



EARTHJUSTICE



March 16, 2023

Honorable Chair Randolph & Board Members
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted to online docket

Re: Strong Support for CARB's In-Use Locomotive Regulation.

Dear Chair Randolph and Board Members:

On behalf of the undersigned environmental justice, health, and environmental organizations, we applaud the California Air Resources Board (CARB) on the final proposal for cleaning up deadly locomotive pollution in California. Frontline community members and advocates, many of whom are part of our organizations, have pushed tirelessly for decades to get relief from railyard toxic hotspots. This In-Use Locomotive Regulation is a much welcome response to that years-long hard work and community activism. We strongly support this effort to regulate locomotive emissions in California, and call on you to vote to approve this regulation at the April Board hearing.

I. Adopt this life-saving ZE locomotive regulation today.

We strongly support CARB's Locomotive Regulation and ask that you vote to adopt this rule without delay. Communities that reside or work near the more than 18 major railyards in

California have waited too long to be able to breathe clean air in their neighborhoods. Approving this rule will be a critical step forward in addressing pollution from this sector, so we urge you to vote to approve this rule at the April Board hearing.

Locomotives are responsible for a significant amount of pollution in communities across the country. In California, about 12 percent of statewide NOx emissions and 8 percent of statewide PM2.5 emissions originate from locomotives, making the need to regulate rail pollution undeniable. There is no way to clean our air in California without regulating pollution from these sources. While we welcome the announcement from the United States Environmental Protection Agency (EPA) in November 2022 stating the agency's intention to convene a rail study team to evaluate how to best address pollution from the locomotive sector, we cannot rely on this as a commitment to actually reduce locomotive emissions. California needs this In-Use Locomotive Rule to clean our air. And as outlined in detail in our coalition's comment letter submitted to the docket in November 2022, CARB has authority to take such action. We enthusiastically welcome California's work on this pivotal issue.

Addressing locomotive pollution is also critical for achieving the ambitions set forth by Governor Newsom in Executive Order N-79-20, which directs CARB "to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035."¹ The Governor issued this mandate because California desperately needs these emission reductions, and in fact, this is long overdue. There is no way that we can achieve this objective without finalizing this Locomotive rule. The technology exists to bring all locomotives that operate in California to zero-emissions—now it's time to get this done.

Moreover, as we have seen, the railroad industry cannot be trusted to voluntarily reduce its emissions. Even with EPA's adoption of Tier 4 standards 15 years ago, Class I railroads remain notoriously truant. In California today, Tier 4 locomotives make up less than 5% of all Class I locomotives. **Meanwhile, more than 75% of Class I switcher locomotives remain at Tier 0.** There is no justification for this truancy, and in the meantime, people are suffering from higher rates of cancer, asthma, cardiopulmonary illness, and premature death associated with increased pollution from locomotives.

The importance of CARB's Locomotive Rule cannot be overstated. This rule will result in 63 tons per day in Statewide NOx emission reductions, 7,455 tons of PM 2.5 reductions, over 3,200 avoided premature deaths, 1,486 fewer emergency room visits, and almost \$32 billion in health benefits. In fact, this rule offers the single largest amount of emission reductions of any of the rules included in CARB's SIP strategy. There is no question that the Locomotive Rule is one of the most important, life-saving rules in CARB's docket. We strongly support staff's excellent work on this rule. Our organizations ask the Board to adopt this much-needed rule without any delay.

¹ Exec. Order N-79-20 (Sept. 23, 2020), <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>.

II. CARB should work with local air districts to guide their efforts to clean up railyard pollution.

As many Board members, staff, and community advocates remember well, the road to this rulemaking has been a long and arduous one. This has been a decades-long journey, initiated by frontline community members who have had to breathe in diesel pollution from idling locomotives and who have been inundated by vibrations, lights, and horns from passing trains at all hours of the day and night. Community spoke up powerfully about this relentless bombardment, and in 2017, CARB and the South Coast Air Quality Management District (SCAQMD) finally listened.

Through this rulemaking, it is clear that CARB has done significant research into the need to reduce locomotive pollution and the availability of zero-emission locomotive technology. Staff have valuable insights that other air regulators would benefit from. We ask that CARB staff work with local air districts, in particular the SCAQMD and the San Joaquin Valley Air Pollution Control District (SJVAPCD), to give direction and guidance on how to develop the strongest possible railyard rules.

The South Coast and San Joaquin Valley have tremendous need to reduce pollution from railyards, but the South Coast's proposed new railyard rule is not ambitious enough and SJVAPCD has not started a rule to reduce railyard pollution. South Coast's Indirect Source Review (ISR) rule for new railyards is expected to go to the Board in October 2023, and the agency expects to start developing a rule for existing railyards in 2024. We believe SCAQMD and SJVAPCD would benefit from CARB's knowledge since California is leading in this work.

III. Coordination with funding agencies to support ZE rail will be critical.

CARB should work with funding agencies, including the California State Transportation Agency (CalSTA) and the California Transportation Commission (CTC), to ensure that funding is directed toward supporting zero-emissions rail projects. Priority should be given to projects that benefit impacted communities, and to rail projects using overhead catenary and battery-electric technology. CARB should also work with the California Energy Commission (CEC) and utilities to plan for infrastructure that will support rail electrification.

IV. Zero-emission electric locomotive technology is tried and tested, and more is on the way.

We are very pleased that this rule accelerates the transition to zero-emission for switchers and line-hauls. Although American railroads have largely avoided using this technology, zero-emission locomotive technology has been around for decades. In fact, locomotives powered by electricity via an overhead catenary system (OCS) are the most established and widely used locomotives in the world.² About one-quarter of the world's rail lines are already electrified

² Brian Yanity, *The Need for Freight Rail Electrification in Southern California*, (May 2017), at 15-16, <http://calelectricrail.org/wp-content/uploads/2018/05/BYanity-SoCal-freight-rail-electrification-13May2018.pdf>.

using OCS.³ These are also the highest-powered locomotives in the world and capable of carrying the heaviest loads. This explains why many of the world's largest freight rail systems are fully or mostly electrified—from China, France, Russia, and South Africa to Switzerland, Ethiopia, Japan, and South Korea.⁴ It is time for the United States to catch up with the rest of the world.

Battery-electric locomotive technology has also made tremendous advances over the past decade that make these trains well-suited for deployment across California.⁵ There are already battery-electric switcher and line-haul models ready for order and commercialization. Progress Rail's EMD Joule Switcher has up to 3,000 horsepower, and a run time of up to 24 hours, depending on charging and utilization.⁶ Like any other battery-electric transportation, the switcher's battery recovers energy through dynamic braking, which allows the battery to restore its energy reserves in route.⁷ Similarly, Wabtec Corporation completed tests in April 2021 of its battery-powered line-haul locomotive, FLXdrive.⁸ BNSF tested the battery-powered heavy line-haul locomotive in Southern California on a 350-mile track between Barstow and Stockton, California.⁹ The electric, battery-powered locomotive was operated between two Tier 4 diesel locomotives as part of a hybrid consist.¹⁰ Wabtec plans to commercialize this battery-powered locomotive for hybrid operation, and this research will also undoubtedly support the further development of fully zero-emission line-haul locomotives.¹¹

Moreover, railroads can also take advantage of a hybrid model that combines overhead wires with on-board batteries.¹² Overhead wires can power the locomotive directly and also charge on-board batteries while in transit—these batteries can then be used during stretches where there are

³ *Id.* at 16.

⁴ *Id.* at 15.

⁵ See, e.g., Progress Rail, *EMD Joule Battery Locomotive*, <https://www.progressrail.com/en/Segments/RollingStock/Locomotives/FreightLocomotives/EMDJoule.html> (battery-electric switcher locomotive); Joanna Marsh, *BNSF, Wabtec Put Battery-Electric Locomotive to the Test*, (Jan. 5, 2021), <https://www.freightwaves.com/news/bnsf-wabtec-put-battery-electric-locomotive-to-the-test> (battery-electric line-haul locomotive); Carrie Hampel, *Bombardier Converts Five Trains to Zero-Emission*, (Feb. 8, 2021), <https://www.electrive.com/2021/02/08/bombardier-converts-five-trains-to-zero-emission/> (hybrid battery-electric/overhead catenary system passenger train).

⁶ Progress Rail, *EMD Joule Battery Locomotive*, *supra* note 5.

⁷ *Id.*

⁸ Joanna Marsh, *supra* note 5.

⁹ Bill Stephens, *Wabtec's FLXdrive battery-electric locomotive begins revenue tests on BNSF*, (Jan. 4, 2021), <https://www.trains.com/trn/news-reviews/news-wire/wabtecs-flxdrive-battery-electric-locomotive-begins-revenue-tests-on-bnsf/>.

¹⁰ Joanna Marsh, *supra* note 5.

¹¹ Rafael Santana, *The Business Case for Climate Solutions – House Committee on Transportation and Infrastructure*, (March 17, 2021), <https://transportation.house.gov/imo/media/doc/Santana%20Testimony.pdf>.

¹² Alstom, *Alstom's battery solution for electric trains* (Feb. 1, 2022), <https://www.youtube.com/watch?v=TbzEt-0CC8>.

no overhead lines. This hybrid models offers greater flexibility for locomotive operators to work around certain obstacles like tunnels, bridges, and expanses where overhead wires are not yet connected. It also avoids the problems of needing to figure out where in a railyard a locomotive must sit for hours at a time to charge, or the need to provide fast-charging at facilities. By using in route charging, this provides the ability to reduce both the investment needed for electrification itself as well as the size of batteries needed onboard each locomotive.¹³

Electrifying our freight locomotive system also offers attractive cost savings over operating traditional diesel locomotives. Advances in battery energy density translate to lighter, energy-packed battery packs that can carry a battery-electric locomotive very long distances.¹⁴ Indeed, a single typical boxcar can hold a 14-MWh battery and inverter capable of delivering enormous range.¹⁵ A typical diesel line-haul retrofitted with this technology is capable of travelling an impressive 450 miles—three times the average daily distance for a freight train in the United States.¹⁶ Even with the added weight of the battery car, all-electric drives are far more efficient than diesel trains, and can travel these long distances at cost parity with diesel, assuming electricity charging costs of 0.06\$/kWh.¹⁷

As the size and capacity of battery packs continue to grow, their costs rapidly decline, outpacing even expert predictions. In 2010, battery packs cost \$1,000 per kWh, and many assumed it might take until 2030 to reach battery pack prices around \$200/kWh. But instead, between 2010 and 2020, battery energy densities tripled and battery pack prices declined 87 percent.¹⁸ The actual average cost in 2020 blew past estimates to \$137/kWh, with some battery packs pricing less than \$100/kWh.¹⁹ Now, average costs of \$100/kWh are expected as early as 2023, and the new estimate for battery prices in 2030 is \$50/kWh.²⁰

¹³ Ellem, G., Matthews, C., & Tyson, N., *Fast charge batteries and in route charging - an emerging option for low cost freight electrification* (2014), <https://search.informit.org/doi/10.3316/informit.687845950602318>; Brenna, M., Foiadelli, F., & Stocco, J., *Battery based last-mile module for freight electric locomotives*, 2019 IEEE Vehicle Power and Propulsion Conference (VPPC) (Oct. 2019), at 1-6, IEEE.

¹⁴ Natalie Popovich et al., *Economic, Environmental and Grid-resilience Benefits of Converting Diesel Trains to Battery-Electric*, *Nature Energy* 6, (2021), at 1017-25, <https://doi.org/10.1038/s41560-021-00915-5>.

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ Kyle Field, *BloombergNEF: Lithium-Ion Battery Cell Densities Have Almost Tripled Since 2010*, *CleanTechnica*, (Feb. 19, 2020), <https://cleantechnica.com/2020/02/19/bloombergnef-lithium-ion-battery-cell-densities-have-almost-tripled-since-2010/>.

¹⁹ BloombergNEF, *2020 Battery Price Survey* (Dec. 16, 2020), <https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/>.

²⁰ *Id.*

At the same time, commercial, high-capacity fast charging is increasingly available, which allows battery-powered locomotives to travel longer distances without needing to charge. This rise in fast chargers also allows railroads to have more flexibility in determining their routes without having to necessarily return to a single base to charge, and it adds the option of quickly charging locomotives during operational hours. All of this is to say that the costs of operating a battery-electric locomotive are already, and will continue to, rapidly decline.

In sum, there is no question that zero-emission locomotive technology is already technically feasible and will continue to develop for both switcher and line-haul duty cycles.

V. Staff should review ways CARB can further reduce railyard pollution in 2027.

While our organizations are eager for the Board to pass this final rule, there is also a need for the Board to continue to strengthen controls in the areas needed most, such as for equipment used in railyards. The rule already includes a requirement for staff to return to the Board in 2027 with a technology assessment on the development and availability of ZE rail technology. As part of this Board report back, staff should perform an analysis of the ways to further reduce railyard pollution immediately. We ask that staff prepare an analysis on reducing the idling limit to 15 minutes or less, accelerating the ZE switcher transition timelines, and any other ideas staff have to further reduce pollution from railyards.

VI. Conclusion

We applaud CARB's leadership in developing a groundbreaking In-Use Locomotive Regulation. This rule will prevent hundreds of thousands of tons of pollution getting dumped into communities across our state. We look forward to celebrating this victory with the Board's passage of this rule.

Sincerely,

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