



# **Proposed Zero-Emission Forklift Regulation**

Board Hearing  
June 27, 2024

# Outline

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Background

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Proposed Zero-Emission Forklift (ZEF) Regulation

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Benefits and Cost Savings

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Staff Recommendation



# Background

Proposed ZEF Regulation  
Benefits and Cost Savings  
Staff Recommendation

# Mobile Sources & Air Quality

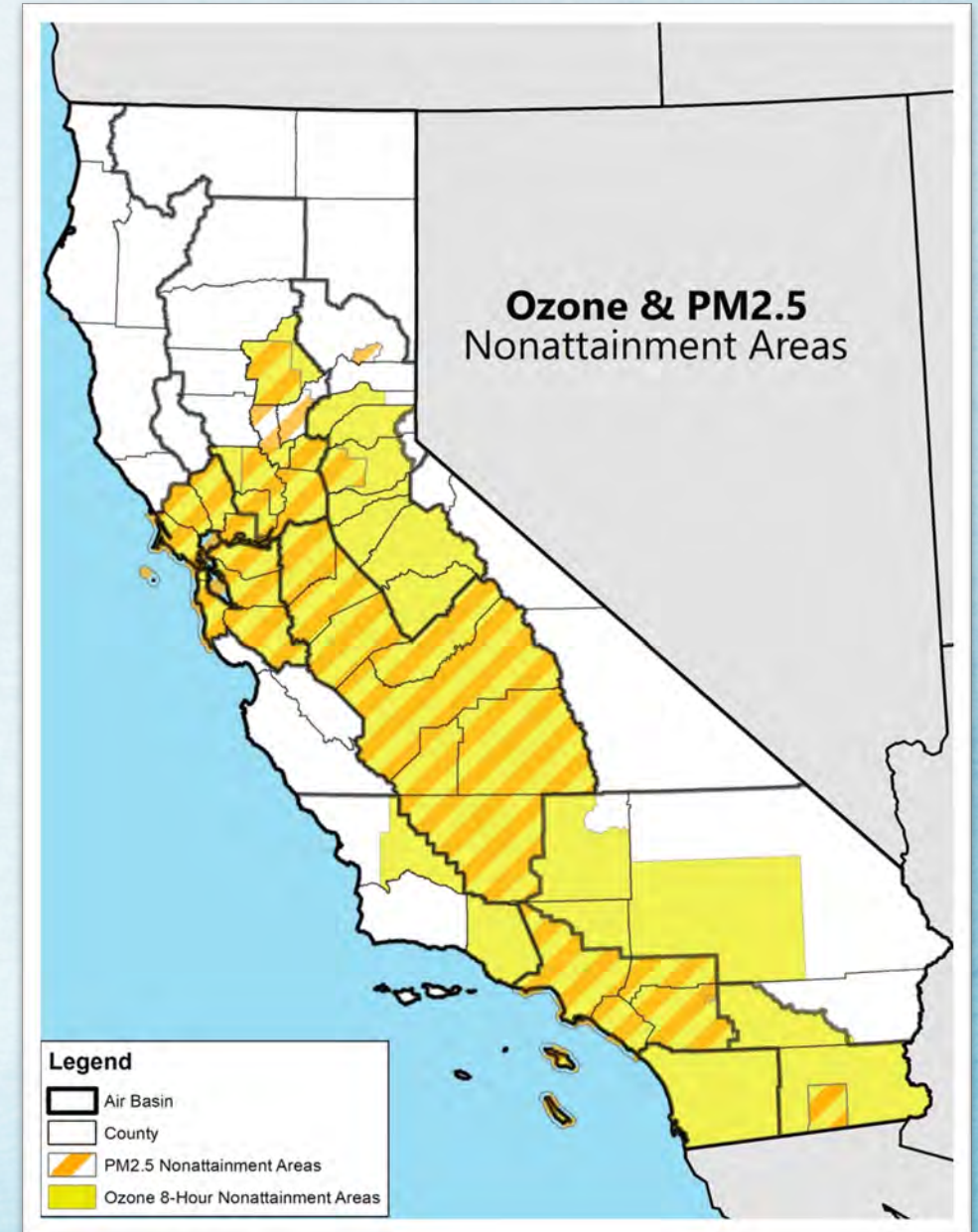
More than **21 million out of ~39 million** Californians live in areas that exceed federal ozone standards<sup>1</sup>

- Low-income and disadvantaged communities

Mobile sources and the fossil fuels that power them are the largest contributors to:

- Ozone precursors
- Fine particulate matter (PM2.5)
- Diesel PM
- Greenhouse gases

1: Based on 2020 monitored ozone design values contoured over population by census tract



# Proposed ZEF Regulation in the State Implementation Plan

- Necessary measure to meet air quality standards by deadlines established in the Clean Air Act
- By 2031, achieve emission reduction goals of:
  - 2 tons per day of oxides of nitrogen (NO<sub>x</sub>)
  - 0.2 tons per day of reactive organic gases (ROG)





# Executive Order N-79-20

Governor Newsom's Executive Order N-79-20 directed CARB and other State agencies to transition off-road vehicles and equipment to 100% zero emission (ZE) by 2035, where feasible.



Full transition to  
**ZE off-road equipment**  
by 2035\*

\*where feasible

# Forklift Classifications



## **Class I ZE**

Manufacturing  
Facilities &  
Warehouses



## **Class II ZE**

Warehouses,  
High Shelves &  
Narrow Aisles



## **Class III ZE**

Loading Areas

## **Targeted Large Spark Ignition (LSI) Forklifts**



**Class IV  
Internal Combustion**  
Indoors, Smooth Floors  
& Loading Docks

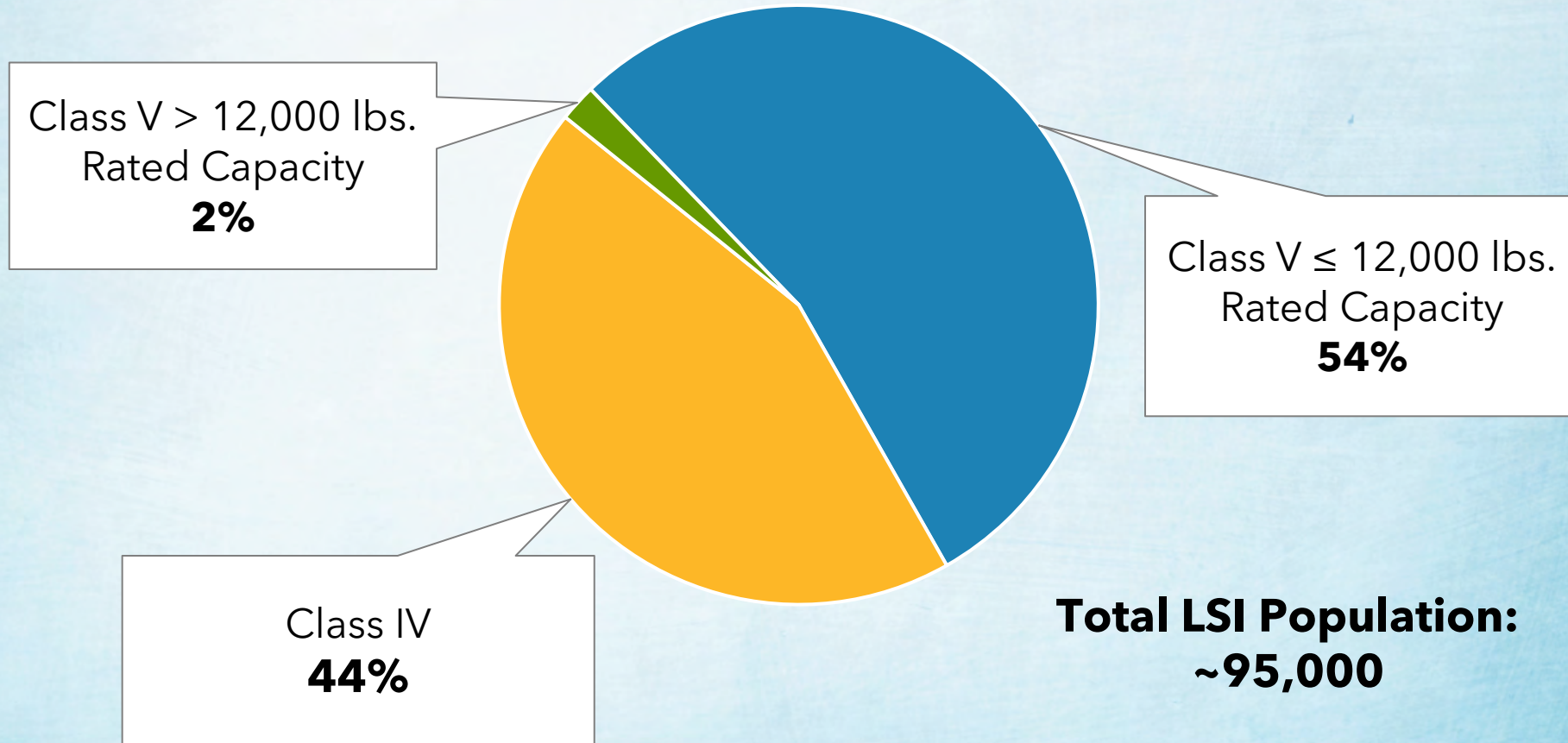


**Class V\*  
Internal Combustion**  
Indoors & Outdoors,  
Lumber Yards, Construction  
Sites & Warehouses



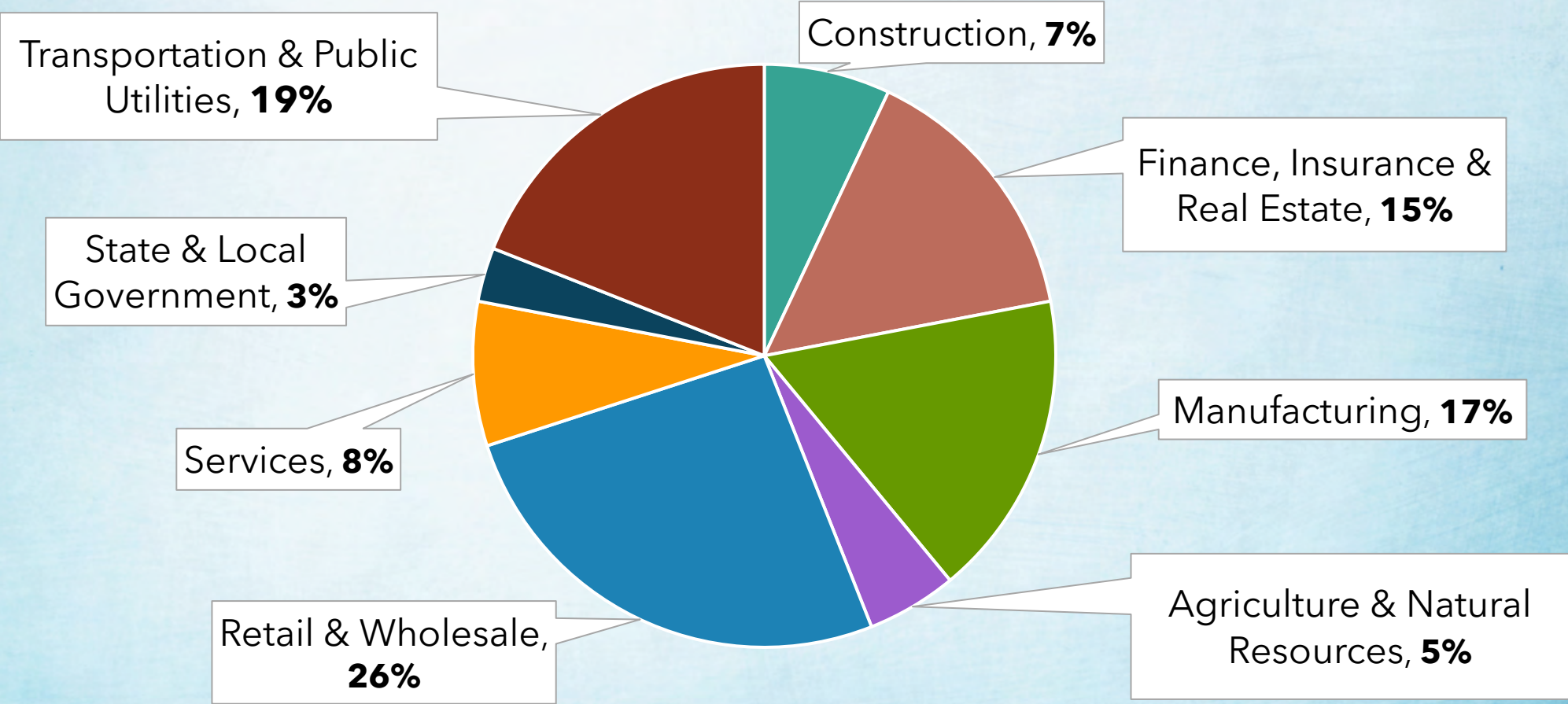
**Class VII  
Internal Combustion**  
Rough Terrain, Construction  
Sites, Lumber Yards  
& Agriculture

# Large Spark Ignition Forklift Population by Classification





# Share of the Affected LSI Forklift Population by Major Sector in California



# Readiness for ZEF

- Forklifts are well-suited for widespread adoption of ZE technology
- 45% of California's forklift population already ZE
  - ZEFs already widely used in indoor applications like warehouses
  - In 2020, ~80,000 ZEFs operating in CA, of which ~70,000 were lead-acid
- Technology advancements
  - Lithium-ion ZEFs (higher energy density and longer lifespan)
  - Fuel cell (quick refueling)



# ZEF Commercial Availability



Based on Sept. 2023 online survey of forklift offerings

# Proposal Development

## Engagement

- Five public workshops and workgroups over three years
- Numerous meetings with fleets, dealers, rental agencies, manufacturers, industry groups, and other stakeholders
- Listening session aimed at environmental justice communities
- Facility site visits

## Outreach

- Over 270,000 mailers to trucking fleets
- Over 200,000 mailers to small businesses
- Email notices to over 70,000 subscribers
- Fact sheets distributed at World Ag Expo and ACT Expo 2024
- 15-Day Changes: May 21-June 5, 2024





Background

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# Main Components



Requirements for Forklift Manufacturers, Dealers, Rental Agencies, and Fleet Operators



Restriction on the purchase of LSI forklifts starting on **January 1, 2026**



Phase-out requirements starting on **January 1, 2028**, for targeted LSI forklifts

# Targeted Forklifts

- Affected Classes
  - All Class IV forklifts
  - Class V forklifts with rated capacity of 12,000 pounds or less
- LSI engines (e.g., propane, natural gas, or gasoline-fueled)
- 89,000 LSI forklifts expected to be phased out

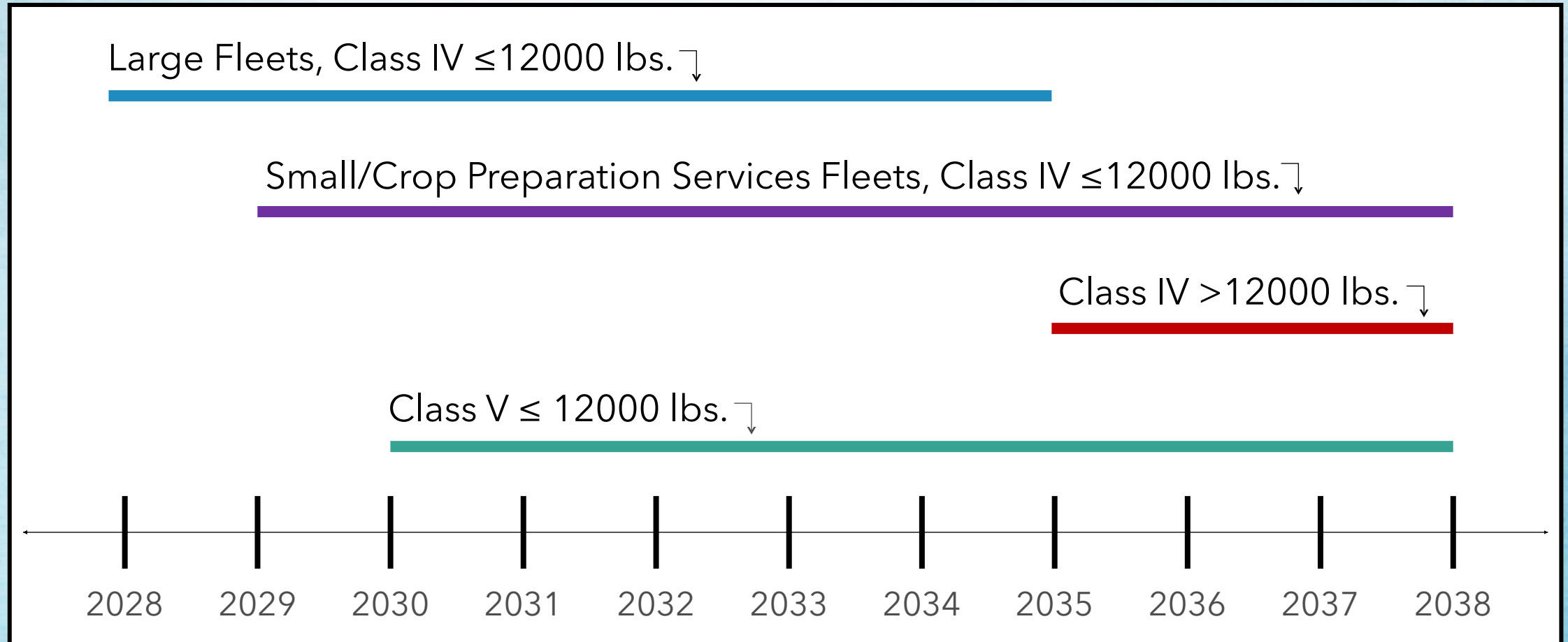


# Requirements

- Starting in 2026 except in limited circumstances:
  - Manufacturers cannot produce or sell Targeted Forklifts in California
  - Fleet Operators cannot acquire Targeted Forklifts
- Starting in 2028 and extending to 2038:
  - Existing Targeted Forklifts phased-out by model year (MY)
  - Phase-out schedule designed so that no forklift phased out before 10 years old
- Less stringent provisions for Small Fleets, Crop Preparation Services Fleets, and Microbusinesses



# Forklift MY Phase-out Timeline



**Large Fleets:** Greater than 25 LSI & ZE forklifts combined

**Small Fleets:** 25 or less LSI & ZE forklifts combined

# Forklift MY Phase-out Schedule

Starting	Class IV ≤ 12,000 lbs	Alternative* Class IV ≤ 12,000 lbs	Class IV > 12,000 lbs	Class V ≤ 12,000 lbs
2028	2018 MY & older**			
2029		2016 MY & older**		
2030				2017 MY & older
2031	2019-2021 MY			
2032		2017-2019 MY		
2033	2022 & 2023 MY			2018-2020 MY
2034		2020 & 2021 MY		
2035	2024 & 2025 MY		2025 MY & older	2021 & 2022 MY
2036		2022 & 2023 MY		
2038		2024 & 2025 MY	Alternative* 2025 MY & older	2023-2028 MY***

\* Alternative Schedule available to Small Fleets and Crop Preparation Services Fleets

\*\* Eligible for phase-out percentage cap

\*\*\* Includes 2026 through 2028 MY Class V LSI Forklifts in Rental Agency Revenue Fleets

# Phase-out Percentage Cap



For first compliance date only, limit required turnover to:

- 50% of forklifts for large fleets
- 25% of forklifts for small fleets and crop preparation services fleets

# Exemptions and Extensions

## Exemptions

- Low-Use
- Dedicated Emergency Forklifts
- Out-of-State Delivery
- San Nicolas and San Clemente Islands
- In-Field Forklifts

## Extensions

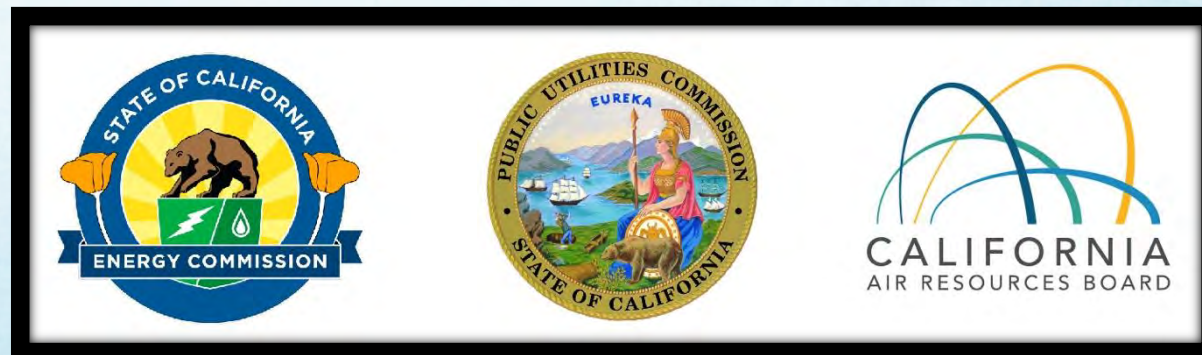
- ZEF Delivery Delay
- Infrastructure Construction Delay
- Infrastructure Site Electrification Delay
- Operational Extension

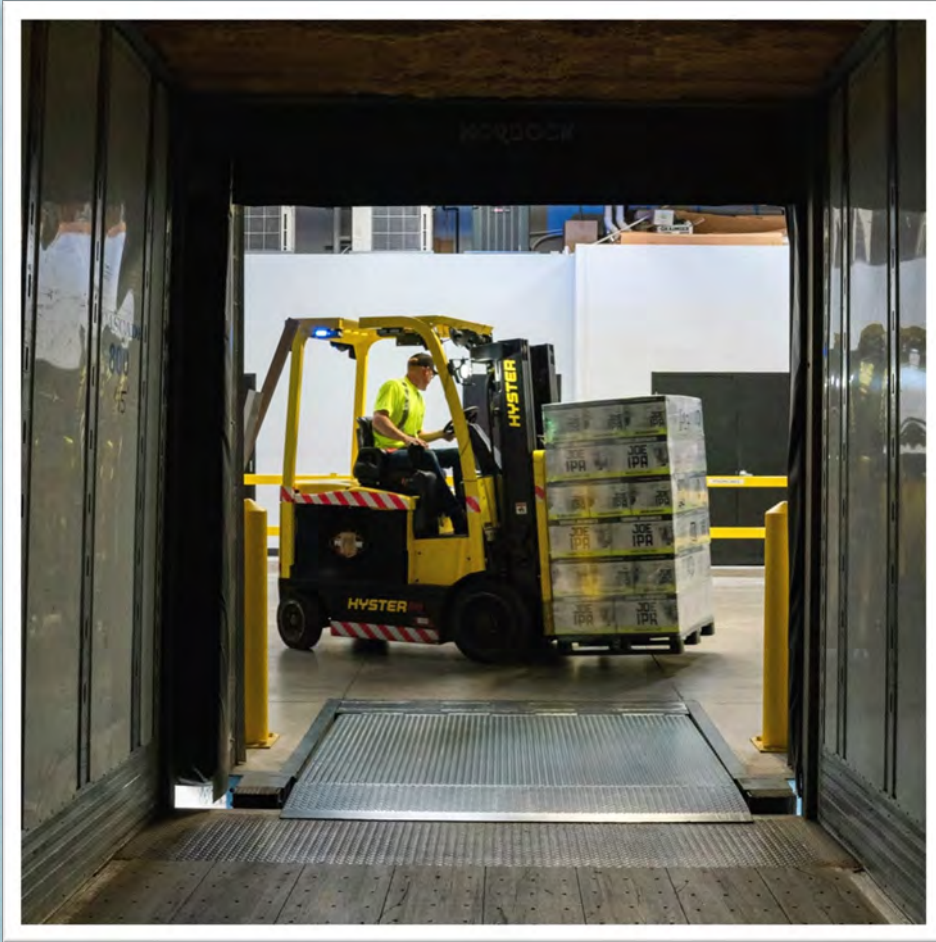
# Operational Extension (OE)

- Regulation allows an OE for situations where a ZEF cannot meet the current operational needs being served by an LSI forklift
  - Allows an LSI forklift to be replaced with another 2026 MY or newer LSI forklift
- Requires fleets to phase out Targeted forklifts once ZEFs available to meet the operational needs

# Utility Planning

- Coordination among CARB, California Energy Commission, California Public Utilities Commission, and electric utility providers
- Staff met with many affected fleets and utilities
  - Utilities stressed need for early information exchange with forklifts fleets to plan for anticipated needs
  - Fleet operators need to contact their electric utility provider, no later than **March 31, 2026**, to initiate discussions regarding potential electrical-service installation or necessary upgrades





Background  
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# Benefits and Cost Savings

Staff Recommendation

# Estimated Emissions Reductions: 2026-2043 Cumulative

**CO<sub>2</sub>: 9.4 million metric tons**

**NO<sub>x</sub>: 18,700 tons**

**PM<sub>2.5</sub>: 2,100 tons**

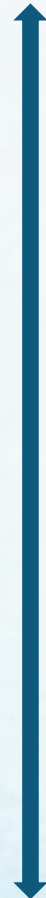
**ROG: 5,000 tons**



# Estimated Health Benefits

From 2026 to 2043, the Proposed ZEF Regulation is estimated to result in numerous public health benefits.

- Expanded, more comprehensive, health analysis
- 12 endpoints quantified (previously only 4)



Cardiopulmonary mortality: 544 fewer cases  
Hospitalizations for cardiovascular disease: 115 fewer  
Cardiovascular emergency department visits: 148 fewer  
Nonfatal acute myocardial infarction: 62 fewer  
Hospitalizations for respiratory disease: 17 fewer  
Respiratory emergency department visits: 321 fewer  
Lung cancer incidence: 42 fewer  
Asthma onset: 1,295 fewer cases  
Asthma symptoms: 109,800 fewer cases  
Work loss days: 80,635 fewer  
Hospitalizations for Alzheimer's disease: 272 fewer  
Hospitalizations for Parkinson's disease: 39 fewer

# Estimated Cost Savings

- Higher upfront cost for ZEFs vs. traditional forklifts, but fuel savings over time mean savings for most fleets
- Estimated cumulative cost-savings from the Proposed Regulation through 2043 are:
  - **\$7.5 billion in health benefit savings;**
  - **\$0.25 to \$1 billion in social cost of carbon savings; and**
  - **\$2.7 billion in net fleet cost savings.**
- Sensitivity analysis of higher electrical rates still show cost savings for typical fleet

# Environmental Impact Analysis

- Draft Environmental Impact Analysis (EIA) completed
  - Potentially significant impacts found for some resource areas
- Released for public comment
  - November 10, 2023– December 26, 2023
- CARB prepared the Final EIA and written responses to comments received on the Draft EIA
  - Released in June 2024



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**Recommendation**

# Staff Recommendation

## Approve Resolution 24-8

