

Freight Railroads & Climate Change

REDUCING EMISSIONS, ENHANCING RESILIENCY

June 2023

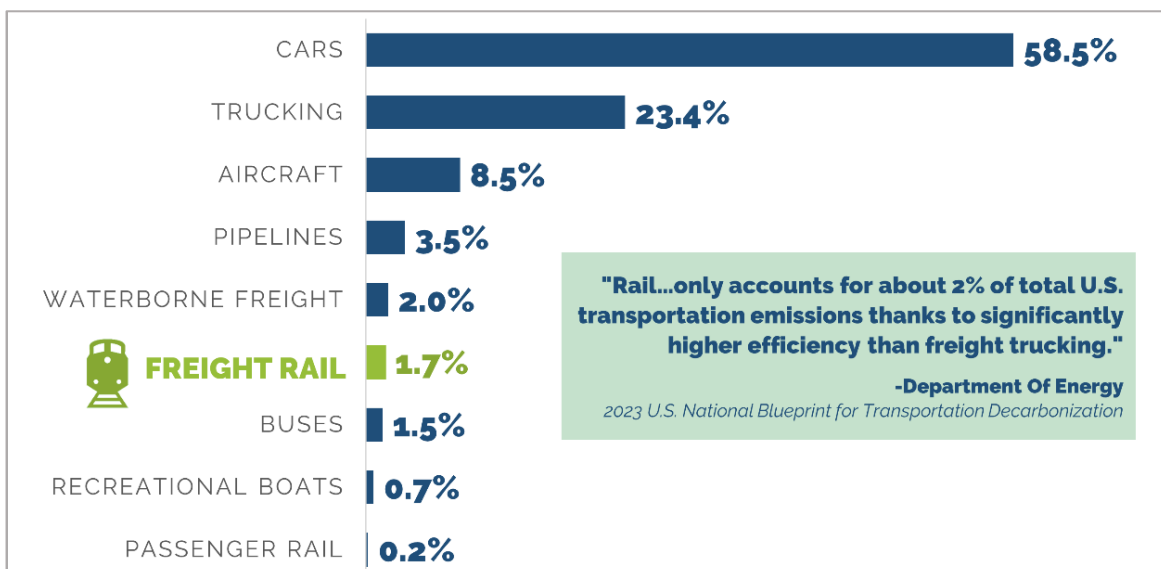


As cumulative global emissions and CO₂-attributable warming continue to rise annually, the need for immediate emissions reductions and smart policies to transition toward a net-zero economy is critical. Railroads remain a responsible partner capable of delivering sustainable transportation solutions in the near-term and for the long haul.

As the safest, most efficient form of surface freight transportation, rail can move one ton of freight nearly 500 miles on a single gallon of fuel. Freight railroads are a responsible solution to substantially drive down transportation-related greenhouse gas (GHG) emissions today while striving toward an even lower-emission future.

With an eye trained on that goal, freight railroads are developing and implementing new technologies, refining operating practices, and working with their suppliers, customers and supply chain partners to reduce GHG emissions. Every North American Class I railroad has an approved target with the Science Based Targets initiative, an organization driving ambitious climate action in the private sector and working to curb temperature rise and mitigate climate change-related impacts.

To facilitate long-term, sustainable reductions in GHG emissions, the U.S. Department of Transportation (DOT) has recognized the need to pursue strategies that encourage modal shift, support innovative technology solutions, and allow for varied approaches. Policies must leverage market-based competition, be grounded in data and be established through a cooperative approach involving stakeholders. Freight railroads stand ready to be partners in this effort and commit to helping policymakers understand what is already working and what is counter-productive for the nation's nearly 140,000-mile rail network.



U.S. GHG Emissions from Transportation: 2021
Source: EPA, Inventory of U.S. GHG Emissions and Sinks, 1990-2021



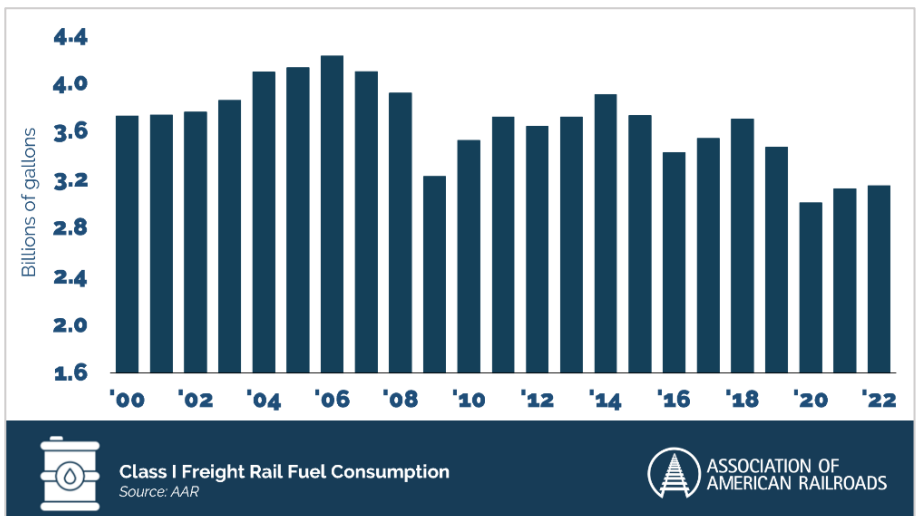
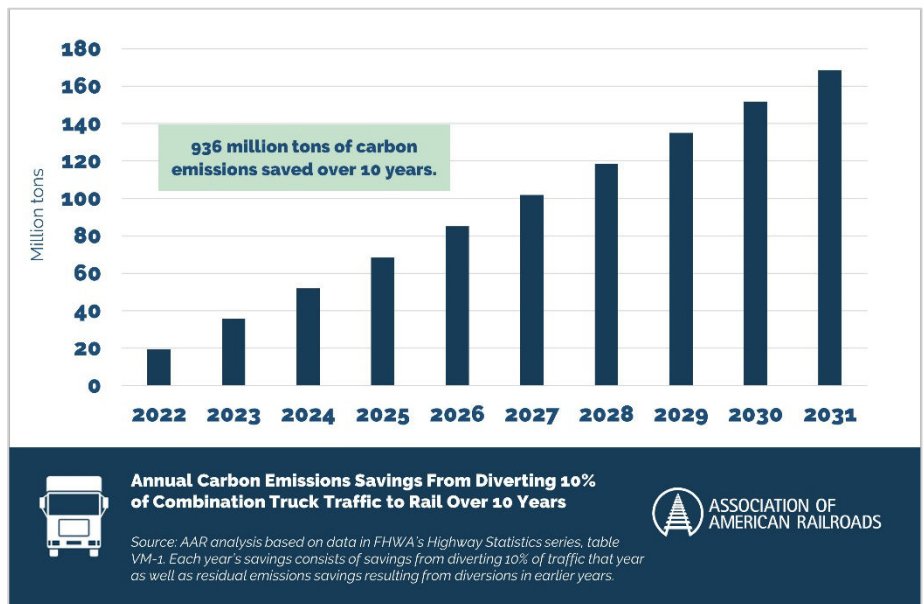
REDUCING EMISSIONS

As the most fuel-efficient way to move freight over land, rail helps drive down emissions.

Freight railroads will continue to work diligently to drive greater fuel efficiency gains and reduce GHG emissions associated with their operations. With DOT projecting total freight demand to grow 30% by 2040, moving more freight by rail is imperative to meet our nation's climate goals and protect the planet's future.

If rail moved 10% of the freight shipped by our largest trucks, GHG emissions would fall by more than 20 million tons annually. That's like taking four million cars off the highways or planting 300 million trees.

- ✓ In May 2023, [Forbes](#) recognized numerous Class I railroads as companies best positioned to be net-zero by 2050.
- ✓ Trains are three-to-four times more fuel efficient than trucks, on average. One train moves one ton of freight nearly 500 miles on one gallon of fuel, on average. That's roughly the distance from Washington, DC, to Boston.
- ✓ Railroads play an outsized role in keeping climate goals on track and our economy moving. Rail makes up about 28% of U.S. freight movement by ton-miles. While rail is essential to national and global supply chains, railroads only account for 1.7% of total U.S. transportation-related GHG emissions.
- ✓ In 2022 alone, U.S. freight railroads consumed 765 million fewer gallons of fuel and emitted 8.6 million fewer tons of CO₂ than they would have if their fuel efficiency had remained constant since 2000. That's like saving nearly 1,200 Olympic-size pools worth of fuel.





REDUCING EMISSIONS

Freight railroads are taking tangible steps to address climate change.

Through strategic, targeted [investments](#), railroads have worked to improve fuel efficiency and drive down GHG emissions associated with their locomotives. Class I railroads are also working to decarbonize yard equipment, such as switcher locomotives, cranes, and service trucks. Each yard asset represents an opportunity to drive down GHG and criteria pollutant emissions and lessen impacts on local communities.



Acquiring or retrofitting thousands of more [fuel-efficient locomotives](#) that emit fewer criteria air pollutants and GHGs over the past decade.



Developing more aerodynamic, high-strength, lighter-weight steel railcars in partnership with U.S. Steel to extend the useful life of railcars and decrease the fuel needed to haul this freight.



Developing and installing fuel management and network optimization systems that calculate the most fuel-efficient speed for a train over a given route, determine the most efficient spacing and timing of trains on a railroad's network, minimize the need to slow or stop trains during trips, and monitor locomotives to ensure peak performance and efficiency.



Working with locomotive manufacturers and refiners to test higher percentage blends of low-carbon fuels, including biodiesel and renewable diesel, which could result in substantial GHG emissions savings.



Expanding the use of technologies, such as automated gate systems, to help trucks get in and out of [yards](#) more quickly, reducing idling and fuel usage. These investments reduce GHG and criteria pollutant emissions near yards.



Exploring technologies that would allow railroads to use alternative fuels in their existing locomotive fleets and hybrid diesel-electric propulsion technology, which would work much like a plug-in hybrid car.



Deploying near-zero and zero-emission yard equipment, such as natural gas and battery-electric service trucks (which reduce ambient noise and recharge their batteries each time they brake), as well as hybrid and electric cranes.



RESILIENCY

Freight railroads are building a resilient network to safely and reliably maintain operations in the face of climate change.

Railroads operate an expansive nationwide network exposed to the increasing frequency of climate-driven natural disasters, such as floods, wildfires, droughts, storms and unpredictable temperature shifts.

Freight railroads invest an average of \$23 billion each year to improve their networks, including maintaining and enhancing infrastructure and equipment. Railroads are improving infrastructure and operations to withstand climate-related hazards, which helps maintain economic stability by reducing the impact of climate-related disruptions to the supply chain.

As a result of these investments, the American Society of Civil Engineers awarded rail the highest grade in its last two [Infrastructure Report Cards](#).



Geo-mapped areas of track prone to wildfires, extreme temperature fluctuations, and flooding to identify and assess vulnerabilities.



Instituted fire prevention programs that clear rights-of-way of grasses and brush to prevent wildfires and reduce the risk of damaging critical technology and infrastructure throughout the system.



Built specialized "fire trains" that carry thousands of gallons of water and other firefighting equipment to deploy along railroad rights-of-way.



Installed seismic, wind and water detectors along high-risk parts of the network. Railroads have also replaced wooden infrastructure with concrete or steel where possible, raised thousands of miles of track to avoid flooding impacts and prevent washouts, and adjusted the timing of track installation and maintenance projects to reduce track-buckling that can be associated with [temperature changes](#).

The right policies will help the U.S. meet its climate commitments and help the railroads build a resilient network.

1. Support low- and zero-emission locomotive research.
2. Help railroad partners decarbonize.
3. Allow railroads to transition their locomotive fleets when zero-emission technologies are commercially viable and operationally safe and reliable.
4. Pursue policies that recognize the value of rail as a low-carbon transportation solution.
5. Empower railroads to make operational decisions to maximize fuel efficiency and meet growing freight demands.
6. Further promote a broad-based, economy-wide transition to net-zero emissions.
7. Encourage testing of new safety technologies.
8. Embrace permitting reform.

1. Support ongoing research at the U.S. Department of Energy (DOE) to develop technologies to accelerate the commercial viability of low- and zero-emission locomotives.

Partnerships between the federal government, railroads and locomotive manufacturers will be essential to developing alternatives to traditional diesel-fuel-powered locomotives. Additional funding for research on these fuels and technologies will speed their adoption, inform the development of standards for such fuels, and advance ongoing private sector research, including at MxV Rail, the world's premiere rail advisory.

As the DOT, DOE and EPA's "U.S. National Blueprint for Transportation Decarbonization" (Blueprint) notes: "[**Freight rail research should be prioritized**] to determine the most promising paths to decarbonization, including a focus on sustainable fuels and the design and manufacture of new locomotive propulsion and fueling systems."

Effective partnerships should rely on regular consultations with railroads, rail manufacturers, and suppliers to identify research projects that will significantly advance the commercial viability of respective technologies.

Notably, zero-emission locomotives are still in a pre-commercial stage and do not currently meet freight railroads' safety, reliability and functionality requirements. However, there are ongoing demonstrations and commercial testing initiatives for battery-electric and hydrogen fuel cell locomotives.

Railroads support grant programs that provide funding to further this research and undertake associated demonstration projects to test new technologies. By partnering with railroads who can offer technical and operational expertise, zero-emission locomotive technologies can move as quickly as possible from testing and development to real-world network demonstrations that are vital to proving commercial viability.

Accelerated, widespread availability of these technologies is crucial as locomotives are long-lasting capital assets, and any delay would hinder fleet transition and the rail industry's ability to join the net-zero emissions economy.

2. Help Class I railroads' partners, including locomotive manufacturers, rail suppliers, and short line railroads, transition to the net-zero economy.

Freight railroads support robust funding for grant programs, such as DERA, CRISI, and Port Infrastructure Development, which help short line railroads improve fuel efficiency and reduce emissions by modernizing and/or retrofitting their equipment, including locomotives. Furthermore, these programs will assist short line railroads in addressing challenges associated with installing the infrastructure required for adopting alternative fuels.

Freight railroads support grant and loan programs for locomotive manufacturers and other rail suppliers to assist them in re-equipping, expanding, or establishing facilities to produce alternative fuel locomotives or related technologies and equipment. Incentives for locomotive manufacturers and other rail suppliers to invest in their facilities will accelerate the commercial viability and availability of low- and zero-emission locomotives.

3. Allow railroads to transition their locomotive fleets when zero-emission technologies are commercially viable and operationally safe and reliable.

Policymakers should avoid imposing prescriptive means for reducing emissions in the rail industry. Because locomotives are long-lived assets and zero-emission locomotives are only now in the demonstration/prototype stage, short-sighted mandates that attempt to immediately reduce GHG emissions via premature replacement of locomotive fleets would compel freight railroads to purchase newer internal combustion engines that will then be in service for decades instead of zero-emission technologies. Such a regulatory misstep would result in wasting resources that could be used to develop zero-emission locomotives.

Instead, as the Blueprint discussed, **"All levels of government and the private sector should align their efforts to enact solutions through technical assistance and collaborative work."** It is essential that any plan for reducing rail emissions developed by government partners be the result of a partnership with industry and, as called for in the Blueprint, provide **"safe, effective, affordable, and sustainable solutions to existing and emerging challenges."** Rail stands ready to engage in a collaborative partnership with the federal government to reach goals based on **"[t]imely and impartial data collection and analysis"** and timelines grounded in a realistic understanding of the current state of technology.

4. Encourage policies that recognize the value of rail as a low-carbon transportation solution.

A key strategy to reduce transportation emissions identified in the Blueprint is "improving efficiency through mode shift." The Blueprint states: **"Road freight vehicles such as trucks... are the largest contributor to freight emissions... Using more efficient modes...is essential to reduce overall transportation emissions and energy use. Using more efficient modes could also reduce the number of vehicles on the road and reduce congestion, improving travel time and traffic flow, thereby further reducing GHG emissions and other harmful air pollutants."**

An effective means of accomplishing this goal is to address the solvency of the Highway Trust Fund (HTF) through a fuel tax increase and, eventually, the implementation of a vehicle miles traveled fee (VMT) that considers vehicle weight. The United States has historically relied upon a user-pays system to fund public road and bridge infrastructure investments. Unfortunately, revenues into the HTF have failed to keep pace with inflation and investment needs, requiring repeated general fund transfers, including \$275 billion since 2008, to cover the shortfall.

The lack of adequate revenue raised for the HTF is partly the result of [heavy trucks](#). Today, these large trucks don't come close to paying for the damage they cause to our public highway system.

The Tax Policy Center found that the current 18-cent tax per gallon of gas, which has not been adjusted since 1993, would today be about 38 cents per gallon if adjusted for inflation alone. Freight railroads support DOT's expeditious completion of a Highway Cost Allocation Study, which will help Congress better ensure different highway users, including commercial motor vehicles, cover their fair share of costs to maintain our nation's roads and bridges.

Furthermore, implementing a VMT could resolve the impending insolvency of the HTF, restore a user-pays model, and rebalance the ongoing modal inequity occurring in the freight transportation market stemming from the trucking industry's underpayment into the HTF. Freight railroads support DOT's work on the National Motor Vehicle Per-Mile User Fee Pilot. This program will demonstrate a national VMT system and help to identify technologies needed to implement this program.

5. Empower railroads to make operational decisions to maximize fuel efficiency and meet growing freight transportation demand.

Policymakers should reject proposals imposing operational restrictions on railroads, such as limitations on [train length](#), which undermine railroads' efforts to improve fuel efficiency and reduce emissions associated with their operations. Moving a given amount of freight in fewer trains requires less fuel and creates fewer associated emissions. Emissions would increase if a cap on train length were imposed, and the subsequent reduction in rail efficiency could cause freight to divert to trucks. AAR analysis of federal data finds: If 25% of the truck traffic moving at least 750 miles went by rail instead, annual greenhouse gas emissions would fall by approximately 13.6 million tons.

6. Further promote a broad-based, economy-wide transition to net-zero emissions.

The Blueprint noted, "[Sustainable fuels can play a key role in reducing rail emissions, especially in the near and medium terms, but they are currently not cost competitive.](#)" Freight railroads support mode-neutral programs to domestically produce a sufficient supply of alternative fuel sources and construct the necessary infrastructure to ensure supply meets demand.

Policymakers should ensure that programs that prioritize the availability of alternative fuels for specific transportation modes do not undermine other modes' efforts to reduce their emissions. Railroads support programs that expand the availability, enhance the performance, and lower the costs of batteries, hydrogen, biodiesel, and renewable diesel. These programs will provide essential scaling to assist railroads in decarbonizing.

Additionally, policymakers should support funding for research to ensure that alternative fuel sources are developed from a broad base of feedstocks, minerals, and other natural resources. For example, freight railroads are supportive of DOE's "Clean Fuels and Products Shot," which seeks to accelerate the development of low-carbon fuels for heavy transportation, such as rail, and will experiment with various biomass and renewable fuel sources, such as municipal waste, agricultural and forest trimmings, algae and carbon dioxide. This effort will be essential to driving down costs and bringing to scale the technologies necessary to reduce emissions from the manufacturing of these fuels.

Finally, policymakers should continue to invest in developing and scaling carbon capture, utilization, and storage (CCUS) technologies and explore opportunities to expand their commercial use through market development programs. Encouraging storage and industrial utilization of captured carbon creates new economic opportunities, and railroads believe this technology can be an important part of a broad effort to address climate change.

As plans for new CCUS facilities are developed, the carbon captured at these facilities could be transported via rail. This would minimize additional GHG emissions, avoid unnecessary highway congestion, and take advantage of the world-class private rail network already in existence. It is likely the facilities where carbon would be captured, and the destination where it would be stored or utilized, already have rail service.

7. Streamline agency requirements to encourage the testing and incorporation of new safety technologies that will improve the resiliency of the rail network.

Policymakers should provide railroads with needed operational and regulatory flexibility to encourage innovation and testing of new safety technologies and processes, including streamlining waiver reviews, encouraging pilot programs, and establishing performance-based thresholds.

Many of the technologies that railroads seek to incorporate will be used to increase the frequency and accuracy of track, infrastructure, and equipment inspections. The huge amounts of data from those inspections will improve railroads' maintenance plans, inform how railroads should best allocate investments in the short- and long-term, and enhance operational safety.

Unfortunately, railroads often encounter significant regulatory barriers when incorporating new safety technologies. For example, safety data from test programs have shown that [automated track inspections](#), when blended with more focused visual track inspections, increase track safety, especially in identifying and remedying invisible track geometry defects. However, despite strong evidence of improved safety, the Federal Railroad Administration (FRA) continues to impede the progress of long-overdue regulatory reform. These changes to how railroads can test and incorporate new safety technologies are imperative to reaching an accident-free future and a more resilient rail network.

8. Ensure timely delivery of rail infrastructure projects through permitting reform.

Policymakers should enact reforms in federal permitting processes that speed project delivery, ensure timely, focused reviews of environmental impacts, and provide greater predictability, modal equity, and transparency for freight rail infrastructure projects. These reforms should strive to ensure timely consultations, provide pragmatic, politically-enduring policy solutions, and avoid reinforcing the existing patchwork of state regulations. Suggested economy-wide reforms include:

- Clarifying timelines and the scope of state reviews for water quality certification requests under section 401 of the Clean Water Act.
- Extending the application of One Federal Decision to include reviews under the National Environmental Policy Act (NEPA) of infrastructure projects undertaken by any federal agency.
- Allowing federal agencies to utilize the categorical exclusions of other federal agencies, including the Army Corps of Engineers and Coast Guard's use of the FRA's categorical exclusions for qualifying rail projects. This is important since DOT is not often the lead federal agency for most rail projects.

Additionally, policymakers should consider specific rail-specific reforms, such as:

1. Aligning the timeframes for filing claims seeking judicial review of a permit, license, or approval for any railroad project issued by FRA under NEPA with those used for highway or public transportation projects. The deadline for highway and public transportation projects is 150 days after the publication of a notice in the Federal Register announcing that the permit, license, or approval is final. In contrast, the deadline for railroad projects is two years.
2. Ensuring the Advisory Council on Historic Preservation's (ACHP) compliance with the FAST Act, which directed ACHP to issue a final exemption from Section 106 requirements for railroad rights-of-way consistent with the exemption issued for interstate highways.

Too often, required [permitting processes](#) and related environmental reviews are overbroad, inefficient, and expensive and can unnecessarily delay critical infrastructure projects for years. The environmental benefits of transport by rail, coupled with its crucial role in the supply chain, underscore the importance of maintaining and improving its safety and efficiency.

These reforms will help expedite the construction of rail infrastructure projects and help incorporate changes to the rail network needed to support greater resiliency to climate change.