

Date of Hearing: April 15, 2024

ASSEMBLY COMMITTEE ON TRANSPORTATION

Lori D. Wilson, Chair

AB 2760 (Muratsuchi) – As Amended April 8, 2024

SUBJECT: Lower Emissions Equipment at Seaports and Intermodal Yards Program

SUMMARY: Creates the Lower Emissions at Seaports and Intermodal Yards Program, administered by the California Air Resources Board (CARB), to certify cargo handling equipment (CHE) that reduces cumulative emissions compared to current regulatory baseline as “covered equipment” under the program, and further prohibits CARB from requiring the mandatory retirement, replacement, retrofit, or repowering of covered equipment until the end of its useful life. Specifically, **this bill:**

- 1) Defines “cargo handling equipment” as any off-road, self-propelled vehicle or equipment used at a port or intermodal rail yard to lift or move container, bulk, or liquid cargo carried by ship, train, or another vehicle, or used to perform maintenance and repair activities that are routinely scheduled or that are due to predictable process upsets.
- 2) Defines “covered equipment” as any hydrogen-powered CHE or off-road hybridized rubber-tire gantry cranes that significantly reduce criteria pollutants, toxic air contaminants, and greenhouse gas (GHG) emissions, and as including:
 - a) New equipment sold for operation at a seaport or intermodal yard;
 - b) Retrofit or replacement of old engines powering equipment with new or retrofitted engines, motors, or drives for operation at a seaport or intermodal yard; and,
 - c) Development and demonstration of advanced technologies for equipment for operation at a seaport or intermodal yard.
- 3) Defines “repower” as replacing an existing engine with a newer engine or power source.
- 4) Requires CARB to approve an application for covered equipment if the applicant demonstrates that:
 - a) The total surplus emissions from the covered equipment are lower cumulative emissions than the emissions resulting from compliance with the current applicable CHE statute, regulation, or rule; or,
 - b) The covered equipment meets the standards and definitions for zero emissions set forth under European Commission (EC) Regulation No. 2019/1242, whereby the heavy-duty vehicle either does not have an internal combustion engine or has an internal combustion engine that emits less than 1 g CO₂/kWh or 1 g CO₂/km.
- 5) Prohibits CARB from deeming an application ineligible for approval solely on the basis that subsequent purchase or funding for acquisition of covered equipment may be purchased using any state or federal grant funding, may be funded or used for credit under any state or federal emissions averaging, banking, or trading program, or participates in any other voluntary emission reduction program.

- 6) Prohibits CARB from deeming an application ineligible for approval solely on the basis that the subsequent purchase of covered equipment is entered into pursuant to a corporate or a controlling board's policy, plan, tenancy agreement, port lease, or any other contract.
- 7) Prohibits CARB from approving an application for the sale, manufacture, distribution, or retrofit of fully automated CHE or infrastructure that is used to support fully automated CHE.
- 8) Establishes eligible applicants as any individual, company, or public agency that sells, resells, distributes, or manufactures CHE for the purposes of operating at a seaport or intermodal yard in the state.
- 9) Requires CARB to certify CHE as covered equipment if the applicant demonstrates that the CHE:
 - a) Demonstrates cumulative emissions reductions of NO_x, diesel particulate matter, and GHGs greater than the regulatory baseline over the useful life of the CHE; and,
 - b) Demonstrates immediate emissions reductions of NO_x and diesel particulate matter upon initial use in operations at least 10% greater than the regulatory baseline at the time of application.
- 10) Requires an applicant to submit an application by December 31, 2025, and include:
 - a) Methodologies for evaluating cumulative emissions reductions of nitrous oxides (NO_x), diesel particulate matter, and GHGs;
 - b) A methodology for determining the useful life of a piece of CHE; and,
 - c) A baseline emissions profile for regulated emission reductions of nitrogen oxides, diesel particulate matter, and GHGs based on the application of both the current applicable statutes, regulations, and rules regarding CHE regulation.
- 11) Requires CARB to establish an application fee, to be deposited in the Air Pollution Control Fund and made available upon appropriation, in a reasonable amount to cover the administrative costs of processing applications.
- 12) Prohibits CARB from adopting a rule or regulation requiring the retirement, replacement, retrofit, or repower of any covered equipment that is purchased before January 1, 2027, until the end of the useful life of the equipment for all equipment except rubber-tired gantry cranes, and specifically for covered equipment rubber-tired gantry cranes purchased before January 1, 2027, until the end of the useful life of the equipment or January 1, 2045, whichever date is earlier.
- 13) Requires CARB, by January 1, 2027 and January 1, 2031, to hold at least one public workshop and evaluate the impact of the program on state and local clean air efforts to meet state and local clean air goals.
- 14) Is repealed on January 1, 2032.

EXISTING LAW:

- 1) Establishes CARB as the air pollution control agency in California and requires CARB, among other things, to control emissions from a wide array of mobile sources and coordinate with local air districts to control emission from stationary sources in order to implement the Federal Clean Air Act. (Health and Safety Code (HSC) 39602; HSC 39602.5)
- 2) Requires CARB, pursuant to California Global Warming Solutions Act of 2006 (AB 32 (Núñez) Chapter 488, Statutes of 2006) to adopt a statewide GHG emissions limit equivalent to 1990 levels by 2020 and to develop a scoping plan for achieving the maximum technologically feasible and cost effective reductions in GHGs. (HSC 38500)
- 3) Requires, pursuant to SB 32 (Pavley) Chapter 249, Statutes of 2016 that CARB ensure that statewide GHG emissions are reduced to at least 40% below 1990 levels by 2030. (HSC 38566)
- 4) Provides, pursuant to the California Climate Crisis Act (AB 1279 (Muratsuchi) Chapter 337, Statutes of 2022) that it is the policy of the state to do both of the following:
 - a) Achieve net zero GHG emissions as soon as possible but no later than 2045; and,
 - b) Ensure that by 2045, GHG emissions are reduced to at least 85% below 1990 levels.

FISCAL EFFECT: Unknown

COMMENTS: A shipping container is a large standardized container designed to be used across different modes of transport—from ship to rail to truck—without unloading or reloading the cargo. Container ports are facilities where cargo or shipping containers are transferred between different vehicles and machinery to move goods, both containerized and bulk. CHE such as yard trucks (hostlers), rubber-tired gantry cranes, container handlers, and forklifts are central to port operations.

This bill defines “cargo handling equipment” as any off-road, self-propelled vehicle or equipment used at a port or intermodal rail yard to lift or move container, bulk, or liquid cargo carried by ship, train, or another vehicle; including, but not limited to, rubber-tired gantry cranes, yard trucks, top handlers, side handlers, reach stackers, forklifts, loaders, aerial lifts, excavators, and dozers as shown in the table below. The bill excludes on-road yard trucks as well as fully automated CHE or infrastructure used to support fully automated CHE.

Most port equipment is powered by diesel or gasoline. Emissions from ports contribute to poor air quality that affects not only port workers, but also those who live and work in neighboring communities. Often these are low-income or disadvantaged communities. Diesel- and gasoline powered port equipment also produces GHGs, contributing to climate change. In recent years, several ports have set goals to become zero-emission, or green, ports, including the Port of Hueneme, and the larger Ports of Long Beach and Los Angeles.

CARB adopted the Mobile Cargo Handling Equipment Regulation on December 8, 2005, to reduce toxic and criteria emissions to protect public health and it was fully implemented by the end of 2017. The regulation requires CHE to use the Best Available Control Technology and has achieved a 91% reduction in diesel particulate matter and a 74% reduction in oxides of nitrogen

(NO_x). CARB staff are currently assessing the availability and performance of zero-emission technology as an alternative to all combustion-powered cargo equipment and evaluating additional solutions that may include efficiency improvements.

CARB plans to amend this regulation to transition CHE to zero-emission, starting in 2024. According to a proposal from CARB in 2018: “Staff would assess the availability and performance of zero-emission technology as an alternative to all combustion-powered cargo equipment and evaluate additional solutions that may include efficiency improvements. The regulatory amendments would propose an implementation schedule for new equipment and facility infrastructure requirements, with effective dates beginning in 2026. CARB staff would also consider opportunities to prioritize the earliest implementation in or adjacent to the communities most impacted by air pollution.” In CARB’s potential action, all mobile equipment at ports and rail yards would be subject to new requirements for zero-emission. Although CARB previously suggested effective dates beginning in 2026, CARB has not yet initiated the rulemaking process.

Increasingly, CHE may be powered by cleaner, alternative fuels, such as electricity, hydrogen, compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG). The table below shows the types of fuel that various types of power CHE can use today. Cleaner alternative power sources are developing and more will be available in the future.

Equipment	Gas	Diesel	CNG	LNG	LPG	Hybrid	Electric	Fuel Cell
Automated Guided Vehicle							✓	
Chassis Rotator		✓						
Container Crane		✓					✓	
Forklift	✓	✓	✓		✓		✓	✓
Log Stacker		✓						
Material Handler		✓				✓	✓	
Mobile Crane		✓					✓	
Pallet Jack							✓	
Reach Stacker		✓					✓	
Rubber-Tired Gantry Crane		✓				✓	✓	
Side Handler		✓			✓		✓	
Straddle Carrier		✓				✓	✓	
Terminal Tractor	✓	✓	✓	✓			✓	
Top Handler		✓					✓	

Source: Argonne National Laboratory, Cargo Handling Equipment at Ports, March 2022

In October 2023, the U.S. Department of Energy awarded \$1.2 billion to California’s Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) through the Regional Clean Hydrogen Hubs Program created under the Bipartisan Infrastructure Law. ARCHES is a statewide public-private partnership to produce and create a market for renewable hydrogen. The ARCHES program is expected to focus on hydrogen infrastructure projects in support of three hard-to-decarbonize sectors: heavy-duty vehicles, power plants, and ports.

Although most hydrogen strategies have focused on zero-emission hydrogen fuel cell (H₂FC) technology, including the Regional Clean Hydrogen Hubs Program, there has been renewed

interest in hydrogen-powered internal combustion engines (H₂ ICEs). Over the last few years both the public and private sector have explored H₂ ICEs for heavy-duty trucking and CHE applications. The DOE recently awarded \$10.5 million total, with individual awards of \$3.5 million each, to PACCAR Inc., Cummins Inc. and MAHLE Powertrain LLC to develop hydrogen combustion engines for medium- and heavy-duty applications. A number of heavy-duty engine manufacturers and light-duty car makers have also announced H₂ ICE prototypes in the works, as government regulations require them to decarbonize.

H₂ ICEs are an old but underutilized, pre-commercial technology. Due to similarities with traditional gasoline and diesel internal combustion engines, H₂ ICEs are much cheaper than H₂ FC technology in terms of manufacturing cost. H₂ ICEs can operate flexibly as bifuel systems, using either diesel or hydrogen, and can run on much less purified hydrogen as compared to H₂ FC systems, which require high purity hydrogen.

Unlike H₂ FC technology, however, H₂ ICEs would not be considered zero-emission under existing state regulations, since the high operating temperatures of H₂ ICEs generate NO_x and trace carbon dioxide (CO₂) emissions (from engine oil). However, H₂ ICEs produce significantly lower levels of other pollutant species compared to diesel-powered engines, and using optimized combustion processes and catalytic conversion after-treatment systems, tailpipe NO_x emissions from H₂ ICEs can be reduced to near zero.

Some studies have shown that the CO₂ emissions profile of hydrogen internal combustion engine technology may not be substantially less than diesel if emissions from hydrogen generation are included. Currently, hydrogen is largely produced from methane, with limited production of “green hydrogen” using cleaner solar or wind energy. The CO₂ emissions from hydrogen generation similarly apply to H₂ FC technology.

The state has prioritized advancement of zero-emission technologies as part of its climate goals. Among the fuel types listed above, only electric and fuel cell are considered to be zero-emission technologies. However, in Europe, H₂ ICE-equipped heavy duty vehicles are sanctioned as a “zero-emission” technology as long as they satisfy CO₂ emissions limits, for less than 1 g CO₂/kWh or 1g CO₂/km. Hydrogen-powered internal combustion engines are the only known internal combustion engine that meet these strict EU regulations.

Hydrogen fuel in internal combustion engine applications such as marine, rail, and ground, and other hard to decarbonize sectors could facilitate transition of CHE towards hydrogen fuel cells. H₂ ICEs also help build out hydrogen refueling networks for hydrogen fuel cells, by creating early demand while hydrogen production, infrastructure, material supply chains, and customer acceptance scale up.

This bill would create the Lower Emissions Equipment at Seaports and Intermodal Yards Program to guide the replacement of hydrogen-powered CHE that are not currently subject to any regulation requiring declining emissions standards. As hydrogen fuel cell technology is already zero-emission, this bill would specifically cover CHE having H₂ ICEs. This bill would require CARB to approve CHE with hydrogen-powered ICEs if they demonstrate lower cumulative emissions than regulatory baseline over the CHE’s useful life.

This bill, in return for terminal operators upgrading to newer, cleaner CHE that has lower cumulative emissions of NO_x, diesel particulate matter, and GHGs, would provide a useful life

reassurance for this equipment that is the earlier of January 1, 2045, or the end of its useful life. As shown in the table below, the average useful life of CHE ages range from seven to 22 years. Additionally, all types of equipment, with the exception of yard trucks, have lives longer than 10 years. Average hours of operation are also shown in this table.

Equipment Type	Numbers of Pieces of Equipment (2013)	Average Annual Activity (Hours)	Average Age of Equipment (Years)
Yard Trucks	2497	2830	7
Forklifts	809	720	20.5
Top picks, etc.	569	1860	11
RTGs	354	2220	12
Bulk Handling	229	970	22
Other	188	800	22
Total	4646		

Source: Technology Assessment: Mobile Cargo Handling Equipment. CARB November 2015

According to the author, “Climate change is the defining crisis of our time and reducing greenhouse gas emissions is critical to the fight against the climate crisis. In order to make progress towards the state’s zero-emission goals while also remaining competitive in international shipping, California must use all the technologies available at its disposal. However, port operators are hesitant to invest in new, cleaner cargo handling equipment (CHE) due to concerns that the lower emission equipment may not meet future “zero-emission” standards.

AB 2760 requires CARB to approve CHE projects that would reduce cumulative emissions and allow the operator to maintain that new equipment over its useful life. While not truly “zero-emission,” these transitional technologies result in significant greenhouse gas reduction and are considered “zero-emission” under EU regulations.”

Writing in support, the Pacific Merchant Shipping Association (sponsor) states “AB 2760 is a modest step in advance of the massive and unprecedented scale of investments and global support which will be necessary to transform the freight sector in the near future. By allowing for the early deployment of equipment that maximizes emissions reductions at high cost-effectiveness levels it will naturally result in higher levels of environmental improvements sooner than under our current regulatory baseline.”

Committee comments: The transition of seaports and intermodal railyards into to zero-emission facilities is challenged by a lack of available zero-emission CHE combined with the difficulty of providing enough transmission infrastructure or hydrogen supply chains to support this equipment. This bill proposes to address that challenge by providing a useful life reassurance on new hydrogen-powered CHE, and more specifically, H₂ ICE-powered CHE, that would cumulatively decrease emissions over the regulatory baseline, while also providing a transitional technology to convert port operations to hydrogen fuel cells.

This bill is related to AB 1743 (Bennett) of 2023, which proposed similar protections around the useful life of CHE, if the CHE under a given project application demonstrated cumulative emissions reductions of NO_x, diesel particulate matter, and GHGs greater than the regulatory baseline over the useful life of the CHE. In contrast to AB 1743, this bill specifies that only

hydrogen-powered CHE may qualify as covered equipment and requires CARB to approve use of the covered equipment if it demonstrates cumulative emissions reductions of NO_x, diesel particulate matter and GHGs greater than the regulatory baseline over the useful life of the CHE *or* if it satisfies the standards and definition for “zero-emission” heavy-duty vehicles as established by the European Commission (EC No. 2019/1242).

This bill changes the application process from an individual project basis (*e.g.*, by an end-user) to manufacturer- or seller-basis, and shifts the onus for providing methodologies for evaluating emissions from CARB to applicants, which may lead to some reductions in administrative costs.

Though there is no prohibition on the use of H₂ ICE-powered CHE today, H₂ ICE-powered CHE are currently in development and may not be available to use for several years. The useful life of traditional CHE can be up to 22 years, so this bill will likely result in front loading the purchases of ‘not quite zero’ emission cargo equipment that would then be in service for up to 22 years, assuming a comparable useful life of hydrogen-powered CHE to diesel CHE. To address concerns related to the non-zero emissions from H₂ ICE technology, the author may wish to add provisions to this bill, such as requiring covered equipment to use renewable hydrogen (or hydrogen not derived from fossil fuels) or grant CARB discretion to require purchase of GHG offsets for any future emissions by hydrogen-powered CHE in excess of regulatory requirements for zero emission.

With the next CHE amendment looming on the horizon, this bill may pose a complicated endeavor for only a short-term window of opportunity. This bill would require additional staff and impose additional workload for CARB to establish an application review process to assess applicant-provided methodologies and demonstration data. It is possible that by the time CARB establishes guidelines, there will be a zero-emission cargo handling regulation in development and soon to be implemented. As an alternative to the bill, CARB could consider incorporating useful life provisions into the future zero-emission cargo handling regulation.

In addition, this bill could have secondary impacts on ports’ efforts to upgrade their infrastructure in preparation for cleaner technologies. Specifically, because hybrid and transitional technologies allow for equipment to partially continue to operate as it always has, these technologies may not necessitate ports to completely upgrade their infrastructure in preparation for fully zero-emission hydrogen equipment. Allowing for “transitional technologies” to operate at the ports could delay necessary infrastructural upgrades, delay ports’ transition to fully zero-emission technologies, and delay expected cost decreases in zero-emission CHE that would result from increased adoption and manufacturing economies of scale.

On the other hand, the wider adoption of CHE using hydrogen ICE technology could also help accelerate larger infrastructure development of hydrogen production, distribution, *etc.* H₂ ICE-powered CHE could also result in higher substantial near-term reductions of GHG, NO_x, and diesel particulate matter emissions than an immediate transition to zero-emission, as there are likely to be delays in availability of zero-emission CHE, as well as for permitting and construction of related transmission or supply chain infrastructure.

Double referral: This bill is double referred to the Assembly Natural Resources Committee and will be heard by that Committee as it relates to issues under its jurisdiction.

Related Legislation: AB 1743 (Bennett, Legislative Session 2023-2024) would have established the Lower Emissions Transition Program, requiring CARB to establish guidelines and

methodologies for approving project applications for CHE having lower cumulative emissions as compared to regulatory baseline and prohibiting CARB from requiring CHE under an approved project to be replaced or retrofitted with zero-emission technology before the end of useful life of the CHE. Died in Assembly Appropriations Committee.

SB 1 (Beall) Chapter 5, Statutes of 2017, in addition to increasing taxes and fees to raise \$50 billion over ten years in new transportation revenues, provides owners of commercial motor vehicles certainty about the useful life of engines certified by CARB and other applicable agencies to meet required environmental standards for sale in the state.

AB 998 (Lowenthal), Chapter 821, Statutes of 2003 establishes the Non-Toxic Dry Cleaning Incentive Program (AB 998 Program), which provides incentives for dry cleaners in the state to transition from systems using perchloroethylene (Perc), a toxic air contaminant and potential human carcinogen to non-toxic, non-smog forming systems. AB 998 assesses a per gallon fee on Perc distributors, which then funds grants for dry cleaners to adopt dry cleaning systems using non-toxic and non-smog forming technologies.

REGISTERED SUPPORT / OPPOSITION:**Support**

Pacific Merchant Shipping Association (sponsor)
CLEANEARTH4KIDS.ORG
International Longshore & Warehouse Union Local 13

Opposition

None on file

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