

Freight Railroads Help Reduce Greenhouse Gas Emissions

ASSOCIATION OF AMERICAN RAILROADS

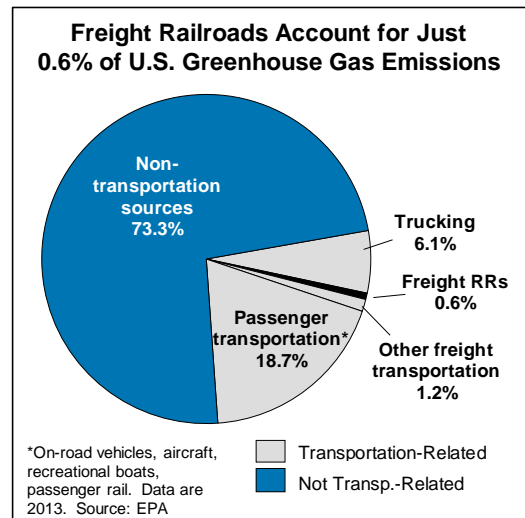
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Summary

Expanded use of freight rail offers a meaningful way to reduce greenhouse gas emissions without harming the economy. On average, railroads are four times more fuel efficient than trucks. That means moving freight by rail instead of truck **reduces greenhouse gas emissions by 75 percent**. According to Environmental Protection Agency (EPA) data, freight railroads account for just 0.6 percent of U.S. greenhouse gas emissions from all sources and just 2.3 percent of emissions from transportation-related sources.

Moving More Freight By Rail Would Significantly Reduce Greenhouse Gas Emissions

- According to an independent study for the Federal Railroad Administration, **railroads, on average, are four times more fuel efficient than trucks**. Greenhouse gas emissions are directly related to fuel consumption. That means that moving freight by rail instead of truck reduces greenhouse gas emissions by 75 percent.
- If just 5 percent of the freight that moves by truck moved by rail instead, fuel savings would be approximately 800 million gallons per year and greenhouse gas emissions would fall by approximately 9 million tons — equivalent to taking 1.8 million cars off the road or planting more than 200 million trees.
- According to EPA data, total U.S. greenhouse gas emissions in 2013 were 6,673 teragrams (trillion grams) of carbon dioxide equivalents (see the table on the next page). Non-transportation sources (power plants, industry, etc.) accounted for 73.3 percent of this total, with transportation accounting for the remaining 26.7 percent. The 41.8 teragrams accounted for by freight railroads, according to EPA data, was just 0.6 percent of U.S. greenhouse gas emissions from all sources and just 2.3 percent of transportation-related greenhouse gas emissions.
- **Moving more freight by rail also reduces highway congestion**, which cost \$160 billion in 2014 just in wasted time (6.9 billion hours) and wasted fuel (3.1 billion gallons), according to the Texas Transportation Institute's 2015 Urban Mobility Scorecard. **A single freight train, though, can replace several hundred trucks**. Shifting freight from trucks to rail also reduces highway wear and tear and the pressure to build costly new highways.



U.S. Greenhouse Gas Emissions By Economic Sector: 2013			U.S. Greenhouse Gas Emissions from Transportation: 2013		
Economic Sector	Tg CO2 Eq.	% of Total	Economic Sector	Tg CO2 Eq.	% of Transp. Total
Electric. generation	2,077.0	31.1%	Trucking	407.7	22.9%
Residential	375.0	5.6%	Freight Railroads	41.8	2.3%
Industry	1,392.1	20.9%	Waterborne Freight	15.7	0.9%
Agriculture	586.8	8.8%	Pipelines	47.7	2.7%
Transportation	1,806.2	27.1%	Aircraft	139.0	7.8%
Commercial	401.1	6.0%	Recreational Boats	12.6	0.7%
U.S. Territories	34.8	0.5%	Passenger Railroads	5.7	0.3%
Total	6,673.0	100.0%	Cars, Light Trucks, Motorcycles	1,090.6	61.3%
			Buses	18.3	1.0%
				1,779.0	100.0%

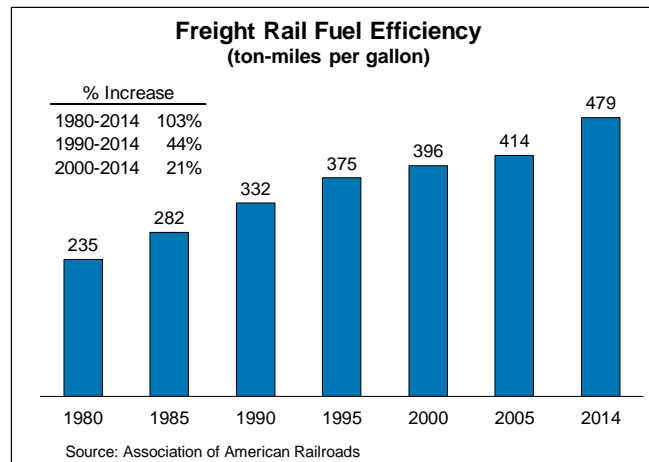
Data are in teragrams of CO2 equivalents.

Source: EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013 (July 2015)*, Tables ES-6, A-116, and A-117. Totals for "transportation" in the two tables do not match because the table on the left includes emissions from sources considered to be transportation but not considered to be passenger or freight (e.g., lubricants).

Railroads Are Constantly Working to Improve Fuel Efficiency

- In 1980, one gallon of diesel fuel moved one ton of freight by rail an average of 235 miles. In 2014, one gallon of fuel moved one ton of freight by rail an average of 479 miles — a 103 percent improvement since 1980.

- In 2014 alone, U.S. freight railroads consumed **4.0 billion fewer gallons of fuel** and emitted **44.7 million fewer tons of carbon dioxide** than they would have if their fuel efficiency had remained constant since 1980. From 1980 through 2014, U.S. freight railroads consumed 73.8 billion fewer gallons of fuel and emitted 826 million fewer tons of carbon dioxide than they would have if their fuel efficiency had not improved.



- Railroads use a variety of means to cut fuel consumption and greenhouse gas emissions:
 - ✓ Dramatically **increasing how much freight is carried in an average rail carload and average train.** Thanks to improved freight car design and other factors, the average freight train carried 3,606 tons of freight in 2014, up from 2,222 tons in 1980, 2,755 tons in 1990, and 2,923 tons in 2000.
 - ✓ **New locomotives.** Railroads have spent billions of dollars in recent years on thousands of new, more fuel efficient locomotives and on overhauling older units to make them more fuel efficient. Many older, less fuel efficient locomotives have been retired from service. Many new switching locomotives used to assemble and disassemble trains in rail yards are “genset” (generator set)

locomotives, which have two or three independent engines that switch on and off depending on how much power is needed at the time.

- ✓ Developing and implementing **highly advanced computer software systems** that, among other things, 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 system; and monitor locomotive functions and performance to ensure peak efficiency. These systems can provide locomotive engineers with **real-time “coaching”** on the best speed for a train from a fuel-savings standpoint.

- ✓ **Training.** Railroad fuel efficiency depends on how well a locomotive engineer handles a train. That's why railroads use the skills of their engineers to save fuel. For example, railroads commonly offer training programs through which locomotive engineers offer suggestions — *e.g.*, the best way to accelerate and decelerate from a fuel-savings standpoint, or the best procedures to follow for shutting down an engine — to their colleagues on ways to save fuel.



- ✓ **Reduced idling.** Railroads are implementing **“stop-start” idling-reduction technology** that allows main engines to shut down when ambient conditions are favorable. One advantage of “genset” locomotives is that their smaller engines use anti-freeze, thus allowing them to shut down in cold weather. Some railroads also use **“auxiliary power units”** that warm engines so that locomotives can be shut down in cold weather.

- ✓ **New technologies and operational changes**, including expanding the use of **distributed power** (positioning locomotives in the middle of trains) to reduce the total horsepower required for train movements; improving **rail lubrication** to reduce friction at the wheel-rail interface and wear and tear on track and locomotives; using **low-torque bearings** in rail cars to reduce weight and save fuel; aerodynamic **drag-reducing devices** at the front of double-stacked intermodal trains; and advanced **defect detectors** which identify poorly performing equipment that waste energy and are a safety risk as well.

