

# Welcome to CARB's Public Workshop to Discuss Development of a Regulation to Accelerate the Deployment of Zero-Emission Forklifts

The webinar will begin shortly. Here is a brief overview of your webinar controls.



Questions: May be typed in this section. We will respond to questions and comments after the presentation.

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# Public Workshop to Discuss the Zero-Emission Forklifts Measure

October 7, 2020

# Agenda

- Background
- Inventory Update
- Example Regulatory Approach
- Next Steps

# Air Quality Goals

**2023:**  
South Coast  
& SJV Ozone

**2031:**  
South Coast  
& SJV Ozone



**2024/25:**  
AB 617  
Communities  
South Coast &  
SJV PM2.5

**2037:**  
South Coast  
& SJV Ozone

# Climate & Zero-Emission Goals

GHG 40%  
Below 1990 Levels

**2030**



**2035**

New Vehicles, Trucks  
& Off-Road Equipment  
Zero-Emission

GHG 80%  
Below 1990 Levels

**2050**



**2045**

Carbon Neutrality &  
New Heavy-Duty  
Non-Drayage Trucks  
Zero-Emission

# Achieving Our Goals

- State Implementation Plan
  - State's roadmap to meeting federal ambient air quality goals
- 2016 Mobile Source Strategy
  - State's plan that targets mobile sources
  - Covers air quality, GHG emissions, petroleum consumption, & health risks from transportation emissions
- Sustainable Freight Action Plan
  - Vision for the state's transition to a more efficient, more economically competitive, and less polluting freight transport system

# Zero-Emission Forklift Measure

- Identified in the SIP, the 2016 Mobile Source Strategy, the Sustainable Freight Action Plan
- Supported in Governor's Executive Order N-79-20 (signed Sep 2020)
- Purpose: Accelerate deployment of zero-emission technology in forklifts
- Full implementation by 2035
- Board consideration in early 2022

# Forklift Inventory Background

- Purpose - Estimate emission reductions from regulatory proposals
- Current Inventory
  - Last updated for LPG/gas forklifts in 1998  
(Sources : Power System Research, ITA data, research report)
  - Last updated for diesel forklifts in 2011  
(Source: DOORS database)
- Updates To Inventory
  - New sources of data
  - Feedback from stakeholders



# Forklift Inventory Inputs

Inventory Calculation Inputs : Population, Activity, Emission Factor, Growth

Inputs	Data Sources
Population	ITA Historical U.S. Shipment (1988 to present) CARB Production Line Testing (PLT) Database (gas and LPG/propane) DOORS Database (diesel/gas/LPG) CSU Fullerton 2016 LSI Survey EPA Nonroad Model
Activity	CSU Fullerton 2016 LSI Survey OFFROAD2007 Model DOORS Survey and Used Equipment Sales (2020)
Emission Factor	CARB LSI Certification Database (2001-present) OFFROAD2007 Model Diesel Engine Certification Tests
Growth Factor	Economic Surrogates (Industrial Production, Manufacturing) ITA Shipment Growth/CARB PLT historical growth rates
Others	Age distribution of forklifts – CSU Fullerton Survey/DOORS Database Horsepower of forklifts – CARB LSI Certification

# Forklift Inventory Timeline

- Current Status/Timeline
  - Analyzing data sources
  - Feedback from stakeholders
  - Preliminary estimates for population, activity, emission factor, growth rates
  - Model development
  - Future inventory workshop and staff report
  - Benefit calculations for regulation

# Questions or Comments???

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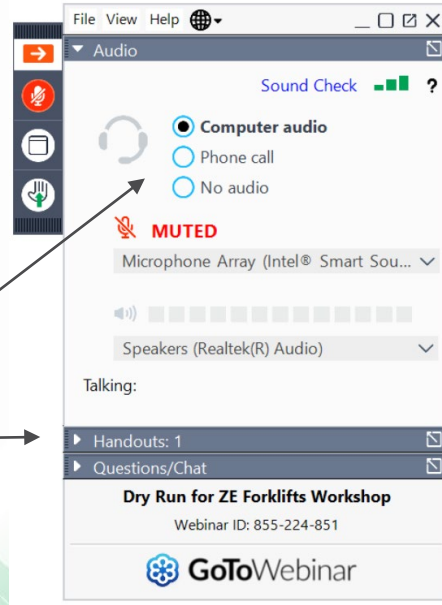
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# ZE Forklift Measure Considerations

- Costs / Economic Impact
- Feasibility
- Infrastructure
- Impacts of Other Regulations
- Small Business Impacts
- Environmental Justice – Disadvantaged Communities
- Fairness - Level Playing Field
- Enforceability – Ease of Determining Compliance
- Monitoring and Reporting

# Forklift Types

- Electric Forklifts
  - Class 1 counterbalanced
  - Class 2 narrow-aisle
  - Class 3 pallet jacks & walkies (excluded from measure)
- Internal Combustion Forklifts
  - Class 4 cushion tire
  - Class 5 pneumatic tire
  - Class 6 industrial tow tractor
  - Class 7 rough terrain forklift

# Technology Status of Battery-Electric Forklifts

- 46% of U.S. forklift shipments in 2018 were battery electric.
  - Among Classes 1,2, 4, & 5
  - Source: Industrial Truck Association
- Battery-electric forklifts are prevalent in lower lift capacities & are offered in > 30,000 lb. lift capacity.
- Advanced lead acid and lithium battery technologies
  - Improving performance and charging

# Technology Status of Battery-Electric Forklifts (Continued)

- Commonly found in indoor operations.
- Outdoor weatherized versions are commercially available.
- Every major industrial lift supplier offers battery-electric options.
- Lower total cost of ownership due to fuel savings and reduced maintenance.

# Technology Status of Fuel Cell Forklifts

- Over 25,000 hydrogen fuel cell forklifts have been deployed in the U.S.
- Commonly used in warehouse applications with high workflow.
- Offer quick refueling for increased productivity.



# Regulatory Approach

- One of our goals today is to initiate meaningful conversation on a potential regulatory approach
- We'll signal to you what we're thinking
- Likewise, we want to hear your ideas and get your feedback

# Request for Alternatives

- We encourage public input throughout this regulatory development, including feedback on alternatives to today's example regulatory approach.
- In particular, based on SB 617<sup>[1]</sup>, we encourage input on alternative approaches that:
  - May yield the same or greater benefits than those associated with the proposed regulation (note - no proposed regulation at this stage), or
  - May achieve the goals at lower cost.

[1] SB 617:

[http://dof.ca.gov/Forecasting/Economics/Major\\_Regulations/SB\\_617\\_Rulemaking\\_Documents/documents/Section%202000%20ISOR%201%20sb\\_617\\_bill\\_20111006\\_chaptered.pdf](http://dof.ca.gov/Forecasting/Economics/Major_Regulations/SB_617_Rulemaking_Documents/documents/Section%202000%20ISOR%201%20sb_617_bill_20111006_chaptered.pdf)

See also the Department of Finance's implementing regulations CCR Title 1, Division 3, §2000-2004

# Example Regulatory Approach

- Proposed Applicability
- Approach Elements
- Preliminary Emission Reduction Estimates

# Approach Applicability

- California forklift owners/operators
- LSI and diesel forklifts
- Not applicable to Class 3 forklifts

# Approach Requirements

- Near-term requirements for forklifts that currently have significant zero-emission market penetration
  - Forklifts with 8,000 lb. lift capacity and less
  - Correlates to about 65 hp
- Delayed requirements for forklifts with greater than 8,000 lb. lift capacity
  - Contingent upon zero-emission availability

# Example Approach Overview

- In-use fleets would be required to phase out internal combustion forklifts by model year
- Replacements and additions must be zero-emission
- Starting in 2025 for Class 4 & 5 forklifts  $\leq$  65 hp
- Starting in 2030 for Class 4 & 5 forklifts  $>$  65 hp

# Example Approach Phase-Out $\leq 65$ HP

- Phase out internal combustion forklifts by model year (MY)
- Example for Class 4 & 5 forklifts at  $\leq 65$  hp

Calendar Year	Engine Phase-Out by MY
2025	2017 & Older
2026	2018
2027	2019
2028	2020
2029	2021
2030	2022
2031	2023
2032	2024

# Example Approach Phase-Out >65HP

- Example for Class 4 & 5 forklifts at > 65 hp

Calendar Year	Engine Phase-Out by MY
2030	2020 & Older
2031	2021
2032	2022
2033	2023
2034	2024
2035	2025
2036	2026
2037	2027
2038	2028
2039	2029
2040	2030



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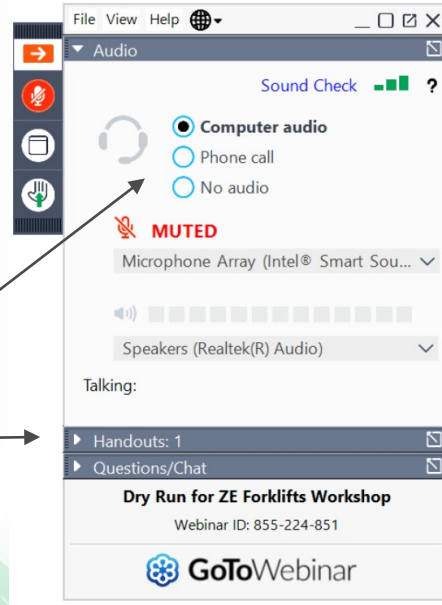
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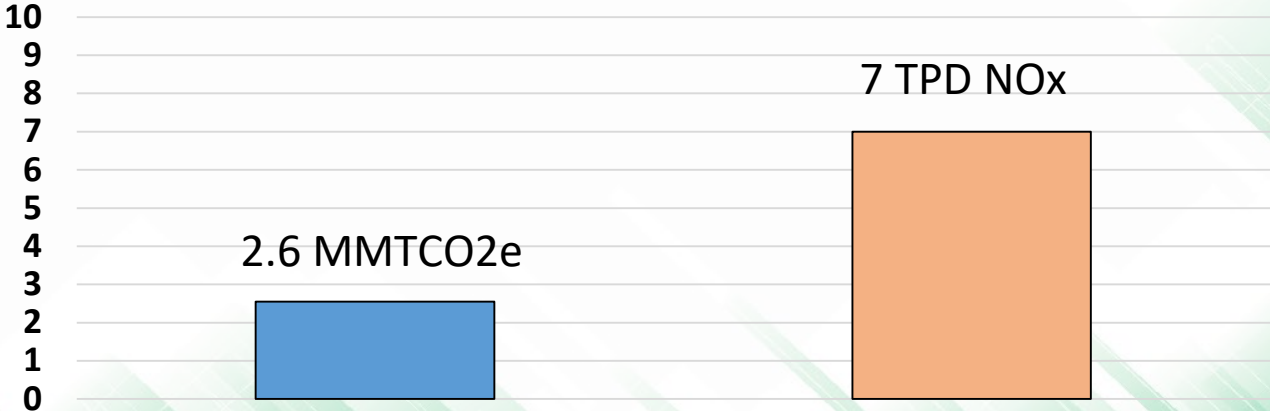
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# Example Approach – Other Elements

- Consider establishing certification requirements for zero-emission forklifts
  - To ensure that zero-emission technologies meet reliability and performance expectations
- Consider applying delayed requirements to Class 6 & 7 forklifts (contingent upon availability)
- Reporting and Labelling

# Preliminary Emission Reduction Estimate for Class 4 & 5 Forklifts in 2031

Based on a mandated engine phase-out age of 8 years  
and zero-emission additions/replacements.



# Next Steps

- Obtain feedback/information from stakeholders through working groups and individual meetings
- 2<sup>nd</sup> workshop in March 2021 (tentative)
- Board consideration in 2022

# Contacts

## Rulemaking

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- David Chen, Manager, Advanced Emission Control Strategies Section: [David.Chen@arb.ca.gov](mailto:David.Chen@arb.ca.gov)

## Inventory Update

- Walter Wong, Air Resources Engineer: [Walter.Wong@arb.ca.gov](mailto:Walter.Wong@arb.ca.gov)
- Cory Parmer, Manager, Off-Road Diesel Analysis Section: [Cory.Parmer@arb.ca.gov](mailto:Cory.Parmer@arb.ca.gov)

# Webpage & Email Sign-Up

- Webpage:
  - <https://ww2.arb.ca.gov/our-work/programs/zero-emission-forklifts>
- Sign-Up for Zero-Emission Forklifts Email Updates
  - [https://public.govdelivery.com/accounts/CARB/subscriber/new?topic\\_id=zeforklifts](https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=zeforklifts)

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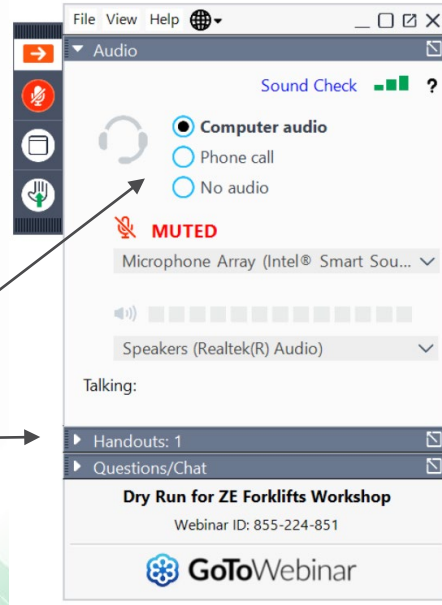
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