NAVIGANT

OIL & GAS MARKET NOTES

CONTENTS

Mexico Energy Reform: The *Other* Story

Over the past month, two big stories have emerged from Mexico. One is the continued progress being made in pursuing true constitutional energy reform, with three rounds of auctions on oil fields so far and 30 production contracts awarded in pursuit of a new energy paradigm for Mexico. The true success of this program remains to be seen, but all indications are that there will be a turnaround in the steep decline of oil production in Mexico. Production is down more than 25% from its peak in 2004 and the lowest since 1986—30 years ago—according to the U.S. Energy Information Administration. In 2015, the initial auction phase of Round One offered 14 offshore blocks, but only two received bids that were deemed adequate and awarded. Since then, the pace and success of the offerings have improved, with 28 out of 30 production contracts awarded. Mexico is on its way to implement the much needed reforms in the oil sector.

The second story is related to air quality. Mexico, for years heavily dependent on electric generation from (its own) oil, had seen the need to address the crippling air pollution in the country, particularly in and around the high altitude setting of the capital, Mexico City. At 7,350 feet of elevation and surrounded by mountains on all sides, the city was subject to regular weather events trapping the pollution and severely affecting health and visibility. Steady improvements in vehicle emissions and other consumption limitations, including reducing electric generation from oil, have improved the overall air quality. But last month, Mexico City was forced to take several actions—including a 40% limit in vehicular traffic—to address a backslide in the improvements to date. While an unusual set of climatic factors may have caused the event, it was a firm reminder of just how tenuous the situation regarding clean air is in the city of over 20 million. And this city is in a country that has just committed to the global warming directives from COP21 earlier this year.

But the *other* story (and the reason for this article) is natural gas. Mexico has an abundance, particularly in the south and in the Burgos Basin to the north (Figure 1). By some estimates, shale gas reserves in the country exceed 545 TCF, fifth in the world—but Mexico is doing little to develop them. This seems counterintuitive. Meanwhile, the Comisión Federal de Electricidad (CFE)—the state-owned electric utility of Mexico—aims to ramp up new gas-fired power plants from 21 MW in 2014 to almost 56 MW in 2028 to augment or replace existing facilities. This will result in a sharp increase in gas demand in the country (Figure 2). So what's up with gas development?

FIGURE 1 MAP OF BURGOS BASIN IN MEXICO

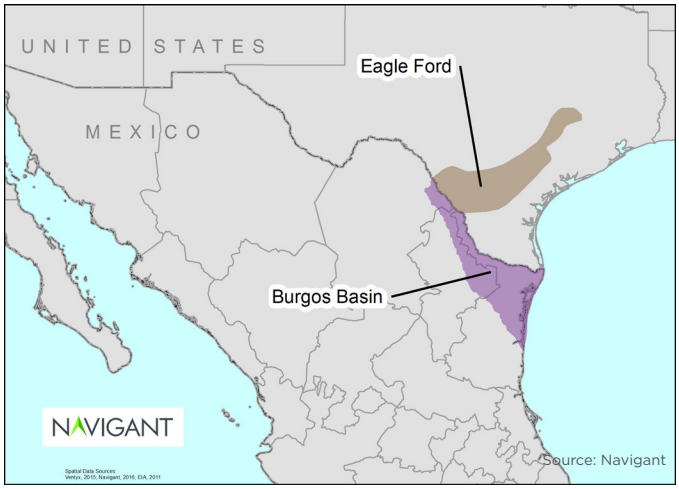
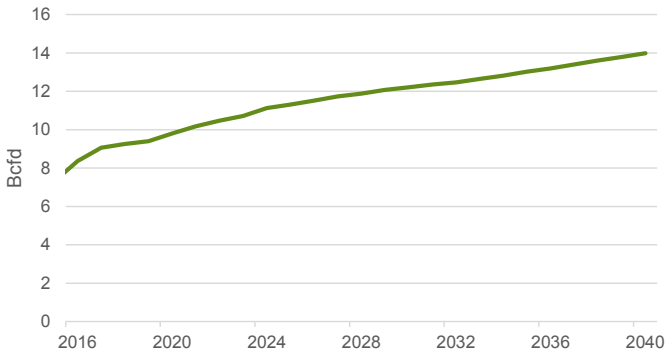


FIGURE 2 MEXICO TOTAL NATURAL GAS CONSUMPTION



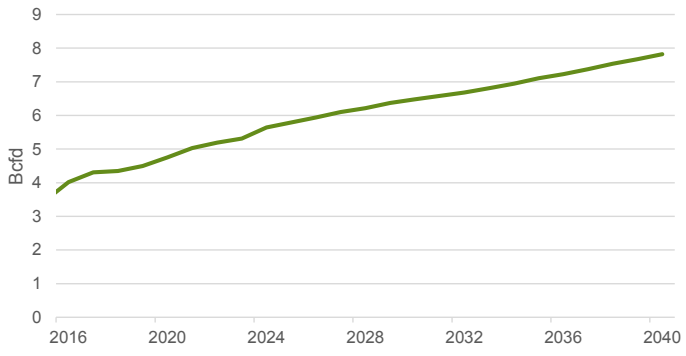
Source: Navigant's North America Natural Gas Market Outlook, Spring 2016, Navigant Consulting, Inc.

GAS DEVELOPMENT

Actually, there's plenty going on. Shale development in the Eagle Ford fields of Texas (just across the river and a geologic twin to the shale in much of the Burgos Basin) has boomed. Naturally, things have slowed down with the overall downturn in natural gas business activity and commodity prices in the United States, but the Eagle Ford still produces 4.9 Bcfd and is a fairly easy place to maintain or increase production. Part of the slowdown is actually rooted 2,000 miles away in the Marcellus and Utica formations in Pennsylvania and surrounding states. The production from there is so abundant that it's making its way south on reversed mainline pipelines to reach the same markets that the fields in Texas (and Louisiana and offshore) historically served. So where's the market for Eagle Ford gas? One is certainly in the refineries and processors in Houston as feedstock. Soon, another will be on the Texas coast, when several other liquefied natural gas (LNG) export facilities (besides Cheniere's Sabine Pass, which came on stream on February 24, 2016) that are in construction are commissioned. Beyond that, though, the market is in Mexico. Such is the abundance of the gas resource base in the United States, which is just starting to export by ship and by pipeline to global markets, including Mexico. It's already big, and there are going to be shipments of natural gas to Mexico to a greater extent and for a long time into the future should matters continue to progress as it looks today.

By Navigant's estimates, the forecast growth (see Figure 3) for electric generation gas demand in Mexico will double in the next 25 years. And to achieve this demand growth, you need two things: supply and pipelines.

FIGURE 3 MEXICO NATURAL GAS CONSUMPTION IN THE ELECTRIC SECTOR



Source: Navigant's North America Natural Gas Market Outlook, Spring 2016, Navigant Consulting, Inc.

What is interesting as both the United States and Mexico face this new emerging market development is that indigenous gas supply potential in the Burgos Basin in Mexico most certainly exists. According to gas resource studies that have been prepared on Mexico, the resources of Mexico rank among the top estimated technically recoverable resources of any country in the world at 545 TCF. But domestic Mexican development has been stagnant recently due to factors such as a lack of adequate existing pipeline infrastructure and the very small number of shale gas wells (the blueprint for extracting gas is not necessarily the same from field to field, or even within different parts of a field), as well as security concerns in the field. The Burgos Basin lies primarily in the State of Tamaulipas, just south of Texas. The Zetas and Gulf cartels also have strongholds in Tamaulipas and have become a factor in not only the matter of upping security concerns, but also in the involvement in the oil & gas business themselves. In fact, some Mexican press reports say that the cartels have oil distribution operations that are nearing the scope of Pemex—through illegal taps and hijacked tanker trucks. Edgar Rangel, a commissioner at the National Hydrocarbon Commission in Mexico, has acknowledged these are high risk areas in which to operate.

ACTION ITEMS

So what has Mexico decided to do? Mexico has embarked on a plan made up of building domestic natural gas pipelines and importing gas from the United States. The plan is being pursued on a number of fronts and is being effectively implemented. It came together seemingly separate from the larger reforms taking place in the country (with some impact from the electric portion of the reforms) and likely could, interestingly, have generally occurred without the reforms.

Three major action items are being carried out simultaneously that affect the Mexican gas industry today:

- The acquisition of supply.
- The construction of U.S. natural gas pipelines for delivery of U.S. gas to Mexico.
- The expansion and addition of natural gas pipelines in Mexico.

Mexico has long relied on natural gas exports from the United States to augment its domestic supply. Purchase of this supply has occurred using both long-term and spot contracts. The required credit on the part of CFE (or other purchasing entities) has been adequate to support these sales. And the Mexican purchasers have long shown confidence in having access to reasonably priced and reliable U.S. supply. For the most part, this supply is available at or near Henry Hub or the Houston Ship Channel posted prices, which have recently undergone price declines on U.S. gas shale supply abundance. Interestingly, none of these developments required the constitutional reforms in Mexico in order to occur. Instead, they have occurred somewhat like coal-to-gas switching in the U.S. electric generation sector—as a result of the market and the incentive of low prices.

U.S. pipelines built to deliver natural gas to Mexico are shown in Table 1. The pipeline crossings run from far south Texas to near the Pacific Ocean in California. Also shown in Table 1 are the new proposed pipelines for increased delivery from the United States in to Mexico. Altogether, these pipelines reflect over 10 Bcfd in delivery capacity, with 7 Bcfd of that added or to be added since 2014. For the most part, these pipelines are constructed under long-term (10- to 15-year) must-pay contracts between the pipeline company in the United States and the CFE or another substantial economic entity in Mexico. Credit, like that for the gas purchases, has generally met the requirements of the constructing pipelines, including the tariff requirements of U.S. Federal Energy Regulatory Commission (FERC) regulated interstate pipelines. With the long-term and large diameter pipeline capacity (and commitments), the going tariff rate for pipelines is estimated at less than $0.25 per dekatherm for deliveries sourced hundreds of miles from the U.S. border. Again, the constitutional reforms did not do anything to facilitate the building or utilization of these pipelines. Rather, they expanded domestic Mexican demand and a long-term reliable supply source to the north. Confidence in the continuation of a positive business climate between the United States and Mexico has contributed to this development.

Table 1: Pipeline projects from United States to Mexico

PIPELINE PROJECT	CAPACITY (BCFD)	STATUS	IN-SERVICE DATE
San Elizario Crossing	1.10	Proposed	January 2017
Presidio Crossing	1.35	Proposed	March 2017
Impulsora	1.12	Proposed	June 2017
Road Runner	0.57	Proposed	April 2017
Sierrita Expansion	0.31	Proposed	October 2016
Sierrita	0.20	Existing	October 2014
NET Mexico	2.10	Existing	December 2014
Tennessee-Rio Bravo	0.32	Existing	January 2003
Tennessee-Alamo	0.22	Existing	January 1999
Texas Eastern-Hidalgo	0.32	Existing	January 1998
KM Mexico-expansion	0.22	Existing	June 2014
KM Mexico	0.43	Existing	April 2003
KM Border McAllen	0.30	Existing	October 2000
North Baja US	0.51	Existing	September 2002

Source: Navigant's North America Natural Gas Market Outlook, Spring 2016, RBAC, PointLogic

Which brings us to the pipeline capacity across the border in Mexico. There's no point in building substantial export pipelines in the United States if the take-away capacity can't be matched south of the border. Mexico has embarked on a large number of projects, like the Los Ramones pipeline, to provide access to and distribution of the supply coming from the north (see Table 2). The long-term vision of these projects is twofold: to bring gas from the United States into Mexico and to establish significant infrastructure to allow the distribution of domestic Burgos Basin production should it develop in the future. This is seemingly a good two-pronged plan. Many of these pipes have been built by foreign entities with long experience in building and operating pipelines in Mexico.

Table 2 Proposed natural gas pipeline projects in Mexico

PIPELINE PROJECT	CAPACITY (BCFD)	ONLINE DATE
Ojinaga – El Encino Gas Pipeline	1.35	March 2017
Gas Pipeline El Encino – La Laguna	1.50	March 2017
Gas Pipeline San Isidro – Samalayuca	1.14	January 2017
Tuxpan – Tula Gas Pipeline	0.89	December 2017
Samalayuca – Sasabe Gas Pipeline	0.47	November 2017
Tula – Villa de Reyes Gas Pipeline	0.89	January 2018
Villa de Reyes – Aguascalientes – Guadalajara Gas Pipeline	0.89	January 2018
La Laguna – Aguascalientes Gas Pipeline	1.19	January 2018
Guaymas – El Oro	0.51	October 2016
TCPL's Mazatlan	0.20	October 2016
TCPL's Topolobampo	0.67	October 2016
Nueva Era	0.6	June 2017

Source: Navigant's North America Natural Gas Market Outlook, Spring 2016, RBAC

THE *OTHER* STORY

Mexico's growth in natural gas demand is substantial and is expected to grow considerably for the foreseeable future. But it occurred in great part outside the realm of the recent constitutional reforms that have been the one of the big stories in Mexico. But this *other* story, albeit drawing far less attention, is no less impressive. This story has a long and successful history. It also has a bright future ahead with important impacts certainly on Mexico, but also on the United States, as we indicated in last month's *Oil & Gas Market Notes*. As result of the success of gas supply production in the United States, the United States is now and for the first time in history a **net** gas exporter—to Canada and Mexico by pipeline and to global markets by ship. This development is a remarkable about-face in the United States and an artifact of the changing role of the United States as a valued trading partner of natural gas and LNG—to Mexico and to other countries around the world. And it has very broad future implications—far beyond energy and economics.

HOW CAN NAVIGANT HELP?

Using its in-depth industry knowledge and experience, Navigant's Oil & Gas consulting practice specializes in helping clients understand the issues, develop solutions, and execute on their strategy. Our team has deep experience in helping drive value in highly volatile times, through upstream, midstream, and downstream operations.

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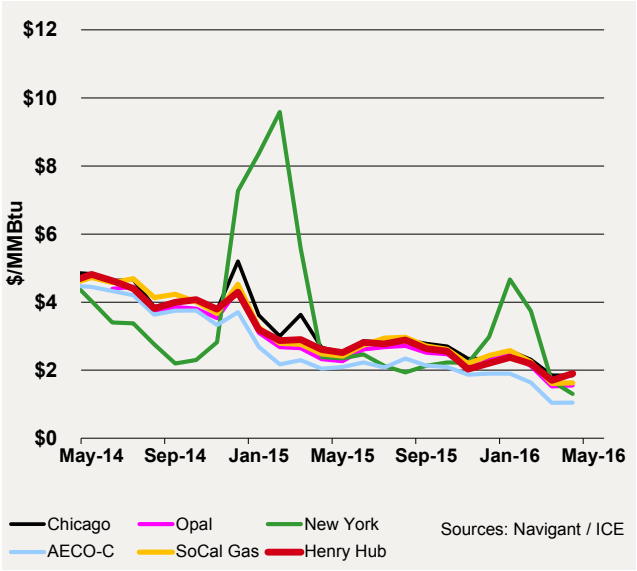
The opinions expressed in this article are those of the authors and do not necessarily represent the views of Navigant Consulting, Inc.

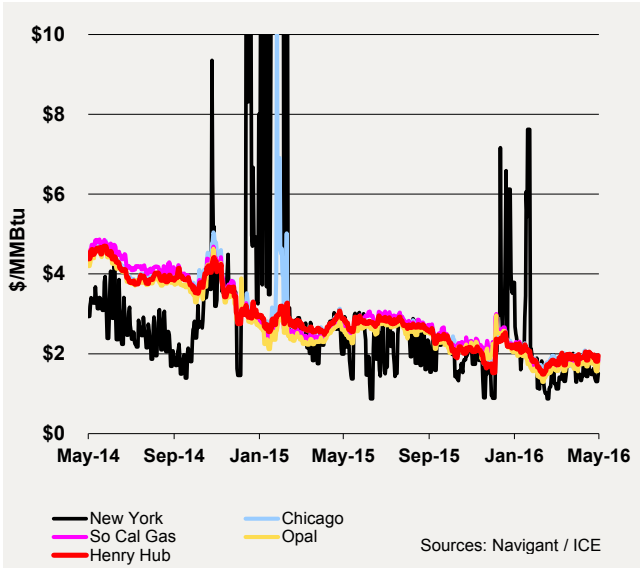
Natural Gas Market Charts

MONTHLY GAS INDEX PRICE



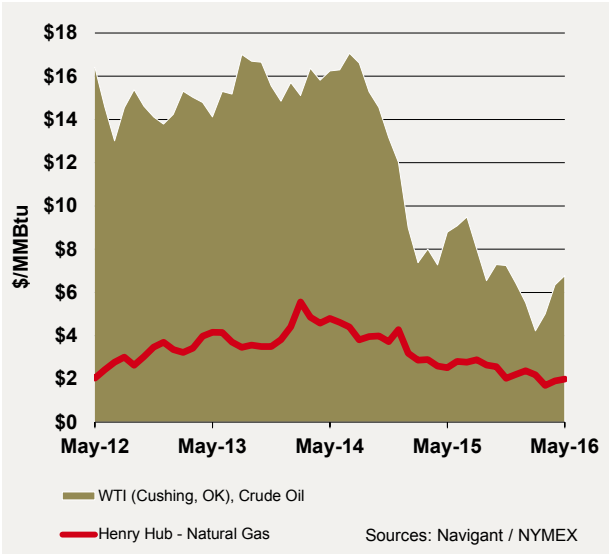
Monthly index gas prices increased 5%, with Henry Hub at $1.99/MMBtu for May versus $1.90/MMBtu for April. The May 2016 price was below the May 2015 price of $2.52/MMBtu by $0.53/MMBtu.

DAILY GAS PRICE



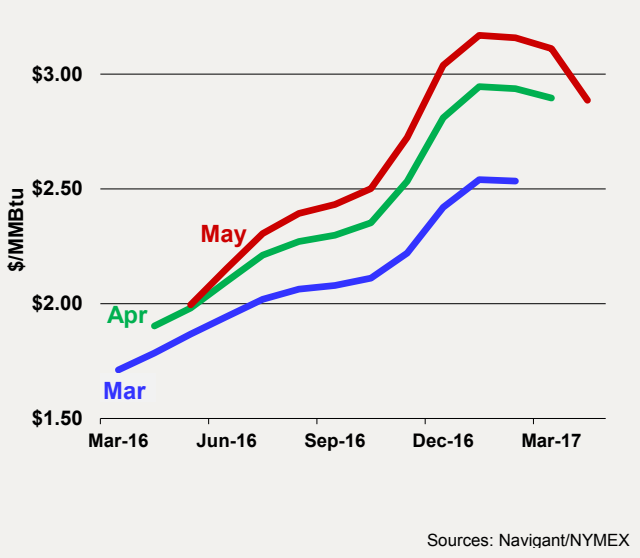
The daily spot prices went up in May 3% versus the end of April, with Henry Hub at $1.95/MMBtu versus $1.89/MMBtu.

MONTHLY PRICES: OIL AND NATURAL GAS GULF COAST



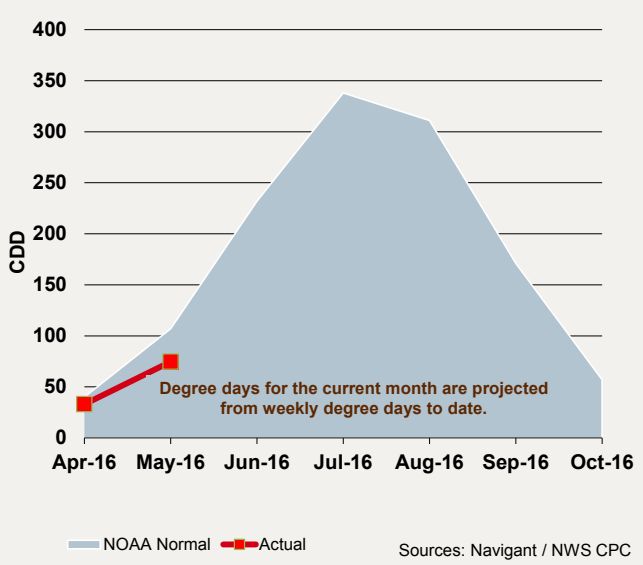
The most recent gas/oil price ratio increased to 3.4 times, with Henry Hub natural gas price at $1.99 per MMBtu versus WTI crude oil price at $6.78. The ratio one year prior was 3.5 times.

NYMEX FUTURES SETTLEMENT PRICES AT CLOSE



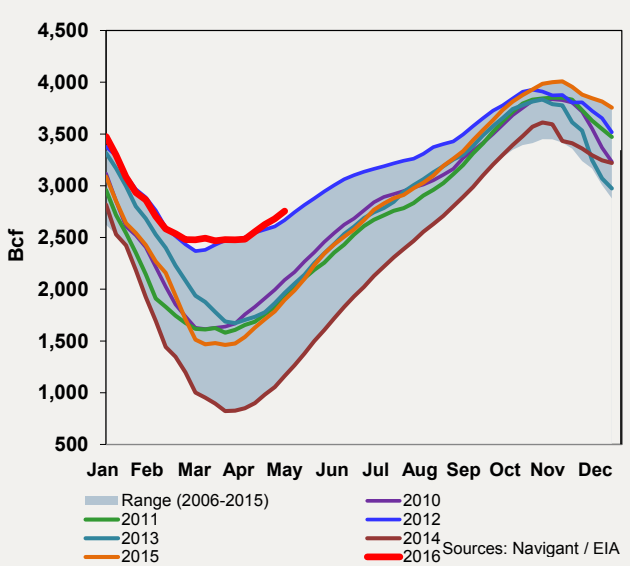
The average 12-month strip price increased 9% to $2.66/MMbtu for the strip starting May 2016, versus $2.44/MMbtu for the April strip.

U.S. POPULATION-WEIGHTED CDD



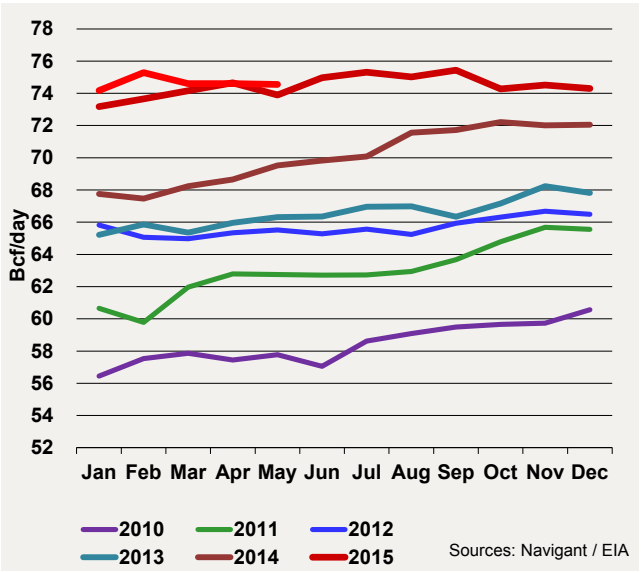
The cooling season continued cool with heating degree days at 27% below normal for the season to date.

U.S. GAS STORAGE



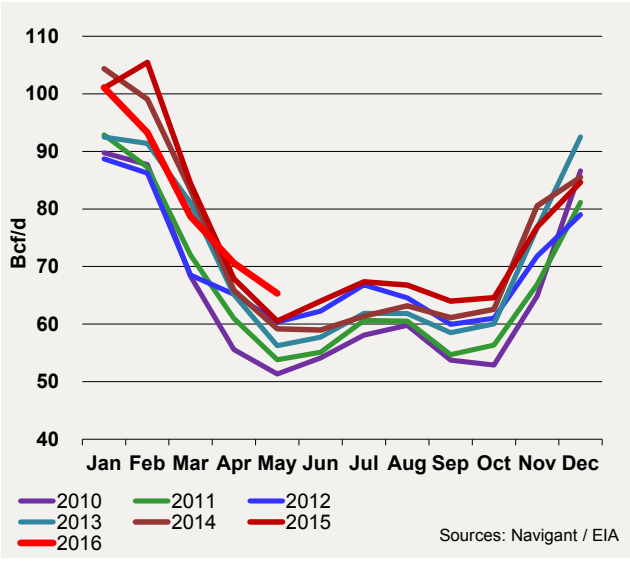
U.S. storage increases brought storage levels at this time of year above the ten-year high, at 2,754 Bcf.

U.S. DRY GAS PRODUCTION



U.S. dry gas production remained at levels above 74.5 Bcfd, exceeding last year's record May of 73.9 Bcfd.

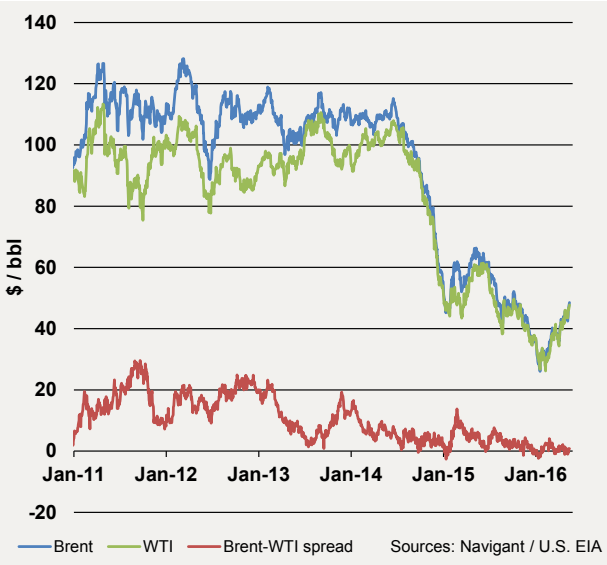
U.S. MONTHLY NATURAL GAS DEMAND



Strong demand in May at 65.3 Bcfd exceeded the prior high for the month from last year by 8%.

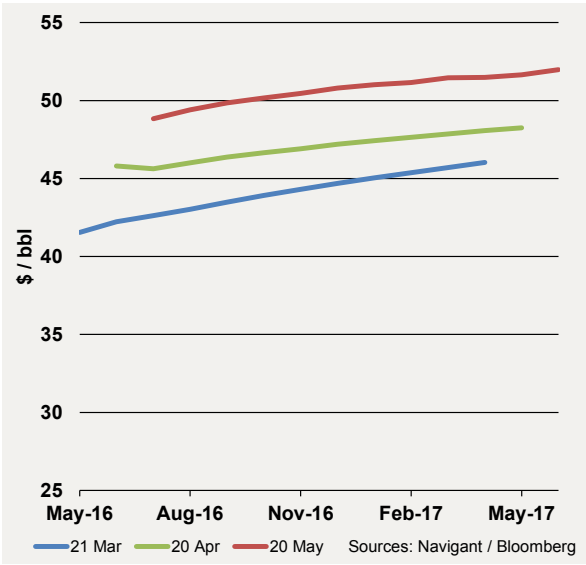
Oil Market Charts

SPOT CRUDE PRICES



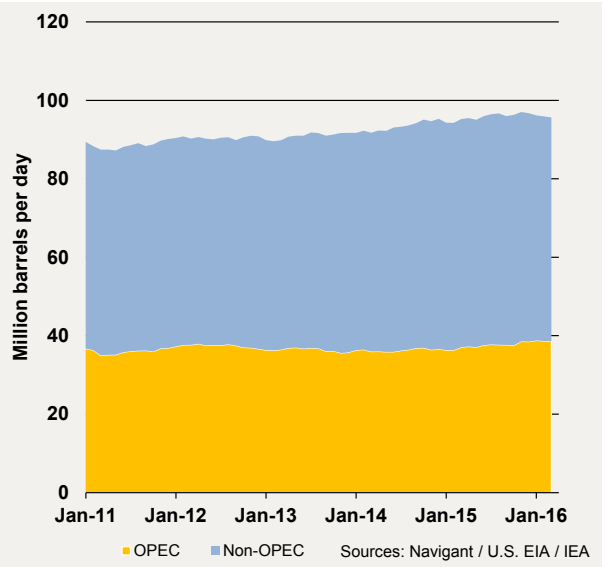
Crude prices averaged $42/bbl (Brent) and $41/bbl (WTI) in April 2016, but have since approached the $50/bbl mark.

ICE BRENT FUTURES CURVE



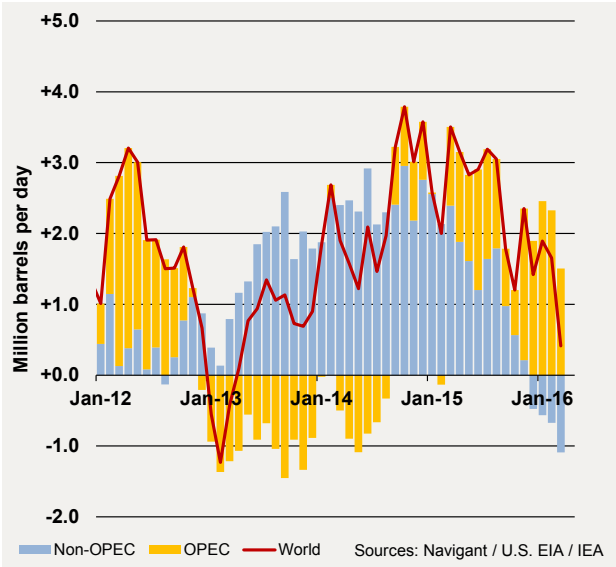
The average 12-month strip price on 20 May 2016 was $51/bbl, an 8% jump from a month ago.

OPEC & NON-OPEC OIL PRODUCTION



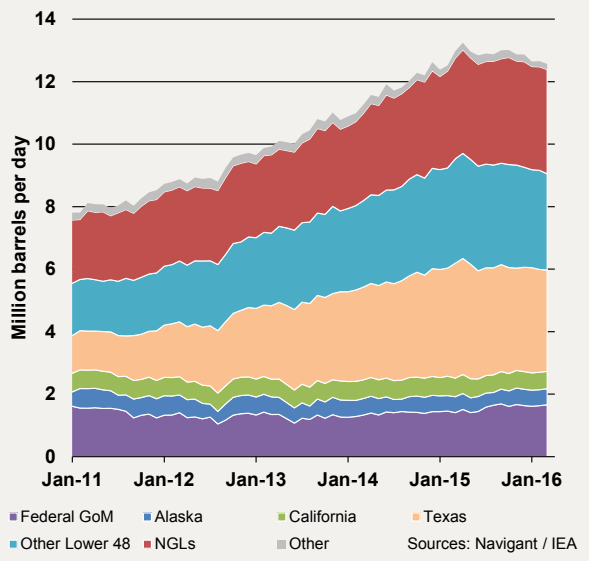
Global oil production increased from 95.2 million barrels per day a year ago to an estimated 95.7 million barrels per day in March 2016, of which 40% was supplied by OPEC.

YEAR-ON-YEAR CHANGE IN OIL PRODUCTION



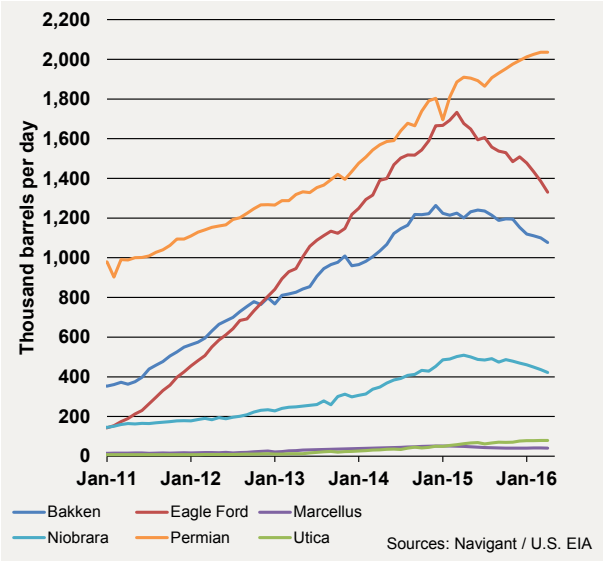
Oil production growth has come mainly from OPEC in recent months as non-OPEC producers react to lower prices.

U.S. OIL PRODUCTION



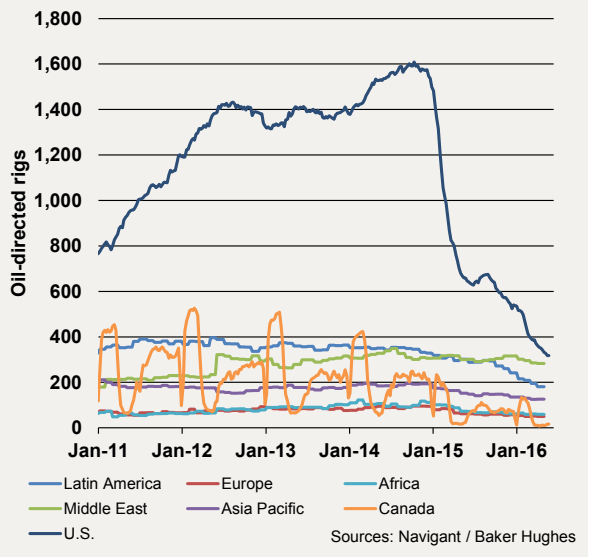
In the United States, oil production fell by 3% over the year to an estimated 12.6 million barrels per day in March 2016.

OIL PRODUCTION IN KEY U.S. REGIONS



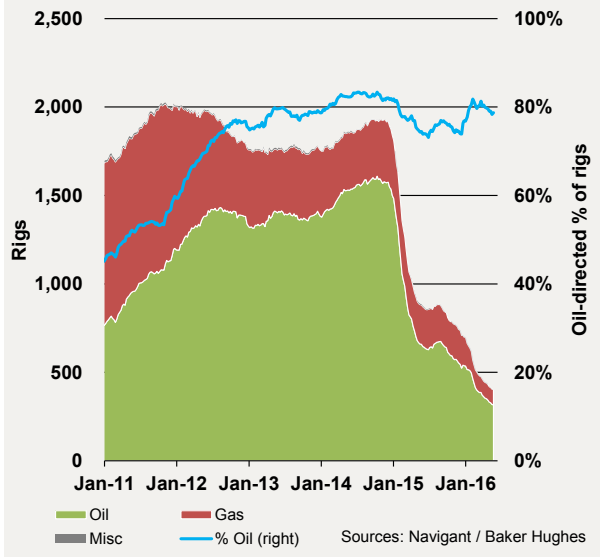
In April 2016, oil production stayed above 2 million barrels per day in the Permian but continued to drop in other major regions. Eagle Ford is down 23% from its peak a year ago.

OIL-DIRECTED RIG COUNT BY REGION



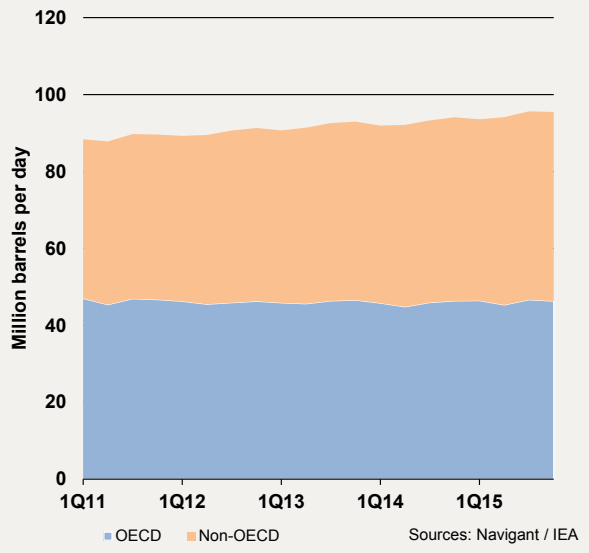
Rig counts have continued to respond downwards to oil prices. The U.S. hit a fresh low of 318 oil rigs in May, a level last seen in October 2009.

U.S. RIG COUNT



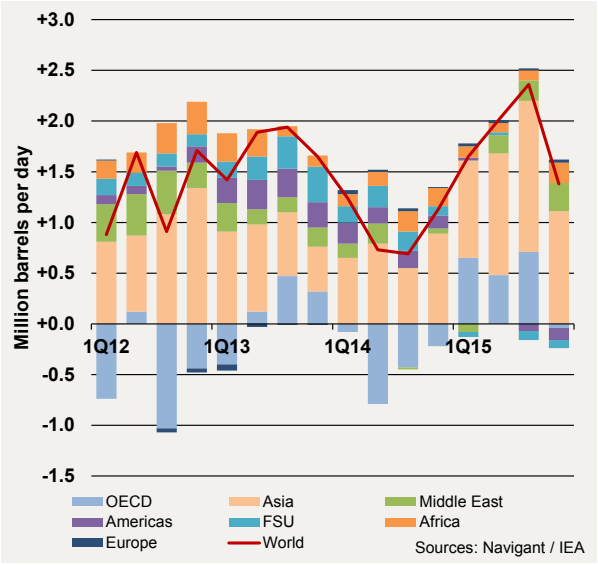
79% of U.S. rigs were oil-directed in May 2016.

OECD & NON-OECD OIL CONSUMPTION



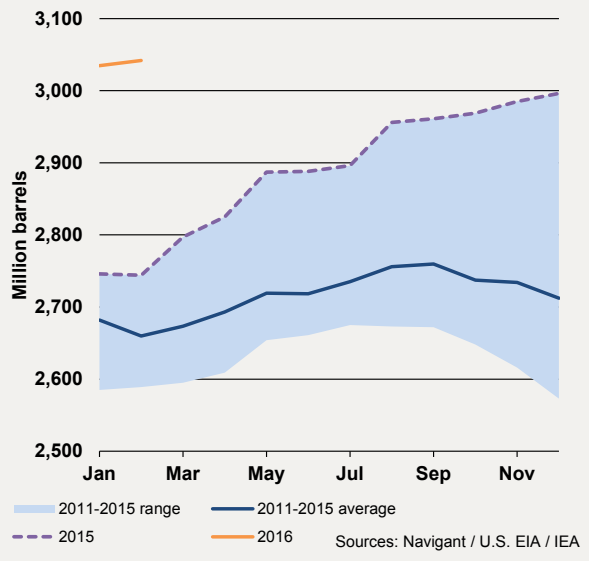
Global oil consumption increased from 94.1 million barrels per day in Q4 2014 to an estimated 95.5 million barrels per day in Q4 2015, of which 49% was consumed by OECD countries.

YEAR-ON-YEAR CHANGE IN OIL CONSUMPTION



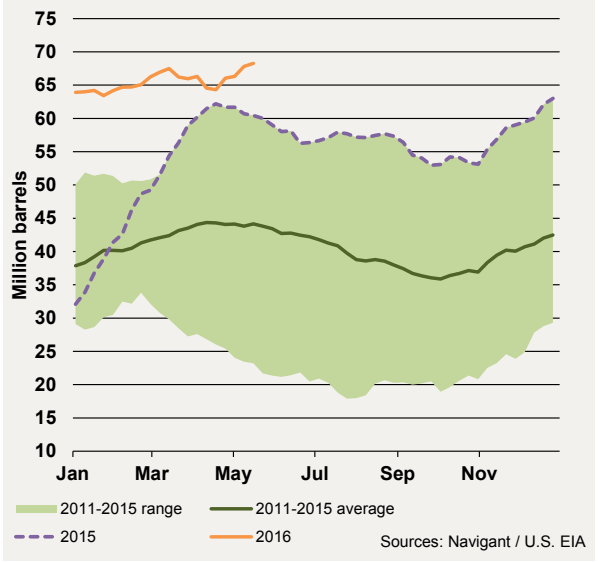
Oil demand growth in recent years has been led by non-OECD countries, particularly in Asia.

OECD COMMERCIAL STOCKS OF CRUDE & PRODUCTS



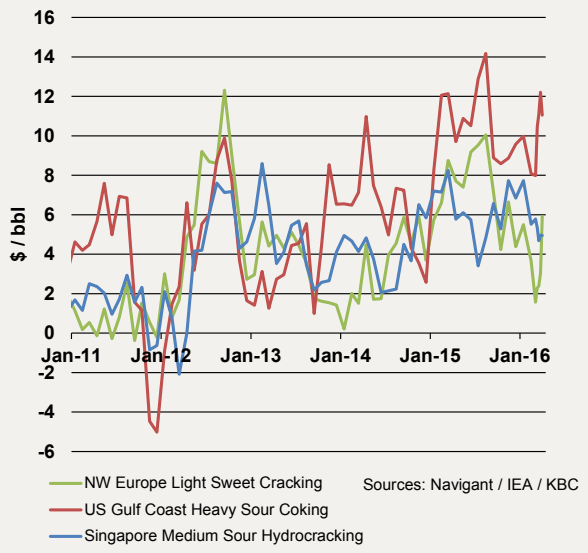
OECD commercial inventories reached an estimated 3,042 million barrels of crude and products in February 2016, 14% above the 2011-15 average.

CRUDE STOCKS AT CUSHING, OKLAHOMA



In May 2016, crude inventories at the Cushing hub stood at 68.3 million barrels, 55% above the 2011-15 average.

INDICATIVE REFINING MARGINS

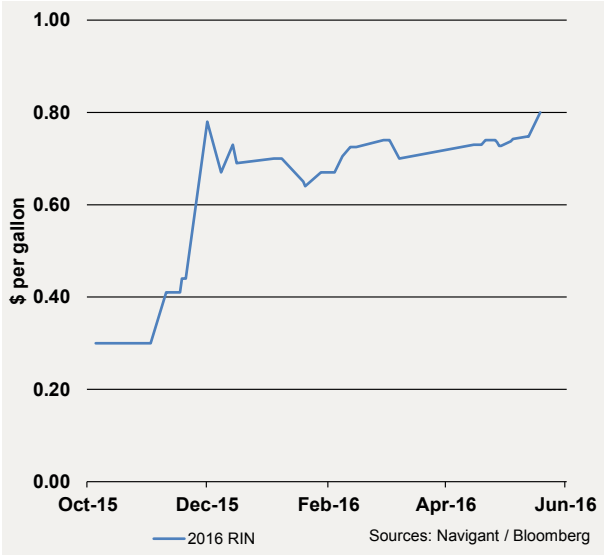


In April 2016, indicative refining margins were $5.91/bbl for NWE light sweet cracking, $11.05/bbl for USGC heavy sour coking and $4.95/bbl for Singapore medium sour hydrocracking.

EU CARBON ALLOWANCE PRICES

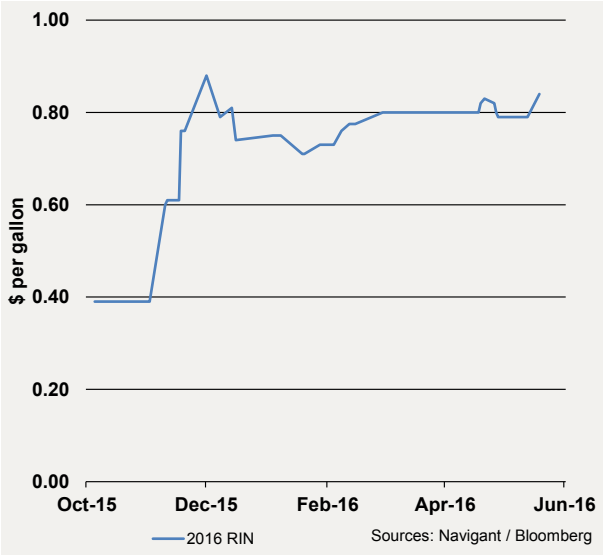
EU carbon prices have retreated from the highs of Q4 2015.

U.S. ETHANOL RIN PRICES



Ethanol RINs have been trading between 65 and 80 cents per gallon in 2016.

U.S. BIODIESEL RIN PRICES



Biodiesel RINs have been trading between 70 and 85 cents per gallon in 2016.

United States Regulatory

SOUTHWEST

FERC Approves Comanche Trail Pipeline to Mexico

On May 19, the Federal Energy Regulatory Commission granted a presidential permit and authorization to construct and operate Energy Transfer Partners' proposed Comanche Trail Pipeline, with a border crossing into Mexico at San Elizario. The project would provide for 1.1 Bcfd of pipeline capacity, and include an intrastate portion linking the Waha hub in Texas to the San Elizario border crossing.

NORTHEAST/APPALACHIA

FERC Issues EIS Schedule for NEXUS Project

On May 17, FERC issued a schedule for environmental review for the NEXUS gas transmission project. The schedule anticipates the issuance of a final EIS on November 30, 2016, with the 90-day decision deadline being February 28, 2017. The NEXUS project includes 36-inch pipeline to be built in Ohio and Michigan to bring Appalachian gas supplies to upper Midwest and Canadian markets. The project would provide 1.5 Bcfd of additional pipeline capacity.

FLORIDA

Florida Supreme Court Invalidates FPL Gas Asset Acquisition

According to the Miami Herald, on May 19 the Florida Supreme Court overruled a decision by the Florida Public Service Commission to allow speculative gas asset acquisition, including those using hydraulic fracturing. Citing the PSC order as an overreach without legislative approval, the court invalidated the acquisition and $750 million per year cost pass-through by a 6-1 vote. The Woodford Gas Reserves Project was a joint venture between FPL and Oklahoma-based PetroQuest Energy Inc.

BRITISH COLUMBIA

FortisBC to Supply LNG To Hawaiian Electric

On May 19, Fortis Inc. announced its execution of an agreement with Hawaiian Electric Company to provide liquefied natural gas for electric generation purposes. The 20-year agreement for annual deliveries of 800,000 metric tons of LNG from FortisBC's Tillbury liquefaction plant, starting in 2021. The agreement will require increased capacity at the Tillbury facility, set to commence in 2018. Hawaiian Electric has stated that the LNG supplies will reduce its oil imports for electric generation by 80 percent.

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