

# *Cleaner Locomotive Initiatives*

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# Overview

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**Environmental policy**

**Rail environmental benefits**

**Green equipment and operations investments**

**Sustainable rail technology R&D**

# Environmental Policy

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*“It is the policy of the BNSF Railway Company to operate so as to protect and enhance the environment, to protect the health and safety of the employees and the communities in which BNSF operates, to comply with environmental laws and regulations, and to continuously improve BNSF’s environmental performance by monitoring and measuring environmental indicators and goals.”*

# *Rail's Environmental Benefits*

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**Increasing Fuel Efficiency**

**Contributing to the sustainability of those we serve**



**Improving Air Quality**



**Reduced Highway Congestion**



# Investments

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## Equipment

- **Locomotives** - Aggressive purchasing of locomotives that are 15% more fuel efficient with lower emissions (over 2,000 Tier 2 locomotives in the last 8 years)
- **Idle start/stop** - Installed on nearly 90% of BNSF's locomotives to date

## Intermodal Yards

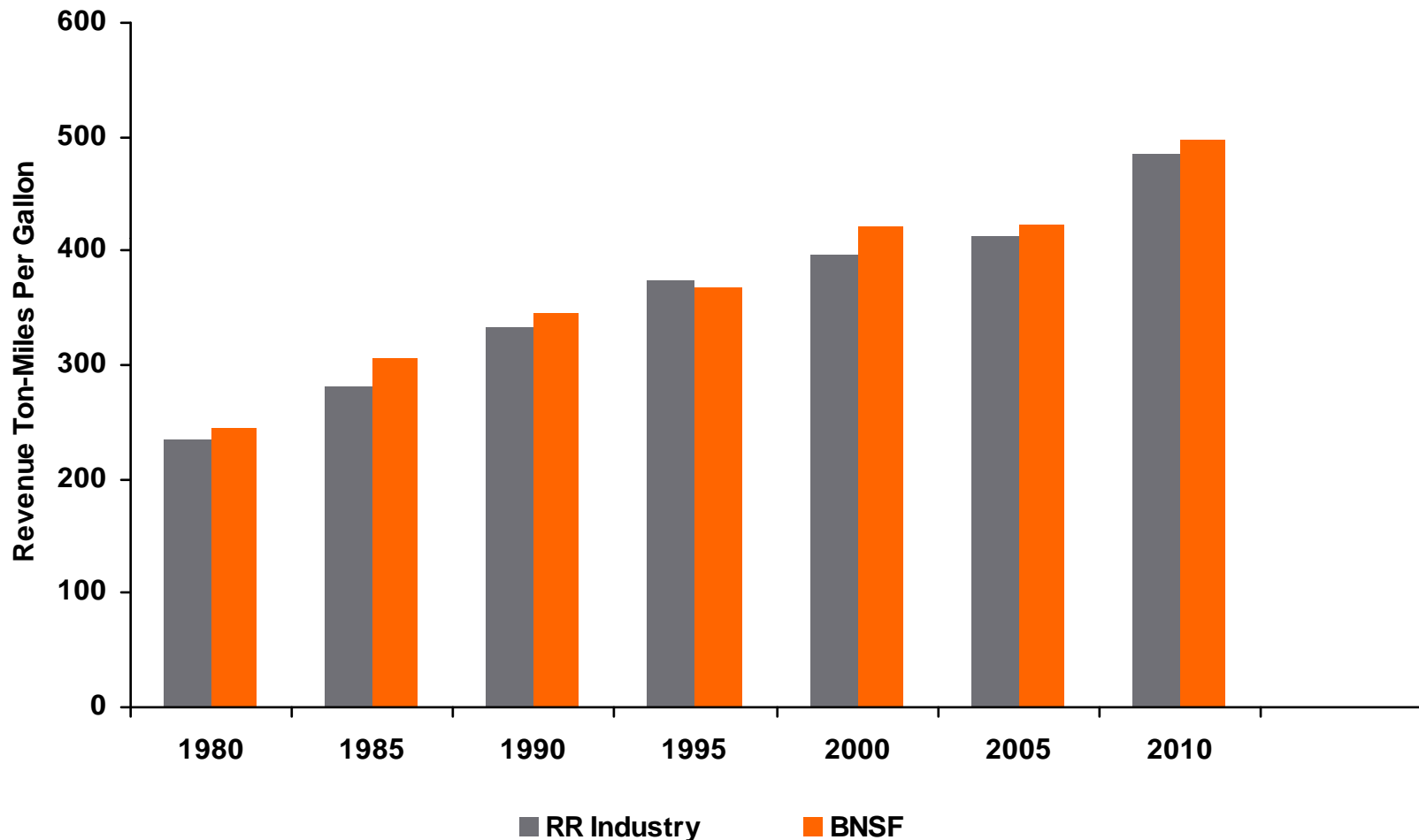
- **Automated Gate Technology** – Installed at 7 facilities through 2011 with 2 more planned in 2012
- **Electric Wide-Span Cranes** – Installed at Memphis and Seattle, planned for future intermodal yards

## Operations

- **Driver assist technology** - throttle control software systems for optimum acceleration & deceleration
- **Train Aerodynamics**
- **Proper horsepower per trailing ton**

# *Results – Roughly 100% Improvement in System Fuel Efficiency from 1980 to 2010*

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# *Green Technology R&D – Alternative Fuels*

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**Biodiesel** – Partner w/ EPA in Montana testing biodiesel blends up to 20%

**Ethanol injection** – Partner w/ Southwest Research on stationary testing as alternative fuel supplement

**Hydrogen fuel cell** – Partner with Dept. of Defense on Ballard fuel cell. Niche application where locomotives only emit water vapor.

**Liquid Natural Gas (LNG)** – Yard hostler trucks at intermodal yard in Commerce, CA



# Alternative Fuels w/ Lower Emissions

## BNSF leads the way in the development and implementation of fuel-efficient technologies

### Natural Gas Hostler Trucks



- BNSF operates 10 hostler trucks at the intermodal facility in Los Angeles and was the first railroad to adopt this technology
- Reduce nitrogen oxide (NOx) and particulate emissions by 90% (compared with standard off-road diesel tractors)

### Liquefied Natural Gas Locomotive



- One of the cleanest burning locomotive technologies in existence
- BNSF operated four liquid natural gas locomotives for nearly 20 years
- 1200 sustainable horsepower, spark ignited

### Hydrogen Fuel Cell Switch Locomotive



- First railroad in the world to develop an experimental hydrogen fuel cell switch locomotive
- Not dependent on oil for fuel
- Operational trials in 2010/2011
- Currently being upgraded



# New Locomotive Technologies

## Idle Control Locomotive Technology

- Reduces air emissions and fuel consumption
- Automatic shut down when not in use
- Used on close to 90% of BNSF locomotives
- Required technology for all new locomotives



## Multiple GenSet Switching Locomotive

- Reduces air emissions up to 90%
- Improves fuel efficiency up to 25% over standard switch engines
- Operating 86 GenSet locomotives nationwide with limited success



## Tier 3 / 3+ Switcher Locomotives

- Currently working to bring Tier 3 and 3+ technologies to railyards
- Technologies reduce air emissions by 50 – 90%
- Represent newest available technology for switch locomotives



# Cargo Handling

## Seattle

- Wide span cranes produce zero on-site emissions
- Reduces hostler truck and locomotive moves
- Technology planned in all future intermodal construction



## California

- Repowering all rubber-tired gantry cranes with Tier 4 interim engine technology
- Retrofitting all other cargo handling equipment with diesel particulate filters

# *Intermodal Truck Efficiency*

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## Auto Gate System

- Optical Character Recognition of truck/trailer information
- Biometric scan of drivers
- Improves turn time, velocity, security, and reduces truck idling



The image features the BNSF Railway logo in white, bold, italicized font. The letters 'BNSF' are significantly larger than the word 'RAILWAY' below them. A registered trademark symbol (®) is positioned to the upper right of the 'F'. A thick white horizontal bar is placed beneath the 'BNSF' text. The background is a blurred photograph of a train moving from left to right during a sunset or sunrise. The sky is a gradient of blue and orange, and the train's motion is captured as horizontal streaks of color. On the far left, a railway signal post with two lights is visible. The foreground consists of dark gravel tracks.

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