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Reductions in Northeast Refining Activity: Potential Implications for Petroleum Product Markets

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Summary

Reduction in refining activity in the Northeast, as reflected in recently announced plans to idle over 50% of the regional refining capacity, is likely to impact supplies of petroleum products. The transition period as supply sources shift could be problematic for Ultra-Low Sulfur Diesel (ULSD), gasoline, and jet fuel supplies. Prolonged uncertainty over the coming months with regard to the disposition and operation of important logistical assets such as pipelines, ports and storage would compound adjustment challenges. Reduced short-term product supply flexibility due to longer delivery times and potential transportation bottlenecks for sources outside the region could also increase price volatility. Finally, an increase in demand for ULSD due to changing State requirements could further exacerbate supply issues.

The U.S. Energy Information Administration (EIA) has received a number of inquiries concerning these developments. These inquiries have focused on: alternative supply options, available pipeline capacity, the implications for regional transportation fuels markets, heating oil supply and prices in the Northeast, and fuel security for the military. This note reflects EIA's initial effort to provide information and analysis on those specific topics. A more in-depth paper providing additional detail and analysis regarding the regional petroleum product market will be issued in February.

Context

Three southeastern Pennsylvania refineries that comprise over 50% of the total refining capacity in the Northeast (Central Atlantic and New England States)[1] have recently been proposed for sale. Two of these refineries have already been idled. In early September 2011, Sunoco announced plans to sell its refineries located in Philadelphia and Marcus Hook, Pennsylvania, with the intent of exiting the refinery business by mid-2012.[2] Later that month, ConocoPhillips announced its intention to idle its Trainer refinery pending its sale, along with the associated pipelines and terminals.[3] On December 1, Sunoco announced the immediate idling of the Marcus Hook refinery.[4]

Northeast refiners, in general, supply a diminishing market share of products in their own region. The balance of product supplies are either imported or moved into the region via pipeline from the Gulf Coast.[5] Refineries on the East Coast mainly serve the Northeast, supplying approximately 40% of

[1] The Northeast is part of PADD 1 and comprises New England (PADD 1A): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont; and Central Atlantic (PADD 1B): Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania. The East Coast, all of PADD 1, also includes Lower Atlantic (PADD 1C): Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia.

[2] Sunoco Press Release, 9/6/11, "Sunoco to Exit Refining and Conduct Strategic Review of the Company," http://phx.corporate-ir.net/phoenix.zhtml?c=99437&p=irol-newsArticle&ID=1603618&highlight.

[3] ConocoPhillips Press Release, "ConocoPhillips Seeks Buyer for Trainer, Pa., Refinery," 9/27/11, http://www.conocophillips.com/EN/newsroom/news_releases/2011news/Pages/09-27-2011.aspx.

[4] Sunoco Press Release, "Sunoco to Idle Main Processing Units at Marcus Hook Refinery," 12/1/11, http://phx.corporate-ir.net/phoenix.zhtml?c=99437&p=irol-newsArticle&ID=1635429&highlight=

[5] Gulf Coast (PADD 3) includes Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas.

Northeast gasoline sales and 60% of distillate[6] sales in 2010. About half this supply came from three refineries expected to be offline.

In 2010, the three refineries at issue combined to produce 315,000 bbl/d of gasoline, 194,000 bbl/d of distillate and 41,000 bbl/d of jet fuel. Distillate volumes produced included 143,000 bbl/d of ULSD mainly for on road use and 51,000 bbl/d of higher sulfur distillate that is primarily sold as heating oil. Production losses from the Trainer facility idling were offset, at least in some measure, by the return to full operations in October 2011 of the Delaware City, DE refinery,[7] which had been idled since late 2009. The idling in December of the Marcus Hook refinery removed 15% of the operating Northeast refining capacity.[8]

Alternative supply options

Alternative sources of petroleum products would be available, subject to certain constraints, if Northeast refinery production remains sharply reduced.

- The Gulf Coast is likely to be a significant alternate supplier. Gulf Coast refinery capacity is both more sophisticated and increasing. The main product pipeline to the Northeast, Colonial, would be the preferable transportation option if, as expected, additional capacity were available (see below). Waterborne transportation via tanker or barge on Jones Act vessels is another possibility.[9]
- Increased product imports, especially of gasoline.
- More output from the remaining Northeast refineries is expected, but not enough to replace lost volumes; other refiners in the region may see an opportunity to expand or upgrade their own capacity in the longer term.[10]
- Rail shipments from Midwest refineries could provide petroleum products in addition to the current shipments of ethanol and propane. Expected volumes would be relatively small.

Distribution infrastructure - pipelines, ports, and terminals

The Trainer, Marcus Hook and Philadelphia refineries are strategically located along the Colonial product pipeline that runs from the Gulf Coast to New York Harbor. Based on publicly disclosed information, there is limited spare capacity to increase shipments to the Northeast on the Colonial pipeline (daily

[6] Distillate includes diesel fuels used in trucks and automobiles and fuel oils used for space heating, electric power, and industrial applications. The sulfur composition of distillates is key to classification: Ultra Low Sulfur Diesel (ULSD) ≤ 15 ppm sulfur; used mostly in on-highway vehicles. Higher Sulfur (Non-ULSD) Distillate (>15 ppm sulfur), including No. 2 distillate heating oil (dyed red); used in residential and commercial heating systems, industrial, power generation applications; waterborne and rail transportation, and off-highway.

[7] The Trainer and Delaware City refineries have comparable configurations and crude oil capacities.

[8] The Trainer refinery was not operating when Marcus Hook was idled.

[9] The Jones Act (46 U.S.C. § 55101) requires that merchandise being transported by water between U.S. points must travel in U.S.-built and U.S.-citizen owned vessels that are registered in the United States. http://www.marad.dot.gov/ships_shipping_landing_page/domestic_shipping/Domestic_Shipping.htm.

[10] PBF Energy Co, LLC. The company purchased the Delaware City, DE refinery and the Paulsboro, NJ refinery, both previously owned by Valero, and both on the Delaware River.

deliveries are up to 2.5 million bbl/d). Colonial has stated that it increased overall capacity in 2011 and that further expansions underway are scheduled for completion by mid-2012.[11]

These three refineries are also located at the origin of several key branches of product pipelines running westward across Pennsylvania to Ohio and beyond, and northward to upstate New York. Interconnections among these systems may need to be changed to facilitate transfer of product volumes from Colonial to regional pipelines. Increased capacity for receiving waterborne shipments of refined products would also be needed. The crude import facilities at these refineries, in the event that any or all of the refineries are permanently shuttered, could be retrofitted for product receipts. Even so, pipeline capacity will still be insufficient to make up the entire lost production volume.

Rail, which is currently used to move ethanol for gasoline blending in the Northeast, could become another option for moving products from Midwest refineries. The current capacity of railcars and rail offloading facilities for incremental volumes is unknown.

Implications for transportation fuels

The implications of reduced regional refinery production for supply security and prices will depend on availability of required fuel types as well as specific developments in storage and logistics. Higher price differentials for wholesale products compared with the Gulf Coast and markets abroad would have to occur to incentivize producers to send more products to the Northeast. Time spreads, the difference between the price for future and current deliveries, might become more volatile in a context of reduced refining capacity in order to balance the market as meeting demand might require larger draws on stocks. When seasonal demand is weak, current sales would need to be at a steep enough discount relative to barrels for future delivery to offset storage costs and provide participants with a market signal conducive to building stocks. Participants will benefit from holding oil in storage if they can sell it in the future at a higher price. Conversely, when demand is strong relative to supply, current sales would need to be at a large enough premium to those for future delivery to attract fresh supply into the market.

Prolonged uncertainty over the coming months with regard to the disposition and operation of important logistical assets could make for a challenging market response, however. Timing differences between refinery closures and infrastructure reconfigurations or additions could result in spot shortages with price spikes for different fuels in different locations. The supply situation for ULSD may be particularly problematic in the second half of 2012 as planned specification changes will necessitate a change-over to ULSD in Northeast terminals for use as heating fuel.

Implications for the northeast heating oil market

While the largest loss by volume will be gasoline supplies, idling the Marcus Hook refinery early in the current heating season eliminates a major regional source of heating oil supplies in a market with relatively low stock levels, although a mild start to the winter has eased demand. By the winter of 2012/13, more regionally-sourced ULSD and heating oil supplies will be lost if Sunoco's Philadelphia refinery is also shut down.

[11] Colonial Pipeline press releases, 6/29/11, http://www.colpipe.com/press_release/pr_110.asp, and 10/31/11, http://www.colpipe.com/press_release/pr_111.asp.

EIA's Short-Term Energy Outlook (STEO) estimates that 5.8 million Northeast households used heating oil as their primary space heating fuel last winter, down 13% from the winter of 2005-2006.[12] A further 3% drop, to 5.6 million households is expected this winter. This decline is a structural change that has occurred as users have permanently switched to other fuels, like natural gas and electricity, for space heating.[13]

While a higher percentage of New Englanders rely on heating oil in the winter, the State of New York alone consumed 76,000 bbl/d or 26% of the regional space heating oil market in 2009. In July 2012, New York will become the first State to require that all oil used for space heating meet ULSD standards. The New York switch could raise regional ULSD demand by up to 10% in less than a year.

Northeast home heating oil reserve

In 2011, the Department of Energy (DOE) changed the operation of the Northeast Home Heating Oil Reserve ("Reserve") by selling the higher sulfur fuel in storage and replacing it with ULSD. The Reserve was also reduced to 1 million barrels, split between two sites, in Groton, CT and in a new location farther north in Revere, MA. The Reserve was established to address short-term and temporary supply losses; it is not a source of ongoing supply. Announcing the change, DOE stated, "Establishment of a one million barrel [Reserve] is consistent with the President's 2012 budget request and will provide supplemental supplies to New England, the area most vulnerable to a supply disruption. DOE does not plan to reestablish a [Reserve] facility in the New York Harbor area because it has abundant commercial stocks and connections to local refineries and a major pipeline for resupply."[14]

Fuel security for the military

The recent idling of two Philadelphia-area refineries and announced plans to idle an additional one by mid-2012 should not significantly affect the use of petroleum products by the military. Military fuel demand is small relative to commercial petroleum demand. In fiscal year 2011 (FY 2011), the military purchased 3,900 bbl/d of jet fuel, diesel, heating oil, and gasoline for operations in the Northeast, which represent only 10% of total East Coast purchases. The majority (3,400 bbl/d or 87% of total purchases) is military specification fuel – jet fuel (JP5 and JP8) and diesel (F76) – produced by Gulf Coast refineries under multi-year bulk purchase arrangements. These fuels are primarily delivered to the Northeast by pipeline and barge. Most of the military bases on the East Coast are located in the Southeast, not in the Northeast.

[12] EIA's Residential Energy Consumption Survey for 2009 found that households using heating oil fell by 8.1% in the Northeast between 2005 and 2009. The downward trend is consistent with the annual data referenced in the STEO from the Census Bureau's American Community Survey (ACS).

[13] Residential and commercial use of distillate fuel for space heating in 2009 fell under 300,000 bbl/d for the first time since 1984, the year EIA began tracking the data. Based on sales of No.2 Fuel Oil to the residential and commercial sectors from EIA's Adjusted Distillate Fuel Oil and Kerosene Sales by End Use for the Northeast (http://www.eia.gov/dnav/pet/pet_cons_821usea_dcu_R1X_a.htm) and Central Atlantic (http://www.eia.gov/dnav/pet/pet_cons_821usea_dcu_R1Y_a.htm).

[14] Storage Contracts Awarded for Northeast Home Heating Oil Reserve, 9/30/11, http://www.fe.doe.gov/news/techlines/2011/11054-NEHHOR_Storage_Contracts_Awarded.html.

Commercial grade products – gasoline, diesel, and heating oil – are purchased locally from terminals near military bases where the products are consumed. In FY 2011, the military purchased only 500 bbl/d of commercial grade products in the Central Atlantic and New England States.