

Evolution of Rail Related Energy Markets

The Energy Forum
New York, NY
March 18, 2013



ASSOCIATION OF
AMERICAN RAILROADS



Assn. of American Railroads

www.aar.org



BUILDING AMERICASM



CANADIAN PACIFIC





Integrated Rail Network

- U.S. freight rail network
~140,000 route-miles;
~40,000 in Canada & Mexico
- Every U.S. state but Hawaii
- ~ 1.5 million freight cars,
~ 31,000 locomotives in
service in N. America
- Seamless across borders
except for Customs



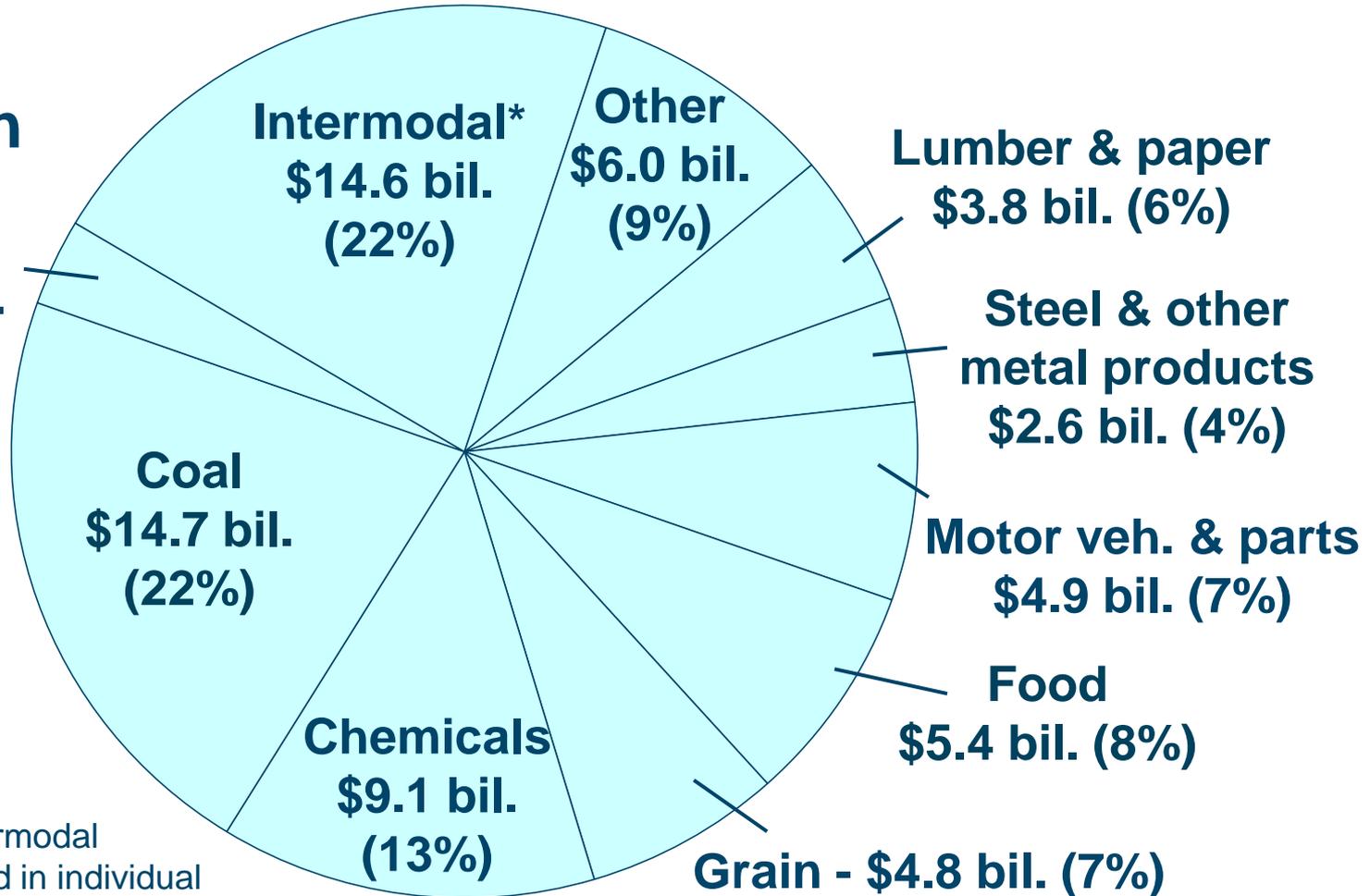


Gross Revenue in 2012 for Class I Railroads

**Total:
\$68.1 billion**

**Stone, gravel,
sand - \$2.1 bil.
(3%)**

**1.83 billion
tons
originated**



*Estimated. Some intermodal revenue is also included in individual commodities. Source: AAR (FCS)



Record Capital Spending Expected in 2013

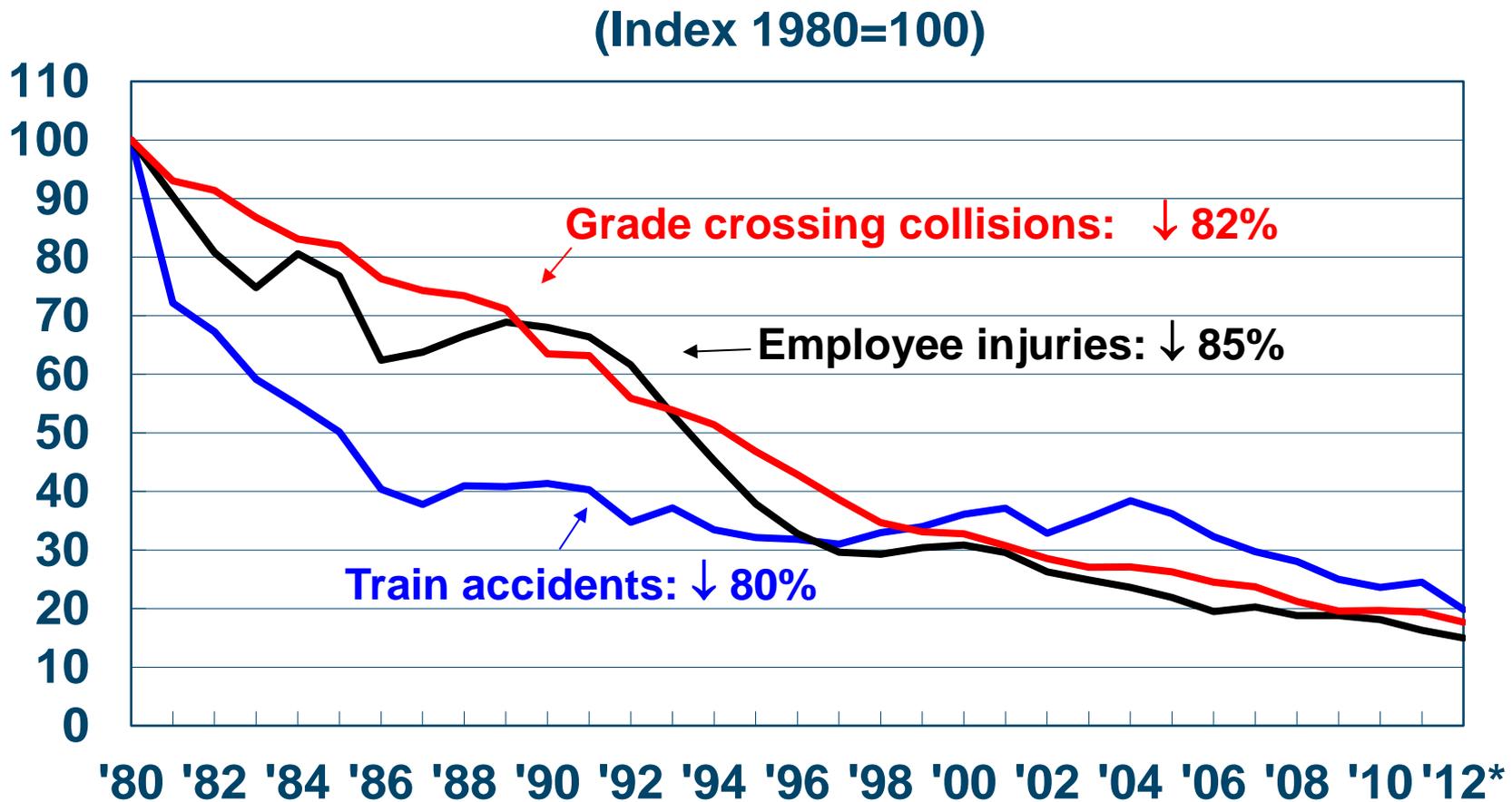
U.S. Freight Railroad Capital Spending (\$ billions)



Data are for Class I railroads. e – estimate Source: AAR



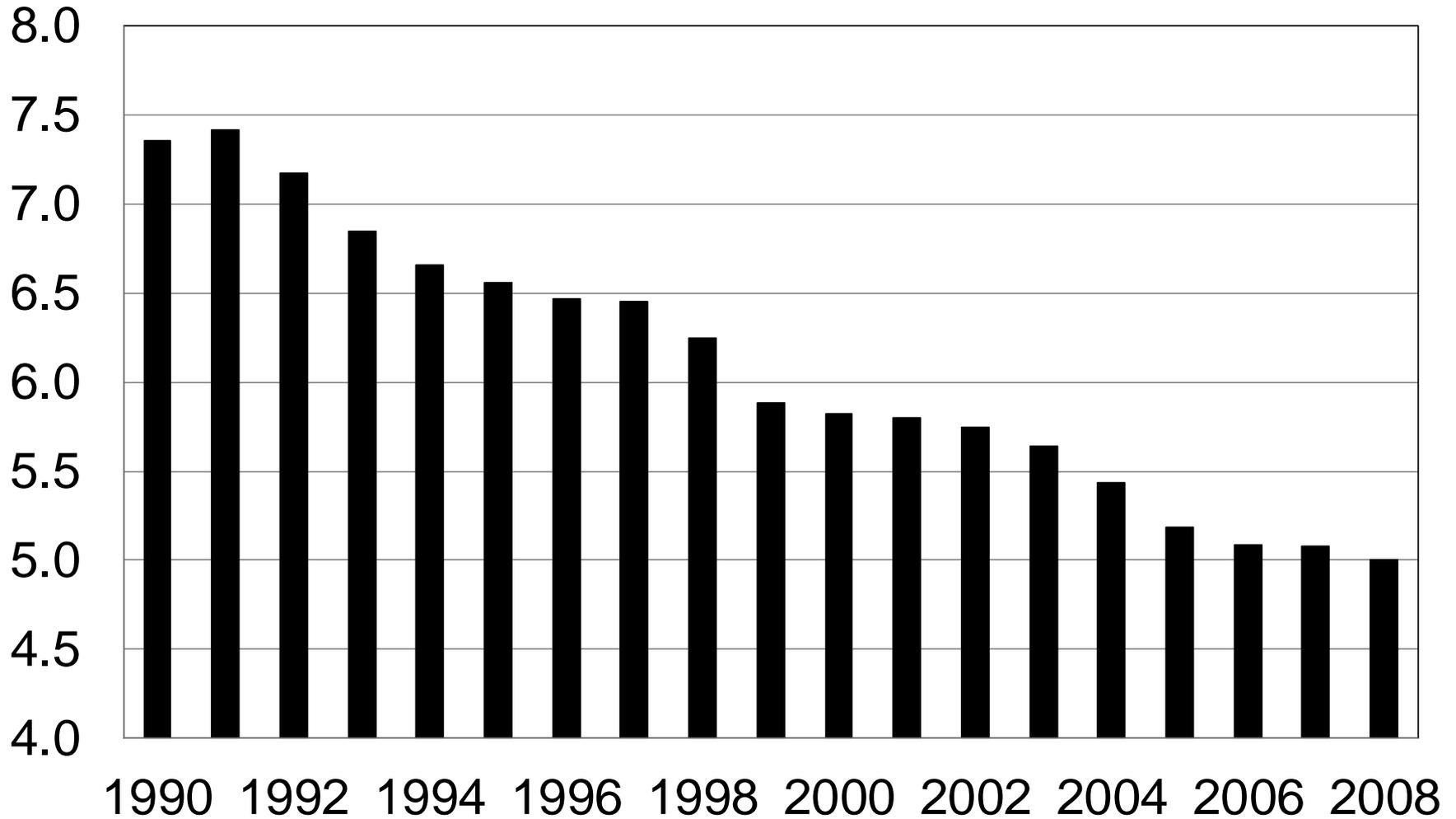
2009-2012 Have Been the Safest Years in History for RRs



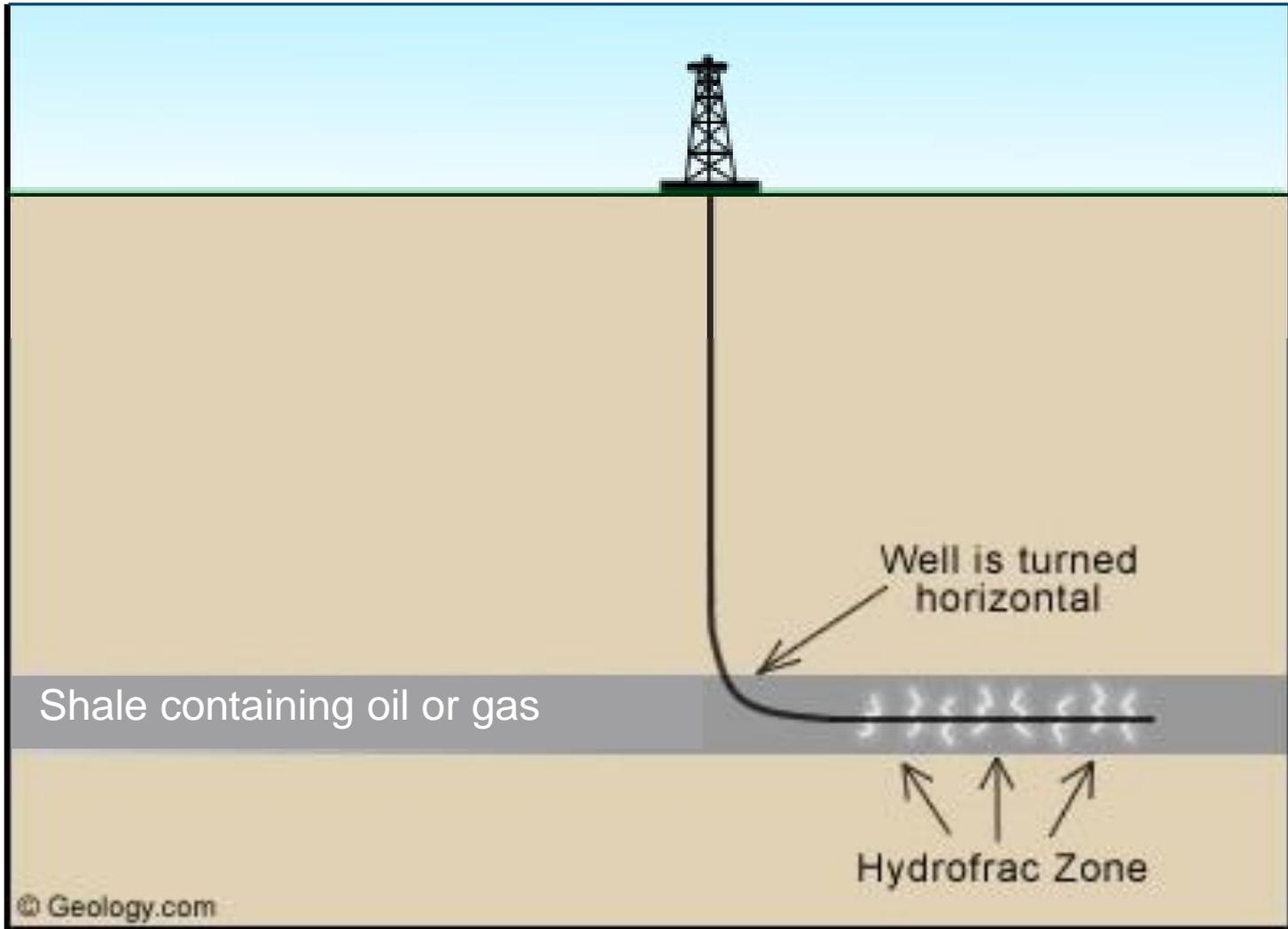
*2012 is preliminary % = change from 1980-2012. Source: FRA

U.S. Crude Oil Production

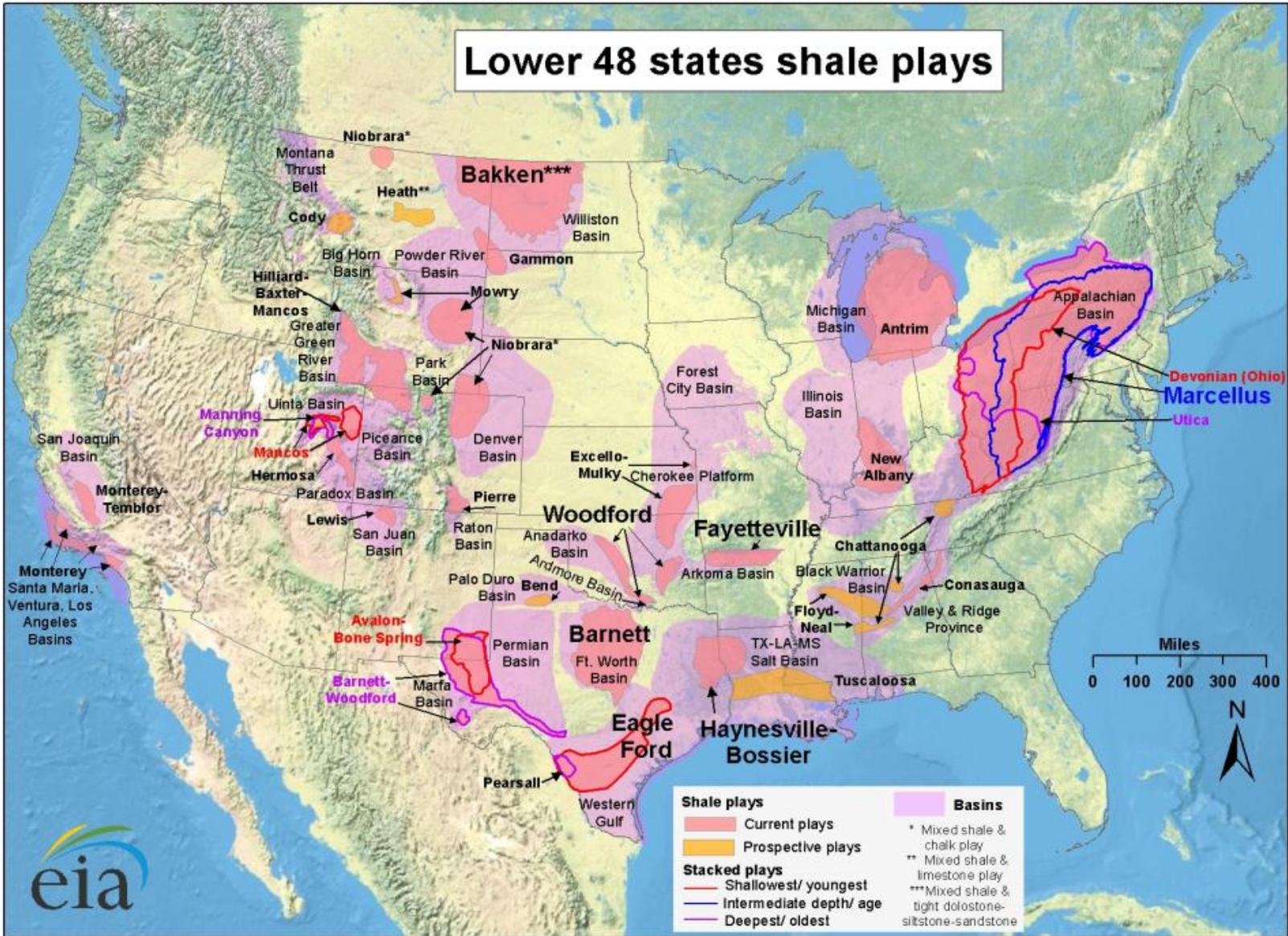
(millions of barrels per day)



Source: EIA



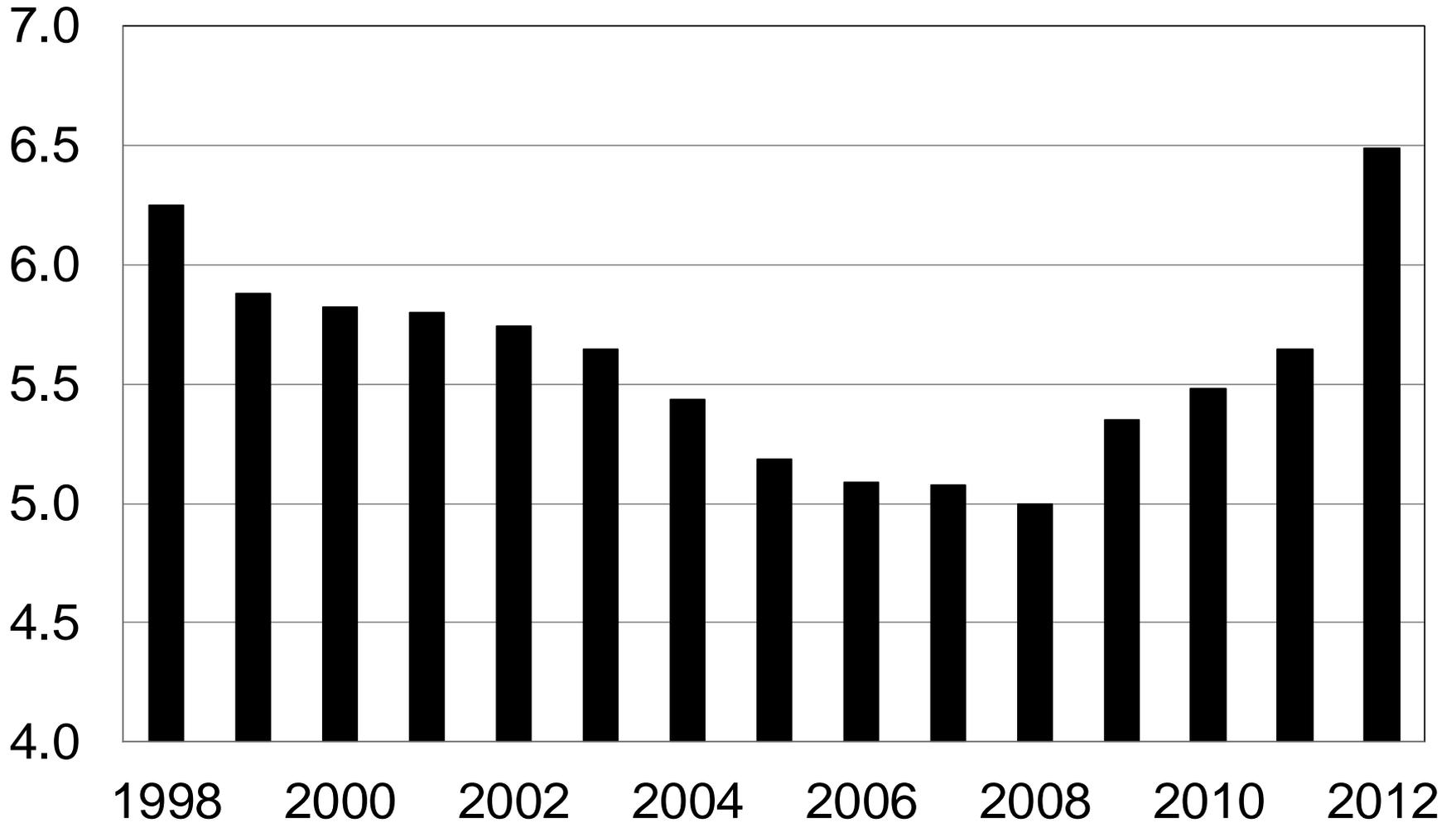
Lower 48 states shale plays



Source: Energy Information Administration based on data from various published studies.
 Updated: May 9, 2011

U.S. Crude Oil Production

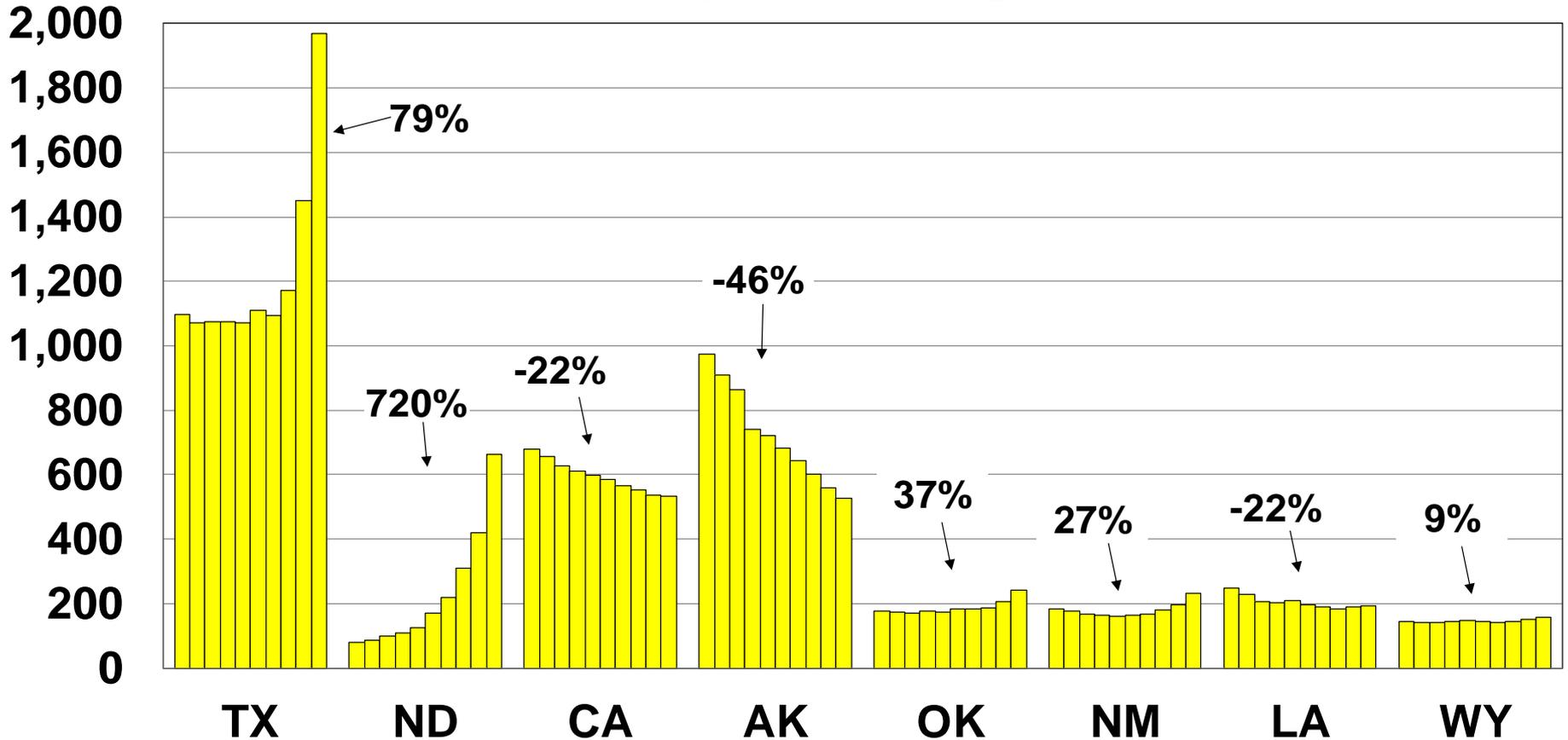
(millions of barrels per day)



Source: EIA

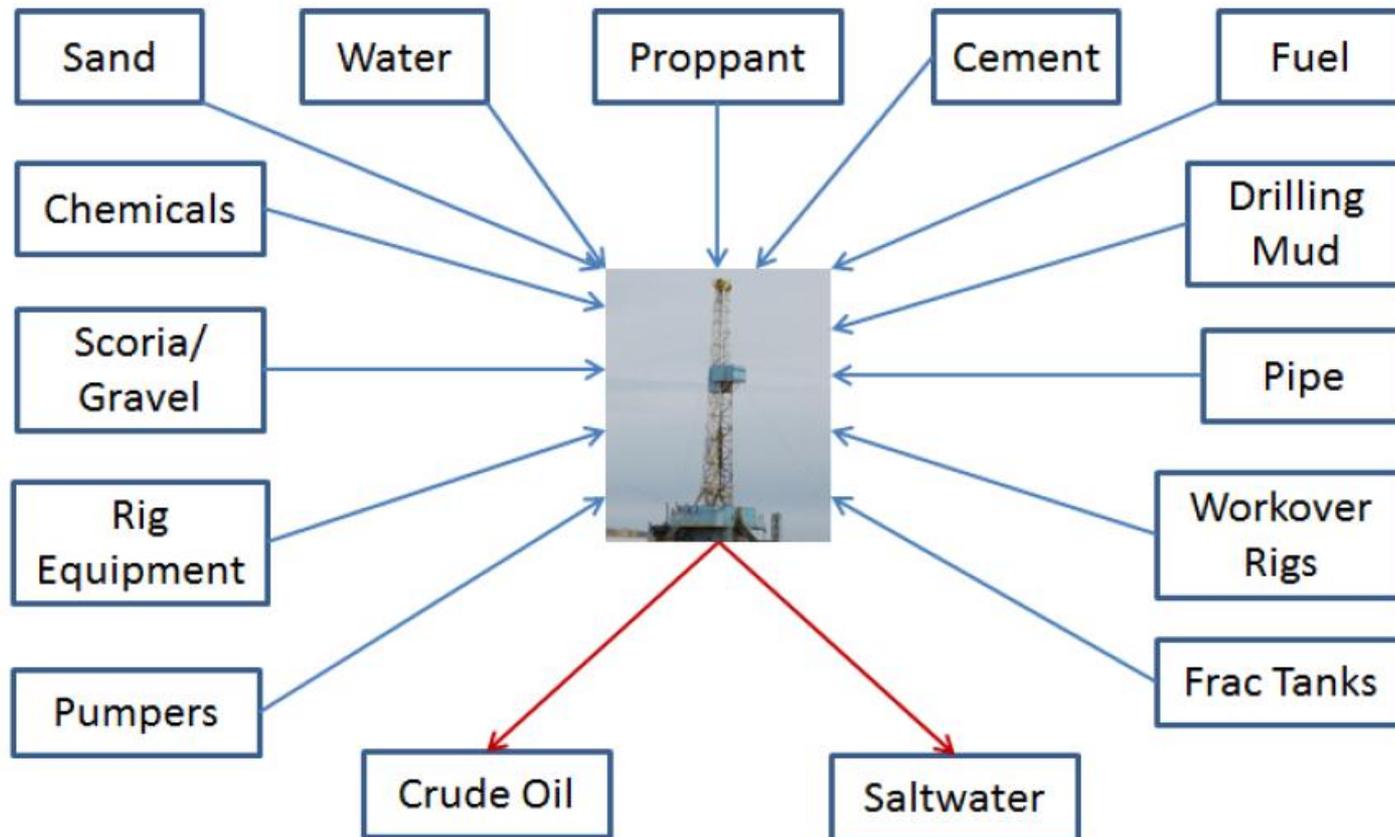
U.S. Crude Oil Production by State: 2003-2012

(000 barrels per day; % = % change 2003-2012)



Federal offshore production (mainly in Gulf of Mexico) is not included. Source: EIA

Truck Movements to and from Wells



Materials and Product Flows

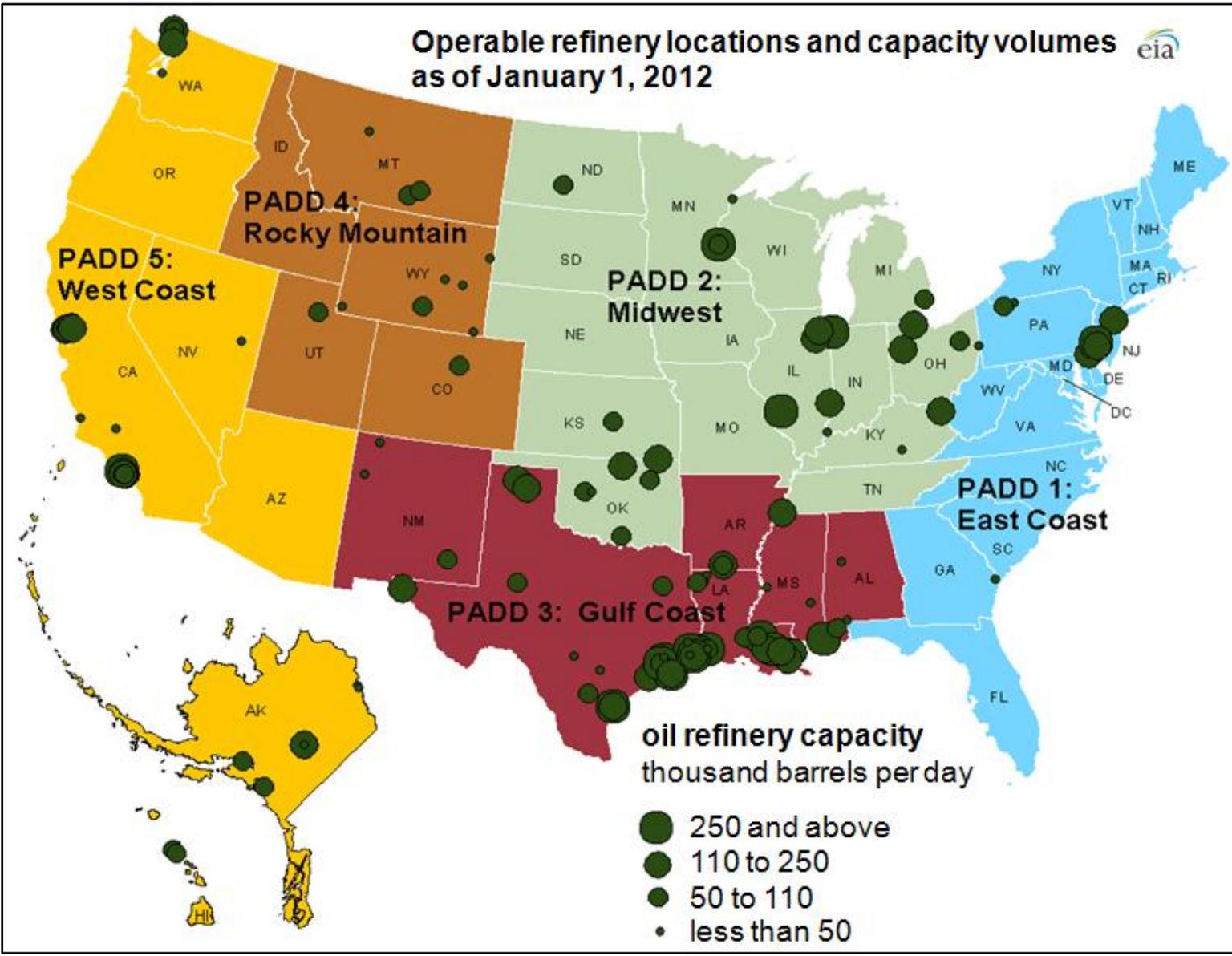
- ▶ Inputs to well site for hydraulic fracturing and production
- ▶ Specialized equipment to and from well site
- ▶ Outbound crude oil
 - ▶ By truck to pipeline or rail transfer location
 - ▶ By small diameter pipeline to trunk line connection
- ▶ Natural gas: by gathering pipeline to trunk connection
- ▶ Outbound byproducts
 - ▶ E.g., salt water mix for disposal by truck or pipeline

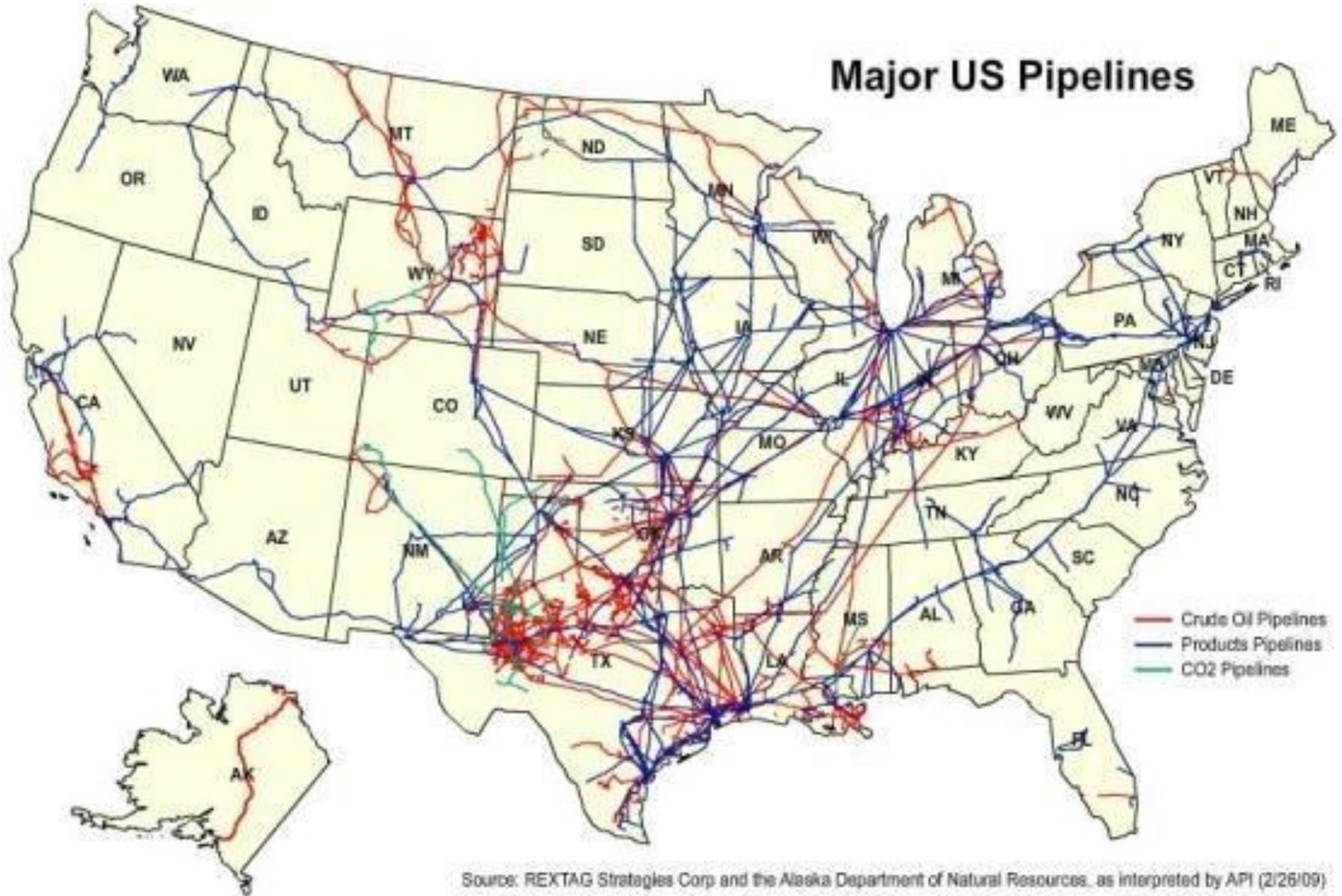
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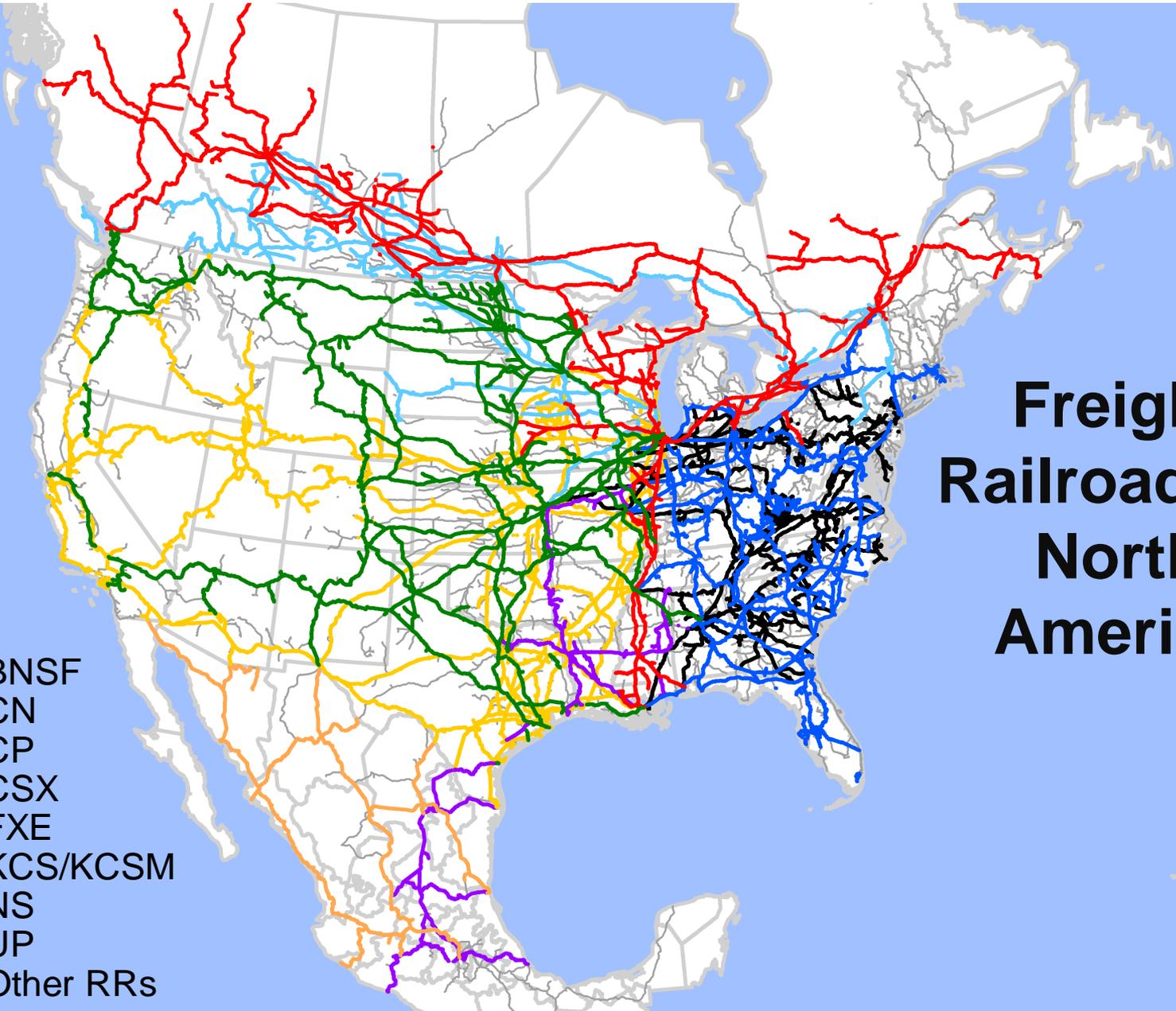
Operable refinery locations and capacity volumes as of January 1, 2012





Freight Railroads in North America

- BNSF
- CN
- CP
- CSX
- FXE
- KCS/KCSM
- NS
- UP
- Other RRs



Hypothetical Transportation Costs Bakken to Gulf Coast (per barrel)

<u>Rail</u>		<u>Pipeline</u>	
Truck through Bakken	\$3		
Load onto rail car	\$2		
Rail direct cost	\$8	Trucking through Bakken	\$3
Tank car lease	\$3	Unload from truck to pipeline	\$2
Unload	\$2	Pipeline direct cost	\$7
Total	\$18	Total	\$12

The big unknown – pipeline capital cost?

Source: Morgan Stanley

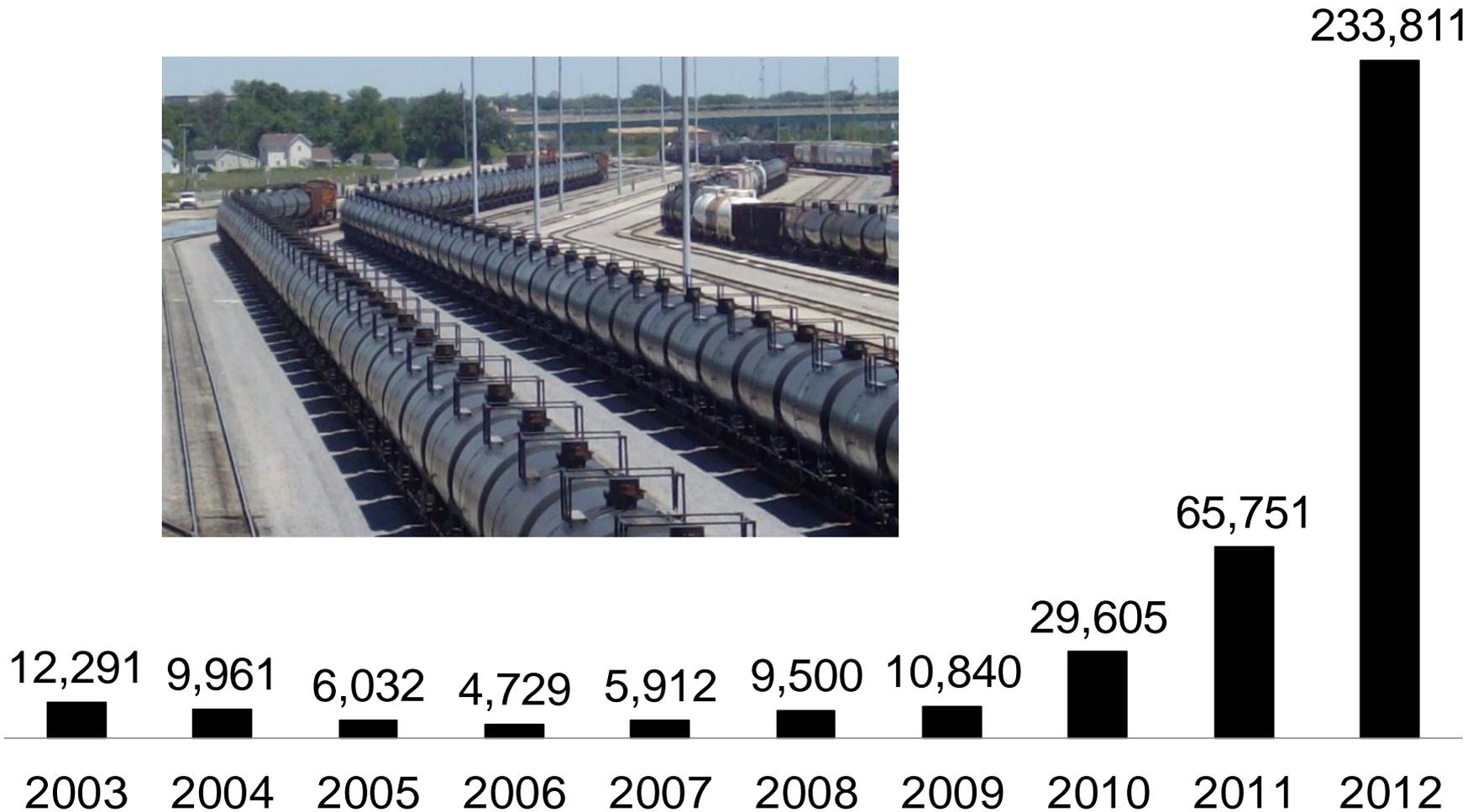
Pipelines and Railroads Have Different Characteristics

	<u>Pipeline</u>	<u>Rail</u>
Environmental concerns	✓✓✓	✓
Permitting challenges	✓✓✓✓	✓
Construction cost	\$\$\$	\$
Long-term contract	✓✓✓	✓
Operating economics	\$	\$\$\$
Flexibility	✓	✓✓✓✓

Relative relationships are approximations.

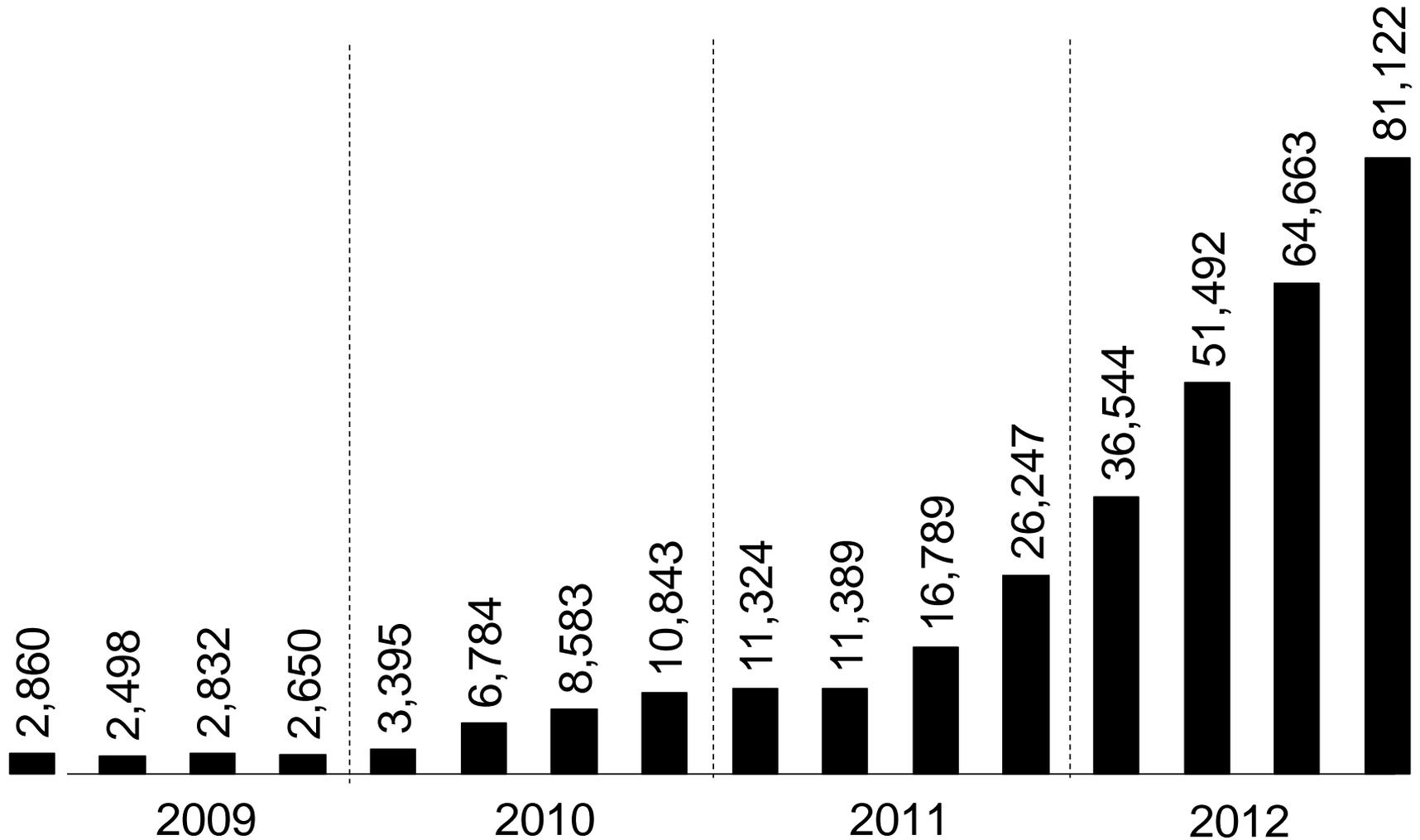
Source: Morgan Stanley, AAR

Originated Rail Carloads of Crude Petroleum on U.S. Class I Railroads: 2003-2012



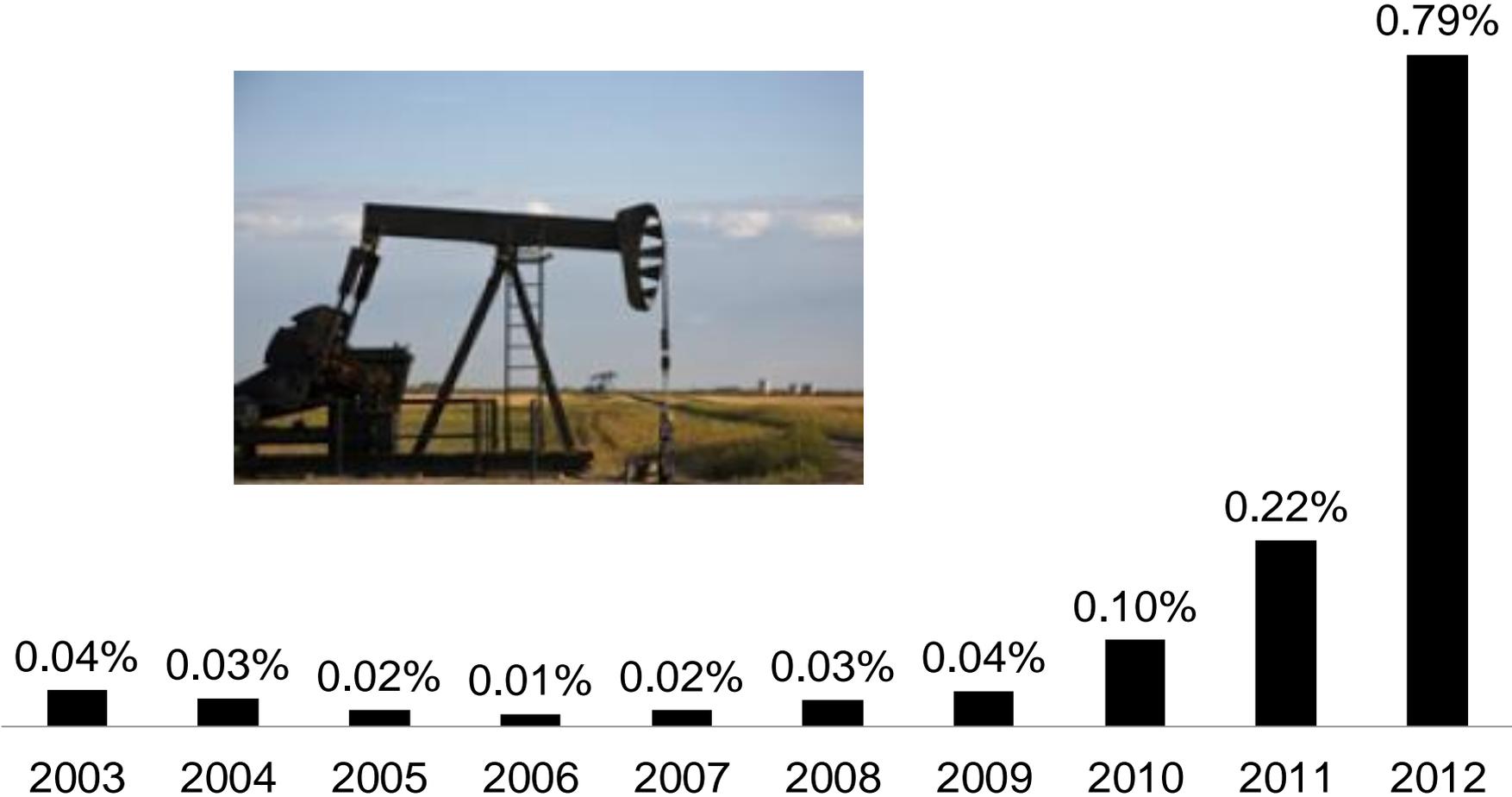
Source: AAR Freight Commodity Statistics

Originated Rail Carloads of Crude Petroleum on U.S. Class I Railroads: Q1 2009 - Q4 2012



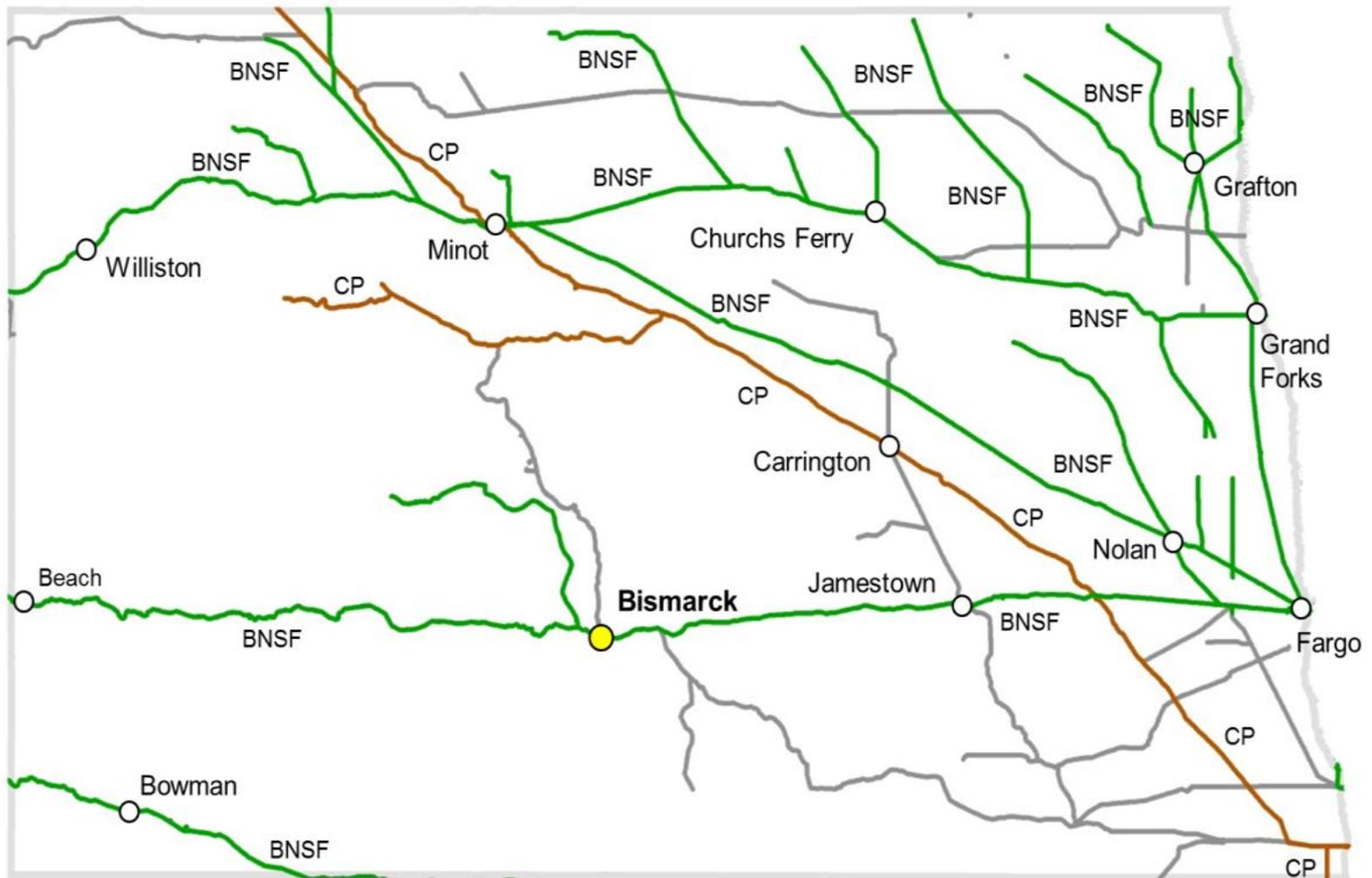
Source: AAR Quarterly Commodity Statistics

Crude Petroleum as % of Total Carloads Originated on Class I Railroads: 2003-2012

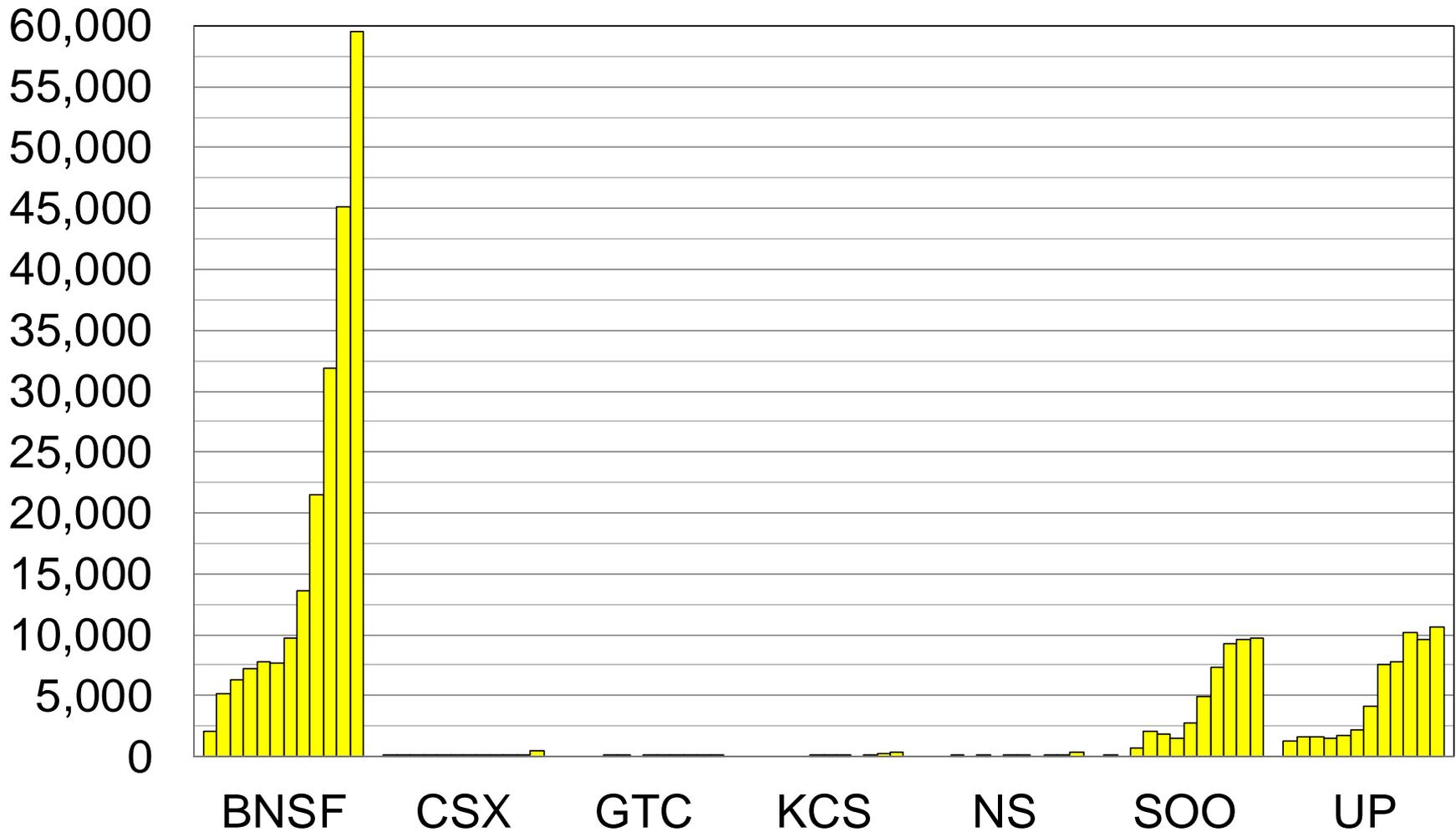


Source: AAR Freight Commodity Statistics

Freight Railroads in North Dakota

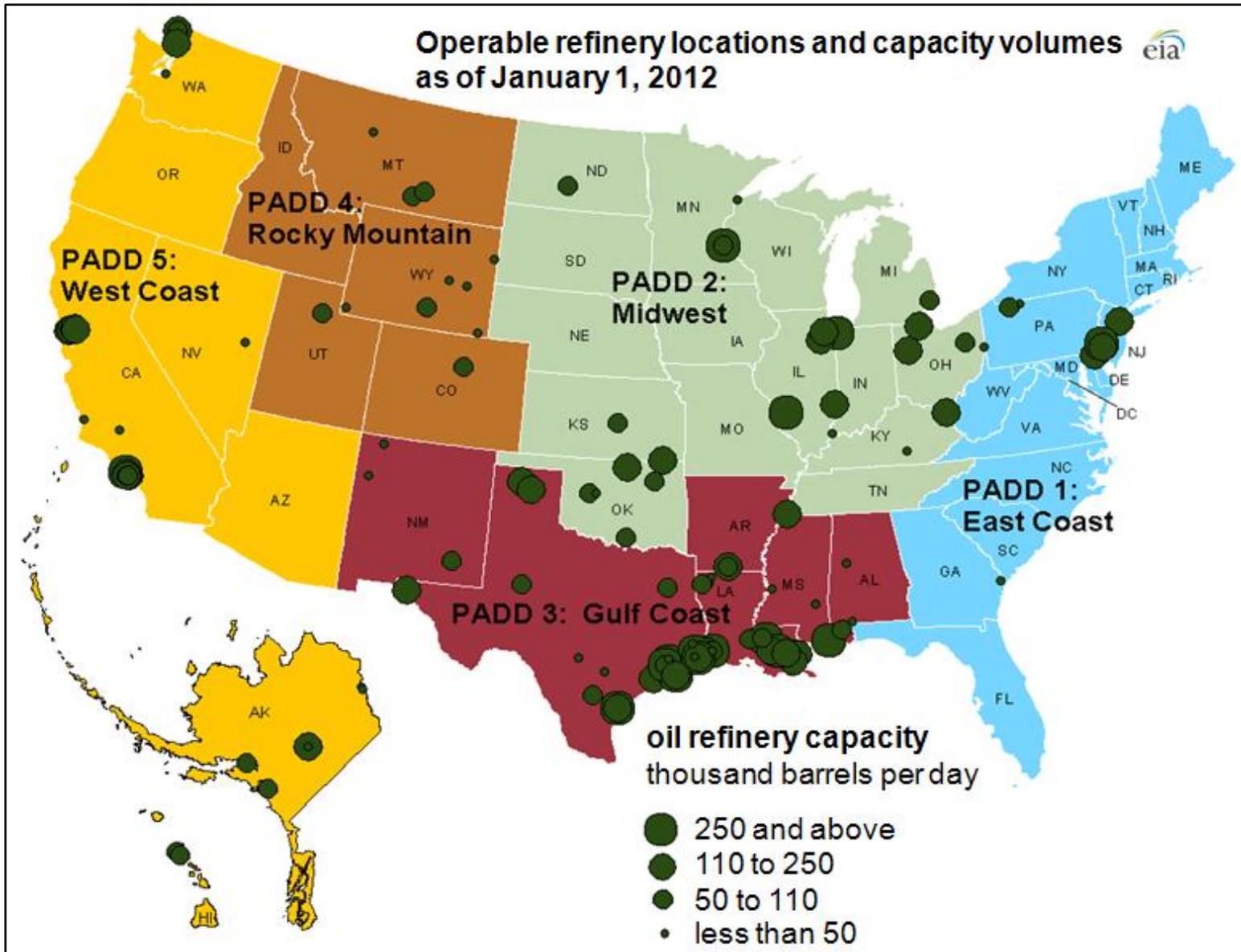


Carloads of Crude Petroleum Originated by Railroad: Q1 2010 - Q4 2012

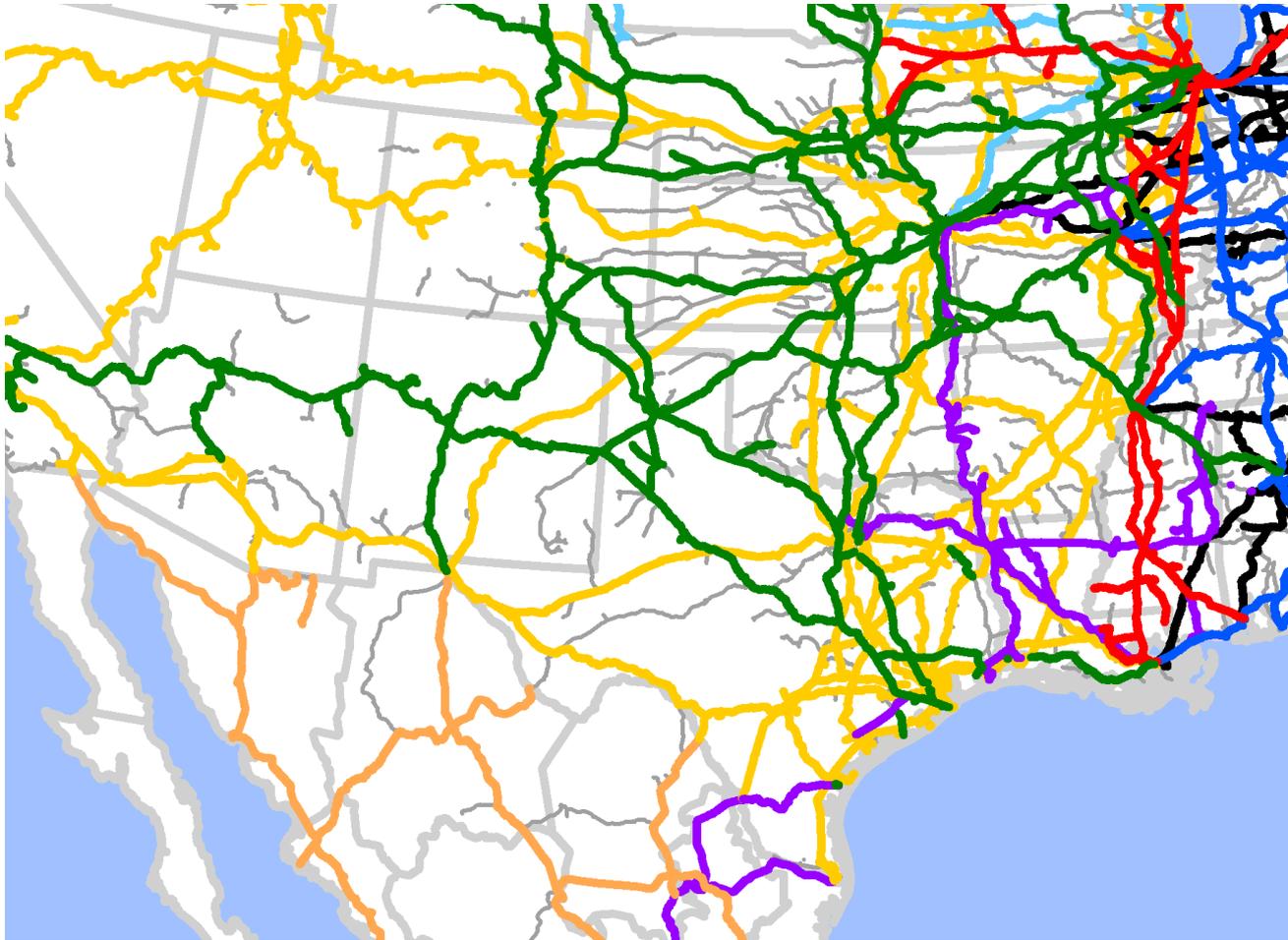


Source: AAR Freight Commodity Statistics

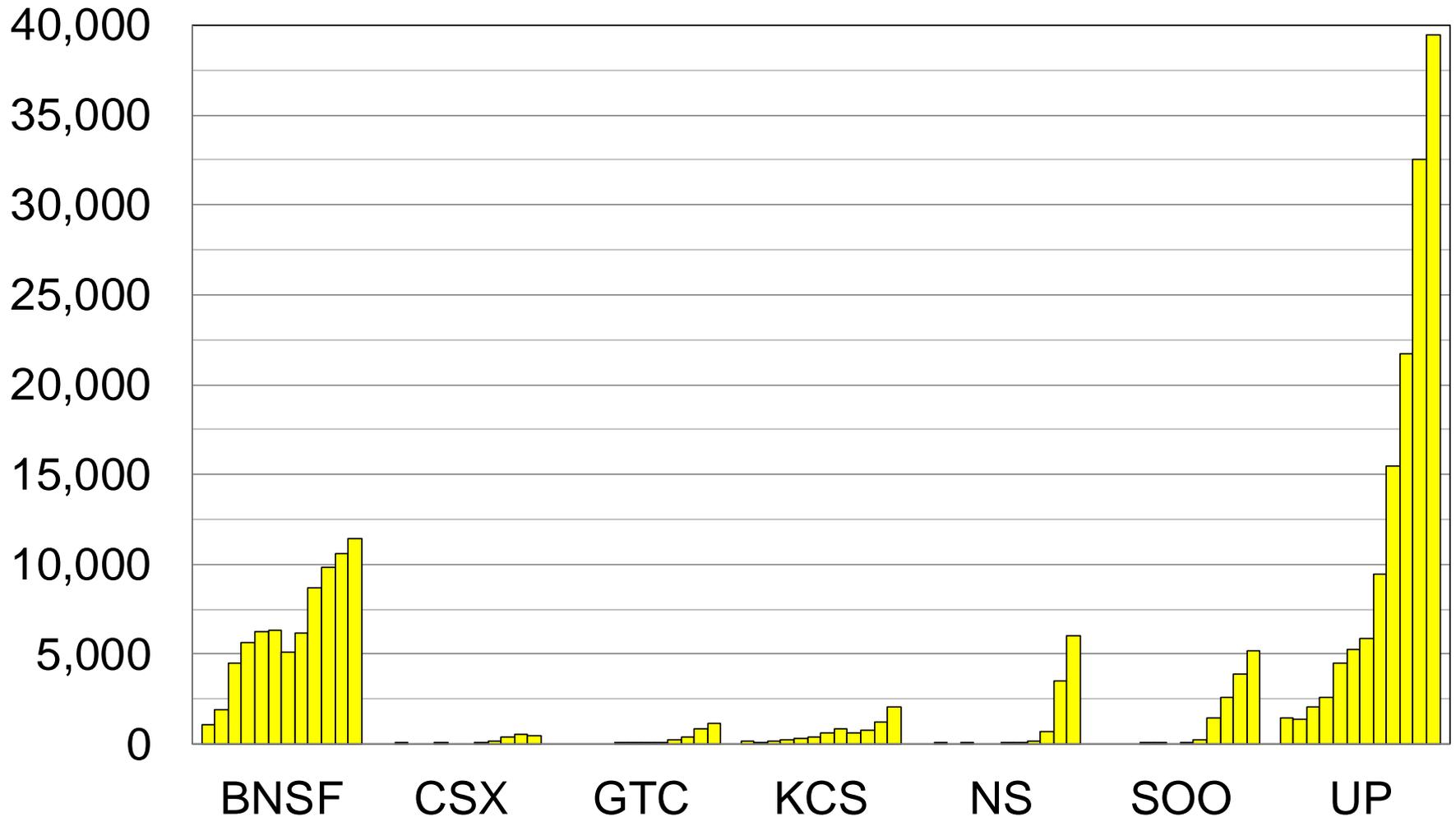
Operable refinery locations and capacity volumes as of January 1, 2012 



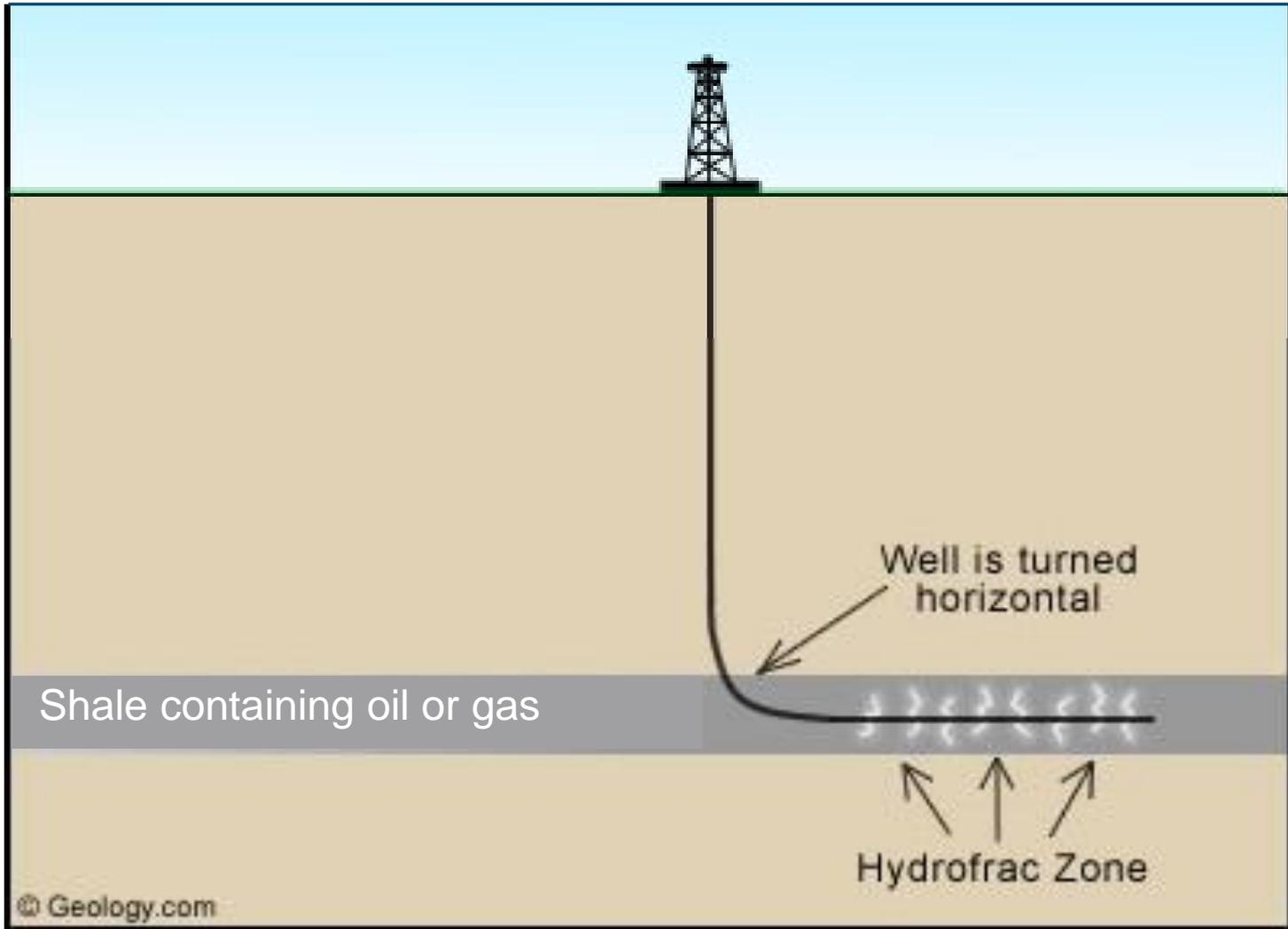
Freight Railroads in the Gulf Area



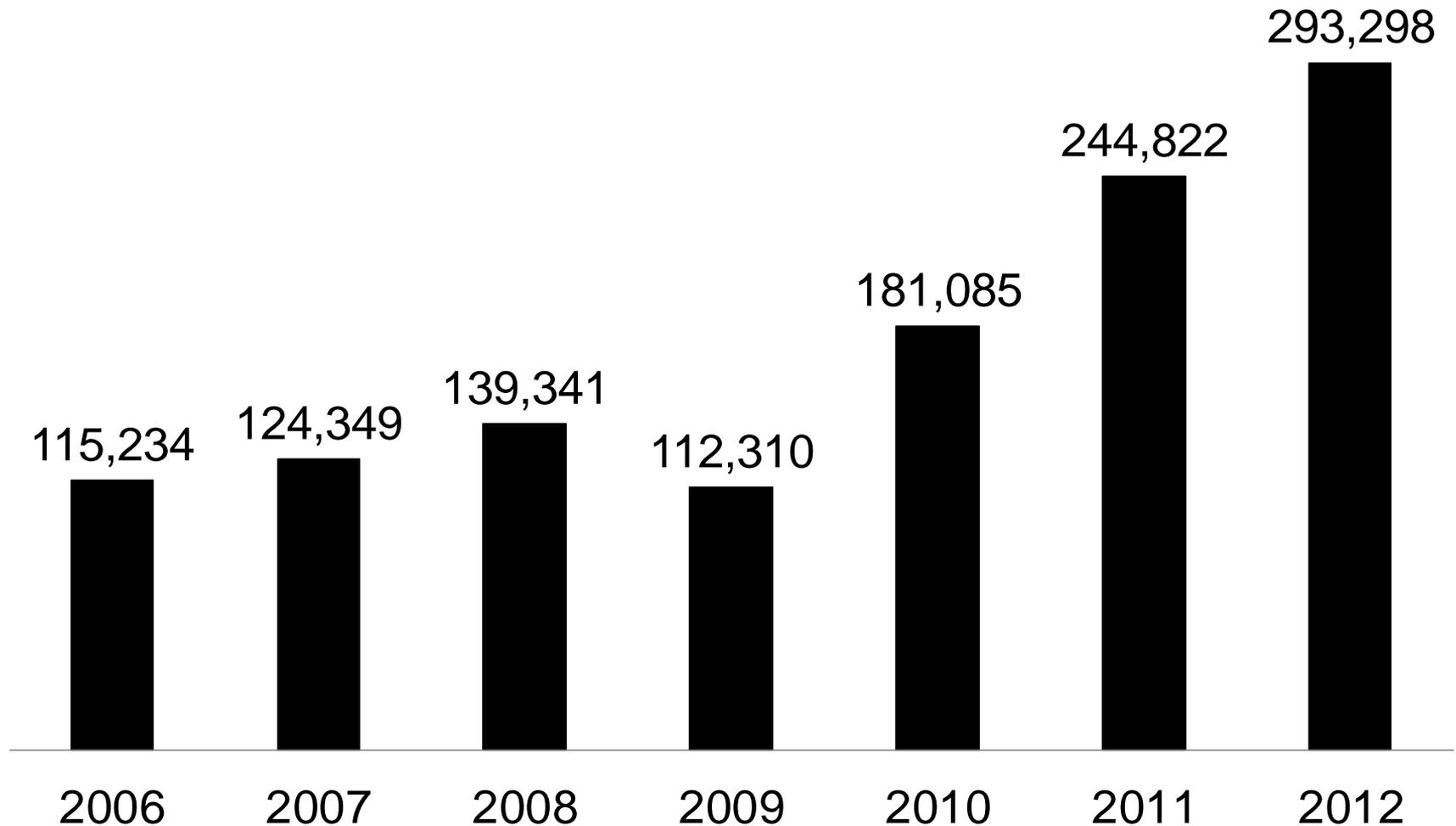
Carloads of Crude Petroleum Terminated by Railroad: Q1 2010 - Q4 2012



Source: AAR Freight Commodity Statistics

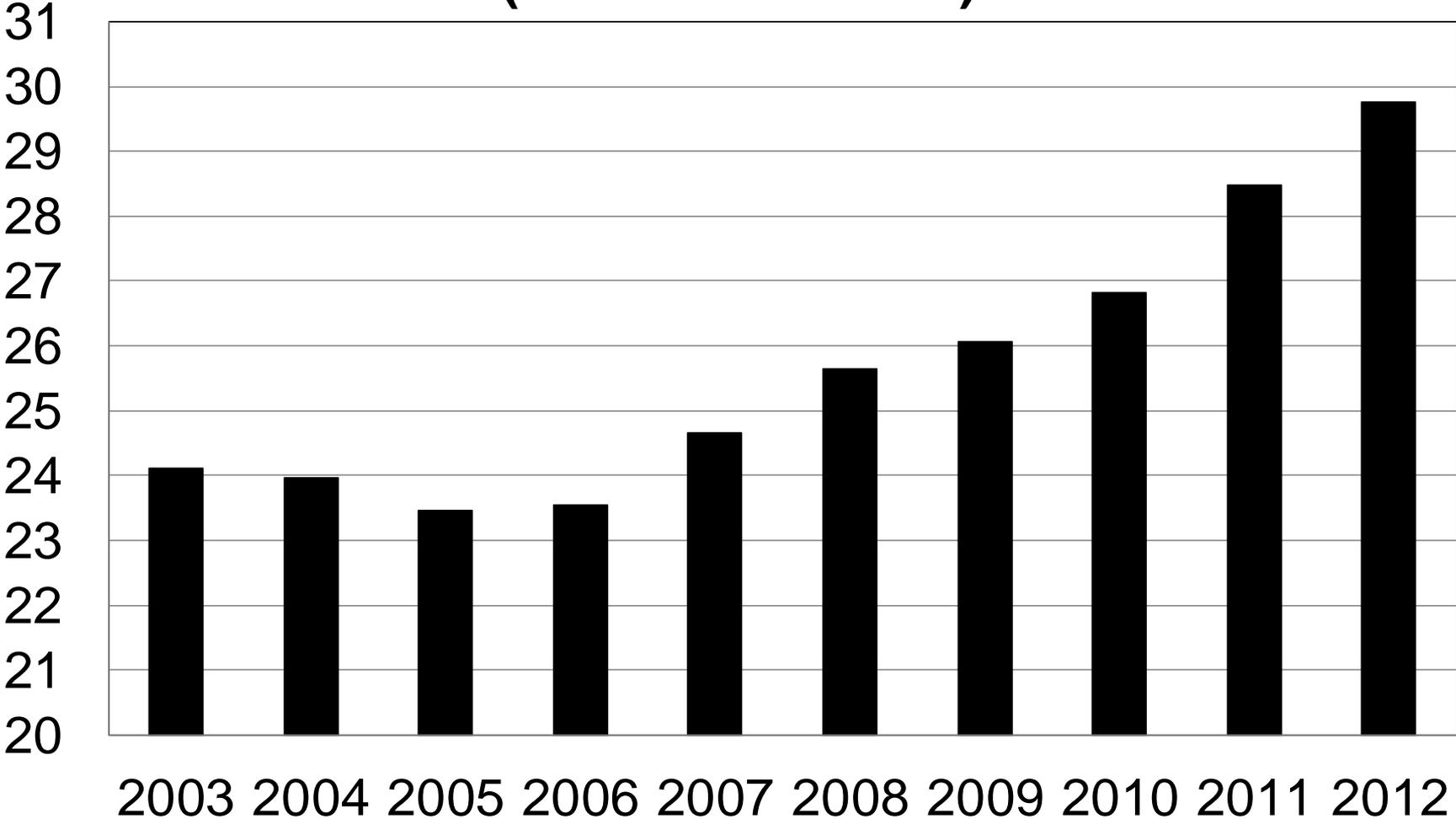


Originated Rail Carloads of Crude Industrial Sand on U.S. Class I Railroads



Source: AAR Quarterly Commodity Statistics database

U.S. Natural Gas Production (trillion cubic feet)

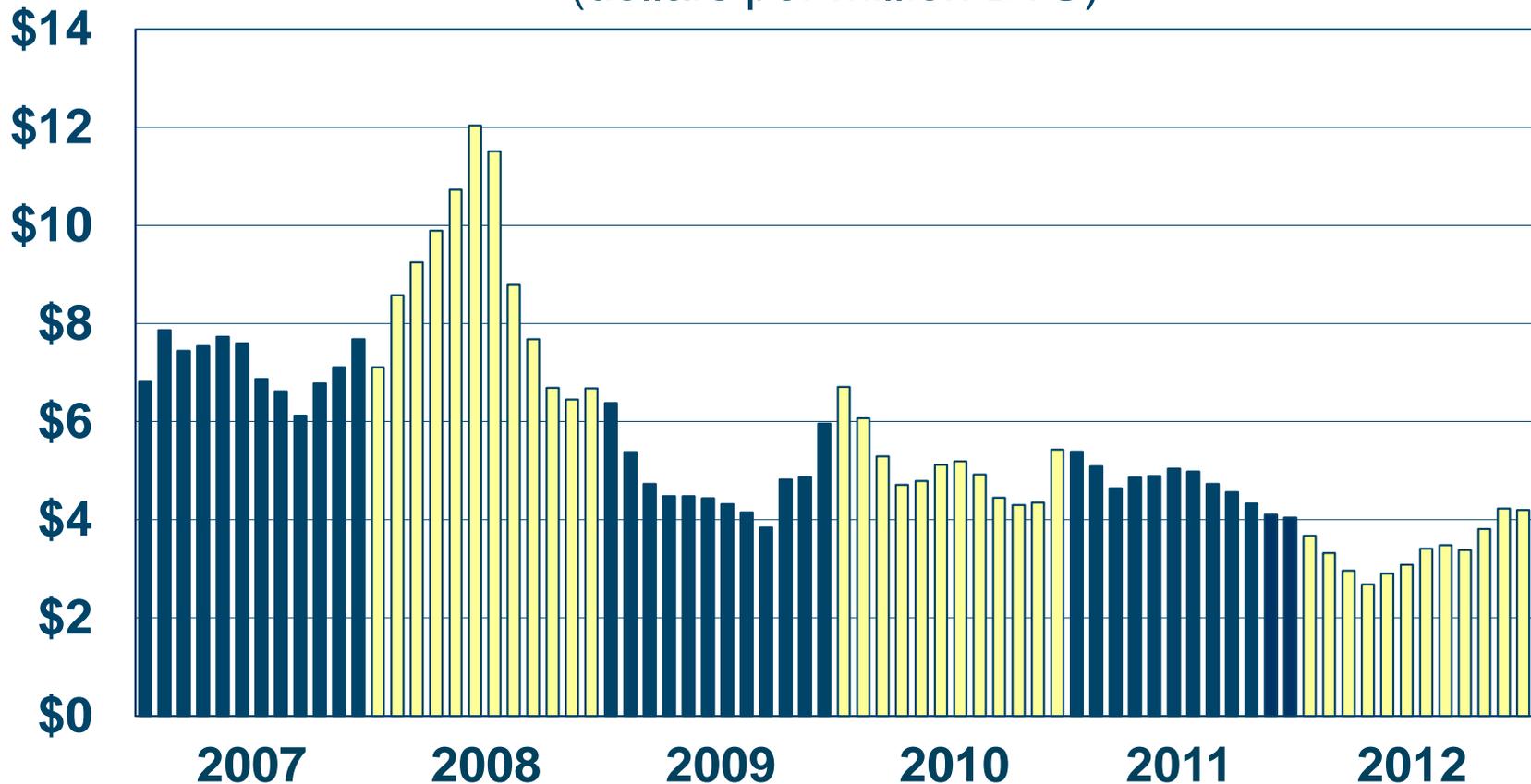


Source: EIA



Avg. Delivered Price of Natural Gas to Electric Power Plants

(dollars per million BTU)

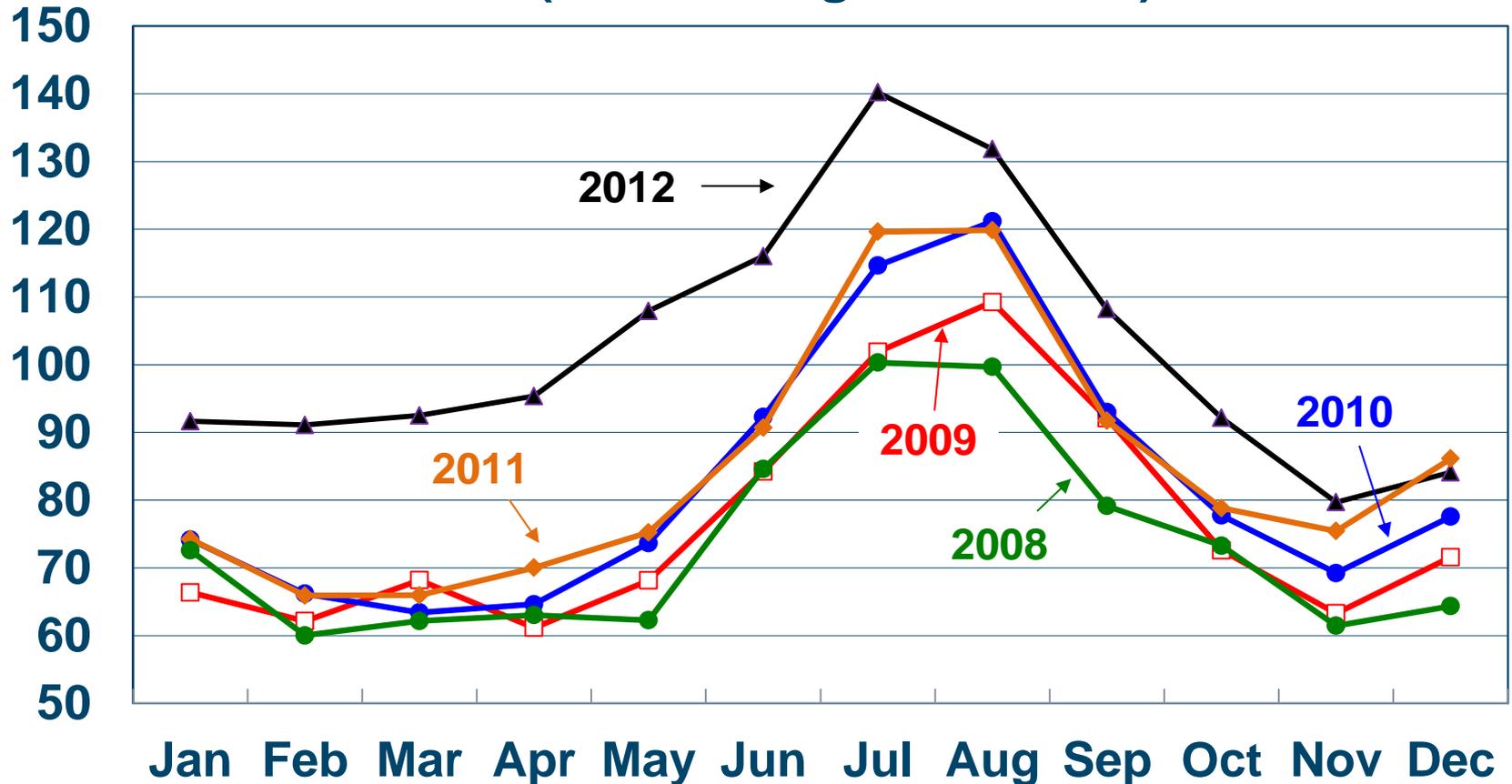


Source: Energy Information Administration



U.S. Electricity Generation: Natural Gas

(million megawatthours)

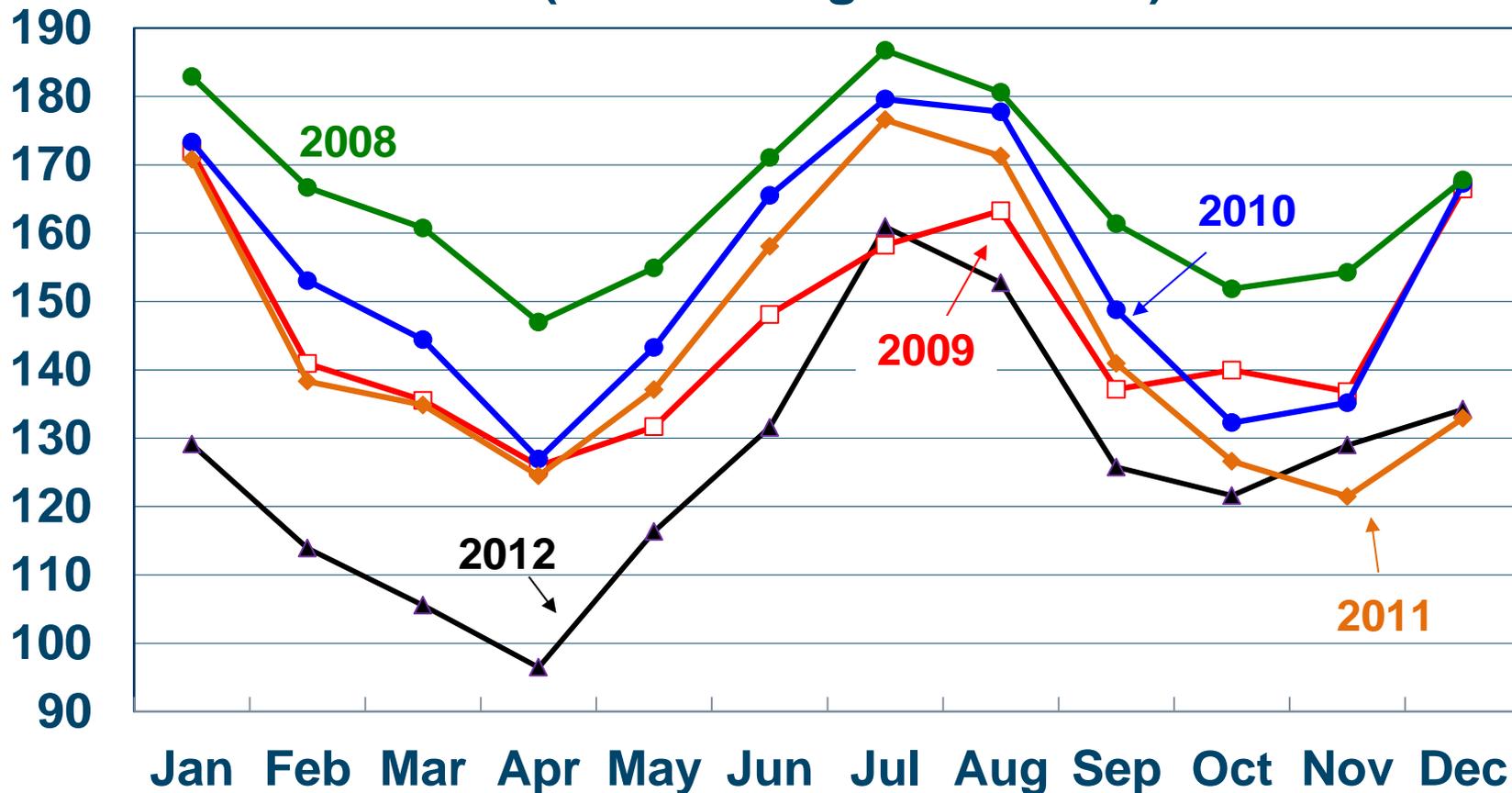


Source: Energy Information Administration



U.S. Electricity Generation: Coal

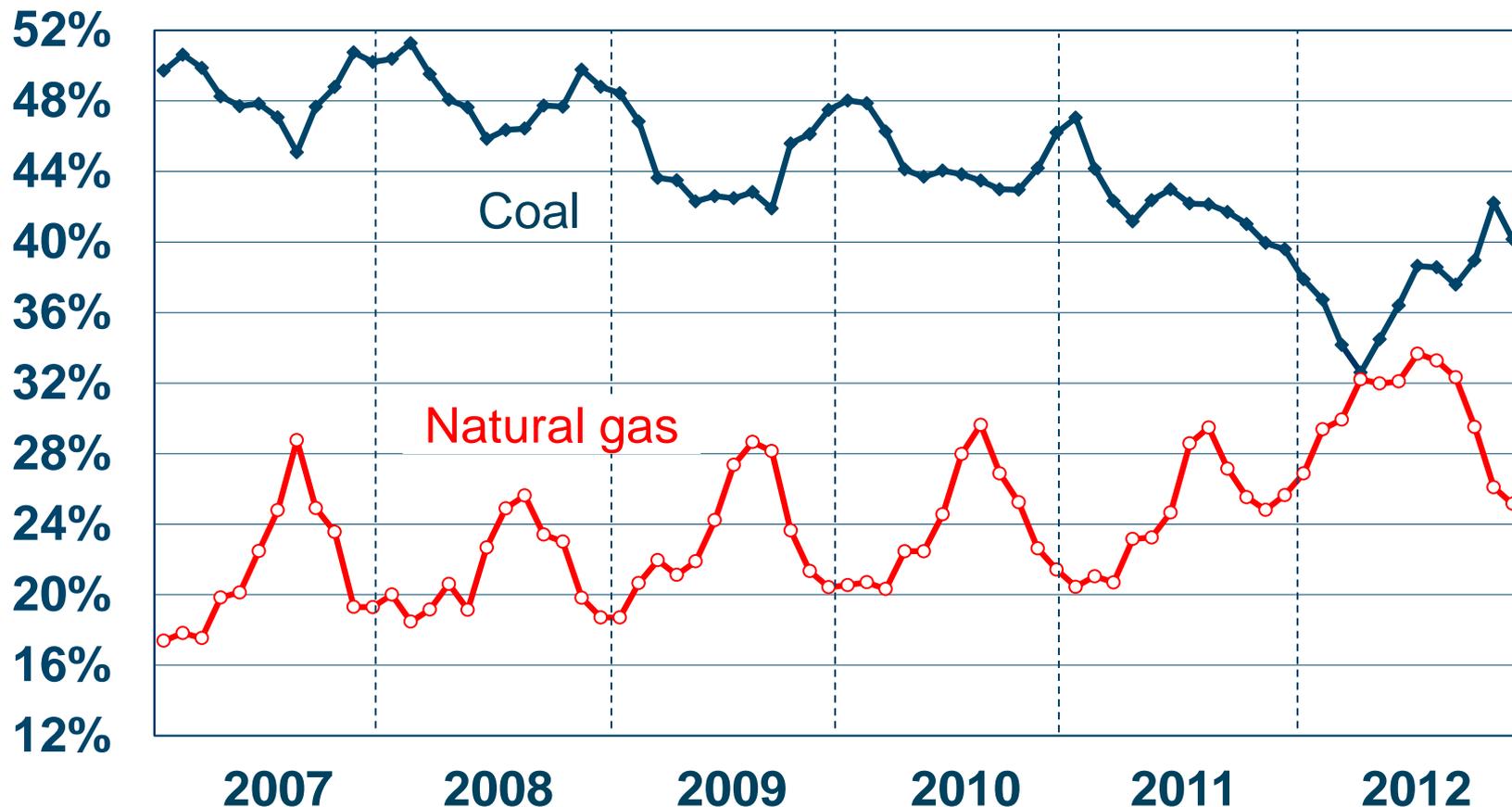
(million megawatthours)



Source: Energy Information Administration



Coal vs. Natural Gas as % of U.S. Electricity Generation



Source: Energy Information Administration



U.S. Rail Carloads of Coal

(average weekly originations)

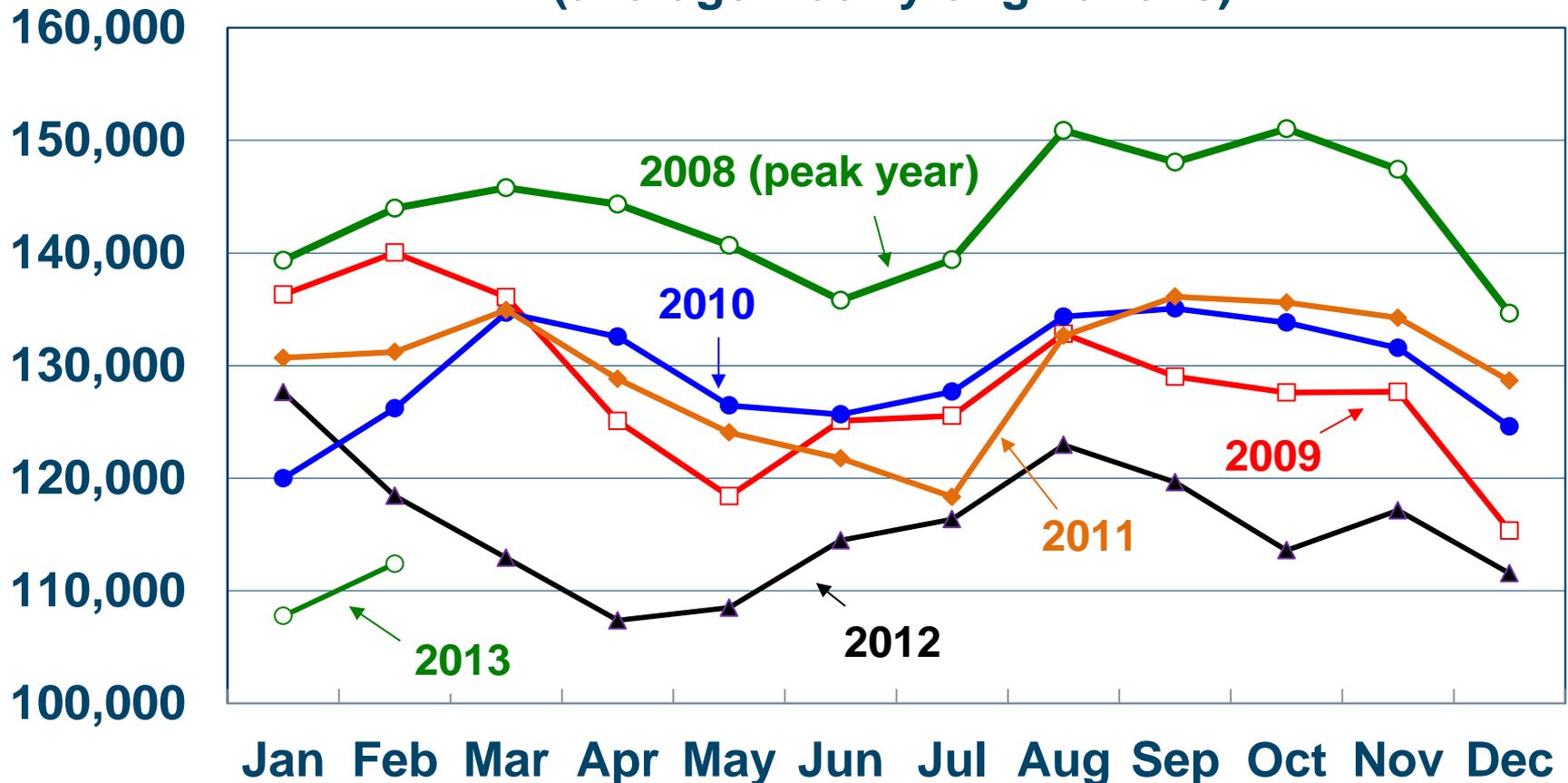


Excludes U.S. operations of Canadian railroads. Source: AAR



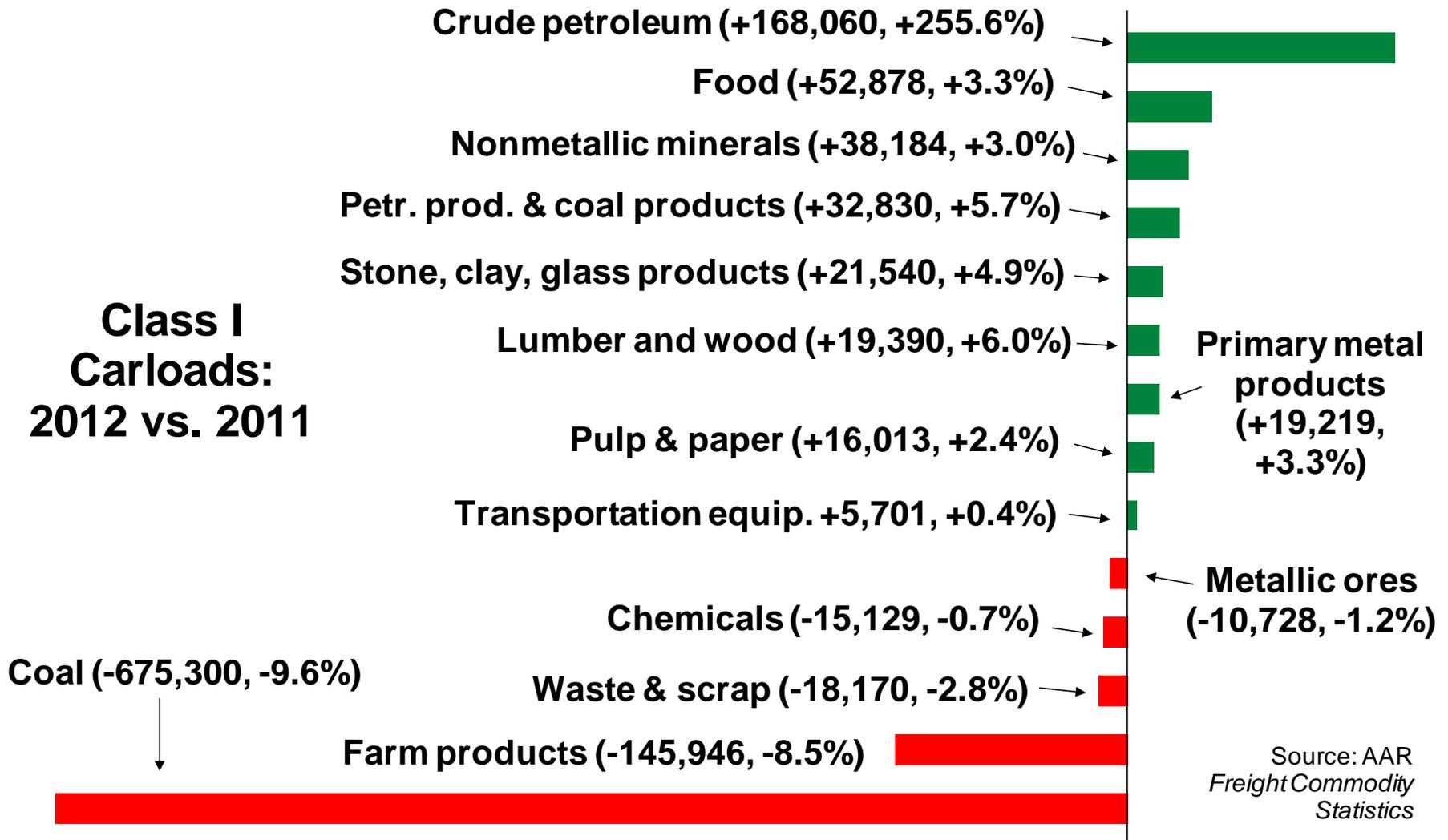
U.S. Rail Carloads of Coal

(average weekly originations)



Excludes U.S. operations of Canadian railroads. Source: AAR

Class I Carloads: 2012 vs. 2011



Source: AAR
Freight Commodity
Statistics



What Could Mess Things Up?

- Limits on fracking
- Economy tanks
- Price changes
- Regulatory change
- Environmental issues





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