Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

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January 30, 2015

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Railroads, Pipelines, and Hazardous Materials
FROM: Staff, Subcommittee on Railroads, Pipelines, and Hazardous Materials
RE: Subcommittee Hearing on "How the Changing Energy Markets Will Affect U.S. Transportation"

PURPOSE

The Subcommittee on Railroads, Pipelines, and Hazardous Materials will meet on Tuesday, February 3, 2015, at 10:00 a.m. in 2167 Rayburn House Office Building to receive testimony on issues related to the Nation's energy renaissance and what this growth in production means for the U.S. transportation system. The Subcommittee will receive testimony from energy, pipeline, railroad, and rail car manufacturer stakeholders regarding their investment and views of the nexus between energy production and private infrastructure investment.

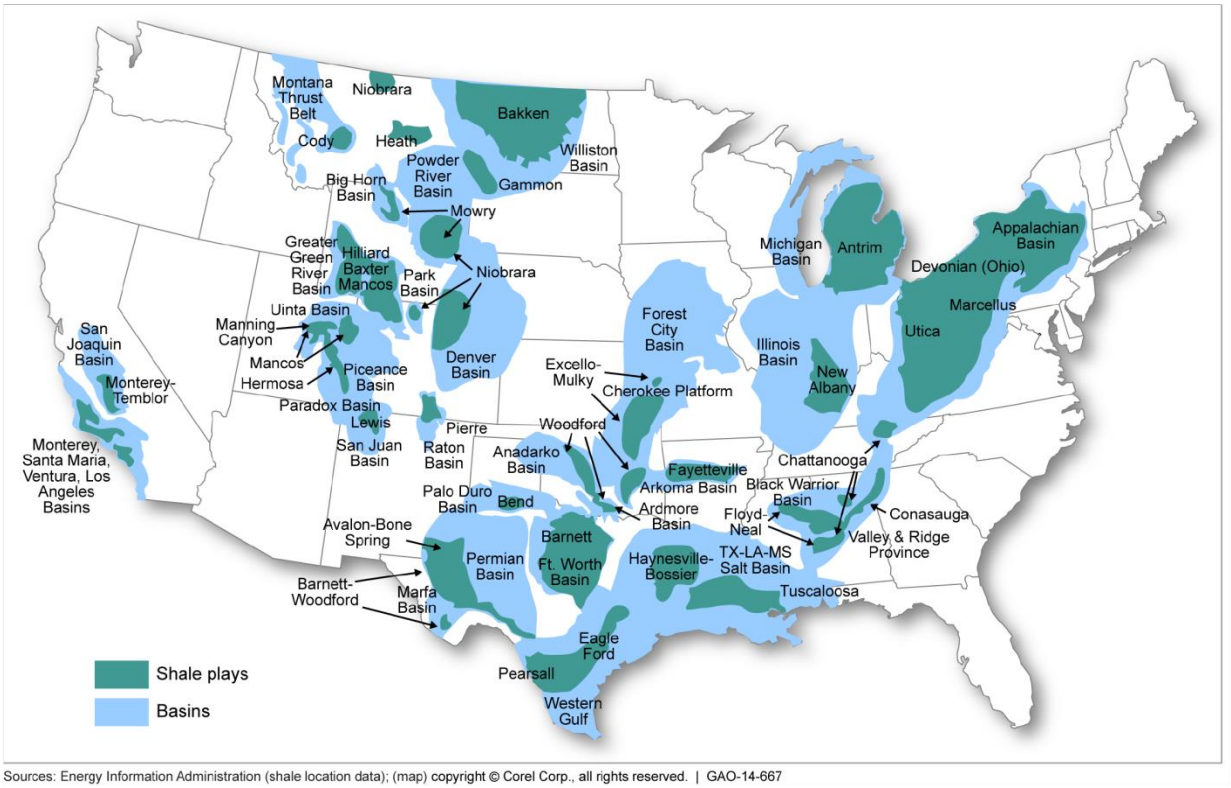
BACKGROUND

Over the last several years, domestic production of oil and gas has increased due to technological advances in resource recovery methods. Specifically, horizontal drilling and hydraulic fracturing, and the combination thereof, allow producers to recover oil and natural gas from tight sandstone and shale plays. The use of horizontal drilling in conjunction with hydraulic fracturing has greatly expanded the ability of producers to profitably recover natural gas and oil from low-permeability geologic plays—particularly, shale plays. While the use of fracturing techniques dates back to the 1950s, it was not until the mid-1970s that a partnership of private operators, the federal government, and researchers began to develop technologies for the commercial production of natural gas from shale in the eastern United States.[1] This partnership led to technologies that eventually became crucial to the production of oil and natural gas from shale rock, including horizontal wells, multi-stage fracturing, and slick-water fracturing.[2]

[1] U.S. Energy Information Administration, *Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays* 4 (July 2011).
[2] Id.

Below is a map of the shale plays and basins throughout the continental United States:

Figure 1: Shale Plays and Basins in the Contiguous 48 States



Sources: Energy Information Administration (shale location data); (map) copyright © Corel Corp., all rights reserved. | GAO-14-667

These new opportunities for resource development have led to a significant growth in both oil and natural gas production. Indeed, from 2007 to 2012 average domestic crude oil production from shale and tight sandstone formations increased more than six-fold, from 0.34 million barrels per day (bbl/d) in 2007 to 2.25 million bbl/d in 2012.

Domestic natural gas production in 2012 increased about five-fold compared with production in 2007, from less than 2 trillion cubic feet in 2007 to more than 10 trillion cubic feet in 2012.[3] These trends appear to be continuing, as the United States is now the largest producer of petroleum and natural gas in the world, far outpacing Russia and Saudi Arabia.[4]

Growth in Petroleum and Other Liquids

In terms of oil production, U.S. crude oil production in 2014 averaged 8.7 million bbl/d.[5] The U.S. Energy Information Administration (EIA) of the U.S. Department of Energy forecasts

[3] U.S. Government Accountability Office, GAO-14-667, *Oil and Gas Transportation: Department of Transportation is Taking Actions to Address Rail Safety, but Additional Actions are Needed to Improve Pipeline Safety* (2014)
[4] U.S. Energy Information Administration, *Oil and Gas Outlook* (Nov. 13, 2014).
[5] U.S. Energy Information Administration, *Short-Term Energy Outlook* 6 (Jan. 2015).

that production in 2015 will average 9.3 million bbl/d, and again rise to an average of 9.5 million bbl/d in 2016, the second-highest annual average bbl/d production level in U.S. history (1970 was the highest annual average at 9.6 million bbl/d).[6] To be clear, not all U.S. production is from shale plays, however, as the EIA noted in the *Annual Energy Outlook 2014*, "the growth in lower 48 onshore crude oil production is primarily a result of continued development of tight oil resources in the Bakken, Eagle Ford, and Permian Basin formations."[7]

This increased production coincides with increases in U.S. consumption of liquid fuels. In 2014, total liquid fuel consumption rose by an estimated 100,000 bbl/d, to 19.06 million bbl/d.[8] The EIA forecasts that liquid fuel consumption will grow to 19.32 million bbl/d in 2015 and 19.43 million bbl/d in 2016.[9] This growth in production and consumption means that the crude oil must move from production point to its destination. To do so, domestic crude oil primarily utilizes pipeline and rail transportation.

Growth in Natural Gas Production

With regard to natural gas production, the EIA expects continued growth in natural gas production through 2015 and 2016, which will be due to growth in the lower 48 states, even though production in the Gulf of Mexico is expected to decline.[10] In 2014, dry natural gas production was 70.1 billion cubic feet per day (Bcf/d); the EIA expects production to increase to 72.3 Bcf/d in 2015 and 73.9 Bcf/d in 2016.[11] The EIA projects that much of the growth in natural gas production will come from the Marcellus Shale formation where wells are drilled but uncompleted as they await new pipeline infrastructure to come online to support the production growth.[12]

Similar to oil production, natural gas production forecasts coincide with consumption forecasts. U.S. natural gas consumption in 2014 was estimated at 73.6 Bcf/d.[13] The EIA projects this consumption will increase in 2015 to an average of 73.8Bcf/d and then an average of 74.8 Bcf/d in 2016.[14] Growth is expected in the industrial, electric power, and transportation use sectors, with residential and commercial consumption declining in 2015.

Oil and gas industry leaders maintain that new infrastructure is needed to meet the continued growth in production and consumption capacity.

The Freight Rail Network

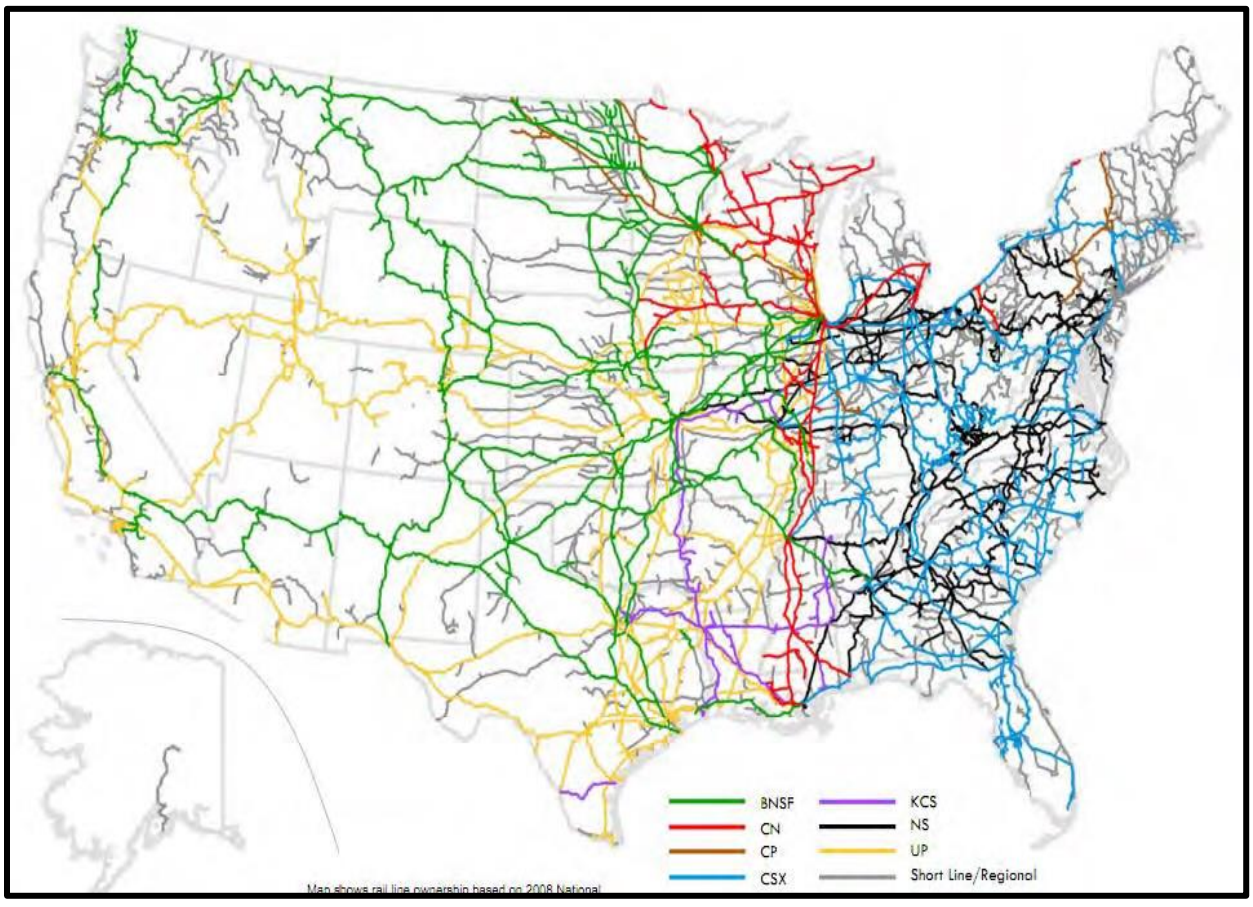
There are more than 650 freight railroads in the country employing nearly 180,000 workers. These are privately owned companies that operate over more than 140,000 miles of

[6] Id. at 1, 6.
[7] [7] U.S. Energy Information Administration, *Annual Energy Outlook 2014* MT-28 (April 2014).
[8] *Short-Term Energy Outlook* at 5.
[9] Id. at 5-6.
[10] Id. at 8.
[11] Id. at 8 and 28
[12] Id.
[13] Id.
[14] Id.

track throughout the Nation. Freight railroads are divided into three groups, called classes, based upon their annual revenues (measured in 1991 dollars):

- Class I railroads are defined by the Surface Transportation Board as having an annual carrier operating revenue of $250 million or more;
- Class II railroads are defined as having an annual carrier operating revenue between $20 million and $250 million; and
- Class III railroads are defined as having an annual carrier operating revenue of less than $20 million.

There are seven Class I freight railroads: BNSF Railway; CSX Transportation; Canadian National; Canadian Pacific; Kansas City Southern; Norfolk Southern; and Union Pacific. The majority of railroads, however, are Class II and III railroads, known generally as regional or short line railroads. The map below provides a visual overview of the freight railroads.



While Class I railroads generally provide long-haul services, the Class II and III railroads often provide the first and last mile of rail freight movements. The products moved by rail include everything from automobiles, agricultural goods, and consumer products to chemicals, lumber, and energy resources. In all, freight rail carries over 40 percent of intercity freight, which is more than any other mode, and for every one rail job, 4.5 other jobs are supported elsewhere in the economy.

Coal is the largest commodity transported by U.S. railroads, representing about 40 percent of tonnage and 22 percent of revenue for Class I railroads in 2012, and the majority of this coal is used for domestic electricity production. Over the last few decades, intermodal movements (long-haul transport of shipping containers and truck trailers by rail) have grown significantly.

More recently, freight railroads have seen increasing shipments of crude by rail, as technology advances have led to a significant increase in domestic energy extraction. As recently as 2008, U.S. Class I railroads transported under 10,000 carloads of crude oil; in 2013 that number had jumped to over 400,000 carloads.

The majority of this increased movement of crude by rail is done using unit trains, which are trains that carry only one commodity to a single destination. Crude oil unit trains may consist of 80 to 120 tank cars, each carrying about 30,000 gallons of product, for a total of about 2.4 million to 3.6 million gallons of crude oil per train. This has resulted in an increase in demand for tank cars. According to the railroads, during 2013 through April 2014, there were 104,597 tank cars used to transport flammable liquids by rail, including 49,182 tank cars used for crude oil. [15]

From 2000 through 2013, nearly all – 99.97 percent -- of the approximately 825,000 carloads of crude by rail shipments made it to their destination without incident. However, as the total number of movements has significantly increased along with U.S. growth in energy production, individual incidents have also increased. Hazardous materials incident data show that in 2008, eight rail crude oil incidents occurred in the United States out of 9,500 carloads, compared to 119 incidents out of approximately 400,000 carloads in 2013.

Freight Railroad Investments

Meeting the increased movement of energy products means that the freight railroads and railcar manufacturers must increase their private capital investment. The freight railroads own the infrastructure over which they operate, requiring them to invest heavily to maintain those networks. Since 1980, railroads have reinvested more than $250 billion into their track, bridges, yards, locomotives, and other equipment. In the last few years, the railroads have invested around $25 billion annually in capital projects. This investment is due in large part to the movement toward de-regulation of the freight railroads beginning in the 1970s through the Staggers Rail Act of 1980 (P.L. 96-448), and culminating in the Interstate Commerce Commission Termination Act of 1995 (P.L. 104-88).

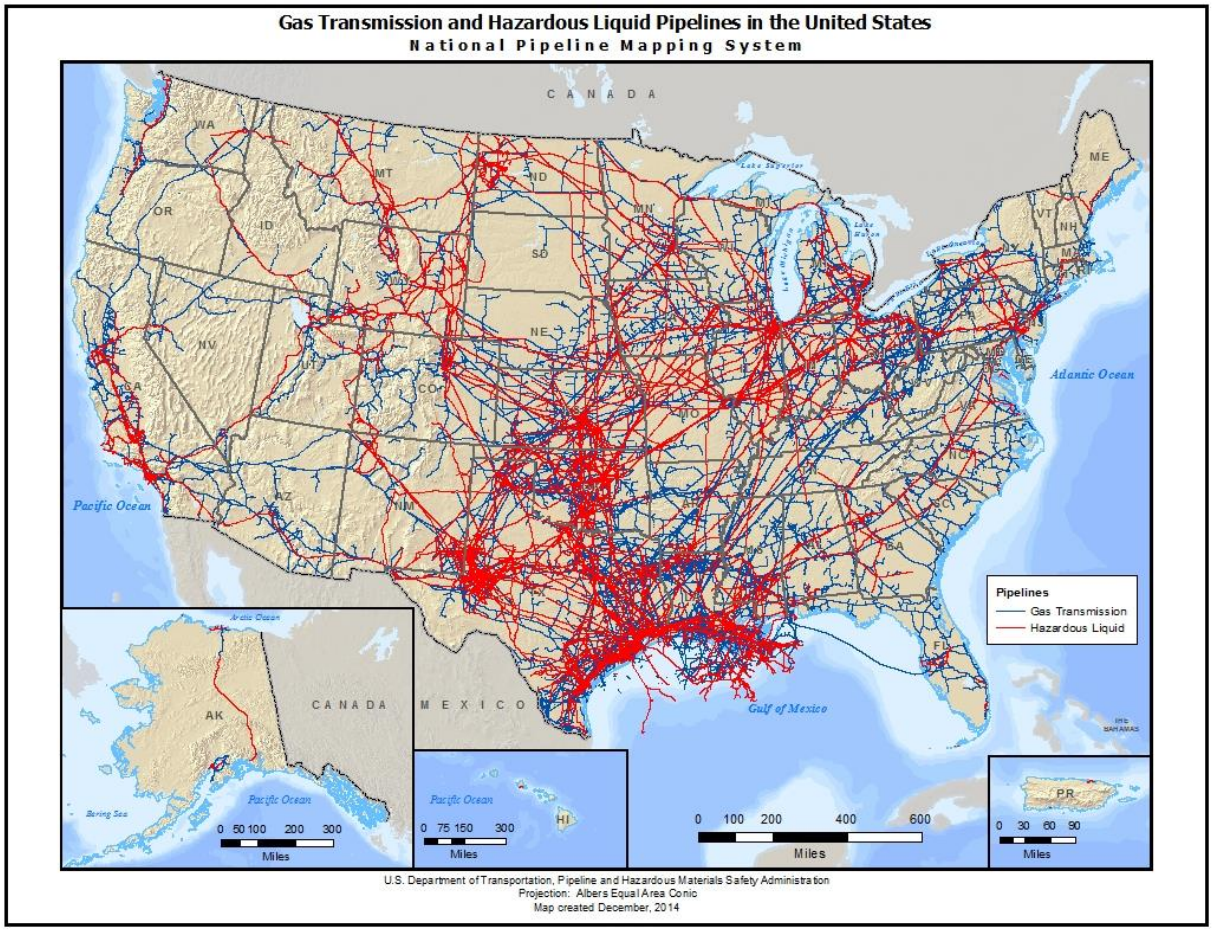
[15] *Oil and Gas Transportation* at 31.

The Pipeline Network

The pipeline transportation network consists of over 2.6 million miles of pipelines, built, operated, and maintained by private sector companies. Pipelines transport roughly two-thirds of all energy supplies in the United States. Since 1986, the volume of energy products transported through pipelines in the United States has increased by one-third, yet the number of reportable incidents has declined by nearly a third.

According to PHMSA, this network consists of approximately:

- 2,066,000 miles of natural gas distribution mains and service pipelines;
- 321,000 miles of onshore and offshore gas transmission and gathering pipelines;
- 175,000 miles of onshore and offshore hazardous liquid pipeline; and
- 114 active liquefied natural gas (LNG) plants connected to the natural gas transmission and distribution system.[16]



[16] Pipeline and Hazardous Materials Safety Administration, *Facts & Stats: Pipeline 101*, https://opsweb.phmsa.dot.gov/pipelineforum/facts-and-stats/pipeline-101/ (last visited Jan. 28, 2015).

Pipelines can be grouped into three main categories:

1) **Gathering pipelines.** These pipelines collect natural gas, oil, and petroleum products from the production areas, and transport them to processing facilities, where they are refined. Gathering pipelines tend to be smaller in diameter, from about 2 to 12 inches, and operate at pressures of about 5 to 800 pounds per square inch (psi). Gathering pipelines tend to be located in rural areas, though not exclusively, and PHMSA estimates there are about 230,000 to 240,000 miles of gas and hazardous liquid gathering pipelines.[17]

2) **Transmission pipelines**. After being processed, transmission pipelines carry hazardous liquid or gas over longer distances, and are larger in diameter, typically between 12 to 42 inches. They also operate at higher pressures, generally 400 to 1440 psi, levels which are maintained by compression stations (for gas pipelines) or pumping stations (for liquid pipelines) along the routes and PHMSA estimates there is approximately 400,000 miles of transmission pipelines.[18]

3) **Distribution pipelines**. Distribution pipelines feed end-use customers, providing product from mainline transmission pipelines. These lines tend to be smaller, less than 1 inch in diameter, and operate at lower pressures, normally between 0.25 and 100 psi. They tend to be located in populated areas.[19]

Pipeline Investments

As described earlier, the increased energy extraction taking place in North America is expected to strain capacity of all modes of transportation, but especially the Nation's pipeline network. Industry leaders maintain new pipelines will be needed to move energy products from the extraction area to where they will ultimately be used, which may require entirely new pipelines, or additional capacity in some areas.

According to a recent industry study, significant infrastructure investments are needed to meet the Nation's energy transportation needs.[20] It projects each year, the Nation will need to build 850 miles in new natural gas transmission lines, 14,000 miles in new natural gas gathering lines, 730 miles in new oil transmission lines, and 7,800 miles in new oil gathering lines.[21] The cost of these annual investments is substantial: about $30 billion per year.[22] About one-third of that amount is needed for new oil and gas lease equipment; another third is required for new or expanded oil and gas transmission capacity; and, the remainder is required for related infrastructure, such as plants and LNG facilities.

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[17] U.S. Government Accountability Office, GAO-12-388, *Pipeline Safety: Collecting Data and Sharing Information on Federally Unregulated Gathering Pipelines Could Help Enhance Safety* 3 (March 2012).
[18] Id.
[19] Id.
[20] The INGAA Foundation, Inc., *North American Midstream Infrastructure through 2035: Capitalizing on Our Energy Abundance*, (March 2014), available at http://www.ingaa.org/Foundation/Foundation-Reports/2035Report.aspx.
[21] Id. at 38-39.
[22] Id. at 39.

INVITED WITNESSES

Mr. Edward R. Hamberger
President and Chief Executive Officer
Association of American Railroads

Mr. Jack N. Gerard
President and Chief Executive Officer
American Petroleum Institute

Mr. Andrew J. Black
President and Chief Executive Officer
Association of Oil Pipe Lines

Mr. Jason Thomas
Managing Director and Director of Research
The Carlyle Group

Mr. Greg Saxton
Senior Vice President and Chief Engineer
The Greenbrier Companies