American Lung Association.

Clean Up Locomotives for Cleaner Air


Los Angeles, California

The transportation sector is a leading source of harmful, lung-damaging air pollution. This includes not only gas-powered cars and diesel trucks, but also the engines that power trains. Cleaning up trains – also called locomotives – is a crucial part of the solution.

America's aging locomotive fleet is a major threat to health due to pollution from old long-haul, short-haul, commuter, and industrial trains. The majority of passenger and freight-carrying trains are currently powered by diesel engines originally constructed decades ago.


Pittsburgh, Pennsylvania

Categories of U.S. Trains

- **Commuter Trains** to transport people.
- **Industrial Trains** to transport cargo (freight).
- **Long-Haul Trains** to travel long distances.
- **Short-Haul Trains** to travel short distances, typically less than 500 miles.[3]

Currently, operational emissions from just one train are worse than those of hundreds of heavy-duty trucks.[1] While America's railways are an efficient option for moving freight, and passenger trains are a key component of clean transportation, the locomotives themselves are very polluting for nearby communities.[2] This pollution negatively impacts air quality and contributes to the climate change-health crisis.

Woodstown, New Jersey

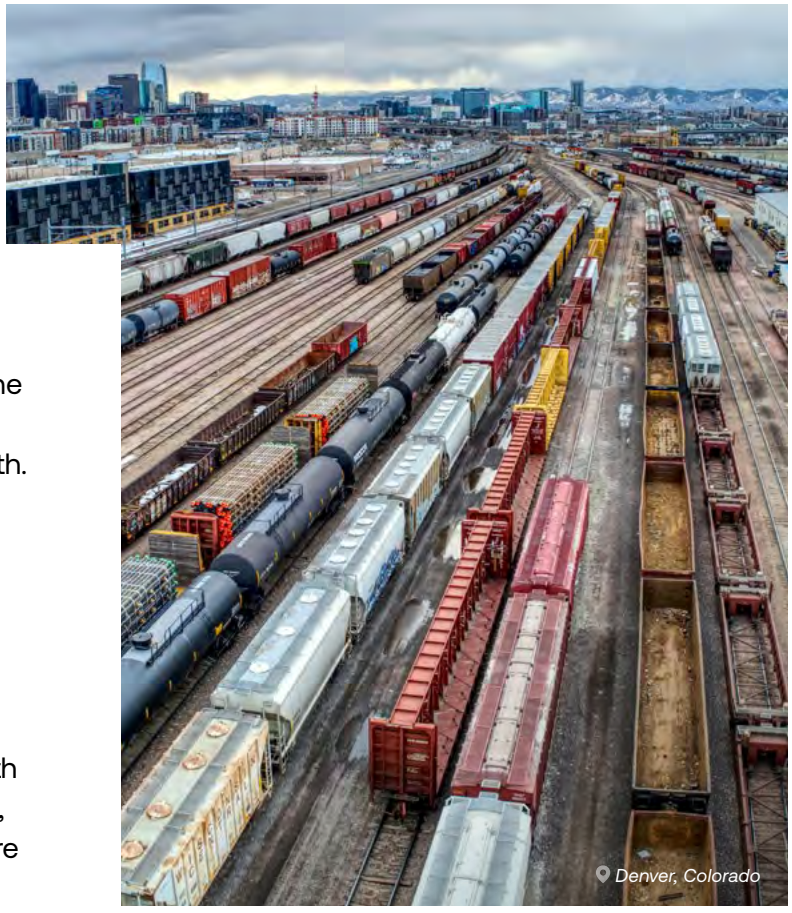
Workers with the heaviest and most prolonged exposures to diesel exhaust, such as railroad workers, **have been found to have higher lung cancer death rates than unexposed workers.**[6]

Burlington, Vermont

Health Impacts and Need for New Standards

Nearly half of all Americans live in counties with unhealthy air, as found in the American Lung Association's 2025 "State of the Air" report.[4] The United States is long overdue for new locomotive standards that can greatly improve air quality, public health and reduce cancer risk. Cleaning up locomotives will remove massive doses of toxic pollution.

Locomotives emit oxides of nitrogen (NOx), carcinogenic diesel particulate matter, and greenhouse gas emissions. They impact air quality for millions of residents, especially for people living near major rail operations such as transit hubs, ports, and railyards. A 2007 EPA study of marine port areas and railyards found over 13 million Americans, including "a high percentage of low-income households, African-Americans and Hispanics," live near these areas.[5]



Denver, Colorado

Diesel particulate matter can cause lung cancer and a wide range of other health impacts.[7] Exposure to fine particle pollution, especially at higher concentrations, can trigger illness, hospitalization and premature death. Fine particle pollution is estimated to be responsible for nearly 48,000 premature deaths in the United States every year.[8]

Other locomotive pollutants can cause various respiratory, cardiovascular, and other health impacts, including asthma attacks, heart attacks, strokes and premature birth.[9] Children, older adults and people with underlying health conditions including asthma, COPD, lung cancer, cardiovascular disease and pregnancy are all at greater risk.

The Technology Exists

Fortunately, cleaner, more efficient and zero-emission technology is available today that will cut emissions, save lives and avoid health emergencies. Federal emissions standards for locomotives have been strengthened over time and are divided into tiers, with each tier being a more recent standard. “Tier 4” locomotives have the cleanest standards of all diesel-engine locomotives under regulations of the U.S. Environmental Protection Agency (EPA).

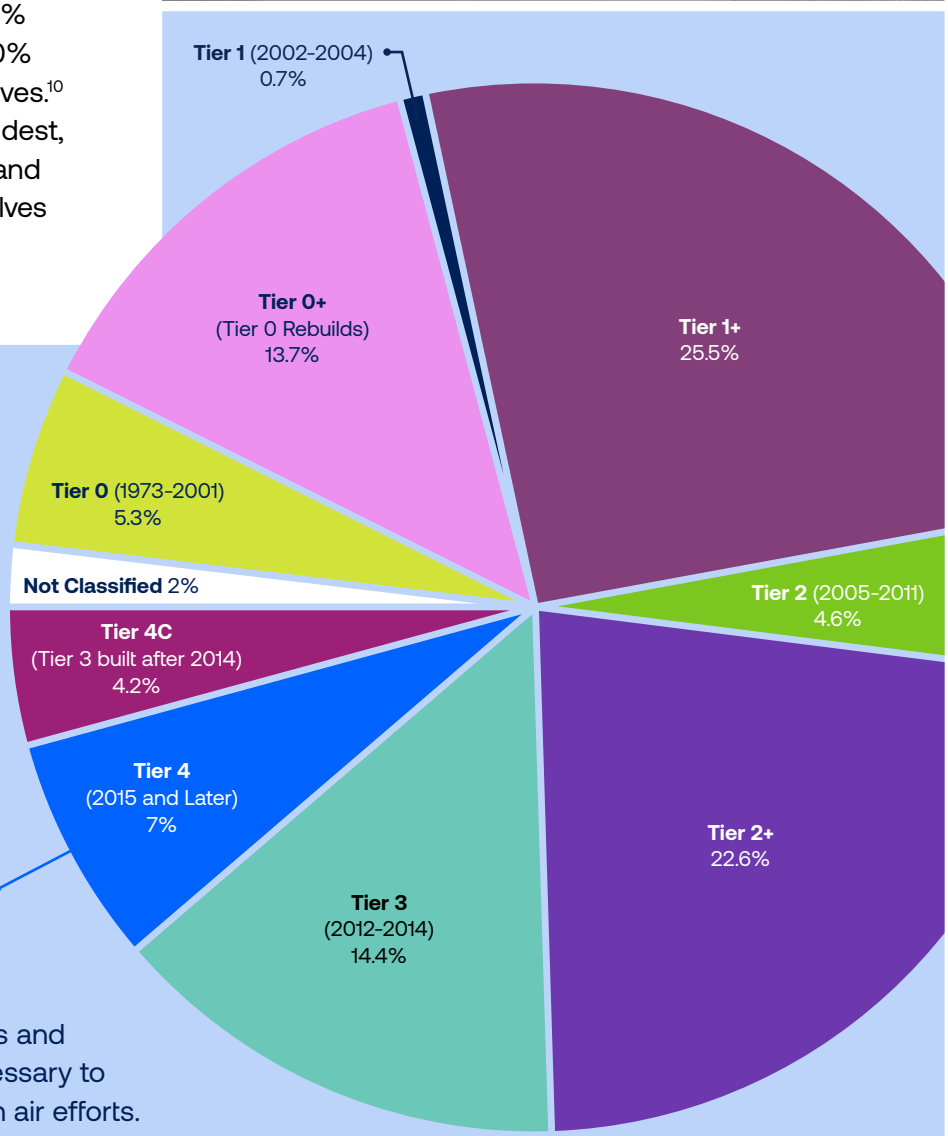
EPA estimates Tier 4 locomotives have 90% lower particulate matter emissions, and 80% lower NOx emissions, than Tier 2 locomotives.[10] However, regulatory loopholes allow the oldest, dirtiest locomotives to continue operating and the most recent (Tier 4) standards themselves have not been updated since 2008.

2020 Class 1 Line Haul Fleet Profile by Tier

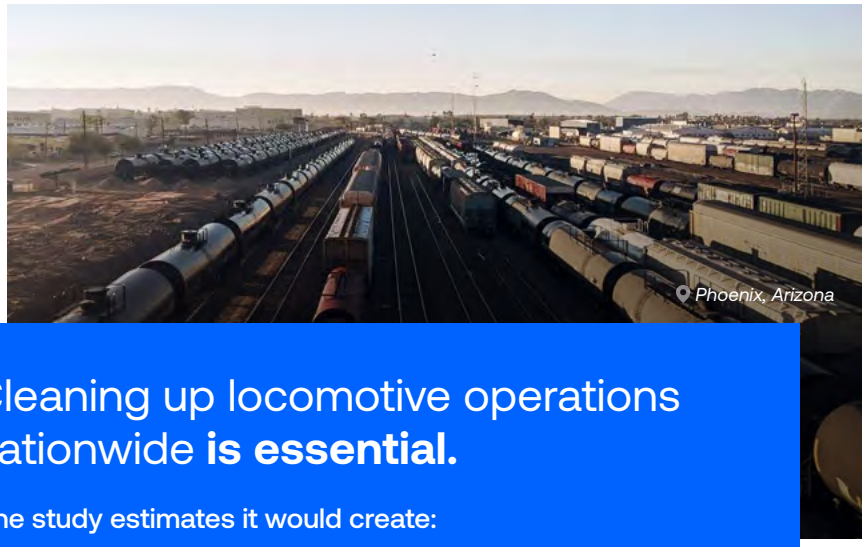
Line-haul fleets, locomotives transporting passengers or freight long-distances across US rail, remain dominated by engines operating under standards from over 25 years ago.[11]

> Class I line-haul fleets, the largest railroad companies, are the biggest emitters with only 7% of those locomotives operating with the more efficient Tier 4 standards.

Technology exists to modernize engines and updated locomotive standards are necessary to protect public health and advance clean air efforts.




San Diego, California


Phoenix, Arizona

Cleaning up locomotive operations nationwide **is essential.**

One study estimates it would create:

- $6.5 billion in annual health damage costs [12]
- 1,000 premature deaths/year [12]
- 91-93% reduced cancer risk in impacted communities who live within a mile of a railyard [13]

Advancing public health, reducing cancer risk, and pushing the rail sector toward a cleaner and more efficient future is of the utmost importance, and the U.S. EPA must take action to modernize emissions standards for locomotives to reflect the growth of zero-emission technologies in this field.

To learn more about the American Lung Association's work towards cleaner air, visit **Lung.org/locomotives**.

[1] California Air Resources Board. Truck vs. Train Emissions Analysis. September 2020. Truck vs. Train Emissions Analysis | California Air Resources Board

[2] U.S. Department of Transportation. Federal Railroad Administration. Freight Rail Overview. February 2025. Freight Rail Overview | FRA

[3] United States Department of Transportation. U30: Evaluation of Freight Vehicles in Short-Haul Intermodal Lanes. NTRCI-50-2011-028. National Transportation Research Center, Inc., Knoxville, Tenn., 2011. U30: Evaluation of Freight Vehicles in Short-Haul Intermodal Lanes

[4] American Lung Association. 2025 State of the Air. Key Findings. April 2025. Key Findings | State of the Air | American Lung Association

[5] United States Environmental Protection Agency. Summary and Analysis of Comments: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder. March 2008. Summary and Analysis of Comments: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder (EPA420-R-08-006)

[6] American Cancer Society. Diesel Exhaust and Cancer Risk. February 2024. Diesel Exhaust and Cancer Risk | American Cancer Society

[7] California Air Resource Board. Overview: Diesel and Exhaust. Accessed March 2025. Overview: Diesel Exhaust & Health | California Air Resources Board

[8] Health Effects Institute. State of Global Air. Boston, MA. 2020

[9] American Lung Association. Health Impact of Air Pollution. State of the Air. April 2025. Health Impact of Pollution | State of the Air | American Lung Association

[10] United States Environmental Protection Agency. Information about EPA Strategies to Reduce Air Pollution from Locomotives. November 2022. Information about EPA Strategies to Reduce Air Pollution from Locomotives - Regulatory Update (EPA-420-F-22-030, November 2022)

[11] Federal Register. Locomotives and Locomotive Engines; Preemption of State and Local Regulations. November 2023. Federal Register: Locomotives and Locomotive Engines; Preemption of State and Local Regulations

[12] Popovich, N.D., Rajagopal, D., Tasar, E. et al. Economic, environmental and grid-resilience benefits of converting diesel trains to battery-electric. Nat Energy 6, 1017–1025 (2021). https://doi.org/10.1038/s41560-021-00915-5

[13] California Air Resources Board. CARB Passes New In-Use Locomotive Regulation Estimated to Yield Over $32 Billion in Health Benefits. April 2023. CARB Passes New In-Use Locomotive Regulation | California Air Resources Board