

5-2014

# The Future of Supply Chain Management in the Downstream Segment of the Oil and Gas Industry: Emphasis on Company Phillips 66

Kiley Huslig

*University of Arkansas, Fayetteville*

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The Future of Supply Chain Management in the Downstream Segment of the Oil and Gas  
Industry: Emphasis on Company Phillips 66

Submitted in partial fulfillment of the requirements for the degree Bachelor of Science in  
Business Administration with a focus on Supply Chain Management

By:

Kiley DaNae Huslig

University of Arkansas, Fayetteville

Bachelor of Science in Business Administration

May 2014

University of Arkansas

## Abstract

The purpose of this research is to provide insight for supply chain management scholars in the downstream segment of the oil and gas industry. To broaden their view of how a supply chain management degree can be used in an industry other than retail/CPG, which is heavily focused on in the classroom. The research will be exploring the downstream segment of the oil and gas industry. A direct focus will be placed on the company Phillips 66. Their company profile will be presented, comparing it to their competitors and peers. The challenges that the downstream oil and gas companies are facing will be presented. Recommendations will be made for Phillips 66 on how to overcome the challenges they are facing and how to stay competitive in the realm of their supply chain.

## Acknowledgements:

I would like to thank the faculty and staff of the University of Arkansas as well as the faculty and staff of the Sam M. Walton College of Business in preparing me to write my senior honors thesis.

I would like to say a special thank you to my thesis advisor Carole Shook. Since sophomore year you have been an encourager to me. You have helped me succeed academically and have shared my successes with me. Thank you for being more than a professor to me, thank you for being my friend. I couldn't have completed this paper without all of your time, support, and help.

I would like to thank Adriana Hofer in taking the time to read, review, and critique my thesis.

I would like to thank the Phillips 66 professionals who offered their time in allowing me to interview them in order to gain additional insight into Phillips 66 and the industry. Thank you Joe Gallagher, Emily Cole, and Stephen Sharr. A special thank you to my former supervisor, Joe Gallaher, in teaching me about Phillips 66, the oil and gas industry, and giving me an appreciation and further interest in this study. Thank you for always being a resource to me.

Motivation:

The University of Arkansas Walton College of Business Supply Chain Management Department is very educated and distinguished. U.S. News and World Report has rated the supply chain management program among the best programs in the United States. The newly restructured program has made strides to create a curriculum that teaches its students about the growing field of supply chain management. Classes offer different emphasis on supply chain management, logistics, and transportation. Because of the support the Walton College gets from neighbor Walmart, most of the classroom studies are focused on the retail industry and consumer packaged goods (CPG's). There is more to the supply chain management degree than the retail industry and CPG's though. Last summer I was exposed to the oil and gas industry. Through my experience of interning with Phillips 66 I was able to learn about one of the worlds largest industries. I was able to see how supply chain management played a very key role in keeping the industry successful. With my knowledge and the help from other professionals in the oil and gas industry I want to be able to expose students to an industry that is sometimes overlooked due to our close location and relationship with Walmart. In this research I will be exploring the downstream segment of the oil and gas industry. I will directly be focusing on Phillips 66; evaluating their supply chain and their competitors, recommending what Phillips 66 and other downstream energy companies should do in the realm of supply chain to stay competitive, and giving Phillips 66 recommendations on where they should focus their attention and resources in the coming years.

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# **I. Industry and Company Background**

## **Introduction**

Oil is one of the world's most important raw materials. It has been the world's leading source of energy since the mid 1950's (IFER, 2013). This energy source is what fuels cars, provides electricity to heat homes and water, is used in modern medicine, processes extract the chemicals used for household cleaning products, and much more. The oil and gas industry plays a critical role in driving the global economy. The products that this industry makes support many other vital industries like the automotive industry and manufacturing industry. The United States is the third largest petroleum producer in the world. Together, oil and gas supply 65% of U.S. energy (EPA, 2011). Oil has been the world's major commercial energy source for many decades and the consensus is that it will maintain this leading role well into the 21st century. Because of its high demand around the world, the oil and gas industry has had tight control since the beginning of its discovery. Companies have found ways to overcome challenges and excel in this industry. Today is no different. Companies are being put to the test with an increasing amount of control and regulation to determine who will come out ahead.

## **Background and Terminology**

The nature of the oil and gas industry is very complex. It is split up into three sectors: upstream, downstream, midstream. The upstream sector includes the processes of exploration, recovery, and production of crude oil and natural gas. This sector is widely known as the exploration and production sector. The midstream sector can include elements of both the upstream and downstream sectors. However, the main focus of the midstream sector is the gathering system. Gathering systems are oil and natural gas storage areas where hydrocarbons from the oil are held

until they can be transported to the refinery, where they are turned into marketable products. The downstream sector refers to the refining of crude oil, and the selling and distribution of natural gas and products that are derived from crude oil. Products can include gasoline, jet fuel, diesel fuel, liquefied petroleum gases, and petroleum coke. Players in the downstream sector include oil refineries, petrochemical plants, petroleum distribution outlets, retail outlets and natural gas distribution companies. There are two types of players in the oil and gas industry; integrated players and independent players. Integrated players are companies who combine activities from different sectors. Independent players are companies who focus on one specialty.

### **Phillips 66 Introduction**

Phillips 66, an independent company since May 1, 2012, is a growing energy manufacturing and logistics company. They have a prosperous and complex history with its many predecessor companies, particularly Conoco and Phillips Petroleum Company. These two companies had long and successful businesses before merging in 2002 to form ConocoPhillips. In 2012, ConocoPhillips repositioned into two stand-alone publicly traded companies, one of which is the Phillips 66 of today. “Phillips 66 is the only integrated downstream company to combine leading midstream, chemicals, refining, and marketing and specialties businesses” (Phillips 66 website). They are the only downstream oil and gas company competing with the integrated upstream players in the chemicals and midstream markets. With a diverse portfolio, Phillips 66 is able to position itself to capture opportunities in the wide energy market. “Phillips 66’s midstream segment consists of Phillips 66’s transportation business; operations of Phillips 66 Partners LP, which is a master limited partnership; DCP Midstream, a joint venture with Spectra Energy Corporation; and natural gas liquids operations.” Their chemicals segment consists of a 50 percent equity investment in Chevron Phillips Chemical Company LLC (CPChem). Phillips 66

has refining operations in all five U.S. Petroleum Administration for Defense Districts (PADDs). PADD's are geographic areas of the 50 States and the District of Columbia that are divided into five districts. They allow users to analyze patterns of crude oil and petroleum product movements throughout the nation. Phillips 66 has assets integrated with transportation, marketing, and commercial activities in each of the 5 regions. Their marketing and specialties segment includes marketing their products in the United States as well as Europe. This segment also includes the company's lubricants, flow improver, and power generation business. Phillips 66 has a very large portfolio of businesses. They are a leader in their industry and are looking to make more strides forward in innovation to stay competitive (Phillips 66 website).

### **Introduction of Competitors**

The United States oil and gas industry is very diverse. There are firms who compete solely in the upstream segment, solely in the midstream segment, solely in the downstream segment, and integrated in one or more of the segments. Phillips 66 competes in the downstream segment. But what differentiates them from other downstream competitors is that they are an integrated downstream company. By looking at the following chart, it is shown that Phillips 66 does not have any direct downstream competitors. It looks as if they are competing with the integrated majors: Exxon, Chevron, and BP. These companies are not direct competitors of Phillips 66 because they are competing in the upstream segment where Phillips 66 does not have a presence. These integrated majors redistribute their earnings differently than Phillips 66. They are in the business of exploration and production. This is a very capital intense business. The earnings that they make from the downstream segment are mostly redistributed to the exploration and production side of their business rather than investing their earnings in the same operation they came from. Phillips 66 does not compete in the upstream segment, therefore the earnings

Phillips 66 makes from the downstream segment is put directly back into the downstream segment where they can continue to grow their business. Although it looks as if Phillips 66 is directly competing with the integrated majors, they are not; they are a competitor but they are not a peer play competitor. The companies that are most closely a peer and direct competitor to Phillips 66 are Valero, Marathon, and Tesoro. As the chart indicates, these three peer companies are competing in the refining business but are not competing in the chemicals and midstream businesses like Phillips 66. This is what differentiates Phillips 66 from its most direct peer play competitors. For further study, Tesoro will not be considered one of Phillips 66's direct threats. After looking at financials, Tesoro is a much smaller company than the other peer plays with a much lower market cap.

<b><u>Competitors' Scope of Operations</u></b>							
Company	Phillips 66	Valero	Marathon	Tesoro	Exxon	Chevron	BP
Refining	X	X	X	X	X	X	X
Retail	X	X	X	X	X	X	X
Transportation	X	X	X	X	X	X	X
Chemicals	X				X	X	X
Midstream	X				X	X	X

## **Phillips 66 Profile**

Phillips 66 is a growing energy manufacturing and logistics company. Their operations include midstream, chemicals, refining, marketing, and specialty businesses. They own and operate over 18,000 miles of pipeline, over 10,500 railcars, and 49 total terminals. Phillips 66's transportation movements are done mostly through truck, rail, and pipeline. They have a joint venture with Sentinel Transportation, LLC that provides a committed and specialty designed trucking service for Phillips 66. Phillips 66's Chemicals segment includes a 50 percent equity investment in Chevron Phillips Chemical Company LLC (CPChem). "CPChem is the largest producer of high-density polyethylene in the world, second largest producer of alpha olefins in the world, and the second largest producer of cyclohexane and largest marketer of cyclohexane in the world" (Phillips 66 website). Phillips 66 has refining operations in all five U.S. PADDs. Presence in all five PADD's allows them to benefit from access to cost advantaged crude and lower natural gas prices. They have four refineries in the western/pacific region, four refineries in the central corridor, three refineries located in the gulf coast, and four refineries in the Atlantic basin and Europe region. Phillips 66 Marketing and Specialties segment includes marketing of gasoline, diesel, and jet fuel in the United States; as well as marketing of gasoline and diesel in Europe. Most of their 7,100 branded retail outlets contain gasoline that has been recognized as top tier by leading automakers. This segment also includes the company's lubricants, flow improver, and power generation businesses.

## **Valero Energy Corporation Profile**

Valero Energy Corporation, through its subsidiaries, is an international manufacturer and marketer of transportation fuels, other petrochemical products, and power (Valero, 2014). They

are the world's largest independent refiner with 16 different refineries. Their operations stretch from coast to coast, with refineries located in 3 out of 5 PADD's. Their refineries are highly concentrated in Texas and around the Gulf Coast. They also have refineries internationally in Canada, the United Kingdom, Ireland and the Caribbean. Valero's refineries produce gasoline, diesel, jet fuel, asphalt, petrochemicals, lubricants and other specialty products. Their recent focus has been on renewable energy. They understand the importance of exploring alternative-energy opportunities to protect the environment. Valero has done this by building a 50-megawatt wind farm near its McKee Refinery in Texas along with acquiring 10 ethanol plants; making them the first traditional refiner to enter the production of ethanol. They are one of the United States' largest retail operators with over 7,300 branded sites (Valero Energy Corporation website).

### **Marathon Petroleum Corporation Profile**

Marathon Petroleum Corporation, together with its subsidiaries, is a petroleum product refiner, marketer, and transporter in the United States. They are the nation's fourth largest petroleum refiner. Their operations include 7 refineries that are concentrated in the Midwest, Gulf Coast, and Southeast regions. Although these operations are strategically placed to serve major markets, they are only located in 2 out of the 5 PADD's. Marathon Petroleum's marketing organization supports several different markets. Their products include gasoline, diesel, lubricants, asphalt, and specialty products. Marathon Petroleum's division Marathon Pipe Line LLC manages one of the largest petroleum pipeline networks in the United States, based on total volume delivered. They own, lease, or have ownership interest in 8,300 miles of pipeline. They have a partnership with Ohio River Pipe Line and they have partial ownership interests in several pipeline companies that operate 110 miles of crude oil pipelines and 3,600 miles of refined

products pipelines. Marathon Petroleum's marketing and transport operations intermix with their retail operations. Marathon branded gasoline is sold through about 5,100 branded locations where the retail stations are owned and operated by independent entrepreneurs. They also have their chain of company owned and operated gasoline and convenience stores, called Speedway LLC. There are 1,470 of these convenience stores located in 9 states. As of 2012 Marathon Petroleum Corporation's product distribution facilities included about 146 transport trucks delivering crude oil and light products and a rail car fleet including 1,970 owned or leased rail cars. Many of Marathon Petroleum's terminals are now converted to ethanol-blended fuels in order to support the nation's renewable fuel goals (Marathon Petroleum Corporation website).

## **II. Future of Downstream Segment of Oil and Gas Industry**

### **Challenges the Oil and Gas Industry are Facing**

1. One of the major challenges the downstream industry is beginning to face is increased competition for labor (both craft labor and skilled/engineering functions) due to the influx of upstream, midstream, and petrochemical projects that are expected to take place in the United States in the coming years. Although the majority of these projects are taking place in the Gulf region, Texas, and the northern Rockies (North Dakota); the wages demanded at these projects will undoubtedly attract workers from other regions. This will in turn force all companies in the oil and gas industry to continue to raise their wages in an effort to attract the necessary talent. According to Peixe (2014), "The competition may drive up wages, and increase the cost of doing business, undermining the profitability of some facilities." Higher wages mean higher costs, and if the costs rise too much some of the planned projects might have to be placed on hold because firms may no longer be able to afford them. The billions of dollars of energy-related

projects expected over the next decade will also have a negative impact on material/equipment pricing and availability in the industry. This is particularly concerning for the downstream segment as they are generally spending only a fraction of what the larger upstream companies are spending on materials/equipment, resulting in a severe loss of buying power both from a purchase price and shop availability perspective.

2. Increased government regulations are going to challenge the industry as a whole. The Obama administration tightened regulations on the oil and gas industry “requiring drillers to capture emissions of certain air pollutants from new wells” (Hargreaves, 2014). Though this regulation is going to protect the environment and public safety, it unfortunately comes at a cost that will trickle through the entire supply chain and ultimately be seen by the players in the downstream segment. According to a survey of over 100 oil and gas professions, executives, and analysts by GL Nobel Denton, “Seventy-eight percent expect regulatory changes will lead to greater administrative workload, while 82 percent expected compliance costs to increase.” Because of the increase in recent oil and gas incidents, this is a necessary evil that companies are going to have to implement.

3. The much-anticipated decision from President Obama regarding the Keystone XL pipeline has the potential to change the landscape of the oil and gas industry. This new pipeline will be the safest and most advanced pipeline operation in North America. It will not only bring essential infrastructure to North American oil producers, but it will also provide jobs, long-term energy independence and an economic boost to Americans (TransCanada, 2014). If the pipeline does not get approved, then business would continue as normal. Companies will have to figure out a way to get the crude oil from Canada to the refineries in the United States.

4. The downstream segment of the oil and gas industry is largely dominated by the refining business. There is much volatility associated with refining due to the cyclical nature of the business, oil price differentials, etc. The challenge will be how companies will be profitable in such a cyclical business.

5. As mentioned earlier, refining dominates the downstream business segment. Crude oil is the single largest component in a refining business' cost structure; secondary to that is transportation. These two components are known as 'feedstock costs' and provide the biggest challenge and opportunity for refiners. Because the market sets the price of crude oil, companies should focus their cost savings attention on the transportation aspect of the oil.

6. The boom of crude oil discovered in the Bakken in North Dakota, has led to an increase in domestic oil production. This is a huge opportunity for the oil and gas industry in the United States. According to the United States Energy Information Administration, "The increase in United States production in 2013 exceeded the increase of 836,000 barrels a day in 2012. The largest increase before that, of 751,000 barrels, was in 1951." (Norris, 2014) Whichever gas and oil company can be a first mover in this area and gain a competitive advantage is the one who is going to see the most growth and profit from this new discovery.

### **Recommendations for Phillips 66 to Respond to Challenges in the Oil and Gas Industry**

1. In order for Phillips 66 to recruit the best talent for their company they are going to have to be competitive with their wages. They already do a great job at being an attractable company to work for; they just need to make sure they are staying one step ahead of their competitors. For Phillips 66 to gain more buying power with their suppliers their procurement organization should seek out leveraging a better partnership with CPChem and DCP Midstream. In an interview with

Phillips 66 Corporate Procurement Services Analyst Emily Cole, she mentioned, “If we work CPChem and DCP Midstream more often and combine our resources and spend with them, we will have more negotiating leverage with our contractors.” Phillips 66 is a very innovative company that is always thinking ahead to stay ahead. By working more closely with CPChem, who is one of the world’s largest chemical producer and marketer, and DCP Midstream, who is one the nations largest producers and marketers of NGL; Phillips 66 has an opportunity to grow their chemicals and midstream businesses. They have the opportunity to gain the leverage they need to compete with the integrated majors when it comes to material/equipment pricing and availability.

2. Phillips 66 will have to adjust their business in order to comply with increased regulations.

The challenge will be to make the adjustments while still being profitable and maintaining the growth their business has seen recently. Though Phillips 66 will feel this financial burden like all other oil and gas companies who have to change their business practices to meet new industry regulations, their values are safety, honor, and commitment. Phillips 66 has been a leader in safety in their industry. They protect their employees, environment, and communities.

3. Phillips 66, along with all other oil and gas companies, needs to be an advocate for the Keystone XL pipeline. This pipeline is a critical infrastructure project for the energy industry. It would give the United States energy security and strengthen the American economy. Having the Keystone XL pipeline approved would give Phillips 66 a huge opportunity to grow their business. It would bring the crude oil directly to some of Phillips 66’s refineries. If the Keystone XL pipeline does not get approved, Phillips 66 should continue to stay ahead of their competitors with the crude by rail projects. Phillips 66 already has a substantial lead due to the

amount of rail cars they own/lease. Having control of so many rail cars will allow them to negotiate better rates with the rail companies.

4. Refining has always been a cyclical business. Because of this uncertainty, downstream companies should look to diversify into other segments, such as chemicals and other finished products. They diversify to protect their company from the cyclical refining business. Even if the refining business is not squeezing a profit, Phillips 66 will have other businesses they can look to, to maintain their overall profit. This is one area where Phillips 66 differentiates from its competitors. They have successfully done this by diversifying across four business segments within its downstream portfolio: Midstream, Chemicals, Refining, Marketing and Specialties. Instead of calling itself a downstream oil & gas company or a “refiner,” Phillips 66 now calls itself an Energy Manufacturing & Logistics Company

5. “If Phillips 66 could get a savings of \$1 per barrel across their refining system , their savings would be worth approximately \$450 million per year” according to Phillips 66 employee Joe Gallagher, former Director of Commercial Truck and Rail. Therefore, businesses are on the hunt for that dollar, which is why there has been a renewed investment in transportation and logistics. In the short term, Phillips 66 should focus on their rail transportation strategies to move crude oil. This would include unit trains of crude oil. A moveable pipeline enables a company to capture opportunity and have maximum flexibility. Phillips 66 has already made a huge investment in focusing their attention to transportation. In 2012 they purchased 2,000 crude oil railcars for the transport of shale crude oil. In the long term, Phillips 66 should focus their attention to pipelines to move crude oil. Joe Gallagher also mentioned, “The crude by rail is not yet a mature market, and it will not likely become the dominant mode or primary focus.”

Competitiveness and versatility of rail will lead to a sustainable business model; a long-term

complement to pipeline. In the end, both of these modes of transportation will be needed to keep up with demand to move crude oil in the United States.

6. Business is about risks. Taking a risk is what takes a business to the next level. Phillips 66 took a big risk when they decided to purchase 2,000 crude oil railcars to transport crude oil from the Bakken to their East and West coast refineries. With much uncertainty about how much oil the wells in the Bakken area would actually produce, Phillips 66 went ahead and trusted their instincts and market research and made the big purchase. A year later and they can see they made the right choice. “We keep raising our forecasts, and we keep underestimating production,” said Lejla Alic, an analyst from International Energy Agency (Norris, 2014). This new market is very competitive. Companies are now playing catch up with one another realizing that this new oil boom in the Bakken is not going away anytime soon. It is recommended that Phillips 66 continue to be innovative with their rail strategies. They need to keep looking ahead to continue to have the advantage in number of rail cars available to move this oil. There is a shortage in the industry for rail cars that carry crude oil because before the discovery in the Bakken, most crude oil was moved by pipeline or truck. Rail car manufacturers are manufacturing new rail cars to carry crude oil, but they can only produce so quickly. This new strategy of crude by rail is just the beginning.

### **Specific Challenges Phillips 66 is Facing**

1. Phillips 66 is in a very unique position today. Much of their workforce is reaching the age of retirement but at the same time they are in a growth stage. CNBC reported, “The oil production boom had been expected, but the magnitude of change in such a short period of time is a surprise. U.S. oil production is at its highest level in 20 years” (Domm, 2013). Phillips 66 will

have to figure out how to keep up with that growth so that they don't lose any potential to save money or make money.

2. Though Phillips 66 as a company is experiencing large growth in the industry, they are still considered a small company compared to the integrated majors in the industry. Phillips 66 isn't trying to become an integrated major and compete in the upstream segment of the industry; that does not follow their business model. Bringing a smaller player is going to hurt Phillips 66 though when it comes to leverage with contractors. They will not have the same power as the integrated majors, so they will have to find a way to achieve that bargaining power.

3. Materials management and inventory optimization is not the same in the oil and gas industry as it is in the retail/CPG industry. Though it is night and day different, is there any way to optimize this and save costs without losing money in an operation being temporarily shut down and losing more money that way? That is what Phillips 66 needs to determine. They need to reevaluate their inventory model to reach an optimization level that complements them and the industry they are in.

### **Recommendations for Phillips 66 to Respond to Specific Challenges**

1. Growth in the industry means Phillips 66 as a company will grow in numbers. They need to keep placing a focus on recruitment and awareness to the campuses they see will be a best fit for their company. They need to make sure they are hiring enough people, both new college graduates and experienced professionals, to achieve all the goals they have set. In order to keep growing in the industry, they need to stay innovative. They need to keep expanding their business in areas that complement them rather than hurt them. They have shown great potential in this area already by being an integrated downstream competitor.

2. Phillips 66's procurement organization needs to do a better job leveraging their joint venture with CPChem and DCP. Emily Cole stated, "If we work with them more often and combine our resources and spend with them, we will have more negotiating leverage with our contractors. I think we are on the path to do that but we have a ways to go." Sharing that close of a relationship with another company is hard. A lot of trust has to be put into the relationship. Taking the experience of Phillips 66 employees and CPChem employees and mixing it could lead to a new wealth of information for both sides. Learning how to achieve the leverage will take the chemicals company to the next level. The same is true with DCP Midstream. Learning how to gain leverage and bargaining power will allow both companies to continue their growth in the NGL business while saving costs.

3. The impact the Supply Chain/Procurement organization has on a large-scale energy company is much different than the impact a SCM organization may have on a company in the retail or CPG industry. Unlike in those industries, a supply chain will never be considered a true competitive advantage for a large energy company, primarily due to the scale of the business in which Phillips 66 operates. The Supply Chain/Procurement department is a true service organization. Its job is to ensure all materials and services are acquired in an expedient manner and available for use at the exact time necessary. "Any cost savings/additional value added services are purely secondary to ensuring the right part is available at the right time. Failure to meet this requirement could result in millions of dollars in lost profit opportunities", Stephen Sharr, Strategic Buyer at Phillips 66. One option that could be explored in materials management and inventory optimization is centralized warehousing for the refineries. There are three refineries in California, and four total on the west coast. By combining inventory in a centralized location these refineries could save money on inventory holding costs. By having a

plan in place to expedite inventory to the refinery when needed, the inventory costs could be outweighed by the shipping costs therefore making this an optimization solution. With three refineries located in the Gulf, this could potentially be another area where centralized warehousing could be implemented.

## **Conclusion**

The oil and gas industry is looking better than ever today. They are making new discoveries, seeing rapid industry growth as well as employee growth, profits to reinvest in their company, and many other exciting things. However, they are facing strict government regulations, increased competition for labor, and uncertainty about projects that could increase energy security in the United States. This industry is always changing. A professional in this industry has to be innovative; always looking for a new way to do business. They have to be able to adapt; to the market as well as the changing nature of the business. A professional in this industry has to take concepts that were learned in the classroom and figure out how to apply them to a nontraditional industry. There is much to know and much to learn about the global oil and gas industry. This industry has been the leading source of energy from the mid 1950's to today. As the world begins to shift to cleaner sources of energy, the oil and gas industry will be the innovators who continue to bring the public energy to fuel their every day lives.

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Appendix

Figure 1: Petroleum Administration for Defense Districts

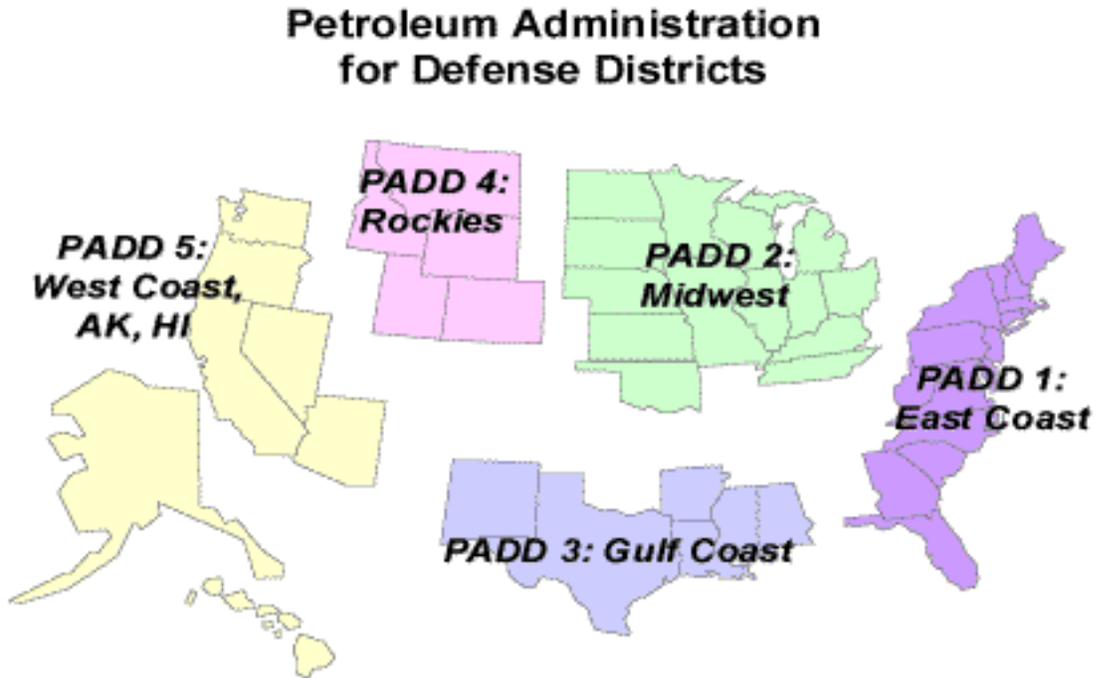


Figure 2: Phillips 66 Refinery Locations



**WORLDWIDE REFINING AS OF DEC. 31, 2011**

Region	Capacity (MBC)				Average Nelson Complexity Factor <sup>4</sup>	Average Clean Product Yield <sup>4</sup>
	Crude	Total	Gasoline <sup>3</sup>	Distillate <sup>3</sup>		
Western United States and Asia <sup>1</sup>	435	473	210	200	11.5	82%
Gulf Coast United States	733	855	345	355	12.3	81%
Central United States <sup>1</sup>	471	507	273	175	11.6	87%
Eastern United States and Europe <sup>1, 2</sup>	588	644	270	285	9.0	83%
<b>Worldwide</b>	<b>2,227</b>	<b>2,479</b>	<b>1,098</b>	<b>1,015</b>	<b>11.0</b>	<b>83%</b>

<sup>1</sup> Includes Phillips 66's share of joint venture refineries.

<sup>2</sup> Excludes the Trainer Refinery in Pennsylvania, which has been idled.

<sup>3</sup> Clean product capacities are maximum rates for each clean product category, independent of each other. The capacities are not additive when calculating the clean product yield capability for each refining region.

<sup>4</sup> Average Nelson Complexity Factor and average clean product yield are weighted averages.

Figure 3: Valero Energy Corp. Refinery Locations



Figure 4: Marathon Petroleum Corp. Refinery Locations

