

Protecting our environment, now and for the future.



BUILDING AMERICA®



CLEANER LOCOMOTIVES

Trains are one of the nation's most environmentally responsible modes of moving freight. Union Pacific can move one ton of freight 454 miles on a single gallon of diesel fuel, generating a carbon footprint that is up to 75%¹ less than trucks.

Locomotive fuel accounts for most of our greenhouse gas emissions (GHG), making it a key focus for our environmental innovations.

- The railroad squeezes the most out of every drop of fuel, focusing on conservation through better locomotive technology, and employee training and involvement.

- Union Pacific has invested more than \$3.4 billion in purchasing more than 1,300 new locomotives since 2009. These locomotives all meet the EPA's tier standards.
- We've retired about 2,500 older, less fuel efficient locomotives over the same time period.
- As a result of new locomotive and refurbishment programs, 98% of Union Pacific locomotives meet EPA emissions standards.

¹Source: Association of American Railroads

PIONEERING TECHNOLOGY

Union Pacific is committed to reducing emissions and improving air quality in our operations through constant development and evaluation of Tier 4 innovative technologies.

- In 2018, the Sacramento Metropolitan Air Quality Management District and the Bay Area Air Quality Management District awarded approximately \$15 million in grants to repower 10 diesel-electric switching locomotives into new EPA-certified Tier 4 single-engine switching locomotives. The repowered locomotives reduce particulate matter and nitrogen oxide emissions by more than 90 percent. Union Pacific is the only Class 1 railroad operating Tier 4 Genset switchers and is the first Class 1 to introduce Tier 4 single-engine repowers.
- Union Pacific developed a comprehensive plan to reduce unnecessary locomotive idling time. All new locomotives have automatic Stop-Start equipment and older locomotives are being retrofitted with it. Locomotive shutdowns can save 15-24 gallons of fuel, per locomotive, per day. In total, nearly 95% of our locomotive fleet is equipped with this technology.
- With its Union Pacific 9900, the signature unit in a series of 25 locomotives in California, Union Pacific tested three emissions-reducing technologies. The tests contributed to learnings for Tier 4 locomotive development as part of this joint work with the California Air Resources Board.
- To reduce yard emissions, Union Pacific pioneered the Genset switcher, which uses ultra-low emissions, EPA-certified, off-road diesel engines. The Genset reduces fuel use by 37%.
- Union Pacific has evaluated other experimental technology for reducing particulate matter and emissions of oxides of nitrogen, such as hybrid and hydrogen fuel-cell locomotives. These serve as stepping stones for other fuel and emissions-reducing innovations; however, no single fuel provides all the answers to today's environmental questions.

EMPLOYEE ENGAGEMENT

Employees understand that protecting the environment is part of every job, and they are pursuing energy-conservation techniques to move more freight with less fuel.

- Through simulator training and peer coaching, locomotive engineers hone their train operating techniques to conserve energy. They also utilize technology, similar to a vehicle's cruise control system, and software that analyzes train operations through advanced GPS maps, prompting throttle and brake actions.
- Other innovative employee efforts include assigning power to reduce fuel consumption and locomotive wear, and increasing use of distributed power to reduce in-train forces and drag while saving fuel and train starts.

OPPORTUNITIES ACROSS THE SYSTEM

Union Pacific's conservation efforts aren't limited to locomotives. Whether working in train yards or administrative offices, employees make environmentally responsible choices every day.

- Union Pacific has a wide-reaching resource management initiative that results in the railroad diverting about 70 percent of its waste from the landfill. This includes metals, crossties, e-waste and more.
- We operate and maintain about 85 wastewater treatment facilities.
- Spill Prevention Control and Countermeasure plans have been prepared and implemented at more than 140 Union Pacific facilities that store, transfer or use oil products.
- Union Pacific continues to pursue conservation initiatives in other areas such as energy efficiency upgrades.

MORE INFORMATION

Union Pacific publishes its annual Building America Report at up.com, detailing environmental, social and governance progress.