Freight Railroads Help Reduce Greenhouse Gas Emissions

ASSOCIATION OF AMERICAN RAILROADS **APRIL 2011**

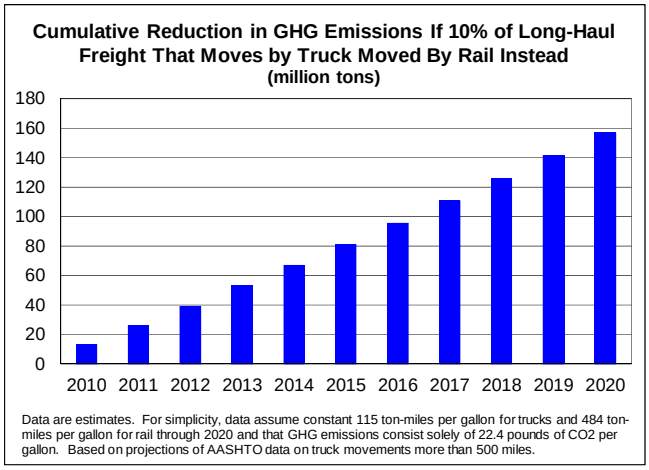
Summary

Greater use of freight rail offers a **simple, inexpensive,** and **immediate way** to meaningfully **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 2.1 percent of emissions from transportation-related sources.

Moving More Freight By Rail Would Significantly Reduce Greenhouse Gas Emissions

According to a recent 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 10 percent of long-haul freight now moving by truck moved by rail instead, annual greenhouse gas emissions would fall by more than **12 million tons**. That's equivalent to taking **2 million cars off the road** or **planting 280 million trees**. Cumulative reductions through 2020 would be around **160 million tons.**



Moving more freight by rail also **reduces highway congestion**, which costs us $115 billion each year just in wasted time (4.8 billion hours) and wasted fuel (3.9 billion gallons), according to a recent study by the Texas Transportation Institute. **A single freight train, though, can carry the load of 280 or more trucks**, equivalent to making room on our highways for more than 1,100 cars. Shifting freight from trucks to rail also reduces highway wear and tear and the pressure to build costly new highways.

America's seven largest freight railroads have joined the EPA's voluntary "SmartWay Transport" partnership aimed at improving fuel efficiency and reducing greenhouse gas emissions.

U.S. Greenhouse Gas Emissions By Economic Sector: 2009

Economic Sector	Tg CO2 Eq.	% of Total
Electric. generation	2,193.0	33.1%
Residential	360.1	5.4%
Industry	1,322.7	19.9%
Agriculture	490.0	7.4%
Transportation	1,812.4	27.3%
Commercial	409.5	6.2%
U.S. Territories	45.5	0.7%
Total	6,633.2	100.0%

Data are in teragrams of CO2 equivalents.

U.S. Greenhouse Gas Emissions from Transportation: 2009

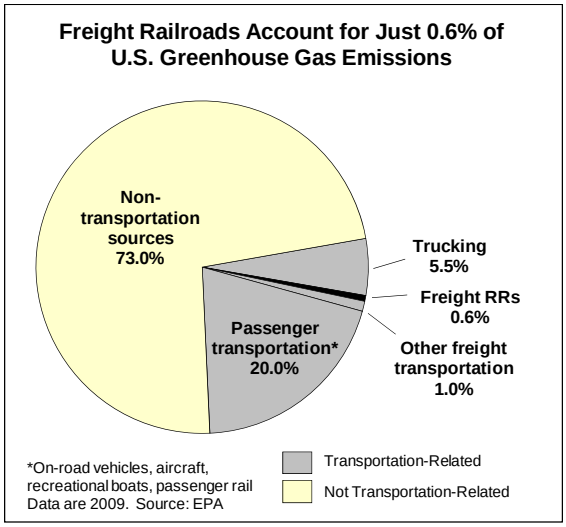
Economic Sector	Tg CO2 Eq.	% of Transp. Total
Trucking	365.6	20.4%
Freight Railroads	**37.2**	2.1%
Waterborne Freight	13.5	0.8%
Pipelines	35.2	2.0%
Aircraft	127.8	7.1%
Recrational Boats	16.9	0.9%
Passenger Railroads	6.0	0.3%
Cars, Light Trucks, Motorcycles	1,180.6	65.8%
Buses	11.2	0.6%
	1,794.0	100.0%

Source: EPA, *Inventory of U.S Greenhouse Gas Emissions and Sinks: 1990-2009*, Tables ES-7, A-111, and A-112. 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 Account For a Small Portion of U.S. Greenhouse Gas Emissions

According to EPA data, total U.S. greenhouse gas emissions in 2009 were 6,633 teragrams (trillion grams) of carbon dioxide equivalents (see table above). Non-transportation sources (power plants, industry, etc.) accounted for 73 percent of this total, with transportation accounting for the remaining 27 percent.

The 37.2 teragrams accounted for by freight railroads was just 0.6 percent of total U.S. greenhouse gas emissions from all sources and just 2.1 percent of transportation-related greenhouse gas emissions.



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 2010, one gallon of fuel moved one ton of freight by rail an average of 484 miles — a 106 percent improvement since 1980.

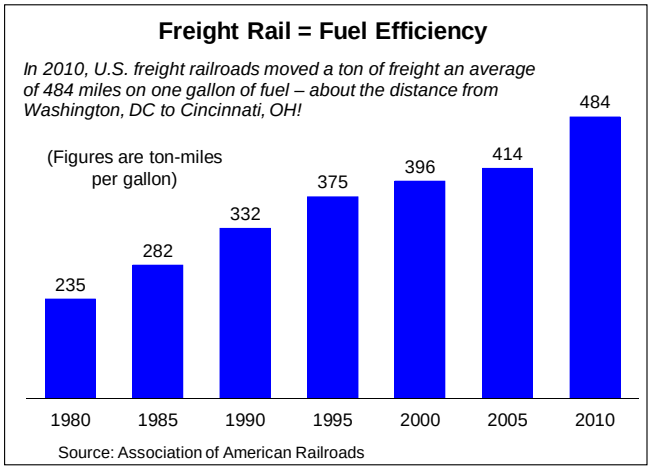
In 2010 alone, U.S. freight railroads consumed 3.7 billion fewer gallons of fuel and emitted **41 million fewer tons of carbon dioxide** than they would have if their fuel efficiency had remained constant since 1980. From 1980 through 2010, U.S. freight railroads consumed almost **59 billion fewer gallons of fuel** and emitted **658 million fewer tons of carbon dioxide** than they would have if their fuel efficiency had not improved.

How Railroads Do It

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 a record 3,585 tons of freight in 2010, up 61 percent since 1980.

- **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**. Gensets have two or three independent engines that switch on and off depending on how much power is needed for the task at hand. Some switching locomotives are **hybrids** with a small diesel-fueled engine and a large bank of rechargeable batteries. Research is underway on hybrid long-haul locomotives.



- 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 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.

- 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, saving fuel and reducing wear and tear on track and locomotives.