Port and Waterway Modernization: Overland Transportation Profile and Trade Affecting Inland Waterways

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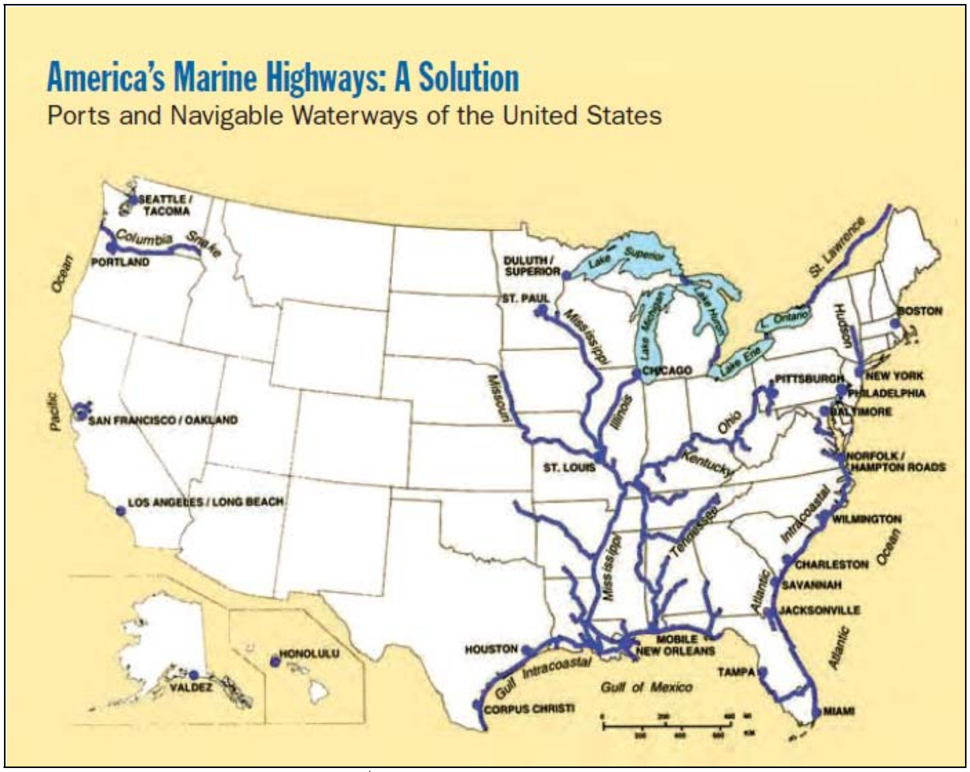
Executive Summary

U.S. ports and waterways play vital roles in U.S. foreign trade, particularly in bulk exports. Transportation accounts for a large part of the delivered cost of U.S. coal, grain, and iron ore in foreign markets. The capacity and efficiency of U.S. marine transportation infrastructure is thus a major factor in the global competitiveness of U.S. bulk exports.

The U.S. ports and navigable waterway network has been referred to as America's Marine Highways by the Maritime Administration (MARAD). This network of ports and navigable waterways, shown in Exhibit 1, provides the available route structure for container on barge services.

Exhibit 1: America's Marine Highway System



Source: MARAD "A Vision for the 21st Century" November 2007

New Panama Canal locks, now under construction and expected to open in 2014/2015, will accommodate larger ships and challenge the capabilities of U.S. ports and waterways. Panamax vessels, the largest class that can transit the existing locks, are limited to 106 feet in beam and 80,000 tons DWT fully loaded. The depth of the existing locks limits sailing draft to 39.5 feet, and Panamax vessels typically have design drafts of around 40 feet. Although capable of carrying 60,000 tons or more, Gulf ports typically load Panamax vessels to no more than about 52,500 tons to keep the draft less than 39.5 feet, thus surrendering some of the available capacity and raising shipping costs. The new Panama Canal locks will accept vessels 1,200 feet long, 160 feet wide, with 50 feet of sailing draft. Where U.S. exporters can take advantage of lower shipping costs from vessel economies of scale, the volume of cost-sensitive exports should rise and the pattern of their movements should shift.

The anticipated changes directly affect USACE's responsibilities for channel draft and navigation maintenance and improvements. Accordingly, the Tioga Group was engaged to analyze and document the outlook for three major export commodities: coal, grain (corn, wheat, and soybeans), and iron ore. The study team also examined the outlook for container-on-barge (COB) services on the inland waterways. Given the tight timeframe of the analysis the team relied on existing data and relevant reports rather than attempting original research.

The analysis focused on the major export ports served by inland waterways:

- The Port of Mobile, on the Tennessee-Tombigbee Waterway.
- The Ports of Baton Rouge, South Louisiana, New Orleans, and Plaquemines on the Lower Mississippi.
- The Ports of Longview, Kalama, Vancouver (WA), and Portland on the Columbia-Snake river system.

The direct effects of the new Panama Canal locks will be to allow exporters to use the full available draft (45 feet) at Mobile and the Lower Mississippi ports. At present, vessel sizes and loads are constricted by the 39.5-foot limit of the existing Panama Canal locks. Large vessels and larger loads will reduce unit shipping costs at affected U.S. ports. The savings will necessarily be shared among the participants, so U.S. exporters will not realize all the cost reductions. Available studies estimate total cost savings of around 9%, with about 3% passed on to export shippers.

Impacts on coal. U.S. coal exports are expected to grow at about 1.5% annually, with China and India as the major sources of demand growth. About 18% of U.S. coal exports pass through the lower Mississippi ports and through Mobile, with about 44% delivered by barge and the rest via rail. Exports via rail across the border to British Columbia ports are growing as an alternative, and small quantities are exported through Long Beach as well. There are several proposals to build coal export terminals in the Pacific Northwest, but if successful these projects are still several years away.

In the near-term (e.g. from now through completion of the new Panama Canal locks):

- There will be growing Chinese and Indian demand for U.S. coal exports.
- To the extent that the growth in exports is steam coal to Asia, that demand will most likely be met by exports of Powder River Basin coal by rail through West Coast ports.
- Growth in coking coal exports is likely to be met by some combination of rail and barge movements through the Gulf, and rail movements through the East Coast.
- There will be increased capacity at British Columbia export coal terminals.
- There will be no new coal export terminals or capacity on the U.S. West Coast (save for marginal increases at Long Beach).
- Reduced domestic coal demand will lead U.S. producers to seek export markets.

- Export coal movements will not be constrained by capacity on either the railroads or the waterways.

These observations imply that coal export growth will be split between existing routes and terminals, relying on either current capacity or same-site capacity improvements.

In the long run (e.g. after new Panama Canal locks are completed):

- One or more U.S. West Coast export coal terminals may be completed (5+ years).
- British Columbia export terminals will likely require additional capacity increases.
- Chinese demand for U.S. export coal will grow more slowly and may plateau.
- Indian demand for U.S. export coal will likely persist and grow, although political and institutional changes could permit more domestic production.
- U.S. and Canadian railroads will make the investments necessary to prevent capacity bottlenecks on major routes.
- Reduced ocean shipping costs due to use of larger vessels and deeper vessel drafts will increase the market shares of Lower Mississippi and Mobile ports and export terminals.

Impacts on Grain and Soybeans. The U.S. is the world's leading exporter of wheat, corn, and soybeans. Export grain (corn and wheat) and soybeans typically move from producer through country and inland terminal elevators before arriving at an ocean export elevator by rail or barge.

For the foreseeable future, U.S. export wheat growth is expected to be nearly flat due to emerging competition from Russia, Ukraine, and Kazakhstan. The new Panama Canal lock capacity will primarily benefit the 15% of wheat exports through the Lower Mississippi, since the Tenn-Tom Waterway and the Port of Mobile do not have significant export grain flows. The Pacific Northwest ports are served by rail rather than by barge, but handle 43% of the U.S. wheat exports. About 62% of the lower Mississippi wheat exports arrive at the port by barge.

U.S. corn exports are expected to grow at about 2% annually over the next decade, with China accounting for much for the growth. Of the waterways ports only the Portland and New Orleans Customs Districts handle large quantities of export corn, with the New Orleans Customs District being the dominant exporter. More than a third of U.S. corn exports feature a barge movement from an inland terminal elevator to New Orleans.

U.S. soybean exports are expected to grow at 3.7% annually, with China again accounting for most of the growing demand. Soybeans have emerged as the leading crop in world trade, with the U.S. as the leading exporter (but being challenged by Brazil). About 67% of U.S. soybean exports pass through the New Orleans and Portland waterway ports, with barge accounting for 59% of the volume through the New Orleans Customs District. The availability of deeper sailing drafts after the new Panama Canal locks open will increase the competitiveness of the Lower Mississippi ports and encourage growth in both rail and barge deliveries there.

The emergence of containerized transport for grain starting in 2000 has created competition for the bulk ports. Taking advantage of low outbound rates for containers that would otherwise have moved empty, exporters are now moving about 5% of their grain business in containers. Asia is the major market for containerized grain exports. The business, however, is volatile, depending as it does on backhaul container rates and the uncertain supply of containers at inland points. About 55% of this traffic moves through Los Angeles or Long Beach, and there are plans to develop transloading facilities at or near the ports to accommodate future growth.

At present, only the Lower Mississippi export grain elevators are served by barge to any appreciable extent. In 2010 an estimated 28.7 million tons of grain moved to those export elevators by barge. Export wheat is the least likely grain to impact the inland waterway system. Only 15% of U.S. wheat exports move through Lower Mississippi ports, and wheat exports are expected to decline. Increasing corn trade volume with Asia will result in growth at New Orleans Customs District ports, and the improvements in the Panama Canal should give those ports a potential share advantage. There is minimal growth expected in soybean exports, in part due to intense competition from Brazil. Brazilian exporters will also benefit from Panama Canal improvements as they continue to penetrate Asian markets.

A recent industry report concludes that the effect of the lower post-expansion Panama Canal shipping costs will be to expand the barge-competitive market area for grain at the expense of the railroads. The extent of that expansion will depend on how much cost savings are achieved and how much of those savings are passed on to shippers. At its most dramatic, such a shift would result in significantly greater grain transport by barge, and corresponding demands on port and waterway infrastructure.

Impacts on iron ore. The U.S. both imports and exports iron ore. Iron ore moves in both directions across the Great Lakes and rail routes between the U.S. and Canada. The major overseas customers are China, Europe, and the U.K. The emergence of China as a export customer has led to an increase in iron ore exports at the Ports of Mobile. South Louisiana, Stockton (CA), and Levin Richmond Terminal (CA). All of those iron ore exports move from producer to port by rail, so the port and waterways impacts are limited to the export vessels themselves. The new Panama Canal locks will enable vessels to use the full capabilities of the Ports of Mobile and South Louisiana, improving their competitive positions. The Port of Stockton is limited by its channel draft, with a dredging proposal in progress. Levin Richmond Terminal is limited by storage capacity, but has ample draft for the near future.

The new Panama Canal locks would allow for greater iron ore export sailing drafts from Gulf ports, as they would for coal or grain, thus reducing unit shipping costs. However, the new Panama Canal locks may give a much greater advantage to Brazilian deep-draft ports, and actually diminish the net competitive position of U.S. exports to China through the Gulf or via the St. Lawrence Seaway from the Great Lakes ports.

Containers on Barge. With the growth of U.S. international and domestic containerization over the past 30 years there has been great interest in increasing the use of container on barge (COB) operations on U.S. navigable waterways to handle container movements. Container on barge operators can provide services in some of the same markets that highway and rail intermodal carriers serve. The stated advantages of using Marine Highway barge service relative to truck or rail modes include reduced highway and rail congestion, fuel efficiency and reduced emissions.

There are relatively few COB services operating in the U.S. today. They include services on the Columbia/Snake system, on the Mississippi River and Gulf Intracoastal Waterway, between the Ports of Virginia, Baltimore, and Philadelphia, and on the James River between Norfolk and Richmond. Some previous efforts have been discontinued, and there are other services planned or proposed.

Depending on the specific origins and destinations, it appears that COB service can be price competitive in many markets along the navigable waterway network. The key disabilities for COB service are its relatively slow transit time, infrequent service, and limited market coverage. Based on the research available, it appears that COB service is most likely to be successful in port-to-port niche markets with heavy export loadings, concentrated volume, balanced trade, circuitous rail or truck routes, and existing terminals.

Rail and Truck Competition. A review of the rail industry indicates that railroads will remain effective as both competitors and complements to the inland waterways. Railroads have been able to access and invest capital as required to sustain and add capacity. They continue to invest in infrastructure, cars, locomotives, communications, etc. to retain profitable traffic. While improved ocean shipping economics due to larger Panama Canal locks will shift the competitive balance in favor of some port and waterway combinations, the modal shift is likely to be small.

The research team also briefly examined trends in trucking economics. The available information suggests that trucking costs are growing faster than waterways costs, but that the potential for modal shift to waterways is small.

Findings. Overall, it appears that the new Panama Canal locks will improve the competitive positions of U.S. ports and waterways for bulk exports of coal, grain, and iron ore. The lower shipping costs from Mobile and the Lower Mississippi ports of Baton Rouge, South Louisiana, New Orleans, and Plaquemines will likely increase the export volumes handled there. To take advantage of these improved economies the authorized channel and berth depths will have to be maintained. Inland waterways and barge transport play an important role in specific export commodity and port combinations and that role will likely expand as export shipping economies are realized.

I. Introduction

Purpose and Scope

The opening of new and larger locks on the Panama Canal is widely expected to alter U.S. imports and export patterns. The specific focus of this analysis is the potential impacts on exports via U.S. inland waterways and waterway ports.

The waterway export points of interest in this analysis are:

- The Mobile Customs District, and the Tennessee-Tombigbee Waterway export port of Mobile.
- The New Orleans Customs District, and the Lower Mississippi export ports of Baton Rouge, New Orleans, Plaquemines, and the nearby port of Lake Charles.
- The Portland Customs District, and the Columbia-Snake export ports of Kalama, Longview, Portland, and Vancouver (WA).

The first issue to be addressed is the existing roles and export market shares of the waterways ports, and the modal splits between rail and barge. The analysis draws from statistics gathered by Customs and Border Protection (CBP) and maintained by the Census Bureau, and statistics gathered by USACE and maintained at the Navigation Data Center. The research team supplemented the statistics with other data sources and port contacts.

Because the data are collected by different agencies, via different sources, and for different purposes, it is not surprising that the figures differ. CBP and USACE classify ports into different groups, and classify individual terminals as parts of different ports or Customs/Corps districts. These distinctions show up mostly in the data for the Lower Mississippi ports of Baton Rouge, South Louisiana, New Orleans, and Plaquemines. In addition, the modal splits in the exhibits below include estimates provided by knowledgeable ports and terminals personnel, but those estimates may not correspond to actual splits in any given year.

Approach

The study team took a mixed approach to estimating modal shares for grain and coal inbound to export ports. Some flows are exclusively rail or barge. Terminals at the Port of Plaquemines, for example, are served only by water. The Columbia River export terminals are all fed by rail. Where there is a mix of rail and barge receipts, as at Mobile, Port of South Louisiana, and Baton Rouge, it was necessary to contact port authorities or terminal operators. In most cases the numbers obtained are estimates, not precise percentages.

This analysis relied heavily on two recent reports for insights into the impacts of the new Panama Canal locks on vessels and shipping costs:

- **Panama Canal Expansion: Impact on U.S. Agriculture**, prepared by informa economics for the United Soybean Board, the U.S. Soybean Export Council, and the Soy Transportation Coalition, September, 2011. ("informa report")

- **Panama Canal Expansion Study, Phase 1 Report: Developments in Trade and National and Global Economics**, prepared for MARAD by EDRG, et al, Draft of June 2011. ("MARAD report")

As the analysis below indicates, there is still significant uncertainty about how exporters and the shipping industry will respond to the opportunities presented by Panama Canal expansion.

Panama Canal Impacts

The greater width and depth of the new Panama Canal locks will enable export coal and grain terminals on the East and Gulf Coasts to 1) use their full capabilities to load existing vessels to greater drafts, and 2) to load larger vessel than could previously transit the Canal.

Panamax vessels, the largest class that can transit the existing locks, are limited to 106 feet in beam and 80,000 tons DWT fully loaded. The depth of the existing locks limits sailing draft to 39.5 feet, and Panamax vessels typically have design drafts of around 40 feet. Although capable of carrying 60,000 tons or more, Gulf ports typically load Panamax vessels to no more than about 52,500 tons to keep the draft less than 39.5 feet (Source: Informa soybean report), thus surrendering some of the available capacity and raising shipping costs.

The new Panama Canal locks will accept vessels 1,200 feet long, 160 feet wide, with 50 feet of sailing draft.

Lower Mississippi ports typically have 45 feet of water, as does the Port of Mobile. Vessels typically need 3 feet of underkeel clearance, so with 45 feet of water these ports could be loading vessel to 42 feet of sailing draft[1]. In a Panamax vessel, the additional 2.5 feet of draft should allow Panamax vessels to take on an additional 5,000 tons (1,000 tons per six inches of draft). The change from 52,500 tons to 57,500 tons would reduce unit ocean shipping costs by about 9%. As the MARAD Panama Canal Expansion Study notes, however, the cost savings will have to be shared between the shipper, the carrier, other parties, and the Panama Canal authority itself. For container shipping the MARAD report estimates that the shipper would realize about 30% of the savings. By this rough guideline, the ocean cost savings captured by a grain or coal shipper from greater loading of Panamax vessels would be around 3% (domestic shipping costs to the ports would not change).

Capesize bulk carriers range from 80,000 DWT to over 200,000 DWT, and cannot presently operate through the Panama Canal with full loads. Capesize vessel are commonly used in coal trades, and smaller Capesize vessels can be used in grain trades (assuming destination ports can handle them). Puget Sound and British Columbia coal and grain terminals already handle large Capesize vessels. (Westshore Terminals data show vessels as large as 207,000 DWT calling there and export coal loads as high as 178,000 tons.) The new Panama Canal locks will accept fully loaded Capesize vessels, but the Gulf ports cannot with out additional dredging. The Gulf ports would be able to load a Capesize vessel to 42 feet of draft. The Informa soybean report notes that grain vessels bound for Europe are loaded to 77,000 tons and up. Substitution of

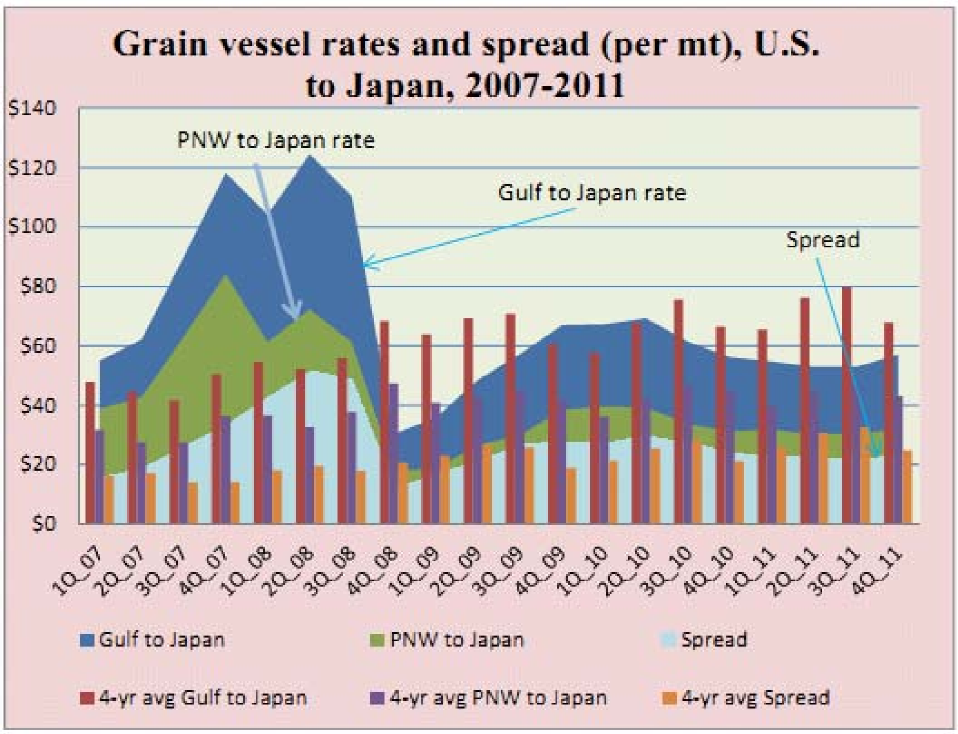
[1] The Informa soybean report may have erred in assuming that vessels could be loaded to the full channel depth, e.g. 45 feet, instead of allowing for underkeel clearance.

smaller Capesize vessel for the existing Panamax vessels would therefore allow for significant cost reductions in ocean shipping.

The reductions in ocean shipping costs will increase the market shares of Gulf ports in Asian coal and grain trades. The question is by how much the market shares might shift, and what impact those shifts might have on U.S. waterways and waterway ports.

Ocean shipping rates are highly volatile. In 2011, grain shippers paid an average of $54.45 per metric tonne from the Gulf to Japan and $31.17 from the PNW to Japan (Source: USDA Special Grain Report). As Exhibit 2 indicates, however, rates and the differential between coasts vary widely from year to year and quarter to quarter. While loading vessels to greater sailing drafts and using larger vessel is always beneficial, the impact of the greater efficiency may be obscured or even negated by market swings.

Exhibit 2: Variability of Grain Shipping Rates



II. Coal

World Coal Supply and Demand

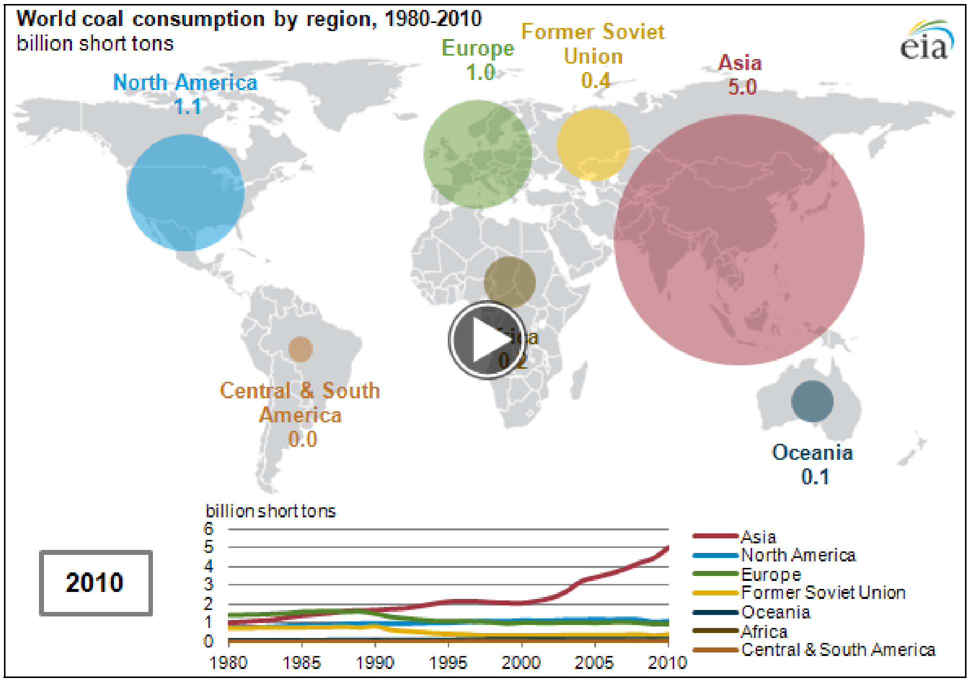
Coal's primary uses are steel production (metallurgical, coking, or "met" coal), and electrical power generation ("steam" coal). Coal accounts for 40.6% of the world's electricity generation.[2]Coal's share of world energy consumption has been increasing recently and reached nearly 30% in 2010, its highest share since 1970.[3]

Coal production has increased at a compound rate of 3.6% since 1995. Concurrently the global coal trade has grown by a 5% annually over the same period and now represents about 16% of production. [4] Global coal production grew by 6.3% in 2010. Production increased in North America and Asia while falling in Europe, in part explaining the high level of U.S. exports to Europe.[5]

World coal consumption grew by 7.6% in 2010, the fastest global growth since 2003. The increase was driven by Chinese consumption, which rose at 10.1%. China consumed 48.2% of the world's coal and accounted for nearly two-thirds of global consumption growth. Consumption in the developed nations, in contrast, grew by 5.2 %.[6] Exhibit 3 illustrates the current levels of consumption by continent and Asia's increasing share.

2 Ibid
3 http://www.bloomberg.com/news/2010-06-09/coal-burning-surges-to-40-year-high-as-natural-gas-use-declines-by-record.html and http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2011.pdf
4 DOE/EIA-0484(2011) September 2001, http://www.eia.gov/forecasts/ieo/coal.cfm
5 Ibid
6 http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2011.pdf

Exhibit 3: World Coal Consumption by Region



Source: USEIA. Today in Energy, December 20, 2011. *http //www.eia.gov/todayinenergy/detail.cfm?id=4390*

Exhibit 4 lists the top coal importers and exporters in 2010. China became a net coal importer in 2009, and in two years China has become the second largest coal importer in the world (behind Japan).

Exhibit 4: Large Coal Importers and Exporters

Top Coal Importers (2010e)				Top Coal Exporters (2010e)			
	Total	**Steam**	**Coking**		**Total**	**Steam**	**Coking**
Japan	187Mt	129Mt	58Mt	Australia	298Mt	143Mt	155Mt
PR China	177Mt	129Mt	48Mt	Indonesia	162Mt	160Mt	2Mt
So Korea	119Mt	91Mt	28Mt	Russia	109Mt	95Mt	14Mt
India	90Mt	60Mt	30Mt	USA	74Mt	23Mt	51Mt
Taipei	63Mt	58Mt	5Mt	So Africa	70Mt	68Mt	2Mt
Germany	46Mt	38Mt	8Mt	Colombia	68Mt	67Mt	1Mt
Turkey	27Mt	20Mt	7Mt	Canada	31Mt	4Mt	27Mt

Source: International Energy Association, From World Coal Association Website,
http //www.worldcoal.org/coal/market-amp-transportation/

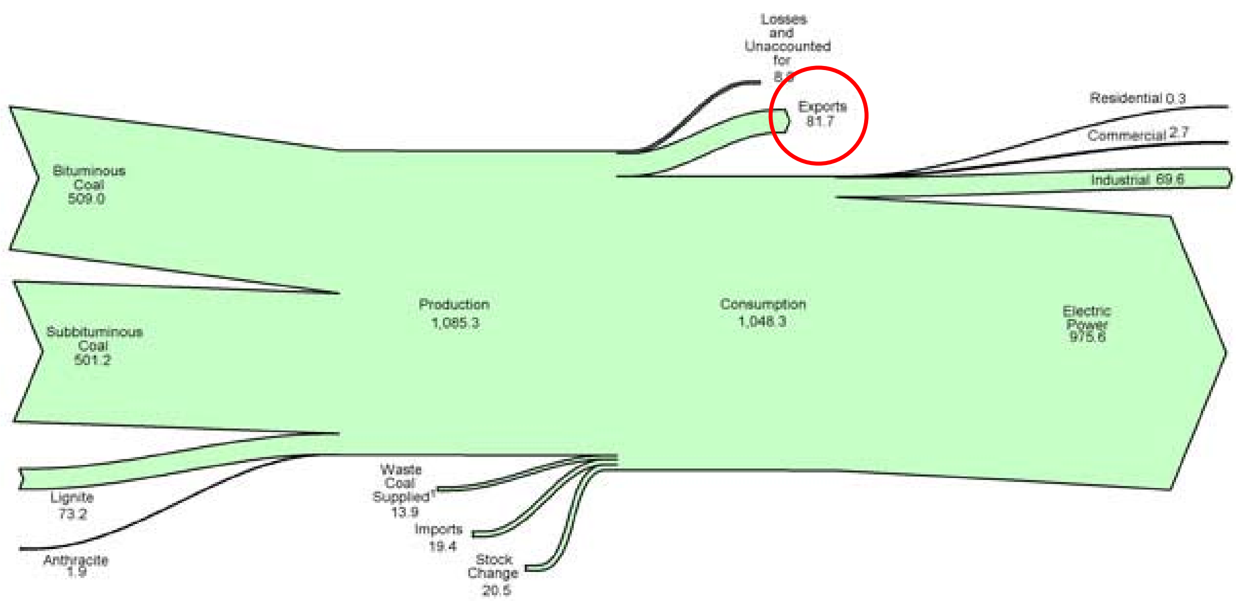
In the 1990s, China began to encourage coal exports. Chinese exports grew to over 90 million tons in 2001. Beginning in 2002, however, the Chinese government became alarmed over the rising exports and reversed policy. Exports dropped form 2003 on while imports rose. China now accounts for half the world's supply and demand for coal, which makes the Chinese coal market the key driver of the global coal market and China's behavior in the global coal trade.

India is the other large country where coal demand is increasing significantly. The Indian Coal Minister, Sriprakash Jaiswal, told the Indian parliament in New Delhi in November 2011 that Indian demand will grow to 980.5 million metric tons by 2017. He also reported that domestic supply cannot meet this demand and that India will need to import 265.5 million tons in 2017.7 Current import levels are 90 million metric tons. (Exhibit 4)

U.S. Coal Export Outlook

In 2011 the United States produced 1,089 million short tons of coal. Exhibit 5 illustrates U.S. 2010 supply and demand for coal, showing that most U.S. coal is used to generate electricity. In 2010 exports accounted for 81.7 million tons, or 8.6% of total production. U.S. coal demand for power production is decreasing with the retirement of old coal fired power plants and their replacement with natural gas and renewable energy sources. As a result coal producers have been aggressively marketing their product abroad. U.S. coal exports now account for about 10% of current production, or roughly 100 million tons annually.

Exhibit 5: U.S. Coal Flow 2010 (Millions of Short Tons)



Source: USTEIA. Total Energy. http://www.eia.gov/totalenergy/data/annual/diagram4.cfm

The United States is now the fourth largest coal supplier in the world. Exhibit 6 below illustrates both the growth in U.S. coal exports since 2002 as well as the volatility of the world coal market.

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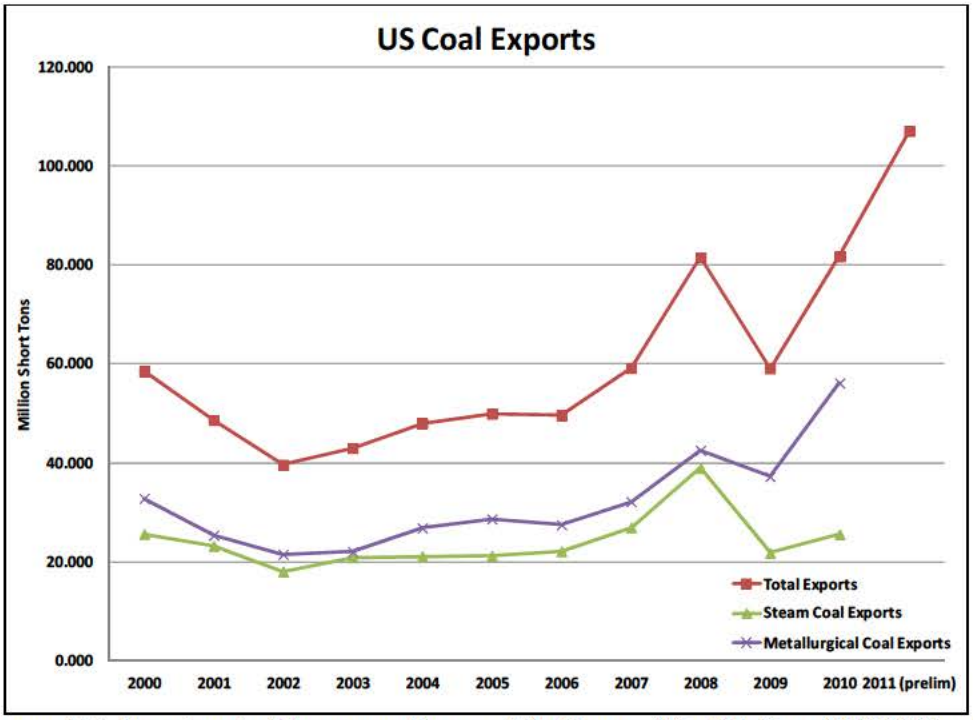
7 http://www.businessweek.com/news/2011-11-30/india-s-coal-demand-expected-to-rise-41-in-five-years-to-2017.html

Exhibit 6: U.S. Coal Exports



Sources: U.S. Department of Commerce, Bureau of the Census, "Monthly Report EM 545" and "Monthly Report IM 145." USTEIA. Today in Energy, February 13, 2012. http://www.eia.gov/todayinenergy/detail.cfm?id=4970

That volatility is also illustrated by Exhibit 7 which shows the United States top ten trading partners. Note the decline in Canadian exports. Canada produces coal is in the western part of the country, but it has traditionally found it advantageous to import coal from the U.S. Midwest. This large export market is now disappearing as Ontario has made the decision to close or convert all coal-fired power plants in the province to natural gas or biomass (primarily wood chips) between 2003 and 2014.

Exhibit 7: Top Ten U.S. Export Partners 3Q Year to Date 2011 vs 3Q Year to Date 2010

Country	3Q 2011 YTD	3Q 2010 YTD	% Change
Europe			
Netherlands	8,138,010	5,531,693	47.1
United Kingdom	4,991,281	2,826,995	76.6
Italy	4,180,162	2,540,079	64.6
Ukraine	3,471,365	1,530,433	126.8
Asia			
Korea, South	7,911,677	4,170,366	89.7
Japan	5,458,785	2,411,466	126.4
China	4,016,396	4,071,837	-1.4
India	3,393,038	2,015,758	68.3
South America			
Brazil	6,874,532	6,216,569	10.6
North America			
Canada	4,573,282	8,505,775	-46.2

Source: DOE/EIA-0121 (2011/03Q) January 2012

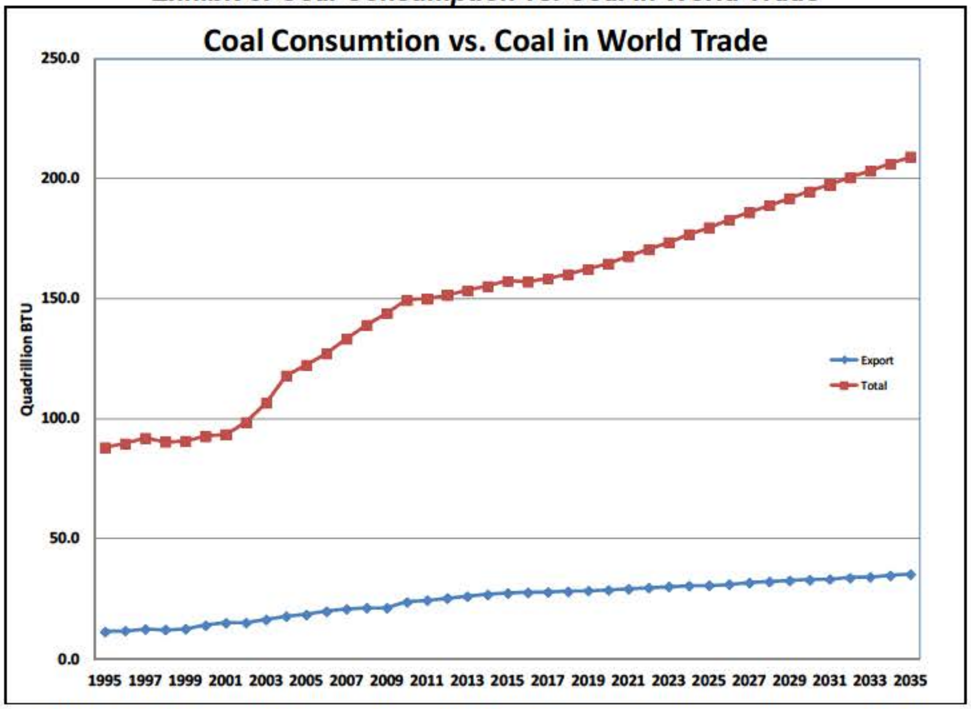
Coal is a commodity under assault in the marketplace by low cost natural gas and in the political arena as a source of pollutants and fossil carbon emissions. The actions of the Province of Ontario are one example. In the United States high coal prices relative to natural gas (in part due to high export demand), a sluggish economic recovery resulting in low electrical demand, and pressure from the Environmental Protection Agency has resulted in the closure of a number of coal-fired power plants.8 The U.S. Energy Information Agency projects the share of U.S. power generation fueled by natural gas to rise from 24.8% in 2011 to 27.1% in 2012. Consequently, the share of electricity generation from coal is projected to drop from 42.2% to 40.4%.9 The result would be a reduction in domestic demand of 40-45 million short tons of coal. The near term reductions may be temporary: the Energy Information Agency is forecasting U.S. domestic coal consumption at 1,155 million short tons per year by 2035.

These pressures are balanced by a growing world demand for energy from all forms. The current trend is toward increasing world coal consumption Countervailing trends make forecasting difficult. The U.S. Energy Information Agency's 2011 projection of world coal production anticipates growth slowing to 1.4 % annually through 2035. Exhibit 8 illustrates world coal exports to grow slightly faster, at a rate of 1.5 %, annually (though on a lower base).

8 Why Coal Plants Retire: Power Market Fundamentals as of 2012, Susan F. Tierney, Ph.D., Analysis Group, Inc. February 16, 2012. http://www.analysisgroup.com/uploadedFiles/News_and_Events/News/2012_Tierney_WhyCoalPlantsRetire.pdf

9 U.S. EIA. Today in Energy, March 29, 2012. http://www.eia.gov/todayinenergy/detail.cfm?id=5610

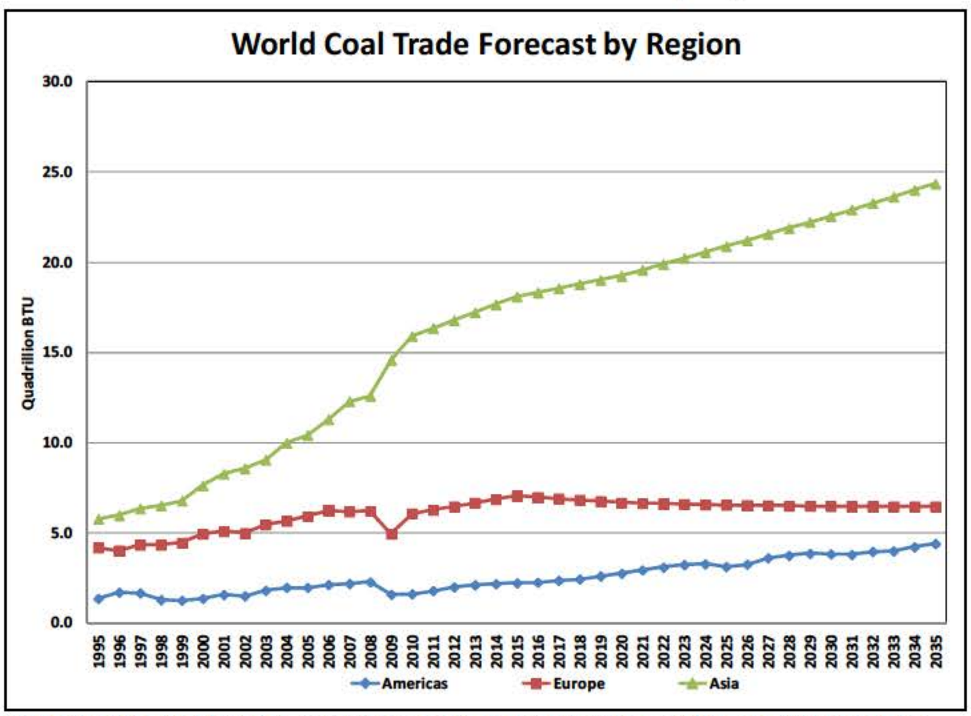
Exhibit 8: Coal Consumption vs. Coal in World Trade



Source: DOE/EIA-0484(2011) September 2001, http://www.eia.gov/forecasts/ieo/coal.cfm

The EIA's forecast for world coal imports as presented in Exhibit 9 expects that the developing economies in Asia and Latin America will drive long-term growth in the world coal trade.

Exhibit 9: World Coal Trade Forecast by Region



Source: DOE/EIA-0484(2011) September 2001, http://www.eia.gov/forecasts/ieo/coal.cfm

EIA expects U.S. coal exports to remain strong but stay below the 107 million short tons exported in 2011. Forecast U.S. coal exports are 100 million short tons in 2012 and 98 million short tons in 2013. U.S. coal exports averaged 56 million short tons in the decade preceding 2011.

Uncertainty over the balance of coal production and demand in both China and India, however, translates to uncertainty over long-term demand for U.S. exports.

China is both a major producer and a major importer of coal. Current and near-term imports are driven by rapid growth in Chinese energy demand that is outstripping both coal production and internal coal transport capacity. Future developments are likely to temper import coal growth:

- Improvements to Chinese railways and waterways will increase the capacity and efficiency of internal coal transport.
- A national policy of reducing per capita energy consumption and promoting greater industrial efficiency will likely slow the growth in energy demand.
- Planned development of China's enormous potential for hydroelectric power will likely reduce dependence on coal.

These observations imply that China's demand for coal imports may not grow as fast in the future as it has in the recent past.

India, like China, has substantial coal reserves and rapidly growing demand for electrical power. In India's case, however, the binding constraints on domestic production appear to be institutional. About 80% of India's coal production is controlled by Coal India, a state-owned company. Coal India is required by regulation to sell coal at a steep discount below market prices, and therefore has little incentive or capital to ramp up production and invest in capacity. In 2011, Indian power plant capacity grew by 11% while coal production rose only 1%. The government has also capped the price of natural gas, reducing incentives to produce it as a substitute for coal.

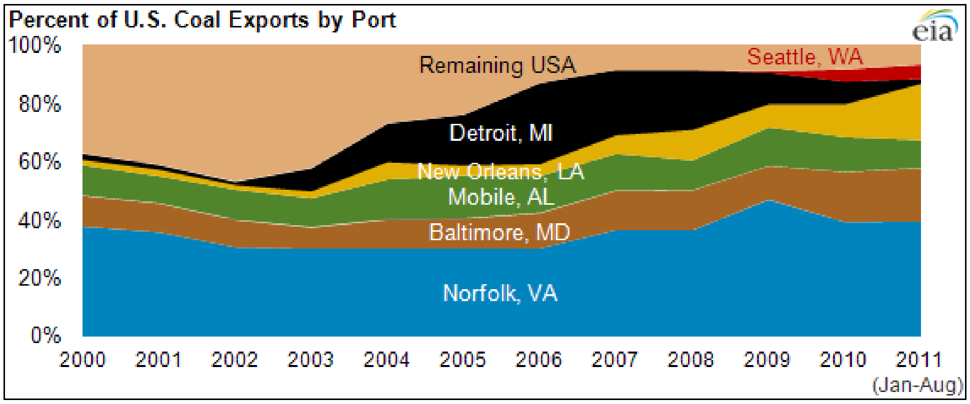
India has thus had an ongoing need to import coal. Much of the coal has come from Indonesia, but the Indonesian government has capped export volume to insure sufficient supply for future domestic needs. The result has been a doubling of prices for Indonesian coal in the export market and reduced exports to India.

The institutional issues hampering Indian self-sufficiency in coal show no signs of abating, but could change quickly given the required political imperative. If the pricing restrictions and other barriers were lifted, it would still take several years to increase the volume and efficiency of Indian coal production. Given India's history of on-again/off-again industrial development it appears likely that India will need to import a growing volume of coal for at least the next decade.

U.S. Export Coal Terminals and Routes

A key feature of the export coal trade is concentration of U.S. coal exports into a small number of large terminals. Exhibit 10 and Exhibit 11 below show this trend from U.S. Customs District Data which collects both waterborne and surface exports.

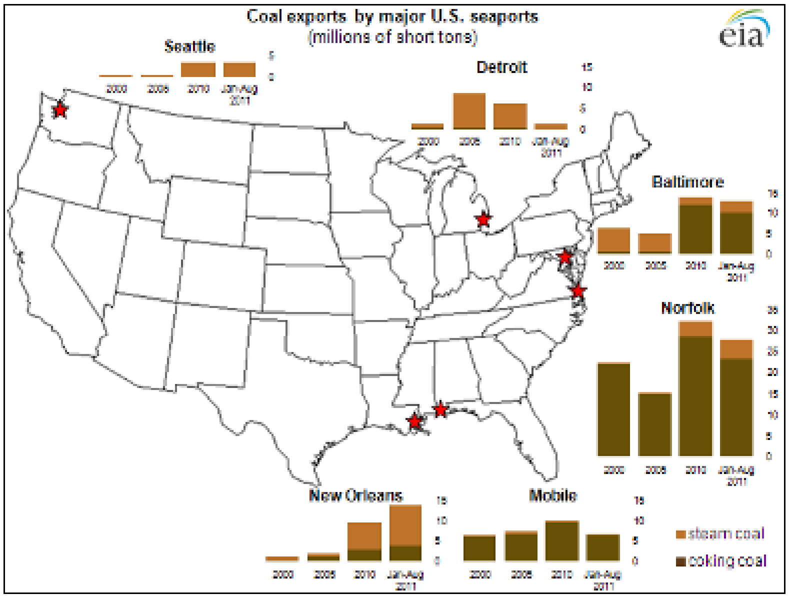
Exhibit 10: Percent of U.S. Coal Exports by Customs District



Source: U.S. EIA. Today in Energy, November 8, 2011.
http://www.eia.gov/todayinenergy/detail.cfm?id=3830

In the first three quarters of 2011 the Norfolk, Baltimore, Mobile, and New Orleans Customs Districts accounted for 86% U.S. exports as illustrated in Exhibit 11. A notable feature of the four largest Customs Districts is that their volume is not highly concentrated with particular trading partners. Each is supplying large volumes of coal to growing European and Asian markets. In 2011 Norfolk's large trading partners in order of importance include Brazil, Netherlands, Italy, India, Ukraine, France, United Kingdom, Turkey, South Korea, Japan, Germany, and Belgium. New Orleans' large trading partners in order of importance were the United Kingdom, Belgium, Morocco, Mexico, Germany, and India. Baltimore's trading partners in order of importance were China, Japan, South Korea, Netherlands, and Brazil. Mobile's large export destinations included Brazil, Germany, and Japan.

Exhibit 11: Coal Exports by Customs District 2011 3 Q YTD



Source: U.S. EIA. Today in Energy, November 8, 2011.
http://www.eia.gov/todayinenergy/detail.cfm?id=3830

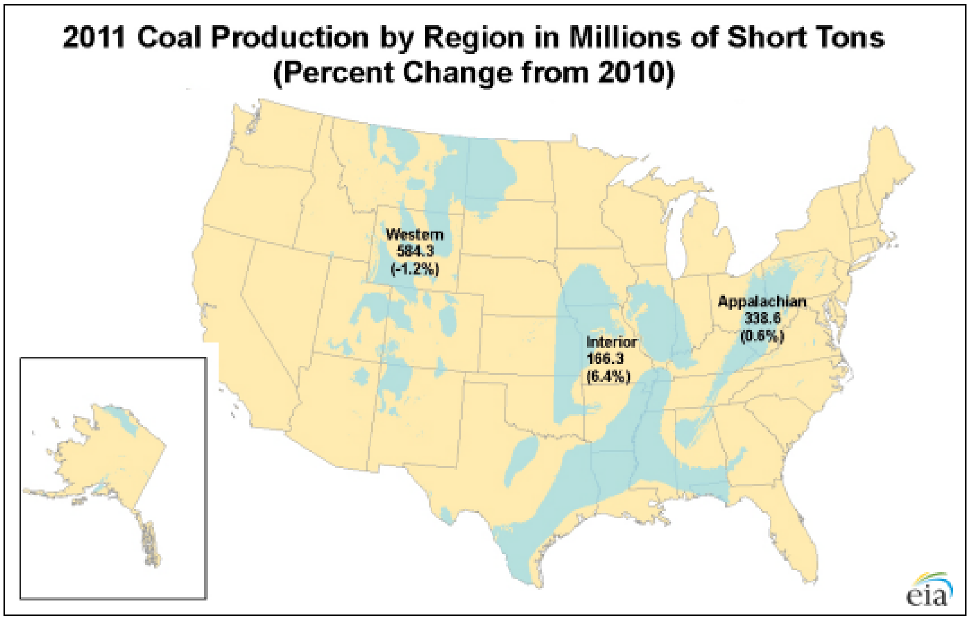
Recent growth at the Seattle Customs District reflects rail movements of Western coal to large Canadian coal terminals near Vancouver for export. The only terminal on the U.S. West Coast shipping a significant volume of export coal is the Metro Stevedoring terminal at Long Beach, which handles petroleum coke, coal, sulfur, etc. The terminal is served by rail and exported around 500,000 tons of coal in 2010 and roughly one million tons in 2011. The former LAXT export coal terminal at the Port of Los Angeles was not an economic success, and was dismantled. The Port of Los Angeles has no interests in reinstating coal traffic, and has other plans for the site.

Note in Exhibit 11 that the different port areas handle different mixes of steam coal and coking (metallurgical) coal. Powder River Basin (PRB) coal is usually sold as steam coal, for producing electrical power, while Appalachian and Interior coal (Exhibit 12) is more often sold as coking coal. Changes in emissions control technology and in environmental regulation, however, may blur some of these past distinctions.

Coal Production Regions and Line Haul Options

U.S. coal is produced in three major production regions in the continental United States as illustrated in Exhibit 12, below.

Exhibit 12: U.S. Coal Production Regions



Source: USTEIA. Today in Energy, February 13, 2012.
http://www.eia.gov/todayinenergy/detail.cfm?id=4970

Movement of this coal for export involves some combination of rail and/or barge movements to a marine port. The tendency is for coal from each region to seek the shortest route to an export port, although there are exceptions.

- Currently, western Powder River Basin coal moves by rail to western Canadian marine terminals for export, as barge is not an option. Completing rail access is a significant issue for Power River Basin coal. BNSF can deliver export coal to Westshore Terminals at Roberts Bank, BC, and to the Metro terminal at Long Beach. UP can only deliver to Long Beach and lacks access to any major West Coast export terminal. This difference also gives PRB coal producers export opportunities that UP producers lack.
- Interior coal tends to move by rail or barge to marine terminals on the Gulf Coast.
- Appalachian export coal typically moves by rail to marine terminals on the Atlantic Coast, or sometimes by barge to the Gulf.

The waterways have accounted for 18-20% of U.S. coal exports in recent years, with Mobile and New Orleans being the dominant exit points (Exhibit 13). The Portland Customs District ports do not handle coal. Customs data show coal being exported through the Seattle Customs District, but that flow is moved by rail to Roberts Bank (Westshore Terminals) in British Columbia rather than exiting the U.S. by water.

Exhibit 13: U.S. Coal Exports at Waterway Ports

District & Port	Short Tons 2008	2009	2010	2011	Share of U.S. Total 2008	2009	2010	2011
2701 Coal; Briquettes, Ov...								
Total All Ports	**80,193,718**	**57,815,961**	**77,321,469**	**101,241,955**	**100%**	**100%**	**100%**	**100%**
Portland District	**-**	**-**	**-**	**-**	**0%**	**0%**	**0%**	**0%**
Kalama, WA (Port)	-	-	-	-	0%	0%	0%	0%
Longview, WA (Port)	-	-	-	-	0%	0%	0%	0%
Portland, OR (Port)	-	-	-	-	0%	0%	0%	0%
Vancouver, WA (Port)	-	-	-	-	0%	0%	0%	0%
Mobile District	**8,273,068**	**7,812,192**	**9,725,154**	**10,137,736**	**10%**	**14%**	**13%**	**10%**
Mobile, AL (Port)	8,273,068	7,812,192	9,725,154	10,137,736	10%	14%	13%	10%
New Orleans District	**7,681,237**	**2,763,526**	**5,454,843**	**7,885,077**	**10%**	**5%**	**7%**	**8%**
Baton Rouge, LA (Port)	542,840	-	-	420,129	1%	0%	0%	0%
Lake Charles, LA (Port)	-	-	-	-	0%	0%	0%	0%
New Orleans, LA (Port)	7,138,398	2,763,526	5,230,457	7,119,312	9%	5%	7%	7%
Port Sulphur, LA (Port)	-	-	224,385	345,635	0%	0%	0%	0%
Other Districts	**64,239,412**	**47,240,243**	**62,141,472**	**83,219,142**	**80%**	**82%**	**80%**	**82%**

Source: U.S. Bureau of the Census, USA Trade On-Line, 4/8/12

The inland waterway system provides a competitive alternative for export coal movements on the Black Warrior and Tenn Tom Waterways to the Port of Mobile, and on the Lower Mississippi to the Ports of Baton Rouge, South Louisiana, and Plaquemines. Exhibit 14 below gives the estimated modal splits for coal deliveries to the selected export ports. For coal exports the only port with a significant split between barge and rail movements appears to be Mobile (mostly the McDuffie Island terminal, but also the Ports Bulk Barge Marine Terminal). Terminals at Plaquemines and Baton Rouge are fed by barge; those at South Louisiana and New Orleans are fed by rail.

Exhibit 14: Estimated Modal Splits for Export Coal

2010 Foreign Exports of Coal - Tons		Estimated Inbound Modal Shares: Barge Share	Barge Tons	Rail Share	Rail Tons
Mobile Customs District					
MOBILE HARBOR	9,614,000	43%	4,134,020	57%	5,479,980
Mobile District Subtotal	9,614,000	43%	4,134,020	57%	5,479,980
New Orleans Customs District					
PORT OF SOUTH LOUISIANA	4,004,000	5%	200,200	95%	3,803,800
PORT OF PLAQUEMINES	3,930,000	100%	3,930,000	0%	-
PORT OF NEW ORLEANS	1,218,000	0%	-	100%	1,218,000
PORT OF BATON ROUGE	85,000	100%	85,000	0%	-
New Orleans District Subtotal	9,237,000	46%	4,215,200	54%	5,021,800
Total*	**18,851,000**	**44%**	**8,349,220**	**56%**	**10,501,780**

Source: 2010 USACE Manuscript Cargo Data
* Pacfic port total at Long Beach is small, and all rail.

At about 8 million tons in 2010, the barge share of total U.S. coal exports was about 9%. Within the waterways-accessible Lower Mississippi and Tennessee-Tombigbee port system, the barge share was about 44%.

Coal Export Terminals

The tendency for coal to take the shortest route to an export port means that the availability and capacity of export terminals is a major factor in the choice of a exit point and in the competiveness of the various coal sources for a given export opportunity. Neither railroads nor waterways are currently constrained by line haul capacity, partly because of capacity investments, and partly because of recession-induced declines in shipment volume. Existing export coal terminals, however, are operating at/near capacity (Exhibit 15). In response to increased demand several smaller marine terminals have increased their participation in the coal export business. Examples include general purpose bulk terminals in Long Beach, Philadelphia, Superior, and Houston.

Exhibit 15: North American Coal Terminal Capacity

Source: Platts, http //www.platts.com/NewsFeature/2012/coaltransport/index

The new terminal proposals are experiencing legal and political pressure from residents and environmental interests. Almost all of the proposed terminals are exclusively rail served facilities. The exception is Ambre Energy's Port Westward project, in which coal would travel the Columbia on covered barges loaded at the Port of Morrow.

East Coast Terminals

The East Coast terminals shown in Exhibit 15 are rail served, and contacts with the railroads suggest that they do not consider barge as a competitive alternative. The Baltimore and Norfolk terminals chiefly handle Appalachian coking coal.

Gulf Terminals

As indicated in Exhibit 14, the Gulf ports are the only places where both rail and barge movement are options. The Mobile terminals are served by both modes. At Mobile, the idle Middle River Terminal may be reactivated in the next few years, although no timetable has been announced. The Port of Louisiana and New Orleans Customs District terminals are served by rail, although some have dual capability. The Port of Plaquemine terminals are all barge.

West Coast and British Columbia Terminals

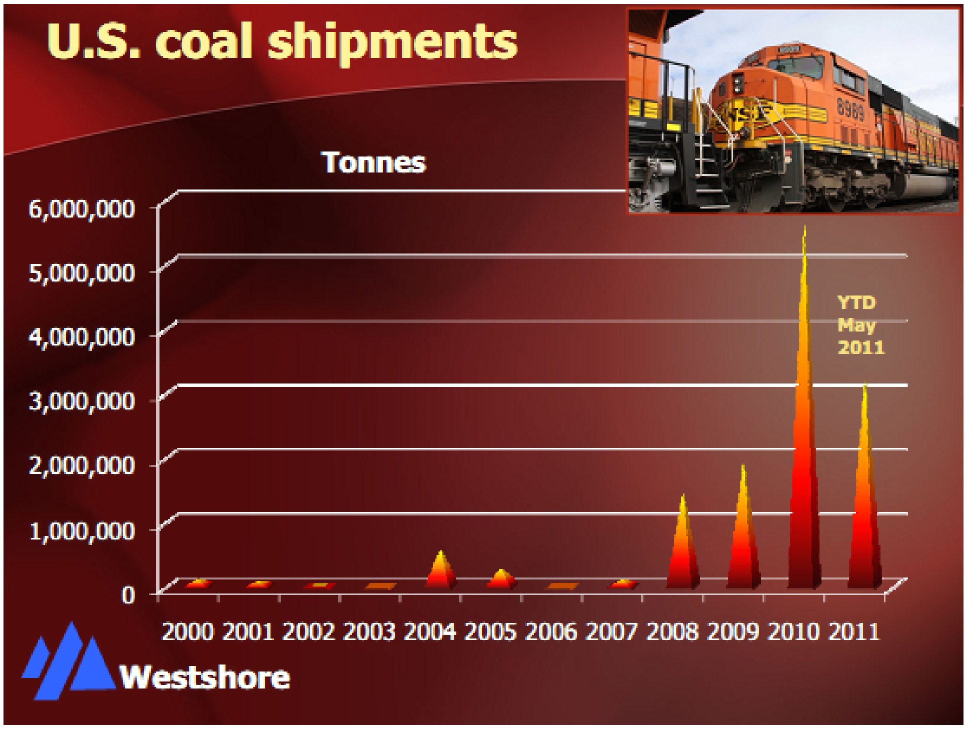
All of the West Coast terminals are served exclusively by rail. The three British Columbia terminals handle almost all the export coal on the West Coast (the exception being roughly 1 million tons via Long Beach). These terminals have water depths of up to 60 feet and can serve the largest vessels engaged in the coal trade (e.g. 207,000 dwt).

These terminals are operating at or near their current capacity, and some have turned away business. All three have on-site capacity expansion efforts in progress. These on-site upgrades do not have the same permitting and environmental review requirements as new facilities, and are unlikely to suffer the same delays.

- Westshore Terminal in Vancouver has announced a capital upgrade and capacity expansion. The upgrade involves the change-out of the existing single dumper to a double dumper, and related equipment improvements. The project is scheduled for completion by the end of 2012. The anticipated rated terminal throughput capacity increase is approximately 33 million tonnes, up from the current 29 million tonnes.
- Neptune Terminal in Vancouver announced over $60 million of investments in its facility. These investments include a new stacker reclaimer that should increase annual coal-handling capacity from nine million tonnes today to 12.5 million tonnes in 2012.
- Ridley Terminals can load up to 12 million tonnes of coal annually. With the addition of a second dumper and new stacker-reclaimer, capacity is expected to increase to 24 million tonnes by 2014.

Exhibit 16 shows that significant volumes of U.S. coal have begun to be exported through the Westshore terminal at Roberts Bank. This coal moves across the border via BNSF, which has working connections to the Westshore terminal.

Exhibit 16: U.S. Export Coal Shipments via Roberts Bank



Source: Westshore Terminals Annual General Meeting Presentation, June 2011

New Terminal Proposals

There are several proposed projects to increase coal export terminal capacity. These are also illustrated in Exhibit 15. Major terminal development activities are proposed in the Gulf with new or expanded terminals planned in Corpus Christi, Houston, Mobile, and the Lower Mississippi. Similarly new Pacific coast terminals or expansions are proposed for British Columbia, Washington, Oregon, and Michoacán. The proposed terminals in Charleston and Tampa are existing Kinder Morgan facilities capable of handling coal.

The aggregate capacity of all the proposed Pacific Northwest coal export terminals – over 100 million tons – far exceeds export volume projections. It is unlikely that all these projects will be completed, but it is not possible to predict which terminals will be built and which projects will be withdrawn or postponed.

None of these projects are likely to be completed before 2016 and most are likely to take longer. All of them face substantial and contentious environmental review and require 2-3 years of construction once permitting is complete and financing is in place. Most will require permitting or review by the USACE Portland District. The Portland District office reports that only one evaluation is actually in progress (the Morrow Pacific proposal for a barge terminal at Port Morrow), and that evaluation is still in the initial public comment phase.

Additional Terminal information

The Appendix provides more detailed information on existing and proposed coal export terminals.

Implications for Export Coal

Mobile and the Lower Mississippi are the two areas where export coal is most likely to create increased demand on inland waterways. The Great Lakes ports participate in the declining coal trade with Canada.

In the near-term (e.g. from now through completion of the new Panama Canal locks):

- There will be growing Chinese and Indian demand for U.S. coal exports.
- To the extent that the growth in exports is steam coal to Asia, that demand will most likely be met by exports of Powder River Basin coal by rail through West Coast ports.
- Growth in coking coal exports is likely to be met by some combination of rail and barge movements through the Gulf, and rail movements through the East Coast.
- There will be increased capacity at British Columbia export coal terminals.
- There will be no new coal export terminals or capacity on the U.S. West Coast (save for marginal increases at Long Beach).
- Reduced domestic coal demand will lead U.S. producers to seek export markets.
- Export coal movements will not be constrained by capacity on either the railroads or the waterways.

These observations imply that coal export growth will be split between existing routes and terminals, relying on either current capacity or same-site capacity improvements.

In the long run (e.g. after new Panama Canal locks are completed):

- One or more U.S. West Coast export coal terminals may be completed (5+ years).
- British Columbia export terminals will likely require additional capacity increases.
- Chinese demand for U.S. export coal will grow more slowly and may plateau.
- Indian demand for U.S. export coal will likely persist and grow, although political and institutional changes could permit more domestic production.
- U.S. and Canadian railroads will make the investments necessary to prevent capacity bottlenecks on major routes.
- Reduced ocean shipping costs due to use of larger vessels and deeper vessel drafts will increase the market shares of Lower Mississippi and Mobile ports and export terminals.

There is a significant possibility that the market for U.S. coal exports could decline or flatten before new terminals are built and operating. The anticipated export coal boom in the 1908s and 1990s led to at least two project failures. The Port of Portland and investors began a $60 million coal terminal project in 1982, but the project ended in 1984. The Port of Los Angeles developed the LAXT export coal terminal, which began operations in 1997 and stopped shipping coal in

2003 after 6 years of heavy financial losses. The terminal has been dismantled and the Port of Los Angeles is no longer interested in export coal.

Applying the current United States market share of world coal exports to the EIA forecast produces a long term, steady state growth rate of 1.5-2.5 million short tons of U.S. export coal annually through 2035. The inland waterway share of this activity was estimated at approximately 15%; applying that share results in an increase of 0.2 to 0.3 million short tons per year. This estimate is in line with recent growth patterns and does not represent an unanticipated load on waterway capacity.

If Mobile and Lower Mississippi terminals are expanded and able to handle the growth, they are likely to gain market share pending the PNW developments. They will probably also benefit from growth in coking coal exports, since the West Coast terminals are most competitive for PRB steam coal.

For the growing Asian market the Gulf terminals are limited by the current Panama Canal dimensions and cannot load vessels to a sailing draft of more than 39.5 feet nor handle the larger Capesize vessels. The new Panama Canal locks will ease both restrictions, but the Lower Mississippi terminals will still be limited by the 45-foot depth of the river itself.

The ability to load vessels to greater sailing drafts will reduce sailing costs from Gulf ports and should increase their market share for coking coal exports vis-a-vis the East Coast ports, and for steam coal vis-a-vis the West Coast ports, all other things being equal. The change may involve 1) increased exports of Interior (e.g. Illinois Basin) coal instead of PRB or Appalachian sources, or 2) increased flow of Appalachian coal to Gulf ports via rail or barge rather than to East Coast ports.

These observations argue for a somewhat more rapid waterway growth than indicated by the 0.2 to 0.3 million ton per year estimate made above. The potential increased market share of Gulf ports, however, does not inherently favor barge over rail. Overall, the Gulf export coal ports are split 44% barge and 56% rail. The impact on waterways versus railroads will depend on which export terminals gain new business. As Exhibit 14 indicates:

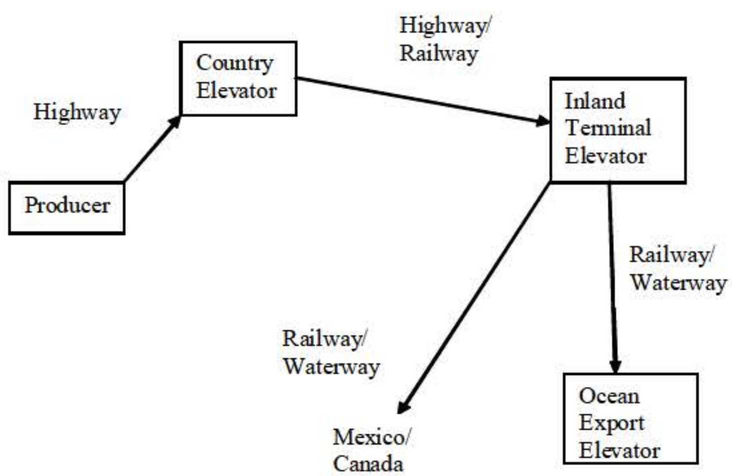
- The Port of Mobile terminals, which have about 10% of the export tonnage, are split 43% barge, 57% rail at present but could shift either way. When rebuilt, the Mobile Middle River Terminal could use either mode.
- Port of Plaquemine and Port of Baton Rouge terminals, which have 4-5% of the export tonnage, are effectively all barge.
- Port of South Louisiana terminals, which also have 4-5% of the export tonnage, are about 95% rail.

III. Grain & Soybeans

Grain Export Channels

The traditional grain production and export channel (Exhibit 17) has evolved over more than a century. Transportation nodes include the producer, a country elevator, an inland terminal elevator, and an export facility. A grain movement involving all the nodes would feature a leg by highway between the producer and country elevator, a leg by highway or railway between the country and terminal elevators, and a leg by rail or water to the export elevator or border crossing. In actual practice any or all of these nodes may be bypassed if transportation economics warrant.

Exhibit 17: Generic Export Grain Flow

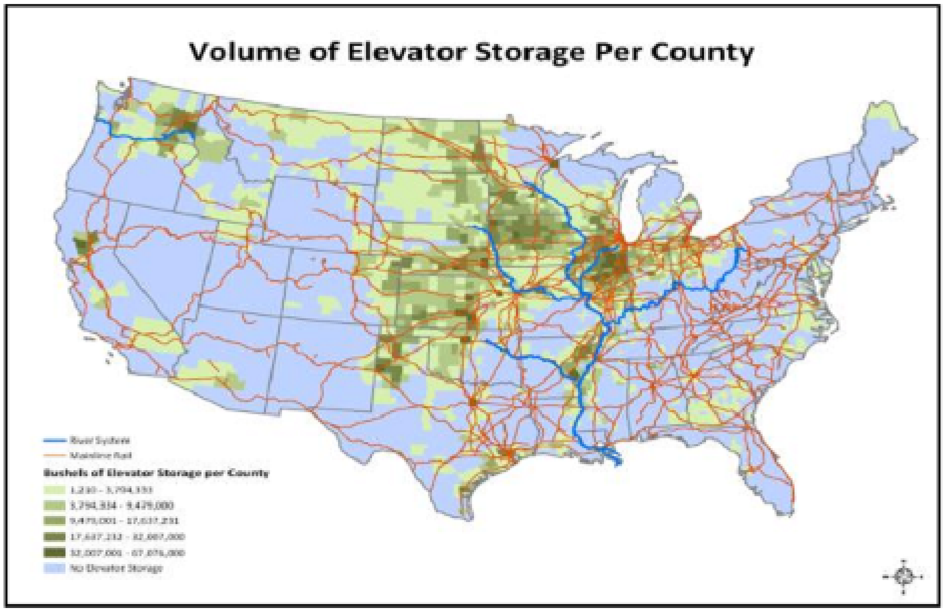


For example, grain produced on a farm in southwestern Minnesota could be trucked to a country elevator located 10 miles away via rural road or highway. From the country grain elevator, a truck or train may move the grain to an inland terminal elevator on the Mississippi River. A train could also move the grain to an export elevator in the Pacific Northwest. The grain could also move by rail to Mexico, perhaps via a terminal elevator in Kansas City. Once at an inland terminal elevator, the grain would move by rail or inland waterway (Mississippi or Great Lakes) to an export elevator for loading on a bulk ocean vessel.

All of these nodes must add value either through blending the product or being able to offer some transportation cost advantage, typically gained by gathering volumes that promote transportation efficiency. Nothing except economics prevents a farmer in Minnesota from selling his grain to a customer in Mexico and delivering the product in his own truck. Grain is stored and may be blended at all of these locations. Grain moves when market conditions are favorable, sometimes creating peak short term demands on the transportation system.

As Exhibit 18 illustrates, grain elevator capacity is concentrated in major growing areas. Much of the elevator capacity is near inland waterways, and all of it is accessible by rail.

Exhibit 18: Grain Elevator Capacity with Rail and Barge Systems



Source: Study of Rural Transportation Issues, Fig 2-7

As would be expected from the geographic distribution shown in Exhibit 18, the Tennessee-Tombigbee waterway and the Port of Mobile do not have significant roles in export grain. From a waterways perspective the export grain market is only served through the Lower Mississippi, since the Portland Customs District export terminals are served by rail. The changes brought about by the new Panama Canal locks would therefore only benefit flows on the Lower Mississippi.

Containerization of grain has led to development of a second logistics channel for grain including a container loading station, a rail intermodal terminal, and the marine container terminal. The container may be stuffed (loaded) at/near the rail intermodal terminal, the marine terminal, or at any node in the traditional system. After the grain is containerized it moves as a part of the overall container shipping system. Containerized shipping accounts for a small part of total grain exports, but grew when export rates were favorable and bulk shipping capacity was tight.

Wheat

World Wheat Supply and Demand

In the 2010/2011 crop year the U.S. produced 60 million metric tons (MMT) of wheat, approximately 9% of the world's total production. About 20% of world production is traded between nations. The largest buyers of wheat are North African and Middle Eastern countries led by the largest wheat importer, Egypt. World wheat trade has grown at about a 3% annual compound rate since 2000, from approximately 100 MMT to 143 MMT in 2011.

Exhibit 19 lists the top wheat importers and exporters in the 2010/2011 crop year. The U.S. is the top world exporter, presently maintaining a 26.6% market share. This is unusually high due to the 2010 drought, which reduced participation in the global market from the states of the former Soviet Union. Since 2000 the U.S. export share has varied annually between 17.6% and 29.3%, averaging 23.9%.

Exhibit 19: Large Wheat Importers and Exporters

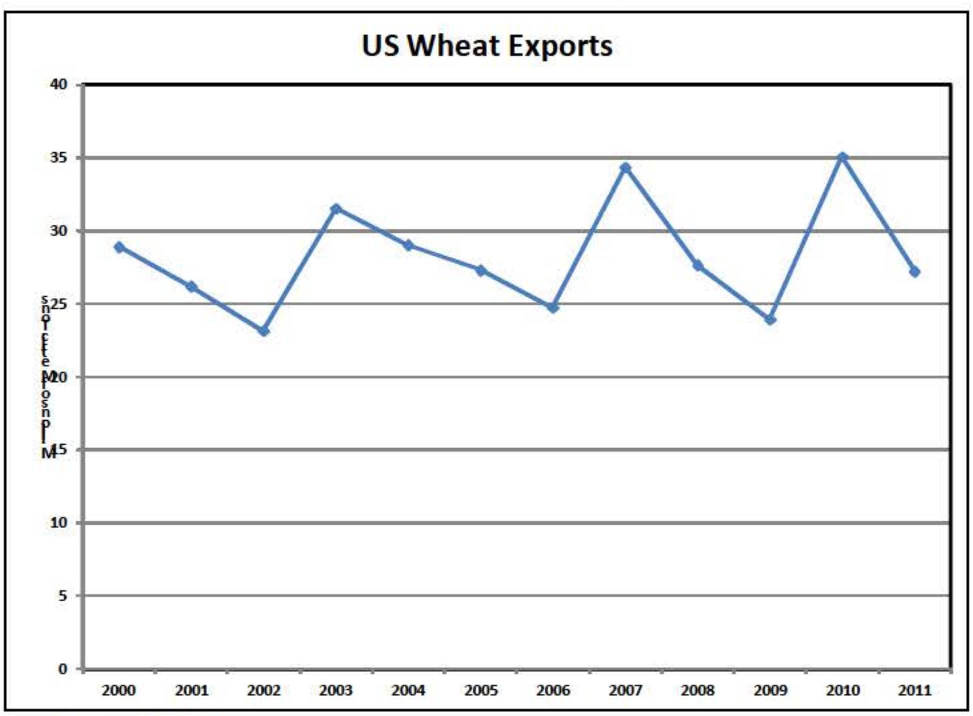
Top Wheat Importers (2010/2011)		Top Wheat Exporters (2010/2011)	
Country	**000,000 Metric Tons**	**Country**	**000,000 Metric Tons**
N. Africa	24.1	United States	35.1
Southeast Asia	15.8	European Union	22.9
Mideast	13.6	Canada	16.5
Brazil	6.7	Australia	18.3
Japan	5.9	Argentina	9.3

Source: USDA. The USDA crop year is June to May.
Notes: North Africa includes: Algeria, Egypt, Libya, Morocco, and Tunisia. Southeast Asia includes: Indonesia, Malaysia, Philippines, Thailand, and Vietnam. Mideast includes Lebanon, Iraq, Iran, Israel, Jordan, Kuwait, Saudi Arabia, Yemen, United Arab Emirates, and Oman.

U.S. Wheat Exports

In 2010/11 the United States exported 35 MMT of wheat, 58% of domestic production. The forecast for the current year is 27 MMT. Since 2000 the U.S. has exported an average of 28.25 MMT annually (Exhibit 20).

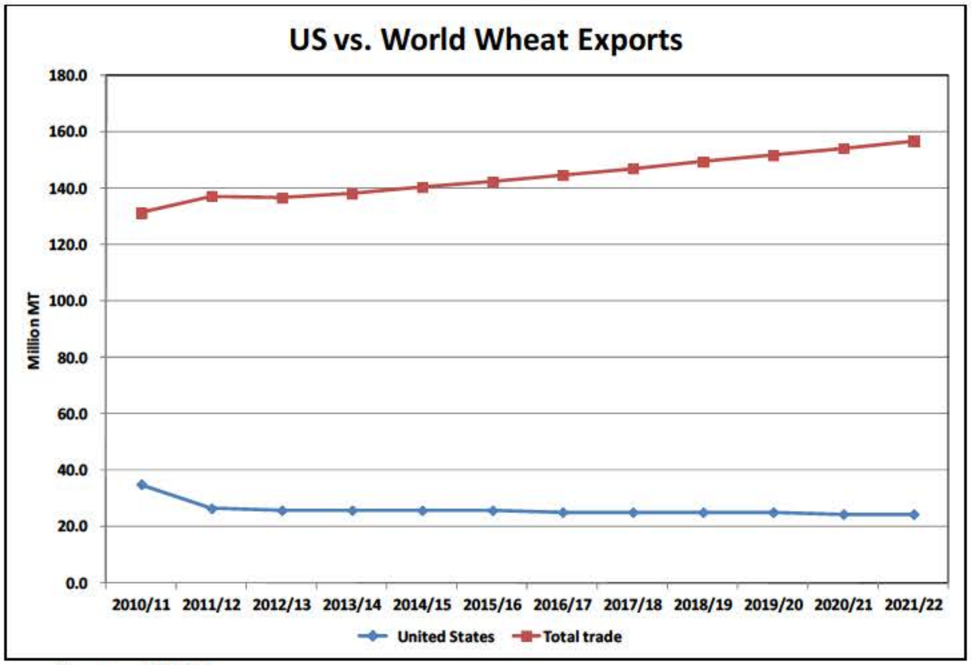
Exhibit 20: U.S. Wheat Exports



Source: USDA

After the peak 2010/2011 year, export volume is expected to drop back to normal levels and remain below historical peaks for the indefinite future. The key factor affecting U.S. wheat exports is market share loss to Russia, Ukraine, and Kazakhstan

Exhibit 21: U.S. vs. World Wheat Exports

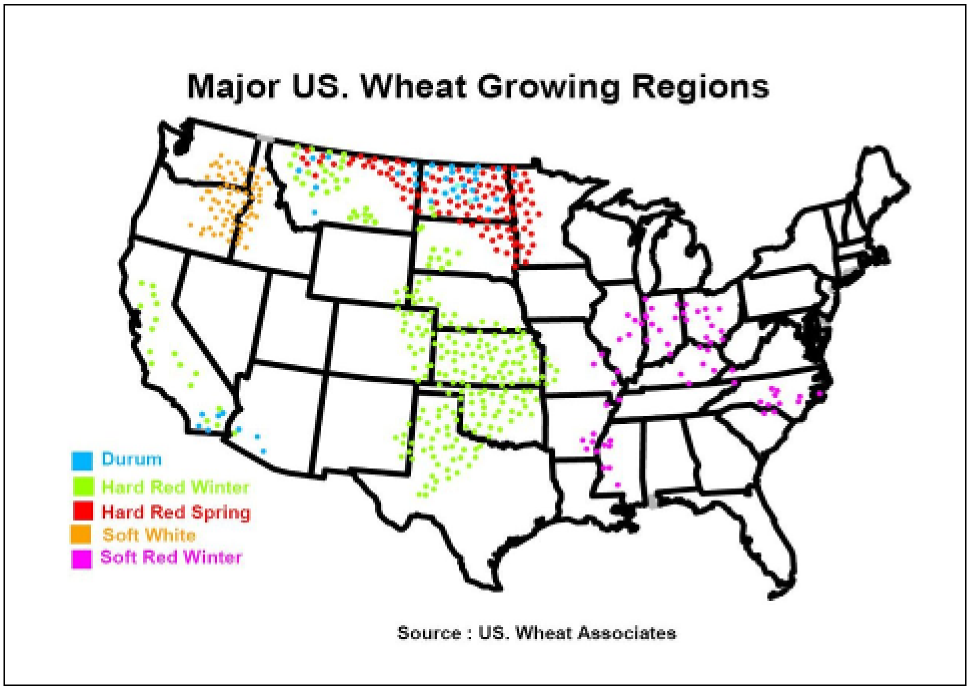


Source: USDA

Wheat Export Ports and Routes

U.S. spring wheat production is centered in the north central plains states of North Dakota, South Dakota, Minnesota, and Montana. From this region some grain moves by rail and truck to the head of the lakes and the head of navigation on the Mississippi system at Minneapolis/Saint Paul. Mainly, however, spring wheat exports move by rail to the Pacific Northwest ports. Kansas is the center of U.S. winter wheat production. Winter wheat mainly moves by rail to Texas ports for export.

Exhibit 22: U.S. Wheat Production Regions



Wheat exports are concentrated at a small number of export ports and elevators. Barge service participates in exports through the New Orleans Customs District (Exhibit 23).

Exhibit 23: U. S. Wheat Export Ports

Customs District	***Wheat Export Share***	***Customs District Barge Share***
Columbia-Snake	42%	0%
Houston, Tx	27%	0%
New Orleans, La	15%	77%
Port Arthur, Tx	5%	0%
Duluth, MN	3%	0%

Source: U.S. Customs

Of the ports accessible by waterway, the Portland, Mobile, and New Orleans Customs Districts together accounted for 57% of export wheat tonnage in 2011 (Exhibit 24). The overall waterway port share has been relatively stable for the last few years, with the exception of a recession year dip in 2009.

Exhibit 24: U.S. Wheat Exports at Waterway Ports

District & Port	Short Tons				Share of U.S. Total			
	2008	2009	2010	2011	2008	2009	2010	2011
1001 Wheat And Meslin								
Total All Ports	**31,305,599**	**23,250,682**	**29,437,407**	**34,742,866**	**100%**	**100%**	**100%**	**100%**
Portland District	**11,483,979**	**10,993,733**	**12,086,499**	**14,776,806**	**37%**	**47%**	**41%**	**43%**
Kalama, WA (Port)	1,786,959	1,873,863	1,723,819	4,446,139	6%	8%	6%	13%
Longview, WA (Port)	-	-	-	-	0%	0%	0%	0%
Portland, OR (Port)	5,666,557	5,721,166	6,395,908	6,326,162	18%	25%	22%	18%
Vancouver, WA (Port)	4,030,463	3,398,703	3,966,771	4,004,506	13%	15%	13%	12%
Mobile District	**163,442**	**26,979**	**12,213**	**54,853**	**1%**	**0%**	**0%**	**0%**
Mobile, AL (Port)	163,442	26,979	12,213	54,853	1%	0%	0%	0%
New Orleans District	**6,299,410**	**3,342,651**	**4,299,290**	**5,106,523**	**20%**	**14%**	**15%**	**15%**
Baton Rouge, LA (Port)	174,595	162,933	161,318	159,874	1%	1%	1%	0%
Lake Charles, LA (Port)	-	-	-	-	0%	0%	0%	0%
New Orleans, LA (Port)	6,124,815	3,179,718	4,137,972	4,946,649	20%	14%	14%	14%
Port Sulphur, LA (Port)	-	-	-	-	0%	0%	0%	0%
Other Districts	**13,358,769**	**8,887,319**	**13,039,404**	**14,804,684**	**43%**	**38%**	**44%**	**43%**

Source: U.S. Bureau of the Census, USA Trade On-Line, 4/8/12

The Portland Customs District accounts for most of the waterway port exports, but that grain is delivered by rail. As the data show, the overall Columbia-Snake share has been fairly stable, although shares have shifted between Kalama, Portland, and Vancouver. The Mobile Customs District does not handle significant export wheat tonnage. The New Orleans Customs District share is all handled at a single export elevator at the Port of New Orleans itself.

Waterway Role

Exhibit 25 provides estimates of the modal shares for wheat exports. In the case of wheat, rail is the dominate model for transport to the export elevators, and rail gained share between 2000 and 2006. Barges accounted for 29% in 2006.

Exhibit 25: Wheat Modal Shares, 2000-2006

WHEAT						
Year & Type of Movement	Rail		Barge		Truck	
	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent
TOTAL						
2001	33,269	52%	11,534	18%	19,668	31%
2002	32,702	56%	9,876	17%	16,081	27%
2003	34,181	53%	10,180	16%	20,428	32%
2004	37,302	56%	11,937	18%	17,625	26%
2005	39,287	63%	8,312	13%	14,759	24%
2006	38,596	67%	8,068	14%	11,302	19%
Average	35,889	58%	9,984	16%	16,644	26%
EXPORT						
2000	17,934	56%	11,975	38%	1,871	6%
2001	16,549	56%	11,099	38%	1,762	6%
2002	16,988	62%	9,367	34%	1,225	4%
2003	17,983	61%	9,726	33%	1,681	6%
2004	21,045	61%	11,370	33%	2,294	7%
2005	22,452	74%	7,938	26%	Not available*	
2006	18,922	71%	7,868	29%	Not available	
Average	18,839	63%	9,906	33%	1,262	4%

Source: Study of Rural Transportation Issues, USDA, April 2010, Table 2-11

Exhibit 26 gives the estimated modal splits for rail and barge deliveries to export wheat elevators at the selected ports. Barge is only a significant factor on the Lower Mississippi. The Port of South Louisiana has several elevators served by both rail and barge. The export terminal at the Port of Plaquemines is served only by barge. The New Orleans elevator is served by both rail and barge, but most grain arrives by barge at present.

Exhibit 26: Estimated Modal Splits for Export Wheat

2010 Foreign Exports of Wheat - Tons		**Estimated Inbound Modal Shares****			
		Barge Share	**Barge Tons**	**Rail Share**	**Rail Tons**
Mobile Customs District					
MOBILE HARBOR, AL	19,000	0%	0	93%	17,670
Mobile District Subtotal	19,000	0%	0	93%	17670
New Orleans Customs District					
PORT OF SOUTH LOUISIANA (LA)	1,984,000	50%	992,000	50%	992,000
PORT OF PLAQUEMINES, LA	1,607,000	100%	1,607,000	0%	-
PORT OF NEW ORLEANS, LA	830,000	95%	788,500	5%	41,500
PORT OF BATON ROUGE, LA	103,000	85%	87,550	0%	-
New Orleans District Subtotal	4,524,000	77%	3,475,050	23%	1,033,500
Portland Customs District					
PORT OF PORTLAND, OR	6,343,000	0%	-	100%	6,343,000
PORT OF VANCOUVER, WA	4,147,000	0%	-	100%	4,147,000
PORT OF KALAMA, WA	1,940,000	0%	-	100%	1,940,000
PORT OF LONGVIEW, WA	42,000	0%	-	100%	42,000
OREGON SLOUGH (NORTH PORTLAND	2,000	0%	-	100%	2,000
Portland District Subtotal	12,474,000	0%	-	100%	12,474,000
Total	**17,017,000**	**20%**	**3,475,050**	**79%**	**13,525,170**

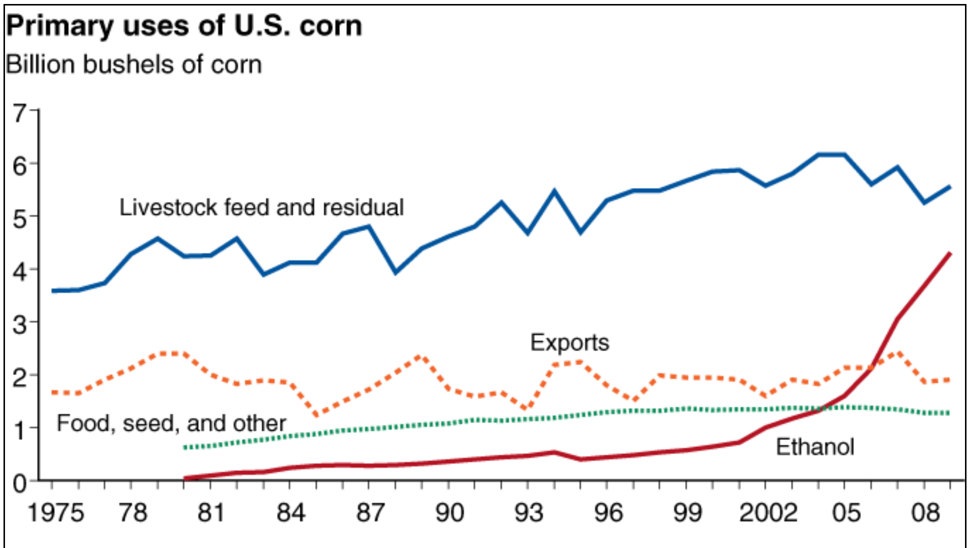
Source: 2010 USACE Manuscript Cargo Data
* Expected modal split for near-term future operations.
** Remainder is trucked in.

Corn

World Corn Supply and Demand

In the 2010/2011 crop year the U.S. produced 316 million metric tons (MMT) of corn, approximately 36% of the world's total production. Approximately 40% of U.S. corn production is used to produce ethanol. Exhibit 27 shows the uses to which this corn is put, including exports. In 2010/11 the United States exported 52 million short tons of corn, 15% of domestic production.

Exhibit 27: Primary Uses of U.S. Corn



Notes: Corn used for ethanol was not tracked separately prior to 1980. Corn used for the "food, seed, and other" category was split between several categories prior to 1980.

Source: USDA, Economic Research Service Feed Grains Database.

World Corn Trade

Corn is the most important "coarse grain". Currently 11% of world corn production is traded between nations. The world corn trade has grown at about a 2% annual compound rate since 2000, from approximately 77 MMT to 97 MMT in 2011. Exhibit 28 lists the top coarse grain importers and exporters in the 2010/2011 crop year. The largest buyers of coarse grains are Japan, Mexico, and South Korea.

Exhibit 28: Large Coarse Grain Importers and Exporters

Top Coarse Grain Importers (2010/2011)		Top Coarse Grain Exporters (2010/2011)	
Country	**000,000 Metric Tons**	**Country**	**000,000 Metric Tons**
Japan	15.7	United States	46.6
Mexico	8.3	Argentina	16.0
South Korea	8.1	Brazil	8.4
Southeast Asia	7.7	Ukraine	5.0
EU-27	7.4	South Africa	2.4
Egypt	5.8	Canada	1.7

Source: USDA. The USDA crop year is June to May. Southeast Asia includes: Indonesia, Malaysia, Philippines, Thailand, and Vietnam.

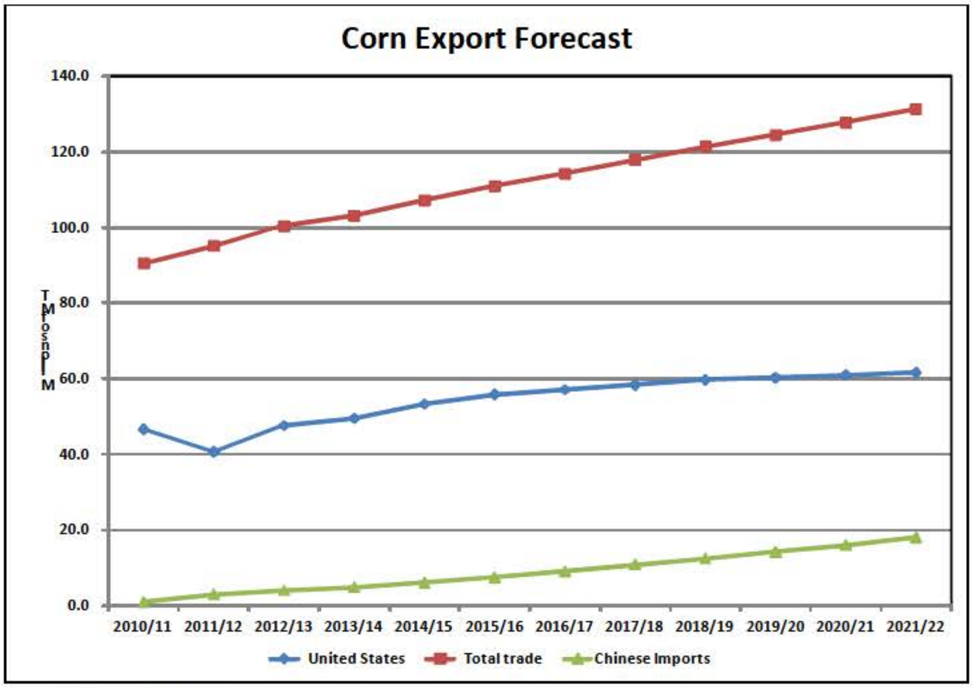
U.S. Corn Exports

In 2010/11 the United States exported 47 MMT of corn, 15% of domestic production. (Exhibit 27) The United States is the top world exporter, presently maintaining a 30% market share. Since 2000 the U.S. corn export tonnage varied between 40MMT and 62 MMT, averaging 59 MMT. U.S. share of the international market has varied annually between 67% and 45%, declining as ethanol production has increased and as production in the rest of the world increased.

Corn Outlook

World corn trade is expected grow at a 3.4% over the next decade as population grows and wealth in developing countries increases. (Exhibit 29) China, Japan, and Mexico are expected to be the world's most important corn importers, with China responsible for the largest share of growth in corn consumption.

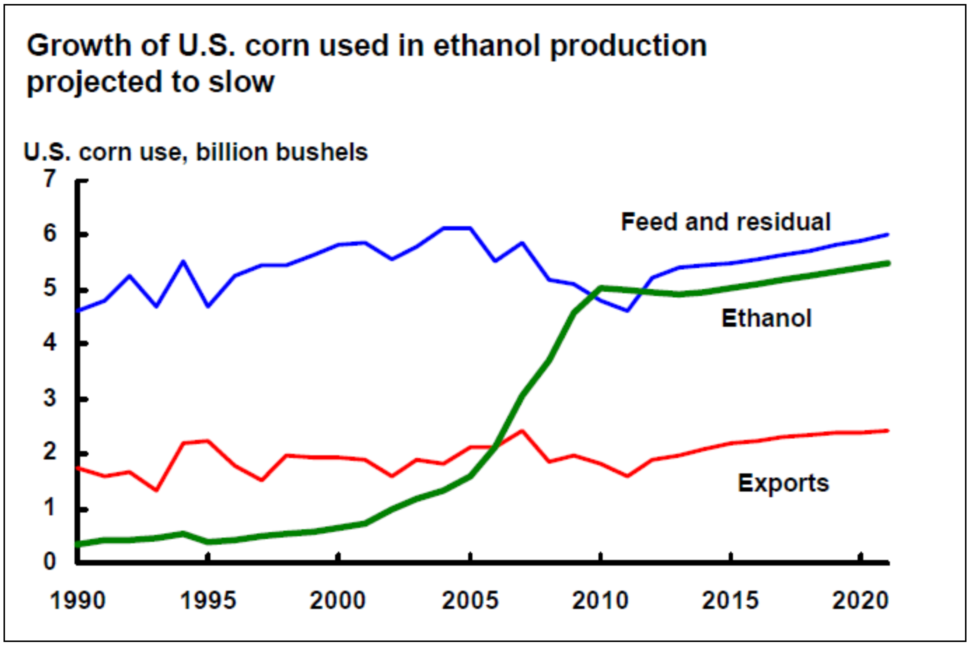
Exhibit 29: U.S. vs. World Corn Exports



Source: USDA

U.S. production is expected to increase by 2% annually over the next decade while exports are also expected to grow slightly faster, at a 2.6% annual rate over the period. The key assumption is that the tax credits and protective tariffs enjoyed by the ethanol industry which expired at the end of 2011 are not renewed. The anticipated result is a short term reduction in ethanol related corn demand followed by a long term demand consuming 36% of U.S. corn production annually. These trends are illustrated in Exhibit 30.

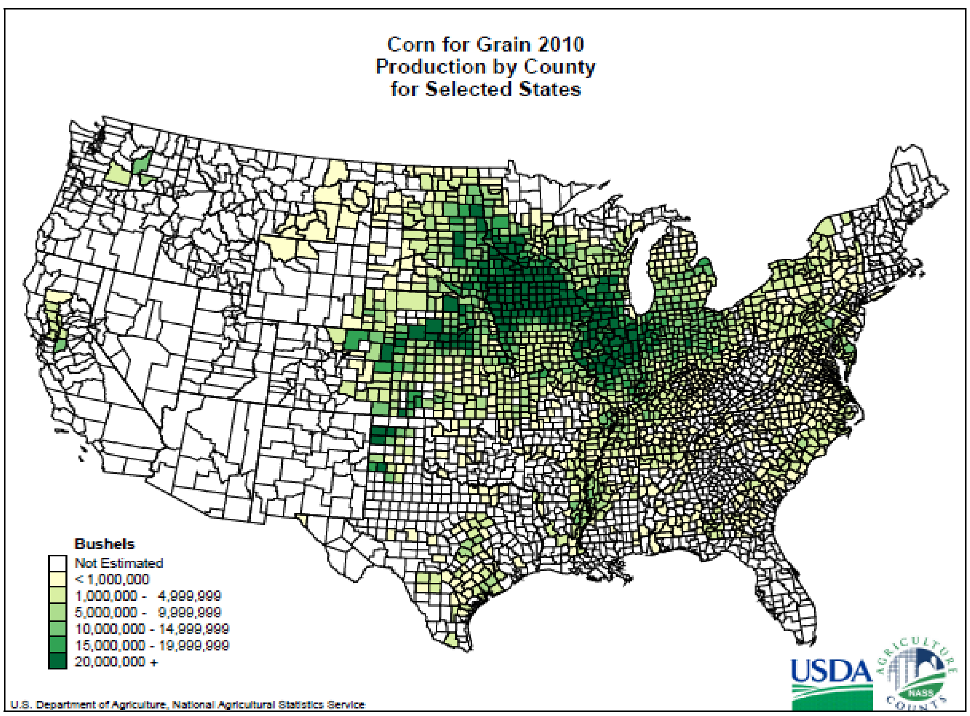
Exhibit 30: U.S. Corn Use Forecast



Source: USDA

U.S. corn production is centered in the upper Midwest, with more than half of the corn production occurring in Iowa, Illinois, Nebraska, and Minnesota. Most of the remainder is produced in the region known as the Corn Belt and illustrated in Exhibit 12.

Exhibit 31: U.S. Corn Production Regions



Corn Export Ports

As with the other grain types, corn exports are concentrated at a small number of terminals (Exhibit 32). All of the ports are rail served. Corn exports may also be containerized. In 2011, containers accounted for 3.78% of corn exports by value. All the corn exports from Los Angeles are containerized.

Exhibit 32: U. S. Corn Export Ports

Customs District	Corn Export Share	Barge Market Share
New Orleans, LA	56%	62%
Seattle, WA	14%	0%
Laredo, TX	9%	0%
Columbia-Snake	6%	0%
El Paso, TX	4%	0%
Los Angeles, CA	3%	0%

Source: U.S. Customs

The waterways ports together handled about 50% of the corn exports in 2011, down from previous years (Exhibit 33). Of the waterways ports only the Portland and New Orleans Customs Districts handle large quantities of export corn, with the New Orleans Customs District being the dominant exporter. More than a third of U.S. corn exports feature a barge movement from an inland terminal elevator to New Orleans. The variability in the waterway ports' share has been due primarily to the variability of flows through the New Orleans Customs District

Exhibit 33: U.S. Corn Exports at Waterway Ports

District & Port	Short Tons				Share of U.S. Total			
	2008	2009	2010	2011	2008	2009	2010	2011
1005 Corn (maize)								
Total All Ports	**50,235,715**	**45,832,563**	**48,006,025**	**42,759,324**	**100%**	**100%**	**100%**	**100%**
Portland District	**5,036,236**	**2,842,682**	**2,810,663**	**2,891,620**	**10%**	**6%**	**6%**	**7%**
Kalama, WA (Port)	4,351,559	2,219,989	2,683,408	2,708,902	9%	5%	6%	6%
Longview, WA (Port)	39,006	-	-	-	0%	0%	0%	0%
Portland, OR (Port)	589,824	611,670	127,255	182,718	1%	1%	0%	0%
Vancouver, WA (Port)	55,847	11,023	-	-	0%	0%	0%	0%
Mobile District	**980,119**	**154,821**	**202,139**	**-**	**2%**	**0%**	**0%**	**0%**
Mobile, AL (Port)	980,119	154,821	202,139	-	2%	0%	0%	0%
New Orleans District	**15,789,565**	**13,227,611**	**17,858,513**	**18,449,895**	**31%**	**29%**	**37%**	**43%**
Baton Rouge, LA (Port)	588,958	420,320	297,960	128,279	1%	1%	1%	0%
Lake Charles, LA (Port)	-	-	388	-	0%	0%	0%	0%
New Orleans, LA (Port)	15,169,510	12,755,924	17,560,165	18,321,616	30%	28%	37%	43%
Port Sulphur, LA (Port)	31,097	51,367	-	-	0%	0%	0%	0%
Other Districts	**28,429,794**	**29,607,449**	**27,134,709**	**21,417,809**	**57%**	**65%**	**57%**	**50%**

Source: U.S. Bureau of the Census, USA Trade On-Line, 4/8/12

Waterways Role

Exhibit 34 shows the shifting modal shares for corn movements. For exports, the rail/barge split has varied from year to year but tended to shift in favor of rail. Barge accounted for about half of corn exports as recently as 2006.

Exhibit 34: Modal Shares for Corn

CORN						
Year & Type of Movement	Rail		Barge		Truck	
	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent
TOTAL						
2000	68,984	30%	37,831	16%	122,531	53%
2001	73,633	31%	38,864	16%	125,340	53%
2002	72,615	31%	41,598	18%	119,713	51%
2003	71,443	30%	36,488	15%	127,916	54%
2004	77,377	32%	37,302	15%	126,588	52%
2005	77,908	30%	31,739	12%	150,519	58%
2006	91,552	32%	34,587	12%	159,086	56%
Average	76,216	31%	36,916	15%	133,099	54%
EXPORT						
2000	15,213	29%	35,150	66%	2,594	5%
2001	15,822	30%	35,904	68%	1,306	2%
2002	14,327	27%	38,125	73%	Not available *	
2003	14,371	30%	32,872	69%	364	1%
2004	17,422	33%	33,974	64%	1,978	4%
2005	20,251	40%	28,778	57%	1,600	3%
2006	28,145	44%	31,941	50%	3,342	5%
Average	17,936	33%	33,821	64%	1,598	3%

Source: Study of Rural Transportation Issues, USDA, April 2010, Table 2-7

The Port of South Louisiana, with multiple elevators, is the dominant waterway export point for corn (Exhibit 35). The 50/50 model split is a port average, with the actual mode depending on which elevator and source combination is involved.

Exhibit 35: Estimated Modal Splits for Export Corn

2010 Foreign Exports of Corn - Tons		Estimated Inbound Modal Shares**			
		Barge Share	Barge Tons	Rail Share	Rail Tons
Mobile Customs District					
MOBILE HARBOR, AL	160,000	0%	0	93%	148,800
Mobile District Subtotal	160,000	0%	0	93%	148800
New Orleans Customs District					
PORT OF SOUTH LOUISIANA (LA)	24,125,000	50%	12,062,500	50%	12,062,500
PORT OF PLAQUEMINES, LA	3,571,000	100%	3,571,000	0%	-
PORT OF NEW ORLEANS, LA	4,656,000	95%	4,423,200	5%	232,800
PORT OF BATON ROUGE, LA*	218,000	85%	185,300	0%	-
New Orleans District Subtotal	32,570,000	62%	20,242,000	38%	12,295,300
Portland Customs District					
PORT OF KALAMA, WA	2,978,000	0%	-	100%	2,978,000
PORT OF PORTLAND, OR	141,000	0%	-	100%	141,000
OREGON SLOUGH (NORTH PORTLAND HARE	2,000	0%	-	100%	2,000
Portland District Subtotal	3,121,000	0%	-	100%	3,121,000
Total	**35,851,000**	**56%**	**20,242,000**	**43%**	**15,565,100**

Source: 2010 USACE Manuscript Cargo Data
* Expected modal split for near-term future operations.
** Remainder is trucked in.

Currently New Orleans and the Pacific Northwest terminals split corn export volumes to China, Japan, and South Korea by 63%/36%. One percent is accounted for by all other ports.

Soybeans

World Soybean Supply and Demand

In 2010/2011 crop year the U.S. produced 91 million metric tons (MMT) of soybeans, approximately 25% of the world's total production. Soybeans used to produce edible foods and vegetable oils, animal feed and bio-diesel fuel. While some soybeans are used whole, most are crushed to produce soy meal and soybean oil. Soybeans (technically an oilseed rather than a grain) are exported in both whole and crushed form as soybean meal, and there may be differences in tonnage statistics depending on whether either or both forms are included.

Exhibit 36 lists the soybean importers and exporters in the 2010/2011 crop year. The largest buyers of soybeans are China, the European Union, Mexico, and Japan. The United States is the top world exporter, presently maintaining a 44% share of the global market. Brazil, however, is presently the number two exporter and is rapidly gaining share. The increased Panama Canal capacity that benefits U.S. Gulf ports in the Asian markets will also benefit competing Brazilian exporters.

Exhibit 36: Large Soybean Importers and Exporters

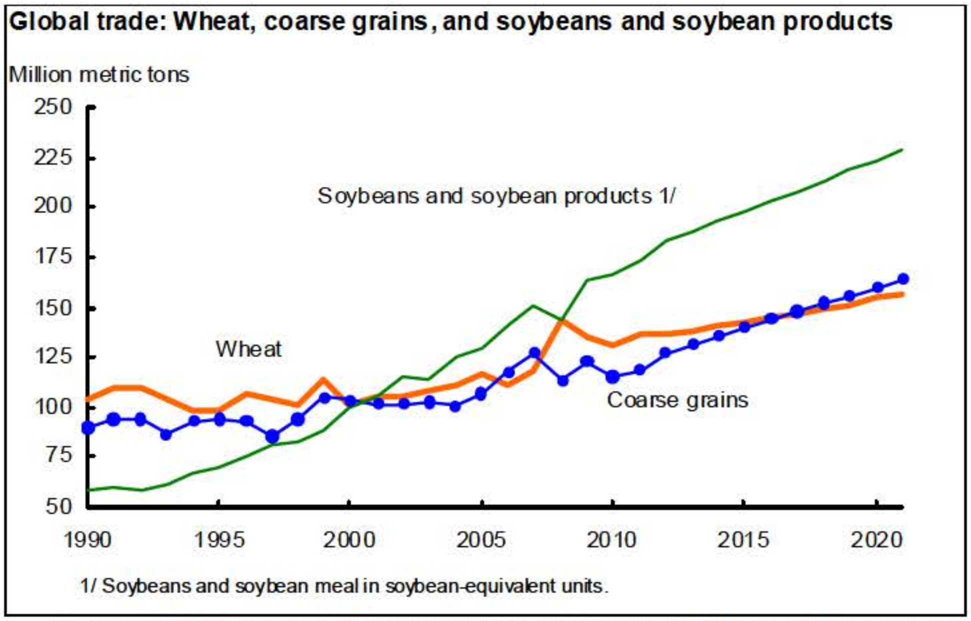
Top Soybean Importers (2010/2011)		Top Soybean Exporters (2010/2011)	
Country	**000,000 Metric Tons**	**Country**	**000,000 Metric Tons**
China	52.3	United States	40.9
EU-27	12.9	Brazil	30.0
Mexico	3.5	Argentina	9.2
Japan	2.9		

Source: USDA. The USDA crop year is June to May.

World Soybean Trade

Exhibit 37 illustrates the emergence of soybeans and soybean products as the most important commodity in global agricultural trade. This trend has been driven by strong global demand for vegetable oil and protein meal in Asia.

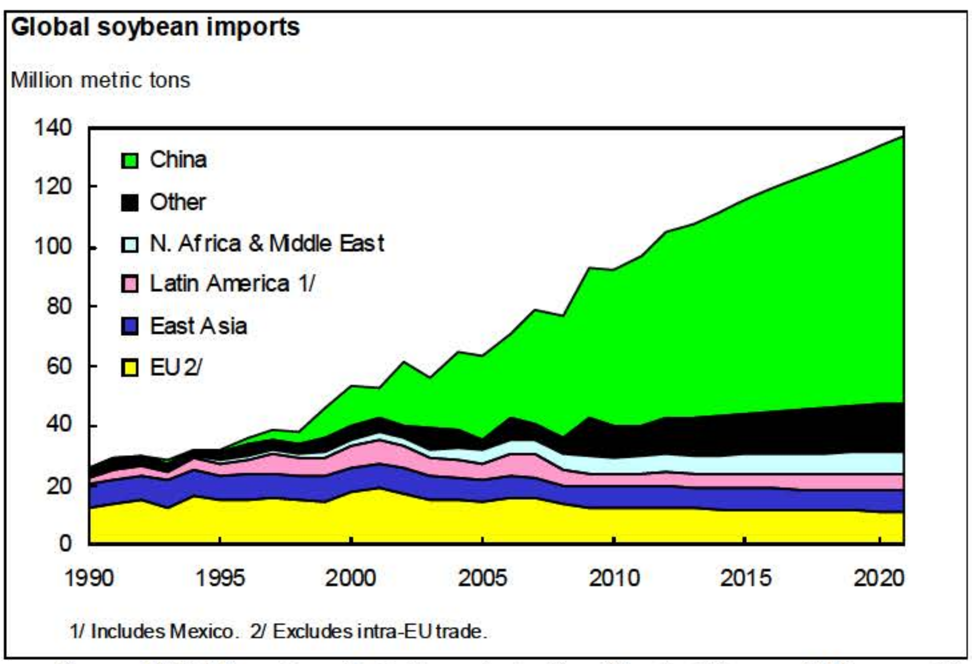
Exhibit 37: Wheat, coarse grains, and soybeans in Global Trade



Source: USDA Long-term Projections, Agricultural Trade, February 2012, page 19
http://www.ers.usda.gov/Publications/OCE121/OCE121c.pdf

Increasing per capita income in China has resulted in that nation becoming the world's most important soybean importer as illustrated in Exhibit 38. A key feature of Chinese demand is that China is expected to prefer to import oilseeds rather than oilseed products. This implies a relatively greater transportation demand for lower valued soybeans as opposed to value-added soybean products.

Exhibit 38: Global Soybean Trade

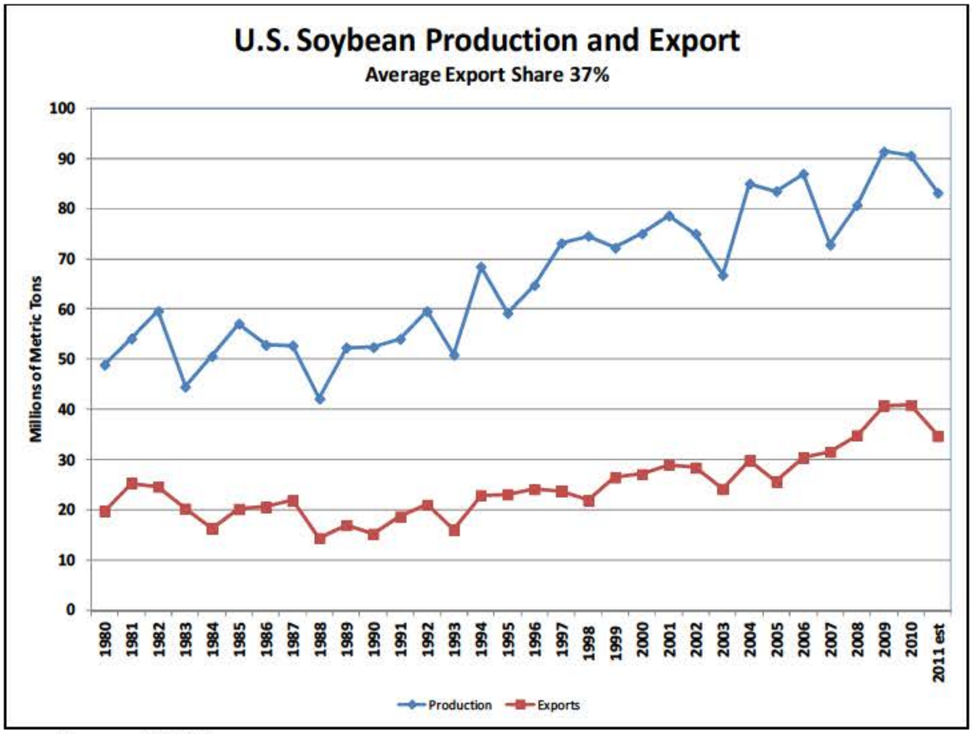


Source: USDA Long-term Projections, Agricultural Trade, February 2012, page 32
http://www.ers.usda.gov/Publications/OCE121/OCE121c.pdf

U.S. Soybean Exports

In 2010/11 the United States exported 41 MMT of Soybean, 45% of domestic production. (Exhibit 39) Since 2000 the U.S. Soybean export tonnage varied between 24 MMT and 41 MMT, averaging 31 MMT.

Exhibit 39: U.S. Soybean Production and Export

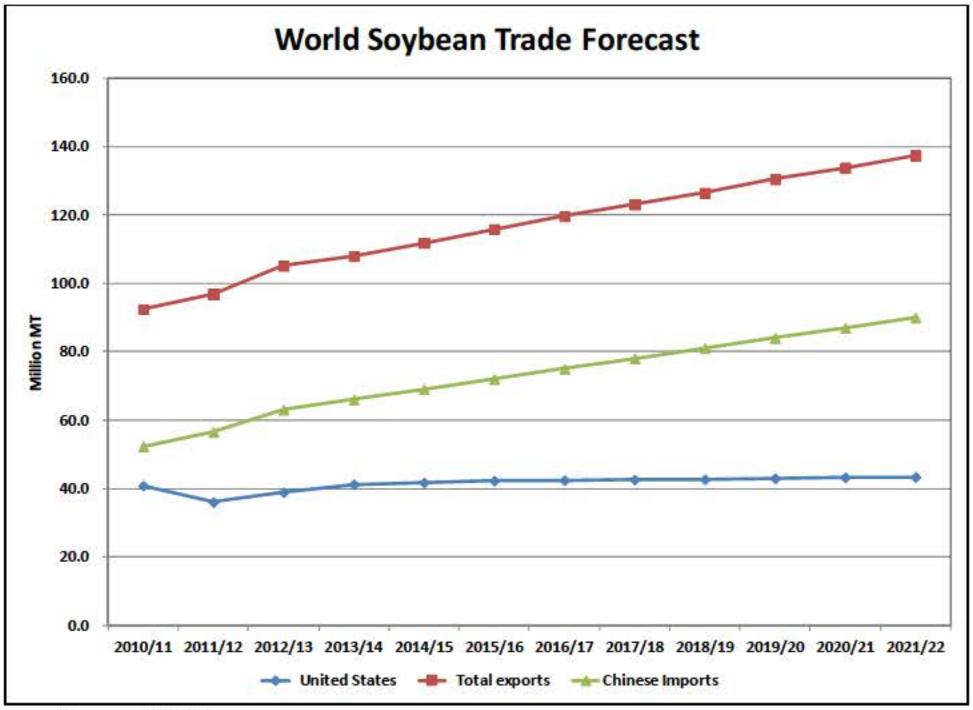


Source: USDA

Soybean Outlook

The world soybean trade is expected grow at a 3.7% over the next decade driven by growth and increasing Chinese income. (Exhibit 40) China, the EU, and North African/Middle Eastern countries are expected to be the biggest traders. Japan and Mexico will continue to import but at rates that grow more slowly than the developing nations.

Exhibit 40: U.S. vs. World Soybean Exports

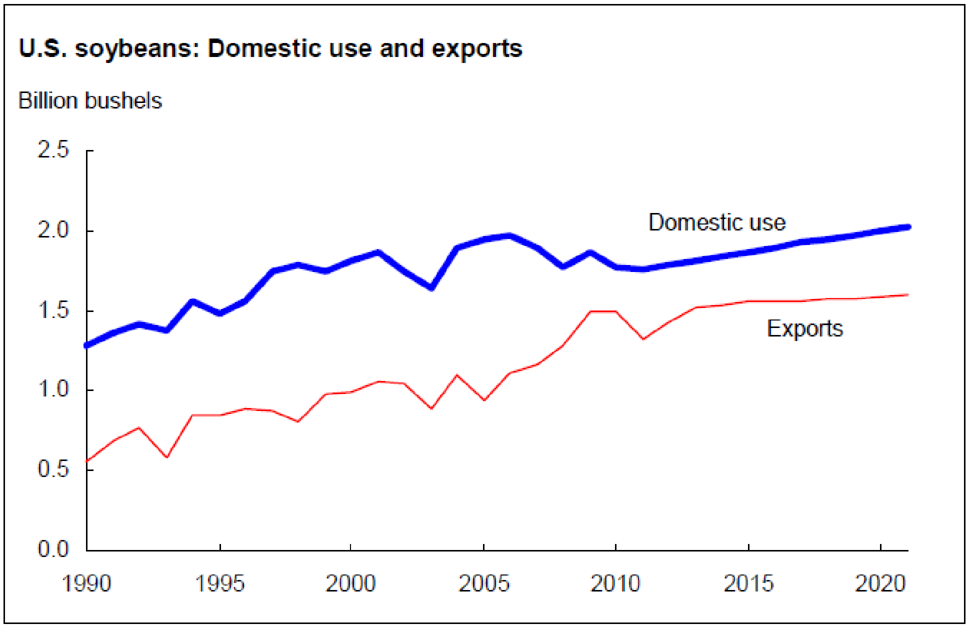


Source: USDA

U.S. soybean production is expected to decline in 2012 as corn acreage is expected to increase. Thereafter, soybean prices are expected to remain high enough to keep soybean acreage constant. As the U.S. economy rebounds U.S. meat consumption will increase and an increase in domestic demand for soybean meal will result. Soybean oil used to produce biodiesel will increase from 13.5% to 20% of production in response to the mandate to produce 1 billion gallons of biomass-based diesel fuel.

The USDA forecast is relatively conservative and exports are projected to grow only very slowly, remaining in the 39-43 MMT range as illustrated in Exhibit 41. U.S. market share will decline as Brazil and Argentina keep pace with increasing global demand and other South American countries continue to increase soybean production.

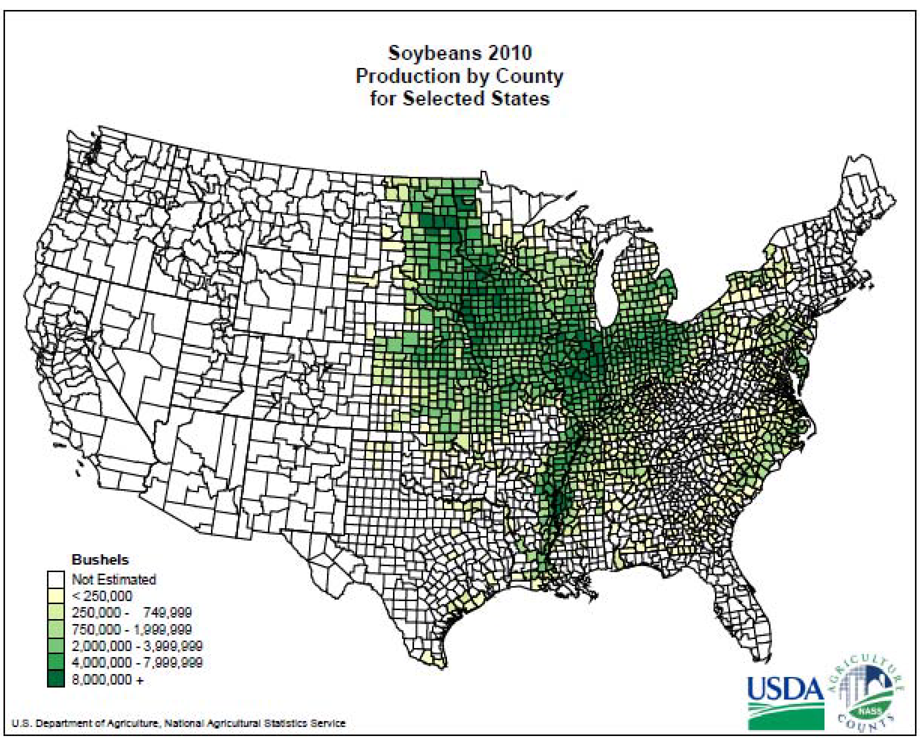
Exhibit 41: Historical and Forecast U.S. Soybean Use



Source: USDA

U.S. soybean production is centered in the corn belt, but is more geographically diverse than corn production. Iowa, Illinois, Nebraska, and Minnesota account for 56% of corn production in 2009 but only 43% of soybean production as illustrated in Exhibit 12. Soybeans are also grown in the Mississippi River Valley and on the Eastern Seaboard, as well as an alternative to wheat in the north central plains.

Exhibit 42: U.S. Soybean Production Regions



Soybean Export Ports

Soybeans, like wheat and corn, are exported through just a few major ports. These ports are slightly more geographically diverse than corn due to less geographical concentration of production. All of the ports are rail served. Approximately a third of U.S. Soybean exports feature a barge movement from an inland terminal elevator to New Orleans. By value, 87% of soybean exports from Los Angeles, and 27% of exports from Norfolk are containerized.

Exhibit 43: U. S. Soybean Export Ports

Customs District	*Soybean Export Share*	*Barge Market Share*
New Orleans, LA	56%	59%
Seattle, WA	12%	0%
Columbia-Snake	11%	0%
Laredo, TX	6%	0%
Los Angeles, CA	4%	0%
Houston-Galveston, TX	3%	0%
Norfolk, VA	2%	0%

Source: U.S. Customs

Overall, the New Orleans Customs District is the dominant export point for soybeans by waterway (Exhibit 44).

Exhibit 44: U.S. Soybean Exports at Waterway Ports

District & Port	Short Tons				Share of U.S. Total			
	2008	2009	2010	2011	2008	2009	2010	2011
1201 Soybeans, Whether Or…								
Total All Ports	**33,894,129**	**41,804,362**	**43,620,550**	**35,015,200**	**100%**	**100%**	**100%**	**100%**
Portland District	**5,168,898**	**4,579,381**	**7,081,561**	**4,207,167**	**15%**	**11%**	**16%**	**12%**
Kalama, WA (Port)	5,102,682	4,313,014	6,078,319	3,797,910	15%	10%	14%	11%
Longview, WA (Port)	-	373	-	575	0%	0%	0%	0%
Portland, OR (Port)	766	260,285	992,912	399,504	0%	1%	2%	1%
Vancouver, WA (Port)	65,451	5,709	10,330	9,178	0%	0%	0%	0%
Mobile District	**318,103**	**704,317**	**1,051,475**	**515,549**	**1%**	**2%**	**2%**	**1%**
Mobile, AL (Port)	318,103	704,317	1,051,475	515,549	1%	2%	2%	1%
New Orleans District	**9,379,781**	**12,480,030**	**13,710,042**	**11,160,887**	**28%**	**30%**	**31%**	**32%**
Baton Rouge, LA (Port)	331,246	239,175	589,803	53,285	1%	1%	1%	0%
Lake Charles, LA (Port)	-	-	-	-	0%	0%	0%	0%
New Orleans, LA (Port)	9,048,535	12,240,855	13,120,239	11,107,602	27%	29%	30%	32%
Port Sulphur, LA (Port)	-	-	-	-	0%	0%	0%	0%
Other Districts	**19,027,347**	**24,040,634**	**21,777,472**	**19,131,597**	**56%**	**58%**	**50%**	**55%**

Source: U.S. Bureau of the Census, USA Trade On-Line, 4/8/12

Waterways Role

Modal shares for soybean exports have, like corn exports, shown a past shift in favor of rail (Exhibit 45). Barges transported about 49% of the export soybeans in 2006.

Exhibit 45: Soybean Modal Shares, 2000-2006

SOYBEANS						
Year & Type of Movement	Rail		Barge		Truck	
	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent
TOTAL						
2000	17,257	22%	20,174	26%	41,225	52%
2001	20,662	24%	19,872	23%	44,813	53%
2002	19,120	22%	21,399	25%	44,848	53%
2003	20,216	24%	20,167	24%	44,409	52%
2004	16,346	22%	17,053	23%	39,337	54%
2005	17,655	22%	16,332	21%	45,501	57%
2006	21,858	25%	16,221	19%	49,557	57%
Average	19,016	23%	18,745	23%	44,242	54%
EXPORT						
2000	8,591	29%	18,665	63%	2,442	8%
2001	11,711	37%	18,689	59%	1,262	4%
2002	10,602	35%	19,642	64%	263	1%
2003	12,479	37%	18,632	55%	2,878	8%
2004	9,322	34%	15,412	56%	2,977	11%
2005	11,273	40%	15,030	53%	1,815	6%
2006	14,169	46%	15,240	49%	1,654	5%
Average	11,164	37%	17,330	57%	1,899	6%
DOMESTIC						
2000	8,666	18%	1,510	3%	38,783	79%
2001	8,950	17%	1,183	2%	43,552	81%
2002	8,518	16%	1,758	3%	44,586	81%
2003	7,737	15%	1,535	3%	41,531	82%
2004	7,024	16%	1,641	4%	36,361	81%
2005	6,382	12%	1,302	3%	43,686	85%
2006	7,688	14%	982	2%	47,903	85%
Average	7,852	15%	1,416	3%	42,343	82%

Source: Study of Rural Transportation Issues, USDA, April 2010, Table 2-9

Based on readily available information, barge transport plays a significant role on the Lower Mississippi, particularly at the Port of South Louisiana with it multiple elevators (Exhibit 46). The Ports of Plaquemines, Baton Rouge, and New Orleans each have single elevators that handle soybeans by barge.

Exhibit 46: Estimated Modal Splits for Export Soybeans

2010 Foreign Exports of Soybeans - Tons		Estimated Inbound Modal Shares**			
		Barge Share	Barge Tons	Rail Share	Rail Tons
Mobile Customs District					
MOBILE HARBOR, AL	1,086,000	0%	0	93%	1,009,980
Mobile District Subtotal	1,086,000	0%	0	93%	1009980
New Orleans Customs District					
PORT OF SOUTH LOUISIANA (LA)	20,220,000	50%	10,110,000	50%	10,110,000
PORT OF PLAQUEMINES, LA	2,324,000	100%	2,324,000	0%	-
PORT OF NEW ORLEANS, LA	2,256,000	95%	2,143,200	5%	112,800
PORT OF BATON ROUGE, LA*	527,000	85%	447,950	0%	-
New Orleans District Subtotal	25,327,000	59%	15,025,150	40%	10,222,800
Portland Customs District					
PORT OF PORTLAND, OR	907,000	0%	-	100%	907,000
PORT OF VANCOUVER, WA	-	0%	-	100%	-
PORT OF KALAMA, WA	6,162,000	0%	-	100%	6,162,000
PORT OF LONGVIEW, WA	-	0%	-	100%	-
OREGON SLOUGH (NORTH PORTLAND	-	0%	-	100%	-
Portland District Subtotal	7,069,000	0%	-	100%	7,069,000
Total	**33,482,000**	**45%**	**15,025,150**	**55%**	**18,301,780**

Source: 2010 USACE Manuscript Cargo Data
* Expected modal split for near-term future operations.
** Remainder is trucked in.

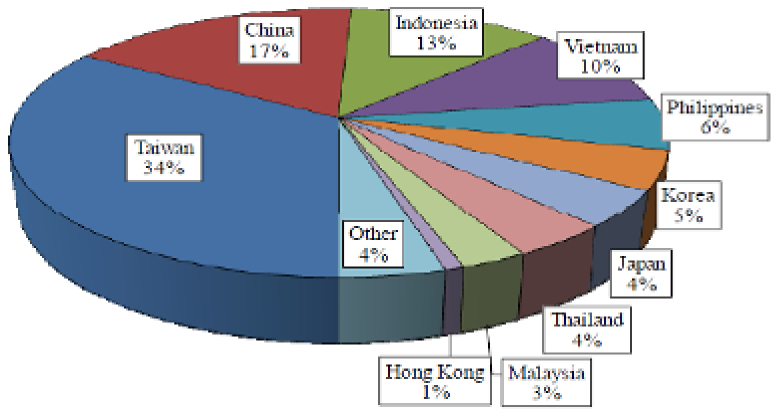
Containerized Grain

Since 2000 a new method of export grain transport has emerged. The United States imports cargo (mainly consumer goods) in approximately 12 million ocean containers each year. Many of these containers are moved from ports directly to population centers inland. A significant portion of these containers return empty – up to half in some trades.. In 2010, containers were used to transport 5 percent of total U.S. waterborne grain exports, and 7 percent of U.S. grain exports to Asia.[10] In 2011, U.S. containerized grain exports reached more than 538,000 twenty-foot equivalent units (TEU), breaking the record set in 2008 by 11 percent.[11] Grain moves by this method when and where backhaul container transportation rates compare favorably to head haul bulk shipping rates. Most containerized grain moves to Asia as illustrated in Exhibit 47.

[10] http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5098465&acct=graintransrpt

[11] http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5097736&acct=graintransrpt. USDA numbers include DDGs, animal feed, and soybean meal & flour.

Exhibit 47: Top 10 Destination Markets for U.S. Containerized Grain Exports, December 2011

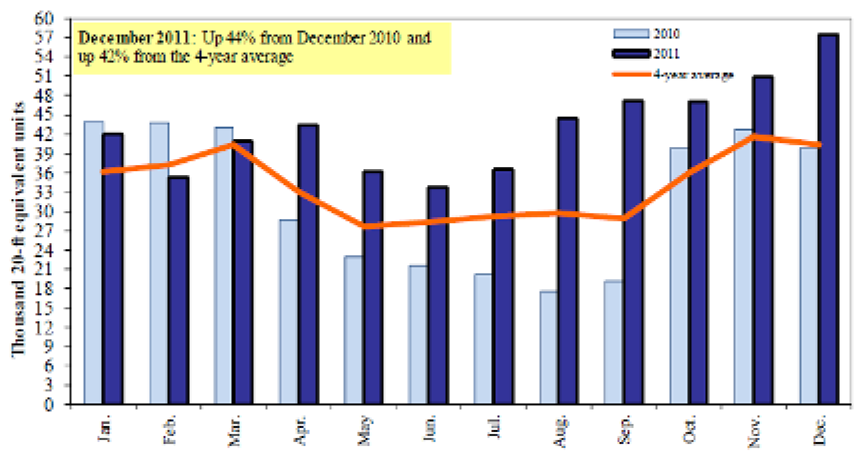


Source: USDA/Agricultural Marketing Service/Transportation Services Division analysis of Port Import Export Reporting Service (PIERS) data

Note: The following Harmonized Tariff Codes are used to calculate containerized grains movements: 100190, 100200, 100300, 100400, 100590, 100700, 110100, 230310, 110220, 110290, 120100, 230210, 230990, 230330, and 120810.

The business is volatile, as illustrated by Exhibit 48. Monthly volume in shipments to Asia over the 24 months ended in December 2011 ranged from less than 20,000 TEU to nearly 60,000 TEU.

Exhibit 48: Monthly Shipments of Containerized Grain to Asia

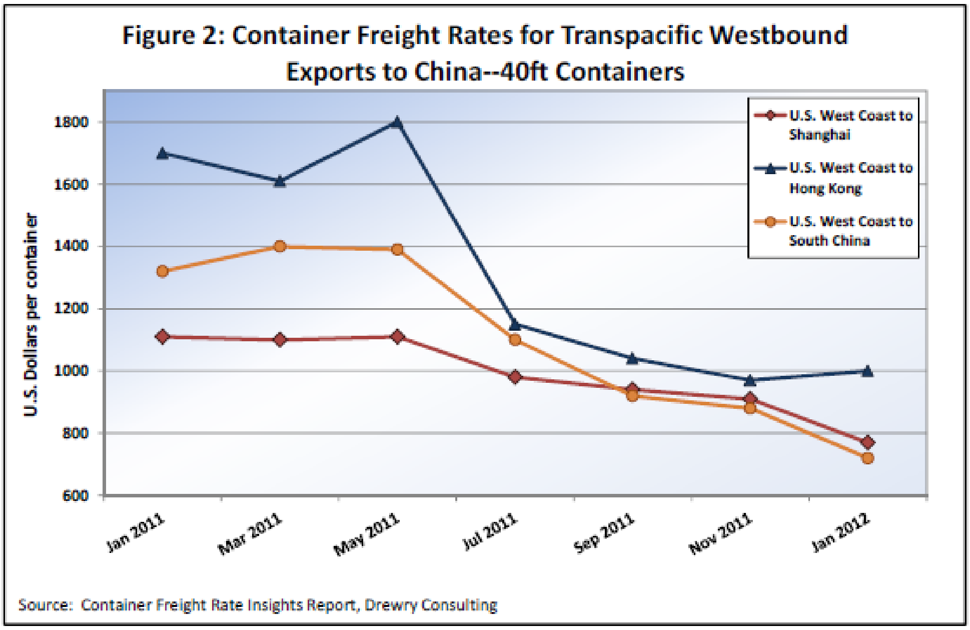


Source: USDA/Agricultural Marketing Service/Transportation Services Division analysis of Port Import Export Reporting Service (PIERS) data

Note: The following Harmonized Tariff Codes are used to calculate containerized grains movements: 100190, 100200, 100300, 100400, 100590, 100700, 110100, 230310, 110220, 110290, 120100, 230210, 230990, 230330, and 120810.

Containerized grain export works best when bulk vessel rates are unusually high or when export container rates are unusually low, as they were in 2011. Note the correlation of high export volume Exhibit 48) and the low Transpacific freight rates (Exhibit 49) in the second half of 2011.

Exhibit 49: Containerized Freight Rates for Transpacific Westbound Exports to China



Containerized shipping for grain has been most competitive in regions where grain production and large population centers are in near proximity. There is less competitive advantage in using this method in locations which add cost and time to a container's return trip. As a practical matter this means that generic grain can be most competitively loaded into containers in/near Chicago, IL.

Exhibit 50 is a table of export ports and share of corn, wheat, and soybean exports. Containerized grain is moved by rail to Los Angeles, Seattle, and New York as well as the other locations. Loadings from the San Francisco and Norfolk Customs Districts may be locally produced grains

Exhibit 50: 2011 Customs District Shares of Containerized Grain Exports

Customs District	Export Share
Los Angeles, CA	55%
Seattle, WA	15%
Norfolk, VA	10%
New York City, NY	8%
San Francisco, CA	7%

Two kinds of exceptions are noteworthy.

- Honda Motor Company assembles automobiles in Marysville, OH. It receives several thousand containers annually, which it refills with soybeans and sends back to Japan. Harmony Agricultural Products, a Honda subsidiary, farms an estimated 32,000 acres producing food-grade soybeans and 1,300 acres producing organic soybeans to fill the returning containers to Japan. Honda also developed its own soybean process plant in Marysville to control quality levels and optimize the loading of containers.

- Production of pulse crops (peas, beans, and lentils) has increased in the northern planes regions of North Dakota, Montana, and Canada as an alternative to wheat. Much of this product is "identified" and moves in containers to its final destination. This is the agricultural commodity moving in containers on the Columbia River. In addition a rail intermodal facility was opened in Minot, ND, which is on the main line of the BNSF, in 2010 to handle export pulse crops. Establishing the facility was a 10 year effort by local businessmen as well as state and local political leaders.

The lack of such services in production regions distant from large population centers has been a source of great frustration for disadvantaged producers and generated a refinement in this logistics channel. Some grain is moved in conventional rail cars to port areas in large metropolitan areas where empty containers are plentiful and transloaded into those containers at/near port. For example, this type of service is offered by the Raritan Central Railway, a shortline railroad that switches the 2,350 acre Raritan Center Business Park, which located 16 miles south of the Port of New York and New Jersey.

Two new projects using this channel variation are currently being developed in Southern California.

- The Union Pacific Railroad is develop a terminal to transfer grain and distillers dried grains (DDG) from covered hopper unit trains directly to marine containers at the railroad's Yermo, CA rail yard. Empty 40-foot marine containers moved from Union Pacific's Intermodal Container Transfer Facility in Long Beach will staged at the Yermo facility.
- Total Terminals International LLC (TTI) has proposed to build a grain export facility using 10 acres at Pier T on Terminal Island in Long Beach, CA. The facility that would transfer grain from railcars into ocean shipping containers. The project would allow for the export of 750,000 to 1.5 million tons of grain per year, utilizing existing rail and container shipping facilities. The proposed Long Beach facility is working it way thought the environmental process.

The proposed Union Pacific Yermo facility illustrates both the volatility and complexity of this market. Plans for the facility were announced in March 2011. Union Pacific shelved plans to open the Yermo facility in November 2011, citing the decline in the conventional rail grain export business.[12]

Volatility and complexity makes this portion of the grain transport business difficult to forecast, but the small market share suggests little immediate impact on inland waterway volume. In the long run, reduced bulk shipping rates from the Gulf due to the new Panama Canal locks may tend to slow the growth of containerized shipping for grain.

[12] http://www.joc.com/class-i-railroads/pushes-back-grain-terminal-opening

Implications for Export Grain

Exhibit 51 estimates base case growth in export grain tonnage by barge, in the absence of shipping cost advantages for the new Panama Canal locks. At present, only the Lower Mississippi export grain elevators are served by barge to any appreciable extent. In 2010 an estimated 28.7 million tons of grain moved to those export elevators by barge. With declining wheat exports and nearly flat soybean exports, the only expected source of significant export growth is corn. The forecast base case net increase in barge tonnage without the Panama Canal changes is just 17% over the next ten years.

Exhibit 51: Base Case Growth in Export Grain by Barge

Commodity	2010 Barge Tonnage	USDA Growth Rate	2020 Barge Tonnage	% Change
Wheat	3,475,050	-3.5%	2,425,605	-30%
Corn	20,242,000	2.8%	26,757,665	32%
Soybeans	15,025,150	0.7%	16,063,473	7%
Total	**38,742,200**	**1.6%**	**45,246,743**	**17%**

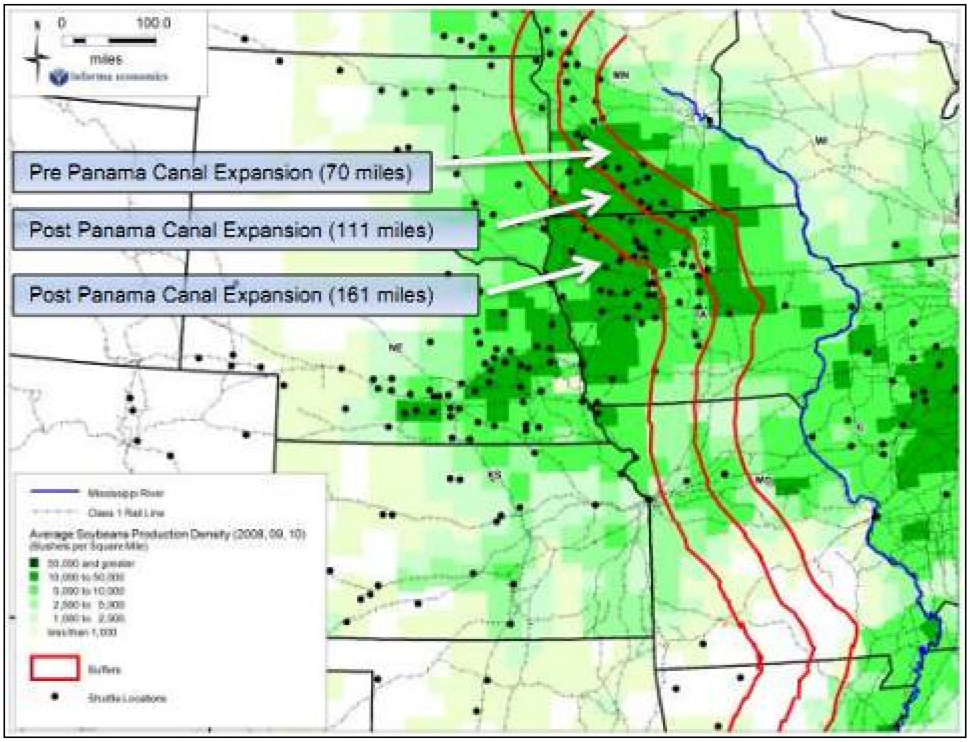
Export wheat is the least likely grain to impact the inland waterway system. Only 15% of U.S. wheat exports move through Lower Mississippi ports, and wheat exports are expected to decline.

Increasing corn trade volume with Asia will result in growth at New Orleans Customs District ports, and the improvements in the Panama Canal should give those ports a potential share advantage.

There is minimal growth expected in soybean exports, in part due to intense competition from Brazil. Brazilian exporters will also benefit from Panama Canal improvements as they continue to penetrate Asian markets.

The informa report concludes that the effect of the lower post-expansion Panama Canal shipping costs will be to expand the barge-competitive market area at the expense of the railroads. The extent of that expansion will depend on how much cost savings are achieved and how much of those savings are passed on to shippers. As shown in Exhibit 52, the informa analysis indicates that before the Canal expansion a farmer 70 miles from the waterway would be indifferent between moving via rail to the PNW and moving via barge to the Gulf. If the Canal expansion allows Gulf ports to increase loads from 56,700 metric tonnes to 63,700 metric tonnes (informa report Table 40), the line of indifference would move out to 111 miles and farmers within that distance would find the Gulf advantageous. This scenario is roughly equivalent to using fully loaded Panamax vessels, as discussed above. If the load can be raised to 70,000 metric tonnes (e.g. s a small Capesize vessel), the indifference line would move out to 161 miles.

Exhibit 52: Lines of Indifference - Gulf vs. PNW Export Costs



Source: informa report, Figure 45

The informa analysis did not estimate the additional tonnage that might move via barge. The informa market width expansion from a 70-mile line to a 111-mile line implies a 56% increase in market area. If that 56% increase is applied to the figures in Exhibit 51, the result would be the sustainably higher barge tonnage "high growth case" shown in Exhibit 53. Instead of the 17% increase shown in Exhibit 51, there would be an 82% increase over the next decade. The equivalent average annual compound growth rate would be 6.2%.

Exhibit 53: Expanded Barge Market - High Growth Case

Commodity	2010 Barge Tonnage	USDA Growth Rate	informa Market Expansion	2020 Barge Tonnage	% Change
Wheat	3,475,050	-3.5%	56.0%	3,783,943	9%
Corn	20,242,000	2.8%	56.0%	41,741,958	106%
Soybeans	15,025,150	0.7%	56.0%	25,059,018	67%
Total	**38,742,200**	**1.6%**		**70,584,920**	**82%**

The report noted that railroads may have to lower their rates to keep the traffic thus exposed to barge competition. The informa analysis also did not apparently consider the option of rail to the Gulf ports (e.g. the Port of South Louisiana).These observation suggest that the shifts may not be as marked as Exhibit 53 might suggest.

The most likely outcome would be somewhere between the 2020 base case scenario shown in Exhibit 51 (17% tonnage growth for barge) and the high-growth case in Exhibit 53 (82% tonnage growth).

IV. Iron Ore

World Iron Ore Supply and Demand

Iron ore is the only source of primary iron for the iron and steel industries. The main forms of iron ore are magnetite and hematite. High-grade iron ore may be sold as run-of-mine (ROM) ore, while lower-grade ore (most U.S. production) is typically concentrated as pellets or nuggets. About 50 different countries produce iron ore, but the top seven account for 75% of the total. Australia and Brazil are the dominant iron ore exporters; the U.S. is a small player in the trade.

Iron ore is used almost exclusively in steelmaking. Most U.S. iron ore is used in domestic and Canadian steel production. Approximately two thirds of U.S. iron ore import and export trade is with Canada.[13] U.S. and Canadian iron ore producers and consumers tend to buy and ship ore based on delivered cost, irrespective of national boundaries. In 2009 for example, Canada accounted for 78% of U.S. exports and 81% of U.S. imports (USGS Mineral Yearbook, 2009), U.S.-Canada iron ore trade moves mostly over the Great Lakes by water, but some moves by rail as well.

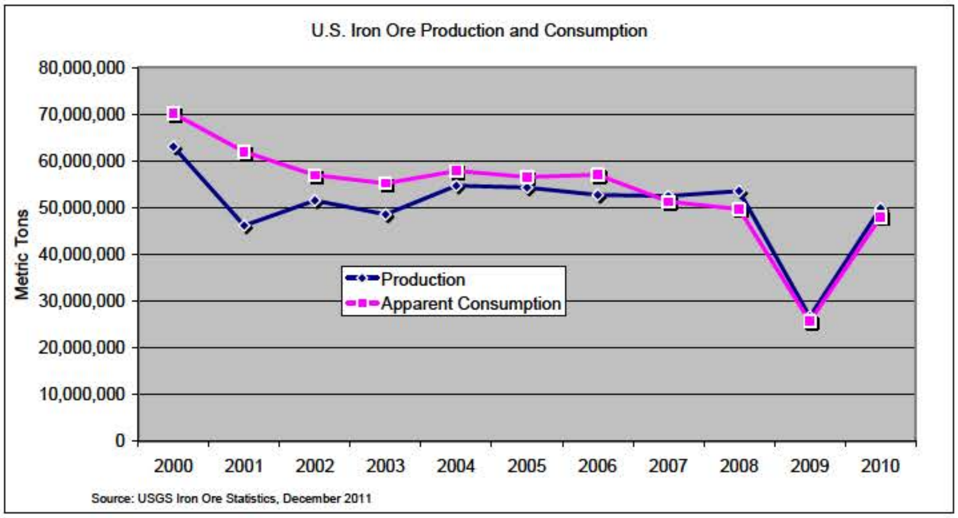
For the rest of the world, China is the primary driver of the international iron ore industry. China produced 60% of the global pig iron total, produced 44% of the world's raw steel, and consumed almost 60% of the world's iron ore exports. China is the second leading receiver of U.S. iron ore. Roughly 39% of this ore came over the Great Lakes. Exports to China leave though the Great Lakes (Cleveland and Minneapolis Customs Districts), the Gulf (Mobile and New Orleans), and the West Coast (San Francisco and Los Angeles Customs Districts). All of the U.S. ore exported through the Gulf and West Coast ports finds its way to China.

U.S. Iron Ore Export Outlook

Exhibit 54 shows U.S. production and consumption of iron ore since 2000. U.S. steel production has declined, as shown in the chart, while iron ore production has stayed relatively level except in recession years (e.g. 2001 and 2009).

[13] http://minerals.usgs.gov/minerals/pubs/commodity/iron_ore/mcs-2012-feore.pdf

Exhibit 54: U.S. Iron Ore Production and Consumption



The U.S. both imports and exports iron ore (Exhibit 55). The softening of demand for steelmaking has resulted in declining imports. In the same timeframe, rising demand for iron ore in China led to greater iron ore exports, starting in about 2005 but interrupted by the recession in 2009. About 19% of U.S. production was exported in 2011.

Exhibit 55: U.S. Iron Ore Imports and Exports

The United States exported 10 MMT and imported 5 MMT of iron ore in 2011. Exhibit 56 shows that Canada received 69% of U.S. exports by value, China 20%, and Europe and the U.K. 10%.

Exhibit 56: Destination of 2011 U.S. Iron Ore Exports by Value

Destination	Value	Share
Canada*	920,706,251	69.1%
China	270,780,268	20.3%
Europe & UK	133,381,745	10.0%
Mexico*	5,853,199	0.4%
South America	1,225,071	0.1%
Other	321,888	0.0%
Total	**1,332,268,422**	**100.0%**

*Includes overland tonnage

Source: U.S. Census Bureau trade data

U.S. Export Iron Ore Terminals and Routes

As Exhibit 57 shows, the Great Lakes ports accounted for virtually all waterborne iron ore exports until 2010. The Lakes trade includes waterborne shipments both ways between the U.S. and Canada, and U.S. overseas exports. Gulf ports began to play a role in 2008, and in 2011 accounted for about 11% of export tons. (Exhibit 58) West Coast ports began to handle significant volumes of export iron ore in 2010 after production began in Utah, and in 2011 accounted for 16% of U.S. export tonnage. The West Coast ports are served by rail.

Exhibit 57: Iron Ore Export Tonnage by Coast

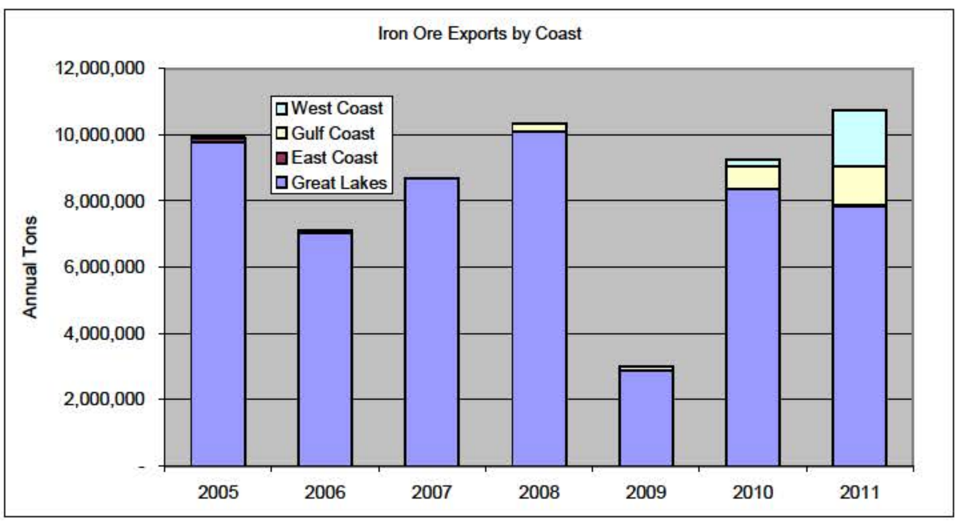
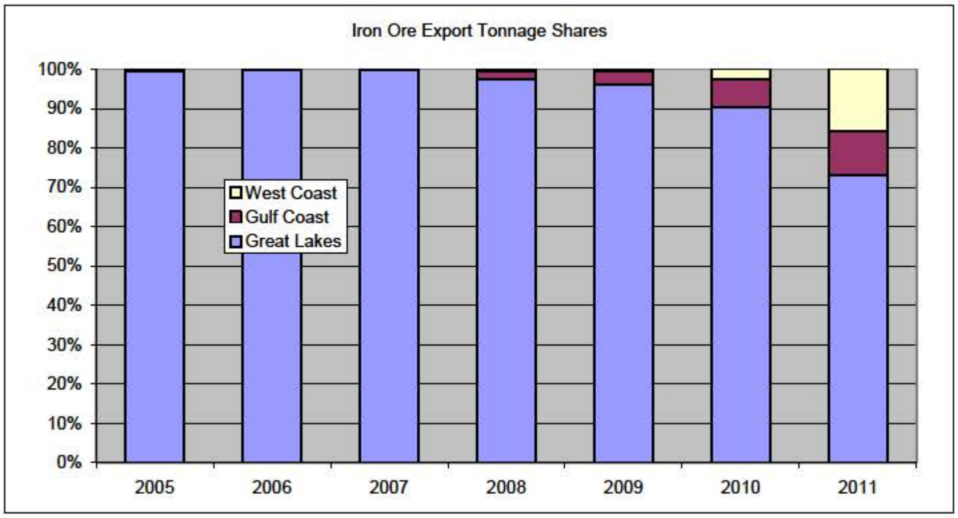


Exhibit 58: Iron Ore Export Shares by Coast



As Exhibit 59 shows, about 60% of the *waterborne* tonnage goes to Canada across the Great Lakes. The exports to Mexico and a significant portion of the exports to Canada move overland, by rail.

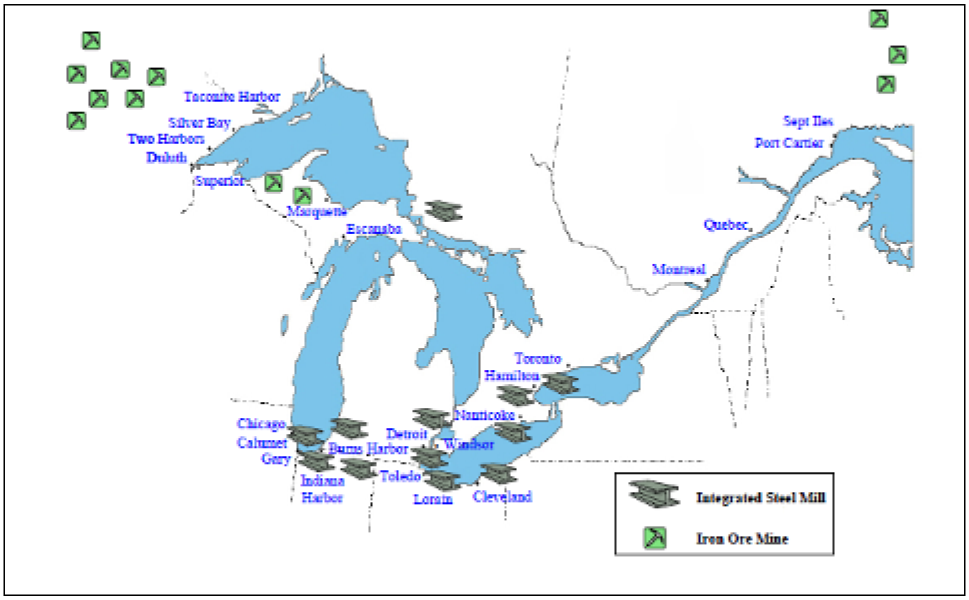
Exhibit 59: 2011 U.S. Waterborne Iron Ore Exports by Tons

Destination	Tons	Share
Canada	5,825,602	59.7%
China	3,159,447	32.4%
Europe & UK	746,517	7.7%
Mexico	-	0.0%
South America	17,120	0.2%
Other	3,735	0.0%
Total	**9,752,421**	**100.0%**

Source: U.S. Census Bureau trade data

The Great Lakes is the key waterway system supporting both domestic and export flows. Exhibit 60 illustrates how the Great Lakes system connects ore production and consumption in the two countries. Iron ore is the most important commodity carried on the Great Lakes, followed by coal and limestone.

Exhibit 60: Great Lake Iron Ore Mines and Lakeside Steel Mills

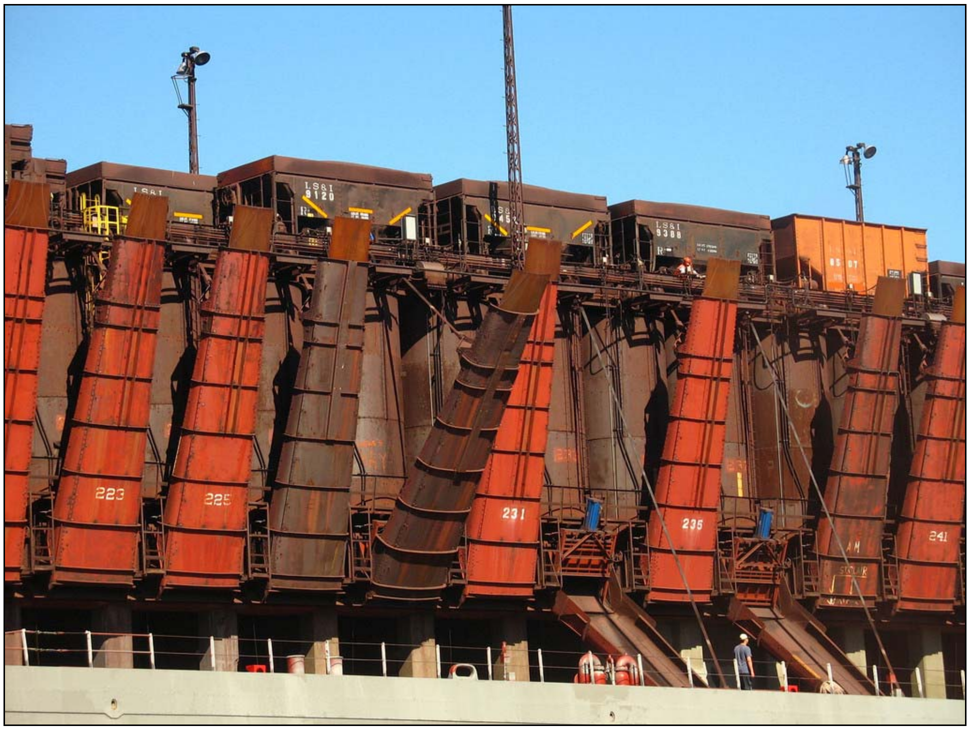


Export ore is loaded into Lakes "ore boats" at massive ore docks such as the one shown in Exhibit 61. As shown in Exhibit 62, ore can be transferred directly from rail cars or from stockpiles. Modern ore boats are typically self-unloading via conveyor.

Exhibit 61: Great Lakes Iron Ore Dock

Source: Cliffs Natural Resources, /www.cliffsnaturalresources.com/EN/NewsCenter/MediaResources/Pages/ImageLibrary.aspx

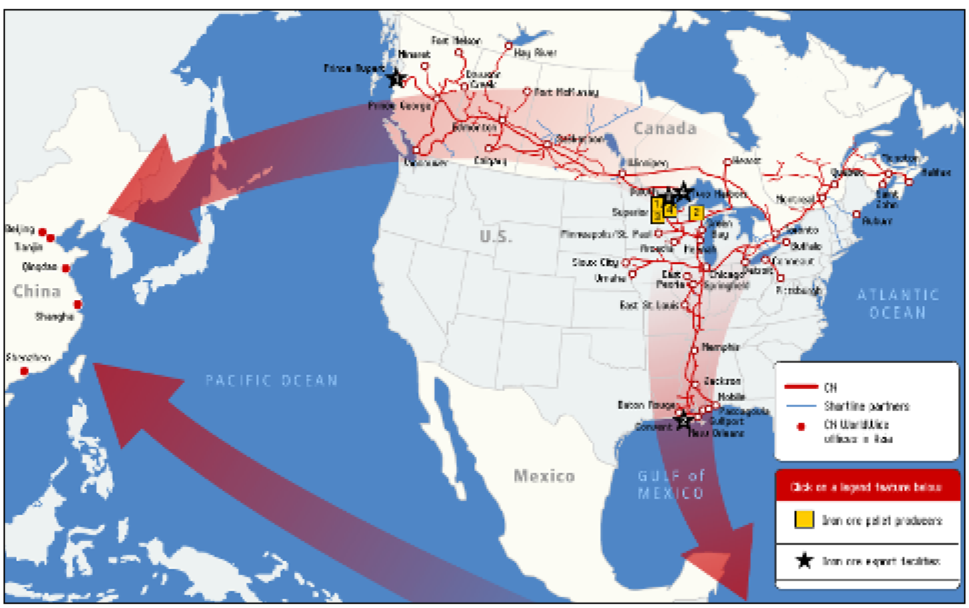
Exhibit 62: Ore Cars on Great Lakes Export Dock



Source: www.bmwoa.org, 5/24/12

As shown in Exhibit 63, the U.S. and Canadian rail system provides alternative export routes for U.S. and Canadian iron ore through Gulf and West Coast ports.

Exhibit 63: CN Ore Export Routes



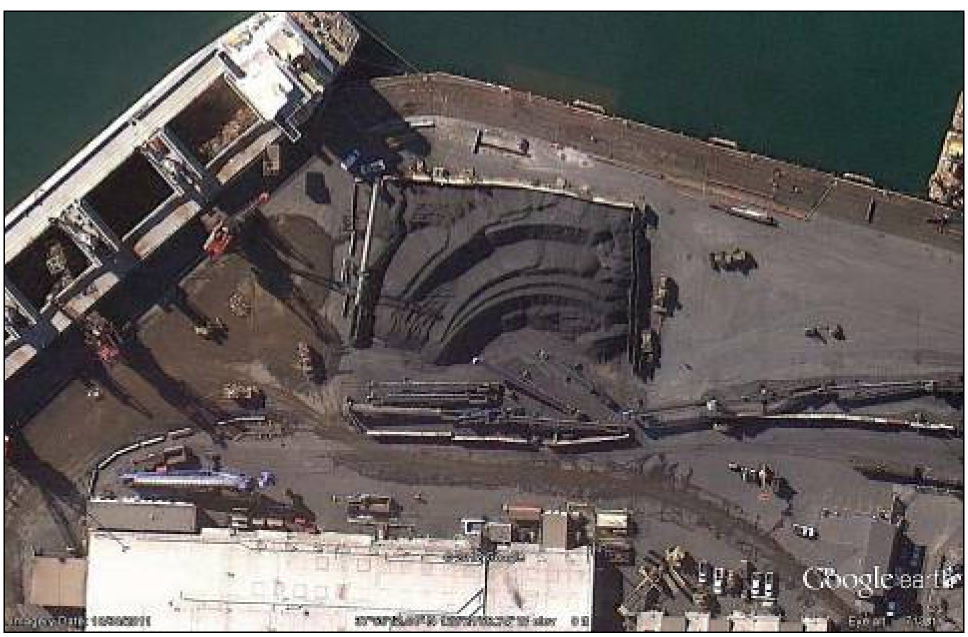
Source: http://www.cn.ca/en/shipping-map-iron-ore-pellet-producers.htm#

At the Ports of Mobile and South Louisiana, iron ore arrives by rail and is transferred to ocean going vessels at dry bulk terminals.

Northern California dry bulk ports have become major export terminals for iron ore originating in Utah and destined for China. At present, outbound vessels are loaded with approximately 30,000 metric tons at the Port of Stockton (Exhibit 64), then topped off with an additional 8,000 metric tons at Levin Richmond Terminal on San Francisco Bay near Richmond (Exhibit 65). The split of tonnage between the two ports has varied, and will continue to vary with the exporter's strategy. The Port of Stockton is currently draft-constrained, and cannot fully load the outbound vessel. Levin Richmond Terminal is space-constrained and cannot store enough iron ore or stage enough rail cars to fill the vessel. Both ports are served by rail.

Exhibit 64: Port of Stockton Iron Ore Export Terminal

Exhibit 65: Levin Richmond Terminal Iron Ore Exports



Iron Ore Production Regions and Line Haul Options

The U.S. enjoys only 3% of the world's ore reserves (by iron content) and depleted its high grade iron ore several decades ago. Most current U.S. production is low-grade taconite, which contains 25% to 30% iron content as finely dispersed magnetite. Taconite is concentrated before shipment by grinding it into powder, separating the magnetite with magnets, and binding the magnetite into pellets (photo).

U.S. iron ore production has long been dominated by Minnesota and Michigan. In 2009, 69% of U.S. production came from 6 mines in Minnesota's Mesabi Range, and 31% from 2 mines in Michigan's Marquette Range. Export shipments from these mines move three ways:

- By Great Lakes "ore boats" to Canadian terminals
- By ocean-going vessel to overseas customers
- By rail to Canadian customers or Gulf Coast export terminals

Based on available USACE statistics, the Gulf export terminals are fed by rail rather than by barge (Exhibit 66). There appear to be no significant inland waterway movements of iron ore for export, as the waterborne shipment data only show outbound (foreign export) tonnage.

Exhibit 66: Modal Shares of Iron Ore Exports at Waterway Ports

2010 Foreign Exports of Iron Ore - Tons		Est. Inbound Barge Share	Est. Inbound Barge Tons	Est. Inbound Rail Share	Est. Inbound Rail Tons
Mobile Customs District			**Modal Split**		
MOBILE HARBOR	87,000	0%		100%	87,000
Mobile District Subtotal	87,000				87,000
New Orleans Customs District					
PORT OF SOUTH LOUISIANA	579,000	0%	-	100%	579,000
PORT OF PLAQUEMINES	-	0%	-	0%	-
PORT OF NEW ORLEANS	-	0%	-	0%	-
PORT OF BATON ROUGE	-	0%	-	0%	-
New Orleans District Subtotal	579,000	0%	-	100%	579,000
Total*	**666,000**				**666,000**

Source: 2010 USACE Manuscript Cargo Data
* Pacfic port total is all rail as well.

The remainder comes from smaller mines in other regions of the country. The most important of these is the Comstock/Mountain Lion mine in Utah (Exhibit 67) which was reopened in 2008, and ships by rail to West Coast ports.

Exhibit 67: Utah Iron Ore Production Site

Implications for Export Iron Ore

The major source of growth in U.S. iron ore exports is expected to be demand from China. China's imports are not expected to rise as dramatically in the next decade as they have in the recent past:

- The Australian Bureau of Resources and Energy expects China's imports to rise at an annual average rate of 5 per cent over the next five years to reach 854m tonnes in 2017, with Australia remaining its dominant supplier. (Financial Times, ft.com, accessed 5/23/12)

- A BHP Bulliton spokesman forecast that China's iron ore demand would grow at about 3% annually to 2025. (Financial Times, ft.com, accessed 5/23/12) BHP was nonetheless increasing production.

Moreover, the U.S. is a minority supplier to China, with Brazil and Australia dominant. Thus, which percentage growth in U.S. exports to Chain may be substantial, the absolute tonnages are likely to remain small on the world scale.

The multiphase "Mesabi Nugget" project is underway currently in northern Minnesota. The first step in this larger industrial development is facility for the production of high-purity pig iron nuggets using an new, innovative direct-reduction process. Kobe Steel has developed and licensed the new technology for production of the high iron content nuggets. Kobe owns 19% of the project. The plant was completed in the fourth quarter of 2009 and has been in operation since. If successful this technology would, at favorable cost, provide nuggets to steel mills as a replacement for purchased pig iron and increase the competitiveness of U.S. iron ore.

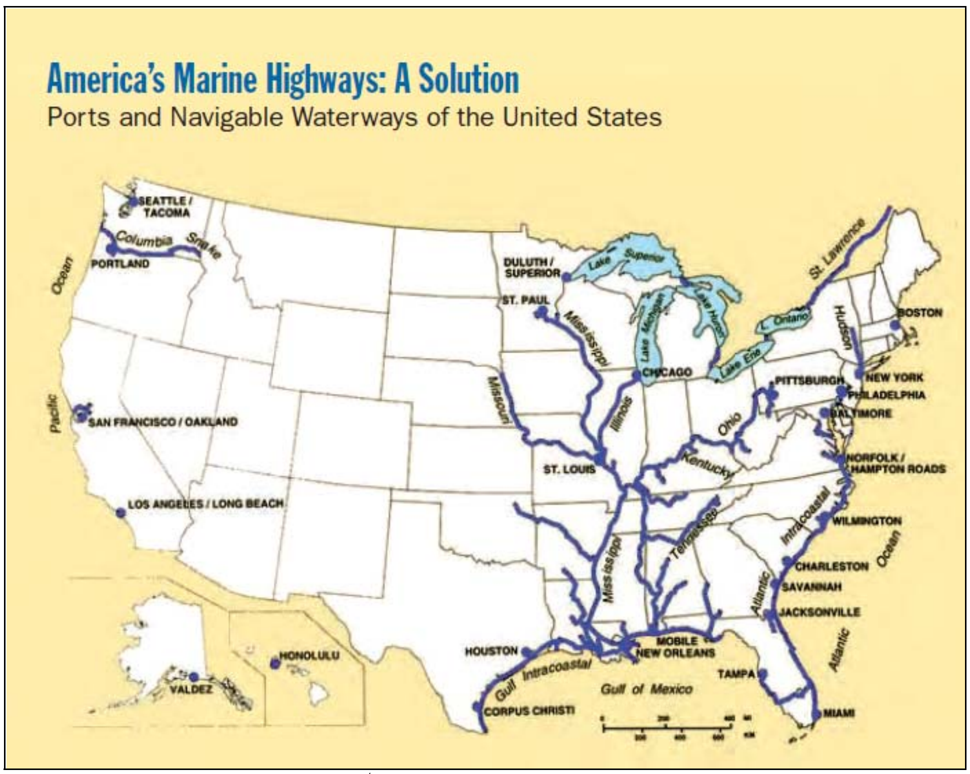
The new Panama Canal locks would allow for greater iron ore export sailing drafts from Gulf ports, as they would for coal or grain, thus reducing unit shipping costs. However, the new Panama Canal locks may give a much greater advantage to Brazilian deep-draft ports, and actually diminish the net competitive position of U.S. exports to China through the Gulf or via the St. Lawrence Seaway from the Great Lakes ports.

V. Containers on Barge

Background

With the onset and growth of U.S. international and domestic containerization over the past 30 years there has been great interest in increasing the use of container on barge (COB) operations on U.S. navigable waterways to handle container movements. The U.S. ports and navigable waterway network has been referred to as America's Marine Highways by the U.S. Department of Transportation, Maritime Administration (MARAD). This network of ports and navigable waterways, shown in Exhibit 68, provides the available route structure for container on barge services.

Exhibit 68: America's Marine Highway System



Source: MARAD "A Vision for the 21st Century" November 2007

The primary components of the inland waterway freight network include the Mississippi River System, the Ohio River System, the Gulf Intracoastal Waterway (GIWW) and the Columbia/ Snake River System. Together these four systems handled 91% of Inland waterway tonnage.[14] The Mississippi River System includes 9000 miles of navigable waterway. This includes the main stem which runs 1800 miles from Minneapolis, MN, to New Orleans, LA along with the

[14] A Modal Comparison of Domestic Freight Transportation Effects on the General Public, Texas Transportation Institute, December 2007 Amended March 2009, page 3

Illinois, Missouri and Ohio Rivers which flow into the Mississippi. The Ohio River System runs from Pittsburg, PA to Cairo, IL, and contains 2800 miles of navigable waterway. The GIWW contains 1109 miles of navigable waterway and the Columbia/Snake system includes 596 miles of navigable waterway. Overall the total inland waterway system is nearly 12,000 miles. [15]

Container on Barge Equipment and Operations

Container on barge operators use a variety of hopper and deck barges for transporting containers. A common hopper or box barge used on the inland waterway for moving containers has outside dimensions of 195' X 35' and has capacity of 1500 tons at a 9 foot draft. The inside dimensions for container loading are about 180' X 28'. This barge can load 27 twenty foot equivalent (TEU) of containers in each layer (3 across and 9 in length). Containers can be loaded 3 layers high providing capacity of 81 TEU. However, due to stability issues, the top layer can only take empties or lightly loaded containers. Twenty and forty foot containers can be mixed together in the consist, subject to 1500 ton capacity. Containers can be loaded to their full carrying capacity of 30 tons providing they are not subject to highway overweight limitations. If the consist or makeup of containers in the barge is all 20 footers weighing 32 tons gross weight the barge can carry 46 containers in two layers before reaching its gross weight. Exhibit 69 shows a two barge tow loaded with containers exiting the Port Allen Lock in Louisiana.

Exhibit 69: Containers Loaded in a Standard Hopper Barges

Source: Osprey Lines presentation, Inland Rivers Ports and Terminals meeting, Baton Rouge, LA, January 28, 2005

[15] An Overview of the U.S. Inland Waterway System, Institute for Water Resources, U.S. Army Corps of Engineers, IWR Report 05-NRTS-R-12, November, 2005

Barge operators will utilize different size barges to fit their operations. One carrier on the Columbia Snake River system utilizes hopper barges that measure 240’ to 280’ in length and 42’ wide with capacity of 3000 tons at 13.5 foot draft. These barges can load about 40 TEU per layer and stack 4 to 5 layers high for a total capacity of 160 to 200 TEU subject to the 3000 ton capacity limit. This barge could handle 93 twenty foot containers loaded to 32 tons gross weight before reaching its capacity limit. Another operator running between the ports of Norfolk and Baltimore utilizes an ocean going deck barge measuring 393’ X 86’ with 10,257 ton capacity at 16 feet 8 inch draft. This barge will load 185 TEU on the first layer and stack five high for a stated capacity of 912 TEU. Exhibit 70 provides a photo of the ocean going deck barge Columbia Elizabeth.

Container on barge towing operations will run from one tug and one barge moving point to point as with the ocean going barge shown in Exhibit 70 to multi barge tows which include container barges integrated into a group of barges or large flotilla of barges. (See Exhibit 71)

Exhibit 70: Ocean Going Deck Barge - Columbia Elizabeth

Source: Ship Spotting website http://www.shipspotting.com/gallery/photo.php?lid=1421989 accessed April 10, 2012

Exhibit 71: Seven Barge Tow with One Container Barge

Source: Tidewater Barge Website http://www.tidewater.com/transport.php, 4/10/2012

Loading and unloading container barges requires a terminal with lift equipment at origin and destination. In virtually all cases the origin and/or destination of a COB service is a container port. In most cases the container movements are export and must originate at an inland waterway container terminal. The container ports use the same overhead gantry cranes to load and unload barges as are used for container ships. Skilled operators can make about 30 container moves per hour using these specialized container cranes. The most common inland waterway cranes are mobile lattice boom cranes or "stick" cranes. These cranes move on crawler belts or rubber tires and are commonly used in handling general cargo. Skilled operators can make about 15 moves per hour using this equipment. Exhibit 72 shows these cranes in operation at a container terminal.

Exhibit 72: Crawler and Rubber Tire Mobile Lattice Boom Harbor Cranes

Source: Osprey Lines presentation, Inland Rivers Ports and Terminals meeting, Baton Rouge, LA, January 28, 2005

Another type of terminal equipment is the reach stacker. This type equipment is used in marine container terminals and railroad intermodal terminals to stack containers and load containers to rail cars. This type of equipment is generally not available at inland barge terminals because of its specialized use in handling containers. However, there has been one application for this equipment at the Osprey Lines Port Allen container terminal. This equipment has now been relocated to the Baytown, TX, barge terminal operated by Couch Lines. Exhibit 73 shows two reach stackers in operation at the Port Allen terminal. One of them is stacking containers in the yard and the other is loading a container into a barge.

Exhibit 73: Reach Stackers in Service at COB Terminal, Port Allen, LA

Source: Osprey Lines presentation, Inland Rivers Ports and Terminals meeting, Baton Rouge, LA, January 28, 2005

Inland waterway container terminals can be established at any waterway ports that handle general waterway barge cargo. Depending on volume the terminal will require at least 5 acres of storage area for containers and chassis and a barge dock. Exhibit 74 provides an aerial view of the Baytown, TX, barge terminal operated by Couch lines. The exhibit shows two barges with containers, containers in ground storage and the entrance gate. This facility loads general cargo and containers. The active terminal area is about 8 acres. The terminal is equipped with a 300 ton P&H mobile harbor crane and a Fantuzzi reach stacker (relocated from Port Allen, LA).

Exhibit 74: Baytown, TX, Barge Terminal - General Cargo and Containers

Source: Google Earth accessed April 10, 2012

Container on Barge Markets

Container on barge operators can provide services in some of the the same markets that highway and rail intermodal carriers serve. At a very high level there are domestic markets, and import or export markets. With domestic markets origin and destination drayage is necessary to move containers between the actual origin or destination and the waterway terminal. This drayage connection adds cost and complexity to the barge/highway intermodal move unless, in limited cases, the actual origin or destination is a waterway terminal. In addition, the standard highway vehicle is a motor carrier supplied 53 foot trailer. Rail domestic services have become competitive with highway by utilizing 53 foot domestic containers supplied by the rail carrier or a third party rail intermodal marketing company.

With import or export markets, one end of the move will be the ocean carrier's container terminal where the barge can be loaded or unloaded directly at the pier. This eliminates one of the drayage moves that is associated with domestic movements. It also allows the movement of heavily loaded containers by barge that would otherwise be overweight for highway transport. Container on barge transportation is most competitive for import and export markets, especially for heavy loading products. These markets utilize ocean carrier supplied 20 foot and 40 foot ocean containers. Use of ocean carrier containers relieves the barge operator of any responsibility for providing and managing container equipment.

A subset of the import and export markets is known as ocean carrier relay service. In this market the ocean carrier is the customer and uses container on barge as a relay service from a hub port to a satellite port. An example is Norfolk to Baltimore where the ocean carrier vessels call at a Norfolk hub port but give the customer a Baltimore bill of lading. In this example, the ocean carrier is obligated to deliver the container to the Baltimore container terminal and utilizes container on barge relay service to make the connection to Baltimore. Container on barge is very competitive for these moves as it is direct water terminal to water terminal movement with no drayage.

It is also important to note that the container on barge origins and destinations are obviously limited to the waterway or “marine highway” network shown in Exhibit 68. Although, this network serves many population centers and container ports, it is predominantly a north south network on the Mississippi River System with direct connection to the Gulf Intracoastal Waterway. The primary container ports are Houston, New Orleans and Mobile. Although all of the East Coast ports are accessible to barge service there is very little waterway network connectivity to U.S. inland markets. Similarly, with the exception of the Columbia/Snake River System which connects to the Port of Portland, there is very little waterway connectivity to inland markets from U.S. West Coast ports.

Container on Barge Services

Tidewater Barge Lines, Columbia / Snake Rivers

There are relatively few COB services operating in the U.S. today. One of the first container on barge operations in the U.S. started in the 1980’s on the Columbia Snake River system with Tidewater Barge Lines. This service primarily handles heavy loading export containers of agricultural products and lumber in barge service from Lewiston, ID, and Boardman, OR, to the Port of Portland. Virtually all of Tidewater’s business is export. At Lewiston Tidewater handles peas and lentils which load to 24 tons in a 20 foot container. At Boardman, OR, Tidewater handles hay and hay pellets, frozen potatoes, and lumber all heavy loading commodities. Compressed hay loads to 27 tons and hay pellets load to 30 tons in a 40 foot container. 30 tons is the maximum loading capacity for 20 and 40 foot containers. Total annual volume from both origins is about 7200 TEU plus the move of empty containers into Lewiston and Boardman.

Tidewater offers a weekly service to Portland and has integrated its container moves into its regular barge operation which mostly handles bulk commodities. Tidewater continuously operates between 5 and 12 tugboats on the river system which allows it to handle container barges in a weekly scheduled service. One container barge generally moves in a 4 barge tow along with three other barges of bulk commodities. Tidewater barges unload at Portland’s Terminal 6 container terminal each Friday and pick up empties for the return move. There are eight locks on the river between Lewiston and Portland and the round trip takes 5 days.

Tidewater container barges measure 240 to 280 feet by 42 feet and have capacity for 160 to 200 TEU subject to a 3000 ton capacity limit. As an example, a recent load out of Lewiston had 88 20 foot containers and 19 40 foot containers (total 126 TEU) and the load reached the barge capacity load limit of 3000 tons. Tidewater also has two barges equipped with generators and reefer plugs enabling it to handle the frozen potato moves.

Current volume is down by over 50% when several major carriers stopped calling Portland and shifted their port of call to Seattle or Tacoma. Export rates from Seattle and Tacoma to Japan run $400 to $800 lower than from Portland causing shippers to move their exports to Japan over those ports. Tidewater had been handling 2000 to 3000 40 foot container shipments from Pasco, WA. There is no volume from Pasco today. At its peak in 1999 and 2000 Pasco handled about 20,000 loads or about 29,000 TEU.

Tidewater also has a rather unique movement of compressed solid waste from Vancouver, WA, to Boardman, OR. The move runs in specialized containers which load to 30 or 31 tons. Annual volume runs 8,000 to 10,000 loads.[16]

Tidewater has taken competitive advantage of container on barge heavy loading capability on export shipments of relatively low value. These loads would require overweight permits to move on the highway. In addition, Tidewater offers a service advantage by being able to handle a large number of loads in one shipment with direct delivery to the port. These advantages along with the reliable weekly service outweigh the transit time disability of barge service relative to a highway move. There is no intermodal service in these lanes. Another key factor is Tidewater's ability to integrate its container service into is bulk barge operation. It is doubtful that Tidewater's export container business would be economically viable as a standalone business.

Osprey Line, Mississippi River and Gulf Intracoastal Waterway

Osprey Lines was established in March, 2000, to handle ocean carrier relay business between the container ports of Houston and New Orleans for Maersk Lines. This service used a 630 TEU ocean going barge. In 2005 Osprey had expanded its container on barge operation and was offering scheduled Memphis-New Orleans-Houston service and a Baton Rouge-New Orleans service. There were also service to ports along the GIWW and a service to Chicago was advertised. The Chicago service was apparently used to reposition empty containers. Osprey also operated a 248 TEU coastal freighter in a Houston-New Orleans-Tampa service.

The Osprey Memphis service primarily handles export products to New Orleans and Houston. A key product was export bailed cotton which loaded to 25 tons in a 40 foot container. One advantage of the COB service was that the ocean carriers provided a Memphis origin bill of lading for export shipments to Asia. This allowed the cotton shippers to get paid when the shipments left Memphis improving cash flow. Osprey used a jumbo hopper barge measuring 50' by 300'. It had a capacity of 210 TEU and about 3500 tons. Osprey used Fullen Dock and Warehouse Company for it Memphis terminal. Fullen operates a 400 foot floating dock to handle containers. The dock moves up and down with the Mississippi river level. It was equipped with a 250 ton capacity crawler crane for loading general cargo and containers. Experienced operators could load up to 15 containers per hour[17].

The Osprey Baton Rouge – New Orleans service handled export plastic pellets which were loaded in sacks. Osprey had a rail served terminal at Port Allen, LA. The plastic came in by rail and was transferred sacks, palletized and loaded into 40 foot containers. Containers loaded to about 25 tons which would be overweight on the highway. The containers were loaded into standard hopper barges with 81 TEU and 1500 ton capacity. Osprey would load 24 40'containers of pellets into the barges, and then run a 4 barge tow to New Orleans for export. In 2004 Osprey handled 173 barges and about 10,000 TEU in a weekly service from Baton Rouge to New Orleans.[18] The Osprey Port Allen terminal was equipped with two reach stackers for stacking and loading containers. (See Exhibit 73). The largest reach stacker, manufactured by Fantuzzi

[16] Source: Interview with Greg Zanavich, Container Manager, Tidewater Barge Lines April 3, 2012

[17] Telephone interview with Larry Chalk, Terminal Manager, Fullen Dock and Warehouse Company, Memphis TN, April 5, 20

[18] Osprey Lines presentation, Inland Rivers Ports and Terminals meeting, Baton Rouge, LA, January 28, 2005

Equipment Company, could handle 30 tons and reach over two containers to load the bottom position of the outside row. Operators could load 20 to 30 containers per hour with the Fantuzzi reach stacker. [19]

In 2008 Osprey discontinued all of its scheduled container services as a result of the recession. Osprey volumes had dropped to the point where the services were no longer economically viable. The Memphis cotton business was lost to highway and rail. In addition, Osprey was not able to generate northbound container volume to balance their Memphis line haul barge operation. The Baton Rouge business was lost to motor carriers who were able to secure blanket overweight permits enabling them to match the Osprey load capacity. Maersk changed its vessel schedules and no longer need to Houston / New Orleans relay service. At this point Osprey will only handle containers on inducement when requested and does not have any plan to return to a scheduled service. Today, Osprey's primary business is project cargo which includes large pieces of equipment, over dimensional and overweight cargo that cannot move readily by highway or rail.

Couch Line, Gulf Intracoastal Waterway

Couch Line was started in 2009 by Rick Couch founder and former president of Osprey Lines. Couch sold Osprey Line to Kirby Corp., a bulk liquid barge carrier, in 2006. As part of the sale, Couch entered into a three year non-compete agreement. Couch operates a Baytown, TX, barge terminal which has COB capability. (See Exhibit 74). Couch Line provides GIWW barge services between Houston and Brownsville, TX, and Houston and New Orleans. The Baytown terminal acts as a satellite terminal for several Houston container carriers. Containers are tendered at Baytown for origination at a Houston container terminal. Couch Line delivers them to the Houston container terminals at Barbers Cut and Bayport to meet the ocean carriers cut off times. 24 40' containers are loaded into each standard hopper barge. Couch Line then runs two to four barge tows to the Houston container terminals. Running time to Houston is two hours. Couch Line has no scheduled container service except for the runs to the Houston container terminals. However, containers will be handled on inducement when the business is available. Couch Line is a new startup business, but Rick Couch has a great deal of ocean container and COB experience and expects to grow his container business. In 2011 Couch Line handled about 16,000 containers which would be about 22,000 TEU.

Columbia Coastal Transport, Norfolk, Baltimore, Philadelphia

Columbia Coastal Transport, established in 1990, provides U.S. flag containerized cargo feeder services linking U.S. East Coast Ports. Columbia Coastal provides COB ocean carrier relay services between the container terminals of the Port of Virginia and the Ports of Baltimore and Philadelphia. All of the business in this service is import or export containers handled for ocean carriers. Ocean carriers offer container service from or to Baltimore and Philadelphia with container ships that load and unload at the Port of Virginia. These carriers utilize Columbia Coastal to provide the relay services from and to Baltimore and Philadelphia.

[19] Telephone interview with Rick Couch, President Couch Lines, Couch Lines, La Porte, TX, April 5, 2012

Columbia coastal currently uses the Columbia Elizabeth, a 393’ by 86’ ocean going deck barge with capacity of 912 TEU and 10,267 tons (at 16 feet 8 inch draft), in this service. (See Exhibit 70.) The barge makes two round trips per week between the Port of Virginia and Baltimore and one trip per week includes Philadelphia. The service originates in Norfolk on Sunday, serves Baltimore on Monday, returns to Norfolk on Tuesday, back to Baltimore on Thursday, then Philadelphia on Friday and the cycle ends back in Norfolk on Sunday. This rotation runs each week serving NIT and APM Terminals in Norfolk and Portsmouth, VA, Seagirt Terminal in Baltimore and Packer Avenue Terminal in Philadelphia. This COB service is really an ocean barge service using deep water ship channels and not inland waterway channels.

This service is very efficient from an equipment utilization perspective. The tug and barge are fully utilized and the ocean carriers avoid a 20 hour round trip up the Chesapeake Bay to Baltimore with their containerships. The barge operation cycles both loads and empties for the ocean carriers. As heavy loading exports have been increasing, the return loads from Baltimore and Philadelphia have come close to maximum barge capacity of 10,267 tons.[20] Tioga estimates that this service handles about 1000 containers per week with between 90,000 and 100,000 TEU.

Because of the highly concentrated volume level and the nature of the port to port service requirement, the barge service appears to be far more economical than highway service. The highway route is via I-64 to Richmond and I-95 through Washington DC to Baltimore and Philadelphia. This route is very congested for motor carriers. Access to the port container terminals directly via barge eliminates all of the gate congestion and gate service hour issues that motor carriers would face. There is no rail intermodal service in these lanes. All in all this is an excellent example of a market where container on barge has the competitive advantage.

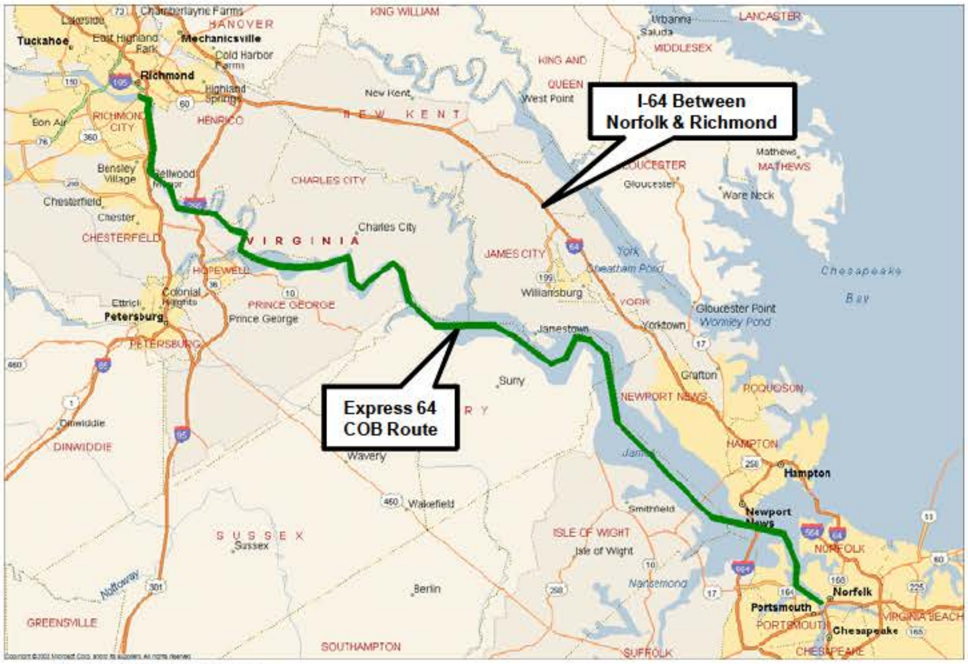
James River Barge Line, Norfolk Richmond Express 64

Express 64 is the brand name for a COB service on the James River between Port of Virginia container terminals and the Port of Richmond. It is operated by James River Barge line, a subsidiary of Norfolk Tug Company. The service started on December 1, 2008.

The service currently runs twice weekly between NIT and PMT container terminals in Norfolk and Portsmouth and the Port of Richmond Deepwater Terminal. The service departs from Norfolk on Monday and Wednesday and departs from Richmond on Tuesday and Thursday. Run time is 14 hours. Ideally, import loads arriving on Tuesday or Thursday will be available in Richmond the next day. The James River barge route parallels I -64 between Norfolk and Richmond. See Exhibit 75. The Express 64 service competes directly with motor carriers operating on I-64 between Norfolk and Richmond. I-64 is very congested as is the city of Norfolk; however, motor carrier transit time is about two hours.

[20] Telephone interview with Jim Greco, Manager Marine Operations, Columbia Coastal Transport, April 4,2012

Exhibit 75: Express 64 Route



Souce: Tioga Group

James River Barge line utilizes hopper barges that measure 260' X 52' with a capacity for 200 TEU and about 3000 tons. Express 64 handles export rolled paper and paper products, cigarettes, wood pellets, specialty logs and scrap paper. The service also handles import raw tobacco and auto parts. There is more export than import and most export loads tend to be heavy loading. Export containers can be stuffed to maximum weight capacity at the port of Richmond to avoid overweight highway loads. Mead Westvaco paper company has been a major supporter of the service and it is their projected volume which is driving a 3 day per week service that is planned to start July 1, 2012. Mediterranean Shipping Company (MSC) is also a supporter of the service. MSC is offering Richmond bills of lading and Express 64 is providing the ocean carrier relay service between Norfolk and Richmond. Current annual volume is about 7000 containers and about 12,000 TEU.

Express 64 service is not yet economically viable as a standalone operation. Express 64 started its service in 2008 with a $3.9 million Federal grant.[21] In addition $3.4 million in Marine Highway and Congestion Mitigation (CMAQ) grants have been approved for the purchase of two more barges to increase service to three trips per week.[22] In total it was reported by Virginia Port Authority (VPA) Chairman Gerry Bridges at the November 22, 2011, VPA Board meeting that "almost $17 million in subsidies have been provided for the barge service and that VPA is looking for ways to make the operation self-sustaining without subsidies"[23].

[21] Richmond Times Dispatch, "The Port of Richmond expands its horizons", article by Peter Bacque, March 5, 2012

[22] Congressional Research Service Report for Congress, "Can Marine Highways Deliver?", by John Frittelli, January 14, 2011

[23] Minutes of the November 22, 2011, Virginia Port Authority board meeting.

The economic viability of the Express 64 service is in question. It has operated for four years with government subsidy but still needs additional volume to become viable. It is anticipated that the 3 days per week service schedule will succeed in driving the needed volume. There is a combination of heavy loading export volume and MSC relay volume that represent the ideal markets for successful container on barge operations. However, without more container volume or integration with other barge traffic in the lane it is uncertain if the service can become economically viable in the long term.

Port Inland Distribution Network (PIDN) New York Albany COB Service

The Port Inland Distribution Network (PIDN) was conceived as part of a 1998 master planning effort by the Port Authority of New York and New Jersey (PA). The Comprehensive Port Improvement Plan (CPIP) evolved from a U.S. Army Corps of Engineers Harbor Navigation Study completed in December of 1999. The USACE study recognized that the existing highway infrastructure would not support the projected non-port growth in traffic. Without a mode shift away from highways, the PA would not be able to maintain its Atlantic port market share in general and its share of cargo destined to inland markets in specific. While there were environmental aspects of CPIP, the major infrastructure components of the plan included developing inland terminals, which led to the Port Inland Distribution Network (PIDN) concept.

PIDN planned to move freight directly from the port via new barge services to cities such as Albany, Providence, Camden, and Wilmington (Exhibit 76). To the extent that PIDN diverted trucks from the highway to barge or rail, it would also reduce net emissions and highway congestion. In consultation with federal officials the PIDN team determined that the Congestion Mitigation and Air Quality (CMAQ) program was the best potential source of funding. Accordingly, the team developed estimates of PIDN's congestion mitigation and air quality benefits. CMAQ ultimately provided $3.3 million for the Port of Albany for the first two years of barge service under PIDN.

Exhibit 76: Port Inland Distribution Network

Source: PANYNJ

The Albany Express Barge Service was operated by Columbia Coastal Transport, the same company that currently operates the Norfolk, Baltimore, Philadelphia COB service described earlier in this report. The Albany COB initiative provided a second- day service twice a week between Federal Marine Terminals in Albany and marine terminals in the Port of New York and New Jersey. The service used an ocean going deck barge measuring approximately 210’ by 80’ with an estimated capacity of 360 TEU. See Exhibit 77.

Exhibit 77: Albany Express Barge

Source: PANYNJ

The barge competed with motor carriers using the parallel interstate highway, I-87. The initial expectation was that ocean carriers and terminal operators would recognize economic and operational benefits of utilizing/supporting the barge service and its “free empty depot” in Albany. Ample opportunities would exist to match export loads with empty containers. Service could be priced competitively with trucks. Costs to provide service would be high but manageable. Growth would be steady and annual deficits would decline. A long-term source of operating assistance would be secured. The joint Albany/NYNJ planning team assumed that the barge service would initially capture 20% of the Albany market and 15% of the Canadian market. Share was expected to grow at 10% annually until it reached 80% of the market in twenty years.

The financial and operating assumptions, however, turned out to be overly optimistic. The actual operating experience was a much lower total volume and slower than anticipated ramp up. Total volume reached 540 loads and empties in mid 2004. The projections also assumed that only 10% of the containers would return empty, the rest being revenue loads. In fact, 100% of the containers were returned empty and little or no use was made of the Albany empty depot. Transportation costs were 50% - 75% greater than planned, primarily due to fuel surcharges. Unit stevedoring costs were 30% greater than planned due to low volumes and high premium payments for labor. Lift costs (the cost of transferring containers between barges and highway chassis) reached $200 per unit, far higher than expected.

Despite a substantial price cut the anticipated volume failed to develop, and all containers were returned empty (at no charge, and no revenue). Competing truckers cut their rates, and potential customers were reluctant to use a "demonstration" service. In 2004, the service carried 4,125 containers instead of the 8,800 forecast, and far more of the movements were non-revenue empties. Permanence was a stumbling block. While all the other reasons were important a major problem was the inability to attract major shippers and ocean carriers due to uncertainty of the barge's future. Shippers were unwilling to abandon their current carriers unless the service was certain to be available for the long term.

This service was ended after the first two years. The service captured only a small amount of cargo in part because of economics, and in part because shippers were reluctant to commit to the service knowing that it was only guaranteed for two years. Project sponsors found that truckers cut their rates to retain the business, an unanticipated consequence. Efforts to secure new funding were unsuccessful. No other barge demonstrations were begun.

COB Services In Development

Mobile to Fulton MS (Port Itawamba) COB Service

Port Itawamba, MS, is located on the Tennessee Tombigbee Waterway (TennTom), in Fulton, (Itawamba County), MS, about 295 highway miles north of Mobile. See Exhibit 78. TennTom has been designated M-65 Marine Highway Corridor by the U.S. Maritime Administration (MARAD) as it runs parallel to I-65 which runs Mobile/Birmingham/Nashville. This designation allowed the TennTom projects to qualify for MARAD project grants.

Exhibit 78: Tennessee Tombigbee Waterway Port of Mobile / Port Itawamba

Source: Tioga Group

Port Itawamba has received a Marine Highway grant of $1.76 million to acquire nine barges to establish a COB service between the Port of Mobile's container terminal and Port Itawamba. The key market expected to utilize this service is the export furniture business originating in northeast Mississippi and northwest Alabama. This business currently moves highway to Memphis then rail to west coast ports. There is also import fabric and import furniture moving over west coast ports, and export pulp, paper and chemicals moving over Mobile that can move via this service. The new service would give Mobile ocean container carriers access to a new market that currently moves via west coast ports.

The planned service is to provide a weekly round trip service between Mobile and Port Itawamba, utilizing a three barge tow of standard hopper barges. The hopper barges measure 35' by 195' and have capacity of 81 TEU and 1500 tons. See Exhibit 69. The operation would use nine barges, three in transit and three loading/unloading at both Port Itawamba and Mobile. Port Itawamba is equipped with an overhead crane which will be used to load and unload containers. The start date for the new service has not yet been determined. Additional market research is needed to develop the potential customer base. [24]

Sea Point Containership / Container on Barge Transshipment Terminal, Venice, LA

Sea Point, LLC, has been in the process of developing a containership to barge transshipment terminal near the mouth of the Mississippi River at Venice, LA, about 90 river miles from New Orleans. The concept envisions unloading container ships into barges and movement of the containers in barge tows to New Orleans for transfer to rail or highway movement beyond. The barges can also be transferred to Mississippi River barge tows or Gulf Intracoastal Waterway tows for movement to metropolitan markets along the inland waterway system like Houston, Memphis, St. Louis or Chicago.

The project envisions a highly mechanized and efficient terminal at Venice which unloads the containers and classifies them into the barges based on destination and routing. The terminal is to be located in the river supported by pilings driven into the river bottom. Containers will be sorted by rail carrier, highway delivery, or barge movement. See Exhibit 79. The plan called for a phased development with final design capacity of 912,000 TEU.

[24] Project details developed from a telephone interview with Greg Deakle, Port Director, Port Itawamba April 3, 2012.

Exhibit 79: Sea Point Terminal Venice, LA, Conceptual Drawing

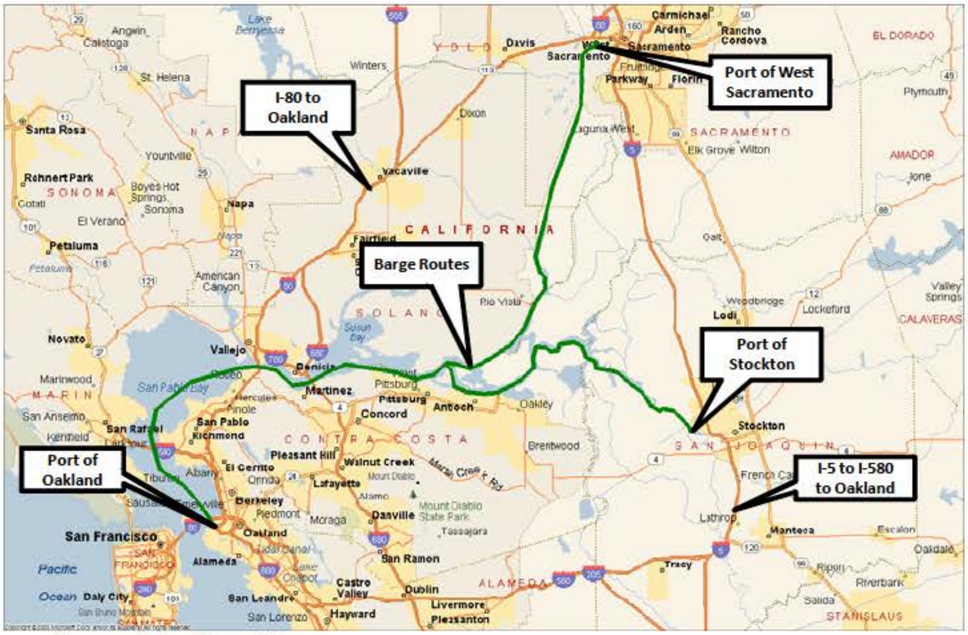
Source: Sea Point Website, http://sea-point.net/home , accessed April 16, 2012

The development concept was created by former Lykes Lines CEO, Jim Amoss, Sea Point's president. The concept has been in development for over 10 years. In 2008, the Louisiana State Bond Commission gave Sea Point conceptual approval to issue $300 million in Gulf Opportunity Zone bonds. These GO Zone bonds are essential tax-free federal loans to spur investment in the Gulf Coast after hurricanes Katrina and Rita. The total project cost for Sea Point's Venice terminal is $400 million. Sea Point, therefore, had to sell the GO Zone bonds and develop the remaining $100 million of capital to advance the project. At this point there is no indication that Sea Point has been able to develop the necessary financing to advance the project.

Ports of Stockton and West Sacramento COB Service to Port of Oakland

COB service between Stockton and Oakland and between West Sacramento and Oakland is a collaborative effort by the three regional ports to move Central Valley export and import containers by barge. This COB service is intended to reduce emissions and relieve congestion on interstate highways between Stockton and Oakland (I-5 and I-580) and between Sacramento and Oakland (I-80). See Exhibit 80.

Exhibit 80: Stockton/Oakland & West Sacramento/Oakland Container on Barge



Source: The Tioga Group

This project has been named "California's Green Trade Corridor". The barge routes are located along the M-580 Marine Highway Corridor which roughly parallels I-580. In 2009 the project received a $30 million Federal Transportation Investment Generating Economic Recovery (TIGER) grant which was shared by each of the three participating ports. The Port of Stockton received $13 million to acquire two 140 ton mobile harbor cranes and expand its container yard facility. The Port of West Sacramento received $8.5 million to acquire one 120 ton mobile harbor crane, strengthen its crane berth #6 and build a container stuffing facility. The port of Oakland received $8.5 million to provide containership wharf side power supply for Marine Highway vessels. In addition, the TIGER grant included $650,000 for each port's share in the acquisition of one or more barges for the COB service.

The Port of Stockton service is scheduled to begin first. In December 2011 the Port selected Savage Services to provide the COB service. This will include management, marketing, logistics and operating services for the project. Savage was to immediately begin marketing the service. Two barges have been acquired for the service and are in the process of being modified for container service. The barges will be completed in late summer 2012 at which time the new service between Stockton and Oakland is expected to start. Initial marketing will be directed to overweight cargo, including agricultural products, wine and canned goods.

The waterway distance from the Port of Stockton to the Port of Oakland is about 76 miles. Run time is estimated to be 8 to 10 hours. With loading and unloading time taken into consideration, the service transit time should be less than one day with the potential for three round trips per week should sufficient volume be attracted. The new service has attracted shipper interest and it has been reported that potential customers are seeking port leases for their operations. The new service also appears to be focused on several COB competitive advantages including heavy loading commodities, markets with heavy volume concentration, and bypassing of congested highway routes.

Outlook for COB Operations

The stated advantages of using Marine Highway barge service relative to truck or rail modes include reduced highway and rail congestion, fuel efficiency and reduced emissions. The following quotes from MARAD's report "A Vision for the 21st Century" reflect these advantages. "The greater use of Marine Highways is one answer to congestion on our highways and railroads. … The use of Marine Highways can reduce overall fuel consumption and limit the amount of air pollution."[25] Exhibit 81 provides fuel efficiency and emissions comparisons for barge, truck and rail freight movement. Fuel efficiency comparisons are stated in the number of miles that one ton of freight can be transported on one gallon of fuel (ton/miles per gallon). Emissions are stated as a ratio to a barge base of 1.0. These comparisons clearly show the fuel efficiency and emissions advantages of barge movement

Exhibit 81: Modal Comparisons of Fuel Efficiency and Emissions

Comparison of Fuel Efficiency & Emissions			
	Barge	Rail	Truck
Fuel Efficiency (ton miles /gallon)	514	202	59
Emissions Ratios (note 1)			
Hydrocarbons plus NO2	1.0	14.2	17.5
Carbon Monoxide	1.0	1.9	74.4
Particulate Matter	1.0	12.0	12.0
Note 1: Eastman Data Emissions Comparison: Ratio of emissions for trucks and rail compared to a four-barge tow on a ton mile basis			

Source: Tidewater Barge Line website www.tidewater.com accessed April 6 2012

However, shippers are not always driven by highway congestion, fuel efficiency and emissions statistics in their mode selection choices. The key factors affecting modal choice are transit time, service reliability and cost. Successful COB services must be economically competitive with motor carrier and rail service.

Depending on the specific origins and destinations, it appears that COB service can be price competitive in many markets along the navigable waterway network. However, the key disability for COB service is its relatively slow transit time. COB services should be able to cover around 150 miles per day. Motor carriers usually run 500 miles per day with a single driver and 1200 miles per day with team drivers. Rail intermodal generally runs 600 miles per day. As an example, New Orleans to Memphis service by barge would be 3 to 4 days. The highway run time is about 8 hours and the rail intermodal run time is about 20 hours.

In addition to the transit time, another service consideration for modal choice is the frequency of service. For motor carriers, the unit of production is one truckload. For this reason, a motor carrier can tailor its service frequency to meet a specific shipper's shipping volumes, i.e. daily, or even multiple daily departures. For rail carriers, the unit of production is a train which runs 5000 feet to as much as 10,000 feet in length. Train carrying capacity runs about 100 to 200 trailers in

[25] "The Maritime Administration and the U.S. Marine Transportation System: A Vision for the 21st Century" U.S. Department of Transportation, Maritime Administration, November 2007, page 19.

conventional service or as many as 300 containers in double-stack service. In major markets, rail carriers can provide a daily service departure between intermodal terminals. Rail service frequency is driven by volume density. To support twice weekly round trip service of 100 units per train requires a market of 20,000 shipments.

Standard box barges can hold about 54 loaded TEU which would up to 24 40 foot containers and 6 20 foot containers. The mix of 20 foot and 40 foot containers can include more 20 footers subject to a 1500 ton load limit. Standard barges can move in multiple barge tows with as many as 15 barges. See Exhibit 82 showing an Osprey lines 15 barge tow with 750 TEU. In addition a large ocean going deck barge, like the Columbia Elizabeth, can carry 900 TEU (See Exhibit 70).

Exhibit 82: Osprey Lines 15 Barge Tow 2005

Source: Southeastern Ohio Port Authority "Container on Barge Concept Paper" June 2008

The unit of production for the barge operator can be adjusted to fit the volume of business available. A regular two barge tow operating twice weekly between two ports requires a market of about 10,000 shipments, a sizeable market.

The service frequency of existing scheduled COB operations reviewed earlier in this report is one or two departures per week, with the Express 64 service planned to increase service to three departures per week in July, 2012. This level of service frequency presents a service disability for COB relative to motor carrier or rail intermodal. In contrast, COB has an advantage for large volume concentrated movements of containers as in the Columbia Transport ocean carrier relay service discussed earlier in this report.

Another factor affecting barge competitiveness with motor carrier and rail intermodal is the network coverage and markets served. Exhibit 68 shows the marine highway system. This network covers about 12,000 miles and its primary components include the Mississippi River System, the Ohio River System, the Gulf Intracoastal Waterway (GIWW) and the Columbia/ Snake River System. In comparison the primary freight lines of the U.S. railway system along with the marine highway system is shown in Exhibit 83. The total U.S. Rail system includes about 162,000 miles of track with intermodal terminals serving practically all major population centers and container ports. See Exhibit 84. Of course, the most comprehensive service network is the motor carrier system which can directly reach any freight customer in the US.

Exhibit 83: Primary Rail Freight Lines with Marine Highway System

Source: MARAD website
http://www.marad.dot.gov/ships_shipping_landing_page/mhi_home/mhp_map/mhp_map.htm accessed April 16, 2012.

Exhibit 84: U.S. Rail Intermodal Terminals

Source: National Transportation Atlas, BTS

It is clear that COB services will not be available or competitive in many markets. However, based on the case studies of COB operations and the inherent advantages of barge operation, there are certain niche markets which will be best suited to COB services. Following are the market characteristics for which COB services are most likely to be competitive with rail or motor carrier.

- **Heavy loading export markets**: Heavy loading commodities, especially agricultural products, have been the dominant characteristic of COB operations of Tidewater Barge Lines on the Columbia Snake River and Osprey Line out of Memphis. The Osprey Line movement of plastic pellets from Baton Rouge to New Orleans took advantage of the barge heavy loading capability over motor carrier highway weight limits. The Express 64 service from Richmond to Norfolk and Portsmouth container terminals is heavily supported by Mead Westvaco paper company which exports heavy loading paper products.

- **Volume concentration**: COB markets must have sufficient volume concentration to enable at least one barge load per week. Loaded annual volume from two origins on the Columbia Snake River to the Port of Portland was estimated to be about 7200 TEU of mostly heavy loading 20 foot containers. This volume was sufficient to drive at least one barge per week from each origin. The return move was empty containers. The Columbia Coastal ocean carrier relay COB service has good volume concentration driven by the ocean carriers' needs to reach their bill of lading markets at Baltimore and Philadelphia from their Port of Virginia hub terminals.

- **Efficient barge operation and balance**: The Tidewater COB operation was fully integrated into its existing bulk operation enabling multiple barge tows that were operationally efficient. All of Tidewater's business was one way loaded with the empty container return. The economics of the operation must be able to include the empty return or the market must have a balance of import and export cargo. In the case of Osprey Line, the lack of inbound volume to Memphis was a significant factor in discontinuing the scheduled Memphis service. The Columbia Coastal ocean carrier relay COB service has very efficient utilization of its equipment running Norfolk / Baltimore and Norfolk / Baltimore / Philadelphia in one week with the same tug and barge.

- **Use of existing terminals or sufficient volume for a dedicated container terminal**: Many existing inland waterway terminals are equipped with mobile harbor cranes or overhead cranes which are used for general barge cargo. This equipment can also be used to load containers. This was the case at Lewiston, ID, Boardman, OR and Pasco, WA, on the Columbia Snake River and the Fullen Dock terminal in Memphis. The Osprey terminal at Port Allen, LA, utilized side loaders which were more efficient for loading containers into barges. The volume of container cargo at Port Allen justified the acquisition of this specialized container loading equipment. Use of existing inland waterway terminals will reduce start up cost.

- **Markets that can accept barge transit time:** An example is the export agricultural products on the Columbia Snake River. The export products are shipped from storage and the shippers can plan on the weekly service offering which is about two days longer than motor carrier. The plastic pellets from Port Allen to New Orleans were transloaded from rail car to containers and also moved in a weekly service. The heavy loading advantage offset the additional transit time relative to motor carrier. However, once the motor carriers were able to get the blanket overweight permits the heavy loading advantage was lost and the business shifted back to highway. The Express 64 service is currently twice weekly and moving to three times weekly. The transit time difference is about one day which can be overcome with the appropriate planning, especially when the service frequency moves to three days per week. On longer moves the transit time difference is magnified. The Memphis New Orleans service was about 3 days longer than the competing rail service and was not able to secure sufficient north bound volume to remain viable. In general import containers are lighter weight and higher value than export containers making transit time a more significant factor in mode selection.

- **Port to Port markets:** The ocean carrier relay market provides an advantage to the ocean carriers by utilizing COB service between the hub port and the bill of lading ports that are not directly called. This is the case with the Columbia Coastal service between the Port of Virginia hub container terminals and the bill of lading container terminals at Baltimore and Philadelphia. MSC also utilizes the Express 64 service between its Norfolk hub and bill lading container terminal at Richmond. The Couch Line service between its Baytown, TX, terminal and the Houston container terminals is another example of a port to port market. Couch Line acts as an ocean carrier's satellite terminal and makes the delivery by barge directly to the container terminal. These COB services are used by the ocean carrier who receives the benefit of improved container ship and container terminal utilization. In this case there is no concern about heavy loading commodities or balance, as the COB service is directly integrated into the container carriers' regular container service. However, this type market is very specialized and is driven by ocean carrier operating needs. Osprey Line also participated in the ocean carrier relay market between Houston and New Orleans. When the ocean carriers changed their service pattern the service between Houston and New Orleans was no longer needed and it was discontinued.

- **Take advantage of circuitous or congested highway routes:** The Columbia Coastal Norfolk / Baltimore / Philadelphia service is a good example of bypassing congested highways. The highway route via I-64 and I-95 passes through very congested routes around Richmond, Washington, DC, and Baltimore providing a competitive advantage for the COB service. In addition, since the origin and destination are both container ports, there is also an advantage over highway because the barge service can directly access the container terminal with no drayage or gate delay. The Express 64 service is also working to take advantage of highway congestion in the city of Norfolk and on I-64. In addition, the planned COB service between Stockton and Oakland will bypass the congested interstate highway I-580.

- **Build a broad market base:** Relying on a few large customers or ocean carriers increases the risk of large volume losses if the markets change. In the case of Tidewater Lines, the loss of its Pasco, WA, business due to a change in ocean carrier port of call did not terminate the service from Boardman, OR, and Lewiston, ID. Tidewater lost about half its container business but it had a broad base of bulk business to hold the container operation together for its remaining customers. When Osprey Line lost its plastic pellet export business from Port Allen, LA, to New Orleans that service was no longer viable. The Express 64 service is working to develop a broad base of business as it looks to start a three day service and expand its import business. This will be important for its long term viability.

The long term outlook for significant expansion of COB services does not look particularly promising. Even as the increasing cost of diesel fuel improves the competitive advantage of fuel efficient COB service, there does not seem to be any significant interest from major barge operators in developing a large scale COB service on the inland waterway system. One barge operator examined the potential in 2007 and at that time determined that there was not a significant advantage to enter the market. It was also stated that the rail carriers had done an excellent job of improving their services making it very difficult for barge operators to compete. Another comment noted that the barge system is primarily oriented in a north south direction while the major U.S. international container transportation markets were largely oriented east west which was advantageous for the rail and highway networks. It appears that specialized niche markets will remain the primary opportunity for COB expansion.

VI. Competitive Position of Railroads

Summary Findings

Overview

The rail industry is a robust mix of more than 560 mostly privately held firms serving North America. The industry is dominated by 8 large railroads that provide most intercity rail transportation. There are a very large number of regional and short line railroads, some of which are important to coal and grain exports. There is nothing in the marketplace that would suggest that the railroads will be anything but healthy collaborators and competitors for the inland waterways for the foreseeable future.

- Coal is the largest single commodity handled by U.S. railroads, accounting for 44% of rail tonnage and 24% of revenue in 2010. Railroads are seeking to replace currently declining domestic demand for coal with longer haul exports.
- Rail grain shipments represent one of the rail industry's largest transportation markets. In 2010 originated shipments of all grain products totaled 151.5 million tons making up 8.2% of total rail tonnage.

Railways both collaborate and compete with waterways for export coal and grain business, depending upon the particular geographic franchise of the rail system. The Canadian National Railway's north/south service is the most directly competitive with the Mississippi River system. CSX's position is more typical; it moves export coal to a variety of ports, but also serves barge transload facilities on the Ohio River.

Railroad performance since deregulation in 1980 has produced volume gains, productivity gains, and meaningful rate reductions. When adjusted for inflation current rail rates are about half the 1980 levels. For coal and grain shippers the downward rate trend turned around early in the last decade, with the most significant increases applied to shorter coal hauls.

Access to capital

Since deregulation U.S. railroads have evolved into commercially successful enterprises, able to attract capital for expansion. Railroad equity and financial instruments have become attractive investments, the best known example being Berkshire Hathaway's purchase of BNSF. The durability and resale value of railroad equipment (locomotives and cars) has made it relatively easy for railroads to acquire needed equipment through purchase, financial leasing, short-term leasing, or pooling.

Capital investment

The large railroads will spend more than $15 billion on capital projects in 2012, about 17% of revenue. Most of these expenditures will renew worn out locomotives, rail cars, track, and terminals. The portion related to expansion and increasing efficiency will be largely directed toward improvements that serve the coal and intermodal businesses. Railroads are spending about 10% of their available capital for mandated positive train control (PTC) safety enhancements that must be completed by December 2015. Although PTC will increase line capacity by allowing more precise control over train speed and spacing, it is primarily a safety initiative. Once PTC is implemented, the carriers will have more capital available for conventional capacity improvements.

Rail car capacity

Rail car availability is not a long term constraint on the industry. The rail car manufacturing industry is subject to wild swings in demand, but has proven its ability to accommodate emerging capacity needs with only modest lead time delays. There are multiple methods for financing and acquiring rail cars.

Waterway Capacity Implications

The analysis conducted for this report suggests that railroads are ready and able to invest in coal and grain capacity. Railroads have a long history of finding financing for profitable market segments, even in times of tight capital. Railroads are thus unlikely to permit capacity shortfalls that would drive attractive business to the waterways.

The most attractive coal and grain businesses are the long-haul unit-train movements to power plants, destination markets, and export terminals. Unit trains are multi car trains of the same commodity moving from one origin to one destination. These trains can handle as many as 100 cars exceeding 10,000 tons of lading. Railroads will make every effort to retain and grow this business. Shorter rail-barge transfer moves are less attractive, and more likely to face capacity shortfalls if money tightens.

Rail Industry Background

There are more than 560 railroad companies in the North American continental railway system operating more than 175,000 railroad route miles. There are three classes of railroad firms.

The largest railroads are designated as Class I rail carriers. This designation is given to those railroads with operating revenues in excess of $398.7 million. There are eight Class I rail systems in North America as follows:

- The Burlington Northern and Santa Fe Railway Company
- Union Pacific Railroad
- Canadian Pacific Railway
- CSX Transportation Inc.
- Norfolk Southern
- Canadian National Railway
- Kansas City Southern/Kansas City Southern de México
- Ferrocarril Mexicano

Class II rail carriers, typically known as regional carriers, have annual operating revenues in excess of $31.9 million.

Class III rail carriers, typically known as short lines, have annual operating revenues less than $31.9 million.

Major Rail Carriers and Networks

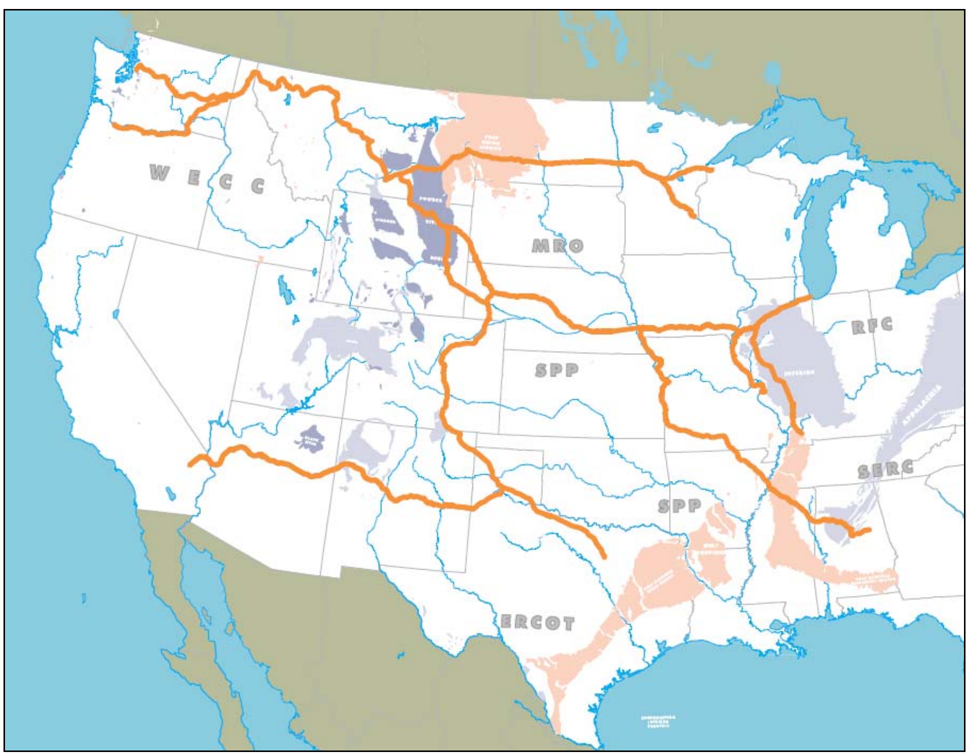
U.S. Class I rail carriers provide the core of the system, operating and maintaining 70 percent of the U.S. railroad industry's route mileage and accounting for 81 percent of the rail industry's freight revenue and 88 percent of railroad employment.

BNSF Railway

Fort Worth-based BNSF railway is owned by Berkshire Hathaway Inc. It operates one of the largest North American rail networks, with about 32,000 route miles in 28 states and two Canadian provinces. In 2011 BNSF had $19.5 billion in revenue and an operating ratio of 72.4%. In 2011, 26.7% of the revenue came from coal and 19.9% came from agricultural products.

Exhibit 85 shows BNSF's main coal lines. BNSF's primary coal business is moving Powder River Basin coal to domestic power plants. In addition, coal is moving to the Great Lakes and to the Mississippi River system for transfer to vessels and barges for movement to points east. Some of the waterway transload will move the ports of New Orleans and Mobile for export. Though not identified on the coal network map, BNSF is also moving coal to west coast ports in British Columbia for export to Asia.

Exhibit 85: BNSF Coal Network



Source: BNSF

Exhibit 86 illustrates BNSF's grain gathering and distribution network. Because grain production and gathering is not as localized as coal production, rail grain networks are necessarily more complex and less concentrated than coal networks. The railroad serves major wheat, corn, and soybean growing areas. BNSF moves grain to ocean export terminals in the Pacific North West, Gulf of Mexico and the Great Lakes. BNSF also moves grain to inland waterway transfer terminals in St. Paul, St. Louis, and Memphis.

Exhibit 86: BNSF Grain Network

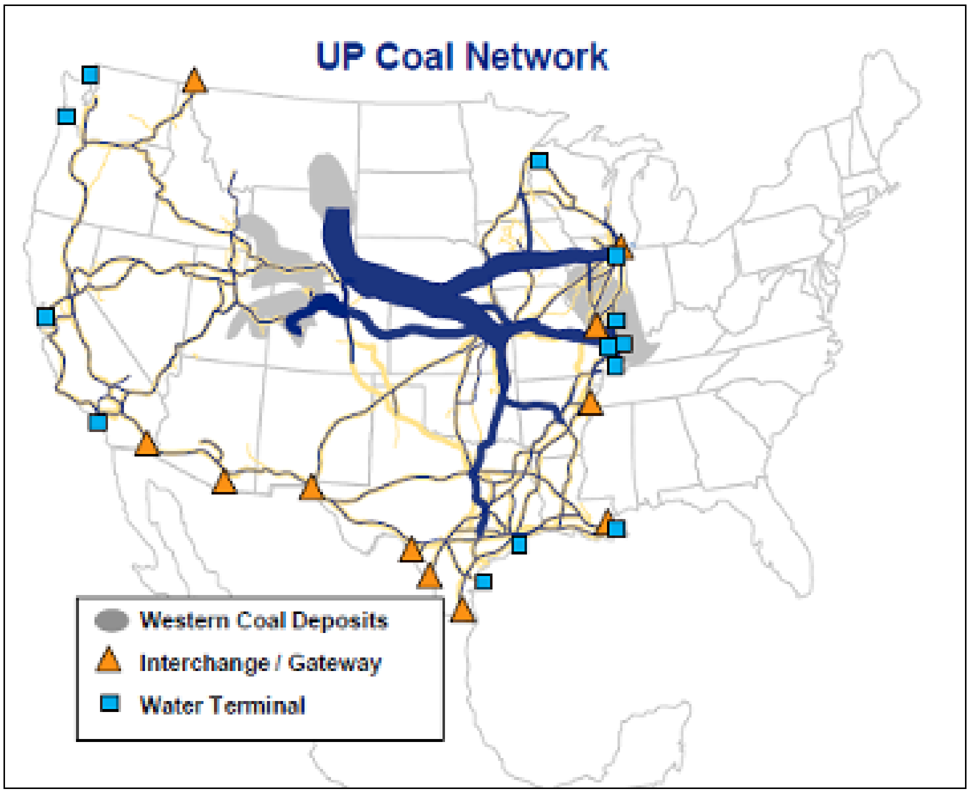
Source: BNSF

Union Pacific

Union Pacific Railroad (UP) operates nearly 32,000 miles of track in 23 states. In 2011 Union Pacific had $19.6 billion in revenue and an operating ratio of 70.7 %. About 22 % of the revenue came from coal and petroleum coke, while 18% came from agricultural products, mostly whole grains and grain products.

Exhibit 87 presents Union Pacific's coal network. The thickness of the lines illustrates the amount of coal moving. Union Pacific also serves the Powder River Basin and moves coal to domestic consumers. The coal network map shows routing for western coal to Mississippi River transfer terminals, Gulf coast ports and west coast ports. Although the network map shows coal export terminals on the U.S. west coast, very little coal moves through these facilities. The map also identifies rail interchanges to other railroads for interline movement to Mexico.

Exhibit 87: Union Pacific Coal Network



Source: Union Pacific

Union Pacific's grain franchise covers major winter wheat, corn, and soybean growing areas as well as California's central valley. Exhibit 88 illustrates Union Pacific's overland agricultural connections as well as service to west coast and gulf coast export facilities.

Exhibit 88: UP Grain Network

Source: Union Pacific

Kansas City Southern

Kansas City based Kansas City Southern (KCS) is a holding company that owns a number of railways including:

- Kansas City Southern Railway (KCSR), a U.S. Class I railroad operating approximately 3,500 route miles in 10-states.
- Kansas City Southern de Mexico, S.A. de C.V (KCSM).
- Panama Canal Railway Company (PCRC).
- The Texas Mexican Railway Company (Tex Mex).

Collectively this system generated $2.1 billion in revenue in 2011 with an operating ratio of 70.9%. 13% of the revenue is attributable to coal and 21% from agriculture and minerals. The agriculture revenue is mainly from grain and food products.

Exhibit 89 displays the KCS route map. KCS serves U.S. and Mexican ports in the western gulf as well as Lazaro Cardenas, the fastest growing significant port in North America. A major new coal terminal is reportedly under development in Lazaro Cardenas.

Exhibit 89: KCS Route Map

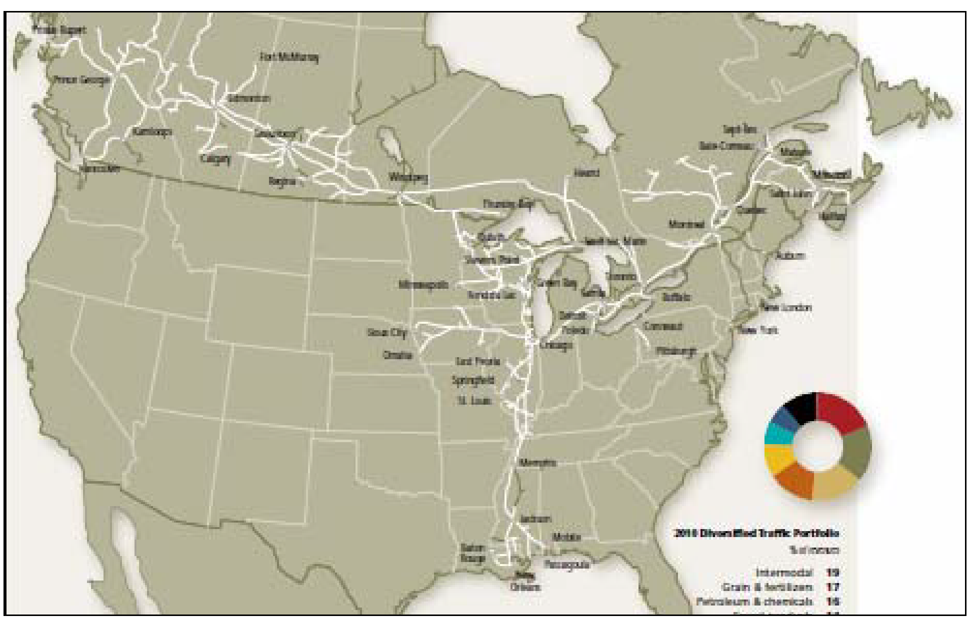
Source: KCS

Canadian National

Montreal-based Canadian National Railroad (CN) operates nearly 21,000 miles of track in the United States and Canada. In 2011 Canadian National had $8.4 billion in revenue and an operating ratio of 65.0 %. About 5 % of 2010 revenue came from coal and petroleum coke while 17% came from agricultural products, mostly whole grains and grain products. The railroad was formerly owned by the Canadian government, but now is a publicly traded corporation.

CN serves Canada's wheat producing areas in the Northern plains as well as major corn and soybean producing areas in the United States. CN provides the most direct competition to the Mississippi River waterway system. (Exhibit 90)

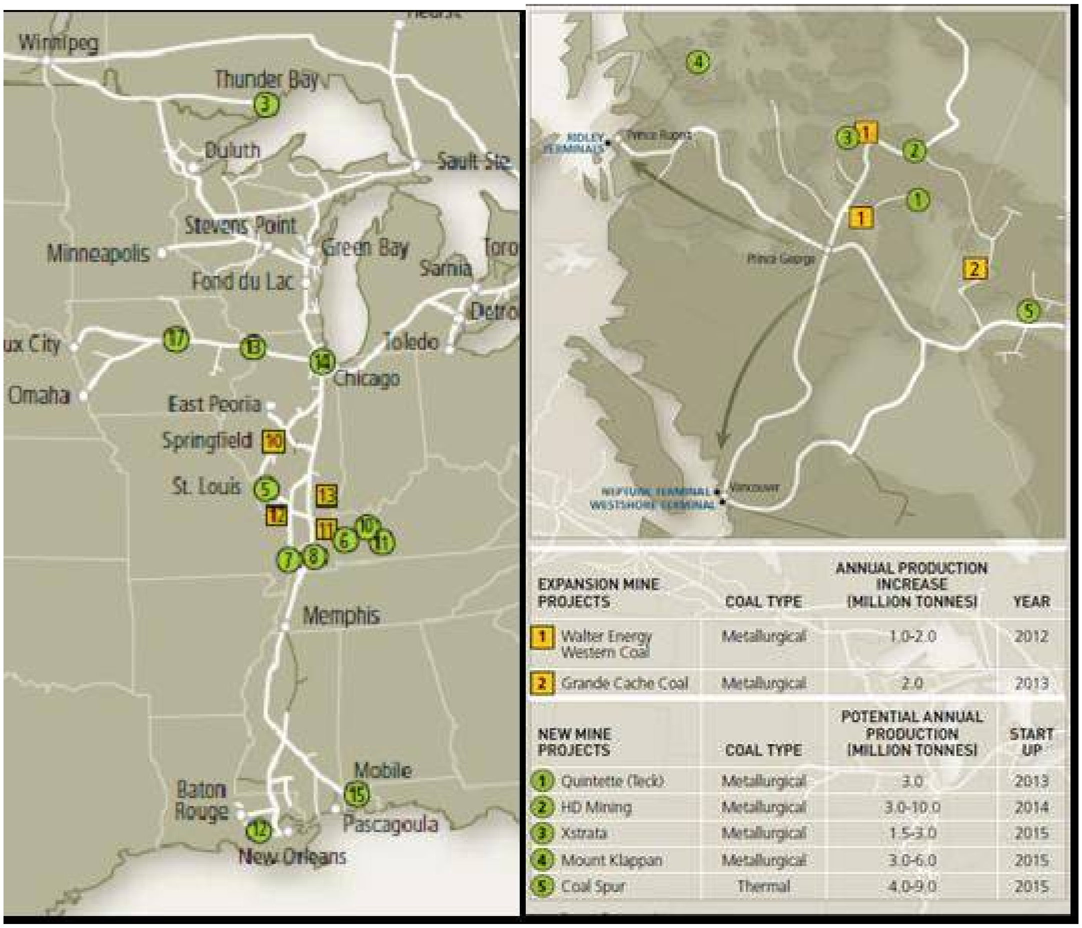
Exhibit 90: CN Rail Network



Source: CN Website

Exhibit 91 illustrates the key CN-served coal facilities in the Pacific Northwest, the Great Lakes, and the Mississippi River system. Key CN coal ports include Prince Rupert, Vancouver, New Orleans and Mobile.

Exhibit 91: CN Coal Network



EXPANSION MINE PROJECTS	COAL TYPE	ANNUAL PRODUCTION INCREASE (MILLION TONNES)	YEAR
1 Walter Energy Western Coal	Metallurgical	1.0-2.0	2012
2 Grande Cache Coal	Metallurgical	2.0	2013

NEW MINE PROJECTS	COAL TYPE	POTENTIAL ANNUAL PRODUCTION (MILLION TONNES)	START UP
1 Quintette (Teck)	Metallurgical	3.0	2013
2 HD Mining	Metallurgical	3.0-10.0	2014
3 Xstrata	Metallurgical	1.5-3.0	2015
4 Mount Klappan	Metallurgical	3.0-6.0	2015
5 Coal Spur	Thermal	4.0-9.0	2015

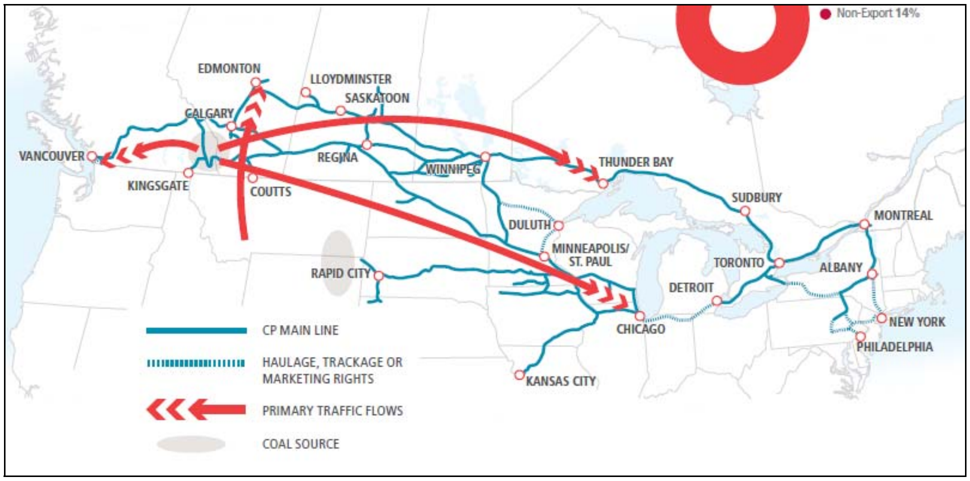
Source: CN Website

Canadian Pacific

Calgary-based Canadian Pacific Railway (CP) operates 14,800 miles of railway in 13 states and 6 provinces. In 2011 Canadian Pacific produced $5.1 Billion in revenue and an operating ratio of 81.3 %. Roughly 11 % of the freight revenue came from coal and petroleum coke while 22% came from grain.

Canadian Pacific moves Canadian coal export terminals in Vancouver and Thunder Bay on Lake Superior. Coal also moves overland to the United States. (Exhibit 92) The Canadian Pacific purchased the Dakota Minnesota and Eastern railroad in 2008 for $1.48 billion to gain access to the Powder River Basin. Construction of 278 additional route miles was required to reach the coal fields. Access to the Powder River coal would have given CP a means to bring coal to the Mississippi river in competition with BNSF and UP. The project was put on hold in 2009 with the downturn in the economy.

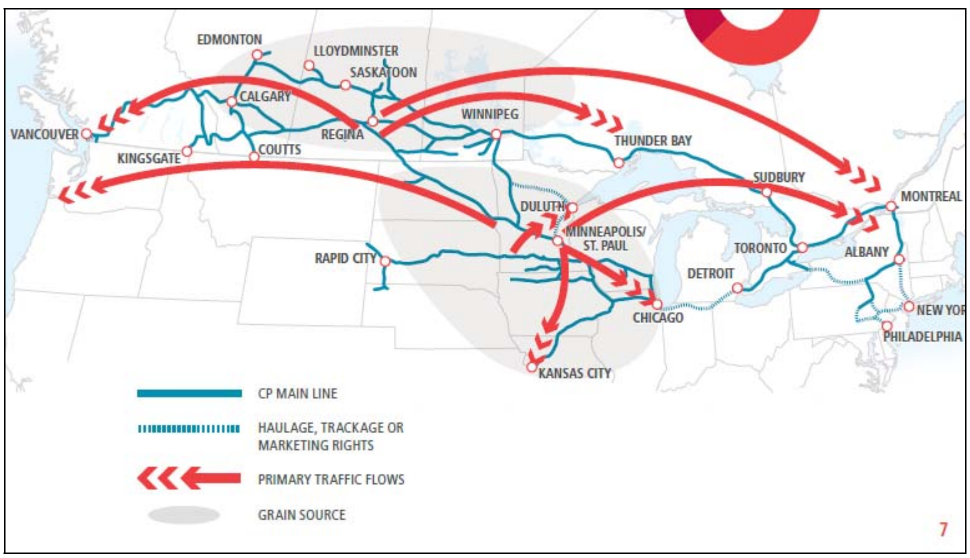
Exhibit 92: Canadian Pacific Coal Network



Source: CP Rail

Canadian Pacific serves major wheat, corn, and soybean producing areas in the United States and Canada. It can efficiently deliver export grain to Canadian Ports on the Atlantic and Pacific as well as Great Lakes Ports in both countries. It reaches the Mississippi River at St. Paul and various points to the south. (Exhibit 93)

Exhibit 93: Canadian Pacific Grain Network



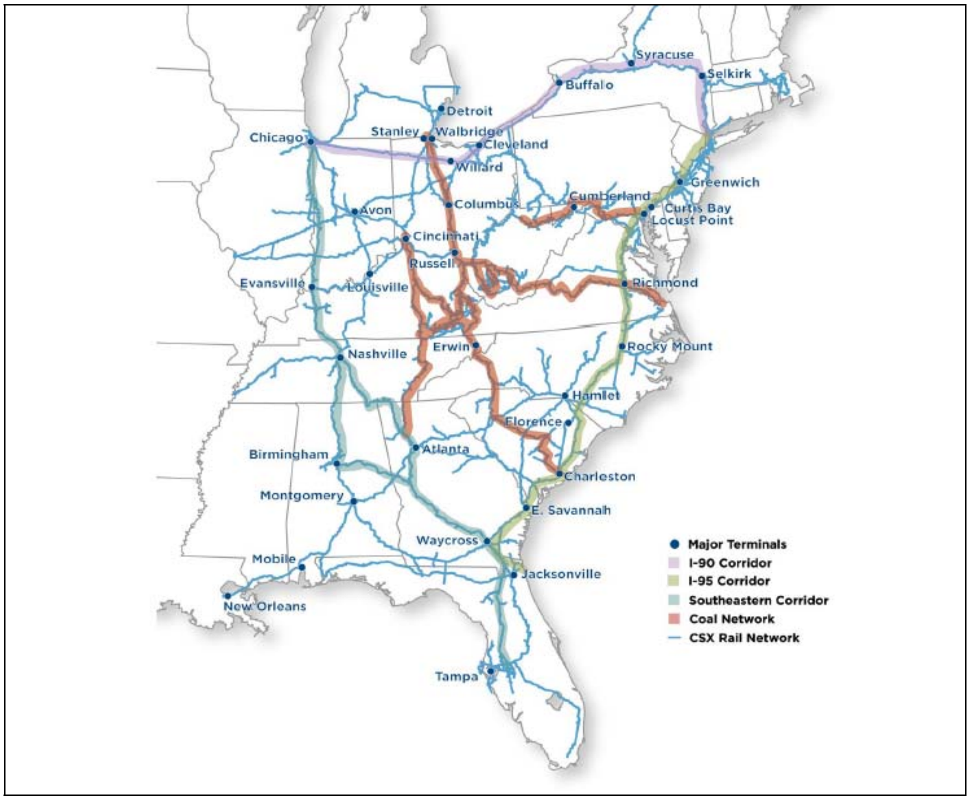
Source: CP Rail

CSX

CSX is headquartered in Jacksonville, FL. It operates approximately 21,000 route miles in 23 states, two Canadian provinces, and the District of Columbia. In 2011 CSX produced $11.7 billion in railway revenue with an operating ratio of 70.9%. Some 9% of the revenue came from agricultural shipments.

Exhibit 94 illustrates CSX's coal system in brown. CSX is the most coal reliant Class I railroad, with coal responsible for 32% of revenue. The railroad moves coal from inland coal fields to major port locations in Baltimore and Norfolk as well as north to the Great Lakes. It connects in various places to the Ohio River and other inland waterway points.

Exhibit 94: CSX Rail Network



Source: CSX

Norfolk Southern

Norfolk Southern Railway (NS) is headquartered in Norfolk, VA and operates approximately 20,000 route miles in 22 states and the District of Columbia. (Exhibit 95)

Exhibit 95: Norfolk Southern Rail System

Source: Norfolk Southern

In 2011 Norfolk Southern produced $11.2 billion in railway revenue with an operating ratio of 71.2%. About 31% of the revenue came from coal and 12.8% from agriculture, consumer products, and government shipments.

The NS coal network functions much like CSX; major export terminals include Baltimore and Norfolk. NS coal transload facilities include:

- Great Lakes Facilities
  - Ashtabula Coal Pier, Ashtabula, OH
  - Sandusky Dock, Sandusky, OH
- Ohio River
  - Big Sandy Terminal, Cyrus, WV
  - Coal Network, Kenova, WV
  - General Materials Terminals, Conway, PA
  - Kanawha River Terminal, Ceredo, WV
  - Louisville Jefferson Riverport, Louisville, KY
  - MOL-DOK, Leetsdale, PA
  - Wheelersburg Terminal, Wheelersburg, OH

- Atlantic
  - CNX Marine Terminals - Baltimore Terminal
  - Lamberts Point Coal Terminal, Norfolk, VA

Shortlines

There are a number of short line railroads that are involved in the coal trade. One important example is the Alabama State Port Authority Terminal Railway (TASD). It operates ten locomotives and 75 miles of track in the Port of Mobile. It interchanges traffic with NS, CSX, BNSF, KCS, and, CN maximizing the port's competitive options.

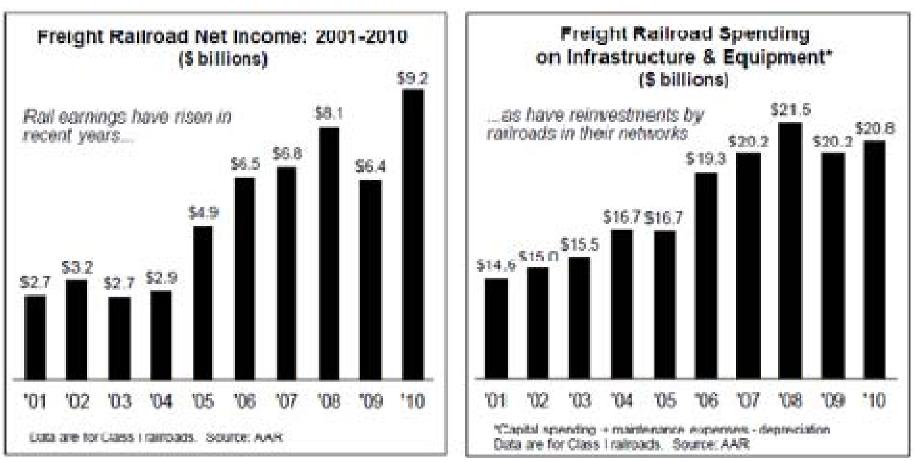
Grain is also a key commodity for scores of short line and regional freight railroads.

RR Industry Financial Health

Railroads were heavily regulated until 1980. In 1980, more than 20 percent of rail mileage was owned by bankrupt railroads and rail tracks and equipment were literally falling apart because railroads could not afford the repairs.

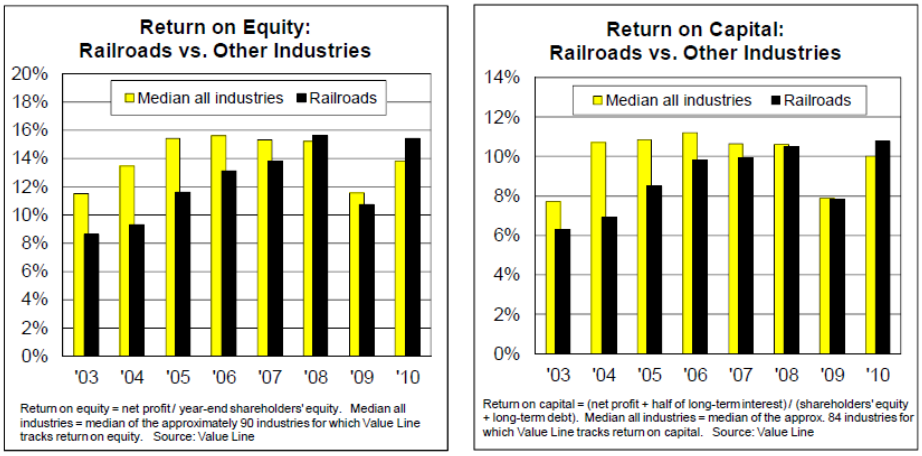
Since that time economic regulation has been focused on "captive shippers" who do not have realistic competitive alternatives to rail. Regulatory activity has been limited almost exclusively to coal movements between mines and domestic power plants. In recent years rail financial returns (Exhibit 96 and Exhibit 97) have improved significantly. This is primarily due to improvements in productivity and increased costs for motor carriers, the rail industry's primary competitor. The result is that railroad financial returns are in line with other industries.

Exhibit 96: Railroad Net Income and Capital Spending



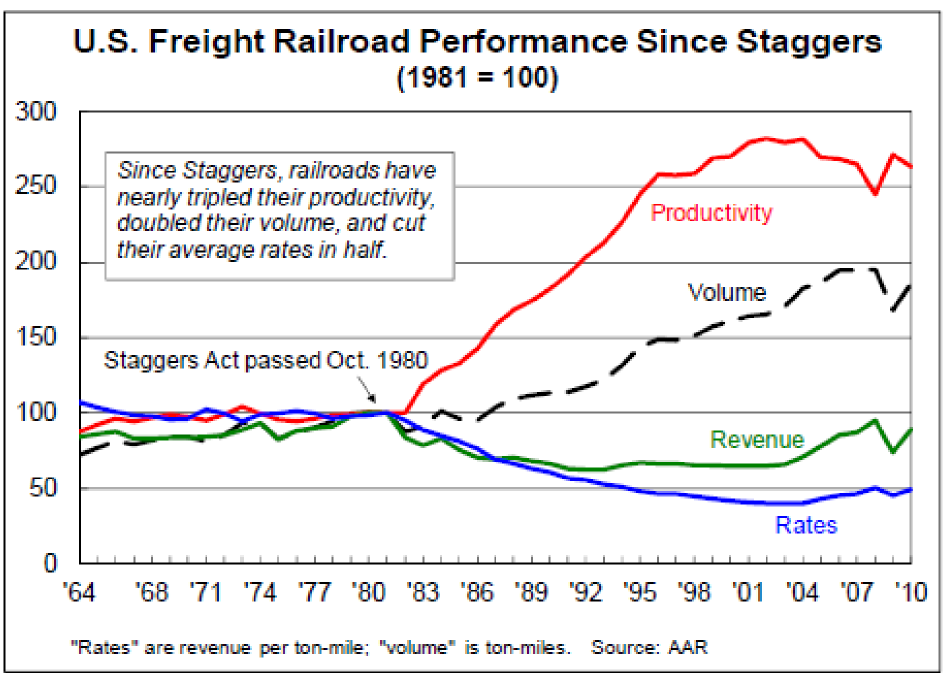
The successor to the Interstate Commerce Commission, the Surface Transportation Board, issues an annual report on the adequacy of rail economic returns. While none of the railroads returned their cost of capital in 2009, the trend has been positive. At least one railroad has returned its cost of capital in each of the three years, prior to 2009. Though data is not yet available the post-recession trend is again positive. As a consequence of positive financial returns, the possibility of a return to stringent regulation has become a railroad public policy issue.

Exhibit 97: Rail Return on Equity and Capital



The Association of American Railroads (AAR) opposes this move to re-regulation. The AAR points out that from 2000 to 2009, the average U.S. railroad spent 17 percent of revenue on capital expenditures. See Exhibit 96. This level of capital spending is much higher than other industries. In addition, railroads provide a much cleaner and energy efficient means to move freight than motor carriers. AAR also makes the argument that railroad performance since deregulation in 1980 has produced volume and productivity gains concurrently with rate reductions. (Exhibit 98)

Exhibit 98: Railroad Performance Since 1980



Railroad Capital Investment

All the railroads are spending on renewal of locomotives, freight cars, and infrastructure. Exhibit 99 was developed from the announcements of the large, Class I railroads regarding their capital spending plans for 2012. The total is over $15 billion, and the plan increases overall spending from 2011.

Exhibit 99: U.S. and Canadian Class I Railroad 2012 Capital Plans ($ Millions)

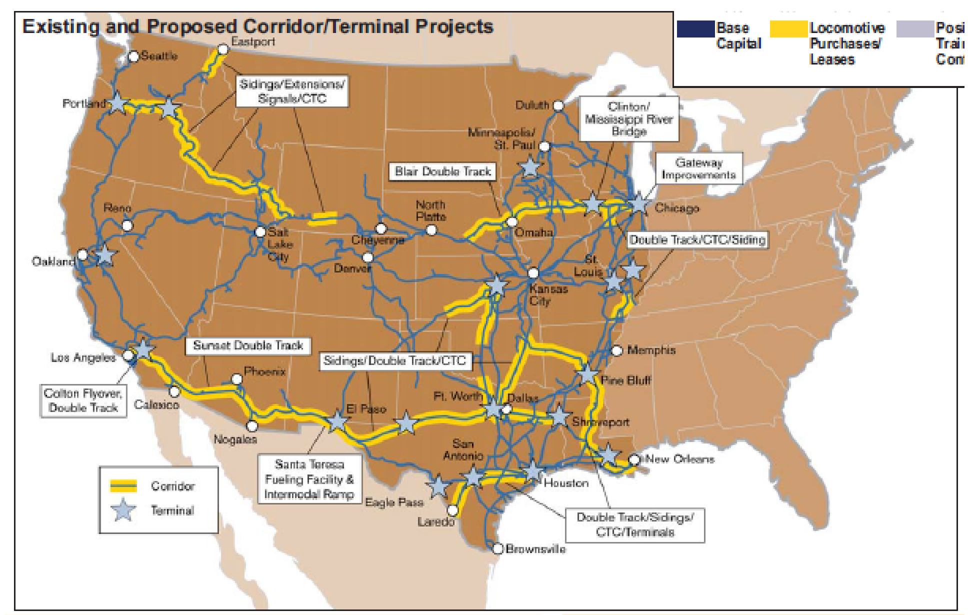
Railroad	Freight Cars & Locomotives	Infrastructure Replacement	Expansion & Efficiency	Positive Train Control	Other	Total
BNSF	$1,100	$1,700	$400	$300	$400	**$3,900**
Union Pacific	$845	$1,670	$650	$335	$100	**$3,600**
CSX	$540	$1,170	$270	$270		**$2,250**
Norfolk Southern	$588	$1,055	$545	$247		**$2,400**
Canadian National	$153	$1,020	$410*	$100*	$97	**$1,780**
Canadian Pacific						**$1,100**
Kansas City Southern						**$400**

Source: Rail carrier websites and press releases with Tioga Group estimates where noted by asterisk

BNSF's program is an increase of $400 million over 2011. Expansion and efficiency investment is focused on coal routes and intermodal facility at Kansas City.

Union Pacific's expansion and efficiency is focused on the Santa Teresa, New Mexico facility, additional double-track on the Sunset Corridor and Blair Subdivision. Particular attention is being paid to various projects supporting energy exploration and production. Exhibit 100 illustrates UP's longer term capital intentions.

Exhibit 100: Existing and Proposed Union Pacific Corridor and Terminal Projects



Source: Union Pacific

CSX expansion plans focus on their coal and intermodal business groups as well as implementing technology to improve carload service performance. Recent expansions have increased CSX's coal export capacity from 30 to 45 million tons. These were focused on improved access to Mobile as well as Illinois Basin mines.

A substantial portion of the NS program will go toward investments along the "Crescent Corridor", a public-private partnership to create a high-capacity, truck-competitive intermodal freight rail route between the Gulf Coast and Northeast. Additional funds will go to the CREATE project, a public private partnership designed to improve rail movement through the Chicago bottleneck. Also notable is that NS is investing in new coal cars as replacements for an aging fleet. It is executing a coal car re-body program in 2012

CN plans to spend for rail-line and yard improvements on the Elgin, Joliet and Eastern Railway (EJ&E) Company that CN acquired in 2009. The EJ&E serves CN a belt line around Chicago. CN also is extending sidings along its route to the deep water port in Prince Rupert, BC as well as on its route in Northern Ontario.

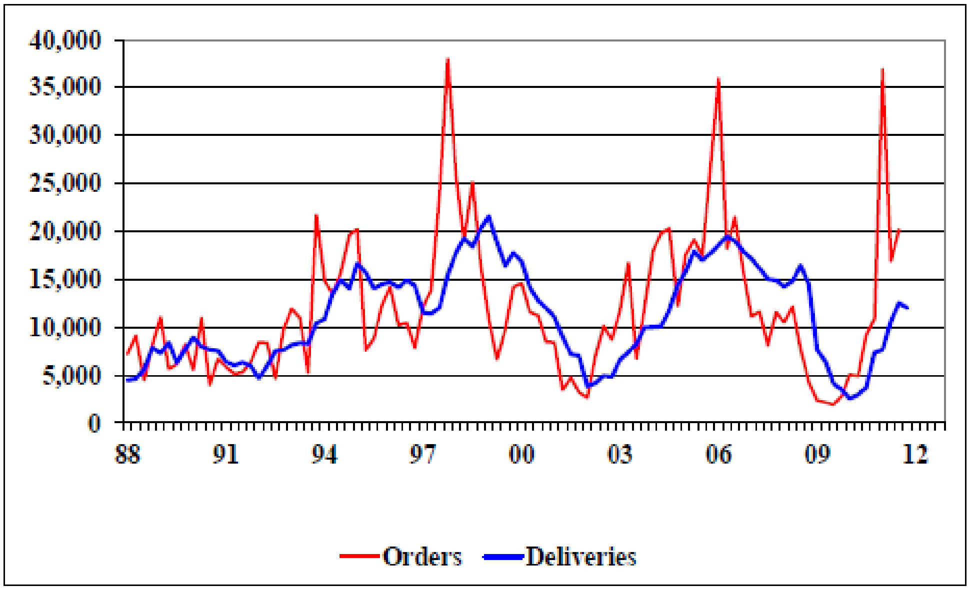
CP is focusing its expansion and efficiency investments in western Canada, North Dakota, and Minnesota with the goal of handling longer trains at faster track speeds

KCS has been spending heavily on capital improvements in recent years and is the only railroad reporting a decline in anticipated capital expenditures from $495 million in 2011 to between $400 million and $425 million in 2012.

Rail Car Capacity

The rail car manufacturing industry is subject to wild swings in demand, but has proven it ability to accommodate this very volatile industry, with only modest lead time delays.

Exhibit 101: Quarterly Rail Car Orders and Deliveries[26]



Coal Cars

Rail cars used in unit coal trains are of two basic types. Closed-bottom gondola cars (Exhibit 102) are unloaded in rotary dumpers that turn the car upside down. Rapid-discharge hoppers (Exhibit 103) can be emptied in rotary dumpers or through the bottom gates. Both types are equipped with rotary couplers on one end (note red painted ends in the photos) that enable the car to pivot while remaining coupled in the train.

Exhibit 102: Example of Gondola for Coal Service

Source: http://www.johnstownamerica.com/Aluminum-BethGonII.htm

[26] Source: RPI (ARCI), Progressive Railroading Rail Trends Conference Presentation by Toby Kolstad November1, 2011

Exhibit 103: Example of Hopper Car for Coal Service

Source: http://www.johnstownamerica.com/Aluminum-AutofloodIII-Hopper-Car.htm

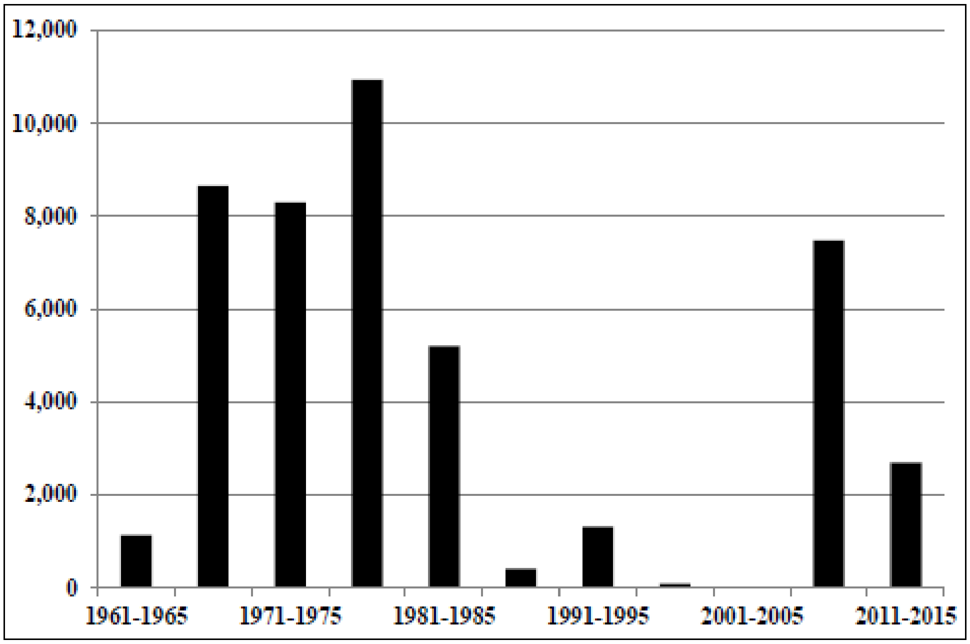
Outside of unit train service, coal is carried in conventional multi-use hopper cars such as the example in Exhibit 104

Exhibit 104: Conventional Hopper Car

Source: http://www.johnstownamerica.com/Triple-Hopper.htm

Some question has been raised about the eastern railroads' aging coal car fleet. This issue is illustrated in Exhibit 105 below.

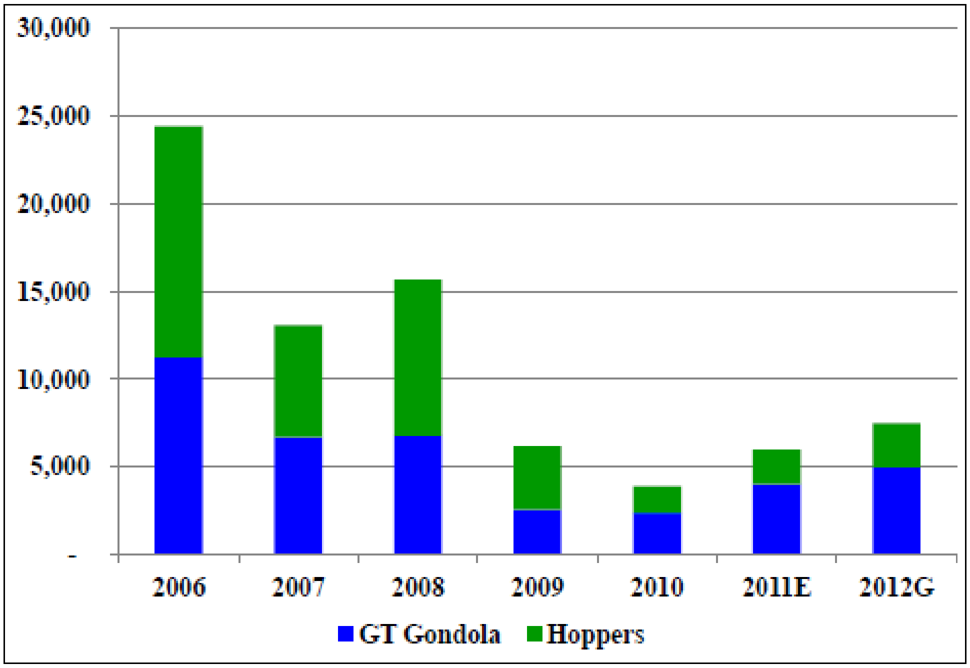
Exhibit 105: Age Distribution of Eastern Railroad Coal Fleets



Source: Presentation by Toby Kolstad, Principal, Rail Theory Forecasts, Rail Trends conference, New York City, November 1, 2011

Shipper-provided rail cars represent a large percentage of the fleet handling coal for electric power generation. Export coal movements utilize rail owned equipment. As utility coal demand declines it is anticipated that any surplus cars can be shifted to export loading, if necessary, to maintain car utilization for this utility service equipment. As rail cars are retired from the fleet each year, railroad managers must project expected demand and acquire the cars needed to protect demand forecasts. Exhibit 106 shows coal car deliveries to the U.S. car fleet from 2006 thru 2011 (estimated) with a projection for 2012. Rail car supply for coal business does not appear to be an issue for rail carriers in the near future.

Exhibit 106: U.S. Coal Car Deliveries

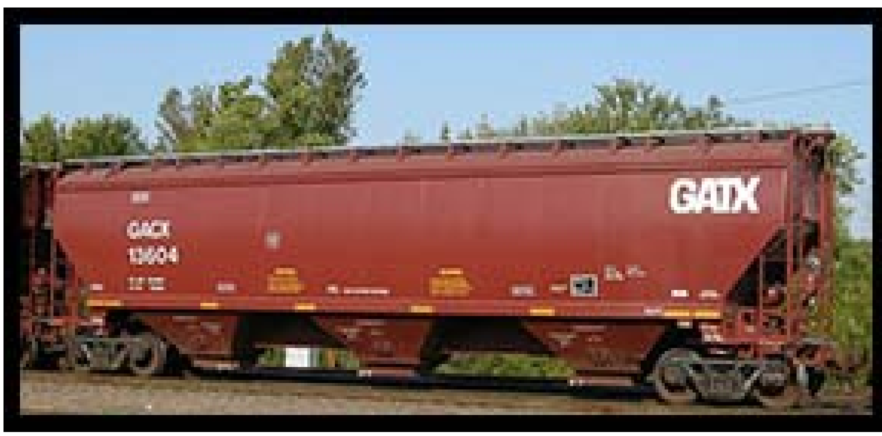


Source: Presentation by Toby Kolstad, Principal, Rail Theory Forecasts, Rail Trends conference, New York City, November 1, 2011

Grain Cars

Wheat, corn, and soybeans move in covered hoppers. Exhibit 107 provides an example. The cars are owned by railroads, leasing companies, or grain companies.

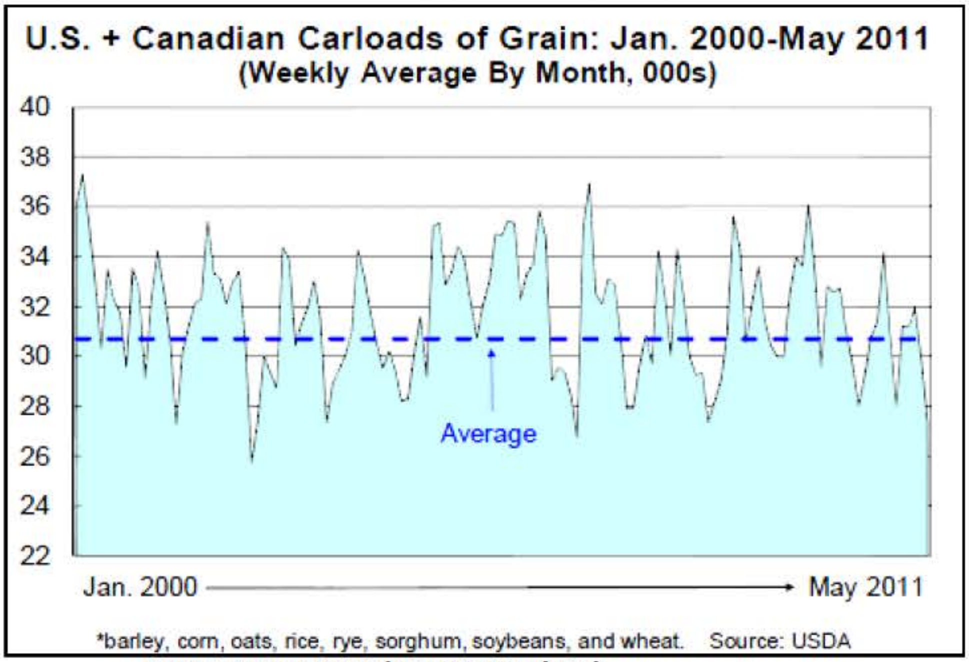
Exhibit 107: Example of Covered Hopper for Grain Service



Source: http://www.gatx.com/wps/wcm/connect/GATX/GATX_SITE/Home/Rail/Rail+North+America/Products/Equipment+Types/Freight/Covered+Hopper/Gravity+Discharge/

Fleet owners manage their covered hopper fleets to maintain good car utilization while minimizing car shortages during peak periods. This is particularly challenging because of the volatility of grain shipments. Exhibit 123 and Exhibit 108 show the volatility of export and total rail grain shipments.

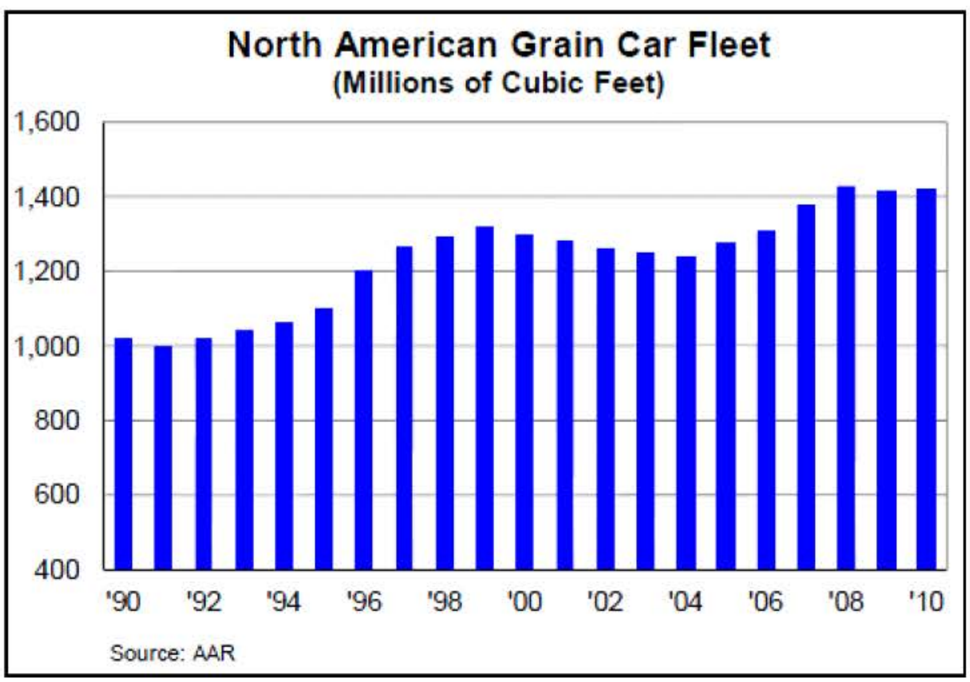
Exhibit 108: Weekly Average Grain Carloads by Month Jan. 2000-May 2011



Source: Association of American Railroads

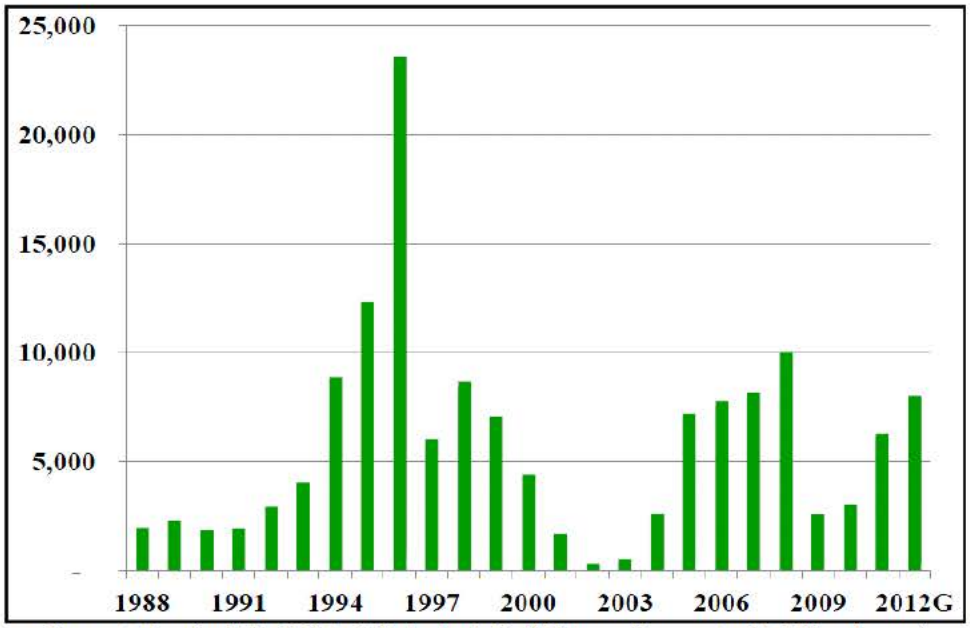
Rail carriers have been increasing the capacity of the rail car fleet through purchases of their own equipment as well as encouraging the acquisition of shipper owned rail cars. Non railroad owned cars are nearly 50% of the total car capacity. Exhibit 109 shows the capacity of the North American grain car fleet from 1990 to 2010. Not only is the fleet capacity expanding but its productivity is also increasing with the increase of unit train services.

Exhibit 109: North American Grain Car Fleet



As rail cars are retired from the fleet each year, railroad managers must project expected demand and acquire the cars needed to protect demand forecasts. Exhibit 110 shows large covered hopper deliveries to the North American car fleet from 1988 thru 2011 with a projection for 2012. This projection estimates the addition of about 8000 covered hoppers to the fleet in 2012. This represents about 40,000,000 cubic feet of capacity or about 2.9 % of the total car fleet.

Exhibit 110: Large Covered Hopper Deliveries 1988 thru 2012



Source: Presentation by Toby Kolstad, Principal, Rail Theory Forecasts, Rail Trends conference, New York City, November 1, 2011

Ore Car Capacity

Cars dedicated to iron ore service are specialized due to the very high density of pelletized taconite. While there are several designs in use, most are short hopper cars similar to the example in Exhibit 111. These cars are acquired and maintained by the major railroads serving the mines, or by the mining companies themselves.

Exhibit 111: Ore Car Example

Source: Freight Car America, http://www.johnstownamerica.com/Ore-Hopper.htm, 5/24/12

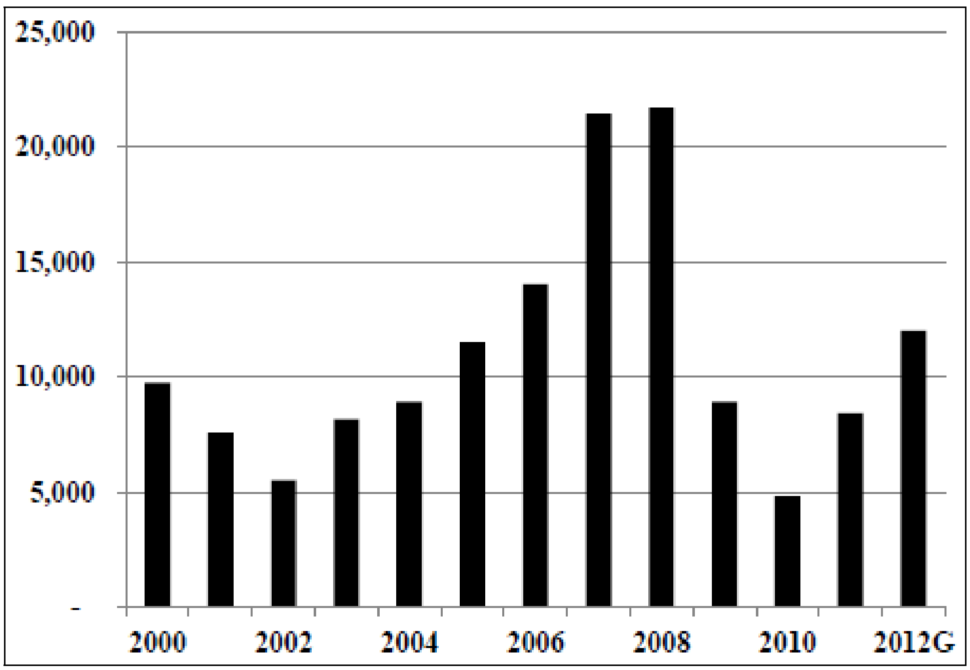
The railroad industry has a record of investing in the necessary capacity for iron ore movements. In 2008, for example, CN began a long-term plan to upgrade its iron ore car fleet, acquiring 232 new cars and refurbishing another 500 out of total fleet of around 2,200.

Outside of the Great Lakes taconite pellet movements, iron ore is also moved in conventional hopper cars. The movements between Utah and the West Coast ports use hopper cars drawn from the same fleet that serves coal business.

Rail Car Manufacturing Response

Over the past decade, rail car capacity shortages due to unexpected business changes have proven to be relatively short in duration. In recent years, the rail car manufacturing industry has demonstrated its ability to respond quickly to unusual demands brought about by fundamental changes in the rail industry. Recently, there was a need to produce a large number of tank cars to handle ethanol shipments. Exhibit 112 illustrates the industry's ability to respond. More than 20,000 new tank cars were produced in 2007 and 2008.

Exhibit 112: Tank Car Production



Source: Presentation by Toby Kolstad, Principal, Rail Theory Forecasts, Rail Trends conference, New York City, November 1, 2011

Currently, the urgent need for cars to move sand to support hydrofracking wells for natural gas generated orders for 18,000 small-cube covered hopper cars between the third quarter of 2010 and the second quarter of 2011. More orders were expected for the second half of 2011. Deliveries eventually could increase the overall size of the 65,000-car, small-cube covered hopper fleet by 50 percent.

Positive Train Control

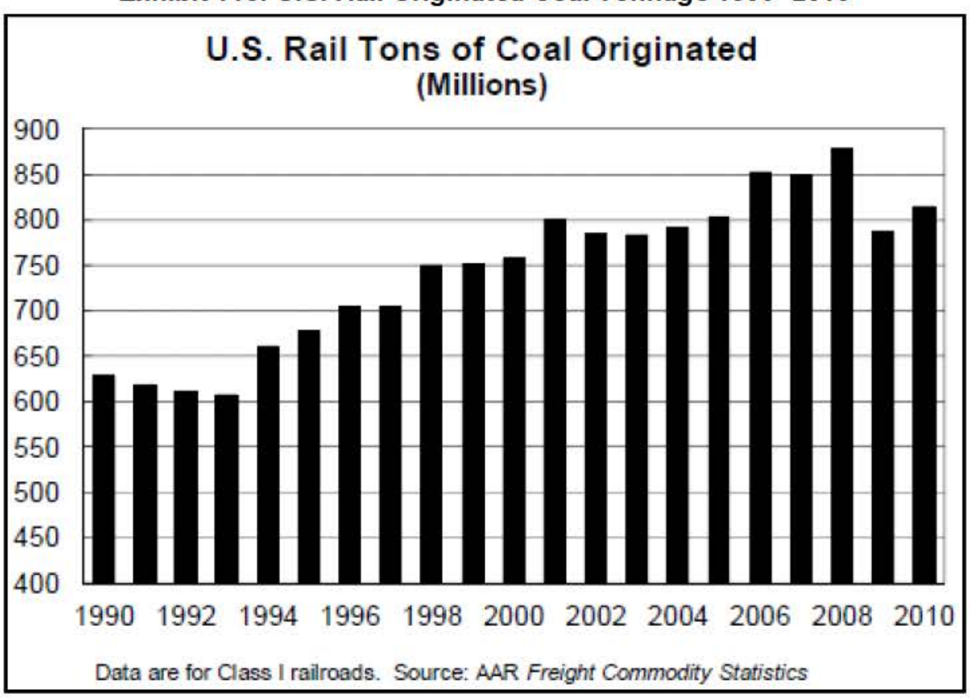
Positive Train Control (PTC) is a technology that automatically stops or slows a train before an accident occurs. The Rail Safety Improvement Act of 2008 (RSIA) mandates the widespread installation of PTC systems by December 2015. In 2012, the railroads will spend more than a Billion dollars, or approximately 10% of annual capital expenditures, to prepare for the mandate. The ongoing cost of maintenance is also a concern for the rail industry. The practical impact is to reduce the funding available for other types of capital expenditures while PTC is being implemented.

Railroads and Coal

Background

Coal is the largest single commodity handled by U.S. railroads accounting for 44% of rail tonnage and 24% of revenue in 2010. This coal business accounted for 814 million tons and 7.07 million carloads. U.S. rail coal tonnage has shown steady growth over the past 20 years. See Exhibit 113.

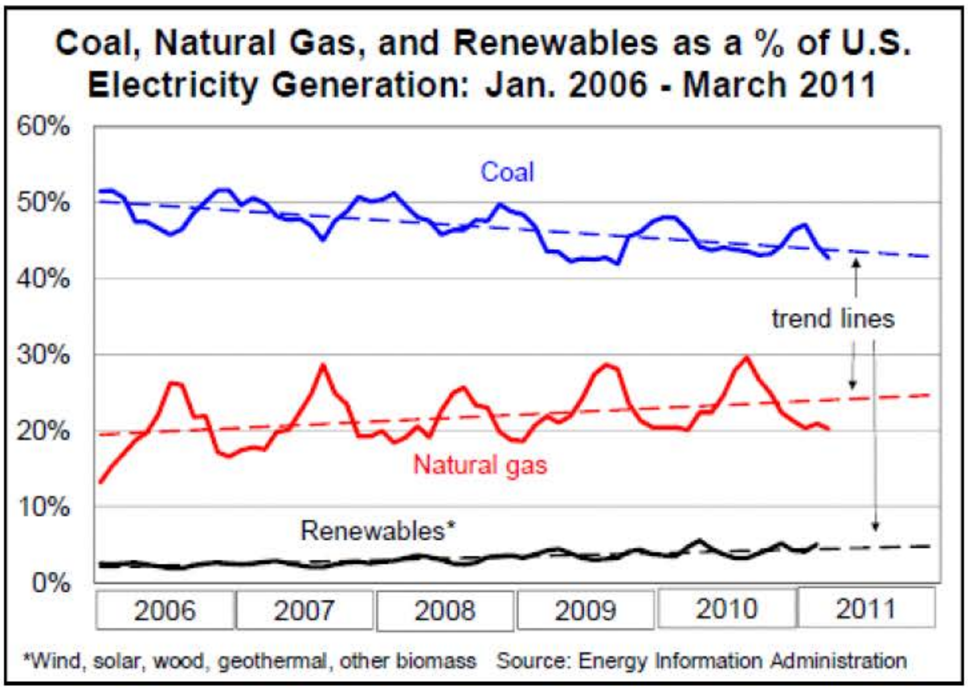
Exhibit 113: U.S. Rail Originated Coal Tonnage 1990 -2010



Rail productivity has been a major factor in rail movement of coal. About 95% of rail coal tonnage moves in highly efficient unit coal trains which can run to 100 cars and over 10,000 tons per train. In addition to the productivity of unit trains, lighter weight aluminum freight cars and improved track capacity have also improved efficiency. In 2010, the average coal car carried 115.3 tons up by 17 % from 1990 when the average was 98.2 tons. These productivity improvements have allowed rail rates on a ton mile basis to decline over the last 30 years. According to the Association of American Railroads (AAR) the coal revenue per ton mile, on an inflation adjusted basis, was 55% lower in 2009 than in 1991.

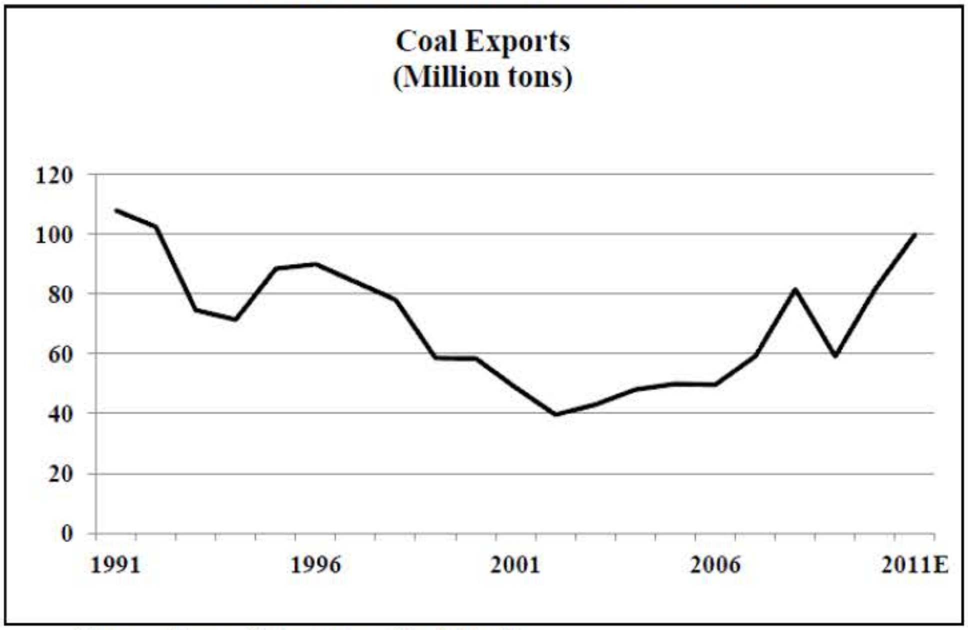
The primary use of coal in the U.S. is for electricity consumption. In 2010, 93 % of U.S. coal consumption was for electricity generation. However, the market share of coal use for electricity generation has been declining as natural gas and renewable energy share has been increasing. These share shifts are driven by the retirement of older coal burning power plants and the increased supply of natural gas. Exhibit 114 shows the share trends for coal, natural gas and renewable energy sources for electricity generation.

Exhibit 114: Power Source for Electricity Generation



This reduction in use of coal for power generation has driven coal producers to increase their focus on export markets for their coal production. In 2010 U.S. coal exports were nearly 82 million tons and estimated to reach 100 million tons in 2011. See Exhibit 115.

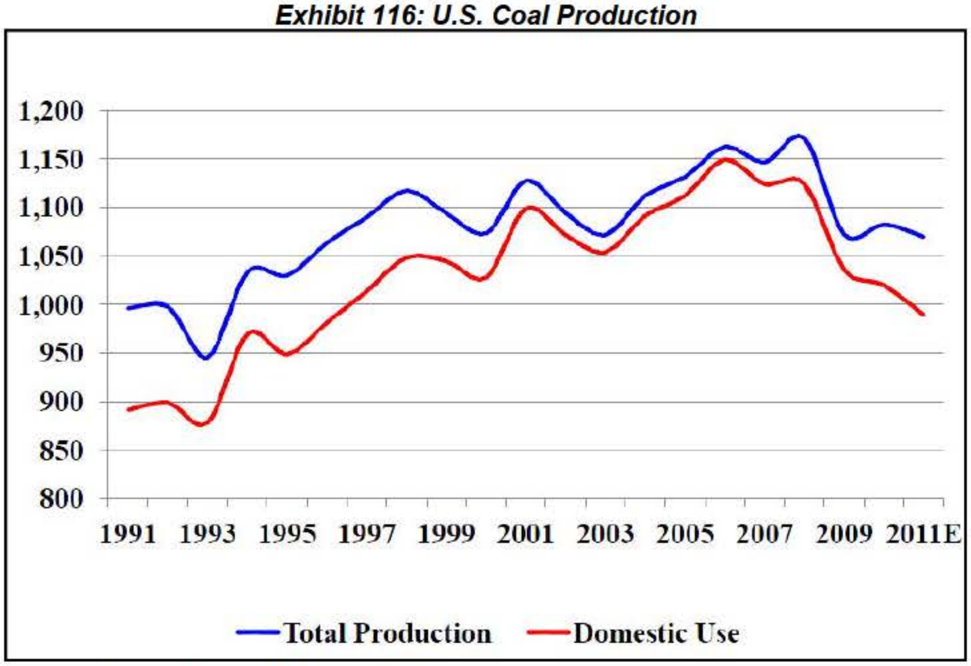
Exhibit 115: U.S. Coal Exports 1991 - 2011E



Source: Energy Information Administration

Although coal exports are increasing, it does not appear that the rail volume generated from coal exports has offset the loss of domestic utility coal. The EIA has forecasted that consumption of domestic utility coal will decline by 3% in 2012. In addition, Class I railroads, Union Pacific, Norfolk Southern and CSX have projected weak coal demand in 2012 in their 1st quarter review presentations. This weakness is driven by lower coal electricity production due to mild weather, energy efficiency and lower natural gas prices which combine to reduce overall coal demand and production. See Exhibit 116.

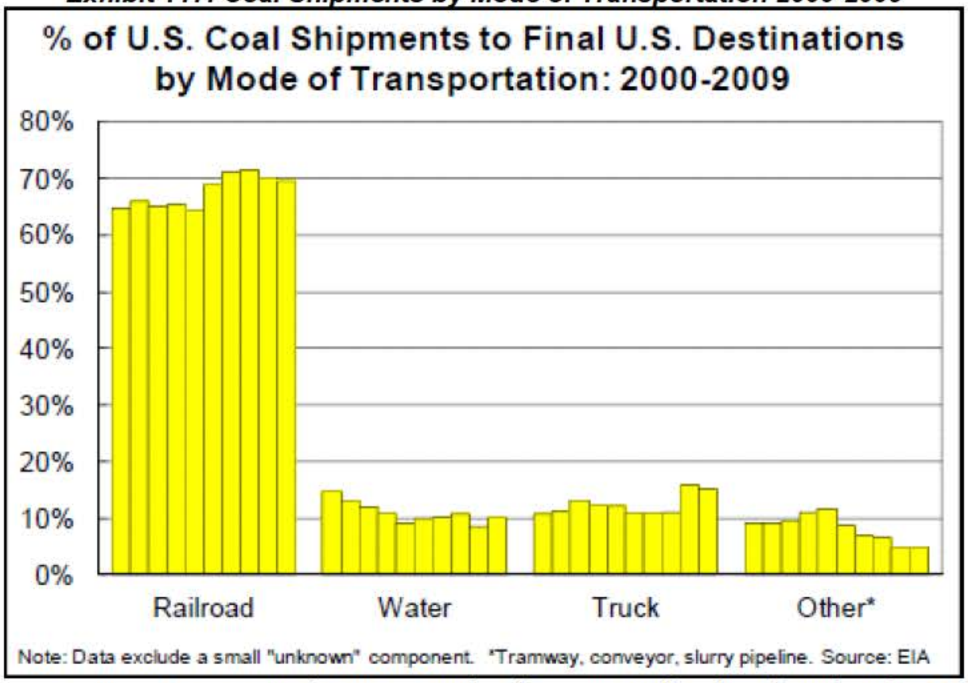
Exhibit 116: U.S. Coal Production



Source: Energy Information Agency

According to the Energy Information Agency (EIA) 70% of U.S. coal was delivered to its final destination by rail. The rail share has increased over the past 15 years due to the growth of Western Powder River Basin coal production. Exhibit 117 provides a comparison of modal share of coal movements for rail, barge, truck and other (i.e. tramway, conveyor or slurry pipeline) from 2000 thru 2009. The rail and barge shares have been relatively constant from 2005 thru 2009.

Exhibit 117: Coal Shipments by Mode of Transportation 2000-2009

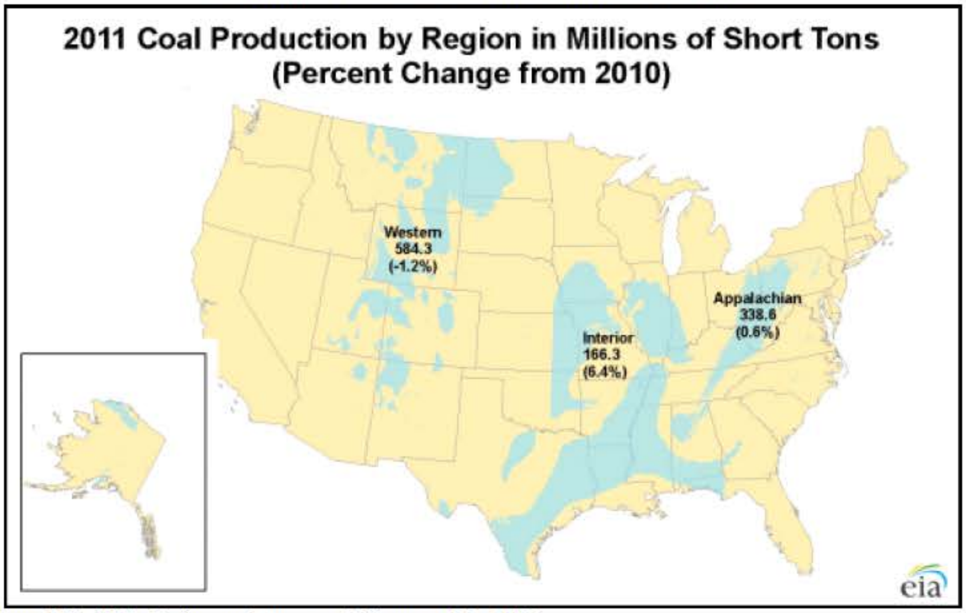


Source: Association of American Railroads report "Railroads and Coal" July 2011

Coal Production Areas and Rail Routes

Modal routing of coal by rail or water is largely dictated by the coal mine origins and shipment destinations. The major coal production regions of the U.S. are the Western and Appalachian regions, which together produce about 85% of U.S. coal tonnage. See Exhibit 118.

Exhibit 118: U.S. Coal Production Regions



Source: USTEIA. Today in Energy, February 13, 2012.
http://www.eia.gov/todayinenergy/detail.cfm?id=4970

As the maps of railroad coal networks suggest, each of the major systems serves a linked subset of mines, rail-barge transfers, power plants, and export terminals. These systems overlap geographically even where they may not connect operationally.

Wherever possible coal producers or coal customers prefer to have competing transportation options to keep rates down. Options, however, are rarely available, so many coal shippers or customers are "captive" to one railroad. The potential for rail market power can be offset in multiple ways:

- Through "source competition", where a customer can pick a coal source on a different railroad or where a producer can ship from mines on different railroads.
- Through barge service. Where barge can be substituted for all or part of a rail move, the customer gains market leverage.
- Through rail-barge transloads. Shipper can sometimes ship via rail to a river transfer point and use barge to the customer.

The Appalachian region coal mines have access to the Ohio River coal terminals. These mines and river coal terminals are largely served by CSX and Norfolk Southern. Rail to barge transfer terminals are located along the Ohio River from Pittsburg to Louisville. These terminals will handle coal destined for waterway served power plants or export through New Orleans or Mobile. Export coal to U.S. East Coast Ports will move by rail from the Appalachian coal region. The primary ports for coal exports are Baltimore, and Norfolk/Newport News. Coal is also being exported through the Fairless Hills Terminal in Philadelphia served by both CSX and Norfolk Southern. In addition, CSX has reported it plans to make improvements needed to ship export coal through its Shipyard River Terminal in the Port of Charleston.

Coal from the Western Coal Region which includes the Powder River Basin is desirable because of its low sulfur content. Western coal originates on either the BNSF or UP railroads and can reach Eastern markets via interline shipments to CSX and Norfolk Southern. Western coal can also reach the Mississippi and Ohio Rivers utilizing rail served coal terminals. These terminals, served by BNSF and UP, are located on the Mississippi River near St. Louis and on the Ohio River near Paducah, Ky. BNSF also has a major movement of coal to Duluth/Superior which moves east via the Great Lakes.

Western coal moving for export is transloaded to barge and moves via Mississippi River to New Orleans for transload to ocean vessels. Currently there is very little export coal moving via U.S. west coast ports because there are no major coal terminal facilities. The only west coast terminal handling export coal is Metro Stevedoring at Long Beach. There is some movement of coal to Canada for export via Canadian ports. This coal is exported to Canada through the Seattle Customs District and then moves to large Canadian coal terminals near Vancouver for export. There has been interest shown in development of a Pacific Northwest export coal terminal but this project is still in the planning stage. Development of a west coast coal terminal would impact Asian coal exports via east coast and gulf coast ports.

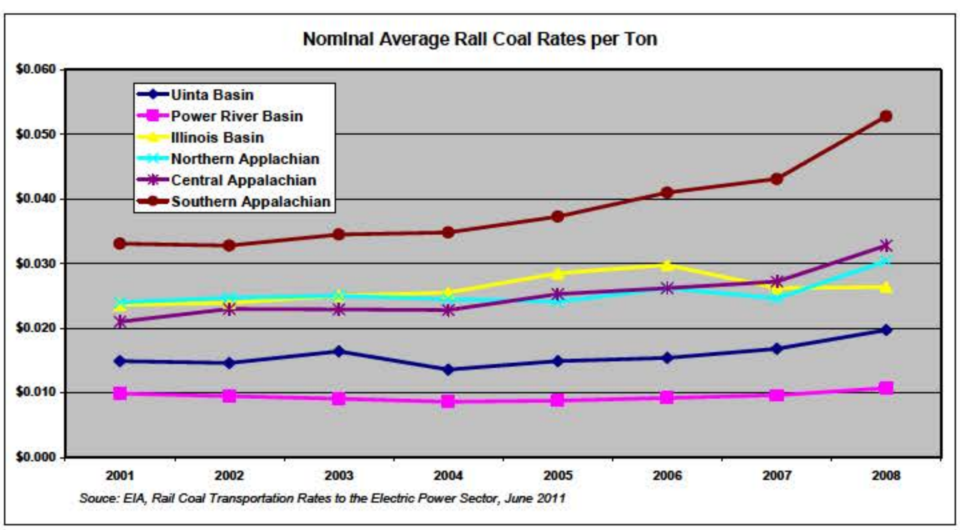
Rail Coal Rates

The Surface Transportation Board studied coal rail rates between 1987 and 2007. They found that between 1987 and 2004 rail rates fell for both privately-owned and rail owned equipment. The rates then showed an upward trend through 2007.

Similarly, rates declined in all distance categories through 2001. Under 500 mile length of haul rates rose continuously from 2001 through 2007, with 2007 rates exceeding those in 2001 by 32%. Longer-distance services became fairly rate stable in 2001 and did not rise until after 2004. For very long-distance hauls (over 1500 miles) rates actually increased by 10.7 percent between 2001 and 2007.

Exhibit 119 illustrates how these pricing trends impact coal from various producing regions. Powder River Basin coal moves the greatest distances at very low rates per ton mile.

Exhibit 119: Rail Coal Rates

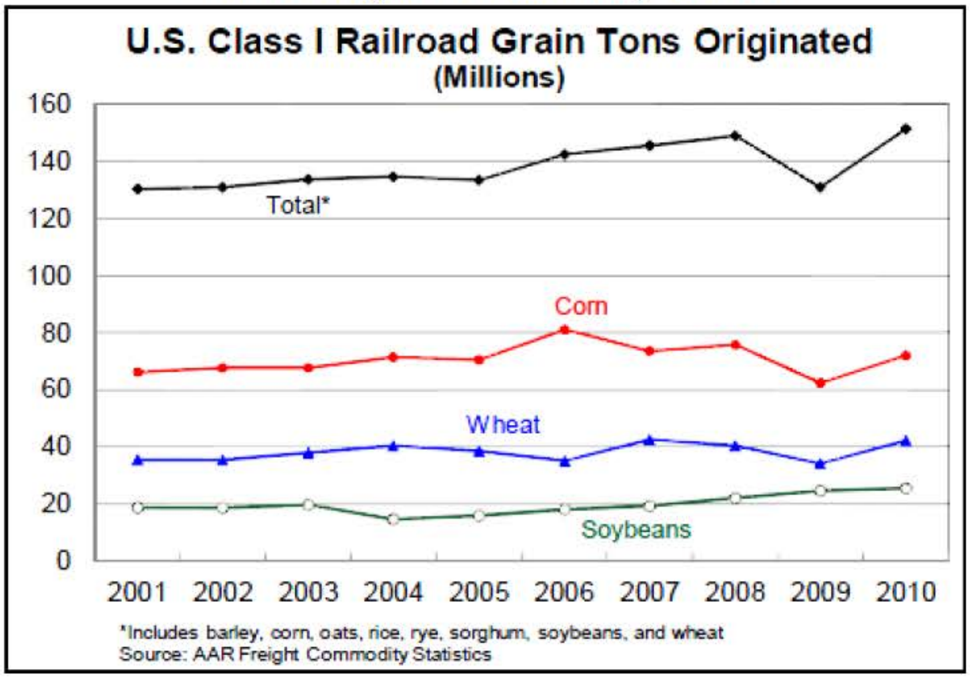


Railroads and Grain

Background

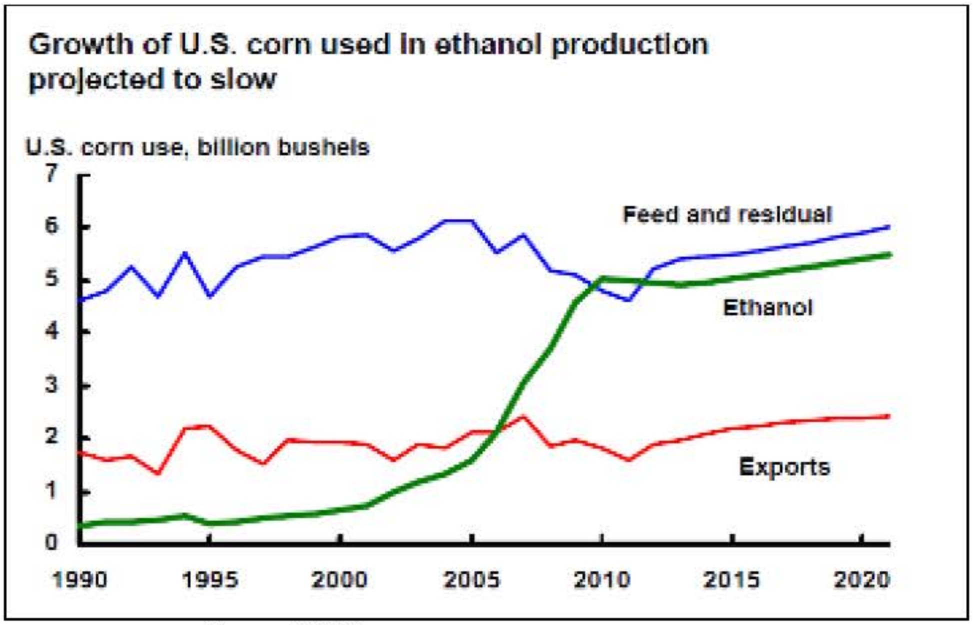
Rail grain shipments represent one of the rail industry's largest transportation markets. In 2010 originated shipments of all grain products totaled 151.5 million tons making up 8.2% of total rail tonnage. The primary grain products shipped by rail include soybeans, corn and wheat. However, grain products also include barley, oats, rice and sorghum. Total U.S. rail-originated grain tonnage has shown small increases over 2001 to 2009. Corn tonnage has declined from its high in 2006. Exhibit 120 shows total grain tonnage along with the corn, wheat and soybean tonnage for 2001 through 2010.

Exhibit 120: Originated Grain Tonnage 2001-2010



This decline in corn tonnage is related to the increased use of corn for ethanol production. In the 2010/2011 crop year, about 40% of U.S. corn was used in ethanol production. Most corn used for ethanol production is sourced locally and trucked to the ethanol plant. This trend reduces the market for rail movement of corn. Exhibit 121 shows the uses of U.S. corn for ethanol, feed and export, illustrating the significant increase in ethanol production that took place in 2005-2009.

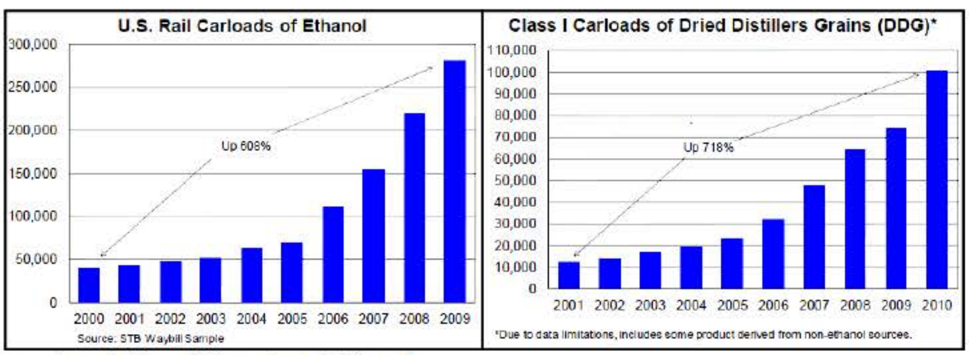
Exhibit 121: U.S. Corn Use and Forecast 1990 -2020



Source: USDA

The decline in rail corn tonnage is only part of the story, as it is offset by the growth in shipments of ethanol and the byproduct of ethanol production, dried distiller's grains (DDG). DDG has become an important high protein livestock feed ingredient. Exhibit 122 shows the increase in rail carloads driven by the increased production of ethanol and DDG.

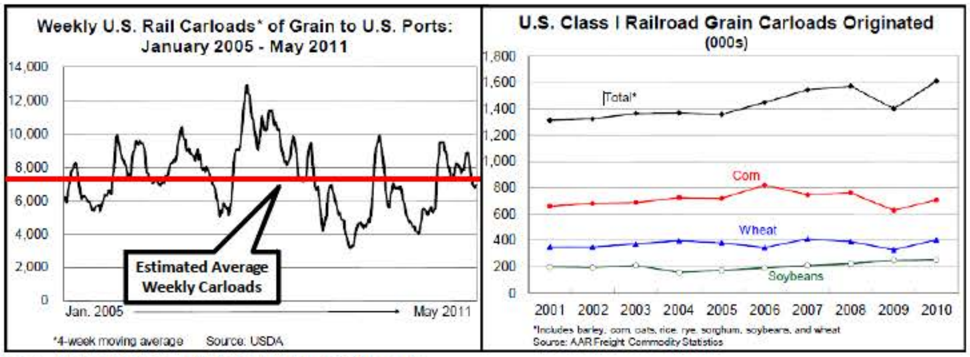
Exhibit 122: U.S. Rail Carloads of Ethanol and Dried Distillers Grains



Source: Association of American Railroads

U.S. grain exports represent a significant portion of the rail grain market. Total U.S. grain exports for the period 2006 – 2010 averaged 129 million tons, or about 23 % of total U.S. grain production. Over this same period rail grain export shipments averaged about 7500 carloads per week or 390,000 carloads annually. This represents about 25 % of total grain carloads, which averaged about 1.5 million shipments per year. See Exhibit 123.

Exhibit 123: Comparison of Grain Export with Total Grain Carloads

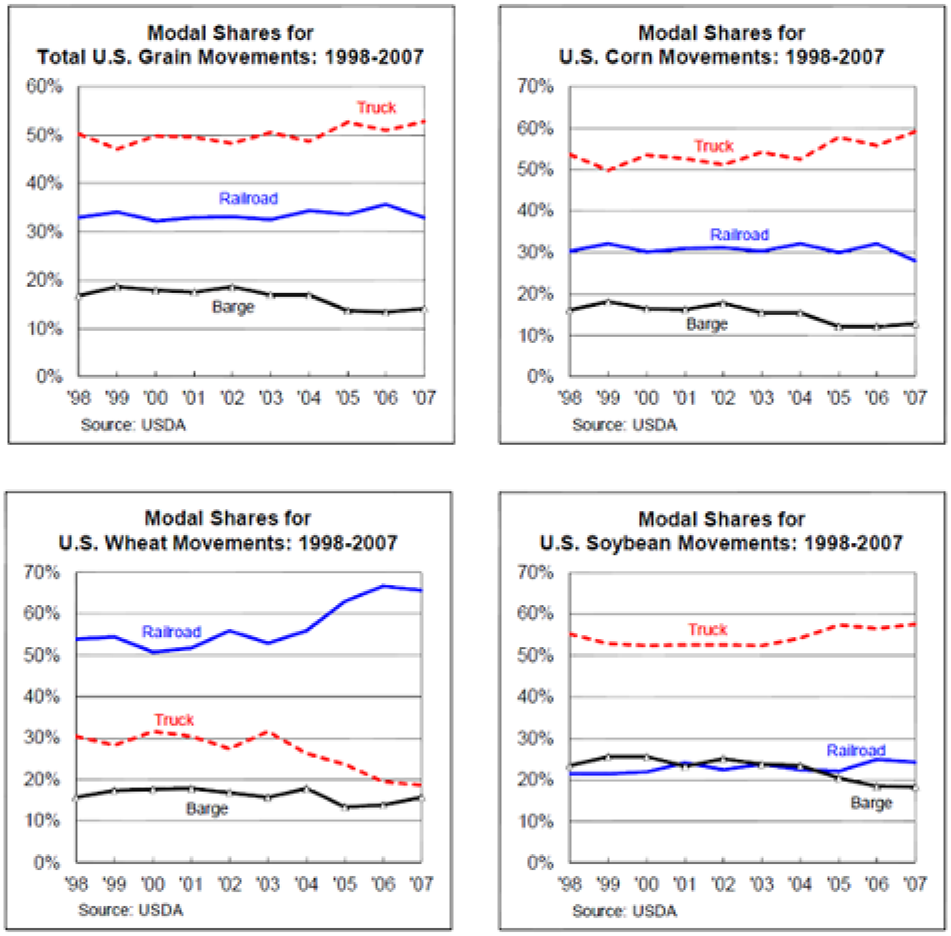


Source: Association of American Railroads.

Rail Share

According to recent USDA data, rail share of total U.S. grain movements was about 33% in 2007. The rail share remained relatively constant from 1998 to 2007. However, the rail share by commodity varied widely for each mode. Rail shipments of wheat had the highest market share while the truck had the highest overall share for soybean and corn shipments. See Exhibit 124. These share splits are largely dependent on length of haul and percentage of export tonnage. Long haul grain movements will move by rail or barge with local short distance movements dominated by truck. Export movements are generally long haul and are dominated by rail and barge.

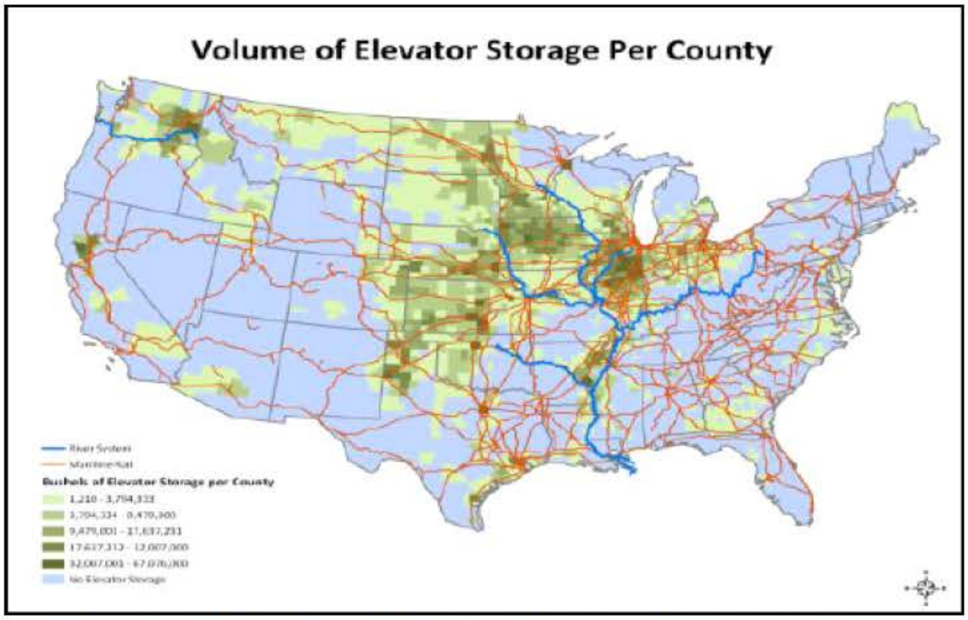
Exhibit 124: Railroad, Barge and Truck Share of Grain Movements 1998-2007



Source: Association of American Railroads

Grain elevator capacity is concentrated in the major U.S. growing areas and represents a geographical depiction of the origin grain markets. The U.S. map in Exhibit 125 shows the concentration of grain elevators along with the U.S. rail and inland waterway systems. The largest concentration of production is in a broad area of the Midwest, with smaller concentrations in Mississippi River Valley, the Pacific Northwest and northern California. This concentration of production shows that most of the grain production regions have good rail access and a high percentage have access to the inland waterway system.

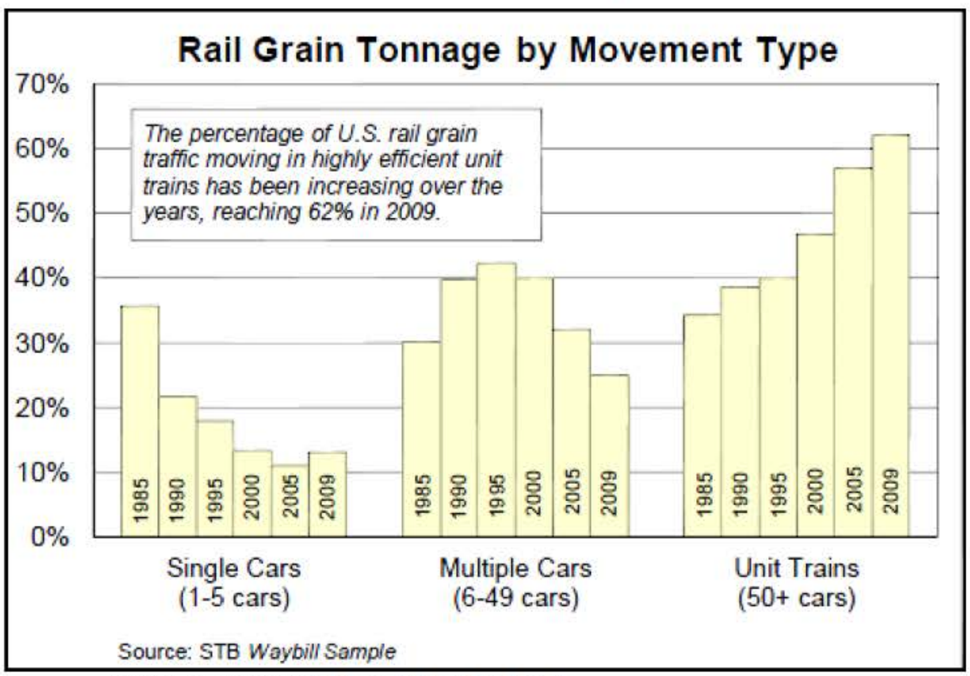
Exhibit 125: Grain Elevator Capacity with Rail and Inland Waterway Systems



Source: Farm Service Agency USWA/UGRSA database (as of January 2009)

Rail carriers have been improving their productivity in handling grain shipments over the past 25 years by shifting more and more volume to unit train movements of more than fifty cars. From 1985 through 2009 grain tonnage in single car movements has declined from 36% of tonnage to 13%. At the same, grain tonnage moving in unit trains has increased from 34% of tonnage to 62% making unit train movement the dominant service type. Exhibit 126 provides a graphic display of the increase in unit train tonnage in five year increments.

Exhibit 126: Rail Grain Tonnage by Type of Movement

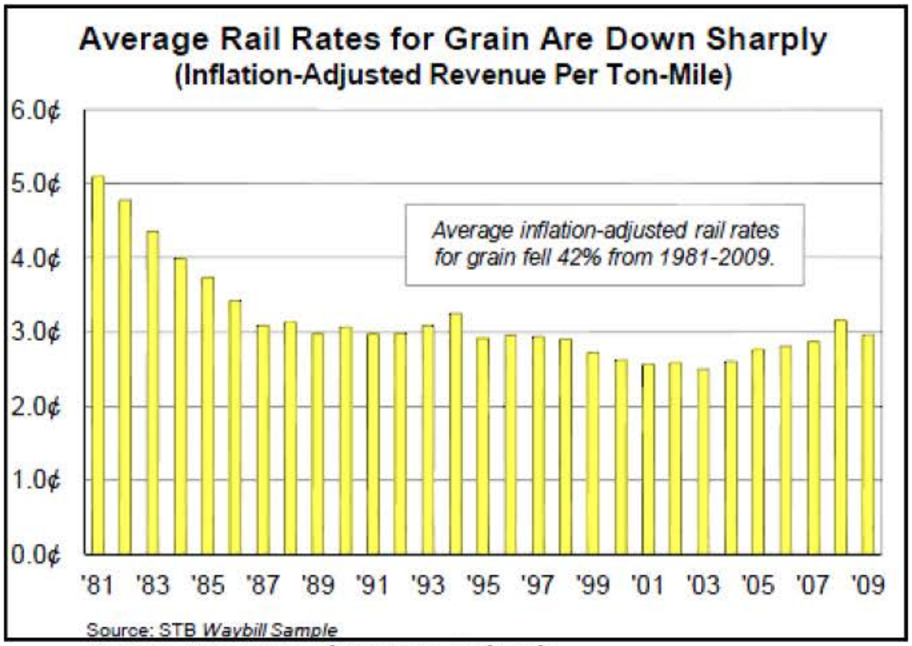


Source: Association of American Railroads

Grain Rates

According to the AAR, access to rail, barge and truck service creates a competitive environment that benefits grain shippers. Average rail rates on an inflation-adjusted revenue per ton mile basis have declined by 42 % from 1981 – 2009. See Exhibit 127.

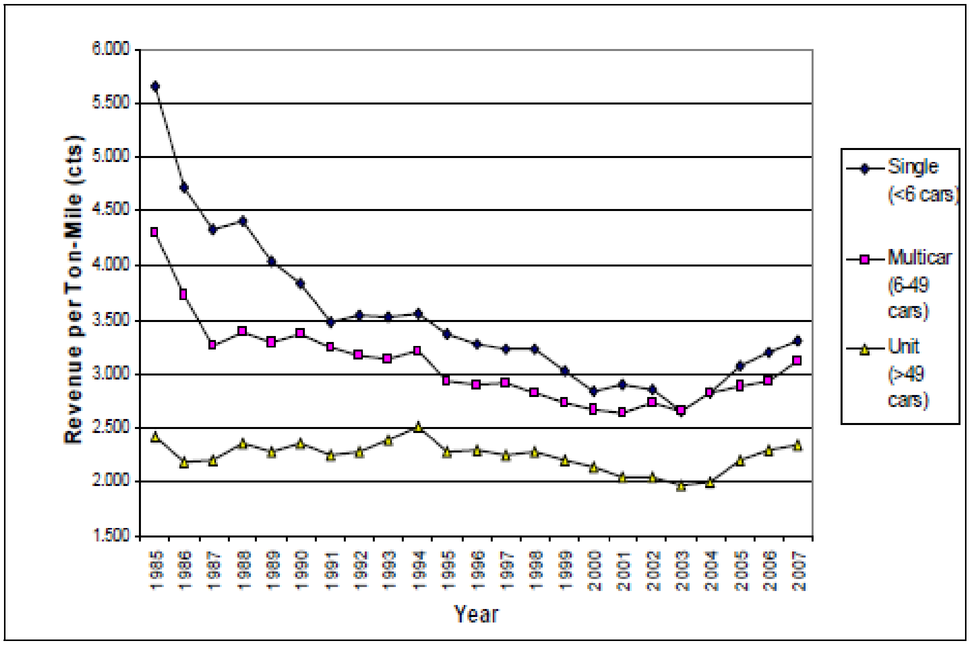
Exhibit 127: Average Rail Grain Rates 1981-2009



Source: Association of American Railroads

Exhibit 128 illustrates the results of an STB study showing how grain rates vary depending on the number of cars tendered. For unit grain trains, real revenue per ton-mile has risen and fallen during period. Rates on single-car and multi-car shipments fell from 1985 through 2003, and then increased. In 2007 single-car shipments were just more than half of their 1985 levels

Exhibit 128: Grain Rates by Train Type



Source: Surface Transportation Board, Office of Economics, Environmental Analysis & Administration, Section of Economics, Study of Railroad Rates: 1985-2007, January 16, 2009, page 9.

Implications for Waterway Capacity

Coal and grain are critical markets for the major railroads. Despite periodic congestion due to unexpected traffic growth or local car shortages in peak season, the major rail carriers have maintained sufficient capacity for the grain and coal business that is profitable. All indications are that the rail carriers will continue to maintain capacity for their coal and grain business.

Railroads can easily justify and fund investments in the coal market. The most lucrative movements are regular, high-volume, long-distance shipments. Unit coal trains from mine to power plant epitomize rail efficiency and profit potential. Unit coal trains to export elevators may not have the predictability of power plants moves, but can be equally attractive.

Grain movements have historically been a profitable, high-volume market for the railroads. The traditional low-volume car-by-car grain gathering practices have been replaced with a system of shuttle trains between local and regional elevators, and unit trains to final destinations or export elevators.

In the coal market many major shippers own or lease the railcars and receive corresponding rate reductions under negotiated contracts. Besides reducing rail capital requirements, these practices tend to lock customers into the rail mode for multi-year periods.

Railroads prefer longer, all-rail moves to the shorter feeder moves to rail-barge transfer terminals. Any future railroad coal or grain capacity shortfalls would likely be in the less profitable short haul low volume markets. These short distance movements are most likely to occur between small Illinois Basin or Appalachian coal mines and river barge transfer points. Movements from large Powder River Basin mines to Mississippi River barge transfer terminals and PNW export terminals will be long distance unit train moves which are attractive to the rail carriers.

Railroads are therefore unlikely to surrender long-haul, higher volume coal or grain business that could shift to the waterways. In any future capital crunch or profit pressure, they are more likely to reduce support for rail-barge transloading.

VII. Competitive Position of Trucking

Trucking Cost Increases

At the start of 2010 truckload carrier operating costs averaged about $1.50 per mile (Exhibit 129). The costs were down from about $1.65 per mile in 2008 because of short-term fluctuations in fuel costs.

Exhibit 129: Average Truckload Carrier Operating Costs

Average Marginal Costs per Mile, 2008, 2009, Q1 2010

Motor Carrier Marginal Expenses	2008	2009	Q1 2010
Vehicle-based			
Fuel & Oil Costs	$0.633	$0.405	$0.465
Truck/Trailer Lease or Purchase Payments	$0.213	$0.257	$0.235
Repair & Maintenance	$0.103	$0.123	$0.120
Truck Insurance Premiums	$0.055	$0.054	$0.052
Permits and Licenses	$0.016	$0.029	$0.023
Tires	$0.030	$0.029	$0.026
Tolls	$0.024	$0.024	$0.024
Driver-based			
Driver Wages	$0.435	$0.403	$0.404
Driver Benefits	$0.144	$0.128	$0.142
TOTAL†	**$1.653**	**$1.451**	**$1.491**

Source: ATRI, An Analysis of the Operational Costs of Trucking: 2011 Update

Exhibit 130 shows the estimated share of operating costs accounted for by major cost categories.

Exhibit 130: Estimated Shares of Truckload Operating Cost

Share of Total Marginal Cost, 2008, 2009, Q1 2010

Motor Carrier Marginal Expenses	2008	2009	Q1 2010
Vehicle-based			
Fuel & Oil Costs	38%	28%	31%
Truck/Trailer Lease or Purchase Payments	13%	18%	16%
Repair & Maintenance	6%	8%	8%
Truck Insurance Premiums	3%	4%	3%
Permits and Licenses	1%	2%	2%
Tires	2%	2%	2%
Tolls	1%	2%	2%
Driver-based			
Driver Wages	26%	28%	27%
Driver Benefits	9%	9%	10%
TOTAL†	100%	100%	100%

Source: ATRI, An Analysis of the Operational Costs of Trucking: 2011 Update

In the long term, trucking costs are being driven upward by several factors:

Rising fuel costs. Fuel accounts for about 30-40% of typical truckload operating costs, and probably somewhat more for coal and grain movements that approach the weight limits of the truck.

Long-term driver shortage. There has been a persistent shortage of new truck drivers over the last decade. While the shortage eased during the recession it is expected to recur and persist. The driver shortage increases labor costs (which are about 35-37%% of typical truckload operating costs) and can lead to spot capacity shortfalls.

Rising insurance costs. Insurance costs are about 3-4% of truckload operating costs and have been rising.

Emissions standard compliance. Trucks used in coal and grain transport tend to be older, and that segment of the trucking industry was probably not markedly affected by the higher cost of 2007-compliant and 2010-compliant diesel engines. The higher cost of low-emissions diesel engines will eventually filter down to the mining and agricultural sectors. These sectors may also be affected by stricter state emissions requirements.

Deterioration of rural roads and highways. The long and pervasive shortfall in U.S. infrastructure funding is resulting in surface and bridge deterioration on rural farm-to-market and mine-to-market roads and highways. Deteriorating conditions result in slower, less reliable trucking; circuitous routing; and higher tire and maintenance costs. As with most infrastructure, neglected or deferred maintenance leads to high long-term repair costs. Those costs, however, tend to be borne by cities, counties, and states rather than by shippers or truckers directly.

Impacts on Coal

The major impact of higher over-the-road trucking costs on coal shipments will be in mine (tipple) to transload movements. Where the nearest or most advantageous transload point is on the waterways, higher trucking costs could lead to a small reduction in market share or potentially to a shift to rail. The lower ocean shipping costs due to greater sailing draft after Panama Canal expansion should offset the impact of higher trucking costs. The net impacts would vary on a case-by-case basis.

Larger, newer mines with direct loadout to rail will not be affected and may gain some slight advantage. Where mines have only one available rail transload point, which is typical of Appalachian mines distant from the waterways, higher trucking costs will raise their operating costs without affecting modal choice.

Impacts on Grain

There are two segments of the grain export logistics chain that will be affected by rising trucking costs:

- Trips between the farm and the first elevator (usually the "country" elevator).
- Trips between the first (country) elevator and terminal (export) elevators or processing plants.

Farmers typically sell their grain to one of the major grain companies (e.g. Cargill, Bunge) and deliver it to the elevator by truck at their own expense. The farmer therefore balances the offering price at accessible elevators and the trucking cost to reach each elevator to get the best net price. Rising trucking costs will therefore lead farmers to favor closer elevators or elevators that can offer higher grain prices to offset the trucking cost.

The informa analysis of Panama Canal impacts on soybean exports concluded that terminal elevators and barge transload points on the waterways would be able to extend their competitive market reach from about 70 miles from the rivers to 111 miles or 161 miles (depending on what ocean shipping economies are realized). Depending on the relative locations of farmers and accessible elevators, this increased market reach would translate into higher offering prices at waterways facilities to offset higher trucking costs.

Where waterways facilities are closer than rail-only facilities, the lower ocean shipping costs will *add* to their locational and trucking cost advantage.

As the informa report points out, the low-cost solution for a farmer/producer will be heavily influenced by distances and geography.

VIII. Appendix: Coal Export Terminals

Overview

As Exhibit 15 indicates, the long-term export coal terminal capacity consists of existing terminals, existing terminals undergoing improvements, and proposed terminals. This appendix covers export coal terminals on the Gulf and West Coasts, since those include the waterways ports and the competing rail-served western ports.

Exhibit 131: North American Coal Terminal Capacity

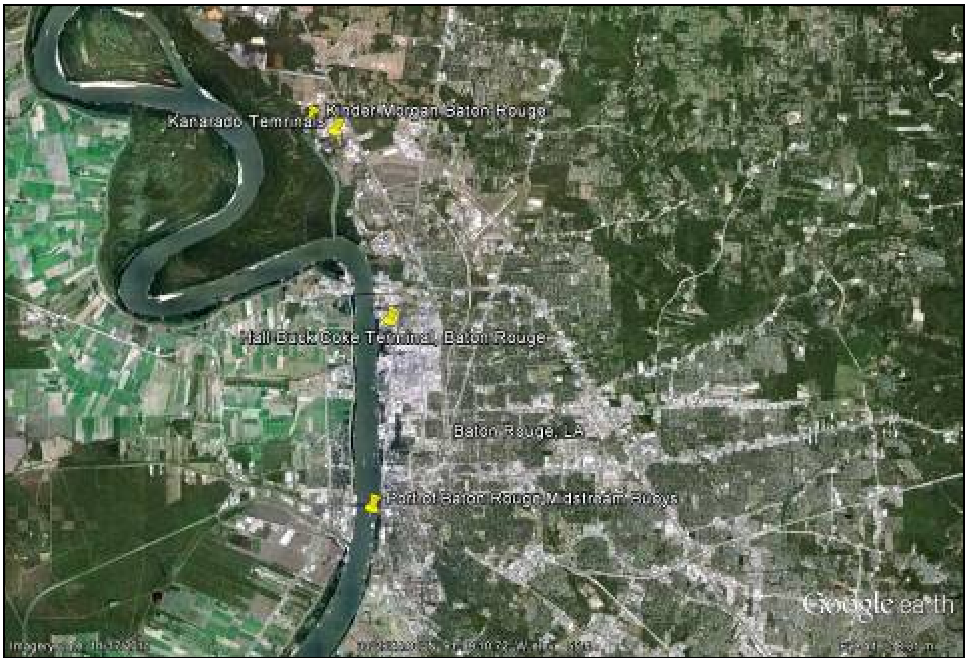
Source: Platts, http //www.platts.com/NewsFeature/2012/coaltransport/index

Lower Mississippi, New Orleans Customs District

Port of Baton Rouge

Baton Rouge has four sites that can or could export coal (Exhibit 132). Actual exports were about 500,000 tons in 2008 and 400,000 tons in 2011, with none in 2009 or 2010.

Exhibit 132: Port of Baton Rouge Coal Terminal Locations



Source: Google Earth

The Baton Rouge Midstream Transfer Buoys and the pile anchor midstream buoys (Exhibit 133) allow barge-to-vessel cargo transfers and have been reportedly used for export coal.. These buoys can accommodate Panamax-size vessels, with 1000 feet of space between buoys with depth alongside of 45 feet. (Source: *World Port Source*)

Exhibit 133: Port of Baton Rouge Midstream Transfer Moorage Buoys

Source: Google Earth

The Kinder-Morgan terminal (Exhibit 134) is on the ship canal rather than on the river. It appears to be principally a multi-purpose barge terminal. It does have rail service.

Exhibit 134: Kinder-Morgan Bulk Terminal, Port of Baton Rouge Ship Canal

Source: Google Earth

The Kanarado Terminal, also on the ship canal (Exhibit 135), does not currently handle coal but could do so.

Exhibit 135: Kanarado Terminal, Port of Baton Rouge Ship Canal

Source: Google Earth

The Hall-Buck site (Exhibit 136) is an export coke terminal.

Exhibit 136: Hall-Buck Coke Terminal, Baton Rouge, LA

Source: Google Earth

Port of South Louisiana

The Port of South Louisiana stretches over 50+ miles of the Mississippi between Baton Rouge and New Orleans (Exhibit 137). It has one active export coal terminal and two terminals that could become involved in export coal.

Exhibit 137: Port of South Louisiana Coal Terminal Locations

Source: Google Earth

The Burnside Impala Terminal (Exhibit 138is a multi-purpose facility with capability to handle export coal, but is not shipping any coal at present. The terminal handles mostly barge traffic, but does have rail service.

Exhibit 138: Burnside Impala Terminal, Burnside, LA

Source: Google Earth

The major export facility at the Port of South Louisiana is the IC Rail Marine Terminal (Exhibit 139). This former Illinois Central ("IC") terminals was operated by Canadian National (successor to IC) but has recently been sold to a private firm. As the aerial photo shows, this is a rail-served terminal and would not ordinarily receive coal by barge.

Exhibit 139: IC Rail Marine Terminal, Convent, LA

Source: Google Earth

There is a coke export dock at Gramercy (Exhibit 140), somewhat downstream from the IC facility, but it does not apparently handle coal at present.

Exhibit 140: Coke Dock, Port of Gramercy, Gramercy, LA

Source: Google Earth

Port of New Orleans

The Port of New Orleans itself has no export coal facilities.

Port of Plaquemines

The Port of Plaquemines (Exhibit 141) is downstream from New Orleans, above the Mississippi Passes. Two major coal export terminals are located there, the International Marine Terminal (Source: Google Earth
Exhibit 142) and United Bulk Terminals (Source: Google Earth

Exhibit 143). Both are exclusively fed by barge as there are no rail connections.

Exhibit 141: Port of Plaquemines Coal Terminal Locations

Source: Google Earth

Exhibit 142: International Marine Terminal, Port of Plaquemines, Davant, LA

Source: Google Earth

Exhibit 143: United Bulk Terminals, Davant, LA, Port of Plaquemines

Source: Google Earth

Mobile Customs District

Port of Mobile

Coal is currently handled at three terminals at Mobile: McDuffie Island, the Bulk Barge Terminal, and the Cooper T. Smith terminal. The Middle River Terminal (also known as the Mobile River Terminal) is dormant. (Exhibit 144)

Exhibit 144: Port of Mobile Terminal Locations

Source: Google Earth

McDuffie Island (Exhibit 145) is the main Mobile coal export terminal. The Port expects to export about 10 million tons from McDuffie Island, with about 57% delivered by rail and the rest by barge. (Source: Port of Mobile)

Exhibit 145: McDuffie Island Terminal, Port of Mobile

Source: Google Earth

Mobile River Terminal

The Middle River Terminal at Mobile, just upstream from the Mobile Container Terminal and McDuffie Island (Exhibit 146), was purchased by Walter Energy in December 2010. Walter Energy is a central Alabama producer of metallurgical coal that accounted for about one-third of the McDuffie Island volume in 2010. The firm plans to convert the Mobile River Terminal site from its past use for iron ore and coke to a dedicated coal terminal. As of December 2011, Walter Energy was "still a couple of years away"[27] from moving any coal through the Mobile River Terminal, with no definite timeline announced. Depending on final design the terminal could handle 3-5 million metric tons annually. The terminal could be served by either rail or barge; no plans have been announced.

Exhibit 146: Middle River Terminal, Port of Mobile

Source: Google Earth

According to Port of Mobile staff, the Cooper T. Smith terminal (Exhibit 147) is currently receiving about 1.5 million tons of coal by barge for export.

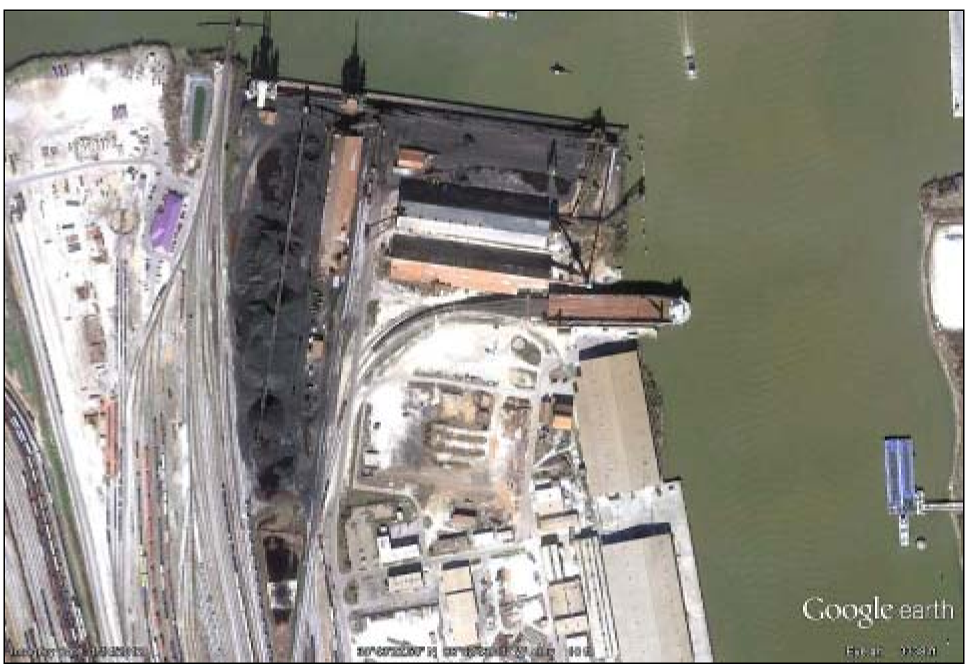
[27] Platts website, article dated 12/29/11

Exhibit 147: Cooper T Smith Terminal, Port of Mobile

Source: Google Earth

The Port's Bulk Material Handling Plant (Exhibit 148) is currently handling about 400,000 annual tons of rail-delivered coal for export, as well as 1 million tons of rail-delivered coal for barge loading.

Exhibit 148: Bulk Handling Terminal, Port of Mobile

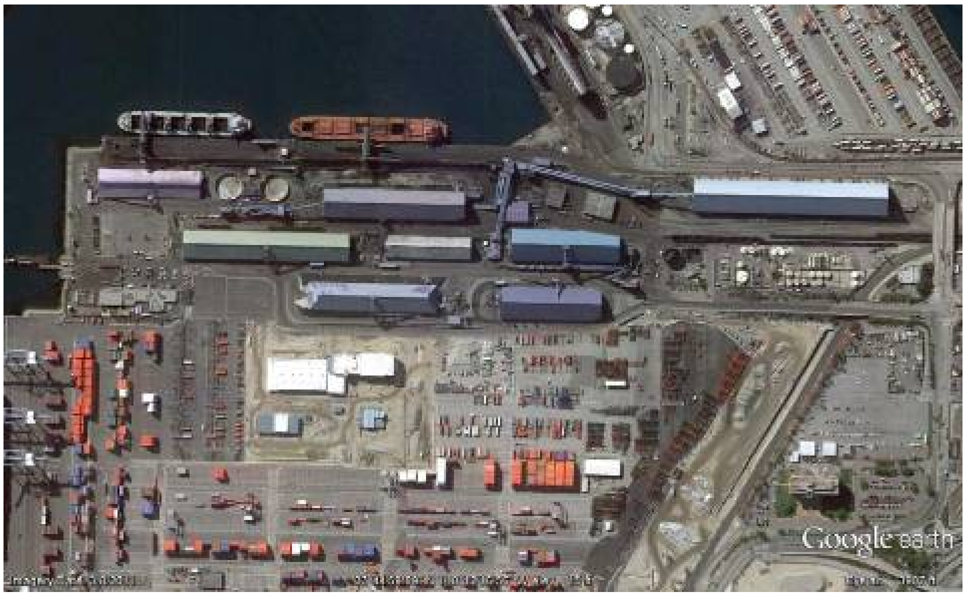


Source: Google Earth

U.S. West Coast Coal Terminals

The U.S. West Coast has only one active terminal exporting coal. The Metro Stevedoring terminal at Long Beach (Exhibit 149) handles petroleum coke, coal, sulfur, etc. The terminal is served by rail. It exported around 500,000 tons of coal in 2010 and roughly one million tons in 2011. As the aerial photo indicates, the terminal has little room to expand. It is served by rail, but there is no loop track as there is at the major export terminals. Community and environmental concerns make it unlikely that the terminal could add significant acreage.

Exhibit 149: Metro Stevedoring Terminal, Long Beach, CA



Source: Google Earth

The site of the former LAXT export coal terminal at the Port of Los Angeles is shown in Exhibit 150. The terminal was not an economic success, and was dismantled. The Port of Los Angeles has no interest in reinstating coal traffic, and has other plans for the site.

Exhibit 150: Site of Former LAXT Coal Terminal, Port of Los Angeles

Source: Google Earth

British Columbia Terminals

Westshore Terminals at Roberts Bank, BC near Vancouver shares the terminal site with the Deltaport container terminal (Exhibit 151). The coal terminal is served exclusively by rail and handed about 25 million tons in 2011. Capacity is being increased to 36 million tons over the next few years. This is the only Canadian terminal handling significant volumes of U.S. coal, about 5 million tons in 2011. This terminal is the actual destination for export coal shown in statistics as departing from the Seattle Customs District. That coal is moved via BNSF to Roberts Bank.

Exhibit 151: Westshore Terminals, Roberts Bank, BC

Source: Google Earth

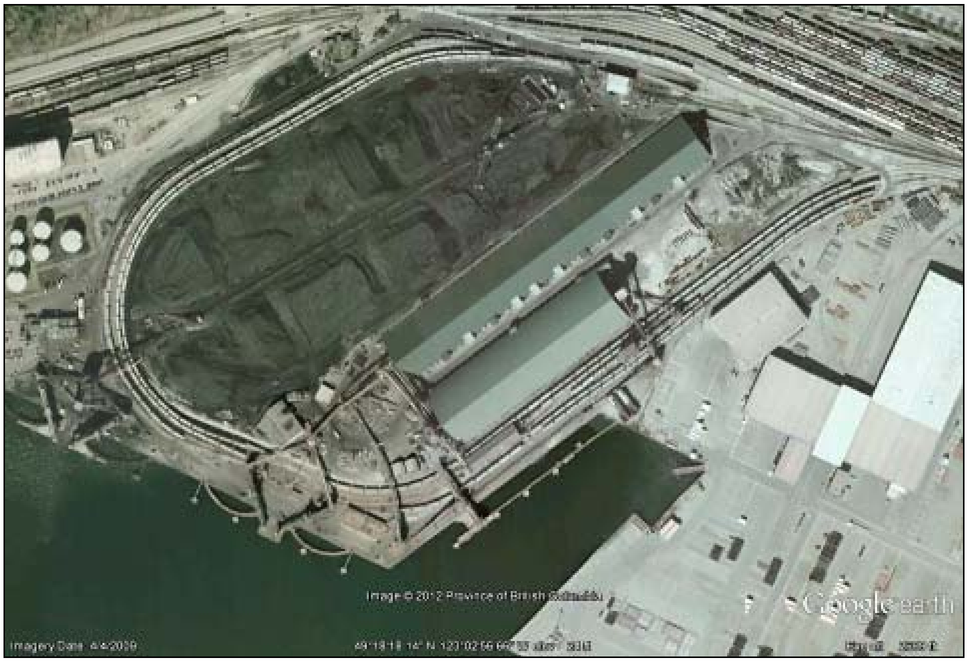
Ridley Terminals at Prince Rupert (Exhibit 152) handles export coal, with a capacity of about 12 tons. Expansion plans will increase capacity to 24 million tons. All receipts are by rail.

Exhibit 152: Ridley Coal Terminals, Prince Rupert, BC

Source: Google Earth

Neptune Bulk Terminals (Exhibit 153) in Vancouver ships metallurgical coal, with all receipts by rail. The terminal also ships potash, and is undergoing a series of capacity upgrades.

Exhibit 153: Neptune Bulk Terminals, Vancouver, BC



Source: Google Earth

New Terminal Proposals

The are several proposals for new export coal terminals along the Columbia River. All would be served by rail with the exception of the Morrow Pacific proposal, which would include a barge link from Port Morrow to Port St Helens. All are facing opposition for local stakeholders concerned about coal dust from both rail and terminal operations, and from the increase in rail traffic. These proposals also face formal scrutiny from federal and state environmental agencies, and permitting requirements for USACE and regional water quality authorities.

In aggregate, the capacity of these projects at full buildout would be 145 million tons, which is more than total current U.S. exports. Even at optimistic growth rates it would take a very long time to fill that capacity,

The Columbia River is dredged to 43 feet, which would limit the available sailing draft for the river terminals to a nominal 40 feet. The tide information system on the Columbia River helps vessel take advantage of the higher tides to sail at greater drafts than would otherwise be possible, but the proposed Columbia River terminals will not be able to fully load Capesize vessels. As a practical matter, Columbia River terminals would likely have roughly the same draft limitation as the Lower Mississippi ports.

St Helens – Port Westward Project

Kinder Morgan is proposing to design, build and operate an export coal terminal on the Columbia River at Port Westward Industrial Park, which is part of the Port of St. Helens. The proposed terminal is estimated to cost $150 to $200 million for construction and development over an 18 to 30 month period. will. The terminal could eventually handle 30 million tons of coal per year, with 15 million tons in an initial phase of development.

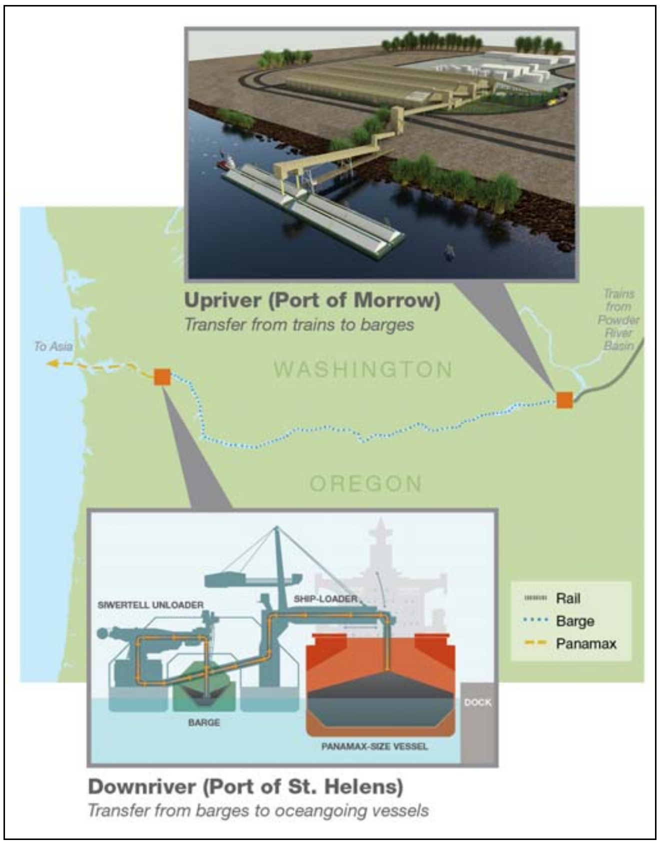
St. Helens – Port Morrow project

The Morrow Pacific project (Exhibit 154) is being proposed by Ambre Energy to provide a coal export route to Japan, South Korea or Taiwan. Coal from the Powder River Basin would arrive at the Port of Morrow facility by rail from Wyoming and Montana.

Initially, approximately one barge-tow per day will move down the Columbia River. Ambre anticipates developing transloading operations at the Port of St. Helens Port Westward Industrial Park, where the coal will be transferred to an oceangoing Panamax vessel. The full operational capacity would entail two barge-tows per day.

When the project begins operation, Ambre anticipates shipping 3.5 million metric tons of coal per year to trade allies such as Japan, South Korea and Taiwan. The overall capacity of the Morrow Pacific project is 8 million metric tons per year.

Exhibit 154: St Helens Port Morrow Proposal



Millennium Bulk Terminals - Longview, Washington.

Millennium Bulk Terminals, a subsidiary of the Australian coal mining company Ambre Energy, has purchased a port site on the Columbia River near Longview. Arch Coal has a 38 percent stake in the site. Ambre hopes to export 44 million tons of coal, with 25 million tons in the first phase.

Gateway Pacific - Cherry Point, Washington

SSA Marine is planning to build and operate the Gateway Pacific Terminal (Exhibit 155), a new shipping facility north of Bellingham, that would be capable of handling 48 million tons of coal per year. Peabody Energy has agreed to supply 24 million tons of coal.

Exhibit 155: Gateway Pacific Project Location

RailAmerica- Grays Harbor, Washington.

According to newspaper accounts, RailAmerica is planning to develop a coal export terminal at the Port of Grays Harbor's Marine Terminal 3 that could handle 5 million tons of coal each year.

Coos Bay – Project Mainstay

The Port of Coos Bay is considering a conceptual proposal known as "Project Mainstay". Names of the firms involved in Project Mainstay have been kept confidential during the current due diligence phase. The rail-served terminal would export Power River Basin coal annually to Asia. A key issue in this proposal is rail access, which would require an estimated $180 million in capital improvements in additional to the $250 million for the terminal itself. Export volumes are estimated to rise from 3 million metric tons in the first year to 10 million metric tons in year five at full buildout. The Port stresses that the project is in an early conceptual stage, and that completion of feasibility analyses and due diligence are necessary before moving further.