state GDP (\$109.1 billion in 2016).² Economic impact studies likewise have affirmed the critical importance of aviation activity at California's major airports to local economies. A4A's commitment extends to reducing greenhouse gas emissions and emissions that can affect local air quality including emissions of criteria pollutants such as particulate matter (PM) and oxides of nitrogen (NOx). Commercial airlines are dedicated to providing air transportation services to the public that, above all, ensure the safety of our passengers, crew and the larger public.

We view responsible environmental stewardship as essential to our business and have embraced the need to work proactively to address environmental concerns and achieve concomitant public health objectives. This was most recently demonstrated by last year's

¹ A4A's members are Alaska Airlines, Inc.; American Airlines Group Inc.; Atlas Air, Inc.; Delta Air Lines, Inc.; Federal Express Corporation; Hawaiian Airlines, Inc.; JetBlue Airways Corp.; Southwest Airlines Co.; United Airlines Holdings, Inc.; and United Parcel Service Co. Air Canada, Inc. is an associate member. ² See FAA, *The Economic Impact of Civil Aviation on the U.S. Economy –State Supplement* (Nov. 2020), at 10, <u>https://www.faa.gov/about/plans_reports/media/2020_nov_economic_impact_report.pdf</u> (last visited Oct. 11, 2022).

agreement that was reached between A4A and CARB to increase the availability of sustainable aviation fuel (SAF) for use within California to 200 million gallons by 2035.³

The A4A Climate Change Commitment and Flight Path includes expanding electric infrastructure at airports and greener airport ground support equipment (GSE).⁴ A4A and our members have a long history of working with the South Coast Air Quality Management District (District) and CARB to reduce emissions from non-aircraft sources, including establishing a voluntary measure to achieve reductions in emissions of ozone precursors from GSE more rapidly than would otherwise be achieved under state regulations (or 0.52 and 0.37 tons per day of NOx emission reductions in 2023 and 2031, respectively). By investing in new equipment, A4A carriers are continuing to work with airports to achieve their respective goals, often in advance of the deadline, resulting in real NOx reductions that have brought the District closer to attainment.

At the same time, it is important to recognize that federal law preempts any requirement for such measures attempting to regulate the aviation industry. Congress has long recognized that commercial aviation safety and the efficiency of the National Airspace System depends on the application of a consistent set of regulatory requirements by a primary federal agency – the FAA – with the necessary expertise and capability to develop and administer those requirements.⁵ In general, each of the four areas under consideration in the Draft Concepts presentation would be pre-empted from state regulation by federal law.

A4A and its carriers have found voluntary pathways to establish and achieve mutual goals within the limitations of federal pre-emption, yet it is also important to recognize the substantial safety, economic and technical challenges associated with the concepts raised in the Draft Concepts presentation. As this effort proceeds, A4A and our members are available and interested in engaging with CARB to address this important topic, including safety, technical and environmental considerations. Thank you for your consideration of our comments.

Sincerely yours,

Selen

Kenley Farmer Director Environmental Affairs Airlines for America kfarmer@airlines.org

³ <u>https://ww2.arb.ca.gov/news/carb-and-nations-leading-airlines-announce-landmark-partnership-sustainable-aviation-future</u>

⁴ See https://www.airlines.org/wp-content/uploads/2021/05/A4A-Climate-Change-Commitment-Flight-Path-to-Net-Zero-FINAL-3-30-21.pdf

⁵ See City of Burbank, 411 U.S. at 639; Arapahoe Cty. Public Airport Auth. v. FAA, 242 F.3d 1213 (10th Cir. 2001). See also *Abdullah*,181 F.3d at 370 n.10 (aviation regulation is an area where "[f]ederal control is intensive and exclusive") (quoting *Northwest Airlines*, 322 U.S. at 303).



California Air Resources Board Air Quality Planning and Science Division 1001 I Street Sacramento, CA 95814 *via email: aircraft@arb.ca.gov*

Re: Comments on the Zero-Emission Aircraft Ground Operation Rulemaking

Dear Mr. Chen,

On behalf of the American Lung Association, I am writing to provide recommendations for the Zero-Emission Aircraft Ground Operation rule following the California Air Resources Board (CARB) workshop hosted on December 10, 2024. Taking actions now to design strategies that reduce airport-related emissions will be key to meeting federal clean air standards and protecting the health of Californians.

As presented by the CARB staff, as on-road policies are implemented, pollution from airports will become the third largest polluting source of air and climate pollution in the coming decades. Our 25th annual "State of the Air" report shows that California continues to have the worst air quality in the nation with six cities ranking in the top 10 list for smog and seven are ranked among the most impacted by particle pollution. It is critical that CARB continue to seek opportunities to reduce emissions that harm regional air quality, as well as community and worker health.

We recommend actions that will provide the most health benefits to ground crews as well as communities living near airports, such as:

- 1. Require transition of ground support equipment (GSE) fleets and aircraft taxiing engines to zeroemissions as broadly and quickly as possible. This will ensure direct emission reductions from engines that rely on diesel-fuels known to cause greater harm to humans.
- 2. Require aircrafts to plug in to electric power at the gate in order to reduce emissions from auxiliary power units.
- 3. As a major source of emissions, it is clear that takeoff and landing emissions need to be lowered. We look forward to ongoing discussions of safe and practical options to minimize NOx impacts during landings and takeoffs, including emphasizing use of existing lower-emission technologies and operations and the development of an activity- and/or emissions-based spending account to support cleaner operations.

In addition, as CARB goes through the rulemaking process, when analyzing the health impacts and benefits of the rule, we recommend examining the health impact to airport workers and communities near airports. These groups of individuals are exposed to as much as six times higher concentrations of particle matter and communities living near airports have higher cancer risk. This is why it is important to examine health impacts to all Californians, but also the most impacted populations too.

We look forward to continuing to work with CARB in this rulemaking process to ensure the rule maximizes health benefits to Californians. If you have any questions, please contact me at <u>Mariela.Ruacho@Lung.org</u>.

Sincerely

Mariela Ruacho Senior Manager, Clean Air Advocacy American Lung Association



To the Air Resources Board:

Coalition for Clean Air urges CARB to set a timeline for adopting a Zero-Emission Ground Operations Regulation that includes zero-emission ground support equipment (GSE), a gate plug-in requirement and zero-emission taxiing. This measure will make airports healthier for workers, passengers and residents of nearby communities.

In the 2022 State SIP Strategy, CARB committed to go to the Board in 2027 with proposed programs and policies to reduce airport and aircraft emissions to the maximum extent practicable. In July 2024 CARB, the South Coast Air Quality Management District, and EPA announced joint intent to act to achieve further emissions reductions from a variety of sources primarily under federal control, including airports and aircraft.

Emissions from the aviation sector are projected to rise substantially. The Mobile Source Strategy Discussion Draft projects that 2050 emissions will be 74% higher for NOx, 12% higher for PM, and 61% higher for CO2, compared to 2020 levels. With air travel increasing, and a lack of national or international action to reduce emissions, NOx emissions from aircraft operations in California are projected to increase from 55 to 71 tons per day (tpd) between 2024 and 2050, whereas all other mobile source sectors are projected to decrease. Multiple areas in California cannot meet federal air quality standards without emission reduction from aircraft operations. As outlined in the 2022 State SIP Strategy, California needs an 80% reduction in aviation emissions to meet the 2015 ozone standard.

Zero-emission solutions are already available for some equipment. For example, LAX has worked with airline tenants on an agreement that all GSE at LAX shall be zero-emission by 2033. An enforceable regulation is necessary to level the playing field and assure the emission reductions that California desperately needs.

Therefore, we urge CARB to prioritize this rulemaking process and move it forward expeditiously. We look forward to working with you to maximize emission reductions.

Respectfully,

Magavern Bill

Bill Magavern Policy Director

www.ccair.org

Via Email Only

David Quiros Mobile Source Analysis Branch Chief California Air Resources Board David.Quiros@arb.ca.gov

Mo Chen Mobile Source Technology Assessment and Modeling Section Manager Mo.Chen@arb.ca.gov

RE: CARB First Public Workshop to Discuss Regulatory Concepts for Using Operational Practices to Reduce On-Ground and Near-Ground Emissions from Commercial Aircraft in California.

Dear David Quiros and Mo Chen,

Communities for a Better Environment ("CBE") appreciates the ability to submit this comment letter on the initial regulatory concepts presented at the California Air Resources Board ("CARB") First Public Workshop to Discuss Regulatory Concepts for Using Operational Practices to Reduce On-Ground and Near-Ground Emissions from Commercial Aircraft in California on December 10, 2024.¹ CBE strongly supports CARB's efforts to introduce regulations to reduce the significant harmful pollution airports emit into surrounding working-class communities of color.

CBE is a community- based environmental justice organization located in both Southern California (Southeast LA and Wilmington) and Northern California (Richmond and East Oakland). The mission of CBE is to build people's power in California's communities of color and low-income communities to achieve environmental health and justice by preventing and reducing pollution and building green, healthy and sustainable communities and environments. The communities where CBE organizes all bear the consequences of airport pollution, whether as direct neighbors to a major airport or neighboring the refineries supplying airport operations with fuel.

I. East Oakland: Health Burdens of an Airport-Adjacent Community

The Oakland International Airport (OAK) is owned and operated by the Port of Oakland ("the Port") in deep East Oakland where CBE members live, work, pray, and play. East Oakland is a predominantly Black and Latine working-class community. Generations of families in these

¹ <u>https://ww2.arb.ca.gov/sites/default/files/2024-12/1st_aircraft_workshop_slides_final_ada.pdf</u> Southern California Richmond East Oa

6325 Pacific Blvd., Suite 300 Huntington Park, CA 90255 Richmond 340 Marina Way Richmond, CA 94801 neighborhoods have experienced disproportionate pollution since the rapid developments of freeways, industry, ports, and airports after World War II. As part of efforts to address decades of unhealthy air quality, East Oakland is developing a Community Emissions Reduction Plan ("CERP") under AB617, co-chaired by the Bay Area Air District ("BAAD") and CBE. The East Oakland Community Steering Committee has identified airport emissions as a key concern to be addressed in the CERP.

Environmental health metrics demonstrate the severity of environmental injustice in East Oakland communities near OAK. CalEnviroScreen shows that nearly 36,000 people live in Deep East Oakland tracts close to OAK scoring on average in the 89th percentile of the overall CalEnviroScreen score and in the 99th percentile of asthma rates compared to all California census tracts.² The health impacts of pollution are even more dire for communities immediately neighboring the airport. The census tract that includes OAK and the closest neighboring communities is in the 97th percentile of overall CalEnviroScreen scores and in the 100th percentile of asthma rates.³ The 4,700 residents of this tract are 54% Hispanic, 35% Black, 5% Asian American, <5% Other, and <2% White.⁴ East Oakland has the highest rate of asthma hospitalization in Alameda County at three times the county average.⁵ The most impacted census tracts of East Oakland have an average life expectancy that is 15 years less than life expectancy in tracts with the highest life expectancy in the county.⁶

Airport-adjacent environmental justice communities across the state share similarly severe health outcomes due to the toxic pollution from jet fuel combustion, ground support equipment, ground access vehicles, diesel backup generators, and commercial shipping and logistics operations beginning at airports and extending into neighboring communities. The literature is clear and growing: airport pollution travels miles into residential communities and contributes to disproportionately high disease burdens.

For more information on airport impacts in East Oakland, please visit <u>www.cbecal.org/wp-content/uploads/2024/09/Final Pollution-for-Airline-Profit-Report English.pdf</u>.

⁵ Alameda County Public Health Department (ACPHD) Comments on Oakland International Airport Terminal Modernization and Development Project Draft Environmental Impact Report, at 2 (Oct. 16, 2023) https://www.oaklandairport.com/wp-content/uploads/agencies/231016_Alameda%20County%20Public%20

Health%20Department_%20Kimi%20Watkins-Tartt%20and%20Nicholas%20Moss.pdf.

⁶ Tejada-Vera et al., Life Expectancy Estimates by U.S. Census Tract, 2010-2015, National Center for Health Statistics (2020).

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² CalEnviroScreen 4.0 (results for Deep East Oakland Census tracts below International Blvd. nearest OAK and other major industrial pollution: 6001409000, 6001408800, 6001409100, 6001409500, 6001408900, 6001409400, 6001409200, 6001409300).

³ CalEnviroScreen 4.0 (results for census tract 6001409000).

⁴ Id.

II. The Need for Statewide Regulation

CBE members and staff in East Oakland, along with many partner organizations, have developed a robust campaign opposing the Port of Oakland's "Oakland International Airport Terminal Modernization and Development Project" ("Project"), which seeks to essentially double operations at OAK by 2038. The Project would increase OAK's NOx emissions by 63% and aviation GHG emissions by 47% over 2019 levels in just 13 years.⁷ The Project does not include *any* mitigation measures for air quality emissions or GHG emissions. Despite the clear and overwhelming evidence that airport pollution is making airport workers and community members sick; despite thousands of comment letters from members of the public, airport workers, doctors, scientists, environmental organizations, and peer government agencies raising alarms; and despite the mounting evidence that we are at the climate crisis breaking point, the Port has decided to increase airport pollution for the sake of profit.

Our experience in East Oakland is not unique. Environmental justice communities and allied organizations are fighting individual airport expansions one-by-one across the state, facing the resources and influence of aviation and fossil-fuel corporations. Particularly in a time of federal deregulation and emboldened corporations, California environmental justice communities need state-wide regulations from CARB to protect our right to breathe clean air.

Statewide regulations are also needed to prevent industry greenwashing and the spread of false solutions that further entrench environmental injustice. Airports and aviation corporations promote alternative fuels, including biodiesel and sustainable aviation fuel ("SAF"). However, the life-cycle climate impacts, the emissions and energy consumption of refining, and air quality emissions at the point of combustion of alternative fuels are, in many respects, the same or worse when compared to conventional fossil fuel.⁸ Locally, OAK is physically connected by pipelines to Bay Area refineries and facilities producing fossil jet fuel, SAF components, and biofuels. As the aviation industry turns to alternative fuels, California refinery communities experience increased toxic air pollution from the refining process and increased industrial transportation, increased flaring, increased risk of fires and explosions, increased risk of fuel spills, and

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⁷ Oakland International Airport Terminal Modernization and Development Project Final Environmental Impact Report, Table 3.3-12 and Table 3.7-3.

preventing the decommissioning by prolonging the lifecycles of century-old facilities.⁹ Statewide regulations should require aviation to reduce emissions and to adopt zero emissions technology rather than entrench systems of exploitation that overburdened communities are fighting to disrupt.

III. Centering Environmental Justice in Regulatory Concepts

CBE supports CARB's development of a robust set of airport regulations and encourages CARB to use the full extent of its authority to achieve environmental justice goals. Our comments below respond to regulatory concepts introduced at the workshop and are not exhaustive.

Aircraft Operation Emissions

As aircraft engine emissions make up the vast majority of airport emissions, strategies to reduce aircraft emissions would likely be the most impactful for the environmental health of workers and neighboring communities. We do not expect federal regulation of aircraft emissions to improve for the foreseeable future, and deregulation is a risk. Our communities cannot afford stagnation or backsliding and all efforts should be made to secure statewide improvements. By advancing aggressive strategies now for submittal to the federal EPA in future years, CARB can continue building towards environmental justice victories.

We encourage CARB to center environmental justice principles such that polluting industry pays for a just transition and workers are ensured healthy jobs. Technological solutions to aircraft taxiing must protect against job loss and worker safety concerns due to automation. CBE strongly supports the use of financial mechanisms to require airlines to invest in and adopt zero-emissions transit technology, pay for decades of environmental harm caused by aviation pollution, pay for mitigation of ongoing and future environmental impacts, provide workforce training, and otherwise fund the transition from exploitative fossil-fuel transit to sustainable transit. Any financial mechanism must benefit the environmental justice communities and workers who have borne the brunt of aviation industry exploitation for decades.

Ground Support Equipment

As noted in the workshop presentation, transitioning to electric ground support equipment ("eGSE") is both technologically feasible and impactful. Based on the 2021 BAAD Emissions Inventory, ground support equipment emissions make up 22% of the known cancer toxicity-

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⁹ Lawsuits Challenge Two Massive Bay Area Biofuel Refinery Projects, Center for Biological Diversity (Jun. 8, 2022), <u>https://biologicaldiversity.org/w/news/press-releases/lawsuits-challenge-two-massivebay-area-biofuel-refinery-projects-2022-06-08/;</u> Re: Phillips 66 Rodeo Renewed Project- comments concerning scoping: File LP20–2040, Biofuel Watch et al. (Jan. 27, 2021), <u>https://www.biofuelwatch.org.uk/wp-content/uploads/Scoping-comments-Rodeo-Renewed-EIR.pdf</u>.

weighted emissions ("TWE") from OAK operations.¹⁰ Although aircraft emissions makeup the largest category of TWE, CARB may face fewer legal obstacles to regulating GSE and eliminating this substantial segment of airport emissions would greatly improve air quality at and near airports. Voluntary adoption of eGSE is dependent on corporate appetite and may leave behind airport communities with fewer resources.

Ground Power and Pre-Conditioned Air

Despite the Port stating OAK has achieved gate electrification at all gates, airport workers and union representatives have reported that in practice, aircraft are frequently not connecting to ground power. This results in auxiliary power unit usage and/or a total lack of heating and cooling for cabin workers, sometimes in extreme temperatures. Voluntary use of available ground power is not achieving worker safety or environmental benefits as intended and a regulation would likely improve compliance.

IV. Community Engagement

We strongly encourage CARB to develop robust community engagement strategies for this regulatory process to incorporate the needs of communities most impacted by airport pollution. It is critical to engage communities early in the process so strategies can be informed by communities' experience; that engagement must also then be iterative, returning to impacted communities as rulemaking proceeds so that agency and community expertise comingle throughout. Utilizing existing community spaces and channels of information will improve outreach. CARB may wish to host public workshops at transit-accessible, trusted locations in airport communities such as libraries, community centers, and schools. Established community organizations and worker unions may be helpful in sharing engagement opportunities with membership. We find that many community members rely on physical sources and word of mouth from trusted organizations. Contracting with these community-based organizations, compensating them for their time, may be most effective. While all airport-impacted communities have a right to be heard in this process, CARB might consider starting in communities where there are robust histories of activism protecting their health against aviation impacts to help shape scope.

Environmental justice communities neighboring airports are linguistically diverse, working-class communities and all efforts should be made to ensure equal access. This includes: translating all outreach materials, presentations, and other public-facing documents into major languages spoken by workers and community members; ensuring all language groups have equal time to access materials (e.g. non-English materials are not posted later than English materials); providing live interpretation at meetings (auto-translate technology is not adequate); hosting

¹⁰ OAK emissions sources by percent of total known cancer TWE emitted at OAK: Aircraft, 77%; Ground Support Equipment, 22%, Diesel Generators, 1%; Gasoline Dispensing, <1%. Bay Area Air Quality Management District (BAAQMD), 2021 East Oakland Emissions Inventory (inventory does not include ground access vehicle emissions).

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meetings at times less likely to conflict with work hours (consider airport workers may have less traditional schedules); and hosting multiple meetings given scheduling conflicts.

We thank you for the opportunity to comment on this important regulatory work.

Sincerely,

Sarah Chen Small Associate Attorney Communities for a Better Environment, East Oakland <u>scsmall@cbecal.org</u> (510) 671-1316

Southern California 6325 Pacific Blvd., Suite 300 Huntington Park, CA 90255 Richmond 340 Marina Way Richmond, CA 94801

To: Mobile Source Emissions Program, Aircraft and Airports California Air Resources Board, Sacramento, CA

Date: February 10, 2025

RE: Comments on Public Workshop on Reducing Emissions from Operational Practices of Commercial Aircraft

Dear Mr. Chen,

In December 2024, CARB held its 1st public workshop on operational practices to reduce NOx emissions from commercial aircraft. In this workshop, California Air Resources Board (CARB) outlined potential pathways to enable the emissions reductions necessary to meet the 2015 Environment Protection Agency (EPA) ozone standard and align with the 2022 State Strategy for the State Implementation Plan (SIP). The International Council on Clean Transportation (ICCT) commends the agency for recognizing the steep reductions needed and its analyses to-date in identifying focal areas for the aviation sector. Local air quality issues are an ongoing challenge for airport-adjacent communities and will only become more prevalent with projected increases in air traffic.

We recognize that the majority of improvements in aviation nitrogen oxides (NOx) emissions must come from new engine technologies, and, at the federal level, higher stringency for an updated International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP) NOx standard will be crucial in ensuring their development for new generation aircraft. However, as engine manufacturers develop new designs over the coming years, ICCT is supportive of action to achieve emissions reductions in parallel through operational practices.

Based on the contents of the public workshop, the comments below offer a number of technical suggestions from ICCT for CARB to consider as it moves forward in assessing proposals for implementation.

Proposed Approach to Implementation

The concepts presented during the public workshop included a combination of airport- and aircraft-level equipment changes, changes in aircraft maneuvers, and fiscal measures. Because interventions requiring new equipment will require initial capital investment and likely have longer implementation timelines, we recommend a phased approach to their rollout across the state.

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ICCT is developing a high-fidelity global inventory of 2023 commercial and general aviation emissions using Automatic Dependent Surveillance-Broadcast (ADS-B) data in which airportlevel landing and takeoff (LTO) NOx emissions are quantified using the ICAO Engine Emissions Databank (EEDB), and cruise-phase NOx emissions are estimated using the Boeing Fuel Flow Method 2.^{1,2}

Using this inventory, we propose the following methodology for the targeted implementation of operational strategies requiring new infrastructure at airports, such as zero-emission ground support equipment (ZE GSE) and pre-conditioned Auxiliary Power Unit (APU) usage. First, California airports with the highest levels of LTO NOx emissions in 2023 can be identified. These airports can be compared with the list of ozone nonattainment areas in the state, prioritizing counties classified as "Serious" or "Extreme", to determine a group of five airports that could have the greatest impact on ozone levels from NOx reductions.³ These airports could then be assessed for the initial integration of airport-level measures, building out this network to grow annually. In the case of GSE, as the transition to ZE GSE occurs, we recommend CARB to consider the widespread use of Selective Catalytic Reduction (SCR) and retrofitting of particulate filters as interim measures for emissions reduction, if not already in place.⁴

Meanwhile, guidelines on operational practices at the aircraft-level and the introduction of fiscal measures can implemented statewide with standardized procedures across airports and minimal implementation costs. Below we describe approaches to implementing practices that we recommend prioritizing in the nearterm: reducing taxi-phase emissions, derated thrust takeoff, and differentiated landing fees. The resulting NOx emissions reductions from these practices could be modeled and input into CARB mobile emissions air quality models to assess ozone reductions.

¹ European Union Aviation Safety Agency (EASA), "ICAO Aircraft Engine Emissions Databank," EASA, accessed November 17, 2023,

https://www.easa.europa.eu/en/domains/environment/icao-aircraft-engine-emissions-databank.

² Doug DuBois and Gerald C. Paynter, "'Fuel Flow Method2' for Estimating Aircraft Emissions," *The Boeing Company*, 2006.

³ U.S. Environmental Protection Agency, "California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants," accessed January 23, 2025, https://www3.epa.gov/airquality/greenbook/anayo_ca.html.

⁴ Zurich Airport, "Diesel Particle Filters for GPU," March 19, 2018.

Reduced Taxi Time & Single-engine Taxiing

Reducing overall taxi time should be prioritized as this will translate directly into engine emissions reductions, fuel burn savings, and more efficient airport operations. The Airport Collaborative Decision Making (A-CDM) system has been implemented across many airports in the European Union (EU) and Asia to reduce taxi time through more efficient communications between Air Traffic Control (ATC), aircraft operators, and ground service operators. A 2015 Eurocontrol assessment of A-CDM implementation impacts across 17 European airports showed a 7% reduction in taxi time over the course of the year, with average taxi time savings of 0.25-3 minutes per departure.⁵

Another measure that can be introduced to reduce taxiing emissions is single-engine taxiing (SET), which is currently implemented by many airlines for both emissions reductions and fuel burn savings. SET procedures could indicate the use of one engine during taxi time in a two-engine aircraft or two engines in a four-engine aircraft. We recommend the widespread use of SET for taxiing operations at airports with suitable conditions. There are existing examples of checklists to develop operator recommendations for SET usage, as seen in Kamenikova et al. (2022) and Eurocontrol guidance documentation on sustainable taxiing.^{6,7} California airports and CARB could collaborate to develop standardized guidelines for the state to better define the conditions in which SET could be implemented and introduce SET as standard operating procedure where possible.

To understand ozone impacts from SET, NOx emissions could be modeled using our 2023 emissions inventory and this method proposed by Stettler et al (2018), where EI_{NOx} is the emissions index of the engine at taxi thrust, m_f is the fuel flow rate, n is the number of engines, t_{TET} is the time of operations using all engines before SET is implemented, and t_T is total taxi time.⁸

SET NOx =
$$EI_{NOx} * m_f * n * (t_{TET} + \frac{1}{2} (t_T - t_{TET}))$$

(December 2018): 1967-84, https://doi.org/10.1017/aer.2018.117.

⁵ Eurocontrol, "A-CDM Impact Assessment," March 2016.

 ⁶ Iveta Kameníková et al., "Application of the Single-Engine Taxi-out Procedure for Commercial Transport, Focusing on the Airbus A320 Fleet," *Transportation Research Procedia* 65 (2022): 126–32, https://doi.org/10.1016/j.trpro.2022.11.015.
⁷ Eurocontrol, "Sustainable Taxi Operations: Concept of Operations and Industry

Guidance," 2024. ⁸ M. E. J. Stettler et al., "The Impact of Single Engine Taxiing on Aircraft Fuel Consumption and Pollutant Emissions," *The Aeronautical Journal* 122, no. 1258

The SET NOx emissions can be compared with the baseline case of aircraft taxiing with all engines to quantify the potential NOx reductions statewide. These NOx reductions can then be inputted into an atmospheric model to calculate the resulting ground-level ozone reductions from SET implementation. The combination of emissions reductions from the deployment of A-CDM systems and SET could serve as an effective approach to lower taxi phase NOx in the interim until widespread adoption of ZE taxiing (e.g. WheelTug, TaxiBot) is feasible across the state.

Derated thrust takeoff

Derated thrust takeoff is a common practice across airlines in which takeoff thrust is reduced below 100% power, or the rated thrust, to reduce engine degradation. While this measure is likely already integrated in the state's operations to some extent, standardizing the practice statewide within the relevant air safety guidelines can provide further NOx benefits. In King and Waitz (2005), a study conducted on operations at London Heathrow (LHR) and London Gatwick (LGW) airports showed 14.5% average NOx reductions for an American Airlines Boeing 777 aircraft when comparing a full power takeoff to a reduced thrust takeoff.⁹ These reductions may vary at across different airports and aircraft types, however, a similar trend was observed in Koudis et al. (2017), where peak NOx emissions could be reduced up to 25% with reduced thrust takeoff.¹⁰

Aircraft landing fees

Given the large variance in emissions across engine types, CARB could consider implementing differentiated landing fees for a flight based on its LTO cycle emissions. We recommend that calculations of total LTO cycle emissions to enforce landing fees are done on the basis of actual aircraft movements, rather than the standard ICAO reference cycle. This would incentivize airlines to implement aircraft-level interventions, such as those described above, and account for airport-specific differences in times-in-mode in each phase of the LTO cycle. CARB could also consider expanding the

⁹ Daniel King and Ian A. Waitz, "Assessment of the Effects of Operational Procedures and Derated Thrust on American Airlines B777 Emissions from London's Heathrow and Gatwick Airports" (Partnership for Air Transportation Noise and Emissions Reduction, July 21, 2005).

¹⁰ George S. Koudis et al., "The Impact of Aircraft Takeoff Thrust Setting on NOx Emissions," *Journal of Air Transport Management* 65 (October 2017): 191–97, https://doi.org/10.1016/j.jairtraman.2017.06.009.

scope of emissions fees to cover GSE operators, to accelerate the shift to ZE GSE.

Currently, NOx landing fees are in place at about 44 airports globally, aiming to improve local air quality. This measure has been implemented at London Heathrow airport (LHR) and London Gatwick airport (LGW) airports, where fees of GBP 7.76 (\$9.62) and GBP 5.26 (\$6.52) per kilogram of NOx are applied to all aircraft above 8,618 kg.¹¹ Applying a similar fee of \$9.62 per kg of NOx emitted could raise ~\$40 million at Los Angeles airport (LAX) or ~\$29 million at San Francisco airport (SFO). Proceeds from the landing fees could be invested in technologies such as ZE Taxiing and ZE GSE to further reduce NOx emissions at the airports.¹²

There are also precedents of revenue-neutral landing charge policies in Europe, where aircraft with higher emissions receive a malus and those with lower emissions receive a bonus.^{13,14} However, due to the possibility of airlines deploying existing fleet with cleaner engines for California airports to avoid the extra landing charges, the revenue recycling approach above is recommended to ensure the policy enables additional emissions reduction.

Collectively, these proposed operational practices can enable reductions of NOx and other criteria pollutants from the aviation sector, and we are supportive of the agency's plan to begin deploying them within the state. We thank CARB for the opportunity to provide initial feedback on this workshop and look forward to continued engagement on these topics at upcoming CARB events. Please reach out to Supraja Kumar (s.kumar@theicct.org) and Nik Pavlenko (n.pavlenko@theicct.org) with any questions you may have.

Nikita Pavlenko

Nik Pavlenko Aviation Program Director International Council on Clean Transportation

¹¹ UK Civil Aviation Authority, "Environmental Charging – Review of Impact of Noise and NOx Landing Charges," October 2013.

¹² Calculated using an estimated 4,187 tonnes of NOx emitted at LAX and 2994 tonnes of NOx emitted at SFO in 2019 (https://airporttracker.org/).

¹³ Swedavia AB, "Airport Charges & Conditions of Services," n.d., accessed February 3, 2025.

¹⁴ Irish Aviation Authority, "Airport Charges and Environmental Variations," December 2023.

Re: SEIU-USWW Comments on December 10th, 2024 Public Workshop - Reducing Emissions from Operational Practices of Commercial Aircraft

Our Union & Environmental Justice Work

SEIU United Service Workers West (USWW) represents over 50,000 janitors, security officers, entertainment & stadium workers across California, including thousands of workers at LAX, SFO and other airports throughout the state. Our membership primarily consists of workers within low-wage industries, including aviation. Many of our members reside in communities near major airports and within their flight paths. For decades, these communities - largely Black and Brown - have endured exposure from an array of toxic pollutants produced by airport operations, adding on to the decades of environmental racism these cities and neighborhoods have faced from other sources.

SEIU USWW recognizes the detrimental health impacts on our membership and communities resulting from commercial aviation's dependency on fossil fuel consumption. For years now, in addition to our fights to raise industry standards at the bargaining table, we have been working to confront the environmental inequity that our members and their communities face as a result of this industry's ever-expanding operations and painfully slow transition to more sustainable fuels.

We've worked with LAX to guarantee that major development at the airport is done sustainably, agreeing on new programs to reduce emissions and accelerating existing benchmarks. Hundreds of our members went to Sacramento last year to push CARB on reforming the Low Carbon Fuel Standard to better address the impact of fossil jet fuels. Now and in the years to come, we remain committed to this fight to ensure that this industry's transition is a real one, and that the worker and community stakeholders are part of it.

Ground Support Equipment

Introduced in this workshop were a collection of concepts for taking on the rapidly escalating mobile source emissions of aircraft, starting with Ground Support Equipment (GSE). We are happy to see a push towards more universal implementation of zero-emission GSE, which - as pointed out in this workshop draft - already has many commercially viable options across several categories. In 2022, our union collaborated with Los Angeles World Airports to accelerate the transition toward electric or zero-emission GSE at LAX, as well as secured funding for an incentive program that would encourage the retirement of older, diesel-fueled machines. Our agreement also included a commitment to an electric infrastructure plan that would facilitate further adoption of electric GSE at LAX.¹

The technology is there and major California airports are already making these moves. We think this should be low-hanging fruit for CARB to do everything in its power to not only set more of California's airports on this path, but to ensure that timelines are as aggressive as is feasible.

¹ Agreement Between LAWA & SEIU USWW, Los Angeles World Airports Board of Airport Commissioners, Adopted February 3, 2022

Via Electronic filing with the California Air Resources Board 2/10/2025

To be clear, however, GSE is a drop in the bucket, making up just 3% of NO_X emissions at LAX in 2023. While we agree with an all-of-the-above approach to taking on the many sources of emissions stemming from aviation activity, we will always want to emphasize that equally ambitious and creative solutions are needed to take on emissions from aircraft operations.

Aircraft Operations at Gates

Just like GSE, electrification of passenger gates - allowing for reduced reliance on aircraft's auxiliary power units (APUs) running on jet fuel - is a relatively achievable concept that is already in implementation at some airports throughout the state. LAX, for instance, has had all of its passenger gates electrified for years, and has been working to do the same for other spaces (cargo, maintenance, remain-over-night parking) where aircraft are parked.²

We support moves to see that this is more universally adopted throughout California, particularly at the most active airports. We would also encourage an assessment of the amount of power coming from renewable sources in use at airports. As an example: LAX has committed to benchmarks regarding the generation of on-site power from renewable sources. Targets like that would pair well with policy aimed at encouraging the electrification of gates at airports. Upgrades of this nature have already been supported by federal grants in recent years, there is no reason California airports should not be well on their way to progress in this area.

Again, however, we want to emphasize that the air quality and emissions gains here are relatively marginal, with just 4% of NO_X emissions from aircraft activity at LAX being attributed to APUs in 2023. Tackling this and other minor sources of aviation emissions cannot be the extent of our ambition if we are to address the serious, growing and harmful impact of jet engine emissions.

Aircraft Taxiing

We support exploring the feasibility of zero-emission taxiing practices, such as electric tugs that already seem to be at or near commercial viability. Aircraft ground movement produces a sizable share of emissions from aircraft (which themselves produce the vast majority of emissions at airports), and the reduction of those emissions is a priority. Though the use of this technology and these practices have been very limited, one 2023 study³ found that the deployment of electric tugs made for emissions savings that were potentially quite promising - noting that the air quality impact near the airport could be particularly pronounced. Reduced noise is another potential benefit, as would be reduced fuel consumption overall.

Takeoffs and Landings

While we are encouraged to see CARB focus on the core of the problem: emissions from aircraft operations, where takeoffs and landings make up a significant share, we are hoping to hear much more about these proposed directions. The spending accounts, for instance - are these entirely voluntary? What level of enforcement is possible? What kinds of activity or technology qualifies?

² Clean Air Fact Sheet, Los Angeles World Airports

³ Hospodka, Stloukal, Environmental impacts of using electric tow trucks, Transportation Research Procedia, Volume 75, 2023, Pgs. 161-172, ISSN 2352-1465, https://doi.org/10.1016/j.trpro.2023.12.019

Moreover, we are looking to see policy direction that actually pushes the industry toward new investment or practices. We would have reservations supporting the creation of a system that would simply reward the airlines for decisions they've already made, on timelines they've already set, by declaring existing investments as in compliance. A poorly executed version of this concept may amount to greenwashing on the airlines' behalf at taxpayer expense. Linking such policies to activity or emissions levels is a potentially promising mechanism, particularly if that includes the consideration of standards that tighten over time, similar to the way carbon intensity targets function within the Low Carbon Fuel Standard program.

As far as rerouting flights and other operational strategies, we would encourage any analysis of these options to consider the environmental justice implications in impacted communities. At some airports, rerouting flights may mean that emissions simply fall into one community at the expense of another, potentially one already disproportionately impacted by various sources of pollutants. Changes made as part of the NextGen Air Transportation System program have sparked fights between different communities over the past decade, and we would urge CARB to take steps to avoid unintended harms that could result from changes of this nature.

Next, as CARB takes a look at options to encourage the use of the cleanest possible aircraft for California flights, we would like to hear more about how the agency plans to square this with airlines whose fleets do not fit that bill. The Airbus A319 NEO, for instance, which CARB has identified as the cleanest narrow-body aircraft, is a non-starter for the state's biggest airline, Southwest, which exclusively uses Boeing 737 aircraft in its fleet. What considerations would be made for airlines who fly aircraft that are worse than the industry average, across various emissions categories?

Next Steps

We view the directions outlined in this workshop as promising, but still in need of significant work. As CARB points out in this workshop, emissions from aircraft are the only mobile source of pollutants whose total is projected to increase by 2050: while on-road emissions are predicted to decrease nearly 90% by that time, emissions from aircraft are set to rise 30%. We are not on track to reach the reductions called for in the 2022 State SIP Strategy, and we are not on track to meet the ambitious targets for aviation in CARB's own 2022 Scoping Plan.

Frontline communities and essential airport workers are first in line to pay the price for this industry's activity, and rather than working to make the transition to sustainable practices real, the airlines have used their time and resources to oppose policies that would directly benefit those workers: opposing local living wage agreements throughout the country⁴, suing over healthcare mandates⁵ and sick leave laws⁶, and even resisting emergency response training for airport workers.⁷

⁴ Chicago Sun Times, "\$13.45-an-hour wage cleared for takeoff at O'Hare, Midway Airports," 09/06/17

⁵ Legal Newsline, "Airlines say new San Francisco law goes too far," 04/08/21

⁶ Courthouse News Service, "Airlines Call Out Massachusetts Sick-Leave Law," 04/05/18

⁷ Re: Motion #15-0817-S1 on Living Wage at LAX, Airlines for America, City of LA Council File No. 15-0217-51, 09/19/17

This is a heavily privileged, heavily subsidized⁸ industry with a history of opposing sustainability standards at the state and federal levels.⁹ California should be leading the way in addressing its growing emissions impact. Policy directions like the ones outlined in this workshop are a good start, but we still have much more to do.

Sincerely,

David Huerta President - SEIU United Service Workers West & SEIU California

⁸ CA Dept. of Tax and Fee Administration, Aircraft Jet Fuel - Frequently Asked Questions; CA Dept. of Finance, Tax Expenditure Reports, 2023-24; CA Dept. of Finance, Tax Expenditure Reports, 2023-24

⁹ Airlines for America, "Input on the December 7, 2021, LCFS Public Workshop," 01/07/2022; Airlines for America, "Comments on the Draft 2022 Scoping Plan Update," 06/24/2022; Airlines for America, "Input on the February 22, 2023, Public Workshop to Discuss Potential Changes to the Low Carbon Fuel Standard," 05/25/2023; Letter to US Treasury Secretary Janet Yellen, "Re: Sustainable Aviation Fuel (SAF) Credit Eligibility," November 1, 2023; *InfluenceMap*, "US Sustainable Aviation Fuel (SAF) Policies and Corporate Engagement," July 2023