



Zero-Emission Forklift Rulemaking Workshop

January 24, 2023

Agenda

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- **Rulemaking Status Update**
- **Staff Goals for this Workshop**
- **Background**
- **Draft Regulatory Concept**
- **Emission Benefits**
- **Costs**
- **Environmental Analysis**
- **Feedback Requested**
- **Next Steps**
- **Questions/Comments**

Meeting Logistics

- Materials on Website: <https://ww2.arb.ca.gov/our-work/programs/zero-emission-forklifts/zero-emission-forklifts-meetings-workshops>

Meeting Logistics

Providing Comments or Questions

- Staff will respond to your comments and questions at the end of the workshop presentation.
- Written comments and questions can be typed by opening the Q&A window in ZOOM.
 - The host will read any questions out loud and answer your comment or question verbally.
 - Please reference the page number of the slide you are discussing, if applicable.
 - After you enter your question into the Q&A box, click send.
- For verbal comments or questions, you may raise your hand 🖐️ to be added to the speaking queue.
 - If you're on the phone, press #2 to raise your hand.

Rulemaking Status Update

- The first ZE forklift workshop held on October 7, 2020
- Two workgroup meetings held:
 - August 17, 2021
 - February 22, 2022
- Updated draft regulatory language released July 2022
- Board consideration in September 2023
- The Standardized Regulatory Impact Assessment (SRIA) to be posted no later than April 7, 2023

Staff Goals for the Workshop

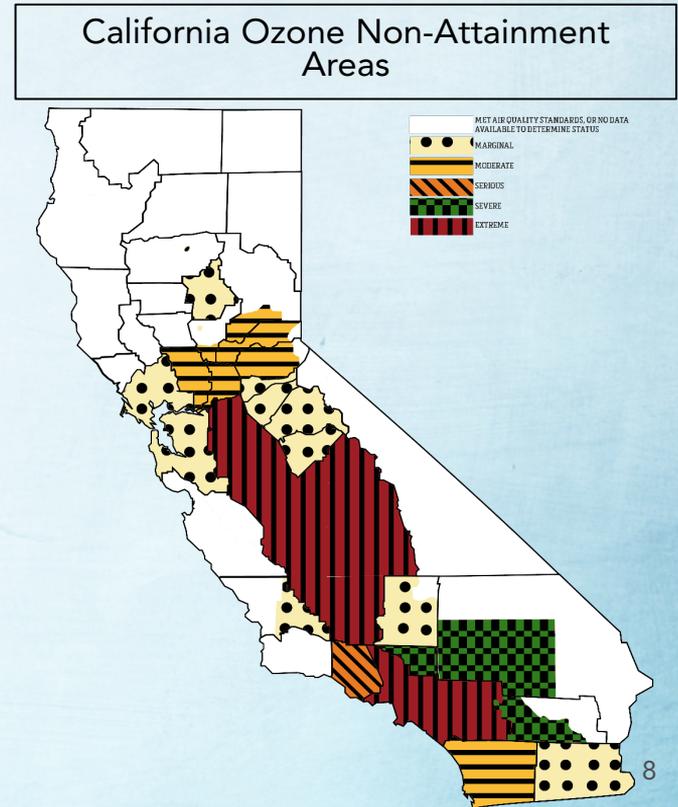
- Gather feedback on the draft regulatory concept.
- Consider suggestions for alternative approaches/provisions that could achieve equivalent outcomes.
- Present preliminary estimates on cost and emission benefits.
- Discuss any stakeholder concerns.

Background

- Purpose: Accelerate deployment of zero-emission technology in forklifts to reduce oxide of nitrogen (NO_x), fine particulate matter (PM_{2.5}), reactive organic gas (ROG), and greenhouse gas (GHG) emissions and help meet federal air quality standards.
- Identified in the 2016 State Strategy for the State Implementation Plan (State SIP Strategy), the 2022 State SIP Strategy, the 2016 Mobile Source Strategy (MSS), the 2020 MSS, and the Sustainable Freight Action Plan.
- Aligns with Governor's Executive Order N-79-20.
 - Goal of the State: transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible.

Major Emissions Reductions Needed

- California has the worst air quality in the nation.
- Unique challenges in San Joaquin Valley and South Coast
- More reductions needed to meet 2031 and 2037 attainment
- Off-road equipment significant contributors to emissions



California's GHG Goals

- California's climate change targets
 - 40% below 1990 levels by 2030
 - 80% below 1990 levels by 2050
 - Carbon neutrality by 2045
- Clean electricity
 - 33% renewable by 2020
 - 60% renewable by 2030
 - Zero-carbon by 2045

Forklift Types*

- Electric Forklifts
 - Class I counterbalanced rider trucks
 - Class II narrow-aisle trucks
 - Class III pallet jacks & walkies
- Internal Combustion Forklifts
 - Class IV cushion tire
 - Class V pneumatic tire
 - Class VII rough terrain forklift



*Categorized based on the classification system used by the Occupational Safety and Health Administration for powered industrial trucks (web link: <https://www.osha.gov/etools/powerd-industrial-trucks/types-fundamentals/types/classes>)

Technology Status of Battery-Electric Forklifts

- Staff estimates there are approximately 79,000 Class I and Class II electric forklifts operating in California today.
- Lower total cost of ownership due to fuel savings and reduced maintenance
- Common in indoor operations
- Every major forklift supplier offers battery-electric options
 - Prevalent in lower lift capacities and are offered in > 30,000 lb. lift capacity
 - Several forklift manufacturers produce Class I equivalents of Class V forklifts
- Advanced lead acid and lithium battery technologies are available
 - Improving performance and charging

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.

Draft Regulatory Concept

Draft Regulatory Concept: Affected Forklifts

- The proposed regulation would apply to “Affected Forklifts,” which is defined as:
 - Class IV and Class V forklifts,
 - Equipped with a large spark-ignited engine (e.g., a propane or gasoline-fueled engine), and
 - With a lift capacity of up to 12,000 pounds.
- Staff estimates the proposed regulation would impact approximately 95,000 Class IV and V forklifts

Draft Regulatory Concept: Definition of Lift Capacity

- As Previously Proposed: "'Lift Capacity' means the rated capacity in units of weight denoted in the forklift's model number and stated in the forklift specification sheet as required by ANSI/ITSDF B56.1 – issued March 27, 2020 sections 7.4 and 7.5."
- Currently Proposed Concept:
 - Base on the lowest rated lift capacity of the forklift.
 - For example, if a forklift has multiple lift-capacity ratings at different load centers, the lowest rated lift capacity would be used to determine regulation applicability.

Draft Regulatory Concept: Excluded Forklifts

- **Excluded from the proposed regulation are:**
 - Rough terrain forklifts
 - Military tactical vehicles
 - Pallet jacks
 - Forklifts with telescoping booms
 - Forklifts owned or operated by facilities subject to the Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards Regulation
 - Forklifts subject to the In-Use Off-Road Diesel Regulation (i.e., diesel forklifts)

Draft Regulatory Concept: Applicability

- Fleet Operators (private and public)
- Forklift Dealers
- Forklift Rental Agencies
- Forklift Manufacturers

Draft Regulatory Concept: Fleet Operator Requirements

- Fleet operators would not be allowed to purchase new Affected Forklifts (LSI) starting in 2026.
- Fleets would be subject to a model-year-based phase-out of 2025 model year (MY) and older Affected Forklifts starting in 2028.
- Fleet Operators would be allowed to purchase a used 2025 MY and older Affected Forklift so long as the MY has not been phased out yet.
 - Note: Staff's previous proposal would not have allowed the purchase of used Affected Forklifts.

Draft Regulatory Concept: Fleet Operator Phase-Out Requirements

Draft Regulatory Concept: Fleet Operator Phase-Out Requirements

- As previously proposed:
 - Fleets would be subject to a model-year phase-out of Affected Forklifts starting in 2026.
 - For Class IV, 10-year-old Affected Forklifts would be phased out each year.
 - For Class V, 13-year-old Affected Forklifts would be phased out each year.
- Currently proposed phase-out concept is based on MY groupings starting in 2028.

Draft Regulatory Concept: Grouped Model Year Phase-Out Schedule for Class IV Affected Forklifts

Compliance Date	Previously Proposed Phaseout Concept	Revised Approach Large Fleets	Revised Approach Small & Agricultural Fleets
Jan 1, 2026	2016 MY & Older	---	---
Jan 1, 2027	2017 MY	---	---
Jan 1, 2028	2018 MY	2018 MY & Older	---
Jan 1, 2029	2019 MY	---	2016 MY & Older
Jan 1, 2030	2020 MY	---	---
Jan 1, 2031	2021 MY	2019 – 2021 MY	---
Jan 1, 2032	2022 MY	---	2017 – 2019 MY
Jan 1, 2033	2023 MY	2022 & 2023 MY	---
Jan 1, 2034	2024 MY	---	2020 & 2021 MY
Jan 1, 2035	2025 MY	2024 & 2025 MY	---
Jan 1, 2036	---	---	2022 & 2023 MY
Jan 1, 2037	---	---	---
Jan 1, 2038	---	---	2024 & 2025 MY

Draft Regulatory Concept: Grouped Model Year Phase-Out Schedule for Class V Affected Forklifts

Compliance Date	Previously Proposed Phaseout Concept	Revised Approach
Jan 1, 2026	2013 MY & Older	---
Jan 1, 2027	2014 MY	---
Jan 1, 2028	2015 MY	---
Jan 1, 2029	2016 MY	---
Jan 1, 2030	2017 MY	2017 MY & Older
Jan 1, 2031	2018 MY	---
Jan 1, 2032	2019 MY	---
Jan 1, 2033	2020 MY	2018 – 2020 MY
Jan 1, 2034	2021 MY	---
Jan 1, 2035	2022 MY	2021 & 2022 MY
Jan 1, 2036	2023 MY	---
Jan 1, 2037	2024 MY	---
Jan 1, 2038	2025 MY	2023 – 2025 MY

Draft Regulatory Concept: Other Provisions Being Considered for the Grouped Model Year Phase-Out

- By January 1, 2026, fleets would be required to provide documentation that infrastructure planning has been initiated with the applicable utility.
- Fleets would be required to provide annual updates on phase-out progress.

Draft Regulatory Concept: Rationale for the Grouped Model Year Phase-Out Approach

- Would provide fleets with more time to work through potential infrastructure challenges.
- Would provide fleets with more flexibility on how they phase-out Affected Forklifts.
- Would provide fleets with more time to better manage the acquisition of zero-emission forklifts.
- Could result in reduced reporting requirements, which staff is currently evaluating.

Draft Regulatory Concept: Compliance Extensions

Draft Regulatory Concept: Product Delay Compliance Extension

- Designed to address delays in the delivery of zero-emission forklifts due to supply-chain or manufacturing issues outside the Fleet Operator's control.
- Extension could be granted if certain conditions are met, which would allow a fleet to delay the compliance date for the Affected Forklift to be replaced.

Draft Regulatory Concept: Product Delay Compliance Extension (Cont'd)

- Conditions:
 - Must have ordered the zero-emission forklift at least one year prior to the applicable compliance date.
 - Note: As previously proposed, order would be required to be placed 18 months in advance.
 - Would be required to submit signed purchase order.
 - Would be required to submit explanation/documentation substantiating the delay.
- Fleet operator would be required to notify CARB of any changes to the projected delivery date within 30 days.

Draft Regulatory Concept: Infrastructure Delay Compliance Extension

- To address delays that are outside the Fleet Operator's control in getting infrastructure installed.
- Facility-Side Infrastructure Delays
 - Eligible reasons could include change of a general contractor, delays obtaining construction permits, delays due to unexpected safety issues, discovery of resources described in the California Environmental Quality Act, or natural disasters.
 - Up to a two-year extension could be granted.
- Extensions for utility-side infrastructure delays up to five years and would depend on specific circumstances and information provided by the applicable utility.

Draft Regulatory Concept: Infrastructure Delay Compliance Extension (Cont'd)

- Guiding Principles
 - Recognize circumstances beyond the fleet owner's control
 - Extension if fleet cannot otherwise comply
 - Fleets must act in good faith to meet project deadlines
 - Fleet owner must deploy all zero-emission forklifts that are feasible
 - Consider all fleet locations
 - Consistent with existing planning processes
 - Coordinate with Advanced Clean Fleets team to achieve, as practicable, consistency across CARB programs

Draft Regulatory Concept: Feasibility Delay Compliance Extension

- Staff is considering a potential extension for feasibility issues, such as:
 - Lack of zero-emission forklift models with adequate water/dust intrusion ratings,
 - Lack of zero-emission forklift models that meet a necessary operational or design specification, etc.
- Would need to be based on objectively verifiable criteria.
- Fixed sunset date.

Draft Regulatory Concept: Exemptions

Draft Regulatory Concept: Low-Use Exemption

- < 200 hours/year
- Limited to 10% of fleet (LSI and ZE)
- Fleet reporting required
- Annual operating-hours reporting (with photo of hour meter)
- Forklift label required
- Exemption sunsets in 2031, except for microbusinesses, which would be allowed to maintain one low-use forklift indefinitely.

Draft Regulatory Concept: Emergency Operations

- Staff seeks comment on whether an exemption is needed for emergency operations
- Staff requests information on how Affected Forklifts are used during emergency operations.
- Staff also requests input on how to structure a potential exemption for emergency operations.

Draft Regulatory Concept: Remote Location Exemption

- Staff continues to hear stakeholder concerns about Affected Forklifts used at remote locations.
- Staff requests more information on such forklifts and how they operate. In particular, staff is interested in operations where such forklifts do not typically return to a home base.
- Staff also requests for input on how to define criteria for a remote location and how to structure a potential exemption for remote location operation.

Draft Regulatory Concept: Requirements for Rental Agencies, Dealers, and Manufacturers

Draft Regulatory Concept: Forklift Rental Agencies and Dealers

- Rental Agencies
 - Subject to same model-year phase-out schedule and associated requirements applicable to Fleet Operators.
 - Allowed to purchase new Class V Affected Forklifts until 2029.
- Dealers
 - Affected Forklift sales restrictions
 - Sales reporting and recordkeeping requirements

Draft Regulatory Concept: Forklift Manufacturers

- Certification to zero-emission standards for applicable forklifts sold in California
- Annual production and sales reporting requirements

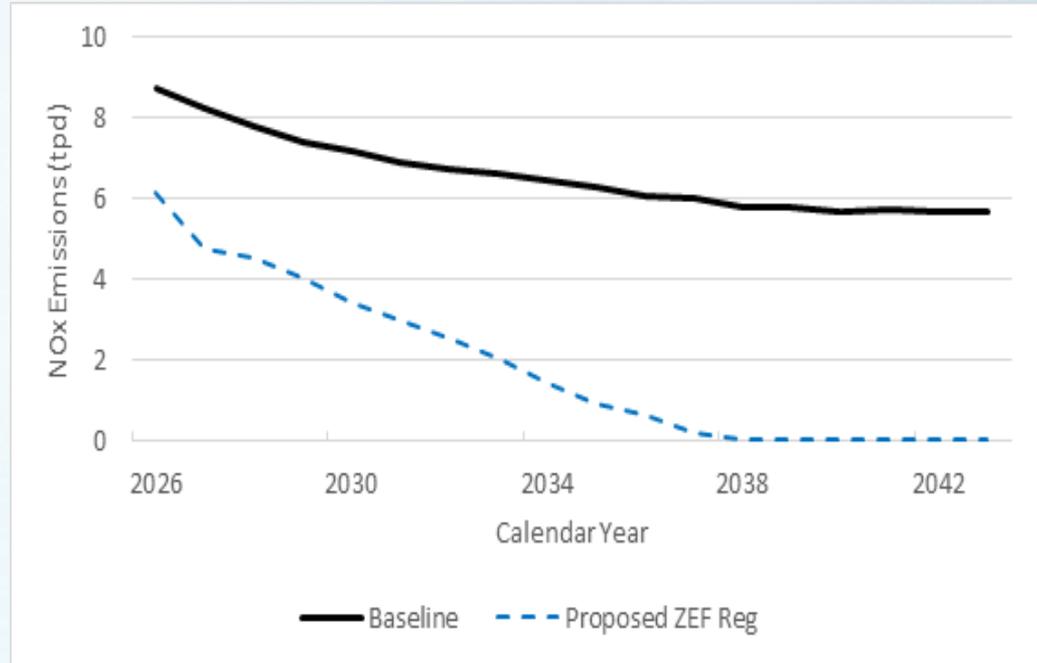
Draft Regulatory Concept: Other Changes to Fleet Operator Requirements Under Consideration

- Removing allowance for a Fleet Operator to purchase a new Affected Forklift for low-use.
- Establishing process for a fleet to retire an Affected Forklift without having to immediately remove the forklift from the premises.
- Streamlining reporting requirements.
- Removing requirements for forklift and forklift-engine manufacturers.

Emission Benefits

Preliminary Estimate of Emission Reductions*

- 8.7 tons per day (tpd) NO_x emission reductions by 2038
- 0.64 tpd PM_{2.5} emission reductions by 2038
- 1.24 tpd ROG emission reductions by 2038
- 13.2 million metric tons cumulative CO₂ emission reductions by 2043



*Based on previous draft regulatory concept without the proposed changes presented herein.

Costs

Preliminary Estimate of Direct Costs*

	Total Direct Costs	Total Direct Savings	Net Direct Costs
Statewide	\$9.3 billion	\$13.8 billion	Savings of \$4.5 billion

- Cumulative costs from 2026 to 2043 in 2021 dollars
- Includes taxes and cost amortization.
- Savings due to combination of reduced maintenance and fuel costs as well as Low Carbon Fuel Standard (LCFS) credits for zero-emission forklifts

*Based on previous draft regulatory concept without the proposed changes presented herein.

Preliminary Estimate of Statewide Avoided Mortality & Morbidity Incidents[^]

	Number of Incidents Avoided
Cardiopulmonary mortality	845 (660 – 1,034; 95% CI*)
Hospitalizations for cardiovascular illness	136 (0 – 267; 95% CI)
Hospitalization for respiratory illness	163 (38 – 287; 95% CI)
Emergency room visits	422 (267 – 578; 95% CI)

*CI - Confidence interval; 2020 through 2043

[^]Based on previous draft regulatory concept without the proposed changes presented herein.

Return on Investment

Example 1- Typical Business

- 8,000-pound lift capacity forklift with a lithium-ion battery
- 1,914 annual operating hours
- \$0.18/kilowatt-hour electrical rate
- Upfront costs*
 - \$102,800 includes new forklift, battery, & charger
 - Infrastructure installation: \$3,650 per forklift (excludes utility-side costs)
- Savings (Fuel, Maintenance, and LCFS): \$7,300 Annually
- Return-on-Investment (ROI) in 5.9 years

* Does not include amortization of costs;
Propane upfront cost - \$63,400

Return on Investment

Example 2 – Small Business

- 8,000-pound lift capacity forklift with lead-acid battery
- 1,044 annual operating hours
- \$0.18/kWh electrical rate
- Upfront costs
 - \$88,200 includes new forklift, battery & charger
 - Infrastructure installation: \$3,650 per forklift (excludes utility-side costs)
- Savings (Fuel, Maintenance, and LCFS): \$4,000 Annually
- ROI in 7.2 years

* Does not include amortization of costs;
Propane upfront cost - \$63,400

Environmental Analysis

Proposed Regulation Environmental Analysis

- Environmental Analysis (EA) being prepared analyzing potentially significant adverse impacts caused by reasonably foreseeable actions.
- Meets requirements of CARB's certified program under the California Environmental Quality Act (CEQA).
- The CEQA Environmental Checklist (CEQA Guidelines Appendix G) is used to identify and evaluate potential indirect impacts.
- The EA will be an appendix to the Staff Report.

Proposed Regulation Environmental Analysis to be prepared

- The EA will include:
 - Description of reasonably foreseeable actions taken in response to the proposal.
 - Programmatic level analysis of potential adverse impacts caused by reasonably foreseeable actions
 - Beneficial impacts
 - Feasible mitigation measures to reduce/avoid significant impacts
 - Alternatives analysis
- Input invited at this early stage on appropriate scope and content of the EA.
- Draft EA will be released for 45-day public comment period.

Feedback, Next Steps, and Contact Information

Feedback Requested

- Any comments or concerns regarding the draft regulatory concept?
- Emergency Operations
 - Are there LSI forklift fleets dedicated to emergency operations?
 - How are LSI forklifts used in emergency operations?
- Remote Worksite
 - Where are LSI forklifts used at remote worksites?
 - Suggestions on how to define a remote worksite?

Feedback Requested (Continued)

- Infrastructure Delay
 - What documentation could fleets provide CARB to substantiate infrastructure efforts and status?
 - How far in advance of a compliance date should a fleet be required to contact their electric utility?
- Feasibility Delay
 - What documentation could fleets provide CARB to substantiate that zero-emission forklifts are not feasible at their facility?

Next Steps

- Obtain feedback/information from stakeholders through individual meetings and emails.
- Finalize Regulation language in the Spring of 2023.
- Submittal of Standardized Regulatory Impact Analysis to Department of Finance by April of 2023
- Possible additional workshops or workgroup meetings
- Board consideration in the Fall of 2023

Contacts

Zero-Emission Forklift Rulemaking

- Keith Roderick, Air Resources Engineer Staff Lead (keith.roderick@arb.ca.gov); 279-208-7768
- David Chen, Advanced Emission Control Strategies Section Manager (david.chen@arb.ca.gov)

Webpage & Email Sign-Up

- **Webpage:**
 - **<https://arb.ca.gov/zeforklifts>**
- **Sign-Up for Zero-Emission Forklifts Email Updates**
 - **https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=zeforklifts**
- **General Information on Existing Off-Road Equipment Regulations: <https://ww2.arb.ca.gov/OffRoadZone>**

Questions/Comments

Backup Slides

Regulatory Concept Review: Qualifying as a Microbusiness

- ≤ 25 employees, $\leq \$5M$ annual gross receipts (California Government Code 14837)
- Annual reporting to CARB
- Must maintain at the facility tax returns from previous 3 years and, if the business has employees, the Quarterly Contribution Return & Report of Wages (Continuation) Form DE 9C from the four most recent quarters.
- Businesses that outgrow microbusiness designation shall have one year to adjust to the regulation requirements for small or large fleets

Revised Regulatory Concept: Grouped Model Year Phase-Out

Compliance Date	Class IV Forklifts Large Fleets	Class IV Forklifts Small Fleets & Agriculture	All Class V Forklifts
Jan 1, 2028	2018 MY & older	---	---
Jan 1, 2029	---	2016 MY & older	---
Jan 1, 2030	---	---	2017 MY & older
Jan 1, 2031	2019 – 2021 MY	---	---
Jan 1, 2032	---	2017 – 2019 MY	---
Jan 1, 2033	2022 & 2023 MY	---	2018 – 2020 MY
Jan 1, 2034	---	2020 & 2021 MY	---
Jan 1, 2035	2024 & 2025 MY	---	2021 & 2022 MY
Jan 1, 2036	---	2022 & 2023 MY	---
Jan 1, 2037	---	---	---
Jan 1, 2038	---	2024 & 2025 MY	2023 – 2025 MY