

CRUDE OIL IN THE DELAWARE VALLEY

August 2015



Commodity Profile
Series
No. 1

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

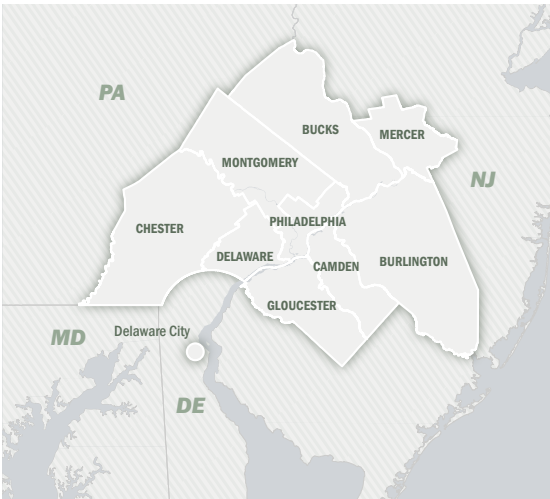
COMMODITY PROFILE INTRODUCTION

Freight transportation is integral to the success of a vibrant community. In the Philadelphia metropolitan area, residents and businesses rely on a complicated global supply chain to provide everyday essentials, such as food, clothes, energy, and raw materials.

This brochure has been developed by the Delaware Valley Regional Planning Commission (DVRPC) as part of a series of commodity profiles that seek to illustrate the supply chain of select commodities. This series is meant to help municipalities and the general public better understand a specific commodity's:

- history in the region;
- impact on economic development and employment;
- key facilities and modal distribution; and
- trends and transportation planning implications.

The first part in this series explores crude oil, historically one of the highest-volume commodities to be imported into the region. Crude oil was identified by regional private-sector partners participating in the Delaware Valley Goods Movement Task Force, DVRPC's freight advisory committee, as a key commodity to consider in planning due to recent changes in the regional supply chain.



The geographic focus for this series is the Delaware Valley region consisting of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. Due to its integrated role in the crude oil supply chain for the region, a facility in Delaware City, Delaware, was included in this profile.

BACKGROUND

The development of new technologies in the shale oil and gas production industry in the United States has led to a shift toward domestic sourcing of fuel energy. The surge in domestic crude, primarily from North Dakota, has resulted in unexpected shifts in distribution



and in several incidents made headlines due to safety and environmental concerns. The role of the Delaware Valley as a major refiner of this crude oil has resulted in a need to better understand the regional transportation and economic impacts of crude oil.

A BRIEF HISTORY

Pennsylvania has long played a key role in the petroleum fuel industry, starting as early as 1859, when the discovery of oil through the use of a drilling rig occurred in Titusville, Pennsylvania. Following this discovery, the growth of oil drilling in Pennsylvania helped the United States to become a leading producer of oil in the late 19th century.

Pennsylvania was a leader in this production, and the key link to the world market was the City of Philadelphia.

The City of Philadelphia was strongly positioned as a port for the export of oil due to its close access to the oil extracted from Pennsylvania formations. The key infrastructure that made this possible was the **Pennsylvania Railroad** system, which served as a rolling pipeline to bring products to Philadelphia.



Advertising lithograph of Atlantic Petroleum Storage Company at Girard Point.
Surveyed and drawn by E. Hexamer, 1866 | Source: The Library Company of Philadelphia

Atlantic Refining Company built its first refining unit in 1870 at Girard Point on the Schuylkill River, which became the first step in the rapid growth of refining capacity in the Delaware Valley.

In the early 20th century, with access to coal and oil markets, Philadelphia was the nation’s energy hub.

This access to energy markets helped to make Philadelphia known as the “Workshop of the World.” The success of the Delaware Valley’s seven oil refineries helped ensure the region’s role as a key player in the national energy market. However, since the start of the 21st century, changing international markets and new consumption patterns in the United States began to put negative pressures on the region’s refining and energy industry.

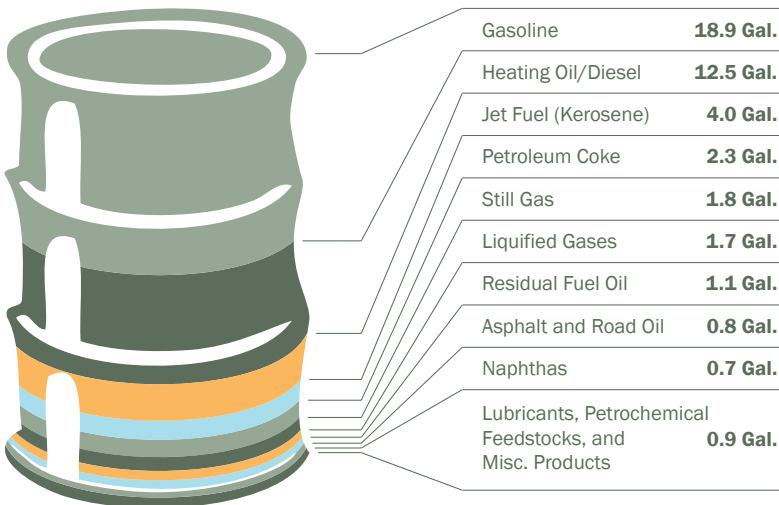
REFINING AND THE REGIONAL ECONOMY

By 2005, the Delaware Valley’s refineries represented a much smaller piece of the global refining complex, with the Gulf Coast of the United States becoming the leader in the energy industry.

In 2005, seven refineries in the Delaware Valley reached a peak, with a combined refining capacity of 1.2 million barrels per day (bbl/d). By 2014, refining capacity had dropped to 934 thousand bbl/d.¹

At the peak period for refinery throughput, the Delaware Valley enjoyed both the benefits of direct employment in the petroleum refining industry and related manufacturing sectors. These related sectors benefit from the feedstocks and by-products created in the refining process.

What does one barrel of oil yield?



42 gallons of crude oil = **44.8** gallons of refined products

Source: U.S. Energy Information Administration, *National Refinery Yield for 2014*

¹ U.S. Energy Information Administration, *Weekly Inputs and Utilization Reports* (Washington, DC: U.S. Energy Information Administration, November 2014).

Several key industry clusters in the region benefit from refining by-products

2010 employment

Biopharmaceuticals



9.9K

Downstream Chemical

5.7K

Plastics

11.7K



In addition...

5.5 million Northeastern U.S. households rely on heating oil during cold winters

The slate of refined petroleum products that support the lifestyle of U.S. residents goes beyond the fuels that power transportation. Petroleum products can be found throughout our daily lives. Much of the consumer products we use (including paints, plastics, soaps, detergents, synthetic fibers, flooring, insulating materials, and perhaps of added importance in the Delaware Valley, pharmaceuticals) are derived from petrochemicals.

The petroleum refining sector is the third largest supplier to the Biopharmaceutical industry sector.²

As a result, the petroleum refining industry has direct benefits to the Biopharmaceutical, Downstream Chemical, and Plastics industry clusters. Both Downstream Chemical Products and Biopharmaceuticals have been identified as strong and growing clusters in Greater Philadelphia.³

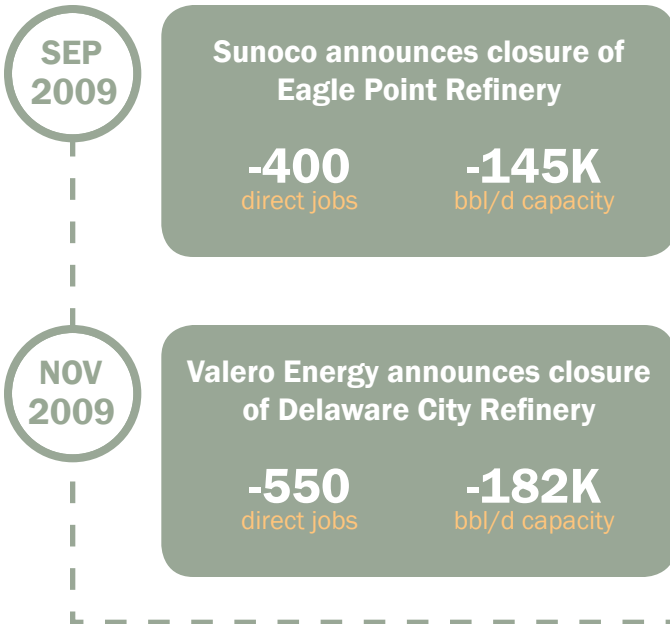
² Battelle Technology Partnership, *The Economic Impact of the U.S. Biopharmaceutical Industry* (Washington, DC: Pharmaceutical Research and Manufacturers of America, July 2013), 13–14.

³ Delaware Valley Regional Planning Commission, *Data Snapshots 2.2—Regional Economics: Regional Economic Cluster Analysis* (Philadelphia: Delaware Valley Regional Planning Commission, September 2014).

CHANGE AND DECLINE IN REFINING

During the peak period of refinery throughput in **2005**, the Petroleum Manufacturing, Chemical Manufacturing, and Plastics and Rubber Products Manufacturing sectors **employed over 50,600** in the region comprising **23 percent of all manufacturing employment**.⁴ In the years that followed, the market for petroleum crude refining experienced several changes that altered the industry in the Delaware Valley.

By 2008, the region's seven refineries were experiencing decreasing profit margins and in some cases had suffered several quarters of losses. Much of these losses were the product of decreasing demand for fuels, as the economy faltered during the recession and consumers utilized less fuel for transportation due to increased efficiencies and fewer vehicle miles traveled. Shrinking markets combined with growing global refining capacity and instability in oil-producing regions created new challenges for the region's refineries.



⁴ U.S. Census Bureau, 2005 County Business Patterns.

JUN
2010

PBF purchases Delaware City Refinery

PBF becomes owner of 375K bbl/d capacity and the most sophisticated refining units on the East Coast.

SEP
2010

PBF purchases Paulsboro Refinery

JUN
2011

PBF reactivates idled Delaware City Refinery

+500
direct jobs

+182K
bbl/d capacity

Despite the promising reactivation of the Delaware City Refinery, late 2011 revealed major problems still existed for the region's refineries.

SEP
2011

ConocoPhillips announces closure of its Trainer Refinery

-400
direct jobs

-185K
bbl/d capacity

DEC
2011

Sunoco completes the closure of its Marcus Hook Refinery

-500
direct jobs

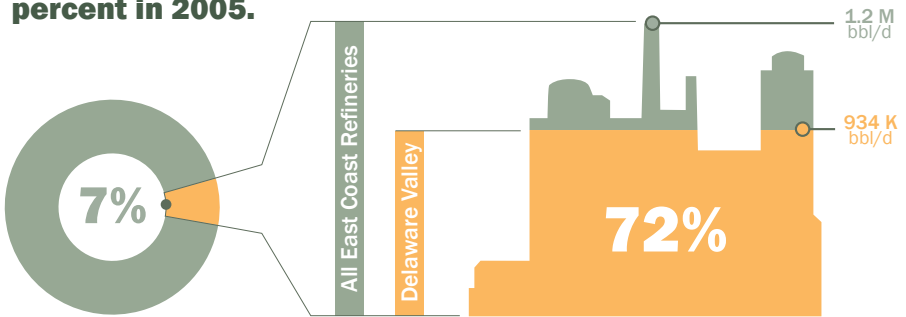
-175K
bbl/d capacity

The closure of the Marcus Hook Refinery and Eagle Point Refinery were part of a corporate decision by Sunoco to depart the refining industry. These closures were only the beginning, as Sunoco still owned the Philadelphia Complex, with a refining capacity of 335 bbl/d and 850 employees.

REGIONAL REFINING: A BROADER CONTEXT

Despite years of declining profitability by the region's refinery industry, the threat of further closures was an issue that concerned every level of the community all the way to the White House. The desire to save this industry was grounded in the role of the region's refineries on a larger, national scale. While the Gulf Coast has become the epicenter of refining activity in the United States, the Northeastern states have long relied on a portion of their energy consumption originating in the Delaware Valley.

In 2014, the East Coast accounted for only 7 percent of the total national refining capacity, a decline from 10 percent in 2005.



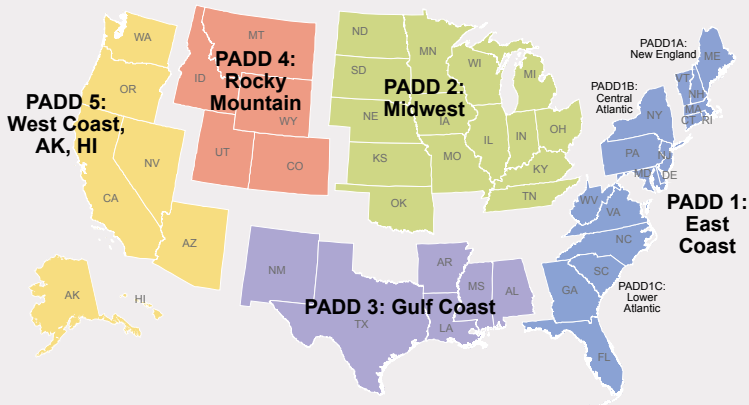
The Delaware Valley's **five remaining refineries are responsible for 72 percent** of this capacity. The former Sunoco Philadelphia Complex represents a third of this capacity. In 2013, these refineries along with the three other Petroleum Administration for Defense Districts (PADD) 1B refineries supplied PADD 1B with 49 percent of its consumed gasoline and 79 percent of its consumed distillate. In addition, it supplied PADD 1A with 32 percent of its consumed gasoline.⁵

The remainder of refined petroleum products consumed in the region are sourced from PADD 3 or imported from elsewhere in the Atlantic Basin. As a result, an interruption in regional production adds stress to the supply chain that moves product between PADD 3 and the Delaware Valley. Two modes of transportation are responsible for the supply of these products: maritime tanker or barge and pipeline.

⁵ U.S. Energy Information Administration, *Refinery Outages: Fall 2014* (Washington, DC: U.S. Energy Information Administration, November 2014).

What is a PADD?

During World War II, the Petroleum Administration for War created the Petroleum Administration for Defense Districts to ration gasoline. Today PADDs are used to better understand the patterns of use and movement of petroleum products.



Source: U.S. Energy Information Administration

From a transportation perspective, a permanent decrease in petroleum refining could be accommodated in the long term, however, it would create undesirable price inflation in the short term due to the limited capacity of the existing supply chain. Maritime movements of crude oil from PADD 3 (Gulf Coast) are limited to barges and a small fleet of Jones Act vessels, hindering a rapid increase in movements. In addition, pipelines are mostly fixed pieces of infrastructure that require a long period for expansion.

Currently, the only major petroleum product pipeline to serve the region from PADD 3 is the Colonial Pipeline which terminates in Linden, New Jersey. In 2012 demand for the pipeline had outstripped capacity in several reporting periods. As of 2013 the capacity of this line was 850,000 barrels per day of product.⁶

While these systems could supplement and eventually replace any lost production capacity in the region, economic impacts from direct job loss and displacement of related industries would have substantial impacts.

⁶ Christine Harvey and Daniel Murtaugh, "Colonial May Expand Capacity on Northeast Pipeline System," *Bloomberg Business*, March 18, 2013, <http://bloom.bg/1y1mLkK> (accessed September 8, 2014).

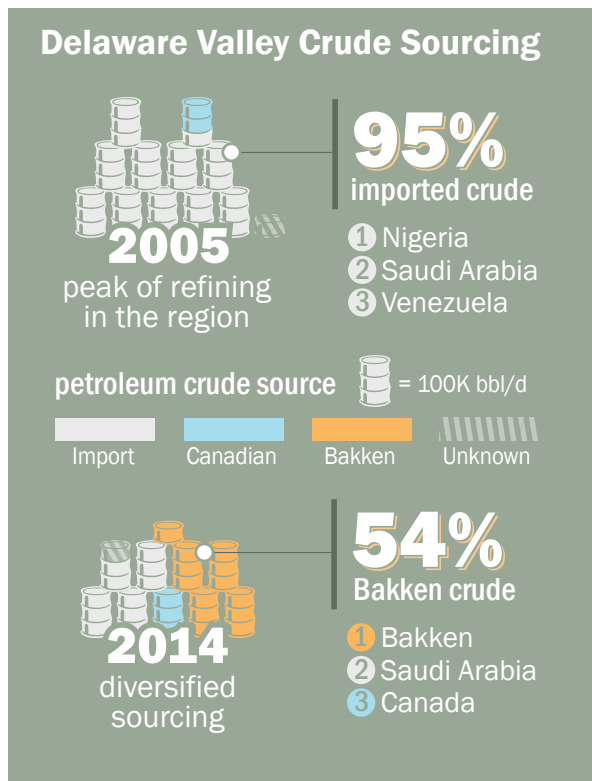
SHIFT IN THE CRUDE SUPPLY CHAIN

The purchase and reuse of the Sunoco Philadelphia Complex required a creative effort on the part of the new operator in order to turn around years of losses at the facility. The answer in this case came in the form of shale oil. By 2011, the domestic energy industry had been rapidly expanding with the discovery of several major plays of shale oil and gas products throughout the country. Extraction of these products was made possible by the development of hydraulic fracturing, better known as fracking.

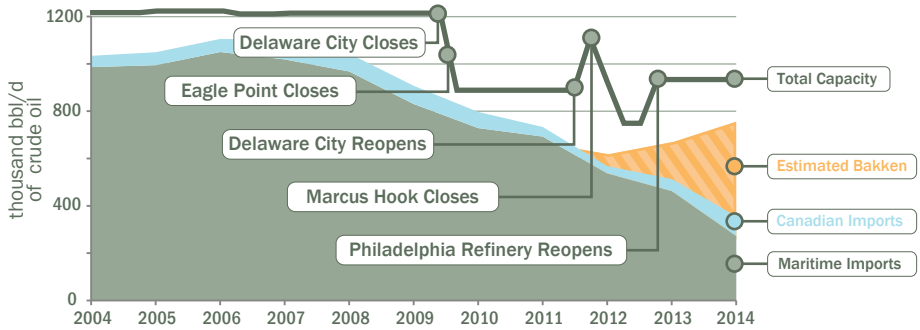
Most impactful to the Delaware Valley refining industry is the Bakken play in North Dakota and Montana as well as part of Canada. This shale formation produces what is referred to as a light, sweet crude. This type of crude oil is similar in quality to the crude that most Delaware Valley refineries have traditionally sourced from West African and North Sea producers. In 2005, during the peak refining period in the Delaware Valley, refineries were collectively importing on average 1.14 million barrels of crude per day with 52 percent of imported oil sourced

in Nigeria and Saudi Arabia. By the end of the third quarter of 2014, the refineries that remained were collectively importing only 356,000 barrels of crude per day while sourcing another 410,000 barrels domestically, a shift to **54 percent domestic inputs**.⁷

⁷ U.S. Energy Information Administration, *Weekly Inputs and Utilization Reports* (Washington, DC: U.S. Energy Information Administration, January 2015).



Daily Refinery Throughput: 10 Years of Change



Source: U.S. Energy Information Administration, *National Refinery Yield for 2014*

The shift in sourcing of crude oil on the heels of a decline in overall consumption resulted in modal shifts regionally. The workhorse of the crude oil supply chain in the Delaware Valley has for many years been oil tankers. For ports on the Delaware River the highest volume commodity by tonnage moved on the river is crude oil. From 2005 to 2014 the Maritime Exchange reported a decrease in the annual number of tanker vessels making call on the Delaware River from 897 to 452 vessels.⁸ This same period saw a decline in maritime crude oil imports from 383 million barrels to 133 million barrels.⁹

The combination of domestic sourcing and declining demand has resulted in a 49 percent decrease in tanker vessel activity for the Delaware River.

The Role of Crude Oil Pricing

Volatility in oil prices has complicated the outlook on sourcing decisions. The cost of a refined barrel varies by source as does the cost to transport. In order for rail to remain viable, the differential between domestic crude and foreign crude must be in the range of \$12 – 18 per barrel.

Delivery Costs

 from North Dakota
\$10–20 /barrel

 from West Africa
\$2–4 /barrel

⁸ Maritime Exchange for the Delaware River and Bay, *Annual Summary of Cargo and Piers* (Philadelphia: Maritime Exchange, January 2015).

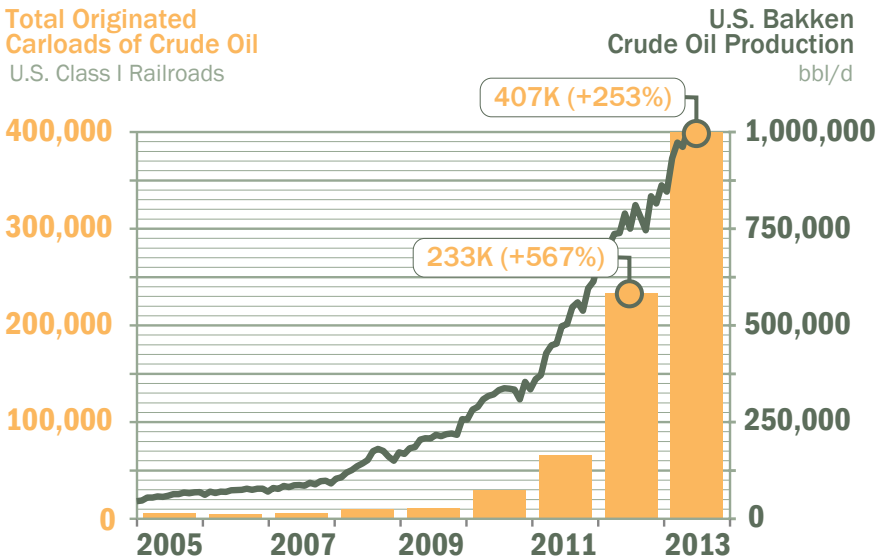
⁹ U.S. Energy Information Administration, *Company Level Imports* (Washington, DC: U.S. Energy Information Administration, January 2015).

MOVING DOMESTIC CRUDE OIL

The realization of the potential of Bakken crude oil as a reliable, domestic source of crude for the refineries in the region was limited only by the capacity to move the oil to the refineries. Unfortunately for the East Coast, the United States' crude oil pipeline system was built primarily in the center of the country, supplying major refining hubs in the Gulf Coast. With a lack of existing pipeline capacity to the East Coast and an extremely high cost to construct, the industry turned to an old, familiar transport system: the railroads.

The use of rail to transport crude oil provides flexibility to reach many destinations, as most refineries are rail served for outbound shipments of refined products.

From 2009 through 2013, there is a close correlation between the growth in crude tank car originations and Bakken crude production growth in North Dakota and Montana. By the close of 2013, these shipments represented 1.4 percent of all Class I rail activity.¹⁰



Source: AAR, *Moving Crude by Rail* (December 2013)
Dept. of Mineral Resources North Dakota (May 2014)

¹⁰ American Association of Railroads, *Moving Crude Oil by Rail* (Washington, DC: American Association of Railroads, December 2013).



A Bakken crude oil unit train destined for Philadelphia makes its way along the Schuylkill River on the Trenton Subdivision south of Walnut Street. | Source: Connie Chang

In order to create the efficiency necessary to move Bakken crude by rail, loaded tank cars are moved in unit trains. **A unit train is a train consisting of 35 or more rail cars of the same commodity destined for a single location.** Unit trains have the benefit of bypassing sorting yards, saving time and costs for shippers. In the case of crude oil unit trains, a single train has 70 to 120 tank cars carrying crude oil plus buffer cars and powered locomotives.

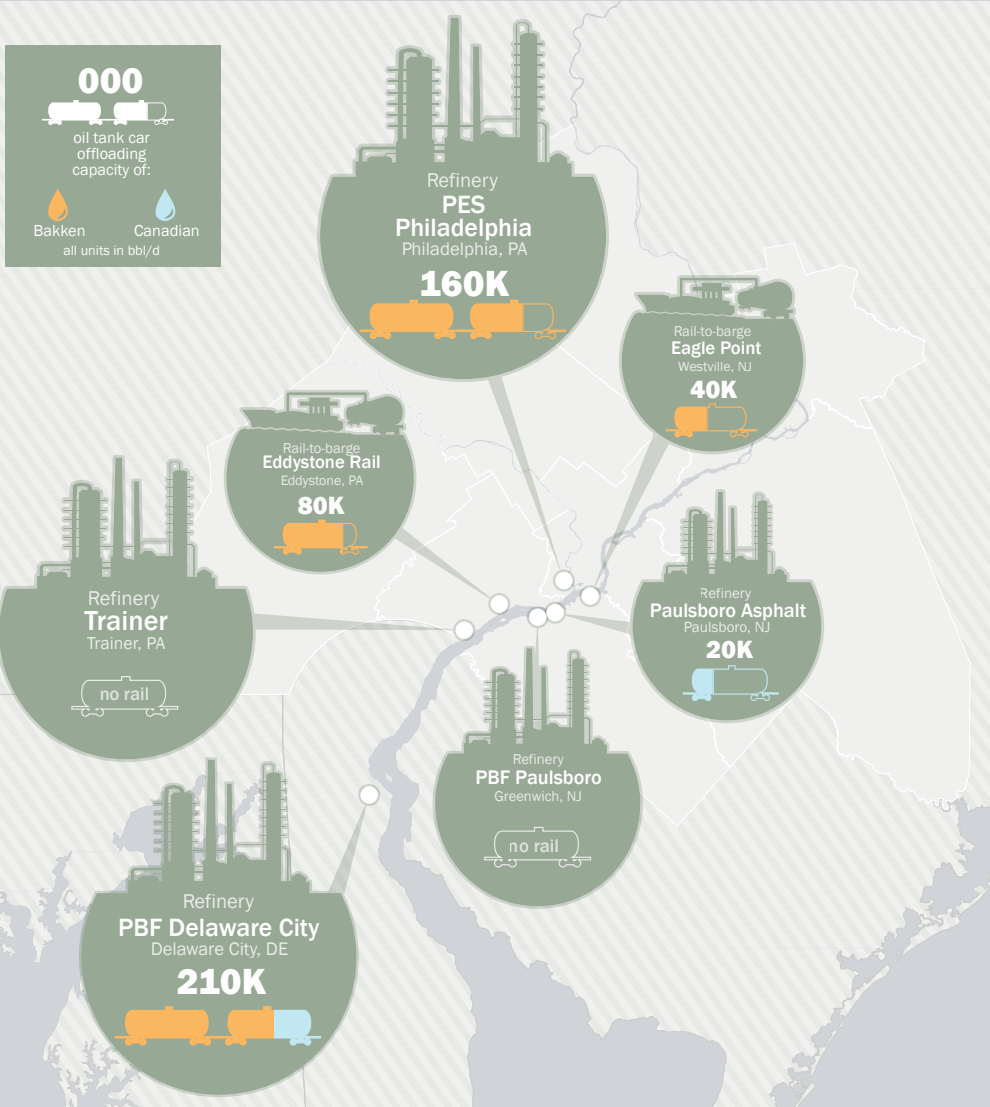
At up to one mile in length, these unit trains can carry over 3 million gallons or 80,000 barrels of crude oil.

For the Delaware Valley, the crude-by-rail movement helped to save not only the former Sunoco Philadelphia Refinery but also allowed other refineries to improve their efficiencies through more flexible and stable domestic sourcing.

Currently, 4 loaded unit trains come into the region each day, with plans to soon increase to 6 per day.

REGIONAL REFINERIES AND TERMINALS

Crude oil facilities in the Delaware Valley are located along the Delaware and Schuylkill rivers. Access to rail, water, pipeline, and highway allow flexibility in shipping modes. These facilities include refineries and specialized rail-to-barge terminals, built in response to crude-by-rail shipments. Below is an overview map of these facilities in the region, with details about rail-unloading capacities.



Delaware Valley Refineries

Refineries in the Delaware Valley represent one facility type that has adapted to domestic sourcing of crude oil. Some facilities have developed crude unloading racks on existing refinery property, while others have partnered with terminals to barge crude to the refinery.

Sourcing Key



Sourcing data is based on DVRPC analysis of Q3-2014 Company Level Imports file from the U.S. Energy Information Administration and industry reports about rail projects. Bakken and rail values are approximate.

PES Philadelphia Refinery Philadelphia Energy Solutions | Philadelphia, PA

335K bbl/d
refining capacity



rail discharge capacity (bbl/d)



Bakken crude by barge (bbl/d)

Crude-by-rail details

2014: 2 unit trains/day

Planned: 3-4 unit trains/day

Served by: CSX Transportation

Detailed Crude Sourcing



PBF Paulsboro Refinery PBF Energy | Greenwich, NJ

160K bbl/d
refining capacity



rail discharge capacity (bbl/d)



Bakken crude by barge (bbl/d)

Sourcing notes

Bakken crude via barge service from PBF Delaware City, DE, facility

Primary Supply: Saudi-light

Detailed Crude Sourcing



PBF Delaware City Refinery

PBF Energy | Delaware City, DE

182K bbl/d

refining capacity



rail discharge capacity (bbl/d)



Bakken crude by barge (bbl/d)

Crude-by-rail details

2014: 2 unit trains/day

Planned: 3 unit trains/day

Served by: Norfolk Southern

Detailed Crude Sourcing



Trainer Refinery

Monroe Energy | Trainer, PA

185K bbl/d

refining capacity



rail discharge capacity (bbl/d)

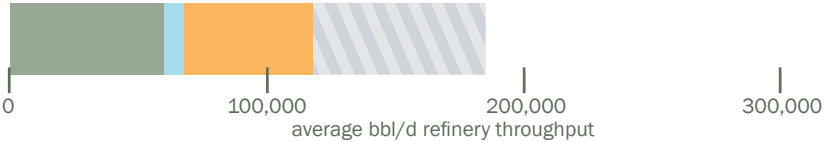


Bakken crude by barge (bbl/d)

Sourcing notes

Bakken crude by barge via Eddystone Rail Terminal
Refinery production focused on aviation fuel for Delta Airlines

Detailed Crude Sourcing



Paulsboro Asphalt Refinery

Axeon Specialty Products | Paulsboro, NJ

72K bbl/d

refining capacity



rail discharge capacity (bbl/d)



Bakken crude by barge (bbl/d)

Sourcing notes

Refinery production tailored toward asphalt products
Axeon reports interest in full unit trains of Bakken

Detailed Crude Sourcing

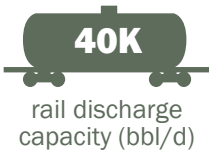


Delaware Valley Rail-to-Barge Terminals

Rail-to-barge facilities provide the region with transflow capacity to move crude from tank cars onto barges for final delivery and consumption at refineries. In addition to two terminals in the region, Delaware Valley refineries rely on barge traffic from Albany, NY.

Eagle Point Terminal

Sunoco Logistics | Westville, NJ



Crude-by-rail details

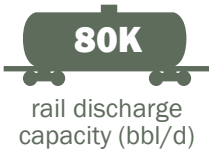
2014: 1 unit train/2 days

Planned: 1 unit train/day

Served by: Conrail via NS/CSX

Eddystone Rail Terminal

Enbridge Inc. | Eddystone, PA



Crude-by-rail details

2014: 1 unit train/day

Planned: 2 unit trains/day

Served by: Conrail via NS/CSX

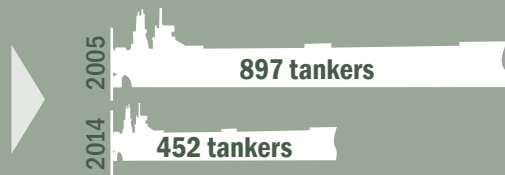
New rail capacity reduces maritime traffic

The Delaware Valley has capacity to unload over **445** thousand barrels/day of crude oil by rail

This capacity has resulted in a shift in maritime activity

In 2014, the Delaware Valley imported, by rail and maritime **151** million barrels of foreign crude oil a substantial decrease from the **383** million barrels imported in 2005

Fewer imports have resulted in a reduction of tanker vessel activity on the Delaware River



BAKKEN CRUDE-BY-RAIL SAFETY

The growth of Bakken crude oil transportation by rail was rapid and mostly unexpected by industry experts and regulators. During 2013 and 2014, this rapid growth became headline news in North America with a series of high-profile accidents.

The first to make headlines was in July 2013, when a runaway unit train operated by a Canadian shortline railroad traveled eight miles before derailing and igniting over 1.5 million gallons of oil in Lac Magentic, Canada, fatally wounding 47 individuals. The incident drew the attention of regulators, oil shippers, and railroads across North America. During the next two years the United States experienced several incidents involving crude oil. These accidents have raised serious concerns about the safety of transporting this commodity by rail without increased regulation and standards.

Nationwide Crude-by-Rail Incidents

2013	Incident Type	2014
5	derailment	7
4	loaded crude unit train derailment	4
4	with release of crude oil	3
2	causing fire or explosion	1
1.2_M gallons	total crude released	57_K gallons

0 injuries or fatalities

During the past five years the Delaware Valley experienced 50 freight train derailments, including 10 involving HazMat rail cars. One incident in those five years resulted in a release of hazardous materials.¹¹ In January 2014, an incident occurred involving a crude oil train bound for a Philadelphia refinery, leaving seven cars derailed without release, above the Schuylkill River.

These statistics fail to predict the potential for future incidents; however, they do reinforce industry claims that rail is a safe mode, with over 99 percent of shipments arriving without a release.

FEDERAL AND REGIONAL RESPONSE

In response to safety concerns, both federal regulators and regional agencies have made an effort to minimize the impacts of a future crude-by-rail disaster. In addition, rail carriers have voluntarily made a series of operational changes and inspection improvements to further improve the safety of their industry. While not comprehensive, below are highlights of some of these actions:

Class I Railroad and USDOT Joint Action

The U.S. Department of Transportation (USDOT) and Association of American Railroads (AAR) entered into an agreement in 2014 on voluntary safety measures. Under the terms of the agreement, member railroads, which consist of primarily Class I carriers, have decreased speeds on Key Crude Oil Train routes, equipped trains with distributed power or telemetry devices for quicker stopping, increased the number of annual inspections above the current federal minimum, and equipped Key Crude Oil Train routes with wayside defective bearing detectors every 40 miles.

USDOT Rulemaking

In addition to several emergency orders issued over two years, the USDOT in May of 2015 released a Final Rule: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable

¹¹ Federal Railroad Administration, *Rail Equipment Accidents Database* (Washington, DC: Federal Railroad Administration, January 2015).

Trains. These new regulations require tank car upgrades, enhanced braking technologies, reduction in operational speeds, and changes to rail routing standards with phased implementation through 2025.

Class I Training and First Responder Coordination

As a part of the voluntary agreement with the USDOT, Class I railroads established a fund of five million dollars to develop a training program for 1,500 first responders focusing on crude oil incidents. Several Delaware Valley first responders have attended these training opportunities.

In addition, local first responders, refineries, and railroads have participated in table-top exercises and safety demonstrations. The DVRPC Office of Freight Planning, with the help of the Office of Transportation Operations, has collaborated with local responders, railroads, and key agencies to assist with awareness and communication to better prepare the region for any and all hazardous material incidents involving rail transportation.

TRANSPORTATION IMPLICATIONS

The sudden growth of crude-by-rail shipments across the country has had significant transportation implications. In addition, the shift in regional sourcing has had more localized impacts.

Service Delays Due to Capacity

From the national perspective, new demand for unit train shipments has put a strain on the rail system capacity. Bottlenecks in the middle of the country and the challenges of training new engineers and building new equipment have been credited with causing delays in various types of rail shipments and Amtrak passenger trips. More locally, Monroe Energy reported a million-barrel shortage of crude-by-rail deliveries in August and September of 2014.¹²

¹² Blake Sobczak, "Rail Delays Put East Coast Refining 'in Jeopardy'—Delta Subsidiary," *E&E Publishing LLC*, October 30, 2014, www.eenews.net/stories/1060008119 (accessed November 12, 2014).

Shift in Regional Trips

The move toward domestic sourcing by rail and new uses of old refinery facilities have led to a new regional supply chain. Barge activity moving refined product and crude oil has shifted in response to the decrease in direct tanker offloading to refinery units. The decrease in tanker service has also reduced the number of up-river transits and lightering activity. In addition, the loss of several refineries has meant new truck trips for feedstock to regional industries that once relied on direct (by pipeline) deliveries. These shifts have only minor impacts but do change the dynamic of water movements on the Delaware River.

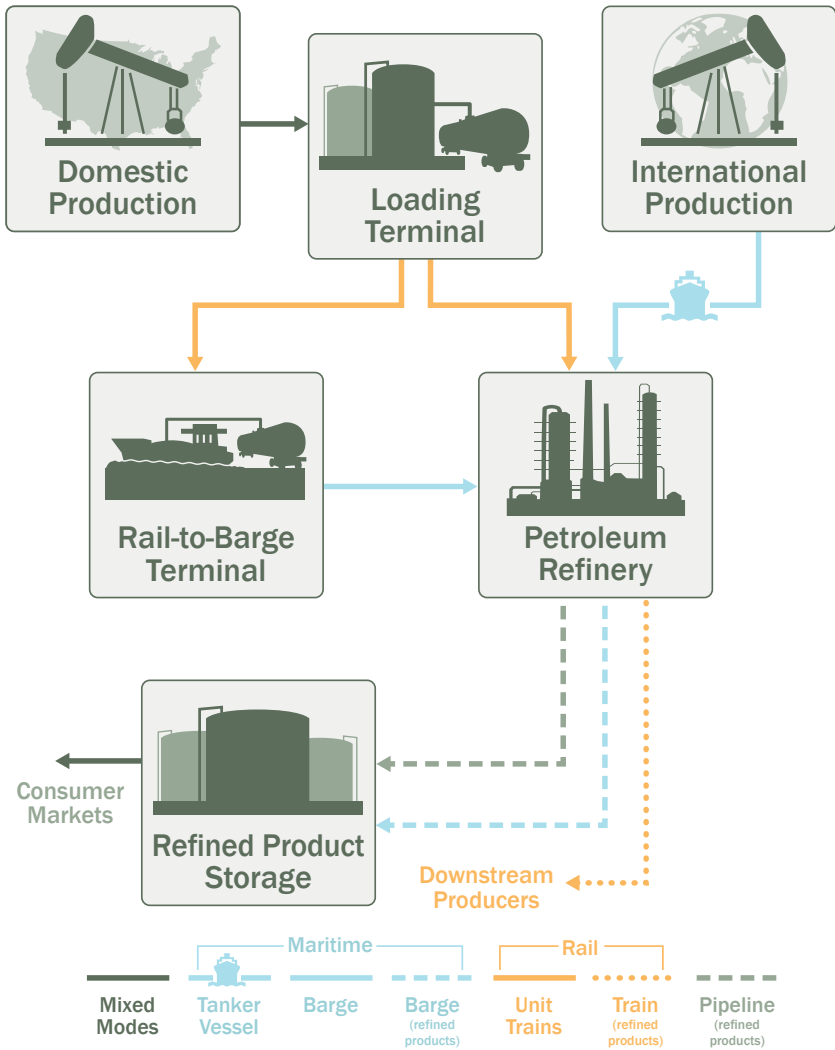
New Safety Concerns and Infrastructure Priorities

The most significant regional impact has been increased visibility of the regional freight rail system as communities have expressed safety concerns. The rail network that supplies crude oil to the Delaware Valley runs through 58 municipalities in the DVRPC region. In addition, this network has six major river crossings, 28 grade-separated crossings with major highways, and 17 at-grade highway crossings. Over 28 miles of this network share right-of-way or track with passenger operations maintained by Amtrak, SEPTA, and New Jersey Transit.

These facilities are mostly privately owned, but better communication with the public and ongoing support for upgrades through state funding programs can help to reduce potential conflicts.

Despite volatility in global markets, crude oil remains a critical commodity in the Delaware Valley region. In addition, the region remains a key player on the East Coast in the manufacturing of essential refined petroleum products from crude oil that helps to fuel the economy and support a high standard of living. Ensuring a safe and efficient network of freight rail and maritime channels will help to support the growth and change in this supply chain while reducing conflicts with other markets and host communities.

SUPPLY CHAIN SNAPSHOT



About DVRPC

The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals and the public with a common vision of making a great region even greater. Shaping the way we live, work and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region – leading the way to a better future.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

DVRPC fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. DVRPC's website (www.dvrpc.org) may be translated into multiple languages. Publications and other public documents can be made available in alternative languages and formats, if requested. For more information, please call (215) 592-1800 or email public_affairs@dvrpc.org.



190 N Independence Mall West
Philadelphia, PA 19106
215-592-1800
www.dvrpc.org

Publication #14026

Staff Contact:

Michael Ruane
Transportation Planner
Office of Freight and Aviation Planning
mruane@dvrpc.org
215-238-2888