Hydrogen and Fuel Cell Activities at CA Airports

DOE FCTO H2@Airports Workshop
November 4-6, 2020

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• Climate change targets
  • 2020: Achieve 1990 GHG levels
  • 2030: 40% below 1990 levels
  • 2045: Carbon neutrality
  • 2050: 80% below 1990 levels

• Air Quality Goals – South Coast and SJV
  • 2023: 80 ppb 8-hour ozone
  • 2025: 12 mg/m³ 24-hour PM2.5
  • 2031: 75 ppb 8-hour ozone
  • 2037: 70 ppb 8-hour ozone

• New ZEV milestones – EO N-79-202
  • 2035: 100% new LD sales are ZEVs
  • 2035: 100% of drayage trucks and off-road equipment are ZEVs
  • 2045: 100% of MD/HD vehicles are ZEVs
Suite of Mobile Source Regulations

Zero-Emission Operation

- Innovative Clean Transit
- ZE Airport Shuttle
- ZE Powertrain Cert
- ZE Ships at Berth
- Advanced Clean Trucks
- ZE TRUs
- Advanced Clean Fleets (inc. drayage)
- ZE Forklifts
- Port and Railyard Cargo Handling Equipment

2018
- CA GHG Phase 2
- Truck OBD
- Truck Smoke Test

2019
- Heavy-duty Low-NOx Omnibus

2020
- Heavy-Duty I/M Harbor Craft

2021
- Locomotives

2022

2023

Lower Exhaust Emissions
Innovative Clean Transit – fleet requirement

- Large agencies: 25% of annual new bus purchase must be ZEBs starting 2023; All agencies 100% by 2029
- Early purchase counts toward future compliance
- ZEB Roll-Out Plans due June 2020 for large, June 2023 for small
- [https://arb.ca.gov/msprog/ict/ict.htm](https://arb.ca.gov/msprog/ict/ict.htm)

Zero-Emission Airport Shuttle – fleet requirement

- Phased in fleet turn-over beginning in 2027 (33%)
- Full implementation in 2035
- 2022- Annual fleet reporting
- [https://ww2.arb.ca.gov/our-work/programs/zero-emission-airport-shuttle](https://ww2.arb.ca.gov/our-work/programs/zero-emission-airport-shuttle)

Zero-Emission Powertrain Certification

- Optional certification for ZE HD powertrains and vehicles
- Includes warranty and reparability provisions
- Required for ZE Shuttle bus and Advanced Clean Trucks MY 2024
- [https://ww2.arb.ca.gov/our-work/programs/zero-emission-powertrain-certification](https://ww2.arb.ca.gov/our-work/programs/zero-emission-powertrain-certification)
Relevant Regulations

Zero-Emission Trucks and Fleet Rules

Advanced Clean Trucks Regulation

• Manufacturer production requirements for Class 2b-8 trucks
• Starts with MY2024
• Credit/deficit system
• One-time fleet reporting
• [https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks](https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks)

Zero-Emission Fleet Rules – Pending

• Take steps to achieve full transition to zero-emission
  • 2035 – Drayage trucks at ports and railyards, last mile delivery, government fleets
  • 2040 – Refuse trucks, buses, and utility fleets
  • 2045 – For all other vehicles where feasible
• Considering purchase requirements, fleet standards, green contracting and ZE zones
South Coast AQMD Commercial Airports MOUs

• Voluntary agreements based on each airport’s AQIP
• MOUs with LAX, SNA, BUR, ONT and LGB
• Airports will implement measures including:
  • GSE fleet average emission reductions
  • Replacing airport-owned and operated buses with ZEVs
  • Parking and shuttle bus electrification
  • Installing jet fuel pipeline to eliminate fuel delivery trucks
• Airports report annually to South Coast AQMD
• District quantifies SIP creditable emission reductions
  • Provides federally enforceable commitments and report emission reduction benefits to U.S. EPA
  • Seek to obtain SIP credits for the measures specified in the MOUs
• www.aqmd.gov/airportsmous
Incentive Programs
Demonstration Projects

Fuel Cell Hybrid Electric Delivery Van

• Funding: $4.3M grant, $9.5M total
• UPS in Ontario and surrounding areas
• 15 FC hybrid delivery vans
  • Retrofitting existing UPS vans
  • Based on prototype built in partnership with DOE and California Energy Commission
  • Hydrogenics 30kw fuel cell engines
• Integration design by Unique Electric Solutions
• Production builds by W.W. Williams in Nevada
• Goal: develop & commercialize fuel cell retrofit kit
• Complete: Early 2022
Demonstration Projects

Next Generation Fuel Cell Delivery Van

- Funding: $5.8M grant, $11.7M total
- UPS in Ontario and surrounding areas
- 4 FC hybrid electric delivery vans
  - Linamar - Gen 2.0 eAxle design & build eAxle
  - Ballard - 85kw fuel cell engines
  - Roush – integrate FC propulsion system into new Ford F-59 chassis
- Goal: develop & commercialize fuel cell retrofit kit
- Complete: Fall 2021
Clean Technology Vouchers

HVIP and CORE

**Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)**

- Established in 2010: 9,500 vouchers and $510M
- HVIP-Eligible on-road HD vehicles
  - Transit, school and shuttle buses; utility, delivery, and class 8 trucks
  - Battery electric, fuel cell electric, hybrid, low Nox, ePTO
  - 30 OEMs and 130 models
- Closed Nov. 2019 after funds exhausted
- [www.CaliforniaHVIP.org](http://www.CaliforniaHVIP.org)

**Clean Off-Road Equipment Voucher Incentive Project (CORE)**

- Launched in February 2020: 316 vouchers and $41M
- Zero-emission airport cargo loaders, aircraft tugs, aircraft ground power units
- Funds exhausted in 6 months
- [www.CaliforniaCORE.org](http://www.CaliforniaCORE.org)
California’s allocation: $423 million for NOx mitigation

Beneficiary Mitigation Plan details 5 funding categories:

1. $130M for Zero-emission transit, school and shuttle buses
   Admin statewide by SJVAPCD  vwbusmoney.valleyair.org/

2. $60M for Combustion freight and marine
   Admin by statewide by SCAQMD  www.aqmd.gov/vw

3. $90M for Zero-emission Class 8 freight and port drayage trucks
   Admin statewide by SCAQMD  www.aqmd.gov/vw

4. $70M for Zero-emission freight and marine equipment
   Admin statewide by BAAQMD  www.californiavwtrust.org/

5. $10M for charging and hydrogen infrastructure for LDVs
   Admin statewide By BAAQMD  www.californiavwtrust.org/

- All funding released in at least 2 instalments, except light duty infrastructure

CARB’s VW Mitigation Trust website
ww2.arb.ca.gov/vwmitigationtrust
Questions?

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