Updated Informative Digest

Proposed Zero-Emission Forklift (ZEF) Regulation

Sections Affected:

California Air Resources Board (CARB) proposes to modify section 2775.1 of the California Code of Regulations (CCR), title 13 and add to the CCR, title 13, the following sections: 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, and 3011.

Documents Incorporated by Reference (Cal. Code Regs., tit. 1, § 20, subd. (c)(3)):

The following documents, test methods, and model would be incorporated in the regulation by reference as specified by section:

American National Standard Institute, “Safety Standard for Rough Terrain Forklift Trucks”, 2021, ANSI B56.6-2021, incorporated by reference in CCR, title 13, section 3000.

American National Standard Institute, “Safety Standard for Vehicle Mounted Forklifts”, 2020, ANSI B56.14-2020, incorporated by reference in CCR, title 13, section 3000.

Title 29, Code of Federal Regulations, Part 1910.147(b), last amended on July 25, 2011, incorporated by reference in CCR title 13, section 3000.

Background and Effect of the Proposed Regulatory Action:

CARB mobile source programs have made significant progress in improving air quality throughout California. However, many areas throughout the State still fail to attain the National Ambient Air Quality Standards (NAAQS) for ozone and fine particulate matter (PM) (i.e., PM2.5). About 67% of California's population, some 26 million people, live in areas exposed to concentrations above the federal ozone and PM2.5 3 standards[1]. In addition, climate change continues to impact California communities and the environment by increasing smog

[1] Based on 2021 monitored ozone design values contoured over population by census tract.

formation[2,3,4]; extending the pollen season; contributing to intense wildfires[5]; creating hotter temperatures that could cause heat-related health problems[6,7]; cause weather extremes, such as drought[8] and flooding[9,10]; and increase prevalence of infectious diseases[11,12]. Taking action to reduce criteria-pollutant and greenhouse gas (GHG) emissions is urgently needed to reduce the toll air pollution and climate change is taking on Californians.

Mobile sources and the fossil fuels that power them are the largest contributors to the formation of ozone, GHG emissions, fine PM (i.e., PM2.5), and toxic diesel PM. The combustion of fossil fuel by mobile sources accounts for approximately 80% of smog-forming nitrogen oxide (NOx) emissions, 90% of the diesel PM emissions, and nearly 40% of statewide GHG emissions[13,14,15]. Of that, off-road equipment contributes to approximately 14% of the NOx

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[2] Reidmiller, D.R., et al., Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, Chapter 14, Human Health, U.S. Global Change Research Program, 2018 (web link: *https://nca2018.globalchange.gov/chapter/14/*).

[3] McMichael, A.J. et al. (Eds.), Climate Change and Human Health: Risks and Responses, World Health Organization, page 12, 2003 (web link: https://apps.who.int/iris/bitstream/handle/10665/42742/ 924156248X_eng.pdf?sequence=1&isAllowed=y).

[4] NRDC, Issue Brief: Climate Change and Health in California, page 3, February 2019 (web link: *https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf*).

[5] Singleton, M.P. et al., Increasing Trends in High-Severity Fire in the Southwestern USA from 1984 to 2015, Forest Ecology and Management, Volume 433, 2019 (web link: *https://www.fs.usda.gov/rm/pubs_journals/2019/rmrs_2019_singleton_m001.pdf*).

[6] Kadir, T. et. al (Eds.), Indicators of Climate Change in California, Office of Environmental Health Hazard Assessment, August 2013 (web link: https://oehha.ca.gov/media/downloads/climatechange/document/climatechangeindicatorsreport2013.pdf).

[7] California Air Resources Board, Health & Air Pollution (web link: https://ww2.arb.ca.gov/resources/health-airpollution, last accessed August 2023).

[8] Mann, M.E. and Gleick, P.H., Climate Change and California Drought in the 21st Century, Proceedings of the National Academy of Sciences of the United States of America, March 2015 (web link: *https://www.pnas.org/doi/epdf/10.1073/pnas.1503667112*).

[9] Swain, D.L. et al., Increasing Precipitation Volatility in Twenty-First-Century California, Nature, 2018 (web link: https://www.sierraforestlegacy.org/Resources/Conservation/FireForestEcology/ThreatsForestHealth/Climate/CI_Swain_etal_2018_Increasing_Precip_Volatility.pdf).

[10] Dettinger, M., Climate Change, Atmospheric Rivers, and Floods in California—a Multimodel Analysis of Storm Frequency and Magnitude Changes, Journal of the American Water Resources Association, June 2011 (web link: *https://ca.water.usgs.gov/pubs/2011/climate-change-atmospheric-rivers-floods-california-dettinger.pdf*).

[11] Lindgren, E. et al., Monitoring EU Emerging Infectious Disease Risk Due to Climate Change, Science, April 2012 (web link: https://www.researchgate.net/publication/224856024_Monitoring_EU_Emerging_Infectious_Disease_Risk_Due_to_Climate_Change).

[12] Solomon, G. et al., Airborne Mold and Endotoxin Concentrations in New Orleans, Louisiana, After Flooding, October through November 2005, Environmental Health Perspectives, September 2006 (web link: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1570051/*).

[13] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, page 184, December 2022 (web link: *https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf*).

[14] California Air Resources Board, Mobile Source Strategy, page 5, May 2016 (web link: *https://ww3.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf*).

[15] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, page 56, Figure 1-8: 2019 State GHG emission contributions by Scoping Plan sector, December 2022 (web link: HYPERLINK "https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf"*https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf*).

emissions and 7% of the PM emissions attributable to mobile sources[16]. GHG emissions[17,18,19]. Of that, off-road equipment contributes to approximately 14% of the NOx emissions and 7% of the PM emissions attributable to mobile sources[20].

The Proposed Regulation has been identified in the 2022 State Strategy for the State Implementation Plan (SIP), the 2020 Mobile Source Strategy, and the Sustainable Freight Action Plan as one of several measures necessary for California to achieve its established air-quality and climate goals.

Forklifts that use internal combustion engines can be spark-ignited (i.e., gasoline, propane, or natural gas) or compression-ignited (i.e., diesel). Large Spark-Ignition (LSI) forklifts are spark-ignited forklifts of 25 horsepower or greater.

As described in the Staff Report, the Proposed Regulation is critical to meeting California's State and Federal air quality standards, protecting public health and achieving the State's climate goals. The Proposed regulation aims to further curb criteria, toxic and GHG emissions from LSI engine powered forklifts. Given the advanced state of zero-emission forklift (ZEF) technology, phased-out LSI forklifts are likely to be replaced with zero-emission technology (i.e., battery-electric or fuel cell electric). Certain types of forklifts, such as rough-terrain forklifts and diesel forklifts, would not be addressed by the Proposed Regulation.

About half of the forklift population in California already uses ZEF technology largely due to advantages that ZEFs can provide, such as reduced indoor air pollution and lower operating costs. The Proposed Regulation would target most existing LSI forklifts.

Objectives and Benefits of the Proposed Regulatory Action:

The primary objectives of the Proposed Regulation include the following:

- Decrease and eliminate emissions from petroleum and fossil-fuel use by forklifts by setting standards that eliminate exhaust emissions from forklifts. Emissions from petroleum use as an energy resource contribute substantially to the following public

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[16] California Air Resources Board, Staff Report for the Proposed Amendments to the In-Use Off-Road Diesel Fueled Fleets Regulation, page 35, September 2022 (web link: https://ww2.arb.ca.gov/sites/default/ files/barcu/regact/2022/off-roaddiesel/isor.pdf).

[17] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, page 184, December 2022 (web link: *https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf*).

[18] California Air Resources Board, Mobile Source Strategy, page 5, May 2016 (web link: *https://ww3.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf*).

[19] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, page 56, Figure 1-8: 2019 State GHG emission contributions by Scoping Plan sector, December 2022 (web link: HYPERLINK "https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf"*https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf*).

[20] California Air Resources Board, Staff Report for the Proposed Amendments to the In-Use Off-Road Diesel Fueled Fleets Regulation, page 35, September 2022 (web link: https://ww2.arb.ca.gov/sites/default/ files/barcu/regact/2022/off-roaddiesel/isor.pdf).

health and environmental problems, among others: air pollution and its associated health impacts, acid rain, global warming, and the degradation of California's marine environment and fisheries (PRC Section 25000.5[b], [c]).

- Decrease GHG emissions in support of statewide GHG reduction goals by adopting strategies to deploy ZEFs in California to support the Scoping Plan, which was developed to reduce GHG emissions in California, as directed by Assembly Bill (AB) 32 (Nu?ez, Chapter 488, Statutes of 2006) and Executive Order S-3-05 (Ch. 249, Stats. 2016, Pavley).

- Develop a regulation that is consistent with and meets the goals of the SIP, providing necessary emissions reductions for all of California's nonattainment areas to meet NAAQS (Health & Safety Code Sections 39002, 39003, 39602.5, 43000, 43000.5, 43013, and 43018).

- Maintain and continue reductions in emissions of GHGs beyond 2020, in accordance with Senate Bill (SB) 32 (Health & Safety Code Sections 38551(b), 38562, 38562.5, 38566); and pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to the 1990 level by 2020 and 40% below the 1990 level by December 31, 2030. In addition, target and achieve carbon neutrality in California as soon as possible, but no later than 2045, pursuant to SB 100 (De León, Chapter 312, Statutes of 2018) and AB 1279 (Muratsuchi, Chapter 337, Statutes of 2022), maintain net negative emissions thereafter in accordance with AB 1279 and Executive Order B-55-18, and to ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels, pursuant to AB 1279.

- Support ZEF sales and Executive Order N-79-20's goal of making off-road operations zero-emission (ZE) by 2035.

- Complement existing programs and plans to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, criteria pollutants, petroleum-based transportation fuels, and toxic air contaminant emissions.

- Incentivize and support emerging zero-emission technology that will be needed to achieve CARB's SIP goals.
- Achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable (Health & Safety Code Sections 38560, 38562(d)(1)).

- Provide market certainty for ZET and charging and hydrogen-fueling infrastructure to guide the acceleration of the development of environmentally superior ZEFs that will continue to deliver performance, utility, and safety demanded by the market.

- Take steps to ensure all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution. Protect and preserve public health and 6 well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health & Safety Code Section 43000(b)).

- Spur economic activity of ZET in the off-road sectors. Incentivize innovation that will enable emissions reductions through greater use in California's economy of clean and sustainable ZET and promote increased economic and employment benefits that will accompany this. (AB 1493, Section 1(g) (Pavley, Chapter 200, Statutes of 2002); Health & Safety Code Section 38501(e)).

- Establish a fair and level playing field among fleet operators, forklift manufacturers, forklift dealers, and forklift rental agencies.

- Craft requirements in a way that ensures institutional capacity for CARB to manage, implement, and enforce requirements.

The Proposed Regulation is one of many regulatory measures that will be needed to achieve California's air-quality, climate, and ZE goals and would establish phase-out requirements applicable to the most common internal-combustion forklifts used in industry and other applications across the State. Given operational constraints (such as indoor operation and forklift size) and the state of ZEFT phased-out LSI forklifts are expected to be ultimately replaced with ZEF (battery-electric or fuel-cell powered).

Full implementation of the Proposed Regulation through calendar year 2043 is expected to result in the following emission reductions:

- 18,724 tons of NOx.
- 2,075 tons of PM2.5.
- 4,973 tons of reactive organic gases (ROG).
- 9.4 million metric tons (MMT) of carbon dioxide (CO2).

Estimated cumulative health impacts of the Proposed Regulation through calendar year 2043 include the following:

- 544 avoided cardiopulmonary mortalities.
- 115 fewer hospital admissions for cardiovascular disease.
- 148 fewer cases of cardiovascular Emergency Department visits.
- 62 fewer cases of nonfatal acute myocardial infarction.
- 17 fewer hospitalizations for respiratory disease.
- 321 fewer cases of respiratory Emergency Department visits.
- 42 fewer cases of lung cancer incidence.
- 1,295 fewer cases of asthma onset.
- 109,800 fewer cases of asthma symptoms.

- 80,635 fewer cases of work loss days.
- 272 fewer hospitalizations for Alzheimer's disease.
- 39 fewer hospitalizations for Parkinson's disease.

Cumulative cost-savings from full implementation of the Proposed Regulation through calendar year 2043 are estimated as follows:

- $7.5 billion in health benefit savings.
- $0.25 to $1 billion in social cost of carbon savings.
- $2.7 billion in net fleet cost savings.

Without the Proposed Regulation, the ZEF population is expected to remain somewhat constant, at a population of about 79,000. The Proposed Regulation is projected to significantly increase the number of ZEFs in California. The estimated number of ZEFs would increase from about 79,000 to about 109,000 in 2031, and to about 168,000 ZEFs by 2038, when full implementation would be reached.

Description of Regulatory Action

The Proposed Regulation would require California fleets to phase out most LSI forklifts over time. The Proposed Regulation includes two primary components: a restriction on the sale and acquisition of LSI forklifts starting on January 1, 2026, and phase-out requirements starting on January 1, 2028, for existing LSI forklifts. The Proposed Regulation would also establish requirements for forklift manufacturers, forklift dealers, and forklift rental agencies.

The Proposed Regulation is the result of an extensive public process. The ZEF measure was identified first in the 2016 MSS and also in the SIP and the Sustainable Freight Action Plan. In October 2023, CARB staff began informing the public of the initial concept of the Proposed Regulation and development process. Over the past almost 4 years of development, staff hosted 5 public workgroups, and workshops. CARB staff reached out directly to affected stakeholders and conducted numerous meetings with many groups and individuals. CARB staff also sent more than 470,000 mailers and numerous emails to over 70,000 recipients from email distribution lists. CARB staff offered engagement opportunities to receive feedback and solicited alternatives from a variety of groups and stakeholders, including manufacturers, large fleet owners, operators, environmental advocacy organizations and the public. Through this public process, staff considered all stakeholder feedback and integrated many stakeholder's concepts into the Regulation.

CARB opened a 45-day public comment period in the Public Hearing Notice. The public comment period began on November 10, 2023, and ended on December 26, 2023. CARB received 336 written comments during the 45-day comment period. In response to the comments received, CARB made changes to the Proposed Regulation. Staff's proposed changes and supporting documents, including 106 additional references, were made available for a 15-day comment period through a "Notice of Public Availability of Modified Text and Availability of Additional Documents and Information" (15-Day Notice). The 15-Day Notice and

modified regulatory language were posted on May 21, 2024, for public review and comment through June 5, 2024. During the comment period, the Board received 14 additional written comments. Staff received and responded to the comments and determined that no further changes to the Regulatory Order were necessary.

The following is a high-level summary of the most significant modifications made to the original proposal in response to stakeholder comments. The summary of changes does not include any definitions, edits made for clarity or those used to restructure. For more detailed information on each change and their purpose and rationale, see the Proposed Regulation 15-Day Notice on CARB's website:

https://ww2.arb.ca.gov/rulemaking/2023/zeforkliftsregulation

Changes to the Regulation include

- A change of title from "ZEF Fleet Requirements Regulation" to "ZEF Regulation" in order for the title of the Proposed Regulation to be consistent with the other rulemaking documents included in the rulemaking package and to reflect that the regulation includes requirements not just for fleets but also for dealers, rental agencies, and manufacturers.

- Removal of the ZE standard that had been added to Section 2433, Emission Standards and Test Procedures – Off-Road Large Spark Ignition Engines. Inclusion of a ZE standard would have inadvertently triggered certification requirements for ZEFs, which were not intended. ZEFs have been used successfully for decades and certification would not provide significant tangible benefits to the forklift consumer at this time.

- Exclusions to the requirement that starting January 1, 2026, LSI forklift manufacturers cannot produce for sale or offer for sale a Class IV LSI forklift in California, and starting January 1, 2029, cannot produce for sale or offer for sale a Class V LSI forklift with a rated capacity of 12,000 pounds or less. The exclusions are addressed in section 3005(c) and include forklifts operated: as Dedicated Emergency forklifts; solely on San Nicolas and San Clemente Islands; as In-Field Forklifts; or as replacements to forklifts overed by Operational Extensions or Infrastructure Site Electrification Delay Extensions.

- Changes and additions to definitions in section 3001 to improve specificity and clarity and to incorporate an exemption of In-Field Forklifts which is set forth in section 3007(a)(6).

- Addition of "sell-through" provisions, requested by several stakeholders, allowing Dealers to sell 2025 Model Year (MY) LSI Forklifts until the end of 2026 so that such Dealers would be able to clear inventory remaining at the end of 2025.

- Addition of a new section 3002(a)(6) to exclude the acquisition of LSI Forklifts from the restriction set forth in section 3002(a) if the Fleet Operator has qualified for an Operational Extension or an Infrastructure Site Electrification Delay Extension and is replacing an existing LSI forklift covered by such extension. Also note that throughout the Proposed Regulation, the term, “Operational Extension” is replacing the term “Technical Infeasibility Extension,” as it more accurately characterizes the extension.

- Addition of a new section 3006(e) and its subordinate sections to establish phase-out percentage caps intended to help ease the compliance burden for older fleets. This would address concerns from numerous commenters that such fleets could be required to phase out nearly all their forklifts by their first compliance date.

- Deletion of Section 3007(a)(1)(B) to address stakeholder comment that fleets should not be required to acquire a forklift of a specific MY only to operate it as a low use forklift. This change is being made because the intent of the Proposed Regulation is to allow fleets to use forklifts they phase out as low-use forklifts, not acquire additional forklifts for that purpose.

- Removal from section 3007(a)(3)(B), of the text, “work attachments, such as the forks,” from the phased-out forklift tagout requirements, reducing the tagout burden in response to stakeholder comments.

- Addition of new sections 3007(a)(6)(B), 3007(a)(6)(B)1., 3007(a)(6)(B)2., 3007(a)(6)(B)3., and 3007(a)(6)(B)4. to set forth the requirements for monitoring hours of use of an In-Field Forklift. These requirements are necessary so that it would be possible to verify that forklifts designated as In-Field Forklifts operated as In-Field Forklifts pursuant to the Proposed Regulation. The monitoring requirements are analogous to the monitoring requirements set forth for Dedicated Emergency Forklifts.

- Modification throughout the Proposed Regulation of the term “Phase-Out Extension” to the more general term “Extension,” because the term “Phase-Out” no longer accurately identifies all extensions.

- Addition to Section 3007(b)(3)(A)1.a. of the four additional scenarios under which a Fleet Operator could qualify for an Infrastructure Construction Delay Extension:

    - The first scenario is when the delivery of necessary building materials has been delayed, and the delays are beyond the Fleet Operator’s control.

    - The second scenario is when a Fleet Operator faces delays in construction of ZEF-related storage or shelter other than a delay in the delivery of necessary building materials, and the delays are beyond the Fleet Operator’s control.

    - The third scenario is when a Fleet Operator faces delays in obtaining a permit, and the delays are beyond the Fleet Operator’s control.

- The fourth scenario is when a Fleet Operator is a tenant and is experiencing issues with obtaining landlord approval for the installation of the infrastructure upgrades necessary to charge or fuel ZEFs.

- Addition in section 3007(b)(4), of text to allow an Operational Extension to be used to allow the replacement of a qualifying LSI forklift with another LSI forklift, even if the replacement is years in advance of the upcoming compliance date. A 2026 MY or newer replacement LSI forklift would be allowed even though the regulation generally prohibits possession, sale, and use of LSI forklifts of MY 2026 and newer. It is necessary to allow fleets to obtain replacement LSI forklifts in such situations, because, if an Operational Extension applies, there is no commercially available ZEF model that can meet the needs of an operation. This change is needed due to the broadening of the Operational Extension to allow replacement LSI forklifts years in advance of the applicable compliance date.

- Clarification in section 3007(b)(4)(E) that if an Operational Extension expires or is denied, the fleet has 180 days to get into compliance and would be allowed to apply for an Infrastructure Construction Delay Extension, Infrastructure Site Electrification Delay Extension, or ZEF Delivery Delay Extension, if needed, addition of section 3007(b)(5) and subordinate sections to allow for the sale of LSI forklifts to Fleet Operators that are replacing existing LSI forklifts included in an Operational Extension or an Infrastructure Site Electrification Delay Extension. This change is necessary to allow Fleet Operators to continue operations should an LSI Forklift included in an Operational or Infrastructure Site Electrification Delay Extension become inoperable or impractical to operate.

- Modification of section 3011(a) to reflect removal of the prohibition on acquisition of a Diesel Forklift as a replacement for a Class IV LSI Forklift or a Class V Forklift of a Rated Capacity up to 12,000 pounds. The prohibition was removed since Diesel Forklifts are already regulated under the In-Use Off-Road Diesel-Fueled Fleets Regulation, and bifurcating the provisions for Diesel Forklifts between two regulations could cause confusion. Instead, text has been added to require that when a Diesel Forklift is acquired on or after January 1, 2026, the Fleet Operator or Rental Agency needs to report whether the Forklift is doing work previously performed by a Class IV LSI Forklift of any Rated Capacity or a Class V LSI Forklift of a Rated Capacity of 12,000 pounds or less that has been phased out of the Fleet.

In accordance with Government Code section 11346.8, the Board directed the Executive Officer to adopt the proposed amendments after making any appropriate conforming modifications, as well as any additional supporting documents and information, available to the public for a period of at least 15 days. The Board further provided that the Executive Officer shall consider such written comments as may be submitted during this period, shall make such modifications as may be appropriate in light of the comments received, and shall present the regulations to the Board for further consideration if warranted.

Comparable Federal Regulations:

The SIP acknowledges the need for emission reductions in the off-road vehicle sector and has included the Proposed Regulation as one of the measures that will support meeting the air quality standards established in the federal Clean Air Act.[21]

There are currently no federal requirements for fleets or rental agencies to phase out the purchase or use of Targeted LSI forklifts. There are also no federal requirements prohibiting manufacturers or dealers from selling Targeted LSI forklifts.

An Evaluation of Inconsistency or Incompatibility with Existing State Regulations (Gov. Code, § 11346.5, subd. (a)(3)(D)):

During the process of developing the proposed regulatory action, CARB conducted a search of any similar regulations on this topic and concluded these regulations are neither inconsistent nor incompatible with existing state regulations.

[21] Occupational Safety and Health Administration, Powered Industrial Trucks (Forklift) eTool (web link: https://www.osha.gov/etools/powered-industrial-trucks/types-fundamentals/types/classes, last accessed August 2023).