



**LOS ANGELES INTERNATIONAL AIRPORT  
2022 YEAR REPORT ON MOU IMPLEMENTATION – REVISION 1**  
Summary and Data Report

**Background**

On December 13, 2019, a Memorandum of Understanding (“MOU”) was entered into by the South Coast Air Quality Management District (SCAQMD) and the Los Angeles World Airport (LAWA) regarding Los Angeles International Airport (LAX). The overall purpose of the MOU is to quantify the emission reduction benefits from the three (3) voluntary measures from LAWA’s LAX’s Air Quality Improvement Measures (AQIM). The three LAX MOU measures are:

1. MOU Measure 1 - Ground Support Equipment Emission Reduction Policy
2. MOU Measure 2 - LAX Alternative Fuel Vehicle Incentive Program
3. MOU Measure 3 - Zero-Emission Bus Program

The annual emission data is used to quantify the estimated emission reduction benefits in the South Coast Air Basin. This MOU does not create State Implementation Plan (SIP) creditable reductions, but it identifies specific voluntary measures and provides the means for the SCAQMD to quantify the emission reductions from the MOU Measures to obtain SIP credits.

**2022 Annual Report Summary**

The 2022 Annual Report is the third report submitted by LAWA to the SCAQMD that reports on the LAX MOU progress towards meeting the targets in MOU Attachment A for MOU Measures 1 to 3. The report does not apply to any source or operation of any source that is not specifically identified in the MOU Measures. This report and attached excel datasets contain all the elements required in the MOU so the SCAQMD may calculate emission benefits from the measures. The emission factor calculation methodology and the performance targets were not amended from the 2021 submittal.

Over the past year, passenger air travel at LAX returned to near pre-pandemic levels, while cargo operations have remained above pre-pandemic volumes. Notable MOU progress includes the final phases of developing a facility-wide GSE incentive program, which will promote the removal of older units from operator fleets. Additionally, despite an increase of almost 200 GSE units at LAX since the last MOU report, total nitrogen oxides (NO<sub>x</sub>) emissions dropped by approximately 25 tons. The LAWA GSE Emission Reductions policy surpassed the 2023 goal of meeting 1.8 grams per brake horsepower hour (g/bhp-hr) for hydrocarbons (HC) plus NO<sub>x</sub>, The emission factor has been reduced to 1.16 for reporting year 2022. No funds were distributed under the Alternative Fuel Incentive program this year, though one awardee has two vehicles on order for this coming year. One additional awardee is actively searching to acquire two incentive program eligible vehicles. Finally, the Zero-Emission Bus Program has surpassed the Measure’s goal with 40% LAWA-owned electric bus fleet as of January 1, 2023. Below is the status of each of the LAX MOU Measures.

**MEASURE NO. 1 - GROUND SUPPORT EQUIPMENT EMISSIONS REDUCTION POLICY**

**This measure requires all ground support equipment operators at LAX achieve fleet average hydrocarbon + nitrogen oxides emission factors of 1.8 and 1.0 grams per brake horsepower-hour (g/bhp-hr) by January 1, 2023 and January 1, 2031, respectively.**

The 2022 report shows the fleet average HC + NO<sub>x</sub> emission factor for commercial GSE at LAX is 1.16 g/bhp-hr, which is lower than the 2017 AQIM baseline fleet averaged HC + NO<sub>x</sub> emission factor of 2.24 g/bhp-hr and exceeded (i.e., is better than) the 2023 target. This year, LAWA refined its data collection process by providing operators with their previous inventory submittals, enhancing data accuracy. Additionally, actual meter-based use hours were requested for all pre-2010 gasoline and Tier 0 and Tier 1 diesel equipment designated by the operator as “low use” (200 hours per year or less). These actual hours were used for emissions inventory calculations, rather than the default 200 hours, yielding a more accurate representation of facility emissions. In addition, LAWA staff worked directly with operators to confirm engine designations for over 150 GSE previously reported with an off-road engine. Many were corrected to on-road engines, which are cleaner and contributed to the lower overall facility emissions this reporting year.

On August 16, 2023, the South Coast AQMD requested LAWA develop a side-by-side comparison of all GSE reported in 2021 and 2022, paired by unique equipment ID for quality review purposes. A side-by-side comparison was developed first provided to South Coast AQMD on September 13, 2023. This comparison is also included in the calculation documents provided to South Coast AQMD as part of this revised annual report. South Coast AQMD also requested the following minor revisions to the 2021 and 2022 annual reports and inventories, which are incorporated in this revised submittal. The revisions included: In the initial 2022 reporting period calculations, electric GSE with an equivalent horsepower rating below 25 were not included in the fleet-performance factor calculation. This has been corrected; In the initial 2022 reporting period calculations, fuel correction factors were being improperly assigned to model year 2022 units. This has been corrected; In the initial 2022 and most recent 2021 inventories, deterioration hours were being based on actual equipment operating hours. To ensure conservative deterioration estimates, deterioration hours were revised to use default operating hours for all equipment, regardless of current actual operations; In the most recent 2021 inventory, a small subset of low-use equipment were utilizing the low-use default 200 hours of operation when default operating hours for that equipment category or operator-provided operating hours would be lower. This has been revised.

Additionally, South Coast AQMD requested that LAWA confirm the operating specifications, including horsepower ratings and operating hours, for multiple specific equipment from the 2022 and 2021 inventories. LAWA has conducted the necessary outreach to airport operators and has revised discrepancies identified for a small number of these units. All other unit specifications were determined to be accurate and representative. No changes or modifications were made to the emission factor calculation methodology or airport performance targets as part of this updated annual report.

The two summary tables below compare the number of equipment between the 2017 MOU baseline and the current reporting year. As seen in Table 1, the total electric count has increased, specifically equipment 2010 and newer. Additionally, there has been a notable shift overall towards 2010 and newer equipment, along with the removal of older equipment. This is likely due to the increased availability of eGSE as well as outreach and improved data verification processes. Table 2 narrows the scope to off-road diesel engines, again showing a shift from older, dirtier equipment to newer, cleaner engines.

**Table 1 – Fleet Comparison 2017 to 2022**

**2022 Fleet** (difference as compared to 2019 reporting year [based on 2017 fleet])

| Model Year  | Fuel Type  |             |            |            | Total       |
|-------------|------------|-------------|------------|------------|-------------|
|             | Gasoline   | LPG/Propane | Electric   | Diesel     |             |
| ≤ 2007      | 153 (-106) | 92 (-62)    | 336 (-241) | 168 (-144) | 749 (-553)  |
| 2008 - 2009 | 54 (-16)   | 17 (-24)    | 83 (-35)   | 42 (-21)   | 196 (-96)   |
| 2010 - 2015 | 194 (+67)  | 178 (+51)   | 257 (+38)  | 184 (+12)  | 813 (+168)  |
| 2016 - 2020 | 465 (+311) | 207 (+128)  | 281 (+147) | 314 (+201) | 1267 (+787) |
| ≥ 2021      | 62 (+62)   | 84 (+84)    | 120 (+120) | 57 (+57)   | 323 (+323)  |
|             |            |             |            |            | 3348 (+629) |

**Table 2 – Diesel Tier Comparing 2017 to 2022**

**2022 Fleet** (difference as compared to 2019 reporting year [based on 2017 fleet])

| Tier     | Model Year  | Horsepower Bin |          |          |           |           |           |           |       | Total      |
|----------|-------------|----------------|----------|----------|-----------|-----------|-----------|-----------|-------|------------|
|          |             | 25 - 49        | 50 - 74  | 75 - 99  | 100 - 174 | 175 - 299 | 300 - 599 | 600 - 749 | ≥ 750 |            |
| ≤ Tier 1 | ≤ 1999      | 1 (-)          | 2 (+1)   | 0 (-11)  | 0 (-11)   | 3 (-8)    | 1 (+1)    | 0 (-)     | 0 (-) | 7 (-28)    |
| Tier 1   | 1996 - 2005 | 3 (+1)         | 52 (+45) | 11 (-70) | 10 (-28)  | 6 (-19)   | 0 (-1)    | 0 (-)     | 0 (-) | 82 (-72)   |
| Tier 2   | 2001 - 2010 | 2 (-3)         | 9 (-3)   | 4 (-7)   | 10 (-16)  | 2 (-14)   | 3 (-1)    | 1 (+1)    | 0 (-) | 31 (-43)   |
| Tier 3   | 2006 - 2011 | 0 (-)          | 0 (-)    | 4 (-3)   | 39 (-39)  | 19 (-20)  | 7 (-1)    | 0 (-3)    | 0 (-) | 69 (-66)   |
| Tier 4i  | 2008 - 2014 | 1 (-2)         | 6 (+2)   | 3 (-5)   | 35 (+1)   | 13 (-3)   | 6 (-)     | 1 (+1)    | 0 (-) | 65 (-6)    |
| Tier 4   | ≥ 2013      | 12 (+7)        | 89 (+55) | 27 (+13) | 133 (+85) | 53 (+24)  | 76 (+37)  | 6 (+2)    | 0 (-) | 396 (+223) |

Overall, the data shows that there has been a significant movement away from older (pre-2010) toward newer (2010 to present) GSE. This is a positive trend that is expected to continue.

Looking Ahead

Los Angeles World Airports will continue to work with LAX GSE Operators to achieve the performance targets in the current LAX GSE Emissions Policy through accelerated turnover to cleaner equipment. As of this 2022 report, all but three GSE Operators have met the 1.8 g/bhp-hr goal for HC + NOx. In June of 2023, LAWA adopted a GSE incentive program to accelerate the deployment of zero-emission electric GSE (eGSE) to achieve further emission reductions. We expect these efforts to increase the number of eGSE at LAX in the upcoming reporting years and prioritize the removal of older, dirtier GSE (e.g. pre-2010 gasoline and Tier 0 and Tier 1 diesel). Additionally in 2023, LAWA worked with its GSE Operators and GSE charging original equipment manufacturers to allow existing eGSE to charge at both Minute Charger’s Altus and PosiCharge charging stations at LAX. Both initiatives are aimed at increasing the amount of eGSE at LAX.

Los Angeles World Airports will continue to work with GSE Operators to encourage the continued replacement of older GSE, and to support any future electrical infrastructure changes that may be necessary. LAWA is also drafting a Request for Proposals for a GSE pooling program. The intention of the program is to consolidate GSE facilities and expand the use of eGSE at LAX’s common use terminals.

**MEASURE NO. 2 - LAX ALTERNATIVE FUEL VEHICLE INCENTIVE PROGRAM**

**The LAX Zero and Near-Zero Emission Heavy-Duty Vehicle Incentive Program will distribute up to \$500,000 dollars in funding to applicants based on the "incremental cost" differential of the zero or near-zero emission vehicles as compared to conventionally-fueled equivalents with a Gross Vehicle Weight Rating (GVWR) of 14,001 pounds or greater by December 31, 2021.**

As of December 31, 2022, the LAX Alternative Fuel Vehicle Incentive Program had awarded funds for a total of 15 near-zero emission vehicles. However, due to effects of COVID-19 on businesses and ongoing supply chain shortages, no incentive-funded vehicles were added in 2022. . One incentive recipient has indicated that truck delivery delays are a result of longer than expected lead times to obtain parts and equipment from manufacturers and suppliers. An additional awardee is actively searching for two incentive funded vehicles.

**Looking Ahead**

LAWA is actively collaborating with grant recipients to secure orders and deliveries of zero-emission or near-zero-emission heavy-duty trucks.

**MEASURE NO.3 – ZERO-EMISSION BUS PROGRAM**

**The LAX Zero- Emission Bus Program to convert LAWA-owned buses at LAX to zero-emission buses and is attached to and a part of the MOU between the LAWA and South Coast AQMD. The Measure requires LAX to replace 20% and 100% of the Airport-owned and operated buses with zero-emission buses by January 1, 2023 and January 1, 2031, respectively.**

As of December 31, 2022, LAWA owned a fleet of 50 buses, a decrease of 72 from the 122 buses owned on December 31, 2021. Of the 50 buses, 20 are electric, which represents 40 percent of the LAWA-owned bus fleet. These electric buses are typically dedicated for use on the airfield and on occasion are used on-road to transport passengers.

Since the implementation of the MOU, LAWA has retired a total of 11 diesel and 39 CNG buses with engine model years between 1996 to 2009. Thirty-six of the 39 CNG buses were retired from the LAX Parking Shuttle fleet in 2022. LAWA has also submitted an "affidavit of non-use" to the California Department of Motor Vehicles for 36 CNG buses. These buses have not yet been scrapped since there is an ongoing investigation regarding safety issues with the vehicles.

Table 3 below shows the LAWA buses that have been removed from service. The complete 2022 LAWA-owned fleet is available in the excel data report for MOU Measure 3.



## **2022 Measures 1-3 Data Reports**