Responding to Changes in Energy Markets

Abstract

The North American energy outlook has been permanently altered by the successful technological development of hydraulic fracking for both natural gas and crude oil. This in turn has altered the flow and mode of energy products which could have an impact on intermodal infrastructure capacity.

Environmental restrictions and an abundant supply of natural gas, which is a cheaper, more fuel efficient, and cleaner, has resulted in an acceleration of coal fired plant retirements and an increase in gas fired facilities. While there has been an overall decrease in coal car loadings, exports have helped to replace some of the demand lost to natural gas. While the majority of coal exports continue to flow over existing facilities in the Gulf of Mexico and the U.S. East Coast, a substantial volume moves through existing export facilities in Canada and Seattle.

In 2008, U.S. Class I railroads transported 9,500 carloads of crude oil. In 2014, 493,146 carloads moved over the network— an increase of nearly 5,100 percent. Although oil production was down in 2015, rail is currently a preferred mode of transport, accounting for an estimated three quarters of the total volume, which is attributed, in part, to the fact that pipeline capacity to refining facilities are still under development, particularly in North Dakota. Railroads serve or could serve nearly every refinery in the United States and Canada, giving market participants enormous flexibility to shift product quickly to different places in response to market needs and price opportunities.

One of the beneficiaries of America’s shale boom has been the hydraulic fracturing sand industry. The high-grade silica sand is mixed with water and chemicals, then pumped down a well to crack open rocks, which allows oil and natural gas to escape. This sand is transported in small cube covered hopper cars, necessitating a doubling of this car fleet over the past few years.

Another aspect of developing new sources of fossil fuels has been the pursuit of new technology to utilize these fuels to reduce transportation costs for both passenger and rail. The rail industry is exploring the use of Liquefied Natural Gas (LNG) in locomotives, while the Steamship lines are actually in the process of converting selected ships to dual fuel use including LNG as a cost savings effort.

Primary Resources:
Domestic Coal Demand has Decreased

- No single commodity is more important to America’s railroads than coal, which accounted for 38.8 percent of rail tonnage and 18.8 percent of rail revenue in 2014.

- Coal production and consumption in the U.S. have both declined while exports have only marginally increased.

- Natural gas is increasingly being used in electrical plants and recently became the top source of electrical power generation.

- Due to the increase in shale gas production and increasing environmental regulations many coal plants are being retired.
  - In 2015 alone 85 coal-fired generators will be retiring.

- Rising coal exports could cover some of the loses in the domestic market, however, harsh environmental criticism is making expanding coal exports challenging.

Oil and Natural Gas Production has Increased

- Since 2005 increased U.S. oil production from hydraulic fracturing (fracking) has caused a steep increase in petroleum exports and corresponding decrease in imports.

- Many U.S. refineries were designed to process crude oil coming from overseas and are therefore located near ports. The Jones Act can make it prohibitively expensive to ship between U.S. ports, so with the increase in U.S. crude production refineries are now investing in the infrastructure to facilitate overland shipping.
  - This new desire for overland shipping has drastically increased the amount of crude oil moved by rail.
Changes in How Crude Oil is Produced

- Advancements in oil recovery technology such as fracking have opened previously unaccessible oil fields such as the Bakken formation in North Dakota, the Barnett and Eagle Ford formations in Texas, and the oil sands of western Canada. These new developments are not well connected to existing pipeline infrastructure.

  - Adding new rail facilities is usually a quicker, more financially viable alternative than building new pipeline projects; however, many new pipelines are being considered.

  - Shipping by rail allows more flexibility to accommodate delivering crude oil from new oil fields to a variety of different refineries.

- The primary increase in fuel extraction in the U.S. has been through hydraulic fracturing which requires proppants, usually sand, in order to extract the fuel.

  - The shipment of frac sand has been another huge area of growth for the rail industry and is predicted to continue growing as rail operators build more infrastructure to facilitate sand shipments.

  - Rail spills accounted for one-hundredth of one percent of crude oil transported by rail in 2013, however, when there is a rail incident it usually receives considerable public attention.

Market Volatility

- Oil markets are subject to drastic price fluctuations. When oil prices drop it reduces the profit margin on oil production and companies ship less oil.

  - Recent drops in oil prices have highlighted this vulnerability, however, rail is in a unique position to be able to withstand these drops in shipping because one of their primary operational costs is fuel so they also benefit from decreasing oil prices.

  - Shipping crude by rail tends to be more expensive than transporting it through pipeline. Shipping by rail became attractive because the profit margins were high enough and pipeline capacity wasn’t available, however increasing pipeline capacity and connectivity could make shipping by rail a less attractive option.

  - In the event that more pipelines are built rail will likely receive new business in carrying some of the pipeline construction materials.

- Even though oil shipments have emerged as a lucrative market for the rail industry oil still makes up a relatively small portion of total freight shipments.

Liquefied Natural Gas (LNG) in Rail

- LNG is a relatively cheap and abundant fuel source. It’s predicted to continue to be significantly more affordable than crude oil making rail operators seriously consider adding LNG fueled locomotives or updating existing locomotives to run on LNG.

  - LNG fuel is already starting to be used in cargo ships.

  - LNG-fueled locomotives have the potential to reduce fuel usage and emissions, allow for longer distances before refueling, and create financial savings.

  - Railroads are currently testing LNG as a fuel and awaiting regulatory permission from FRA.

  - LNG’s positive outlooks have caught the attention of other industries and communities as well. In addition to fueling their locomotives with LNG rail operators see the increased interest in LNG and are also looking into starting to ship LNG.

Transport Safety

- When it comes to transporting crude oil, safety is a huge concern. It is difficult to gauge which mode of transportation is the safest and best because their impacts are so different.

  - Truck spills are most likely to occur, but spill the least amount of fuel.

  - Pipeline spills, on the other hand, are usually the least likely to occur, but spill the most oil when they do.