



## **Rail is “Green” Transportation: *The Community, Environmental and Economic Benefits of Rail Freight***

### **THIS TRAIN IS ACTUALLY GREEN.**

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Norfolk Southern trains may be painted black and white, but every day they prove they're green. One train can take up to 300 truckloads of freight off our congested highways. That helps reduce pollution, fuel use and demand for foreign oil. We're recycling, adopting clean technologies and working with public agencies and other partners to promote environmental stewardship. That's good for the environment and the economy.





# EPA Standards

- 1998 -- new EPA standards for new locomotives
  - 40% reduction in hydrocarbon (HC) emissions
  - 60% reduction in nitrogen oxide (NOx) emissions
  - 40% reduction in particulate emission

**Railroads: The Best Choice for the Environment  
(Emissions Per Ton-Mile)**

Rank (1= Most Desirable)	Oxides of Nitrogen	Volatile Organic Compounds	Particulate Matter	Carbon Monoxide	Carbon Dioxide
1	<b>Rail</b>	<b>Rail</b>	Air	<b>Rail</b>	<b>Rail</b>
2	Water	Water	<b>Rail</b>	Water	Water
3	Truck	Air	Water	Air	Truck
4	Air	Truck	Truck	Truck	Air

Source: Envirotrans



# Greenhouse Gas Emissions

**Total U.S. GHG Emissions  
By Economic Sector: 2005**

<u>Economic Sector</u>	<u>Tg CO2 Eq.</u>	<u>% of Total</u>
Electr. generation	2,429.8	33.5%
Residential	380.7	5.2%
Industry	1,352.8	18.6%
Agriculture	595.4	8.2%
Commercial	431.4	5.9%
Transportation	2,008.9	27.7%
U.S. Territories	61.5	0.8%
<b>Total</b>	<b>7,260.4</b>	<b>100.0%</b>

**U.S. GHG by Transportation Sector: 2005**

<u>Economic Sector</u>	<u>Tg CO2 Eq.</u>	<u>% of Transport.</u>
Trucking	385.8	19.4%
<b>Freight Railroads</b>	<b>44.1</b>	<b>2.2%</b>
Waterborne Freight	49.9	2.5%
Refrigerated Transport	13.6	0.7%
Pipelines	31.1	1.6%
Aircraft	170.3	8.6%
Recreational Boats	14.4	0.7%
Passenger Railroads	6.7	0.3%
Pass. Cars & Light Duty Trucks	1,201.4	60.5%
Buses	15.3	0.8%
Mobile Air Conditioners	53.1	2.7%
<b>Total</b>	<b>1,985.7</b>	<b>100%</b>

Data are in teragrams of CO2 equivalents.

Source: EPA, *Inventory of U.S.  
GHG Emissions and Sinks: 1990-2005*,  
Table ES-7, A-110, and A-111

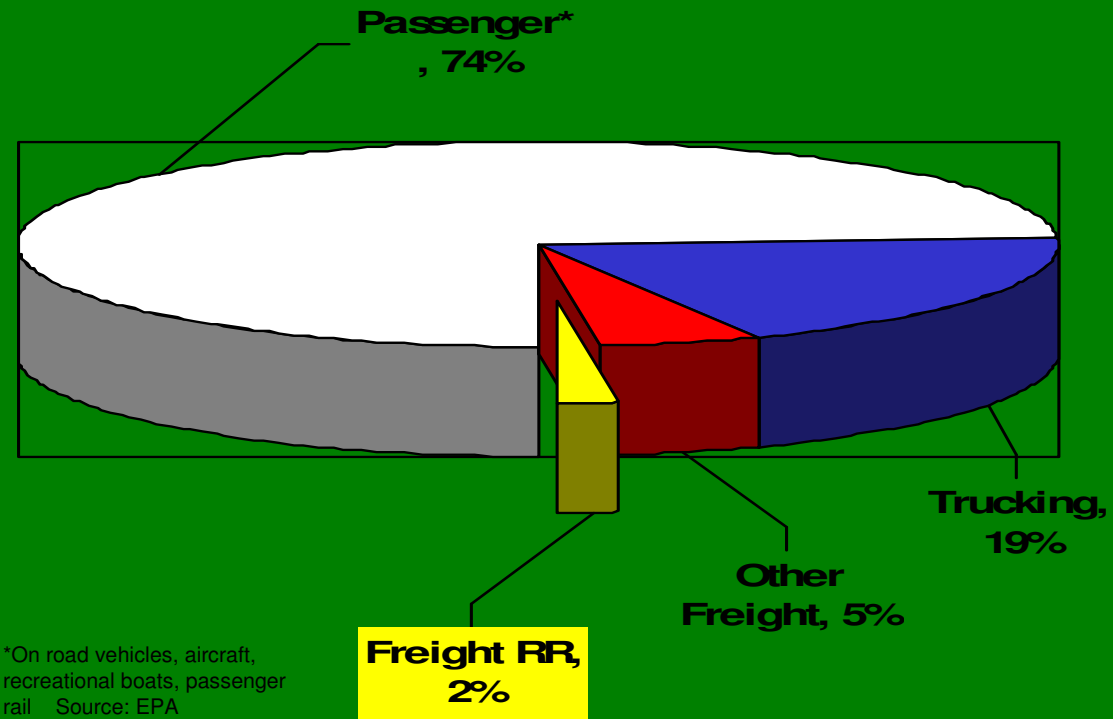
Figures for "transportation" in the two tables do not match exactly because of estimation issues.

**Note: 80% of transportation GHG comes from  
Trucking and Vehicular Traffic**



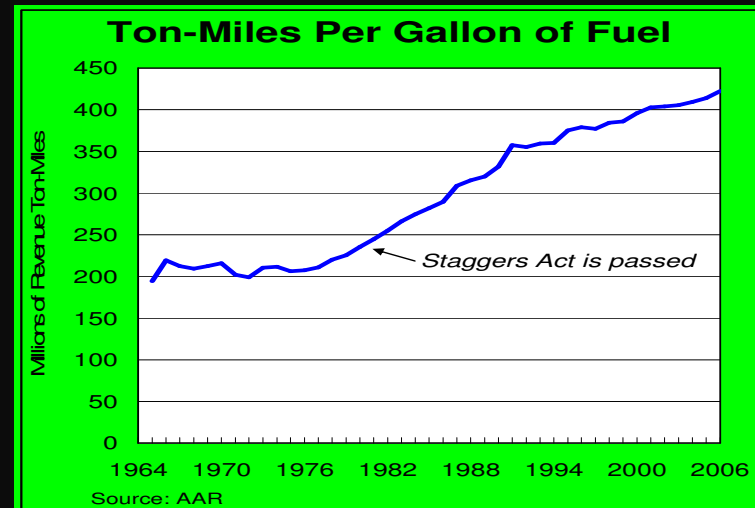
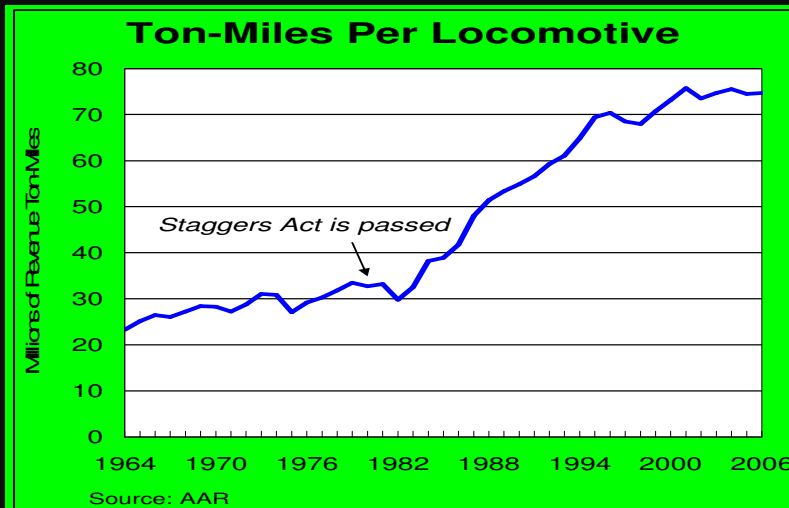
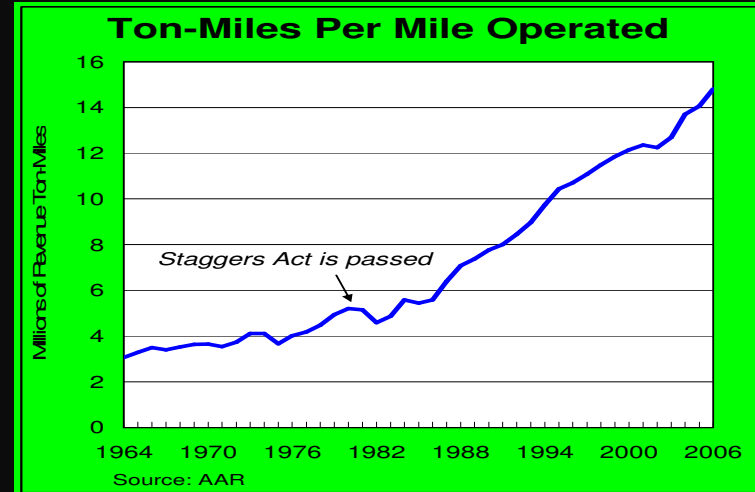
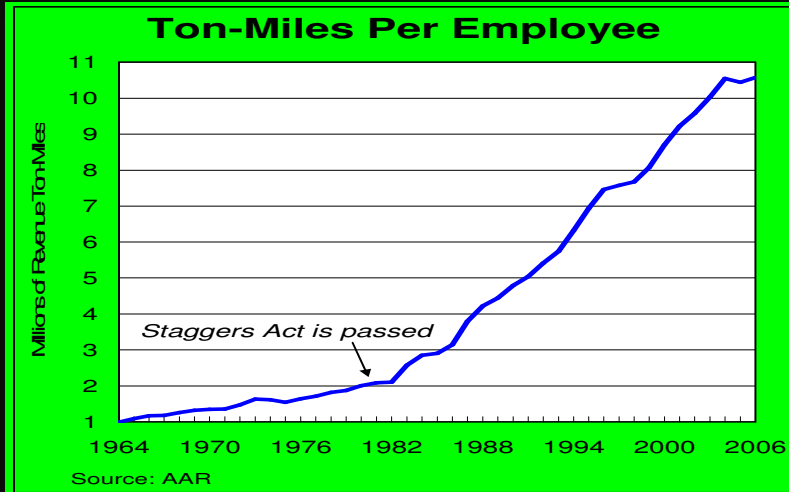
# Greenhouse Gas Emissions

**U.S. Transportation Greenhouse Gas Emissions**  
Source: 2005 (% U.S. Transportation GHG Gases)





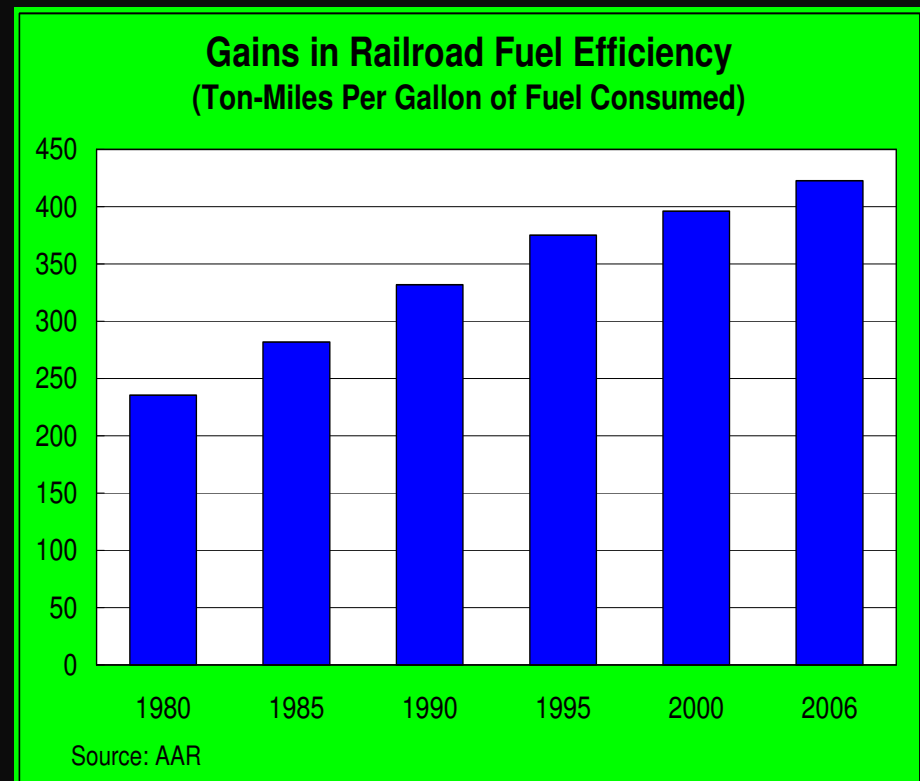
# Rail Productivity Gains





# Railroad Fuel Efficiency

- Thousands of new locomotives
- Advanced microprocessors that monitor locomotive functions
- Policies and technologies to reduce idling
- Promoting partnerships between governments, railroads and suppliers to enhance fuel efficiency
- Graph—89% increase since 1980





## For Instance...

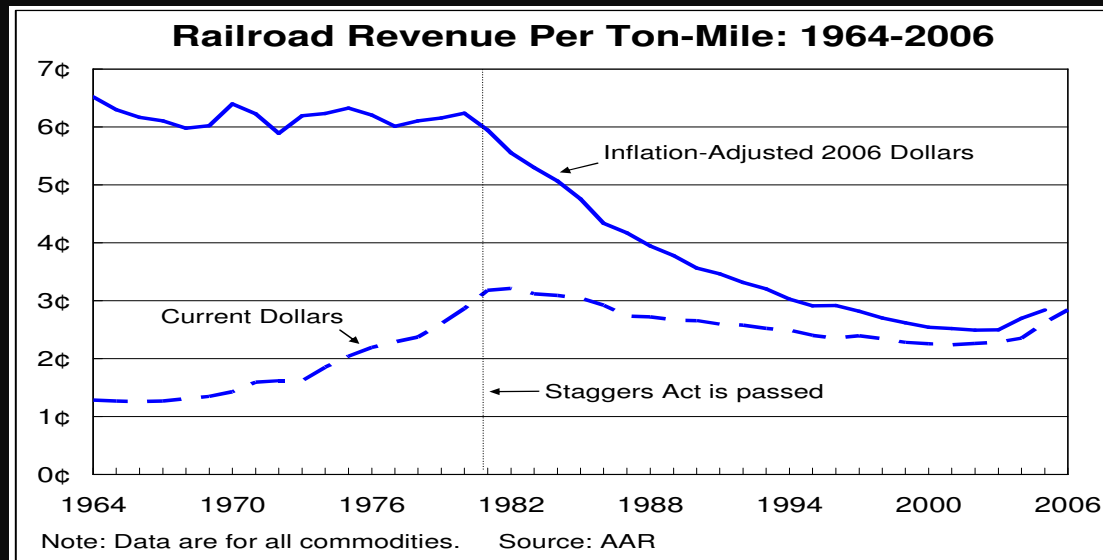
- A passenger vehicle that averaged 20 mpg in 1980 would average 37 mpg today
- Chicago to New York City is 800 miles
- One gallon of unleaded gasoline is \$2.70
- At 20 mpg, the trip would cost \$108 in gas
- At 37 mpg, would cost \$58 in gas
- You save \$50





# Railroad Rates

- Effects of Staggers Act
  - Freedom to price services
  - Confidential contracts
  - Increased productivity
  - More competition
  - Rail revenue per ton-mile (RPTM) down 54%
    - Reflects a drop in rail rates

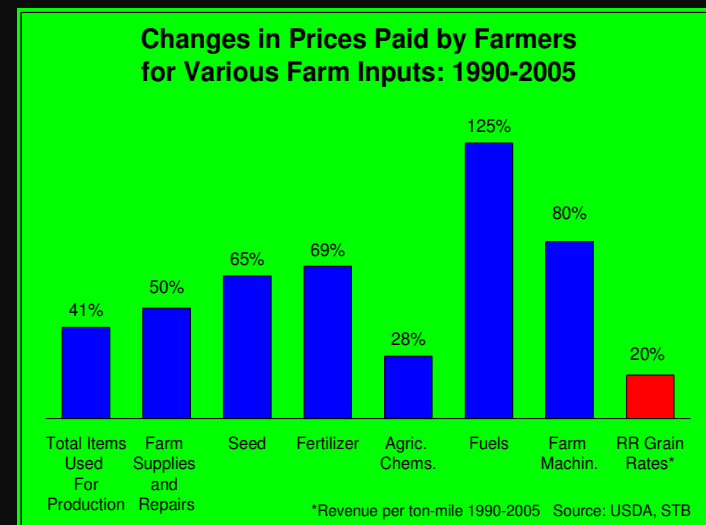
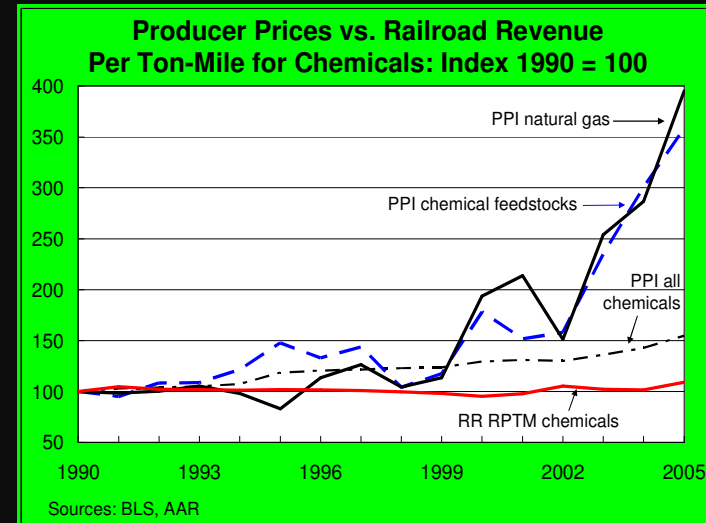






# Railroad Rates

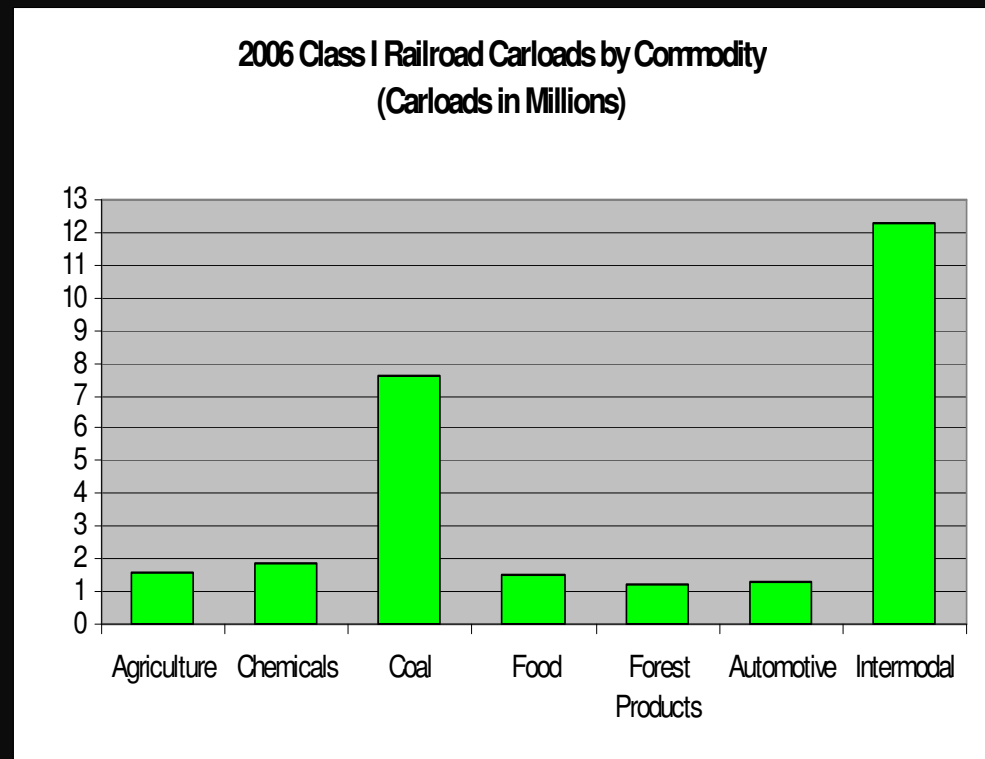
- From 1990 to 2005:
  - Electricity prices rose 24%
  - Rail coal rates fell 17%
  - Liquefied refinery gas prices rose 258%
  - RPTM for chemicals rose 9%
  - Farm products rose 41%
  - Average rail rate for grain rose only 21%
  - GAO— rail rates in 2006 were 20% below 1985 rates in non-inflation adjusted terms
    - Cause—continuous productivity gains in the RR industry





# U.S. Railroad Traffic

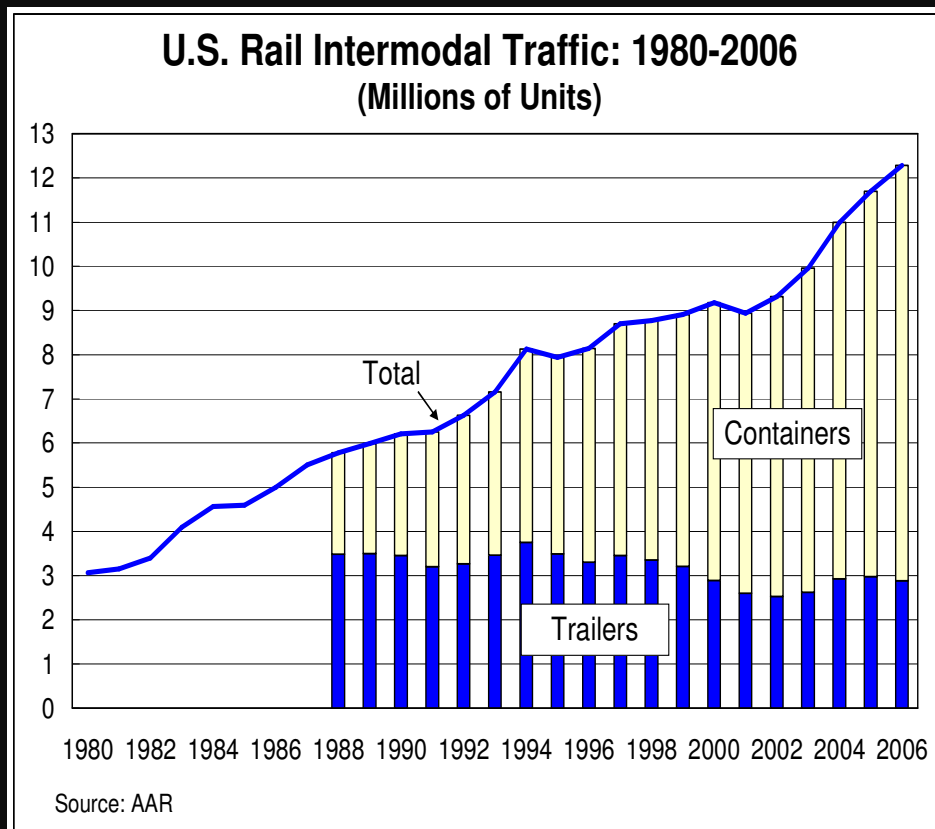
- 40% of U.S. freight ton-miles
- Intermodal traffic--12.3 million annual carloads
- Class 1 non-intermodal traffic—15.1 million:
  - Agriculture – 1.6 million
  - Chemicals – 1.9 million
  - Coals – 7.6 million
  - Food – 1.5 million
  - Forest products – 1.2 million
  - Automotive – 1.3 million



27.4 million carloads x 2.5 trucks=68.5 million trucks off the highways



# Intermodal Transportation



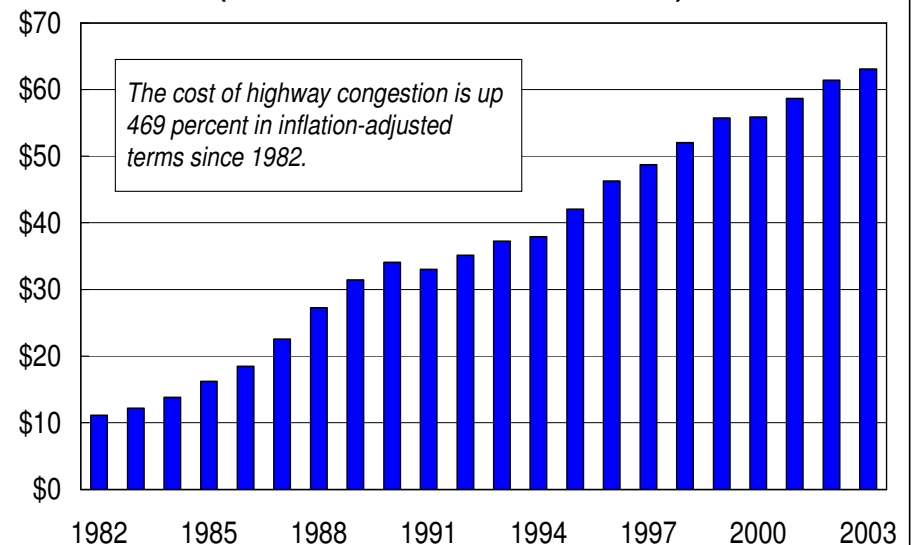
- Traffic quadrupled since 1980
- International trade—over half of traffic
- 23% of total railroad freight 2003 –revenue surpassed coal revenue for first time
- Safer for environment than trucks alone, as railroads are 3 times more fuel efficient
- 1 intermodal train = 300 truckloads



# Impact of Highway Traffic

- Truck needs will soon exceed highway capacity
- Aggregate annual cost of highway congestion in U.S. -- \$200 billion
- Cost of one mile of highway -- \$10 million
- Cost of one mile of rail track-- \$1 to \$3 million
- One intermodal train = 300 trucks
- Public-private partnerships and tax incentives are key

**Estimated Cost of U.S. Highway Congestion Due to Wasted Travel Time and Wasted Fuel**  
(Billions of Constant 2003 Dollars)



Source: Texas Transportation Institute



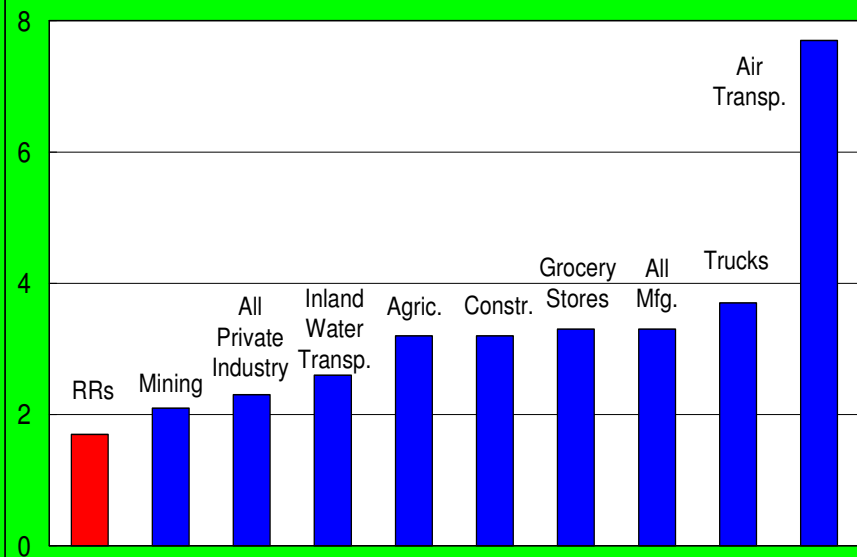
# Railroad Safety

- 2006—safest year ever for railroads
- 2006—99.997% of Hazmat carloads arrived safely
- Since 1980—hazmat accidents down 86%
- Since 1980:
  - Employee casualty rate down 81%
  - Grade crossing collision rate down 76%
  - Overall train accidents down 69%



NS has been awarded the E.H. Harriman Award for 18 consecutive years

Lost Workday Injury & Illness Rates Per 100 Full-Time Equivalent Employees for Various Industries: 2006



Source: U.S. Bureau of Labor Statistics



## Norfolk Southern's Efforts

- 50 kilowatt wind turbine
- Bellevue Yard, Ohio
- Three 24 foot rotor blades on an 80 foot tower
- Will power yard's wastewater treatment plant
- Will generate over 100,000 kw hours annually
- One of 1<sup>st</sup> times wind has been used to provide power to a U.S. railroad facility





# Norfolk Southern's Efforts



- Electronically Controlled Pneumatic (ECP) brakes
- 60% reduced stopping distances over air brakes
- Electronic signals – brakes on each car of the train work at once, instead of a car-to-car series
- 30 locomotives, 210 quick-drop coal hoppers and 230 hybrid gondolas with ECP brakes in next few months
- Benefits of ECP brakes
  - Shorten stopping distances
  - Improves railroad and public safety
  - Improves network capacity and efficiency
  - Better asset utilization
  - Fuel savings



# Questions?

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