Freight Rail: The Most Environmentally Friendly Way to Move Freight Over Land

Preserving the natural environment is a responsibility railroads take seriously.

Freight rail is well ahead of other modes of transportation when it comes to limiting greenhouse gas emissions, increasing fuel efficiency and reducing its carbon footprint.

What helps make such a large iron horse locomotive so eco-friendly? Technology.

From advanced locomotive technology to zero emission cranes, freight railroads leverage technology in all aspects of their operations to limit their impact on the environment. Thanks in part to these technologies, U.S. freight railroads can, on average, move one ton of freight more than 470 miles per gallon of fuel, making rail the most environmentally friendly way to move freight over land. Additionally, moving freight by rail instead of truck lowers greenhouse gas emissions by 75%.

This commitment to technology is a growing factor in freight rail's impressive environmental record. Railroads move approximately one-third of all U.S. exports and intercity freight volume in the United States. Despite the large volume of freight moved, U.S. Environmental Protection Agency data show freight railroads only account for 0.6% of total U.S. greenhouse gas emissions and just 2% of emissions from transportation-related sources.

- **Fuel Management Systems:** Railroads use advanced computer programs, known as fuel management systems, to ensure that each gallon of fuel moves a train as efficiently as possible. The systems, fully integrated into the trains' locomotives, provide engineers with real-time recommendations on how to operate the train to maximize fuel efficiency and train performance based on numerous variables including topography, track curvature, the weight and length of the train and even wind effect. Fuel management systems can improve fuel efficiency by up to 14% depending on the route.

- **Anti-idling Technology:** Anti-idling technologies significantly reduce the amount of fuel wasted during idling periods and help minimize air pollution. Automatic Engine Start Stop (AESS) units, for instance, turn off a locomotive if it has been idle too long and automatically restart it to prevent freezing if the temperature drops. Auxiliary Power Units (APUs) — small diesel engines — keep the main locomotive engine warm to prevent freezing in cold weather. APUs can reduce emissions from one locomotive by more than 80 tons of nitrogen oxides, 12 tons of carbon monoxide and three tons of particulate matter, per year.

- **Tier 4 Locomotives:** Tier 4 locomotives have hundreds of sensors that generate thousands of readings on locomotive performance every minute. This data helps railroads prioritize maintenance and minimize the impact of poor locomotive performance on the environment and network fluidity. Tier 4 locomotive technology reduces particulate emissions from diesel locomotives by as much as 90% and nitrogen oxide emissions by as much as 80% over the Tier 3 model. As additional locomotives are needed, or older units replaced, Tier 4 Locomotives are being phased into rail fleets nationwide.

- **Zero-emission Cranes:** Zero-emission cranes, rather than traditional diesel cranes, seamlessly transfer goods between ships, trucks and trains in ports and intermodal facilities across the country. The electric cranes, which reduce ambient noise and pollution, recharge their own batteries each time they lower a load. Technologies like these play an important role in decreasing emissions in densely populated urban areas where intermodal rail yards are often located.

- **Ongoing Enhancements:** Enhanced operating practices and rail car components minimize fuel usage by improving aerodynamics and reducing overall weight, friction between wheels and rail, and total horsepower required for moving the train. Redesigned railcars have helped increase average tonnage. In 2017 the average freight train carried 3,630 tons, up from 2,923 tons in 2000.