Testimony to US Senate Committee on Energy and Natural Resources

By Faisel Khan

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Opening Remarks

Chairman Wyden, Ranking Member Murkowski, and distinguished members of the Committee, my name is Faisal Khan and I am a Managing Director at Citigroup working in the Equity Research Department. My primary responsibilities include the fundamental research and analysis of the integrated oil, refining and pipeline industries in North America. I am honored to be here today to testify on how U.S. gas and fuel prices are being affected by the current boom in domestic oil production and the restructuring of the U.S. refining industry and distribution system.

Independent Refiners

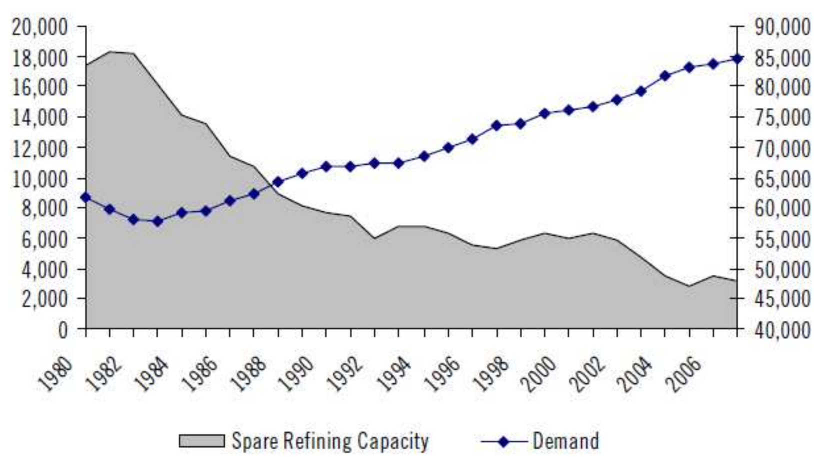
Historically, refineries have been considered part of the integrated oil supply chain. As oil was discovered, producers felt the need to integrate their supply with the product market (gasoline and distillate) through refineries and retail stations. However, as the industry became increasingly competitive over the last few decades, there has been less of a need to be integrated. The result has been the emergence of a major independent refining industry.

While the refining industry is clearly attached to the energy industry, the mechanics of the industry are more like other industrial and manufacturing sectors in the US rather than primary energy producers. Generally, independent refiners do not have control over their input costs and product prices. Refiners are price takers on both ends of the barrel. Their costs, crude oil, are priced in the global market and the products, gasoline and diesel, are similarly priced. We therefore look at the independent refining industry as a major industrial sector that is deeply cyclical and deeply seasonal (seasonality of gasoline and diesel demand). Margins and not the notional price of crude oil drive their profitability.

Industry Background

For almost the entire decade of the 1990's refiners did not make their cost of capital and actually destroyed value for shareholders. There existed a tremendous amount of overcapacity in the system throughout all the 80's and most of the 90's. During this time, capacity was rationalized and demand grew steadily bringing the market into balance by the time of the millennium.

Figure 1. Refining Spare Capacity

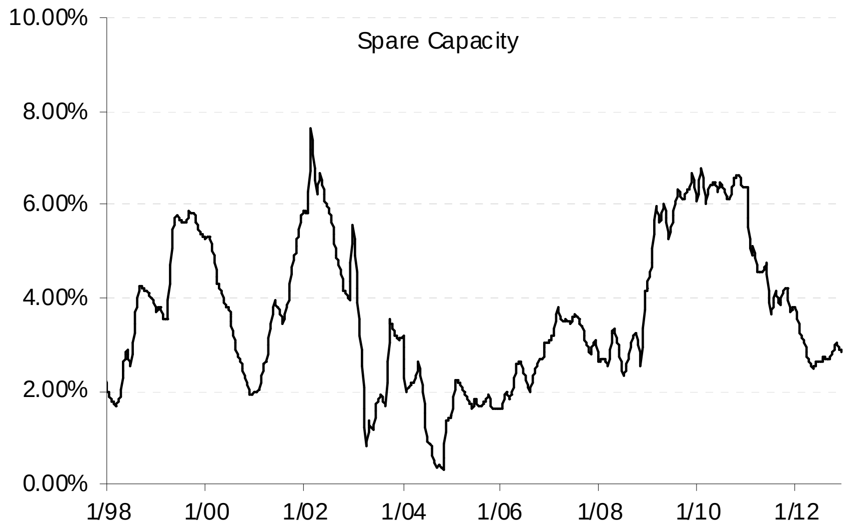


Source: Citi Research, EIA, Oil & Gas Journal

Starting in 2000, global refining capacity began to tighten. Major oil companies began to shed their refineries after major consolidation. Environmental costs also escalated as gasoline specifications became more rigid. During this time, independent refiners grew their market share. In 1998, 40% of refining capacity in the US was controlled by the independents. By 2008, this number had grown to 60% and today stands at 70% following the spin-off and sale of a number of refining assets from integrated and major oil companies.

The refinery shutdowns in the 80's along with growing fuels demand during the 90's in the US, China, Asia, the Middle East and Brazil brought refining supply and demand into balance in 2000. However, just as we turned to a new millennium, oil supply began to disappoint as many OPEC countries did not deliver on new supply to the market. Therefore, just as refining was coming into balance, oil prices started to rise, pushing gasoline prices to levels that had not been since the late 70's.

Figure 2. OPEC Spare Capacity



Source: Citi Research, OPEC, IEA

During most of the last decade (2000-2010), refiners earned healthy margins as overall global refining utilization approached 90% (2006). Generally speaking, the industry requires 15% extra capacity for adequate supply of fuels to take into account major turnarounds and downtime in the industry.

The high utilization rate was a result of solid growth in gasoline and distillate demand during this decade (2000-2007) resulting in solid refining margins in 2004, 2005 and 2006. The high margins were a direct market signal to national oil companies, major integrated oil companies and independent refiners to bring more capacity to market. In this effort, there began a push to expand capacity across the entire world with the US, Asia and Middle East building new capacity. At the same time, renewable fuels such as ethanol began to enter the supply pool through the renewable fuels standard (Renewable Fuels Standard as part of the 2007 Energy Bill passed in December 2007). **So on the supply side, we began adding more refining capacity and ethanol supply just as the world was about to go into a major recession.**

Figure 3. Renewable Fuels Mandate

Year	Corn Based Ethanol (Bn Gals) RFS MANDATE	Gasoline Demand (mmbpd)	Gasoline Demand (Bn gals)	Blending Requirement (% Demand)
2006	4.0	9.23	141.5	2.8%
2007	4.7	9.29	142.3	3.3%
2008	9.0	9.01	138.6	6.5%
2009	10.5	9.00	137.9	7.6%
2010	12.0	8.99	137.9	8.7%
2011	12.6	8.75	134.2	9.4%
2012	13.2	8.73	134.1	9.8%
2013	13.8	8.67	132.9	10.4%
2014	14.4	8.64	132.4	10.9%
2015	15.0	8.61	132.0	11.4%
2016	15.0	8.50	130.6	11.5%
2017	15.0	8.38	128.5	11.7%
2018	15.0	8.27	126.8	11.8%
2019	15.0	8.16	125.1	12.0%
2020	15.0	8.05	123.7	12.1%

Source: Citi Research, EIA

On the demand side, the high price of oil (hitting nearly $150 per barrel in 2008) became a tax on the consumer resulting in some price elasticity in 2007-2008 (wholesale gasoline prices were $3.52 per gallon in the middle of 2008 or about $4.25 a gallon at the pump). Furthermore, increased CAFÉ standards in the US and demand for more fuel efficient cars from global consumers became a headwind for demand. **We currently estimate gasoline demand could contract by a further 600 mb/d through the end of this decade just using the current CAFÉ standards.**

Figure 4. Impact of CAFÉ standards on Gasoline Demand

Estimated Vehicle Fleet (Light Truck and Car) through 2020														
New Vehicle Standard (100%)	**25.3**	**25.4**	**25.6**	**25.8**	**27.4**	**29.3**	**30.4**	**31.1**	**32.2**	**33.9**	**34.7**	**35.8**	**36.7**	**37.9**
Model Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
2007 and Prior	235.7	222.1	209.8	198.2	186.7	175.0	163.2	151.4	139.6	127.6	115.6	103.6	91.5	79.3
2008 Fleet		16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
2009 Fleet			13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
2010 Fleet				11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
2011 Fleet					16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
2012 Fleet						16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2013 Fleet							16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
2014 Fleet								16.9	16.9	16.9	16.9	16.9	16.9	16.9
2015 Fleet									17.0	17.0	17.0	17.0	17.0	17.0
2016 Fleet										17.1	17.1	17.1	17.1	17.1
2017 Fleet											17.2	17.2	17.2	17.2
2018 Fleet												17.3	17.3	17.3
2019 Fleet													17.4	17.4
2020 Fleet														17.5
Total	235.7	238.6	240.1	240.1	245.3	250.3	255.4	260.5	265.6	270.8	276.0	281.2	286.5	291.8
Vehicle Retirements		13.6	12.2	11.6	11.5	11.7	11.8	11.8	11.9	11.9	12.0	12.0	12.1	12.2
VehicleAdditions		16.5	13.8	11.6	16.8	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5
MPG of Fleet (CIRA)	**18.7**	**19.4**	**19.4**	**19.3**	**19.2**	**21.1**	**21.8**	**22.6**	**23.4**	**24.2**	**25.1**	**26.1**	**27.0**	**28.0**
Demand in mmBBls/day	**9.29**	**9.01**	**9.00**	**8.99**	**8.75**	**8.73**	**8.67**	**8.64**	**8.61**	**8.50**	**8.38**	**8.27**	**8.16**	**8.05**

Source: Citi Research, DOT, EIA

With the world in the midst of a major recession in late 2008, all of 2009 and part of 2010 (wholesale gasoline prices dropped to $1.00 per gallon in early 2009 or about $1.75 per gallon at the pump), **increased supply of refined product from new capacity and ethanol caused the industry to fall on difficult times with many questioning whether some companies would remain solvent.**

In 2010, 2011 and for part of last year, refiners began shutting down older, less competitive refineries in order to improve the supply demand balance of refined products in the global markets. Capacity was shutdown in the US, Europe and Japan. Even today capacity continues to be shut in Japan, Australia and North America. Furthermore, the delay in new refining capacity in Latin America, the shutdown of European refining capacity and a solid economic recovery in Latin America caused refined product (both diesel and gasoline) exports out of the US to surge.

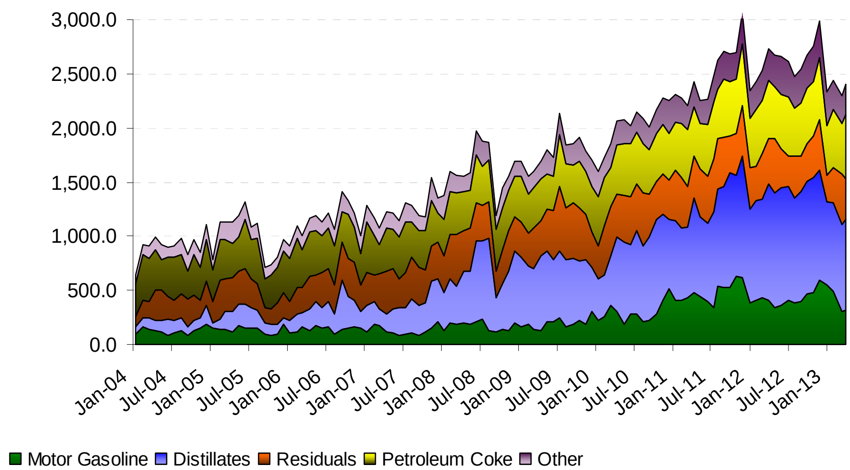
Figure 5. Global Refining Utilization Including Closures and New Supply

	2007	2008	2009	2010	2011	2012E	2013E	2014E	2015E
Refining Capacity (Start) (mmbpd)	**85.2**	**85.2**	**85.6**	**87.0**	**87.8**	**87.4**	**87.5**	**88.6**	**89.7**
Additions			1.9	1.6	0.9	1.4	1.8	1.6	1.3
Closures			(0.6)	(0.7)	(1.3)	(1.4)	(0.6)	(0.5)	(0.2)
Refining Capacity (End) (mmbpd)	**85.2**	**85.6**	**87.0**	**87.8**	**87.4**	**87.5**	**88.6**	**89.7**	**90.9**
Growth in Refining Capacity		*0.5%*	*1.6%*	*1.0%*	*-0.5%*	*0.1%*	*1.3%*	*1.3%*	*1.3%*
Global Oil Demand	85.80	86.13	84.98	88.30	88.95	89.79	90.60	91.82	93.16
Assumed Demand Growth		*0.4%*	*-1.3%*	*3.9%*	*0.7%*	*0.9%*	*0.9%*	*1.3%*	*1.5%*
Estimated Crude Runs	73.7	73.0	72.3	74.3	75.0	75.1	75.9	77.1	78.4
Capacity Utilization (%)	**86.5%**	**85.3%**	**83.1%**	**84.6%**	**85.8%**	**85.8%**	**85.6%**	**85.9%**	**86.3%**
Refinery Upgrades (MBD)					0.19	0.00	0.16	0.08	-

Source: Citi Research

The recent surge in exports has certainly opened a new avenue of business for domestic refiners. For most of the last decade (2000-2007), product exports from the US to other parts of the world remained fairly range-bound between 900mb/d to 1.2mmb/d. Imports of refined product were in fact much higher at 2.1mmb/d. However, following the great recession and the increase in fuel efficiency in the US, our country had too much refining capacity and these refineries needed to find other markets for their product or risk being shutdown. At the same time, the market expected refining capacity in the US to get rationalized because newer capacity in Asia was threatening to push more refined products into the US**. However, lower natural gas prices and therefore cheaper hydrogen enabled US refineries to move down the global cost curve to become more competitive.** The US is now exporting between 2.6-2.9mmbls/d of refined products - more than doubling exports to the rest of the world. Last year, product imports were 640mb/d.

Figure 6. Refined Product Exports



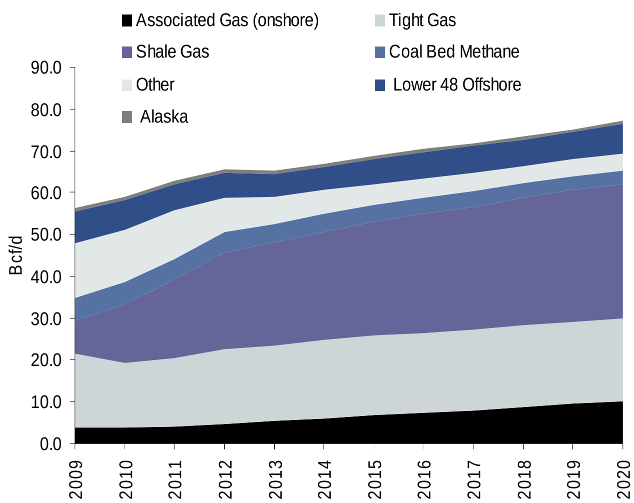
Source: Citi Research, EIA

The Hydrocarbon Production Boom in the US & Canada

US Production

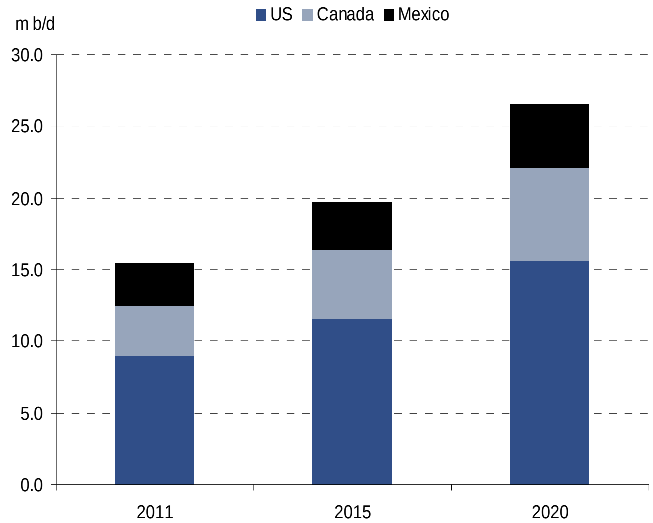
The discovery of shale gas in the US during the last decade by US independent oil and gas companies resulted in robust natural gas supply growth over the last several years. These new discoveries were the result of a technology shock. New methods in natural gas extraction resulted in a significant increase in supply and therefore a large reduction in domestic natural gas prices. During most of the last decade, natural gas prices in the US were higher than that of Europe (2000-2010). This changed with the discovery of shale gas which made US energy intensive industries highly competitive, refining included. We estimate natural gas supply could grow 10%-15% through the decade.

Figure 7. US Natural Gas Supply Estimate



Source: Citi Research

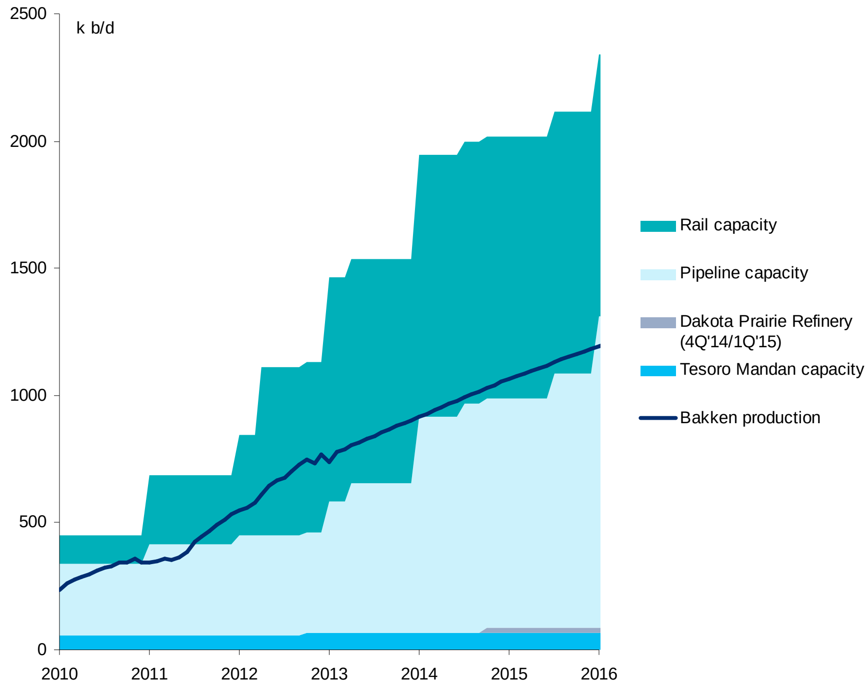
Figure 8. North American Crude Oil Supply



Source: Citi Research

The technology advancements in shale gas began to spill over into oil in the last five years. The industry figured out how to access oil from shale and tight formations more economically. This technology combined with high sustained oil prices resulted in increased oil production from unconventional sources of oil. Oil production has now grown by 2.8 mmbd since bottoming out at 4.4 mmbd in 2008. The Bakken is a clear example of the technological break through with production growing from 300 mbd to 780 mbd over the last few years. The Eagle Ford in South Texas, the Niobrara in Colorado, the Utica in Ohio, the Permian in New Mexico and Texas and finally the Monterey in California are all shale formation and/or basins that are or could contribute to the continued growth in oil production. We estimate total US crude oil production could reach 9.0 mmbd by the end of this decade (currently 7.3 mmbd).

Figure 9. Bakken Oil Production & Transportation Takeaway Capacity



Source: Citi Research

Canadian Oil Production

Over the last several years, oil production in Canada has grown while Canadian refinery demand has remained flat, driving increasing exports into the US, mainly into the Midwest. In the next 18-36 months, heavy-sour Canadian crude should make its way via new pipelines to the US Gulf Coast in increasing abundance, while a surplus of heavy-sour crude from Canada should move from the US Midcontinent to the US Gulf Coast. We estimate this increased supply from Canada will put pressure to back out medium and heavy crude oil imports from Saudi Arabia, Iraq, and Kuwait in the Middle East as well as Venezuela, Colombia and Mexico in Latin America. In order for the Middle East and Latin America to maintain market share in the US, they may have to discount their crude to remain competitive.

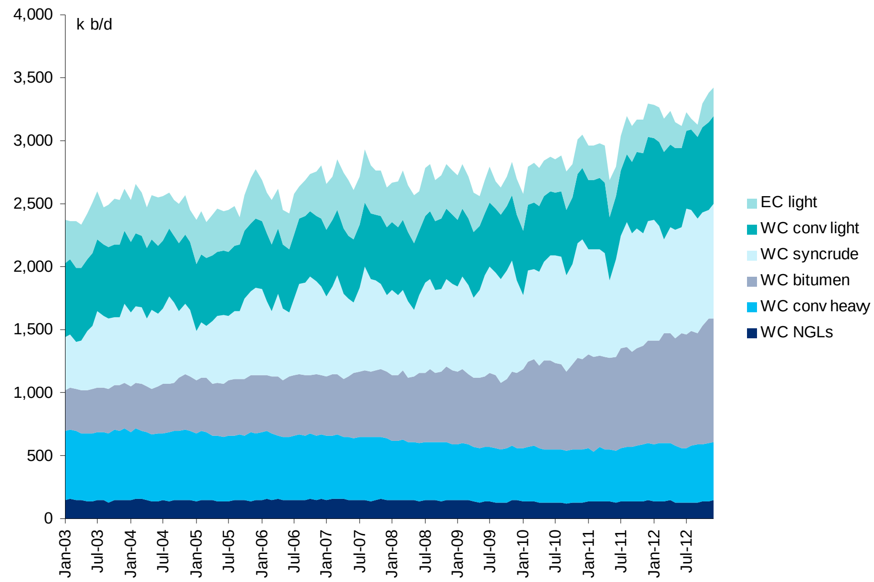
We estimate Canada could grow liquids (oil and NGLs) production from nearly 3.5 mmbd today to 6.5mmbd by the end of the decade. Canada's liquids production is a mix of oil sands, sythentic, conventional, shale and natural gas liquids. Oil sands is the main source of Canadian production growth through the decade. We expect oil sands production will contribute about 200 mb/d of growth every year for the next 10, perhaps 20, years. Canadian oil sands production could grow +1.9-mmb/d to 3.7-mmb/d from the end of 2012 to 2020. Infrastructure bottlenecks were impacting producer economics for most of 2012 and early this year, however, the discounts on Canadian crude have narrowed more recently with the ramp up of rail volumes out of Western Canada and seasonal downtime.

Takeaway capacity from Canada into the US has been challenged with the delay of Keystone XL and other pipelines running at below capacity from the Canadian border to the Midwest. However, producers appear to be shifting their production to rail and have been more aggressive lately in signing up for alternate pipeline takeaway capacity both in the US to debottleneck the Midwest and Midcontinent as well as move crude East through a partial conversion of the Canadian Mainline (natural gas). While a potential pipeline from Alberta to the Pacific has always been a goal of producers and pipeline developers, it appears political friction between British Columbia and Alberta could put those aspirations on hold forcing more crude to move:

1. by rail to the Canadian coastal markets for export;
2. into the US Midcontinent through the debottlenecking of pipeline capacity (not including Keystone XL); and
3. by a new pipeline to the Canadian East Coast (Mainline conversion).

Based on this analysis, the markets appear to be working around the delay in Keystone XL. Therefore a delay of the pipeline is unlikely to affect crude oil production growth out of Canada.

Figure 10. Canadian crude production by region and type (2003-12)

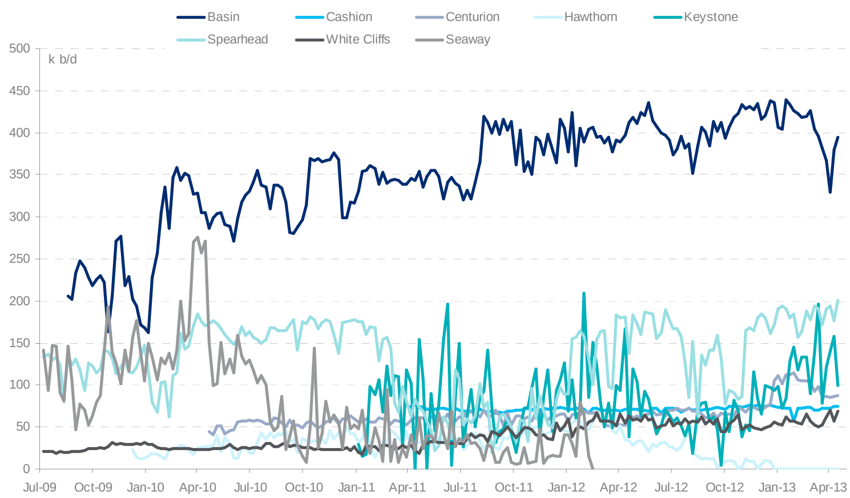


Source: NEB, Citi Research

Crude Oil Production Growth Impact to Oil Markets

With the sustained growth in crude oil from the lower 48 and continued production growth in Canada, the markets were caught off guard in 2011 and 2012. There was not enough logistics takeaway capacity (both pipeline and rail) to evacuate all the crude being produced in the interior US and Canada. Furthermore, the delay in infrastructure to move Canadian crude to the Gulf Coast only exacerbated the situation. Much of this new production ended up in inventory in Cushing and other facilities through PADD II (Petroleum Administration for Defense Districts).

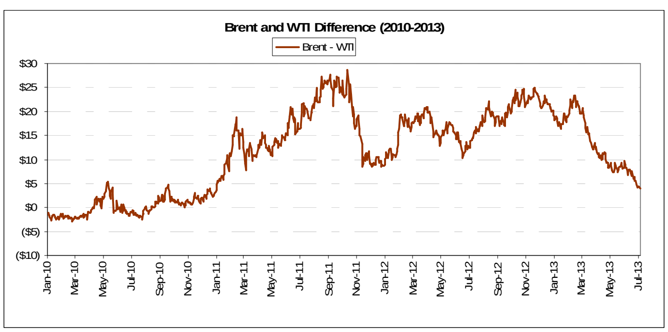
Figure 11. Flows of Crude Oil into Cushing



Source: Citi Research, EIA

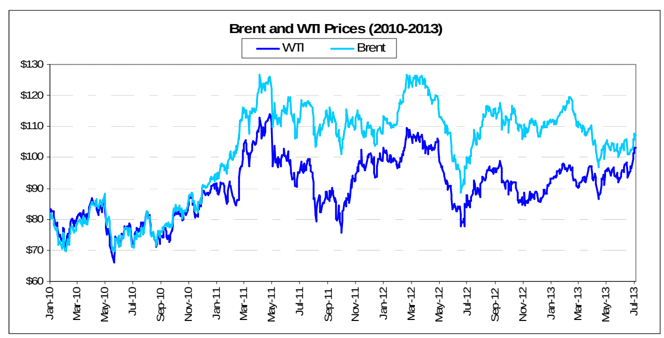
During 2011 and 2012, only 250 mbd of pipeline takeaway capacity (Cushing to Gulf Coast) was added to alleviate the bottleneck against 1.5 mmbd of production growth (US crude oil production). The combination of crude oil production growth and the lack of logistics capacity resulted in interior US crude oil benchmark pricing (WTI – West Texas Intermediate) trading to substantial discounts to international Benchmark oil prices (such as Brent oil, priced in Northwest Europe).

Figure 12. Brent-WTI Difference



Source: Bloomberg

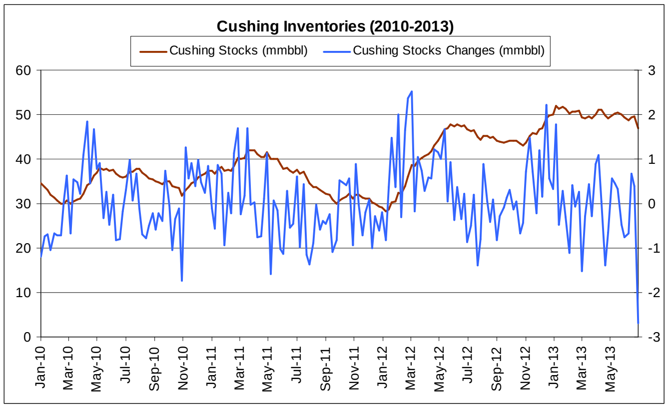
Figure 13. Brent and WTI Prices



Source: Bloomberg

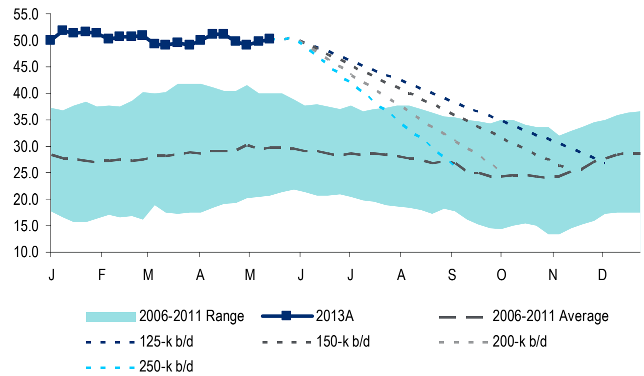
At the peak of the bottleneck, the benchmark US interior crude oil price (WTI) traded at $28 per barrel discount to waterborne prices (Brent). Canadian crude price discounts actually faired much worse at over $40 per barrel versus similar waterborne crudes.

Figure 14. Cushing Inventories



Source: Citi Research, EIA

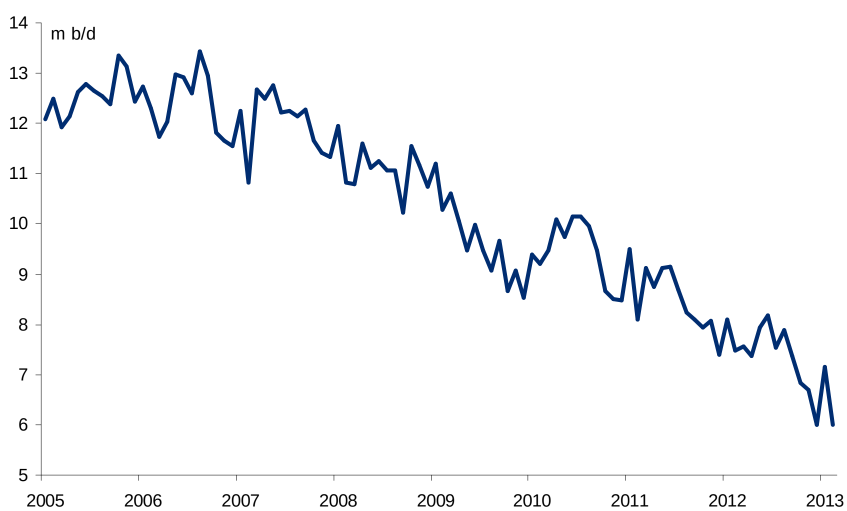
Figure 15. Citi Forecasted Cushing Inventories



Source: Citi Research, EIA

With pipelines taking longer to get done, rail quickly picked up the slack with producers and refiners now moving nearly 400,000 car loads (annualized for 1Q'13) of crude oil this year compared to 9,500 car loads in 2008 (according to the Association of American Rail Roads) . Producers and pipeline owners have been working on new projects to alleviate the bottlenecks. Large pipeline companies have been working with Canadian producers to find new ways around the constraints that existed in 2011 and 2012. Smaller US pipeline companies have been working with producers in the lower 48 to move crude to the Gulf Coast. These projects are just starting to contribute to crude oil being evacuated to the coastal markets resulting in the continued reduction in crude oil imports. From 2005 to 2013, US imports of crude oil have nearly been cut in half (graph below).

Figure 16. Crude Oil Imports

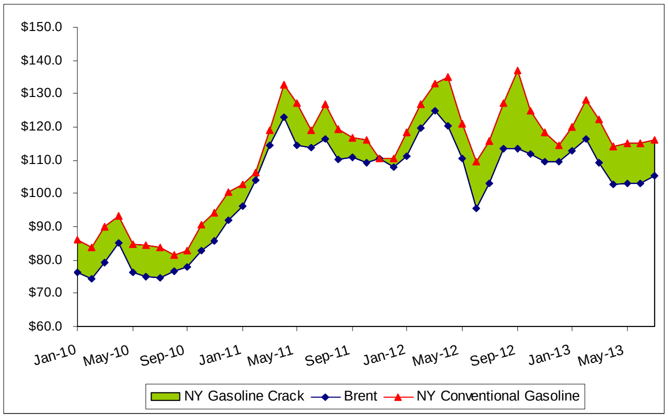


Source: Citi Research, EIA, IEA

The refining industry has seen a massive shift in its crude purchases. The industry used to move crude by tanker from international sources and then by pipeline into the interior US. Almost all this international crude has stopped moving into the Midcontinent, Midwest and Rockies refining systems. **It has been replaced by domestic and Canadian crude.** Pipelines that used to run crude from the Gulf Coast to the interior US have had to be reversed and many existing pipelines now run at reduced capacity.

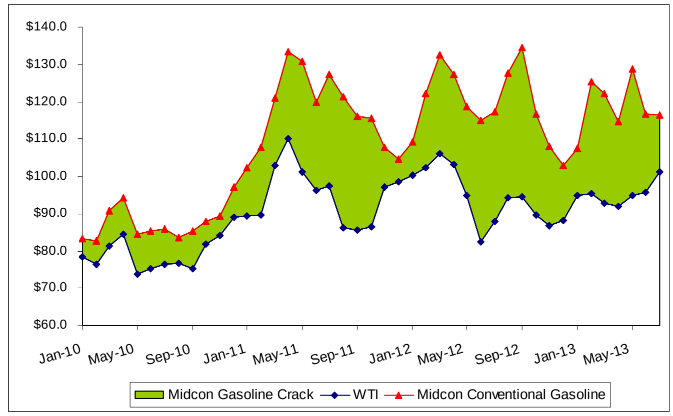
The benefits of these crude discounts mostly flowed to interior US refining capacity which makes up about ~20% of total US capacity. However, as we've seen more recently, these discounts have compressed. Market signals allowed producers, refiners and pipeline developers to bring more logistics capacity to market.

Figure 17. Gasoline Prices & Margins in the Northeast ($/barrel)



Source: Citi Research, Bloomberg

Figure 18. Gasoline Prices & Margins in the Midcontinent ($/barrel)



Source: Citi Research, Bloomberg

With more crude now hitting the Gulf Coast from the interior US by pipeline, differentials are starting to collapse. Canadian crude is also making its way to the Gulf Coast by barge and in small quantities by pipeline. With international crude prices holding firm, interior US benchmarked crude have finally caught up in the last nine months moving from $88 per barrel in 4Q'12 to $105 per barrel last week. International benchmark crude oil prices are actually down. At these prices, we continue to see US and Canadian producers highly incentivized to grow production. **Citi's view is that continued growth in North American oil production will put pressure on international benchmark prices.**

Figure 19. Pipeline Capacity Additions (mb/d)

Inflows to Cushing	From	4Q'12	1Q'13	2Q'13	3Q'13	4Q'13	1Q'14	2Q'14	3Q'14	4Q'14	2015
Basin	Permian Basin	450	450	450	450	450	450	450	450	450	450
Keystone	Steele City, NE	400	400	400	400	400	400	400	400	400	830
Spearhead	Wood River, IL	190	190	190	190	190	190	190	190	190	190
Centurion North	Permian Basin	90	90	90	90	90	90	90	90	90	90
Hawthorn	Stroud, OK	90	90	90	90	90	90	90	90	90	90
SemGroup White Cliffs	DJ Basin, CO	70	70	70	70	70	70	150	150	150	150
Blue Knight Energy Partners	Local	25	25	25	25	25	25	25	25	25	25
Great Salt Plains	Cherokee, OK	20	20	20	20	20	20	20	20	20	20
PAA Mississippian Lime	Miss. Lime, OK				150	150	150	150	150	150	150
SemGroup Gavilon	Gavilon, OK					140	140	140	140	140	140
Enbridge Flanagan South	Patoka, IL								585	585	585
Kinder Morgan Pony Express	Guernsey, WY								220	220	220
Total inflow capacity		**1335**	**1335**	**1335**	**1485**	**1625**	**1625**	**1705**	**2510**	**2510**	**2940**

Outflows from Cushing	To										
Local refineries (at 90% util.)		402	402	402	402	402	402	402	402	402	402
Ozark	Wood River, IL	215	215	215	215	215	215	215	215	215	215
BP1	Whiting, IN	175	175	175	175	175	175	175	175	175	175
Osage	El Dorado, KS	135	135	135	135	135	135	135	135	135	135
Centurion South	Permian Basin	60	60	60	60	60	60	60	60	60	60
Seaway	USGC	150	400	400	400	400	850	850	850	850	850
Keystone XL southern leg	USGC					700	700	700	700	700	830
Total outflow capacity		**1137**	**1387**	**1387**	**1387**	**2087**	**2537**	**2537**	**2537**	**2537**	**2667**
Surplus outflow capacity (deficit)		**-198**	**52**	**52**	**-98**	**462**	**912**	**832**	**27**	**27**	**-273**

Source: Citi Research, Company Reports

In Citi Research's view, pipeline and tanker shipping constraints, such as the Jones Act, only serve to slow down the influence of US oil production growth on the global oil markets. Furthermore, the higher shipping costs of Jones Act tankers has the effect of increasing gasoline prices particularly in the Northeast where product imports are critical in meeting demand. In our view, pipelines and tankers continue to be the safest and most efficient means to deliver crude to market with rail used as a medium to deliver crude from stranded locations or to refineries that may not have access to pipeline or port capacity.

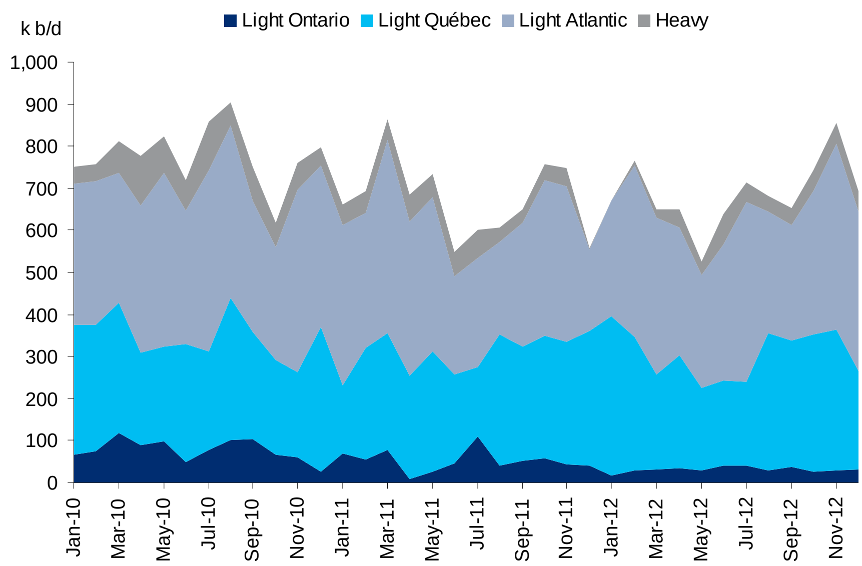
Aside: Shipping crude or product from the US Gulf Coast to ports on the East or West Coast falls under the Jones Act, which would require that the goods be carried on US flag vessels, constructed in the US, owned by US citizens and crewed by US citizens and permanent residents. There are very few US flagged vessels available for these purposes.

According to the Manhattan Institute of Policy research, moving crude by rail and truck have much higher incident rates than pipelines. Rail has almost 4x the incident rate and road has almost 40x the rate of pipelines.

Crude Oil Exports

With US imports of crude oil continuing to fall, we are already starting to see the constraints on the refining complex's ability to absorb all the light sweet crude being produced in the US. Over the last two and half years we have seen price discounts on domestic crude oil of over 20% as a result of volumetric constraints on the logistics systems. However, we could be entering a period of quality constraints as US refiners reach their maximum intake of light sweet crude. We believe we are seeing this in the Gulf Coast where Eagle Ford crude is now being shipped from Corpus Christi to Eastern Canada.

Figure 20. Eastern Canada crude imports by quality (2010-12)



Source: NEB, Citi Research

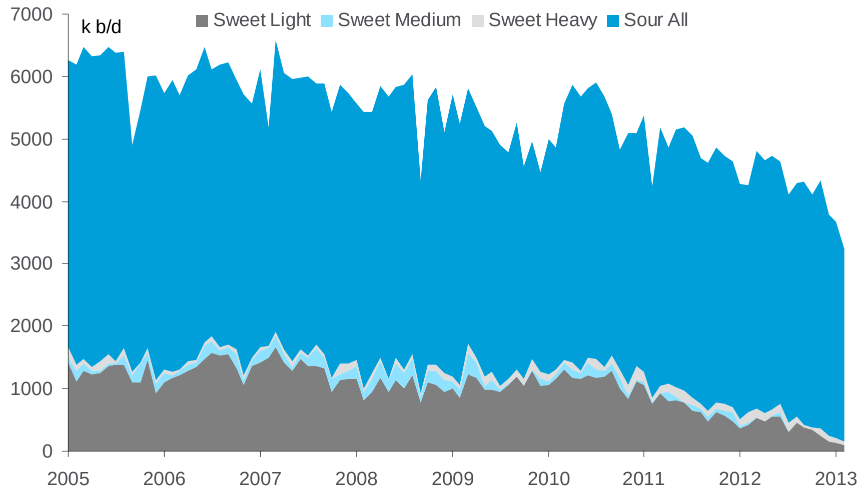
We estimate the Canadian Northeast has the ability to consume up to 800 mb/d of US light sweet crude. Crude can be shipped from the US to Canada by a non-Jones Tanker. Furthermore, because Canadian crude has no export constraints, producers are most likely to export crude out of Canada at better netbacks rather than compete with US crude that will be shipped to the Canadian Northeast at discounts to global benchmarks.

Other export outlets potentially exist to Mexico and to countries with which the US has free trade agreements with. Singapore and Korea are countries the US has a free trade agreement with and have large refining industries.

Gasoline and Distillate Markets

With crude oil production clearly on a trend to grow, the question has often been asked: **Why is all this production growth not driving down gasoline prices?** Since the US still imports crude oil and exports refined product, US refined product prices are connected to global gasoline and diesel markets (minus transportation). In addition, crude oil prices in the US are likely to remain linked to global markets minus the cost of transportation and logistics. **We estimate it would take several more years for the US to reach crude oil independence without significant substitution affects.**

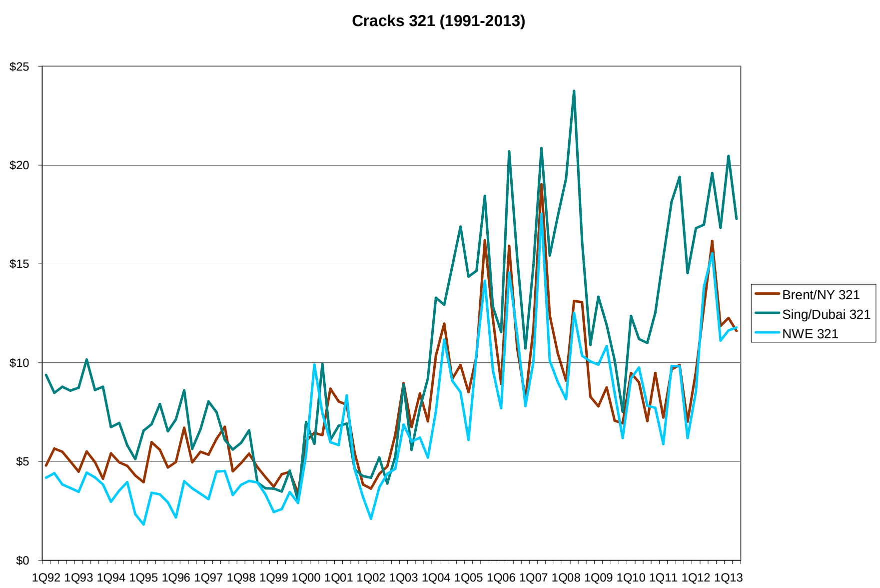
Figure 21. Gulf Coast Imports of Crude Oil (mb/d)



Source: Citi Research, EIA

For the last few decades, global product prices have remained linked with prices in Asia generally being higher than that of the US and Europe.

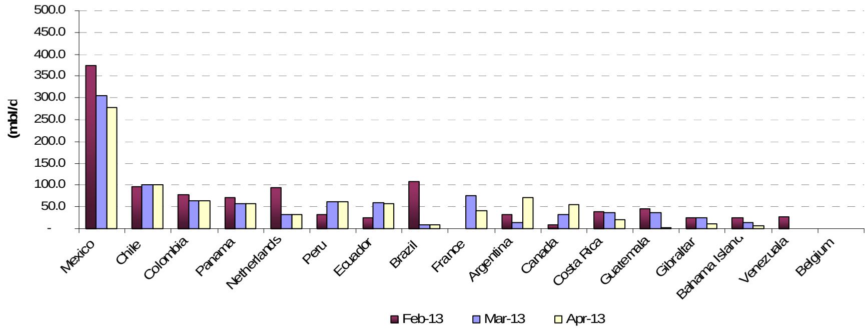
Figure 22. Global Refining Margins (mb/d)



Source: Citi Research, Bloomberg

With US gasoline consumption continuing to decline, excess gasoline production has been moving increasingly to Latin America. Given the limited amount of new refining capacity coming on line, we see the US continuing to deliver more gasoline to Latin America. Over the last ten years, product demand in Latin America has grown by over 150 mb/d per annum.

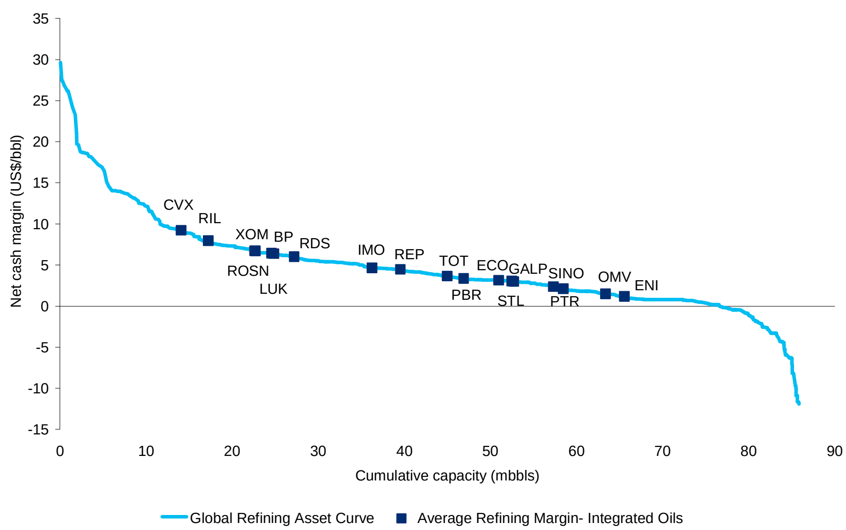
Figure 23. Exports of Refined Products (mb/d)



Source: Citi Research, EIA

Higher exports are a critical ingredient to the vitality of the US refining industry. As we've discussed, US refiners now have significant advantages when compared to their global counterparts. Lower natural gas prices in the US relative to the rest of the world and growing crude oil production put US refineries on the high end of the global margin curve. Of the 500 refineries across the world that we detail on the margin curve below, **the vast majority of US assets show up in the top quartile.**

Figure 24. Citi Global Refining Margin Curve

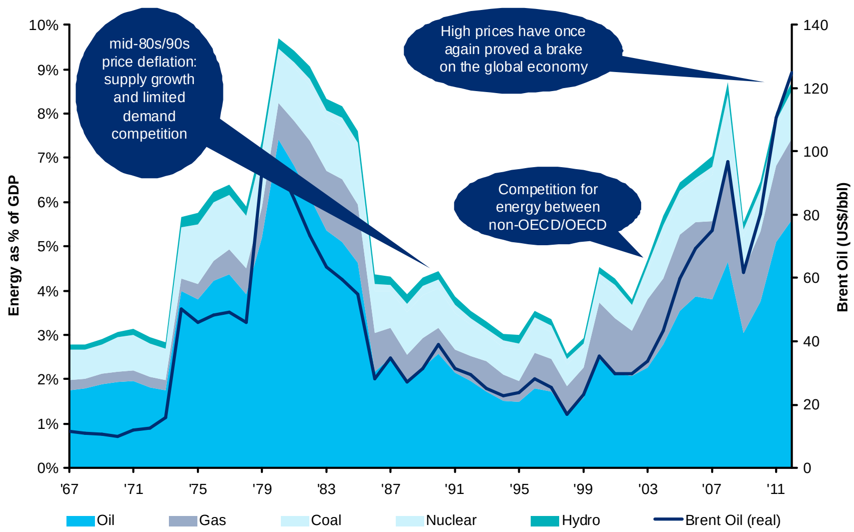


Source: Citi Research, Oil & Gas Journal

Crude Oil and Refined Product Market Threats

The rise in crude oil prices and therefore refined product prices over the last decade have resulted in global oil consumption reaching 10% of global GDP, which represents one of the highest levels we've see in more recent history.

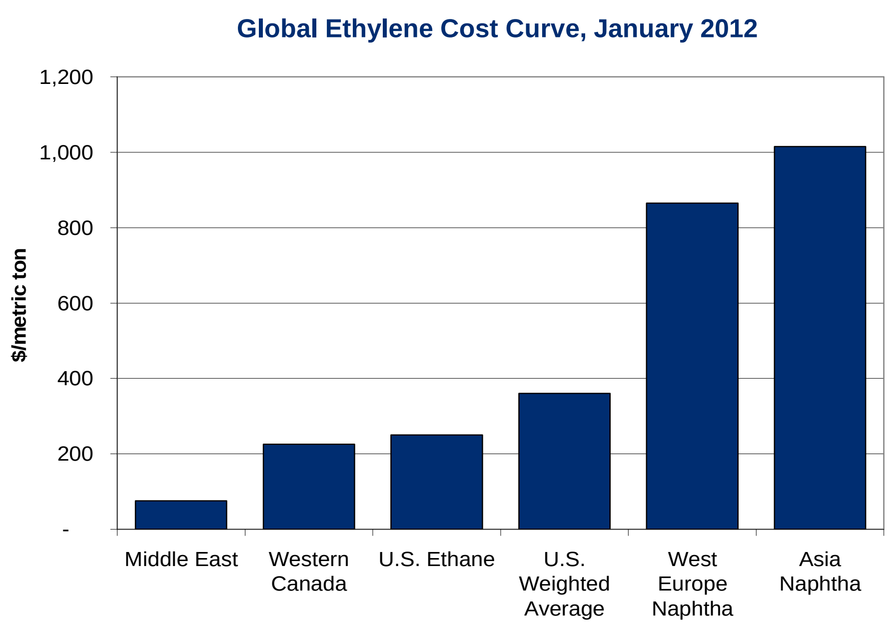
Figure 25. Energy Consumption as % of Global GDP



Source: Citi Research, IEA

The higher cost of crude and advent of new technology is resulting in the substitution of natural gas and electricity for crude oil in the US. We see this in the chemical industry where naphtha is being substituted out of the US chemical crackers in favor of ethane and propane (derivatives of natural gas production). US chemical manufactures now show up on the bottom of the cost curve.

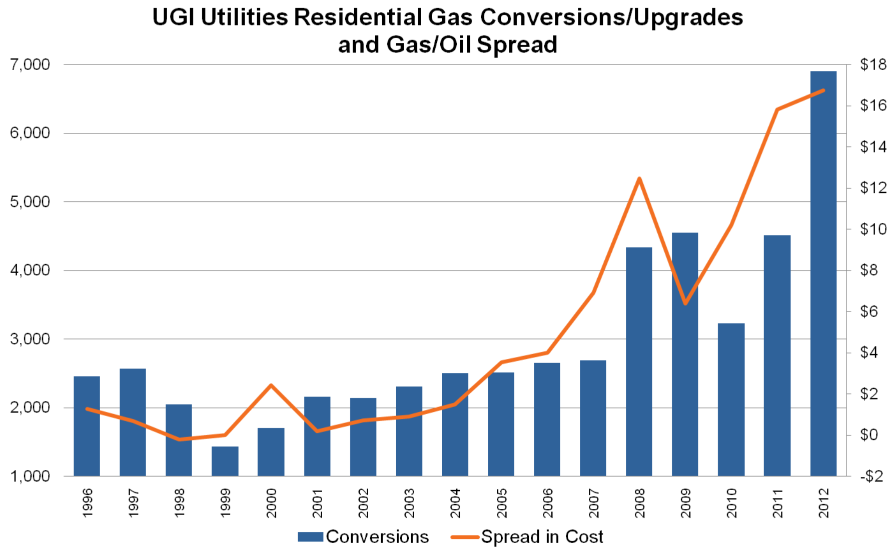
Figure 26. Chemical Margins



Source: Citi Research, CMAI

We are also seeing a substantial amount of heating oil (distillate) demand destruction in the Northeast and Mid-Atlantic where home owners are switching from heating oil to natural gas. **This momentum has the potential to substantially reduce the almost 500mbd heating oil market that exists in the US today.**

Figure 27. Heating Oil Substitution



Source: UGI Corp.

The other clear threat to the refining industry is the substitution of natural gas and electricity in the transportation sector. We are starting to see heavy duty vehicles move to natural gas. Citi estimates 50% of all refuse trucks sales are now CNG vehicles. And while the long haul trucking fleet has seen very little penetration by natural gas vehicles, Citi estimates up to 50% of heavy duty vehicle sales could be LNG and/or CNG by 2025. This assumes the current price difference between natural gas and oil carries forward into the next decade. Under this scenario, up to 1.8mmbd of distillate demand could be displaced.

We view the market penetration of natural gas into the light duty vehicle fleet to be somewhat limited. However, we do see an opportunity for electric vehicles to make up 3% of global vehicle sales by the end of this decade. Plug-in vehicles could make up another 3-4% of vehicles sales by 2020. Next generation electric vehicles could raise this market share.

The Impact of Regulation on the Industry

There are a number of key regulatory issues that have an effect on the refining industry. These issues include:

4. Environmental costs. This may include the cost of compliance with changing gasoline and distillate specifications, emissions standards and carbon costs.

5. Government Mandates. This includes the renewable fuels mandate and cost of renewable identification numbers.

6. Construction Permits. This includes permits to build pipelines and expand or retool refining capacity; and

7. Trade and shipping restrictions. This may include crude oil export permits and the Jones Act.

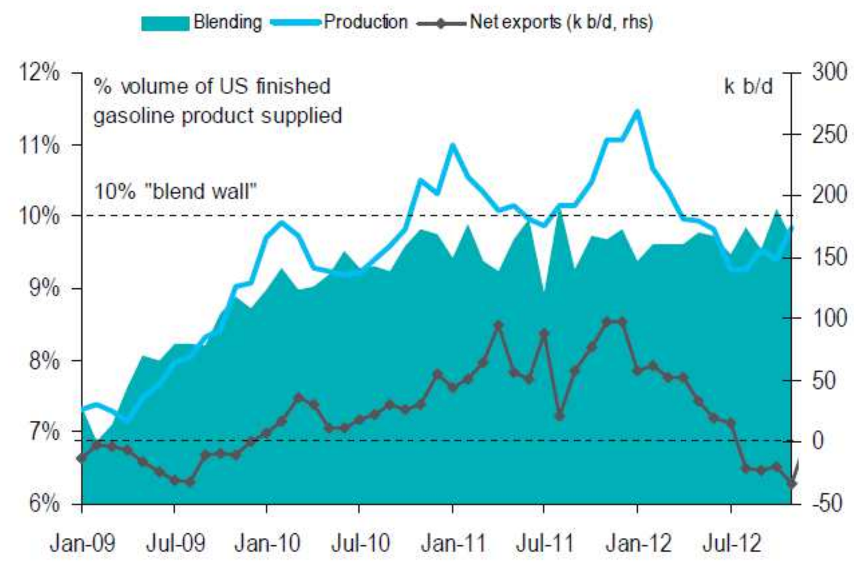
Environmental costs

Many of the fuel specification changes over the decade are now fully capitalized in the current assets of the US refiners. Many other countries are also following some of the US standards. The cost of carbon is an unknown quantity for the industry. The state of California is moving forward with its low carbon fuel standard (LCFS) program. Carbon credits in California have more than doubled over last year trading near $70/ton. This is a much higher price than Europe and could threaten the competitiveness of the industry.

Government mandates

The renewable identification numbers (RINs) has taken the industry by surprise this year. 2013 ethanol (D6) RIN prices have increased from 7¢/gal in early March 2013 to $1.10/gal this month. Blenders are hitting the "blend wall" but are still required to fulfill the RFS obligations which are higher than the "wall". The RFS-2 (the latest targets from 2007 legislation) mandates 13.8-bn gal (900-k b/d) of ethanol be blended into the gasoline pool in 2013. But with US gasoline demand at 8.7-m b/d in 2012 and declining due to higher vehicle efficiency standards, this places the blend wall at around 870-k b/d (13.4-bn gal).

Figure 28. The Blend Wall

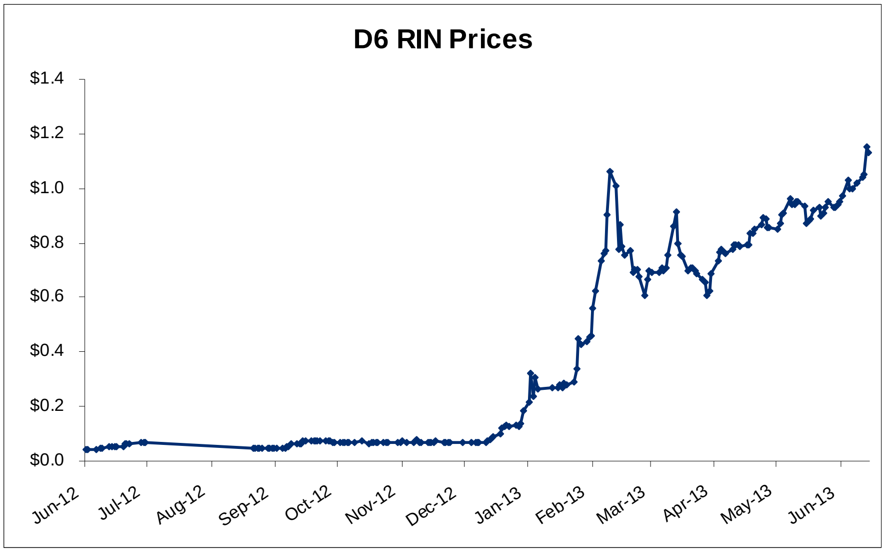


Source: Citi Research

We believe the RFS mandate had envisioned increasing gasoline demand. However, higher vehicle efficiency standards in the US are at odds with the RFS mandate. As we get closer to 2014, the RIN liability is likely to grow and it is not clear if higher RIN prices will be passed along to the retail gasoline price.

Current penalties for non-compliance are high at $32,500 per day per RIN. Refiners have some flexibility to carry a 20% deficit into the following year. One solution could be to increase the availability of E15 or E85 (increasing RIN supply), however the wide adoption of a new fuel might be difficult given the potential corrosion issues to model year cars built before 2001 (11/4/10 EPA report and www.epa.gov/otaq/regs/fuels/additive/e15) and product liability issues associated with retail distribution. Currently ~20 retail stations provide E15 in 6 states out of ~121,000 retail gasoline stations across the entire US. According to Citi Research's Agriculture analyst, corn inventories are expected to reach surplus levels for crop year 2013/2014, which would result in the cost of ethanol being much lower than gasoline (all else being equal) providing a market incentive for additional E15 stations.

Figure 29. D6 RIN Prices ($ per gallon)



Source: Citi Research, Bloomberg

We believe there are currently both winners and losers in the RIN market today, which is mitigating the impact of the RIN cost to the consumer. However, we envision a situation next year when refiners and marketers exhaust the RIN "bank". Under this situation, the entire market would be short RINs. **Under this scenario, RIN prices would most likely be passed along to the consumer and wholesale gasoline prices in the US could be higher than the rest of the world.** Therefore without the addition of more RINs to the market, the price of RINs could soar resulting in higher gasoline prices in 2014.

Our research shows that higher RIN prices this year will impact the profitability of refiners by between 5-15%. Refiners that do not blend their own gasoline production are clearly most at risk.

Aside: Buying and selling of RIN credits revolves around three distinct counterparties in what is a highly illiquid and esoteric over-the-counter (OTC) market. Obligated parties (OP)—refiners and importers—that are subject to statutory requirements set by the EPA are the largest components of market trading (physical and paper). Pure blenders that mix ethanol or biodiesel with traditional fuels are another source of RIN demand (physical and paper). Non-commercials are newer market participants which speculate on price direction and to a degree might be construed as 'liquidity providers' willing to hit a bid or lift an offer in an otherwise one-sided market (paper).

Construction Permits

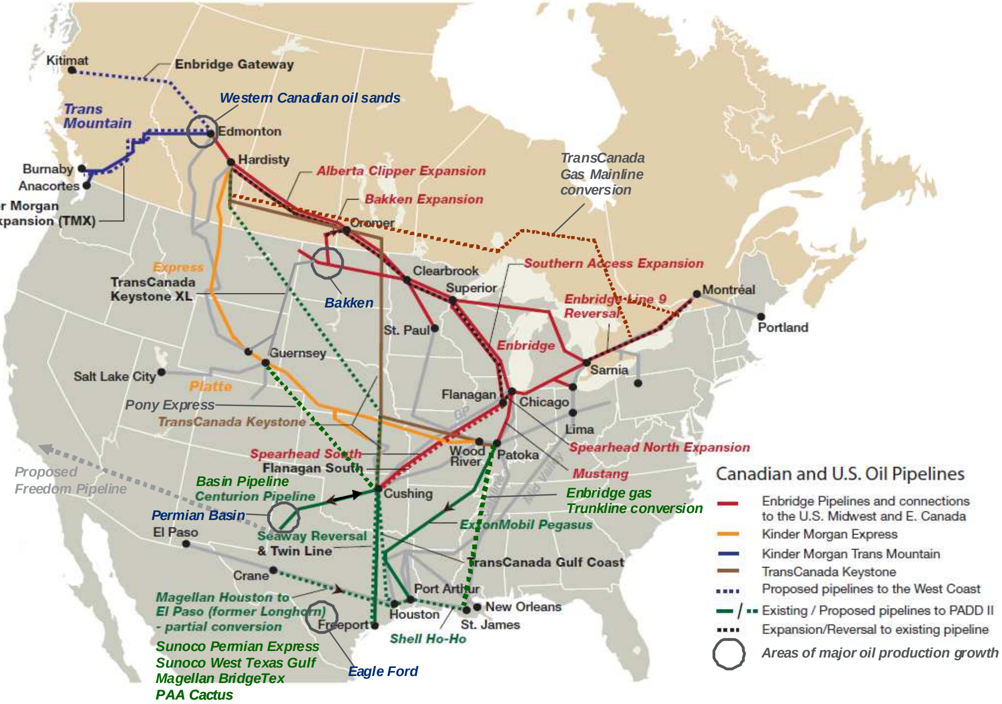
The two issues refiners and pipelines are dealing with are permits for new pipeline construction and CO2 permits to increase or retool refining capacity to absorb more light sweet crude into refineries' crude slates.

The Keystone XL pipeline is a new pipeline project that has faced unprecedented delays. I have covered the pipeline industry for 12 years and I have never seen such a long delay in pipeline construction as we have seen for Keystone. In our opinion, the delay in Keystone will not stop crude production growth in Canada and the US. The decision to delay Keystone only allows other mediums of transportation such as rail, barge and trucking to be more widely used. **Furthermore, the delay only forces producers to look at alternate pipeline routes to deliver crude to market. As more Canadian crude gets delivered to the coastal markets, it will enter the global market and the US could lose a dedicated supply source.** Finally, as more crude ends up on the rail systems of North America, the law of numbers suggests we are only likely to see more incidents. We believe the unfortunate incident that we observed in Quebec is a reminder of the consequences of moving increasing amounts of crude by rail.

Trade restrictions

As crude oil production grows and fuels demand subsides in the US, we at Citi Research believe Congress may very well have to address the issue of crude exports. Separately, the Jones Act has clearly become an impediment to moving new US crude to the coastal refineries that could use it. It also has the affect of increasing gasoline and diesel prices in the US because of the added cost of transportation. Moving crude and products from the Gulf Coast to the West Coast and East Coast requires the use of Jones Act tankers. The cost of moving crude by Jones Act tanker could be 3.0x to 6.0x the price of using non-Jones Act tankers. As we previously discussed, Canadian East Coast refineries are now delivering crude from the Gulf Coast to Canada's Northeast at much lower rates than tankers that could deliver crude to the US Northeast.

Figure 30. Major Oil Pipelines in the US and Canada



Source: CAPP

Closing Remarks

Thank you for the opportunity to testify before you today on these important issues. I look forward to answering any questions you may have.