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U.S. Energy Information Administration

Refinery Outages: First Half 2015

February 2015

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1. Preface

This report examines refinery outages planned for the first half of 2015 and the potential implications for available refinery capacity, petroleum product markets and supply of gasoline, diesel fuel, and heating oil. The U.S. Energy Information Administration (EIA) believes that dissemination of such analyses can be beneficial to market participants that may otherwise be unable to access such information.

Refinery outages result from the planned shutdown of refinery units for maintenance and upgrades, and from unplanned shutdowns from a variety of causes, e.g., mechanical failure, weather, power failures, fire, and flooding. Planned maintenance is typically scheduled when refined petroleum product consumption is relatively low, in the fall and in the first quarter when there is less demand for transportation fuels.

This report analyzes the availability of refinery capacity to produce diesel fuel and heating oil (distillate) and gasoline, focusing on two refinery units, the atmospheric crude distillation unit (CDU) and the fluid catalytic cracking unit (FCCU), that are strongly correlated with distillate and gasoline production, respectively.

This issue of the refinery outage report uses the same methodology as the fall 2014 issue and focuses on how planned refinery outages may affect the adequacy of regional distillate fuel and gasoline supplies, as defined by Petroleum Administration for Defense District (PADD) areas. It does not include a discussion of national level balances and does not estimate future unplanned outages.

National supply-demand balances have very limited implications for the regional adequacy of distillate fuel and gasoline supply because pipeline infrastructure, geography and marine shipping regulations constrain the amount of product that can flow among the different regions of the United States. In most regions of the country, the majority of distillate fuel and gasoline is supplied by in-region refinery production.

Unplanned outages are by definition unexpected, thus making an estimate of future unplanned outages based on historical averages problematic. In lieu of estimating unplanned outages, this report provides data on the historical level and frequency of unplanned outages and considers how unplanned outages could prove disruptive based on expectations for overall supply in each region, taking planned outages into account.

EIA plans to continue work to improve the analysis of the impact of refinery outages on the availability of supply, including a more granular analysis of sub-PADD-level supply patterns, inter-regional product flows, and unplanned outages.

2. Executive Summary

Planned refinery maintenance during the first half of 2015 is not expected to adversely impact the supply of gasoline and distillate. The impact of refinery outages on product supplies during the first half of 2015 depends on many factors, including petroleum product demand, the availability of product supplies from available refinery capacity, inventories, imports and redirected exports, as well as actual levels of both planned and unplanned refinery outages. Barring unusually high unplanned outages, planned outages that extend beyond the planned time frame, or higher-than-expected demand, supply of gasoline and distillate should be adequate in all regions.

Demand for distillate (diesel fuel and heating oil) in the United States through the first eleven months of 2014 averaged 4 million barrels per day (bbl/d), an increase of 180,000 bbl/d year-over-year. While some of this increase resulted from colder-than-normal temperatures during the heating season last winter, year-over-year growth continued through the summer months. EIA's February *Short-Term Energy Outlook* (STEO) expects distillate demand to average 4.1 million bbl/d in the first half of 2015, an increase of 40,000 bbl/d (1%) compared to the same period last year. Colder-than-expected winter temperatures could cause distillate demand to be higher than expected in New England and the Mid-Atlantic states.

U.S. gasoline demand is typically lower in the winter months and increases in the spring as driving season begins. EIA's February STEO expects gasoline consumption to increase by 160,000 bbl/d (2%) during the first half of 2015 compared to the same period in 2014.

Like the November 2014 issue, this issue of the report considers the supply of distillate fuel and gasoline supply on regional, both PADD and sub-PADD levels, rather than a national level. National balances have very limited meaning for the adequacy of distillate fuel and gasoline supply because pipeline infrastructure, geography and marine shipping regulations constrain the amount of product that can flow among the different regions of the United States.

Across the country, planned refinery maintenance on atmospheric crude distillation units (CDU) and fluid catalytic cracking units (FCCU), two refinery units that are strongly associated with distillate and gasoline production, during the first half of 2015 is concentrated in the first quarter and is highest during February. Table 1 provides a monthly summary of the percentage of available refining capacity expected to be out of service for maintenance during the first half of 2015 by PADD.

Table 1. Planned outages, percent of available capacity

Region	Atmospheric Crude Distillation Unit (CDU)					
	Jan	Feb	Mar	Apr	May	June
East Coast (PADD 1)	0%	6%	5%	0%	0%	0%
Midwest (PADD 2)	0%	0%	2%	4%	3%	0%
Gulf Coast (PADD 3)	5%	6%	5%	0%	4%	1%
Rocky Mountain (PADD 4)	0%	7%	1%	11%	5%	0%
West Coast (PADD 5)	0%	3%	4%	4%	2%	1%
Region	**Fluid Catalytic Cracking Unit (FCCU)**					
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**
East Coast (PADD 1)	0%	15%	2%	0%	0%	0%
Midwest (PADD 2)	0%	0%	2%	1%	0%	4%
Gulf Coast (PADD 3)	7%	12%	6%	3%	3%	1%
Rocky Mountain (PADD 4)	0%	7%	2%	10%	10%	12%
West Coast (PADD 5)	6%	2%	0%	0%	0%	0%

Source: Industrial Info Resources (IIR), January 27, 2015 database.

Planned maintenance in PADD 1 (East Coast) is light, with the exception of February when FCCU maintenance is expected to affect 15% of capacity. With East Coast gasoline inventories above the five-year range as of February 20, and given the availability of gasoline supply to the region from the global market, gasoline supply should be adequate to meet demand.

Planned maintenance in PADD 2 (Midwest) is also light over the period and concentrated in the March-through-June timeframe. Supplemental supply from the Gulf Coast should be available if needed. However, the time required for resupply to reach the Midwest from the Gulf Coast does vary considerably across the region because of its size. Resupply can reach Oklahoma, Kansas, and Missouri from the Gulf Coast within 7-10 days but may take close to 30 days to reach the northernmost states at the end of the supply line.

In PADD 3 (Gulf Coast), moderate levels of FCCU and CDU maintenance are planned, concentrated in the first quarter. As Gulf Coast gasoline inventories are near the top of the 5-year range (just under 80 million barrels), supply of gasoline should be adequate. Distillate inventories are also high, above both 2014 and 2013 levels. In addition, substantial volumes of gasoline and distillate are exported from the Gulf Coast. Exports generally act as a stabilizer in U.S. product markets, similar to inventories, as they create a source of supply that may be diverted to domestic markets if product balances tighten.

Although there are moderate levels of maintenance planned for PADD 4 (Rocky Mountain), inventories of gasoline and distillate are high and as a result supply is expected to be adequate.

PADD 5 (West Coast) planned maintenance is light over the period, with FCCU maintenance having been concentrated in January. However, on February 18, the ExxonMobil refinery in Torrance, California experienced an explosion that could have a significant impact on in-region production of gasoline and distillate. It is too soon to assess what that impact might be. Gasoline inventories are at the low end of the 5-year range, and are sufficient to supply 21 days of average demand, one day below average. Distillate inventories remain above average and are sufficient to supply 29 days of average demand.

Summary findings for each region of the country (PADD) are provided in the next section. Current market conditions, more detailed discussions of refinery maintenance in each region, and a discussion of other factors that affect the market are provided in subsequent sections. The Appendix provides a detailed breakdown of supply-demand balances for each PADD.

3. Summary Regional Findings

Gasoline and distillate fuel supply during the first half of 2015 should be adequate in all regions, based on planned levels of atmospheric crude distillation unit (CDU) and fluid catalytic cracking unit (FCCU) maintenance and barring unusually high unplanned outages, planned outages that extend beyond the planned timeframe, and higher-than-expected demand.

3.1. PADD 1 – East Coast

Generally, planned refinery maintenance on the East Coast, which includes all states in New England, the Mid-Atlantic and the South Atlantic, is expected to be very light. While harsh winter weather caused several unplanned outages in January , those outages have been resolved. A combination of increased imports and supplies from inventory replaced supply lost to unplanned outages.

As there are relatively few refineries on the East Coast, the region relies on transfers of petroleum products from other regions, primarily the Gulf Coast, and on imports from the actively traded Atlantic Basin market. As a result, refinery outages in other parts of the country and in the countries from which gasoline and distillate are imported can affect supply. Planned maintenance at refineries along the Gulf Coast is not expected to adversely affect supply of gasoline and distillate to the East Coast, as the substantial volumes of gasoline and distillate typically exported from the Gulf Coast can be diverted to domestic markets if product balances tighten.

Planned maintenance at refineries in eastern Canada that supply the northeastern United States is also expected to be light, and supply elsewhere in the Atlantic Basin is expected to be adequate. Reports have indicated that European refineries, which are structurally long gasoline, meaning that in-region refinery production exceeds local demand, have been running at high utilization rates and providing additional gasoline supply to the Atlantic Basin market. While European refineries are expected to begin seasonal maintenance in March, East Coast gasoline supply is not expected to be adversely impacted given high East Coast inventory levels and given that East Coast planned maintenance is light outside of February.

As of February 20, gasoline inventories in PADD 1, at 70 million barrels, are above the five-year range and sufficient to supply about 23 days of average demand. Total distillate inventories in PADD 1 are below the five-year average but are 16% higher than last year, and could supply 22 days of average demand. Inventories may act as a buffer against unexpected supply disruptions. In addition product can be supplied to the East Coast from the Atlantic Basin market, typically within 7-14 days.

Chapter 6 provides a more detailed discussion of East Coast refinery maintenance. Information on PADD 1 gasoline and distillate supply-demand balances can be found in the Appendix.

3.2. PADD 2 – Midwest

Planned maintenance in the Midwest region, which includes states in the midsection of the country from Oklahoma to Minnesota and from the Dakotas and Nebraska east to Ohio and Tennessee, is expected to be light during the first half of 2015. Winter weather did cause unplanned FCCU and CDU outages in January, but those outages have been resolved. The unplanned outages did not result in supply disruptions, as Midwest inventories of gasoline and distillate were high at the start of the year, near the top of the five-year range, and there has been no planned CDU or FCCU maintenance in January or February.

Midwest refineries produce most of the gasoline and distillate fuel consumed in the region, particularly during the winter months when gasoline demand is seasonally lower. The Midwest also receives supplies from other regions, primarily from the Gulf Coast. Planned Gulf Coast refinery maintenance is not expected to affect the supply of gasoline and distillate available to the Midwest.

As of February 20, Midwest distillate inventories are 4% above average, sufficient to supply 28 days of average demand based on the last three years. Gasoline inventories are slightly below average and sufficient to provide 22 days of supply. Inventories can act as a source of supplemental supply during outages. The time required for resupply from outside PADD 2, typically from PADD 3, varies considerably in the Midwest because of the size of the region. Resupply can reach Oklahoma, Kansas, and Missouri, the Group 3 sub-region of PADD 2, within 7-10 days, but can take close to 30 days to reach the northernmost states at the end of the supply line. As a result, unplanned outages in the northernmost states could lead to supply disruptions.

Chapter 7 provides a more detailed discussion of PADD 2 refinery maintenance. Information on PADD 2 gasoline and distillate supply-demand balances can be found in the Appendix.

3.3. PADD 3 – Gulf Coast

Planned maintenance in the Gulf Coast region, which includes Alabama, Mississippi, Louisiana, Arkansas, Texas, and New Mexico, is generally light compared to the first half of 2014, when maintenance did not result in supply disruptions, and distillate and gasoline supply should be adequate to meet demand during the first half of 2015. As of February 20, Gulf Coast gasoline inventories are near the top of the 5-year range (just under 80 million barrels) and distillate inventories are also high, above both 2014 and 2013 levels. Inventories can act as a source of supplemental supply if needed. In addition, substantial volumes of gasoline and distillate are exported from the U.S. Gulf Coast and exports, like inventories, generally act as a stabilizer in U.S. product markets as they create a source of supply that can possibly be diverted to domestic markets if product balances tighten.

The Gulf Coast region, which has substantially more refining capacity than is needed to meet in-region gasoline and distillate demand, supplies substantial volumes of distillate and gasoline to other regions, notably the East Coast and the Midwest. Gulf Coast refinery maintenance is not expected to adversely affect supply to other regions of the country.

Chapter 8 provides a more detailed discussion of PADD 3 refinery maintenance. Information on PADD 3 gasoline and distillate supply-demand balances can be found in the Appendix.

3.4. PADD 4 – Rocky Mountain

Although there are moderate levels of maintenance planned for the Rocky Mountain region, which includes Idaho, Montana, Wyoming, Utah, and Colorado, supply should be sufficient as inventories are at very high levels. As of February 20, gasoline and distillate inventories are sufficient to provide 26 and 23 days of demand cover respectively.

Although refineries in the Rocky Mountain region supply most of the in-region gasoline and distillate demand, the region does receive small volumes of product from refineries in the Midwest and the Gulf Coast, which could be possible sources of supplemental supply during a shortage.

Chapter 9 provides a more detailed discussion of PADD 4 refinery maintenance. Information on PADD 4 gasoline and distillate supply-demand balances can be found in the Appendix.

3.5. PADD 5 – West Coast

With almost all planned FCCU maintenance in the West Coast region, which includes Arizona, California, Oregon, Washington, Nevada, Alaska, and Hawaii, already complete, and with relatively light CDU maintenance in a region that produces more distillate than it consumes, supplies of gasoline and distillate fuel are expected to be adequate to meet demand in PADD 5 during the first half of 2015, barring disruptions to supply resulting from the recent unplanned refinery outage in southern California. On February 18, the ExxonMobil refinery in Torrance, California experienced an explosion that could have a significant impact on in-region production of gasoline and distillate; however, it is too soon to assess what that impact might be. EIA will continue to monitor the situation. As of February 20, gasoline inventories are at the low end of the 5-year range, and are sufficient to supply 21 days of average demand, 1 day below average. Distillate inventories remain above average and are sufficient to supply 29 days of average demand.

Because the West Coast is relatively isolated from other U.S. markets and located far from international sources of supply, the region is very dependent on in-region production to meet demand. Planned FCCU maintenance, which was concentrated in January, is expected to complete in February, and there is no maintenance planned from March through June. Inventories of gasoline at the start of February were sufficient to supply 22 days of average demand, a level consistent with average historical levels.

Chapter 10 provides a more detailed discussion of PADD 5 refinery maintenance. Information on PADD 5 gasoline and distillate supply-demand balances can be found in the Appendix.

4. Background

This report examines refinery outages planned for the first half of 2015 and the potential implications for available refinery capacity, petroleum product markets, and supply of gasoline and distillate (diesel fuel and heating oil). EIA believes dissemination of such analyses can be beneficial to market participants who may otherwise be unable to access such information.

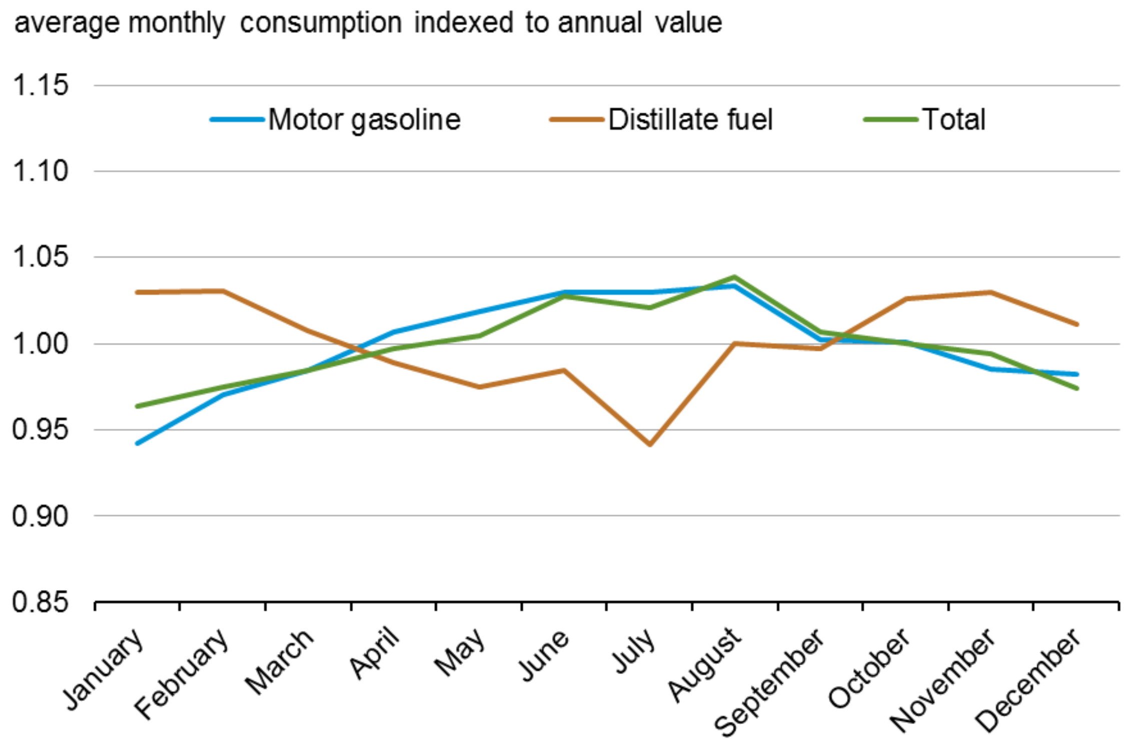
The report looks at reported planned maintenance levels for atmospheric crude distillation unit (CDU) and fluid catalytic cracker unit (FCCU) capacity in relation to historical maintenance levels for planned and unplanned outages at the Petroleum Administration for Defense District (PADD) level and in the context of current market conditions. Distillate (diesel fuel and heating oil) production is mainly affected by outages of the CDU, while gasoline production impacts are most strongly correlated with FCCU outages.

Since 2008, there have been significant changes in the structure of U.S. petroleum product markets and their relationship to global markets. U.S. refinery capacity and utilization rates have increased while U.S. demand for gasoline and distillate fuels has generally declined. The United States, which until recently was a national net importer of petroleum products, is now a significant net exporter of these products, primarily from the Gulf Coast. The East Coast, which lacks sufficient refining capacity to supply in-region demand, continues to rely on significant imports of petroleum products.

Refinery outages result from the planned shutdown of refinery units for maintenance and upgrades and from unplanned shutdowns that result from a variety of causes, e.g., mechanical failure, weather, power failures, fire, and flooding. Planned maintenance at U.S. refineries is typically scheduled when refined petroleum product consumption is low in the fall and in the first quarter when there is less demand for transportation fuels.

Figure 1 illustrates the seasonal variation in petroleum consumption. The seasonality of gasoline consumption is the primary driver of the seasonality of total U.S. petroleum consumption because gasoline accounts for nearly half of petroleum use. Distillate consumption, which has a seasonal pattern due to the winter heating season in the Northeast, moderates the winter decline in total petroleum consumption.

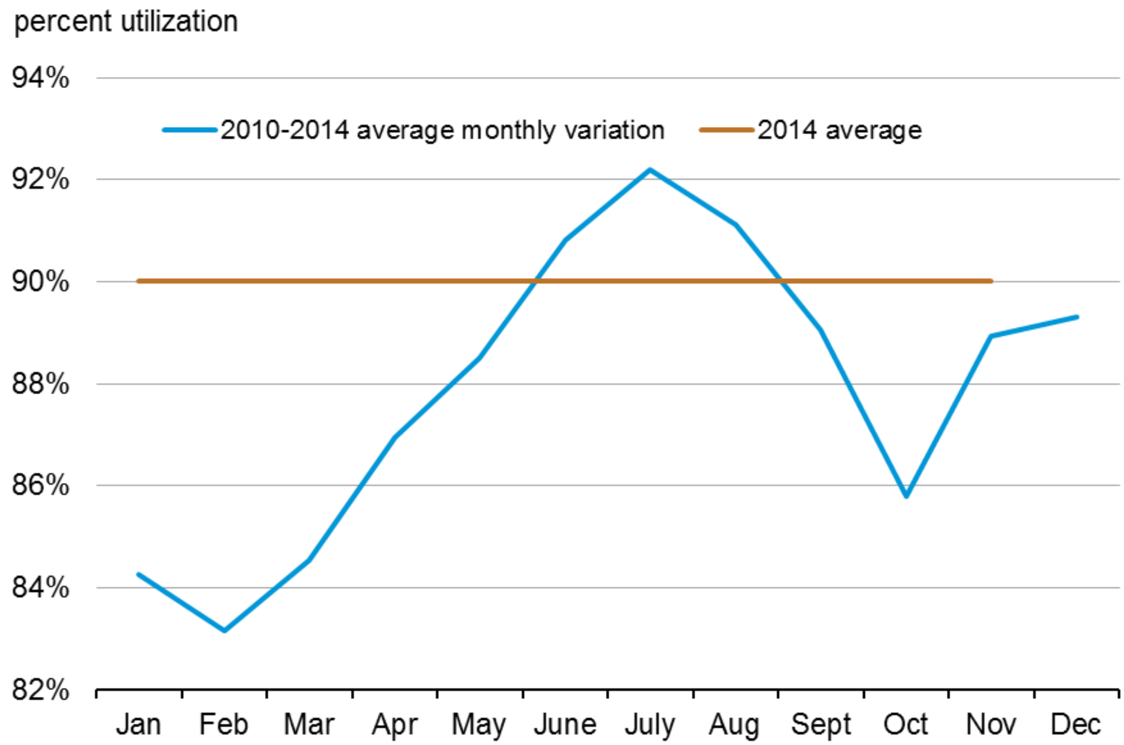
Figure 1. Seasonal variation in U.S. petroleum consumption (January 2010 - November 2014)



Note: Consumption is represented by product supplied. November 2014 is the latest data available.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly.*

Figure 2 illustrates the seasonal variation in refinery utilization rates. Refinery utilization rates reflect crude oil input levels and take into account discretionary changes in crude oil inputs made based on market conditions, including consumption, planned maintenance and unplanned outages. Utilization generally follows the seasonal consumption patterns, falling to the lowest levels during the first quarter when petroleum product demand is low and declining again in the fall.

Figure 2. Seasonal variation in monthly U.S. refinery utilization (January 2010-November 2014)



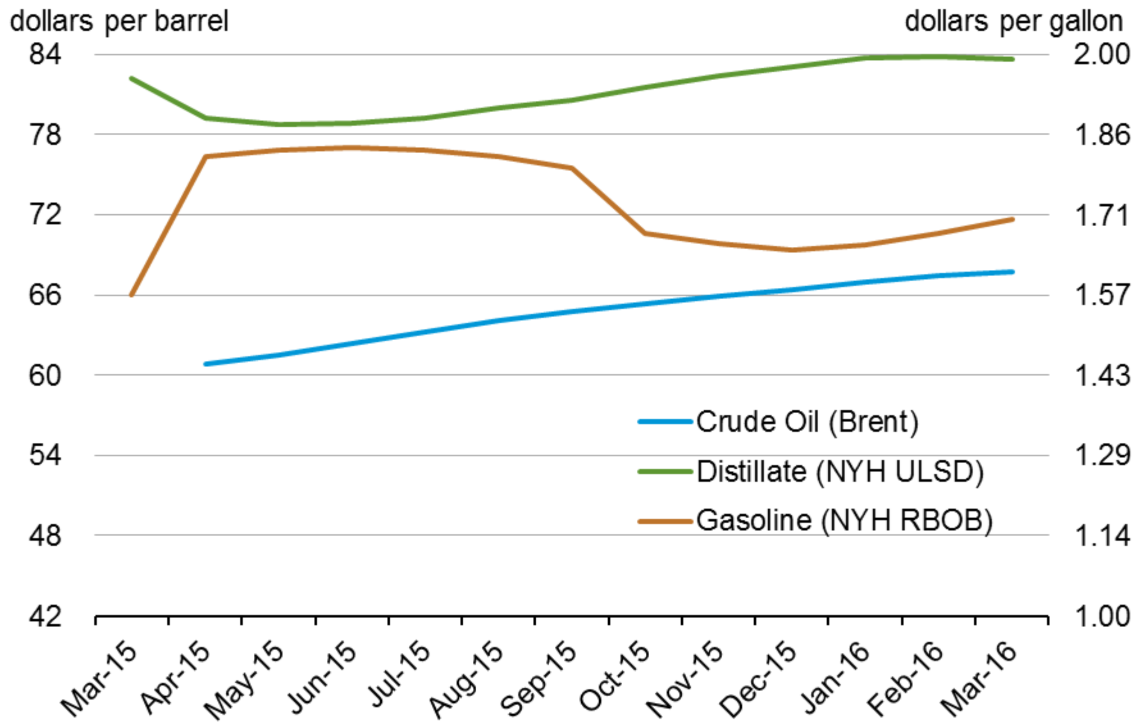
Note: Utilization represents gross inputs as percentage of operable distillation capacity. November 2014 is the latest data available.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly.*

Refiners with planned outages typically arrange for adequate product supplies in advance of planned maintenance, e.g., by operating refineries at high utilization rates during periods prior to planned maintenance to build inventories; by purchasing product from other sources, including other domestic and international refiners; or by curtailing exports into the global market. Other market participants that could be affected by refinery outages often build inventory as well and planned product exports may be redirected to the domestic market. Product in inventory is used to supplement supply during outages, as is product that might otherwise be exported. Storage capacity can limit maximum total product inventory, while minimum inventory operating levels can limit the extent to which inventories can be drawn down.

Refineries with available capacity can increase unit throughputs, and thus gasoline and distillate production, making up for offline capacity. However, the dynamics of this process are influenced by market conditions. Often, higher product prices caused by tight supply conditions signal refiners to increase production or pull back exports.

The perception of future prices can also influence decisions about building inventory. If the market believes that overall price levels will be lower in the future, storing product for future sale may result in a loss on those future sales versus selling the product now. This market condition, called backwardation, penalizes adding products to inventory. If perceptions are that future prices will increase, called contango, then those who store product for future sales may realize higher returns. Perceptions of petroleum prices are reflected in several worldwide markets in which participants can enter into contracts to buy or sell either financial instruments or physical products for future delivery of petroleum products. The main petroleum product futures market in the United States is the New York Mercantile Exchange (Nymex). Current futures prices from Nymex are shown in Figure 3 below.

Figure 3. Nymex and ICE futures prices of crude oil, distillate fuel and gasoline



Note: Nymex RBOB and ULSD futures prices and ICE Brent futures prices are as of February 18, 2015. RBOB is reformulated blendstock for oxygenate blending.
Source: Bloomberg, L.P.

As illustrated in Figure 3, futures prices for crude oil are in contango, when near-term prices are lower than longer-dated prices. As discussed in the Recent Market Conditions section of this report, the near-term crude oil market is significantly oversupplied, driving down near-term prices. However, market expectations are that demand growth will eventually result in a more balanced global supply-demand outlook, which has encouraged inventory builds and higher longer-dated prices.

Gasoline prices are also in contango through April, reflecting both the change from winter specification gasoline to the more costly-to-manufacture spring/summer gasoline, and expectations for increasing demand as the driving season begins in the spring. Gasoline sold in the winter months is different chemically from gasoline sold in summer months. The change from winter grade to summer grade generally occurs in the March to June timeframe. This change in gasoline specifications limits the amount of inventory that can be built in the current timeframe because some storage is needed for winter grade for immediate sales and separate storage facilities are needed for summer grade that will be sold in the future. The futures curve for gasoline flattens out from April through August before moving into backwardation, when near-term prices are higher than longer-dated prices, in September as gasoline specifications shift to less-costly-to-produce winter grades and as the driving season ends and demand is expected to decline.

Distillate markets are in slight backwardation as the winter space-heating season continues into April. Space heating requirements increase demand for distillate in the U.S. Northeast and also in Europe. Distillate prices move into contango in late spring, after the heating season ends, tracking crude oil prices.

5. Recent market conditions

As of February 25, the price of Brent crude oil was $61 per barrel, $54 per barrel below the 2014 high price of $115 per barrel set in June. As of January 26, 2015, the price of Brent crude price had declined to $45 per barrel, the lowest price since 2009. The decline in oil prices followed what had been a period of record stability in oil markets. For 13 consecutive months through July 2014, monthly average Brent crude prices had ranged within a narrow $5-per-barrel band. This price stability resulted from offsetting volatile market factors, as rapidly increasing U.S. crude oil production offset record global crude supply disruptions. That balance came undone when disruptions abated in the second half of 2014, increasing supply, and the outlook for the global economy began to weaken, reducing oil demand growth. As supply began to significantly exceed demand, OPEC adopted a policy of maintaining market share rather than making the significant production cuts needed to support prices. As a result, the near-term oil market is significantly oversupplied. The sharp contango in oil prices, which has encouraged inventory builds, reflects market expectations that demand growth will eventually result in a more balanced global supply-demand outlook.

Global crude oil supplies have risen sharply over the past few years, primarily due to rapid and sustained growth in U.S. oil production, which has increased by more than 4 million barrels per day (bbl/d)–80%–since 2008. In the February 2015 *Short-Term Energy Outlook* (STEO), EIA expects production to continue to increase, albeit at a slower rate due to the fall in oil prices, with U.S. crude oil production averaging 9.3 million bbl/d in 2015, an increase of almost 680,000 bbl/d compared to the 2014 average. Despite the fall in oil prices, EIA expects the global supply of total petroleum liquids, which includes both crude oil and other petroleum liquids, to increase by 820,000 bbl/d in 2015.

While global oil supply growth has been strong, economic growth outside of the United States has been slow, particularly in Russia and non-OECD Asia, the largest source of global petroleum demand growth since 2009. Economic growth in the United States has been relatively strong. EIA's February STEO reflects relatively lower non-OECD oil demand growth in 2015 and relatively higher demand growth in the United States. Overall, EIA expects global oil demand will increase by 1.0 million bbl/d in 2015, including a 290,000-bbl/d increase in the United States.

With continued access to price-advantaged crude oil and natural gas feedstocks, sophisticated upgrading equipment, and a strategic location relative to demand centers in Latin America, U.S. refineries have been running at record levels. In 2014, gross throughputs averaged 16.1 million bbl/d, the highest annual average since EIA began collecting data in 1985. Refinery production of gasoline and distillate has increased to supply growing demand in global markets, contributing to a widening petroleum product trade surplus. For the week ending January 2, 2015, gross U.S. refinery inputs were 16.7 million bbl/d, an increase of 280,000 bbl/d compared to the same week in 2014. Record-high U.S. refinery runs contributed to high U.S. gasoline and ultra-low sulfur diesel (ULSD) inventories. Since then, planned and unplanned refinery maintenance has reduced runs to 15.5 million bbl/d as of February 20.

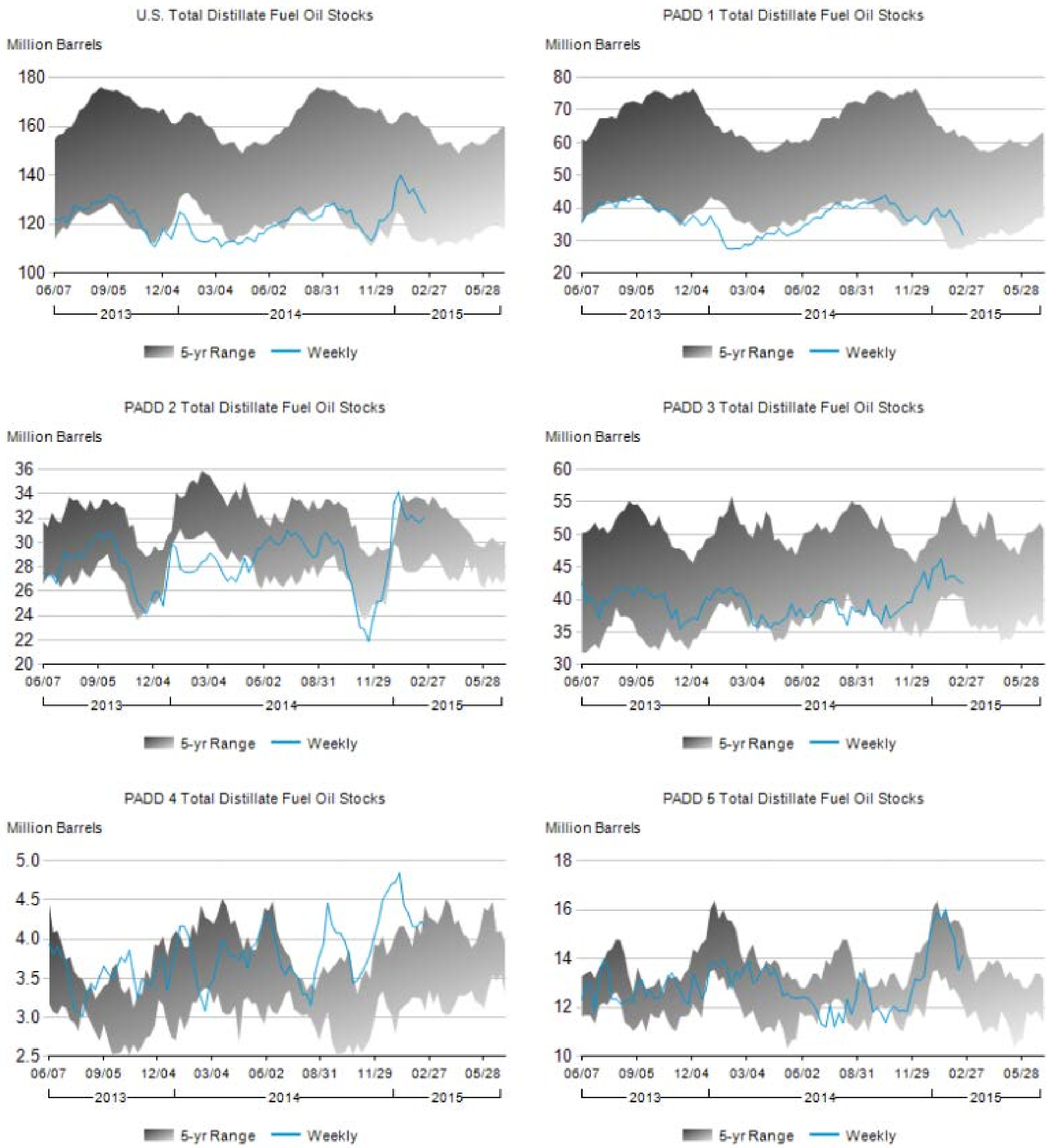
Falling crude oil prices, coupled with increased refinery production of gasoline and distillate (diesel fuel and heating oil), have caused gasoline and distillate prices to decline. Since June 2014, the U.S. average retail price for regular gasoline has declined from $3.69 per gallon (gal) to $2.33/gal as of February 23, a drop of $1.36 per gallon. The U.S. average retail price for ULSD has fallen $1.01 per gallon, from $3.91 to $2.90. The slower decline in the price of ULSD reflects seasonal factors and strong global demand. The refinery cost of crude oil is the primary component in the retail prices of gasoline and diesel fuel.

EIA expects gasoline consumption to increase by 160,000 bbl/d (2%) during the first half of 2015 compared with the same period in 2014. While demand growth from increases in population, employment, and disposable income is largely offset by improving vehicle fleet fuel efficiency, the significant fall in retail gasoline prices–which are expected to average 37% lower during the first half of 2015 compared with the same period in 2014–results in higher gasoline demand. Over the same period, U.S. distillate consumption is expected to increase by 40,000 bbl/d (1%), driven largely by expanding industrial production.

Distillate consumption in 2014 was supported by an especially cold winter. Last winter, when distillate demand for space heating increased, PADD 1 distillate fuel imports averaged 294,000 bbl/d from January through March, up from an average of 155,000 bbl/d during the same period a year earlier. This winter, distillate imports in PADD 1 increased more than 180,000 bbl/d in the last two weeks of January compared to the previous two weeks, offsetting supply lost to unplanned outages. Recent cold weather has increased distillate demand.

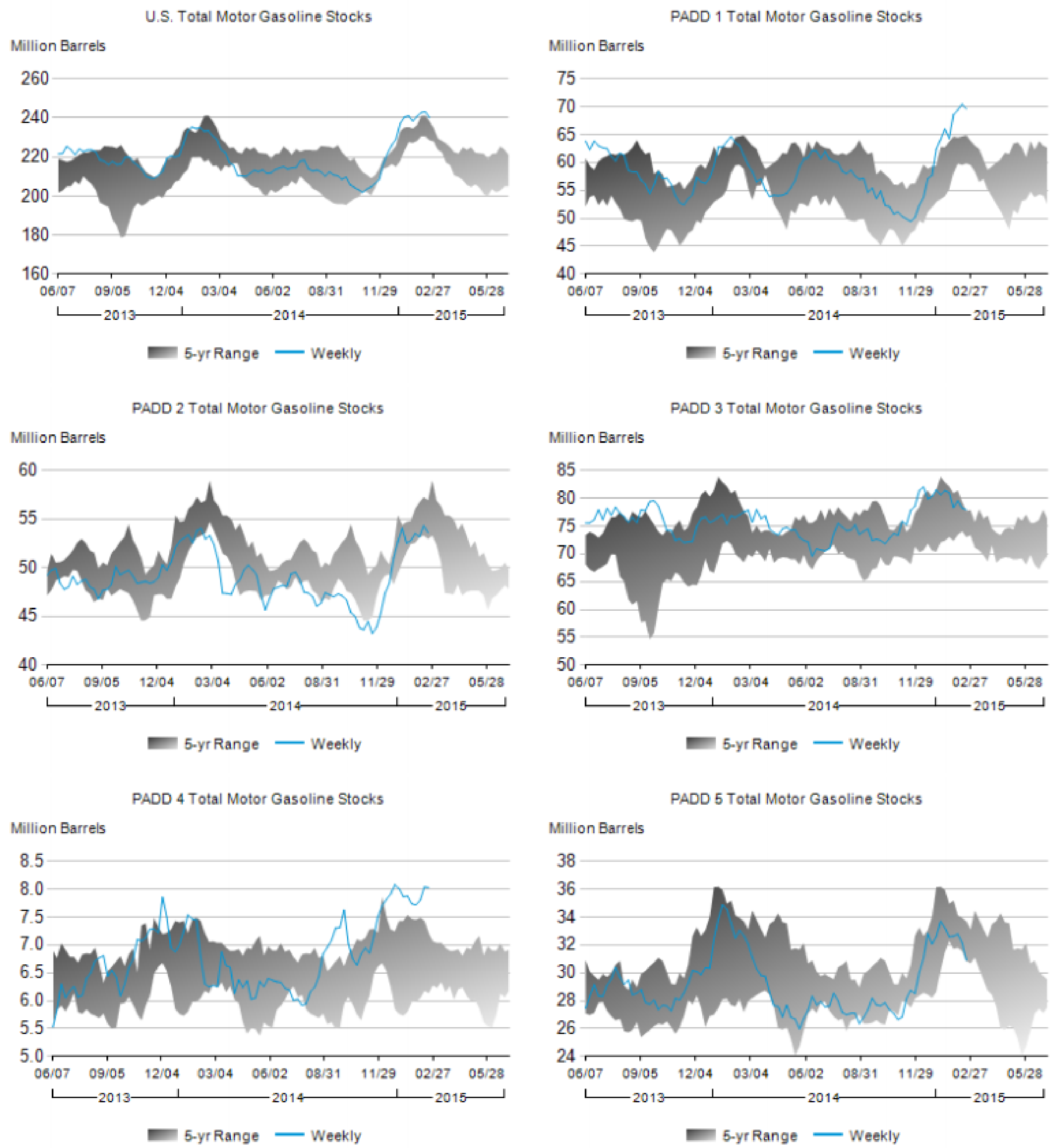
U.S. participation in the global petroleum products markets increased during 2014. Total U.S. product exports averaged 3.8 million bbl/d in 2014, up 0.3 million bbl/d from a year earlier. Exports generally act as a stabilizer in U.S. product markets, similar to inventories, as they create a source of supply that may, depending on the structure of sales contracts, be diverted to domestic markets if product balances tighten. Supplying overseas markets with product from economically efficient U.S. refineries also helps balance global product supply and demand, which in turn helps U.S. regions that rely on imports. In 2014, the U.S. East Coast imported an average of 0.7 million bbl/d of gasoline and distillate.

Figure 4. Regional distillate inventories as of February 20, 2015



Source: U.S. Energy Information Administration, *Weekly Petroleum Status Report*.

Figure 5. Regional motor gasoline inventories as of February 20, 2015



Source: U.S. Energy Information Administration, *Weekly Petroleum Status Report*.

6. PADD 1 Regional outage review

6.1. Summary

Generally, planned refinery maintenance on the East Coast, which includes all states in New England, the Mid-Atlantic and the South Atlantic, is expected to be very light. While harsh winter weather caused several unplanned outages in January, those outages have been resolved. A combination of increased imports and supplies from inventory replaced supply lost to unplanned outages.

As there are relatively few refineries on the East Coast, the region relies on transfers of petroleum products from other regions, primarily the Gulf Coast, and on imports from the actively-traded Atlantic Basin market. As a result, refinery outages in other parts of the country and in the countries from which gasoline and distillate are imported can affect supply. Planned maintenance at refineries on the Gulf Coast is not expected to adversely affect supply of gasoline and distillate to the East Coast, as the substantial volumes of gasoline and distillate typically exported from the Gulf Coast can be diverted to domestic markets if product balances tighten.

Planned maintenance at refineries in eastern Canada that supply the northeastern United States is also expected to be light, and supply elsewhere in the Atlantic Basin is expected to be adequate. Reports have indicated that European refineries, which are structurally long gasoline, meaning that in-region refinery production exceeds local demand, have been running at high utilization rates and providing additional gasoline supply to the Atlantic Basin market. While European refineries are expected to begin seasonal maintenance in March, East Coast gasoline supply is not expected to be adversely impacted given high East Coast inventory levels and given that East Coast planned maintenance is light outside of February.

As of February 20, gasoline inventories in PADD 1 at 70 million barrels are substantially above the five-year range and sufficient to supply about 23 days of average demand. Total distillate inventories in PADD 1 are 16% higher than last year and could supply 22 days of average demand. Inventories may act as a buffer against unexpected supply disruptions. In addition, product can be supplied to the East Coast from the Atlantic Basin market, typically within 7-14 days.

6.2. Refinery capacity overview

As of January 1, 2014, there were ten operable refineries in PADD 1, nine of which are operating. These nine operating refineries have 1.3 million barrels per day (bbl/d) of atmospheric crude distillation (CDU) capacity.[1] The Axeon Specialty Product, formerly Nustar Asphalt, Savannah, Georgia refinery, which has 28,000 bbl/d CDU capacity and produces primarily asphalt, is idle. The region has 475,800 bbl/d of fluid catalytic cracking capacity. As the region is structurally short refining capacity, meaning that in-region demand exceeds local refinery production, it relies on transfers of petroleum products from other

[1] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

PADDs, primarily PADD 3, and on imports from the actively-traded Atlantic Basin market to meet gasoline and distillate demand.

6.3. CDU planned maintenance

Planned CDU maintenance in PADD 1 is light throughout the first half of 2015. PADD 1 refineries currently have planned CDU maintenance scheduled in February and March (Table 2). Refineries in PADD 1 have undergone planned CDU maintenance at least half of the years since 2005 during February through April and less than half of the years in January, May, and June. Last year, maintenance was concentrated over the first four months of 2014, with an average of 124,000 barrels per day (bbl/d) of CDU capacity offline.

Table 2. PADD 1 planned CDU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	89,516	47,984	2/10	6,452	89,516
February	70,232	144,286	89,072	5/10	14,250	200,000
March	63,226	129,355	99,076	7/10	5,148	236,129
April	0	131,667	65,938	8/10	9,333	190,000
May	0	0	58,266	4/10	10,323	180,000
June	0	0	31,500	2/10	30,000	33,000

Source: Industrial Info Resources (IIR), January 27, 2015 database.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

6.4. FCCU planned maintenance

PADD 1 refineries have planned FCCU maintenance scheduled in February and March (Table 3). Maintenance during the first half of 2015 is light, with the notable exception of February. In February, an average of 69,821 bbl/d of capacity is scheduled to be offline (15% of regional capacity). Since 2005, refineries in PADD 1 have undergone planned FCCU maintenance more than half the time in the months of February, March, and April. During January and May planned FCCU maintenance has occurred only rarely during the last ten years and planned maintenance has not occurred in June. Planned maintenance in 2014 was concentrated over the first four months of the year, averaging 35,000 bbl/d.

Table 3. PADD 1 planned FCCU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	4,839	41,129	2/10	4,839	77,419
February	69,821	50,000	41,903	6/10	10,345	63,750
March	8,226	62,194	87,719	7/10	31,355	153,226
April	0	25,833	47,278	6/10	8,333	124,000
May	0	0	88,226	1/10	88,226	88,226
June	0	0	0	0/10	0	0

Source: Industrial Info Resources (IIR), January 27, 2015 database.

Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

6.5. Unplanned outages

Because PADD 1 relies on a variety of sources for product supply, including the actively-traded Atlantic Basin market, the region is often less affected by supply disruptions from unplanned refinery outages, although extreme situations can put stress on the supply chain.

Last January, severe cold temperatures contributed to unplanned outages at PADD 1 refineries. These cold-weather-related disruptions were short lived, limiting the impact on gasoline and distillate supply, aided by the availability of product supplies from the Atlantic Basin market.

In the fall of 2012, Hurricane Sandy caused a number of unplanned outages at PADD 1 refineries, initially because the refineries shut down in advance of the storm but also because of storm-related damage. The hurricane damaged much of the petroleum supply infrastructure in the New York Harbor (NYH) area and significantly disrupted the supply chain. Immediately following the storm, the lack of commercial or generator power kept many terminals from delivering product from storage. Recent winter storms have not significantly affected petroleum supply infrastructure.

Tables 4 and 5 provide detail on levels of historical unplanned outages.

Table 4. PADD 1 unplanned CDU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	60,726	2/10	6,774	114,677
February	45,621	6/10	6,250	114,286
March	95,343	4/10	6,774	161,290
April	80,583	4/10	5,500	222,000
May	77,151	3/10	51,613	109,677
June	26,250	2/10	25,833	26,667

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

Table 5. PADD 1 unplanned FCCU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	32,575	7/10	9,677	60,806
February	17,721	6/10	2,241	48,571
March	34,899	4/10	3,226	65,806
April	28,811	6/10	1,833	110,000
May	24,624	3/10	6,452	58,548
June	29,667	2/10	16,833	42,500

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

7. PADD 2 Regional outage review

7.1. Summary

Planned maintenance in the Midwest region is expected to be light during the first half of 2015. Winter weather did cause unplanned fluid catalytic cracking unit (FCCU) and atmospheric crude distillation unit (CDU) outages in January, but those outages have been resolved. The unplanned outages did not result in supply disruptions as Midwest inventories of gasoline and distillate were high at the start of the year, near the top of the 5-year range.

Midwest refineries produce most of the gasoline and distillate fuel consumed in the region, particularly during the winter months when gasoline demand is seasonally lower. The Midwest also receives supplies from other regions, primarily from the Gulf Coast. Planned Gulf Coast refinery maintenance is not expected to affect the supply of gasoline and distillate available to the Midwest.

As of February 20, Midwest distillate inventories are 4% above average, sufficient to supply 28 days of average demand based on the last three years. Gasoline inventories are slightly below average and sufficient to provide 22 days of supply. Inventories can act as a source of supplemental supply during outages. The time required for resupply from outside PADD 2, typically from PADD 3, varies considerably in the Midwest because of the size of the region. Resupply can reach Oklahoma, Kansas, and Missouri, the southern part of the Group 3 subregion within 7- 10 days, but can take close to 30 days to reach the northernmost states at the end of the supply line. As a result, unplanned outages in the northernmost states could lead to supply disruptions.

7.2. Refinery capacity overview

PADD 2 includes North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Missouri, Iowa, Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Kentucky, and Tennessee. PADD 2 has 27 operable refineries, of which 26 are operating. These 26 operating refineries have combined CDU capacity of 3.8 million barrels per day (bbl/d[2]) (21% of U.S. capacity) and total FCCU capacity of 1.2 million bbl/d (22% of U.S. capacity). While PADD 2 refineries supply most of the gasoline and distillate consumed in the region, PADD 2 also receives supplies from PADD 3, especially gasoline during the peak summer driving season.

7.3. CDU planned maintenance

Planned CDU maintenance in PADD 2 is light during the first half of 2015. PADD 2 refineries have planned maintenance from March through May (Table 6). Planned CDU maintenance peaks in April when an average of 144,633 barrels per day (bbl/d), 4% of capacity, is expected to be offline. Maintenance as a share of regional capacity is expected to average only 2% in March and 3% in May.

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[2] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

Table 6. PADD 2 planned CDU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	0	129,032	2/10	18,065	240,000
February	0	14,071	82,826	9/10	8,571	310,609
March	71,290	193,694	250,025	10/10	107,742	451,161
April	144,633	169,683	221,388	10/10	65,167	595,733
May	100,645	192,258	149,456	10/10	7,258	536,774
June	0	34,667	173,288	5/10	34,667	294,773

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

7.4. FCCU planned maintenance

Planned FCCU maintenance is light in PADD 2 during the first half of 2015, with the exception of June. FCCU maintenance is scheduled during March, April, and June (Table 7). Planned FCCU maintenance has occurred almost every year since 2005 during the February-May period. Planned maintenance is less common in June and rare in January.

Excluding the June peak, planned FCCU maintenance levels are particularly low during the first half of 2015. Maintenance in June is expected to average 50,267 bbl/d or 4% of regional capacity, above the 40,967 bbl/d monthly 10-year average but below the 53,000 bbl/d that occurred last year. In March, an average of 19,039 bbl/d of FCCU capacity is scheduled for maintenance, and only 8,323 bbl/d is scheduled to be offline in April, accounting for only 2% and 1% of regional capacity respectively.

Table 7. PADD 2 planned FCCU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	0	6,194	1/10	6,194	6,194
February	0	2,321	25,799	7/10	1,448	61,786
March	19,039	100,565	78,249	9/10	32,000	207,935
April	8,323	157,333	72,098	9/10	17,067	157,333
May	0	164,677	76,286	7/10	839	164,677
June	50,267	53,000	40,967	4/10	26,000	53,000

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

7.5. Unplanned outages

The large geographic area of PADD 2 is an important factor in understanding the significance to distillate fuel and gasoline supply of both planned and unplanned refinery outages. For example, the closeness of southern PADD 2 to the main U.S. refining center in PADD 3 typically makes it possible for emergency supply to reach the region fairly quickly. An unplanned refinery outage in the northernmost part of PADD 2 is more problematic because it can take several weeks for product from alternate sources of supply to reach the area. In addition, supply disruptions that are concentrated in one part of PADD 2 can have a greater impact than disruptions of similar magnitude that are dispersed across the PADD.

Severe cold weather in January caused unplanned CDU and FCCU outages at several Midwest refineries. The unplanned outages did not result in supply disruptions as Midwest inventories of gasoline and distillate were high at the start of the year, near the top of the five-year range.

Tables 8 and 9 provide detail on historical unplanned outages.

Table 8. PADD 2 unplanned CDU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	65,998	7/10	3,387	131,513
February	29,383	8/10	2,857	90,000
March	62,356	8/10	14,735	203,303
April	55,839	8/10	2,833	137,823
May	61,502	5/10	11,194	174,032
June	48,073	8/10	10,000	96,200

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

Table 9. PADD 2 unplanned FCCU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	18,286	7/10	5,419	29,419
February	14,486	8/10	1,714	49,786
March	16,118	7/10	1,774	58,710
April	17,021	9/10	4,767	35,933
May	29,678	7/10	3,032	75,000
June	17,783	8/10	3,333	49,000

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

8. PADD 3 Regional outage review

8.1. Summary

Planned maintenance in the Gulf Coast region is generally light compared to the first half of 2014 when maintenance did not result in supply disruptions, and distillate and gasoline supply should be adequate to meet demand during the first half of 2015. Gulf Coast gasoline inventories are near the top of the 5-year range (just under 80 million barrels) and distillate inventories are also high, above both 2014 and 2013 levels. Inventories can act as a source of supplemental supply if needed. In addition, substantial volumes of gasoline and distillate are exported from the U.S. Gulf Coast and exports, like inventories, generally act as a stabilizer in U.S. product markets as they create a source of supply that can possibly be diverted to domestic markets if product balances tighten.

The Gulf Coast region, which has substantially more refining capacity than is needed to meet in-region gasoline and distillate demand, supplies substantial volumes of distillate and gasoline to other regions, notably the East Coast and the Midwest. Gulf Coast refinery maintenance is not expected to adversely affect supply to other regions of the country.

8.2. Refinery capacity overview

PADD 3 comprises the southern central states of Alabama, Mississippi, Louisiana, Arkansas, Texas, and New Mexico. As of January 1, 2014, the region has 51 operable refineries, all of which are operating, with atmospheric crude distillation unit (CDU) capacity totaling 9.2 million barrels per day (bbl/d[3]) and fluid catalytic cracking unit (FCCU) capacity of 2.9 million bbl/d (Figure 17). There are an additional five facilities in the region that are considered refineries but do not have CDUs or FCCs, so are not included in this report's analysis. The Gulf Coast region is the largest refining center in the United States and is home to just over half of the country's capacity. Data on refinery capacity within PADD 3 are grouped into five refining districts: New Mexico, Texas Inland, Texas Gulf Coast, Louisiana Gulf Coast (which includes costal portions of Mississippi and Alabama), and North Louisiana-Arkansas (which includes northern Mississippi and Alabama). Regional capacity is concentrated primarily in the Texas Gulf Coast and Louisiana Gulf Coast districts. These two districts have 16 refineries each with 49% and 39% of regional crude distillation capacity, respectively.

8.3. CDU planned maintenance

CDU maintenance in PADD 3 is planned for each month during the first half of 2015. Maintenance is concentrated in the first quarter (Table 10). Maintenance is expected to be somewhat higher than the 10-year historical average in January, February, and May, well below average in April and June, and average in March. With the exception of January, planned maintenance is well below 2014 levels, particularly in March, April, and May. Planned maintenance is expected to peak in February with 6% of regional capacity offline, similar to the historical average and well below last year.

[3] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

Table 10. PADD 3 planned CDU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	422,484	237,023	363,339	10/10	237,023	699,065
February	573,411	733,404	515,887	10/10	112,707	938,143
March	416,516	875,581	415,599	10/10	138,710	875,581
April	26,500	493,500	275,437	9/10	67,500	543,300
May	321,129	733,177	221,910	10/10	3,629	733,177
June	98,000	422,600	214,283	9/10	48,080	544,917

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

8.4. FCCU planned maintenance

FCCU maintenance in PADD 3 is planned for each month during the first half of 2015. Maintenance is concentrated in January-March and is expected to peak in February, with 12% of FCCU capacity offline (Table 11). Maintenance in March, April, and June is below average.

Table 11. PADD 3 planned FCCU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	205,355	87,097	153,791	10/10	37,290	304,323
February	348,771	251,732	272,112	10/10	159,679	394,107
March	164,587	189,629	179,561	10/10	11,290	457,548
April	73,267	87,333	104,739	8/10	23,400	218,333
May	75,000	25,000	56,382	9/10	6,823	93,226
June	20,000	16,667	34,096	5/10	16,667	54,000

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

8.5. Unplanned outages

Unplanned outages can cause supply issues even in a region with substantial refining capacity such as PADD 3. With 89% of its refining capacity concentrated on the Texas and Louisiana coasts of the Gulf of Mexico, the region is particularly vulnerable to hurricanes and other weather events that can disrupt refinery operations. The 2005-2014 monthly maximum unplanned outages all took place in 2008 after Hurricanes Gustav and Ike made landfall in Louisiana and Texas in early September, taking 2.5 million bbl/d of CDU and 1.1 million bbl/d of FCCU capacity offline. The region had similar unplanned outages in 2005 following the devastation of Hurricanes Katrina and Rita. When significant amounts of PADD 3 capacity are offline unexpectedly, regions dependent on Gulf Coast supply as well as the Gulf Coast itself are impacted.

Tables 12 and 13 provide detail on historical unplanned refinery outages in PADD 3.

Table 12. PADD 3 unplanned CDU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	258,540	10/10	19,194	949,435
February	274,069	10/10	21,052	654,857
March	224,571	10/10	4,323	618,000
April	214,402	10/10	10,333	464,917
May	188,320	10/10	12,903	510,742
June	209,859	10/10	2,500	442,533

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

Table 13. PADD 3 unplanned FCCU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	107,610	10/10	7,742	364,645
February	123,810	10/10	4,286	358,500
March	83,247	10/10	9,032	313,452
April	121,117	10/10	21,733	284,100
May	75,848	10/10	9,032	162,213
June	84,472	10/10	32,033	174,483

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

9. PADD 4 Regional outage review

9.1. Summary

Although there are moderate levels of maintenance planned for the Rocky Mountain region supply should be sufficient as inventories of gasoline and distillate are high, sufficient to provide 26 and 23 days of demand cover respectively.

Although refineries in the Rocky Mountain region supply most of the in-region gasoline and distillate demand, the region does receive small volumes of product from refineries in the Midwest and the Gulf Coast, which could be possible sources of supplemental supply during a shortage.

9.2. Refinery capacity overview

PADD 4, the Rocky Mountain region, includes Idaho, Montana, Wyoming, Utah, and Colorado. At the start of 2014, PADD 4 had 17 refineries, all of which were operating. PADD 4 has the least refining capacity of any region in the United States, with combined atmospheric crude distillation unit (CDU) capacity of 631,000 barrels per day (bbl/d)[4] and 189,000 bbl/d of fluid catalytic cracking unit (FCCU) capacity, 4% and 3% of total U.S. capacity, respectively.

9.3. CDU planned maintenance

CDU maintenance is planned for all months except January (Table 14). Maintenance is expected to peak in April when 11% of capacity is expected to be offline.

[4] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

Table 14. PADD 4 planned CDU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	28,877	20,939	2/10	13,000	28,877
February	45,750	51,100	14,288	7/10	1,524	51,100
March	7,903	35,774	36,600	10/10	7,790	83,516
April	70,767	42,733	44,583	9/10	11,933	89,800
May	32,677	2,903	29,408	7/10	1,935	64,606
June	1,213	56,720	34,331	5/10	5,333	62,000

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

9.4. FCCU planned maintenance

FCCU maintenance is scheduled for all months except January. Maintenance is expected to be below the 10-year average in February, March, and April, and above average in May and June (Table 15). Maintenance is expected to peak in June with 22,000 bbl/d offline or 12% of PADD 4 FCCU capacity, above the prior 10-year maximum outage level of 15,200 bbl/d. Maintenance in May is expected to total 18,503 bbl/d or 10% of regional capacity.

Table 15. PADD 4 planned FCCU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	0	2,935	1/10	2,935	2,935
February	13,000	0	16,250	2/10	14,857	17,643
March	2,935	0	14,721	8/10	4,613	32,000
April	18,480	3,133	20,670	8/10	3,133	35,867
May	18,503	887	12,008	8/10	887	29,129
June	22,000	0	8,683	2/10	2,167	15,200

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

9.5. Unplanned outages

PADD 4 is relatively isolated from other refining regions and relies primarily on in-region production. As a result, unplanned outages in PADD 4 can disrupt gasoline and distillate supply. However, PADD 4's reliance on in-region supply insulates the region from disruptions in other parts of the country. Infrastructure connections between PADD 4 and PADDs 2 and 3, as well as Canada, provide sources of supply from outside the region during supply disruptions. As of February 20, PADD 4 inventories of both gasoline and diesel fuel are high, providing an additional source of supply for the region.

Tables 16 and 17 provide detail on historical unplanned refinery outages in PADD 4.

Table 16. PADD 4 unplanned CDU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	17,255	3/10	8,258	22,899
February	12,822	6/10	4,414	33,411
March	10,998	5/10	4,516	24,157
April	29,639	3/10	4,125	77,067
May	7,691	3/10	4,125	12,000
June	8,400	5/10	3,100	26,608

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

Table 17. PADD 4 unplanned FCCU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	5,183	3/10	1,355	7,806
February	8,826	3/10	1,500	22,943
March	9,226	2/10	2,129	16,323
April	15,050	2/10	1,100	29,000
May	3,996	4/10	823	7,806
June	2,408	4/10	800	4,317

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

10. PADD 5 Regional outage review

10.1. Summary

With almost all West Coast fluid catalytic cracking unit (FCCU) maintenance planned for the first half of 2015 already complete, and with relatively light atmospheric crude distillation unit (CDU) maintenance in a region that produces more distillate than it consumes, supplies of gasoline and distillate fuel are expected to be adequate to meet demand in PADD 5 during the first half of 2015, barring disruptions to supply resulting from the recent unplanned refinery outage in southern California. On February 18, the ExxonMobil refinery in Torrance, California experienced an explosion that could have a significant impact on in-region production of gasoline and distillate; however, it is too soon to assess what that impact might be. As of February 20, gasoline inventories are at the low end of the 5-year range, and are sufficient to supply 21 days of average demand, 1 day below average. Distillate inventories remain above average and are sufficient to supply 29 days of average demand.

Because the West Coast is relatively isolated from other U.S. markets and located far from international sources of supply, the region is very dependent on in-region production to meet demand. Planned FCCU maintenance, which was concentrated in January, is expected to complete in February, and there is no maintenance planned from March through June. Inventories of gasoline at the start of February were sufficient to supply 22 days of average demand, a level consistent with average historical levels.

10.2. Refinery capacity overview

PADD 5 comprises the western states of California, Arizona, Nevada, Oregon, Washington, Alaska, and Hawaii. As of January 1, 2014, the region has 32 operable refineries, of which 31 are currently in operation, with atmospheric crude distillation capacity totaling 2.9 million bbl/d[5] and 821,000 bbl/d of FCCU capacity. California has 17 operating refineries (65% of PADD 5 CDU capacity) mostly clustered in two refining centers within the state. About 40% of California refinery capacity is in the San Francisco area and the remaining 60% is in the southern part of the state, primarily near Los Angeles. Washington has 22% of PADD 5 CDU capacity and all five of its refineries are near Puget Sound. Alaska has five refineries, making up 6% of PADD 5 CDU capacity, and Hawaii, with two operating refineries, has 5% of regional capacity.

10.3. CDU planned maintenance

CDU maintenance planned for PADD 5 is below the historic average levels for January–June and largely below 2014 maintenance levels (Table 18). Maintenance peaks in March at 120,116 bbl/d or 4% of regional CDU capacity.

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[5] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

Table 18. PADD 5 planned CDU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	0	0	97,694	8/10	8,623	258,048
February	89,164	177,300	125,523	10/10	838	425,179
March	120,116	72,842	144,038	8/10	45,000	380,645
April	108,000	69,800	118,436	9/10	5,333	241,290
May	53,032	174,968	148,864	9/10	37,968	323,935
June	39,000	201,500	75,073	8/10	5,400	201,500

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

10.4. FCCU planned maintenance

Planned FCCU maintenance in PADD 5 is very light (Table 19). Maintenance peaks in January with an average of 47,097 bbl/d offline, 6% of regional capacity. Planned February maintenance is significantly below historical levels and no maintenance is planned for March through June.

Table 19. PADD 5 planned FCCU outages

(barrels per day)

Month	2015 planned outages	2014 planned outages	2005-14 average of realized planned outages	2005-14 count of realized planned outages	2005-14 minimum realized planned outages	2005-14 maximum realized planned outages
January	47,097	42,903	88,060	10/10	15,806	186,177
February	15,643	60,000	115,632	9/10	55,000	275,464
March	0	46,774	77,961	7/10	46,774	129,403
April	0	36,667	51,100	7/10	3,333	109,400
May	0	0	20,968	5/10	5,806	41,935
June	0	0	1,889	3/10	1,667	2,200

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* planned outages are the average of actual outages and exclude months where no outages occurred.

10.5. Unplanned outages

Because PADD 5 is relatively isolated from other U.S. markets and located far from international sources of supply, the region is highly dependent on in-region production to meet demand. Therefore, when significant capacity is unexpectedly out of service, the market impact can be pronounced. Historically, there have been instances when sustained, high-volume unplanned outages have taken place.

In 2012, gasoline markets on the West Coast were periodically tight due to a series of unplanned outages that coincided with planned outages, resulting in low inventories and high prices. Gasoline supply issues began in February that year with a fire at BP's Cherry Point, Washington, refinery, which caused a three-month shutdown. Market pressures intensified after a large California refinery underwent planned maintenance in March. These outages, combined with other smaller market disruptions, contributed to sharp inventory draws through the spring. West Coast gasoline inventories fell to 24.1 million bbl by May 18, more than 5 million bbl (17%) below the five-year average level for that time of year, making it the lowest level in more than ten years and the second-lowest level since the beginning of the data series in January 1990.

In August of that year, a crude unit fire at the Chevron Richmond refinery unexpectedly took capacity offline through the end of the year. Additional planned and unplanned outages in October put more stress on the system, and pushed Los Angeles wholesale spot prices up to significant premiums over other regions. Tables 20 and 21 provide detail on historical unplanned outages.

Table 20. PADD 5 unplanned CDU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	79,865	5/10	9,290	240,000
February	89,036	7/10	10,286	240,000
March	145,562	6/10	35,000	240,000
April	132,381	6/10	10,333	234,000
May	86,495	6/10	15,484	213,355
June	49,844	8/10	4,500	200,000

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

Table 21. PADD 5 unplanned FCCU outages

(barrels per day)

Month	2005-14 average of realized unplanned outages	2005-14 count of realized unplanned outages	2005-14 minimum realized unplanned outages	2005-14 maximum realized unplanned outages
January	17,797	7/10	2,323	38,387
February	9,736	4/10	2,897	17,857
March	22,795	8/10	6,452	67,823
April	25,617	7/10	7,200	83,167
May	43,903	4/10	3,355	123,484
June	29,606	6/10	333	100,467

Source: U.S. Energy Information Administration, based on IIR data as of January 27, 2015.
Note: *Realized* unplanned outages are the average of actual outages and exclude months where no outages occurred.

11. Appendix: Regional sources of supply

This section describes each region's supply-demand balance for gasoline and distillate fuel.

11.1. PADD 1 – East Coast

PADD 1 includes all states in New England, the Mid-Atlantic, and the South Atlantic and is subdivided into three sub-PADDs.

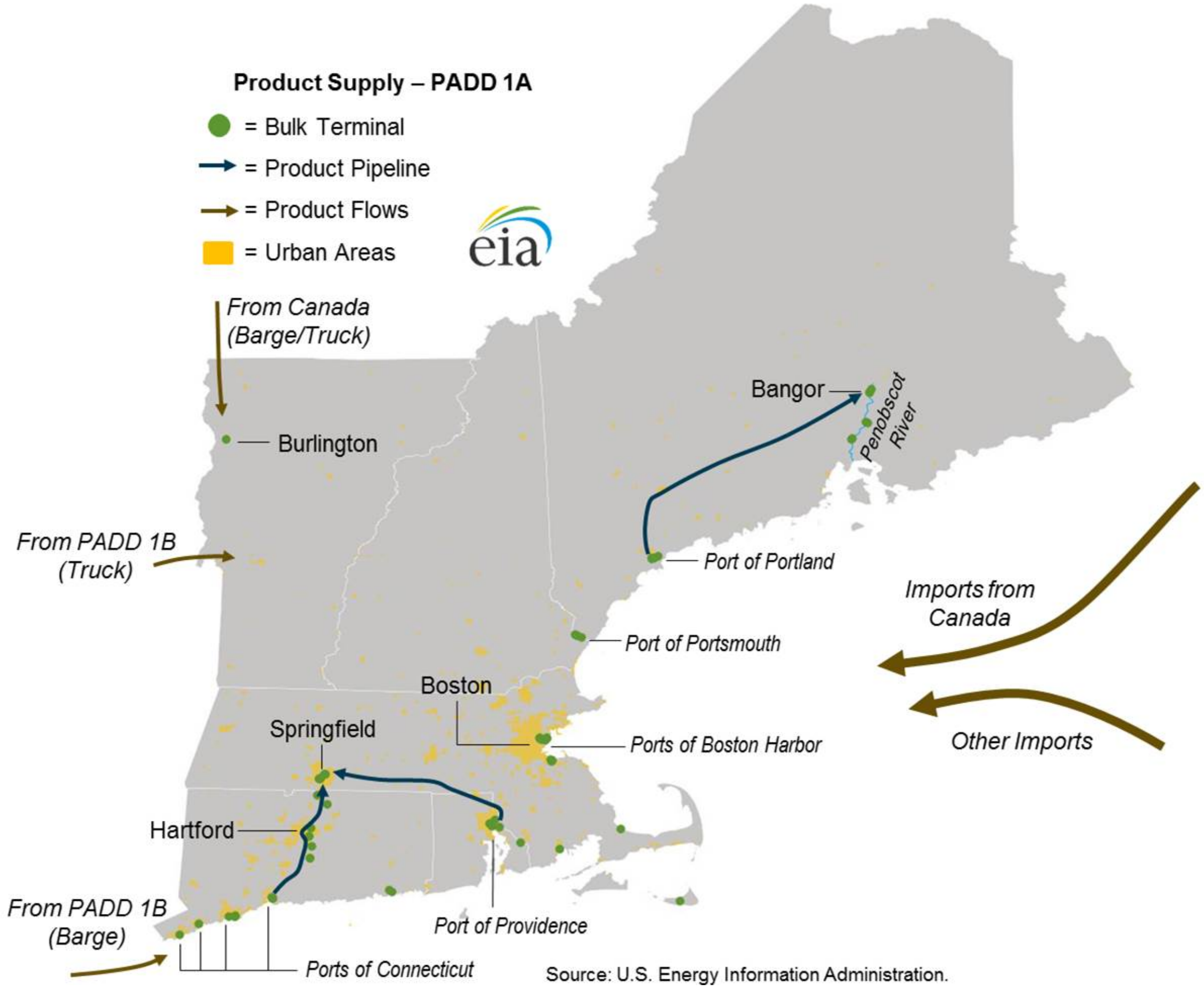
- PADD 1A - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
- PADD 1B - New York, Pennsylvania, New Jersey, Delaware, Maryland, Washington DC
- PADD 1C - West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida

Supply dynamics for each of the three sub-PADDs vary. PADD 1A, New England, has no refineries and relies on imports and transfers from other PADDs, primarily PADD 1B. PADD 1C, the South Atlantic, also has no operating refineries and relies primarily on pipeline transfers and marine shipments from PADD 3 and imports. PADD 1B is supplied by a combination of in-region refineries, transfers from other PADDs - primarily from PADD 3 but also from PADD 2 - and imports. Regional supply dynamics for each sub-PADD are discussed below.

11.1.1. PADD 1A – Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut

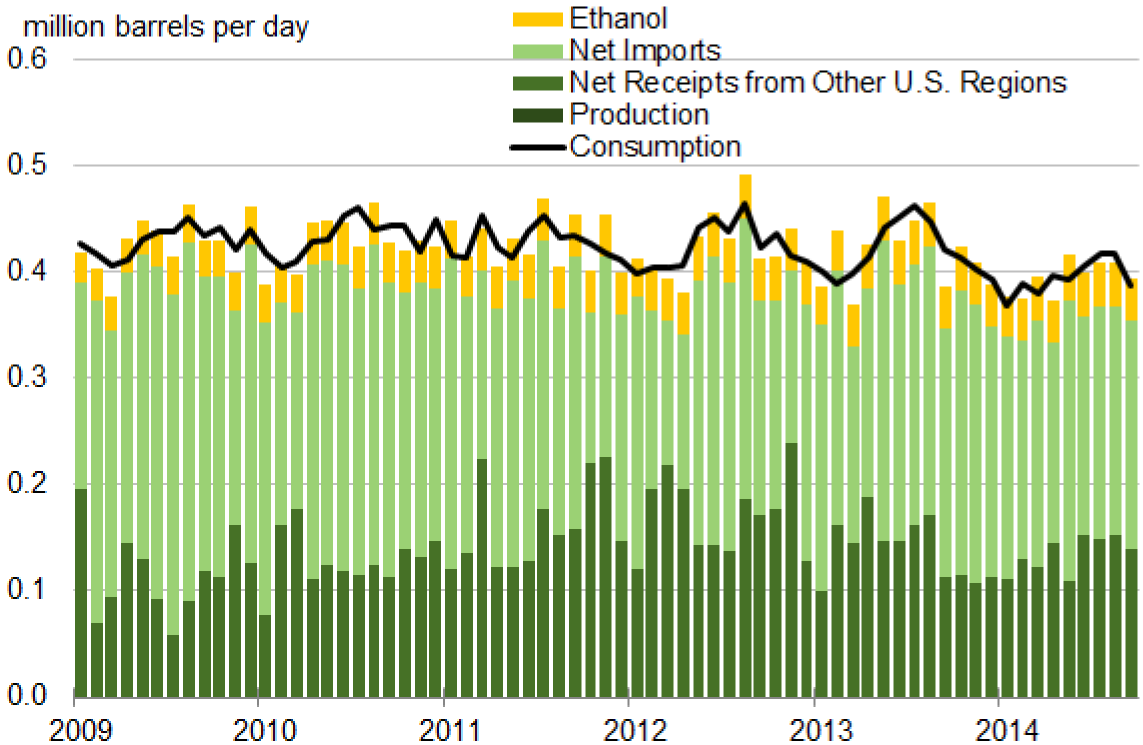
PADD 1A has no refineries and is supplied primarily by imports, the majority of which are sourced from Eastern Canadian refineries, and also by transfers from other PADDs, mostly PADD 1B (Figure 6). Supplies are delivered into the ports of PADD 1A and are moved inland via pipeline or truck. The ports of Boston Harbor, Massachusetts, Portland, Maine, and Providence, Rhode Island are the largest ports by volume. The region also relies on product receipts from other PADDs, mostly PADD 1B via coastwise-compliant barges into southern New England ports in Connecticut and Rhode Island. Some product volumes also arrive into the region via truck shipments from bulk terminals in Albany, New York (PADD 1B). The northern areas of PADD 1A along Lake Champlain can receive product via barge from inland Canadian refineries.

Figure 6. PADD 1A petroleum product flows



In 2013, imports supplied 58% of PADD 1A gasoline (Figure 7) and 52% of those imports came from Canada. PADD 1B supplied 32% of 2013 gasoline demand. The balance was supplied by ethanol from PADD 2 and in-region inventories.

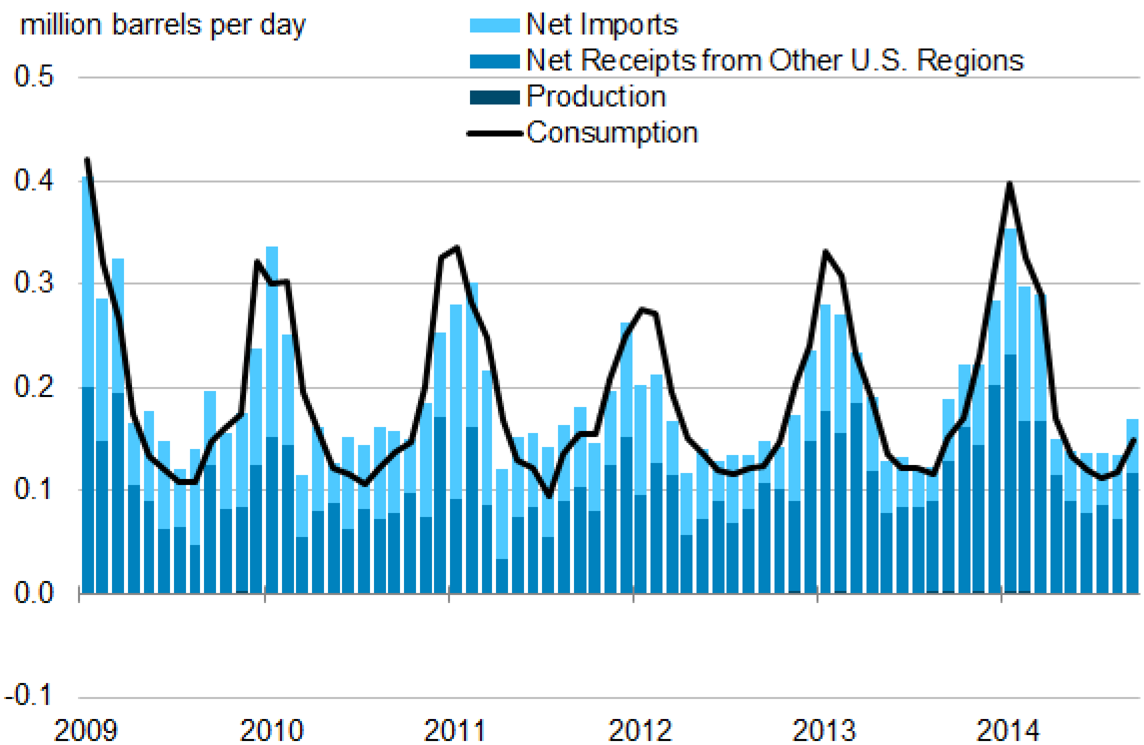
Figure 7. PADD 1A motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

PADD 1A distillate demand is highly seasonal (Figure 8) because, in addition to being used as a transportation fuel (Ultra-Low Sulfur Diesel), distillate is also used for space heating in the winter. A combination of imports and transfers from PADD 1B are used to meet demand. Net receipts typically peak in winter and averaged 130,000 bbl/d in 2013. Imports averaged 65,000 bbl/d in 2013, and, like gasoline, were mostly supplied from Canada. Depending on demand and relative economics, PADD 1A also imports distillate from Europe and Russia in the winter.

Figure 8. PADD 1A distillate supply-demand balance



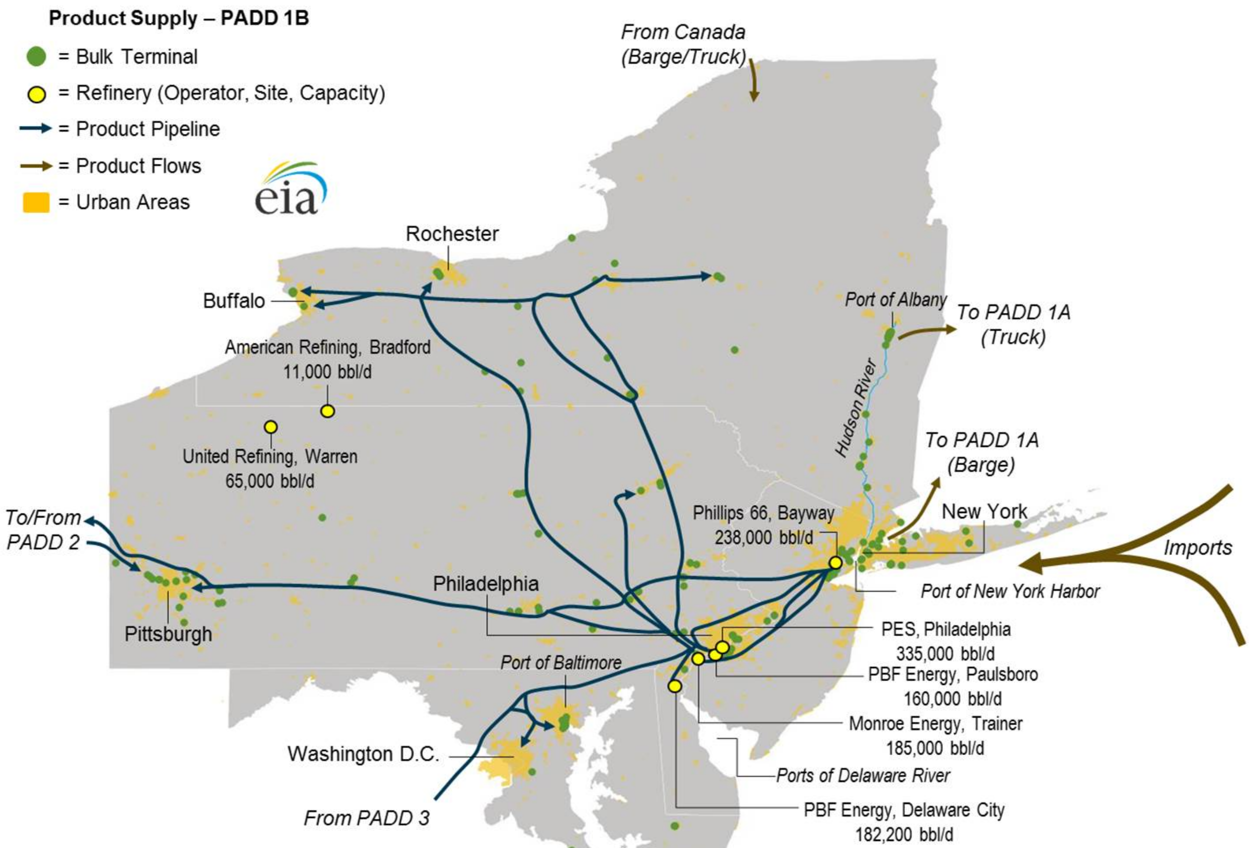
Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.1.2. PADD 1B – New York, Pennsylvania, New Jersey, Delaware, Maryland, Washington DC

PADD 1B, the Mid-Atlantic region, is supplied primarily by in-region production, imports and receipts from other PADDs (Figure 9). Ninety-eight percent of total PADD 1 operating refining capacity is located in PADD 1B, mostly in the refining centers in the greater Philadelphia area, which includes Delaware and southern New Jersey, and New York Harbor. PADD 1B has a total of 1.1 million bbl/d[6] of atmospheric crude distillation capacity. PADD 1B inland markets are supplied primarily by pipeline from the coastal refining centers. Refineries in northwestern Pennsylvania supply northwestern Pennsylvania and western New York. PADD 1B also receives imports, the majority of which enter New York Harbor. Imports can also reach the port of Albany via the Hudson River. Northern PADD 1B, along the Saint Lawrence Seaway, receives supplies via barge from inland Canadian refineries. The Colonial pipeline also brings Gulf Coast supplies into PADD 1B, serving the Baltimore-Washington metropolitan areas before ending at New York Harbor.

[6] This report measures refinery capacity in barrels per calendar day. Barrels per calendar day is a measure of the amount of input that a distillation unit can process in a 24-hour period under usual operating conditions. It takes into account both planned and unplanned maintenance. Stream day capacity, another measure of refinery capacity, is the maximum number of barrels of input that a distillation facility can process within a 24-hour period when running at full capacity under optimal crude and product slate conditions with no allowance for downtime. Stream day capacity is typically about 6% higher than calendar day capacity.

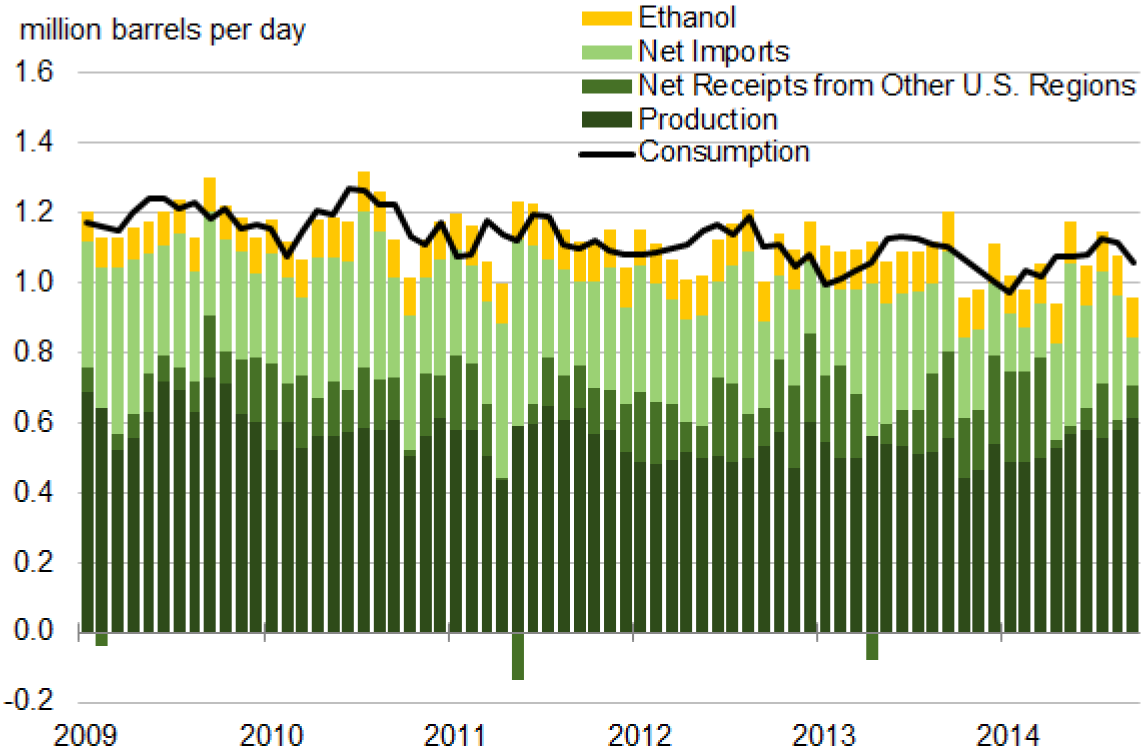
Figure 9. PADD 1B petroleum product flows



Source: U.S. Energy Information Administration.

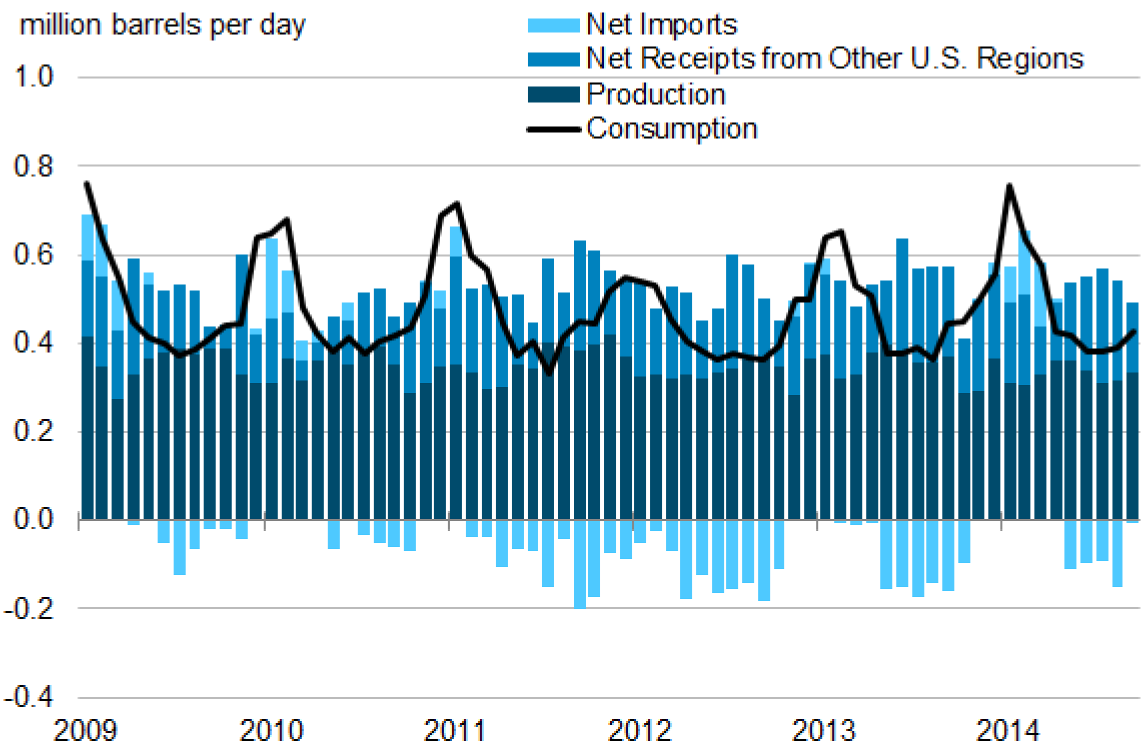
In 2013, production from refineries in PADD 1B supplied 48% and 73% of the region's gasoline and distillate needs, respectively (Figures 10 and 11). PADD 1B also imports a substantial volume of petroleum products. New York Harbor (NYH) is a large hub for petroleum products trade and distribution. Select terminals in NYH are the approved delivery locations for the Chicago Mercantile Exchange (CME) Nymex RBOB (gasoline) and ULSD (distillate) futures contracts, and product is supplied from the harbor terminals to pipelines serving inland locations and regional airports and via barge to other terminals in PADD 1A and PADD 1B. Gasoline imports into PADD 1B averaged 290,000 bbl/d in 2013 and refineries in Western Europe supplied 50% of gasoline imported into PADD 1B. New York Harbor also imports distillate from Canada, which averaged 27,000 bbl/d in 2013. Distillate imports into New York Harbor are primarily supplied by Canada and are highest during the winter heating season.

Figure 10. PADD 1B motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

Figure 11. PADD 1B distillate supply-demand balance



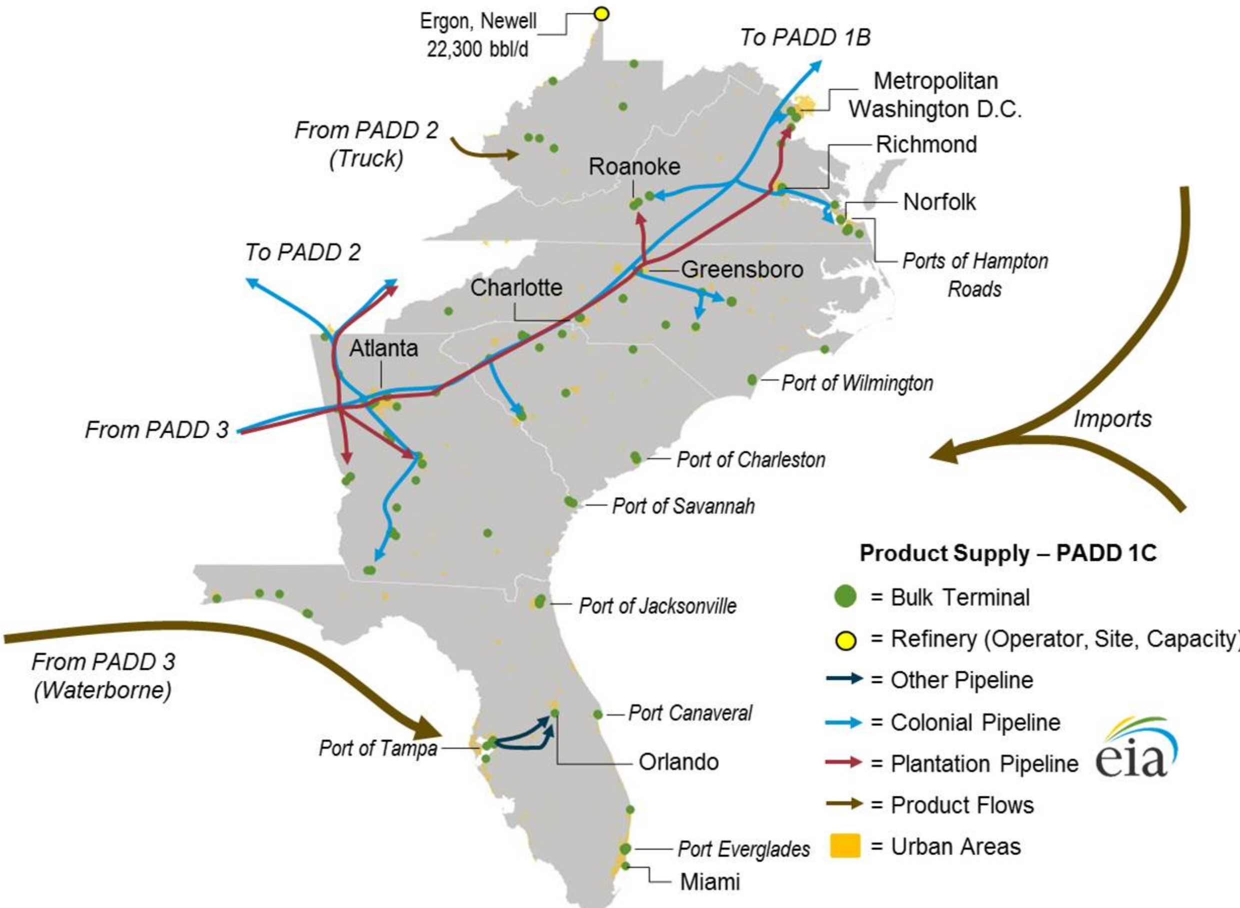
Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.1.3. PADD 1C – West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida

PADD 1C includes the southern states of PADD 1 and is supplied primarily from PADD 3 refineries via the Colonial and Plantation pipelines (Figure 12). These pipelines form the major corridor for Gulf Coast supplies to reach markets along much of the East Coast of the United States. The Colonial pipeline continues through PADD 1 to New York Harbor, while the Plantation pipeline terminates just south of Washington, DC. As a peninsula with no access to pipelines carrying product, Florida relies on waterborne deliveries, primarily from Gulf Coast refineries but also imports from the Atlantic Basin market. Other PADD 1C ports in Virginia, the Carolinas, and Georgia also receive imports.

PADD 1C has one refinery, the 22,300 bbl/d Ergon refinery in Newell, West Virginia. The refinery produces only small amounts of gasoline and distillate to supply the nearby markets of PADD 1B and PADD 2, and does not factor significantly into PADD 1C supply.

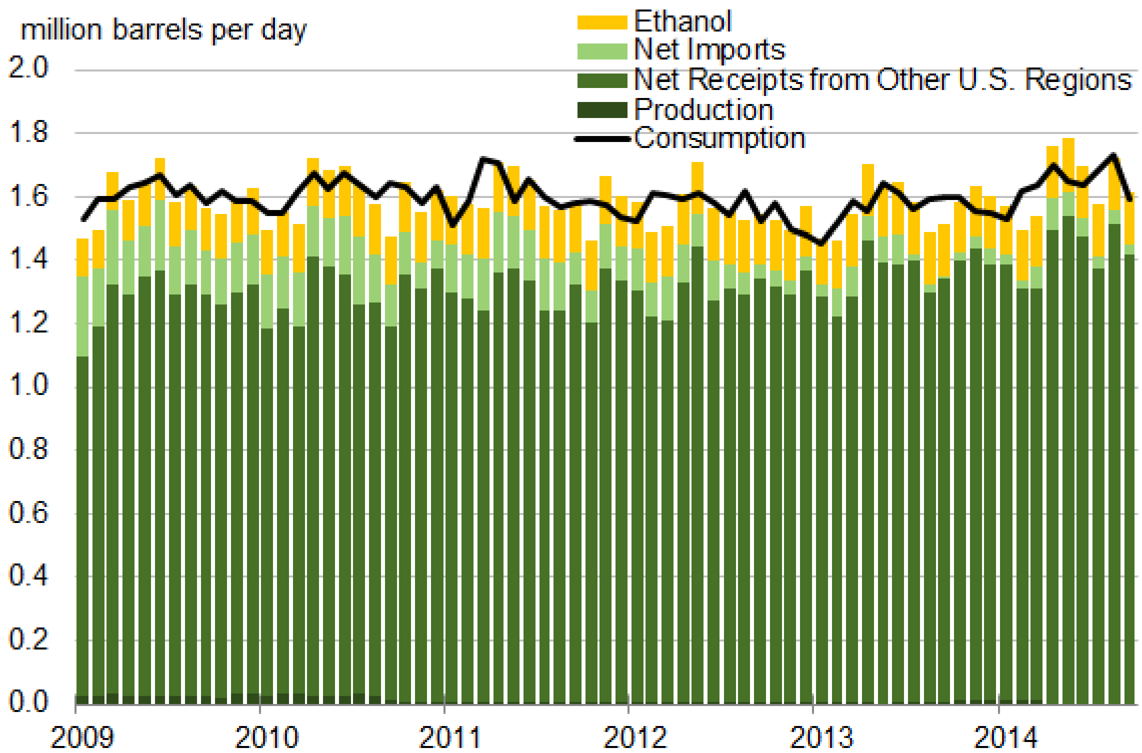
Figure 12. PADD 1C petroleum product flows



Source: U.S. Energy Information Administration.

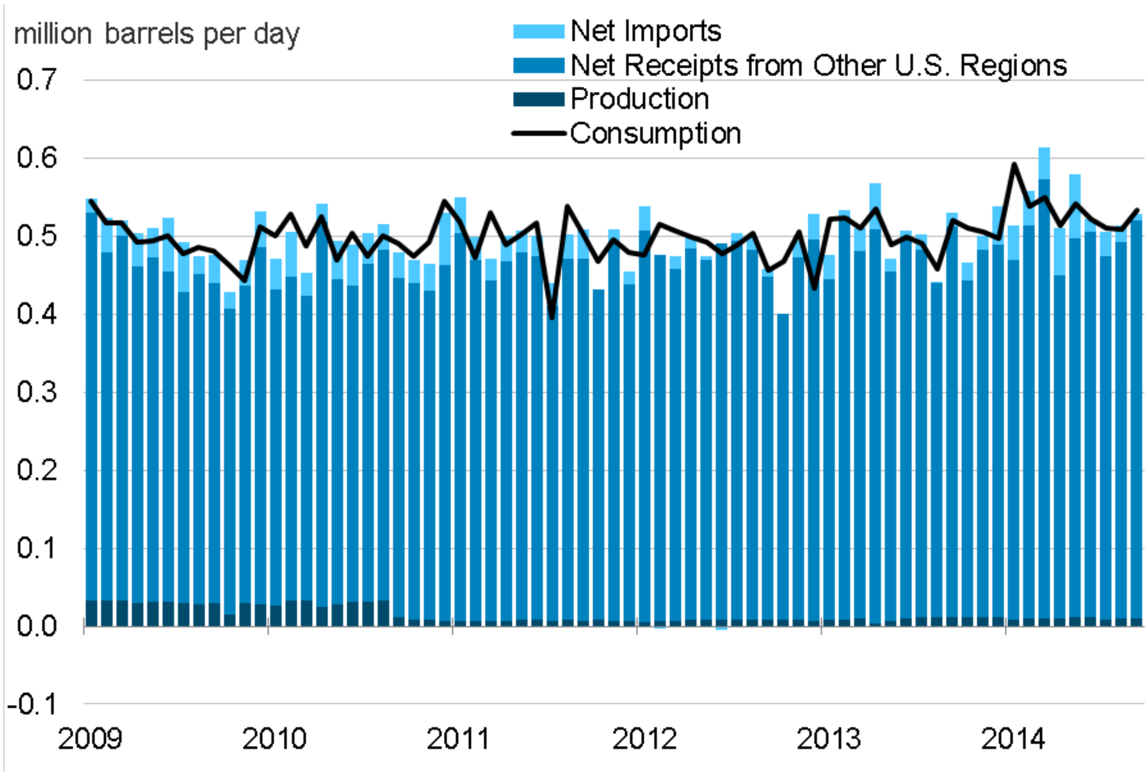
In 2013, 86% of PADD 1C gasoline and 93% of distillate supplies were sourced from other PADDs, primarily from PADD 3 (Figures 13 and 14). Port Everglades and Port Canaveral, both in Florida, are the two most active ports in PADD 1C by volume. In 2013, imports of gasoline and distillate averaged 3% and 5% of PADD 1C supplies respectively, and arrived primarily from Europe and Canada. The region also imports distillate from Central and South America.

Figure 13. PADD 1C motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

Figure 14. PADD 1C distillate supply-demand balance



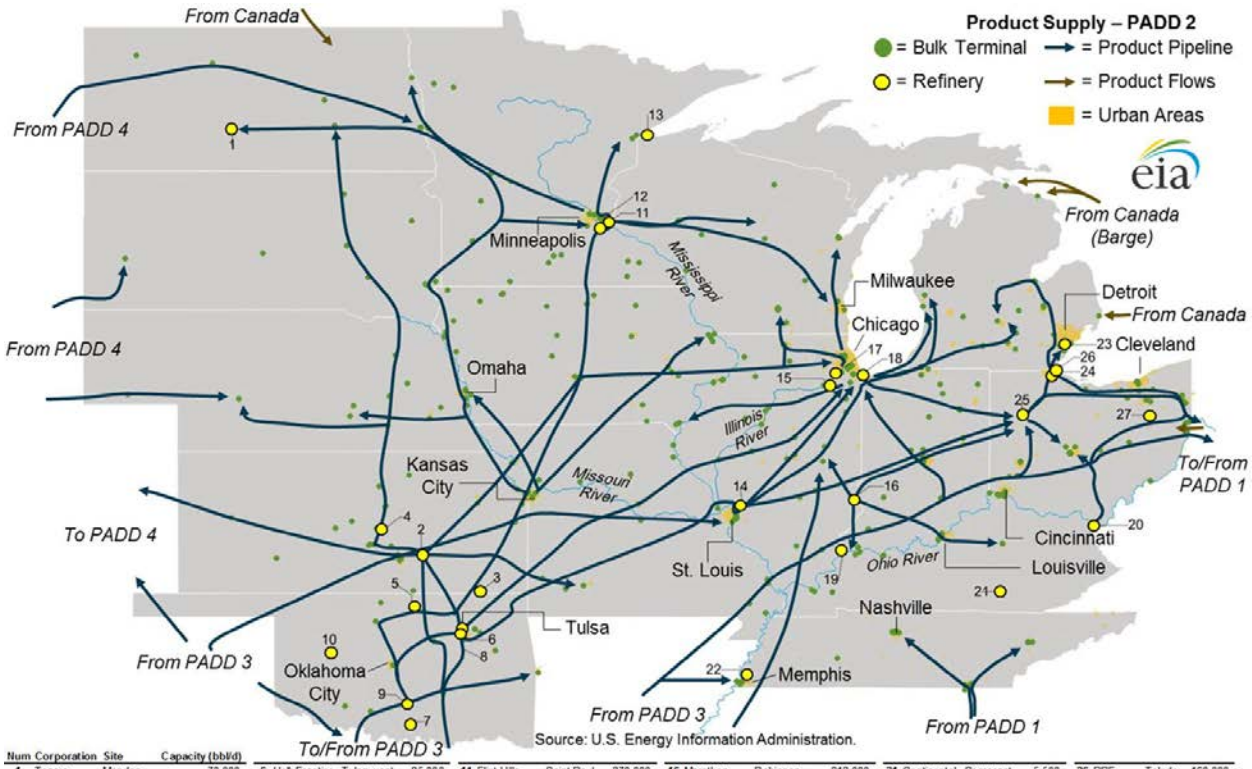
Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.2. PADD 2 – Midwest

PADD 2 includes states in the midsection of the country from Oklahoma to Minnesota and from the Dakotas and Nebraska east to Ohio and Tennessee. PADD 2 covers a wide geographic area and refineries are spread across the region (Figure 15). Broadly, there are four refining centers[7] in PADD 2. The Great Lakes region, which includes Illinois, Michigan, Indiana, and Ohio, has 54% of PADD 2 refining capacity; 'Group 3', the southwest part of PADD 2, includes Oklahoma, Kansas, and Missouri and has 23% of capacity; the Upper Midwest, which includes North Dakota and Minnesota, has 11% of capacity; and refineries in Tennessee and Kentucky account for 11% of PADD 2 refinery capacity. There are no refineries in South Dakota, Nebraska, Iowa or Missouri.

[7] Note that, unlike PADD 1 sub-PADDs (A, B, and C) which are official designations and have greater data granularity, refining center data is largely available only at the PADD level to protect business confidential survey data.

Figure 15. PADD 2 petroleum product flows



Num	Corporation	Site	Capacity (bbl/d)
1	Tesoro	Mandan	70,000
2	HollyFrontier	El Dorado	138,000
3	CVR	Coffeyville	115,000
4	CHS	Mcpherson	86,000
5	Phillips 66	Ponca City	200,000
6	HollyFrontier	Tulsa west	85,000
7	Valero	Ardmore	86,000
8	HollyFrontier	Tulsa East	70,300
9	CVR	Wynnewood	70,000
10	Ventura	Thomas	Idle
11	Flint Hills	Saint Paul	270,000
12	Northern Tier	Saint Paul	89,500
13	Calumet	Superior	38,000
14	WRB	Wood River	314,000
15	ExxonMobil	Joliet	238,600
16	Marathon	Robinson	212,000
17	PDV	Lemont	172,045
18	BP	Whiting	413,500
19	Countrymark	Mount Vernon	27,100
20	Marathon	Catlettsburg	242,000
21	Continental	Somerset	5,500
22	Valero	Memphis	180,000
23	Marathon	Detroit	123,000
24	PBF	Toledo	160,000
25	Husky	Lima	155,000
26	PBF	Toledo	160,000
27	Marathon	Canton	80,000

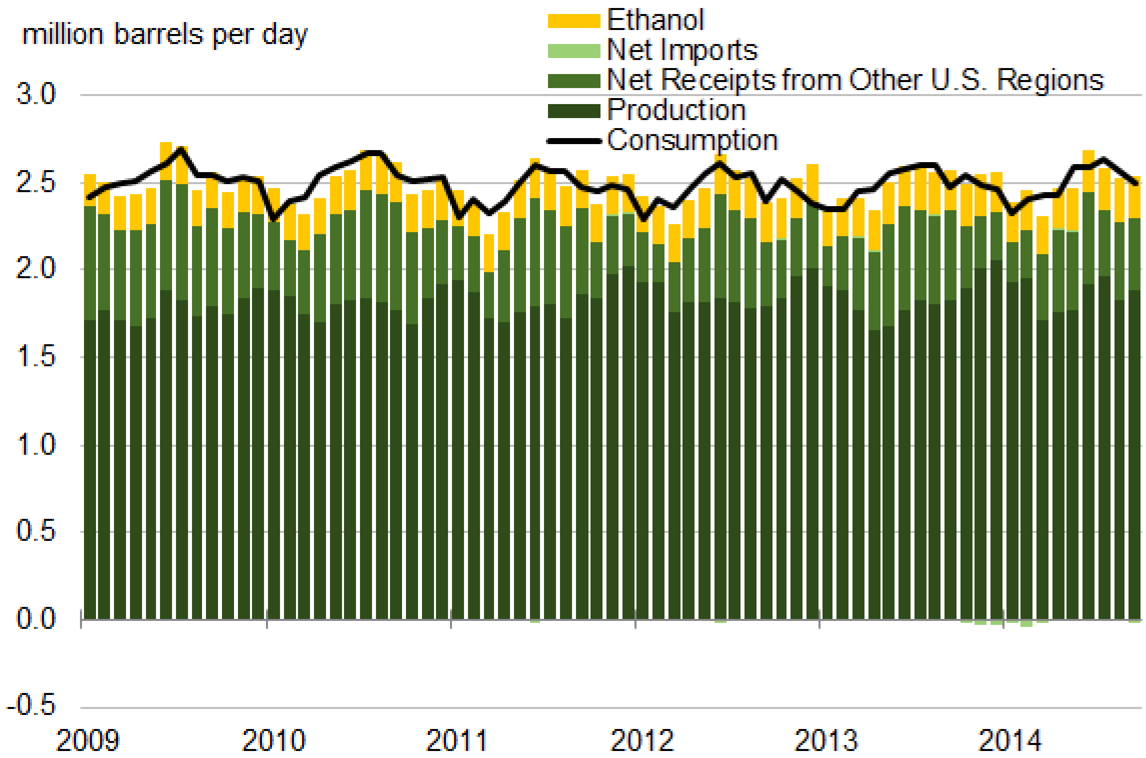
PADD 2 is supplied mostly by in-region refineries; however, to meet peak summer demand, PADD 2 relies on receipts of product from PADD 3. PADD 2 produces around three-quarters of the gasoline consumed in the region and 84% of the distillate. An extensive pipeline network and the inland river system support product shipments into and within the region. Marine transport is by barge along navigable portions of the Mississippi, Illinois, Missouri, and Ohio rivers and the Great Lakes.

PADD 3 supplies the majority of product supplied to PADD 2 from other PADDs. PADD 3 supplied an average of 725,000 bbl/d of petroleum products to PADD 2 in 2013. Product from PADD 3 primarily flows north from Texas to the Group 3 region near Tulsa, Oklahoma where it is dispersed north and west across much of PADD 2 via the Magellan Midstream Partners (Magellan) pipeline system and Explorer Pipeline (Explorer). Magellan also ships products to Colorado in PADD 4.

PADD 1 and PADD 4 provide substantially smaller volumes of petroleum products to PADD 2. In 2013, PADD 1 transferred 304,000 bbl/d and PADD 4 transferred 156,000 bbl/d to PADD 2. Product from PADD 1 is supplied by pipeline spurs from the Colonial and Plantation pipelines into eastern Tennessee and via pipeline from Pennsylvania to eastern Ohio. PADD 4 supplies small volumes by pipeline into the western states of PADD 2 and Minnesota.

PADD 2 produced 1.8 million bbl/d of motor gasoline in 2013, 74% of the 2.5 million bbl/d of PADD 2 consumption (Figure 16). An additional 420,000 bbl/d of gasoline was supplied from other PADDs and 231,000 bbl/d of ethanol was blended into gasoline.

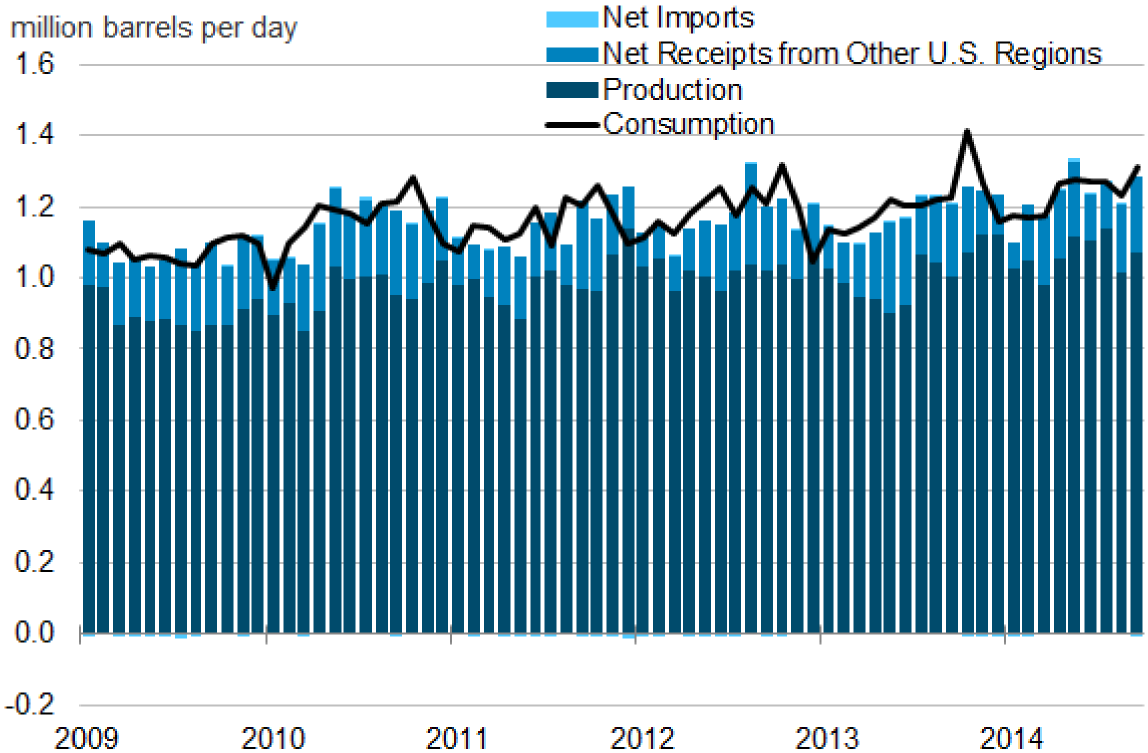
Figure 16. PADD 2 motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

Refineries in PADD 2 supplied about 84% of the distillate consumed in the region in 2013 (Figure 17). Distillate production averaged 1.0 million bbl/d in 2013, while consumption averaged 1.2 million bbl/d. PADD 3, and to a much smaller extent PADD 1 and PADD 4, supplied the balance of the distillate. PADD 2 also supplies distillate to PADD 4.

Figure 17. PADD 2 distillate supply-demand balance

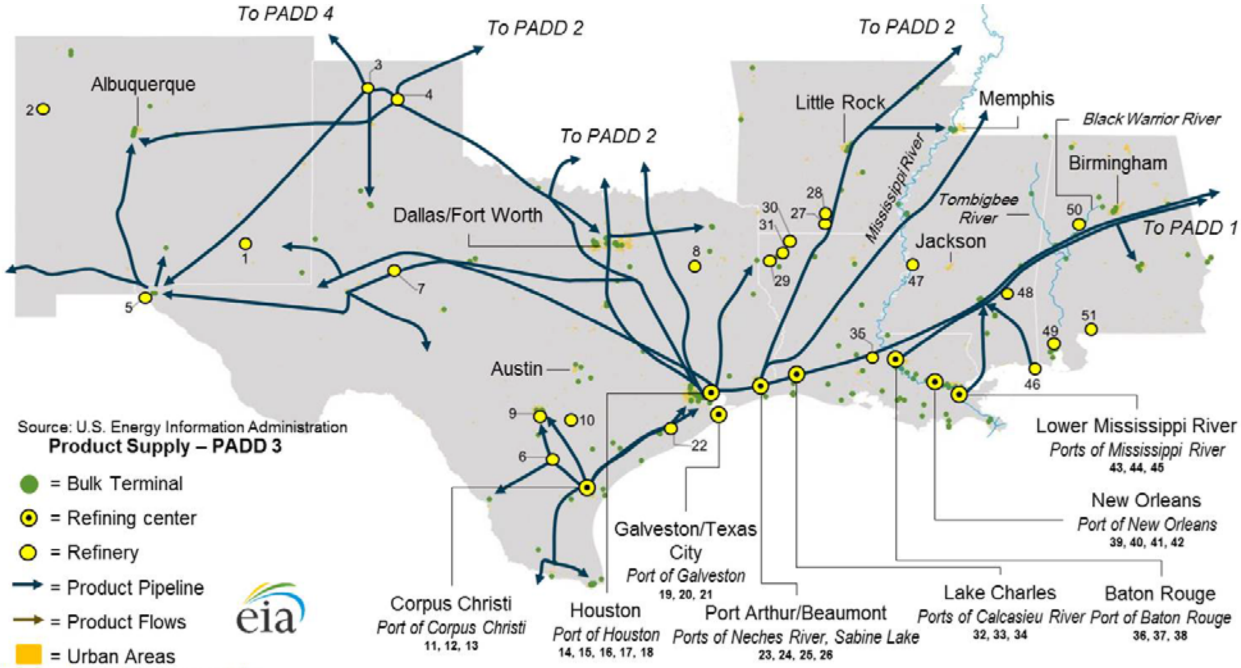


Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.3. PADD 3 – Gulf Coast

PADD 3 comprises the southern central states of Alabama, Mississippi, Louisiana, Arkansas, Texas, and New Mexico (Figure 18). PADD 3 has substantially more refining capacity than is needed to meet in-region gasoline and distillate demand, and PADD 3 refineries are important sources of supply for other U.S. regions, notably PADD 1 and PADD 2, and to a lesser extent PADD 5. In addition, given the capacity and sophistication of refineries in PADD 3, which can access cost-advantaged inputs and significant demand centers outside the United States, the region is competitive in the global petroleum products markets. Refinery capacity expansions and sustained high utilization rates have enabled the region to supply larger amounts of petroleum products and build inventories.

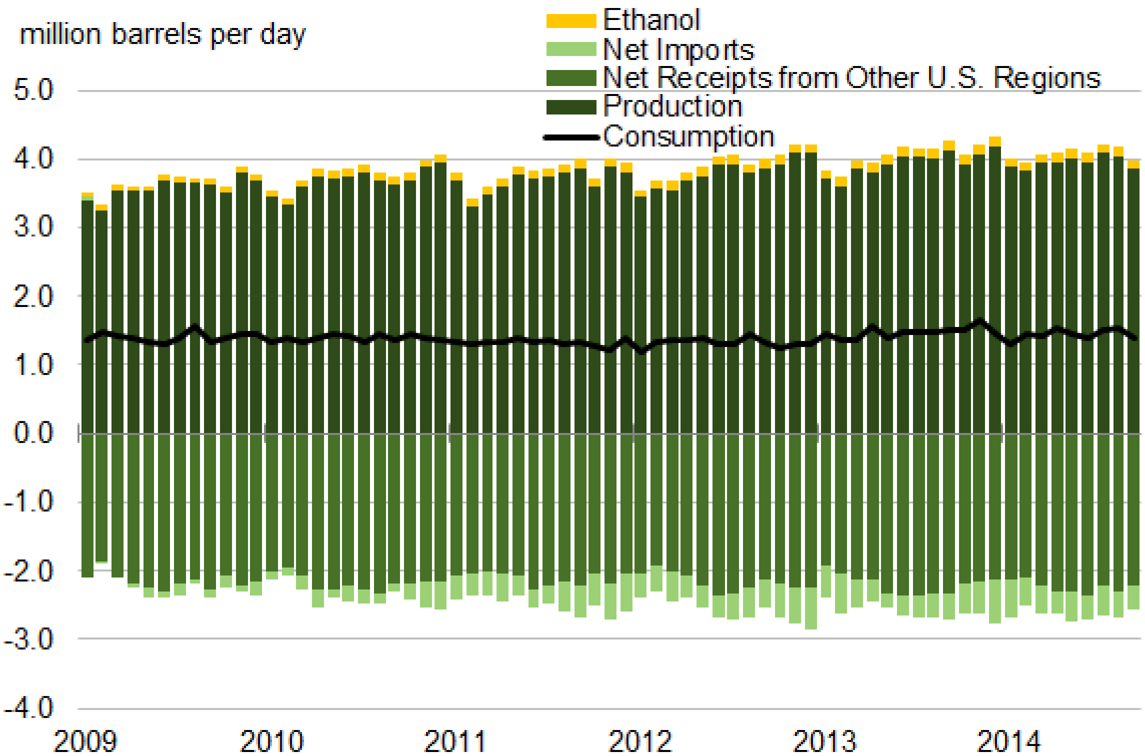
Figure 18. PADD 3 petroleum product flows



Num	Corporation	Site	Capacity (bbl/d)
1	HollyFrontier	Artesia	105,000
2	Western Refining	Gallup	25,700
3	Valero	Sunray	156,000
4	WRB	Borger	146,000
5	Western Refining	El Paso	122,000
6	Valero	Three Rivers	93,000
7	Alon	Big Spring	67,000
8	Delek	Tyler	60,000
9	Calumet	San Antonio	16,112
10	Lazarus Energy	Nixon	11,471
11	Flint Hills	Corpus Christi	293,000
12	Valero	Corpus Christi	200,000
13	PDV	Corpus Christi	163,000
14	ExxonMobil	Baytown	560,500
15	DeerPark	Deer Park	327,000
16	Houston Refining	Houston	263,776
17	Petrobras	Pasadena	100,000
18	Valero	Houston	88,000
19	Marathon	Galveston Bay	451,000
20	Valero	Texas City	225,000
21	Marathon	Texas City	84,000
22	Philips 66	Sweeny	247,000
23	Motiva	Port Arthur	600,250
24	ExxonMobil	Beaumont	344,600
25	Valero	Port Arthur	330,000
26	Total	Port Arthur	225,500
27	Delek	El Dorado	83,000
28	Martin Resources	Smackover	7,500
29	Calumet	Shreveport	57,000
30	Calumet	Cotton Valley	13,020
31	Calumet	Princeton	8,300
32	PDV	Lake Charles	427,800
33	Phillips 66	Westlake	239,400
34	Calcasieu Refining	Lake Charles	78,000
35	Alon	Krotz Springs	80,000
36	ExxonMobil	Baton Rouge	502,500
37	Motiva	Convent	235,000
38	Placid Refining	Port Allen	59,000
39	Marathon	Garyville	522,000
40	Motiva	Norco	238,000
41	Valero	Norco	205,000
42	Shell	Saint Rose	45,000
43	Phillips 66	Belle Chasse	247,000
44	Chalmette Refining	Chalmette	192,500
45	Valero	Meraux	125,000
46	Chevron	Pascagoula	330,000
47	Ergon Refining	Vicksburg	23,000
48	Hunt	Sandersville	11,000
49	Shell	Saraland	80,000
50	Hunt	Tuscaloosa	36,000
51	Goodway	Atmore	4,100

In 2013, PADD 3 produced 3.9 million bbl/d of motor gasoline compared to 1.5 million bbl/d of in-region demand (Figure 19). Approximately 1.5 million bbl/d of the surplus production were supplied to PADD 1 via the Colonial and Plantation pipelines. The Gulf Coast also supplies gasoline to PADDs 2 and 5. 2013 flows to the Midwest and West Coast averaged 306,000 bbl/d and 109,000 bbl/d, respectively. An additional 437,000 bbl/d were exported, mostly to Mexico (44%) and to Central and South America (40%), and to Africa (10%) as well. The Gulf Coast region has long been an important supplier of gasoline to Mexico, and since 2010 has increased gasoline exports to South America. Gasoline exports from the Gulf Coast to West Africa are a more recent development. The recent increase in exports to West Africa, a market traditionally supplied by Europe, signals the competitiveness of U.S. gasoline exports in more distant markets.

Figure 19. PADD 3 motor gasoline supply-demand balance

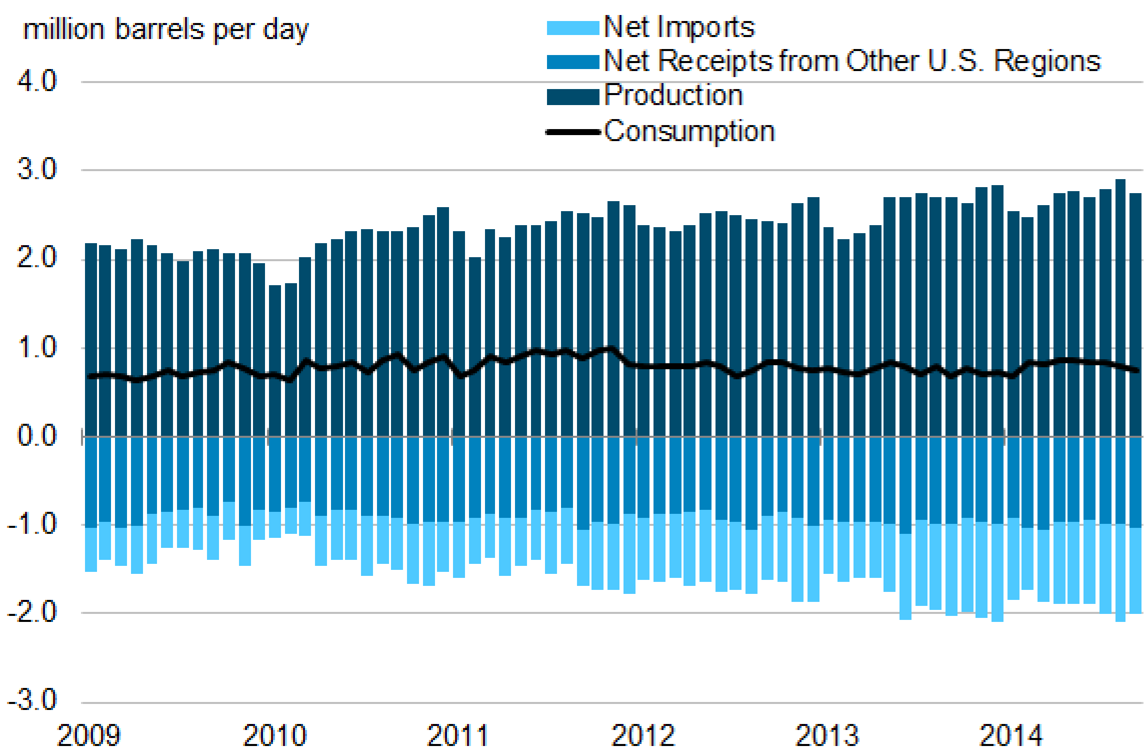


Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

Regional distillate production, 2.6 million bbl/d in 2013, also far exceeds local demand of 745,000 bbl/d (Figure 20). However, while most of the surplus gasoline produced in PADD 3 is supplied to other U.S. regions, PADD 3 surplus distillate is supplied to other U.S. markets and markets outside the United States in nearly equal volumes. PADD 3 distillate exports averaged just less than 900,000 bbl/d in 2013 and were sent primarily to Central and South America (50%), as well as to Western Europe (35%) and Canada and Mexico (10%). Although distillate exports have increased significantly since 2008, the destination mix has remained relatively static.

Net shipments of distillate fuel to other regions within the United States have been just under 1 million bbl/d for the past several years. PADD 1 is highly reliant on Gulf Coast distillate supply, and receives 843,000 bbl/d. Most of the distillate sent to PADD 1 moves via pipeline, with about 11% moving by tanker or barge. PADDs 2 and 5 also receive distillate shipments from the Gulf Coast, but in much lower quantities. In 2013, PADD 3 shipments of distillate to PADD 2 averaged 127,000 bbl/d and to PADD 5 averaged 21,000 bbl/d.

Figure 20. PADD 3 distillate supply-demand balance



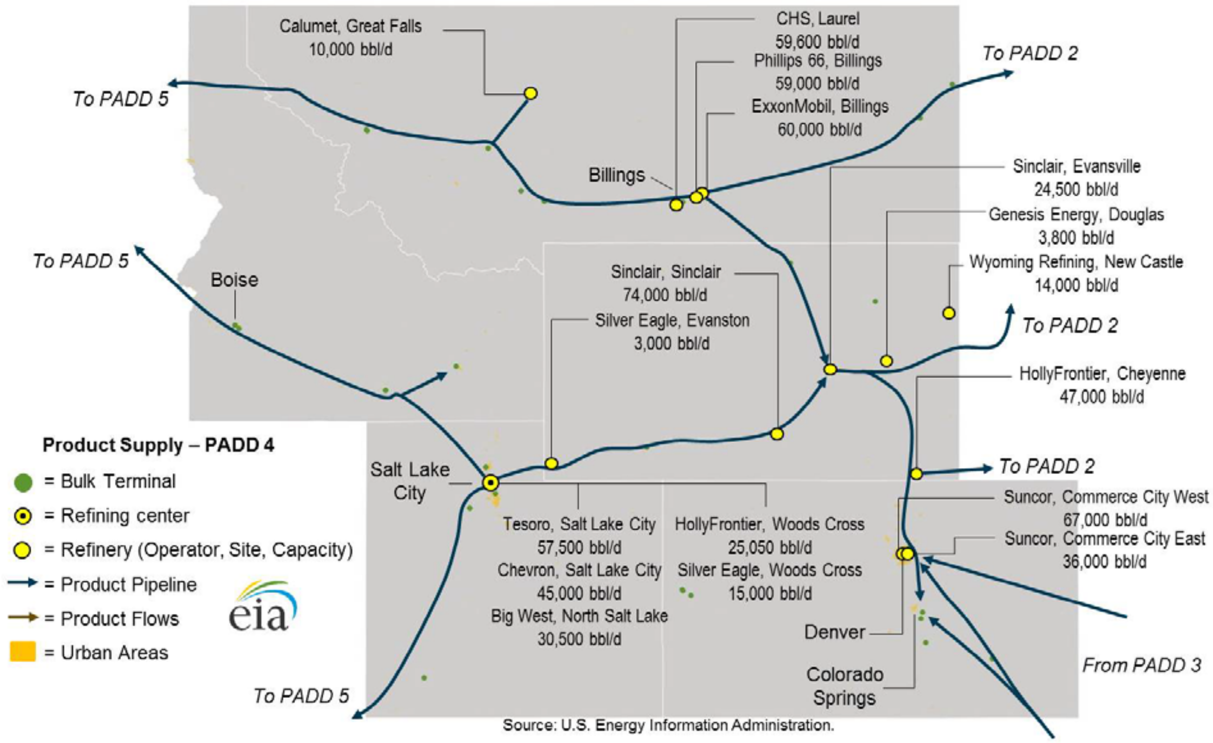
Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.4. PADD 4 – Rocky Mountain

PADD 4, the Rocky Mountain region, includes Idaho, Montana, Wyoming, Utah, and Colorado. Compared with other regions, PADD 4 is relatively isolated and, in 2013, in-region refineries supplied about 94% of gasoline demand and 100% of distillate demand. Refineries in PADD 4 are concentrated around Billings, Montana (180,000 bbl/d), Salt Lake City, Utah (170,000 bbl/d), and Denver, Colorado (100,000 bbl/d) (Figure 21).

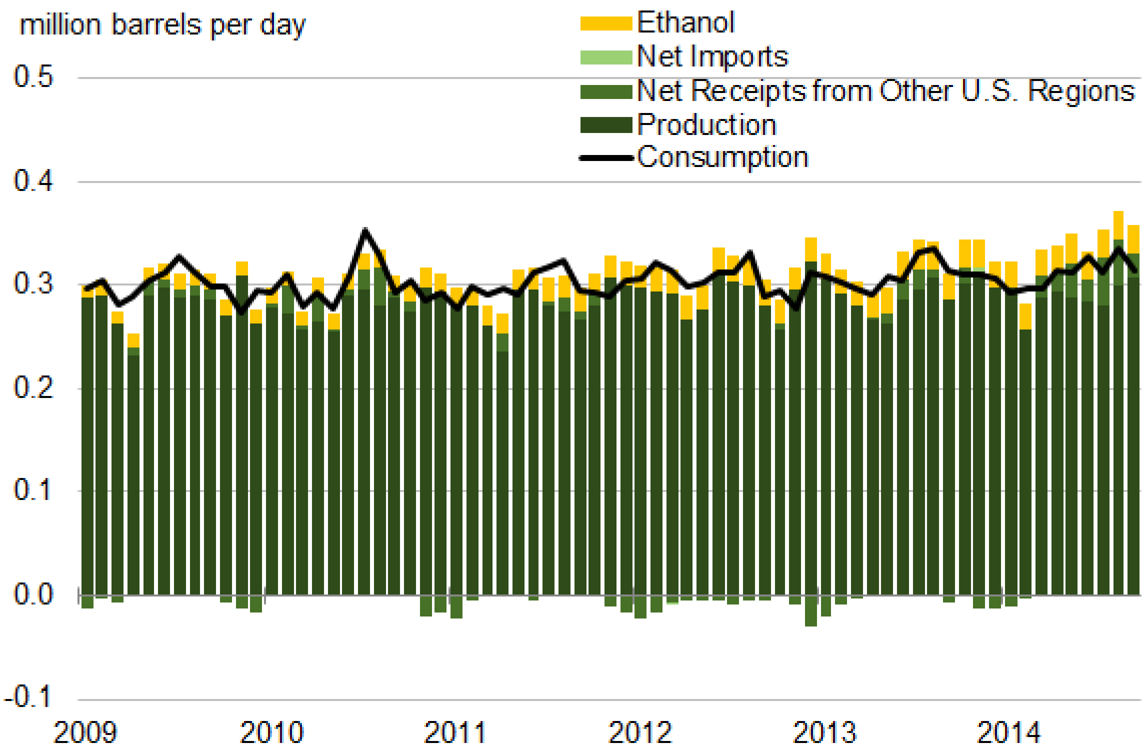
PADD 4 supplies small volumes of petroleum products to the surrounding PADDs (2, 3, and 5); however, it directly receives petroleum products only from PADD 2 (note that some product reported as supplied from PADD 2 to PADD 4 in EIA data originates in PADD 3). This includes volumes supplied via pipeline running from Borger, Texas to Denver, Colorado, which pass through PADD 2. While product flows between PADD 4 and other PADDs are low, PADD 4 is connected by pipeline to PADD 2 at several locations on its eastern border and can serve as a small but important supply source for the Montana-North Dakota and Wyoming-South Dakota border regions. PADD 4 can also supply the four bordering states of PADD 5 and the northwestern part of PADD 3.

Figure 21. PADD 4 petroleum product flows



In 2013, PADD 4 produced 291,000 bbl/d of motor gasoline, about 94% of the 310,000 bbl/d of PADD 4 finished gasoline demand (Figure 22). The remainder of finished gasoline demand was supplied from a combination of PADD 2 and ethanol. PADD 4 supplies small volumes of gasoline to PADDs 2 and 5.

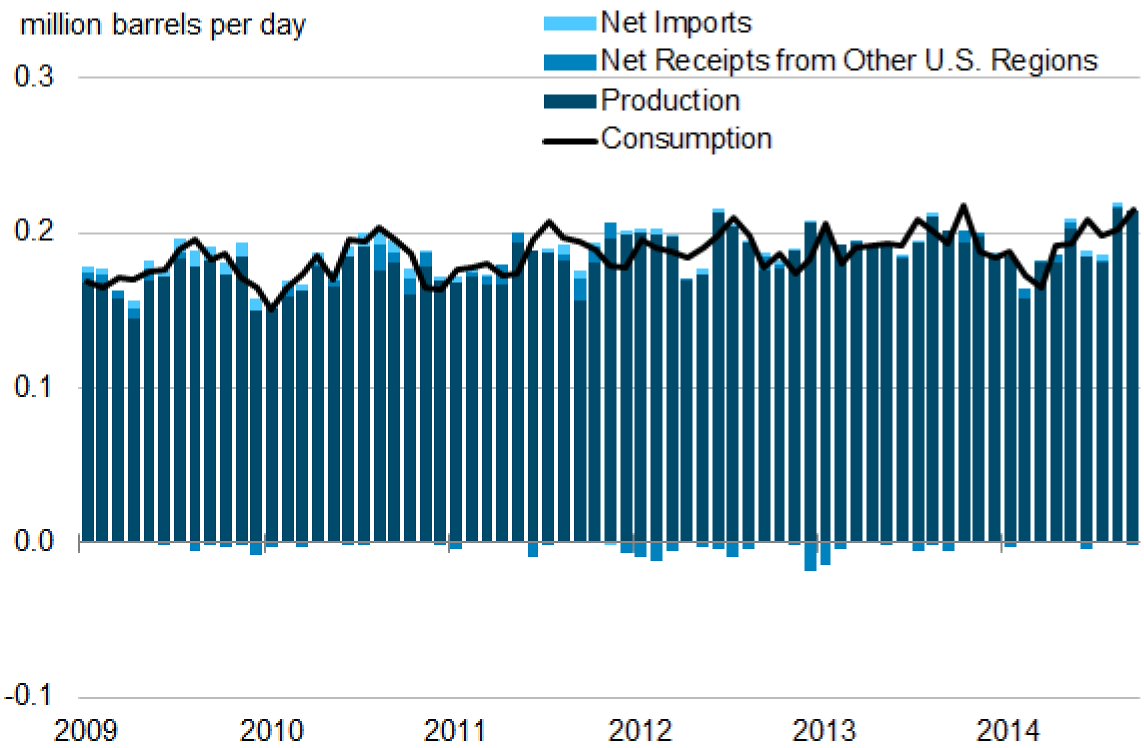
Figure 22. PADD 4 motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

PADD 4 distillate production and consumption in 2013 both averaged about 195,000 bbl/d (Figure 23). While PADD 4 distillate production is approximately equal to consumption, small volumes of distillate are sent to PADDs 2 and 5, with roughly equal volumes received from PADD 2, resulting in balanced net receipts between PADD 4 and other regions.

Figure 23. PADD 4 distillate supply-demand balance



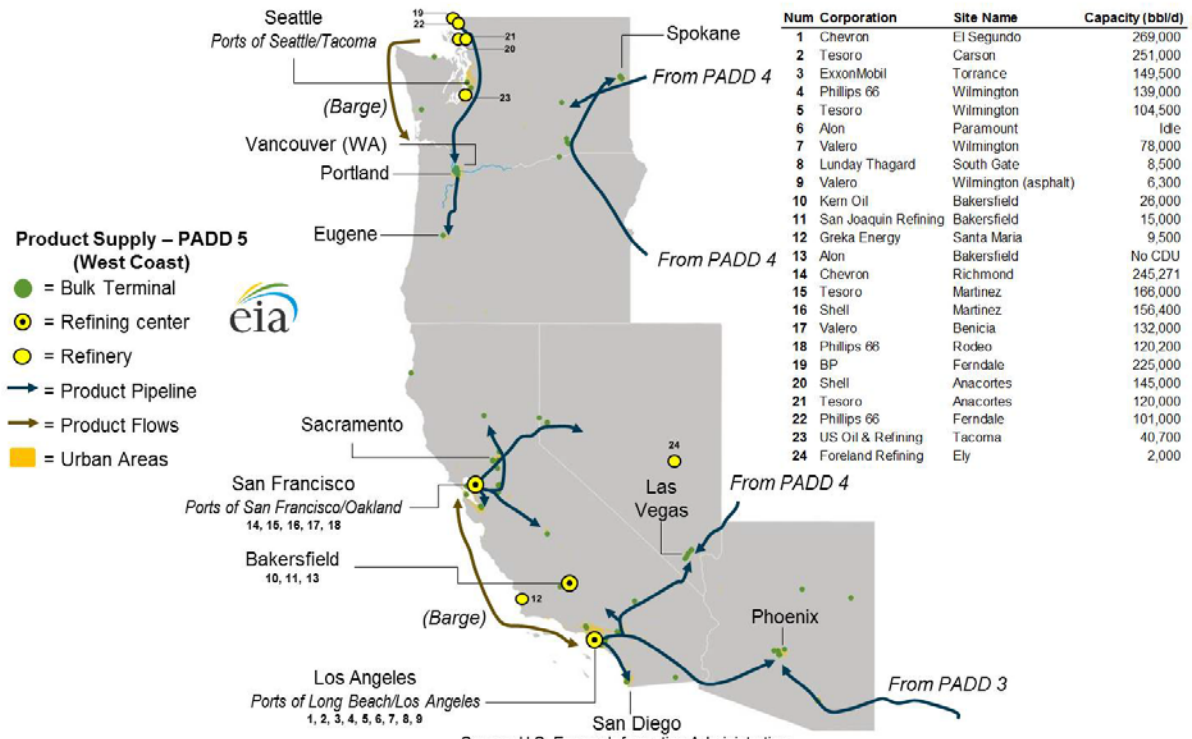
Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

11.5. PADD 5 – West Coast

PADD 5 includes Arizona, California, Oregon, Washington, and Nevada, as well as Alaska and Hawaii. PADD 5 consumes about 1.5 million bbl/d of gasoline and 0.5 million bbl/d of distillate fuel, supplied primarily by in-region production. The West Coast is relatively isolated from the rest of the country's petroleum markets because there are no pipelines that cross the Rocky Mountains (Figure 24). PADDs 3 and 4 supply modest amounts of product to the region via pipelines from El Paso, Texas and Salt Lake City, Utah. The West Coast does not import substantial volumes of gasoline and distillate from the Pacific Basin market.

Washington and Oregon are supplied primarily with refinery production from Washington refineries, supplemented by small volumes of imports into Seattle and Tacoma, Washington. Pipelines move refined products from the San Francisco-area refineries to the north and south within the state and to the east into northern Nevada. Southern California refineries supply local demand and historically have supplied product to Las Vegas, Nevada and Phoenix, Arizona. Gasoline and distillate are imported into California only infrequently, likely due to more stringent product specifications and the region's relative isolation.

Figure 24. PADD 5 petroleum product flows

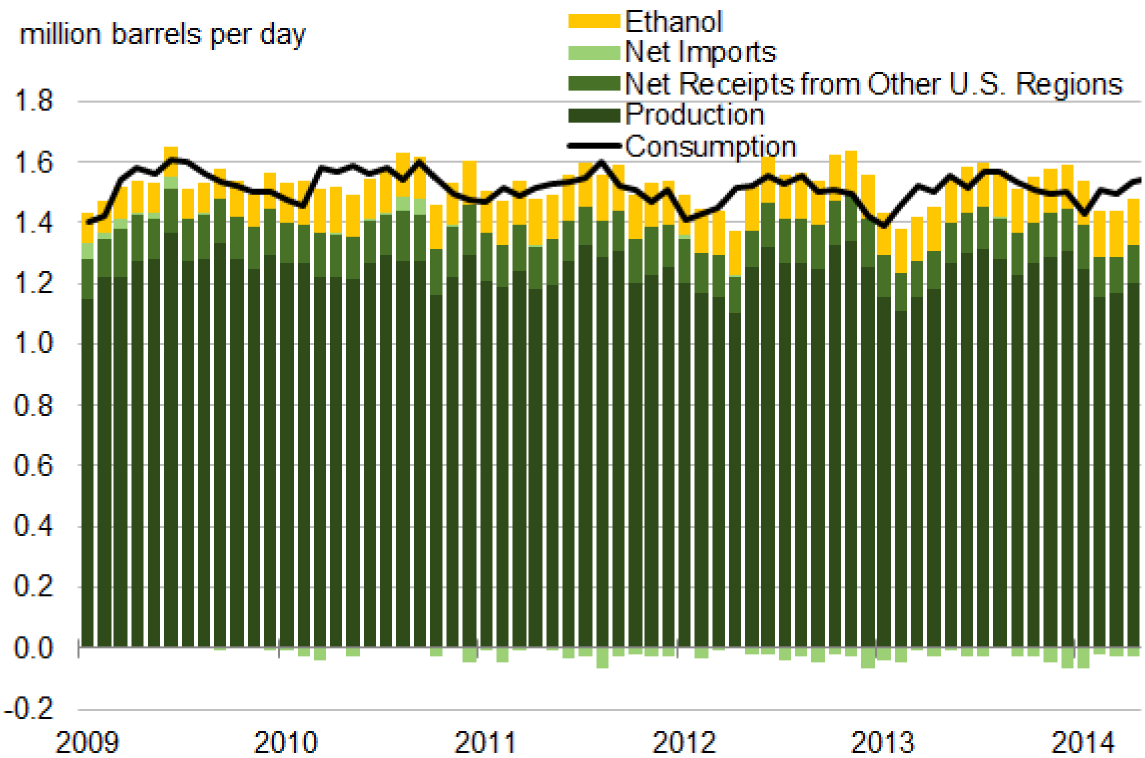


Num	Corporation	Site Name	Capacity (bbl/d)
1	Chevron	El Segundo	269,000
2	Tesoro	Carson	251,000
3	ExxonMobil	Torrance	149,500
4	Phillips 66	Wilmington	139,000
5	Tesoro	Wilmington	104,500
6	Alon	Paramount	Idle
7	Valero	Wilmington	78,000
8	Lunday Thagard	South Gate	8,500
9	Valero	Wilmington (asphalt)	6,300
10	Kern Oil	Bakersfield	26,000
11	San Joaquin Refining	Bakersfield	15,000
12	Greka Energy	Santa Maria	9,500
13	Alon	Bakersfield	No CDU
14	Chevron	Richmond	245,271
15	Tesoro	Martinez	166,000
16	Shell	Martinez	156,400
17	Valero	Benicia	132,000
18	Phillips 66	Rodeo	120,200
19	BP	Ferndale	225,000
20	Shell	Anacortes	145,000
21	Tesoro	Anacortes	120,000
22	Phillips 66	Ferndale	101,000
23	US Oil & Refining	Tacoma	40,700
24	Foreland Refining	Ely	2,000

Source: U.S. Energy Information Administration.

In-region refineries produced 82% (1.2 million bbl/d) of total motor gasoline consumed in PADD 5 in 2013 (Figure 25). An additional 9% of demand was met by supply that arrived via pipeline from PADDs 3 and 4 (from El Paso, Texas and Salt Lake City, Utah). Almost all ethanol blended in PADD 5 arrives via rail from PADD 2, as in-region production of ethanol remains low. In-region petroleum-based production is blended with ethanol and, when combined, equaled 101% of the region's demand in 2013. The extra 1% reflects net exports of petroleum-based motor gasoline (that have not been blended with ethanol). In 2010, the West Coast became a net exporter of gasoline for the first time since 1998.

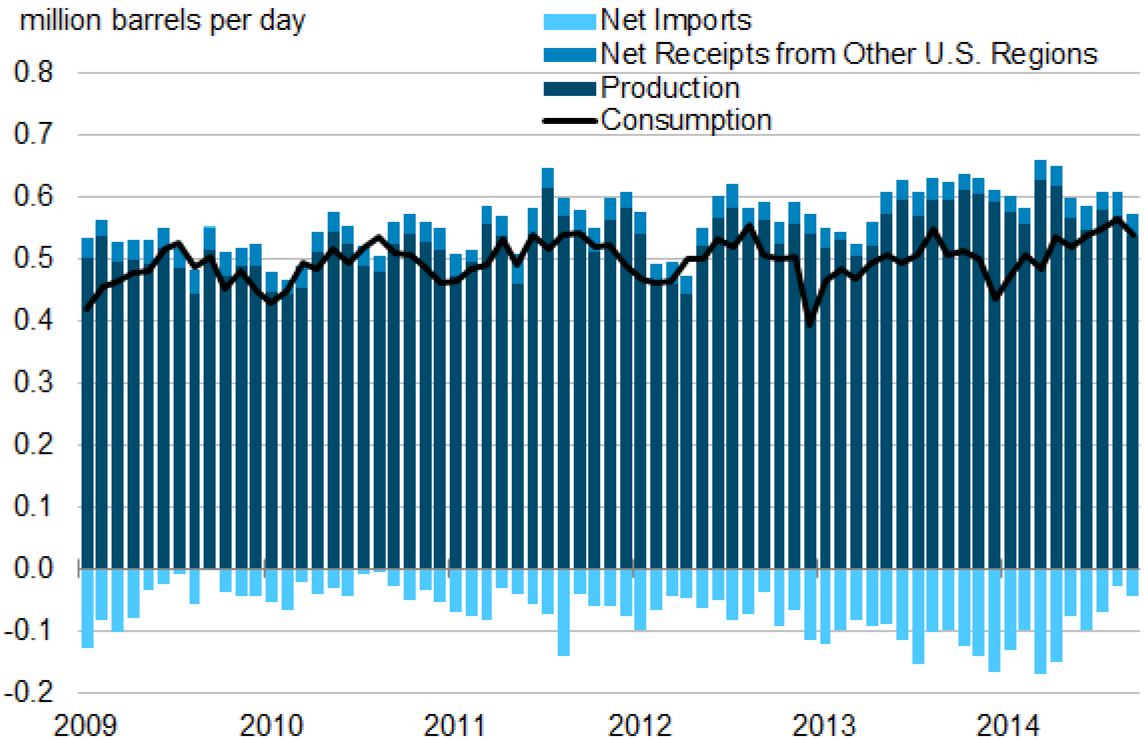
Figure 25. PADD 5 motor gasoline supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.

From January 2008 through September 2014, PADD 5 refineries produced 7% more distillate than the region consumed (Figure 26). This trend has strengthened in recent years, with a 15% surplus of production to demand in 2013. Net receipts from PADDs 3 and 4 have remained roughly steady at around 7% of regional consumption as regional infrastructure connections often make it more economic to supply parts of PADD 5 with production from other PADDs.

Figure 26. PADD 5 distillate supply-demand balance



Note: The difference between consumption and sources of supply reflects stock change. If consumption is higher than supply, inventories are drawn down; if consumption is lower than supply, inventories rise.
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*.