Where

United States Crude Oil is coming from

A Charles R. Weber Reference Report
US Crude Oil Imports 2000 - 2014

1. US Crude oil imports are declining .......

2. .....and are becoming concentrated in the hands of fewer countries, in 2007 35 countries exported at least 250,000 tonnes to the US, by 2014 this had fallen to 23 countries.

These countries have become key players in supplying the US with crude oil. They have had to look for new markets for their crude oil. Much of their oil which is predominantly light and sweet, has been diverted to other areas.

Each coloured stream represents a timeline of crude oil exports to the US by an individual country.

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How the U.S. transformed its crude oil import streams
or How I learnt to stop worrying about increasing U.S. domestic crude production and embrace increased tonne miles, new export markets for traditional U.S. crude imports and a burgeoning U.S. product export market.

Introduction

The US shale revolution has been gaining momentum since it first captured the headlines in 2007. It really started to take off in 2012 with production (excluding NGLs) increasing by more than 3Mnbpd in the period 2012-2014. This increase is equivalent to the current level of North Sea production, and has necessitated a dramatic reduction in the size of the US crude oil import market – both in terms of volumes and the number of active countries.

We at Charles Weber have created an infographic to capture the dramatic changes to the US crude oil import market charting progress from 2000-2014. We identify those countries who have managed to maintain significant trade with the US and explain why. We also look at those countries that have fallen by the wayside, and examine the new markets these excluded countries have moved into.

We also explore the theory that the US crude oil market may now be transitioning to a new phase as current weak oil prices threaten the viability of further US crude production expansion. Already, the first cracks have appeared in the façade of the revolution with the US Energy Information Administration’s latest Drilling Productivity Report (DPR) projecting declining production from key US shale oil plays in both July and August.

Survivors

These countries dominate the US crude oil import market today. Together they account for 96% of total imports, up from 84% in 2007. The primary factors that make these countries survivors are (1) crude profile is sour/heavy – the US is awash with sweet/light crude which is the primary output of the shale revolution, (2) strategic partners, (3) control/participate in US refineries, and (4) geographic proximity. We use a traffic light system in the table below to signify good/bad in relation to attractiveness to US importers.

<table>
<thead>
<tr>
<th>Survivors</th>
<th>Attractiveness of crude oil exporters to US importers</th>
<th>Crude oil Exports to US by country</th>
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<tr>
<td></td>
<td>Country Crude Oil Type</td>
<td>Strategic Partner</td>
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<td>Canada</td>
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<td>Saudi Arabia</td>
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<td>Angola</td>
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<td>Nigeria</td>
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<td>Venezuela</td>
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<td>Total: % share of total US import Market:</td>
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PDV America Inc. controls 3 US refinerie
Saudi Aramco has a 50:50 share of the Motiva refinery, Port Arthur with Shell.
Petrobras controls the 100kbd Pasadena refinery, Texas.
Canadian company Cenovus Energy owns a 50% interest in two major US refineries managed by ConocoPhillips.

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categories). Venezuela is the final country in the table. It provides significant exports to US, but volumes have fallen by 45% since 2007. The potential for improved US relations may see a recovery in its exports.

**Limited interest participants (“moved on”)**

Together the countries defined as “moved on” accounted for 11% of US crude oil imports in 2007, but now account for just 1% of the trade. This group of countries has been forced to look beyond the US to initiate new trades or expand existing trades. This is particularly true of the UK, Gabon, and Algeria, which all relied heavily on exports to the US in 2007.

The UK is a high cost producing region that has been in steady decline since the late 1990s. It has been able to maintain export volumes at 2007 levels to its two largest export destinations (Netherlands, Germany). It has also been able to build up niche markets in China and South Korea.

Gabon has bounced back from the loss of its primary export market and now serves a more balanced portfolio of eastern hemisphere countries including Japan, China, Australia, India and South Korea.

Algeria was largely by-passed by the Arab Spring. Nevertheless, exports have fallen by 25Mntonnnes between 2007-2014. This significant contraction was caused in part by a failure to invest in new projects, but coincidently corresponds to the size of it lost US export market. It is now predominantly focused on serving the European market.

Venezuelan export figures are often at odds with international estimates. The country is in dire recession but it has ambitious plans to build up its exports. India has been one of its few growth markets in recent years.

**Cracks in the Façade**

Having recovered from a mid-USD40’s Bbl low in March, WTI is again coming under pressure with the market spooked by the prospect of extra Iranian crude oil flooding an already oversupplied market if the recent nuclear agreement leads to the lifting of sanctions.

Deteriorating oil prices have been a feature of the market from mid-2014, and US oil producers have responded by sharply and consistently cutting back the number of active rigs since 4Q14.

Despite the drastic cut in exploration activity, US crude oil production has continued to rise with US producers able to focus on those wells that produce the best output.
Continued to rise that is until now. The US Energy Information Administration’s latest Drilling Productivity Report (DPR) projects declining production from key US shale oil plays in both July and August despite the onset of the peak summer driving season.

With crude oil prices once again starting to slide and with crude oil storage around 150MnBbls higher than the same time last year, it would seem a tipping point may now have been reached. If oil prices remain around USD50Bbl for a prolonged period, it is likely that US crude oil production will struggle to gain any further ground during the rest of the year, and may well continue to contract albeit slowly.

If WTI prices return to levels around USD60Bbl many more production projects become viable. However, producers are unlikely to give the green light to many of these projects until more certainty returns to the market regarding the intentions of key players like Saudi Arabia and Iran.

In the longer term, it may be that US producers are well placed to bounce back from a prolonged period of low oil prices because of what has been described as “flexible fracking” i.e. the ability to rapidly and cost effectively deploy rigs when market conditions allow. There are certainly some that argue US producers could be among the last standing.

Last month, the IEA published its first assessment of world oil demand for 2016, which showed demand growth slowing to 1.2Mnbd from 1.4Mnbd in 2015 as high global stocks start to offset the impact of low oil prices. Nevertheless, US producers will hope that global crude oil demand growth will start to alleviate the problems of over-supply and allow prices to begin the recovery process again. However, while producers will be fearful of the potential impact of extra Iranian crude oil, tanker ship owners could benefit from changing global trade patterns.
Coming soon

In recent years, the surge in US crude oil production has not just meant a sharp contraction in US crude oil imports, but a massive increase in US crude oil product exports with the US going from being the largest seaborne importer of refined products in 2008 to the largest seaborne exporter by 2012.
We cover the latest developments in this trade in our US Product Trade Quarterly.

Weber US Product Trade Report

Fastest growing export commodities
1. Inorganic Nitrogen
2. Petroleum & Derivatives
3. Jet Fuel
4. Propane & Butanes
5. Other Products

Fastest growing export regional destinations
- Europe
- Latin America

Fastest growing export country destinations
- U.S.
- Canada

Weber Monthly Refinery Report

Timeline

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Appendix: Latest quarterly US import data – 1Q2014 and 1Q2015 compared

While it is clear from the chart above that Saudi Arabia’s crude imports for Q1 2015 vs Q1 2014 have fallen by 41% or over 7.5 million tonnes, if we look at Saudi Arabia’s market share it has increased from 2007 at 13.55% of total U.S. imports to 16.61% in 2014. Both Iraq and Kuwait market share of imports have also risen over the same period, from 4.50% to 5.02% for Iraq and from 1.62% to 4.03% for Kuwait.

While in 2007 Algeria was responsible for 5.38% of total U.S. crude imports, by 2014 Algerian crude represented only 0.04%. Angola in 2007 exported to the U.S. 4.80% of total U.S. annual crude, buy 2014 Angola was down to 1.84%. Another West African nation, Nigeria, a stalwart of U.S. crude supply in 2007 with 11% of imports had by 2014 dropped to a meager 0.95%. Its neighbor Gabon also fell, from 0.8% in ‘07 to 0.22% in 2014. The North Sea, as represented by Norway and the U.K. jointly delivered 1.58% of U.S. crude imports in 2007 – by 2014 with their light sweet benchmark Brent crude replaced by U.S. domestic shale crude, they were down to 0.12% and 0.14% of total U.S. crude imports respectively.

While Mexico, close neighbor and exporter to the States of 13.30% of U.S. crude imports in 2007 dropped to 10.57% in 2014, Venezuela also slipped from 13.57% of U.S. total imports in 2007 to 10.53% in 2014. Other Latin American
countries have filled this gap. Brazil was up from 1.57% to 1.92%, Ecuador was up from 1.88% to 2.85% and Colombia was up from 1.36% in 2007 to 4.04% of total U.S. crude imports in 2014.

The largest green sphere in the chart above is Canada, with an increase of 11% Q1 2014 over Q1 2015 – a rise of well over 3.5 million tones. What this doesn’t convey is Canada’s massive increase in market share from 2007 to 2014. In 2007 Canada was responsible for 17.33% of U.S. crude imports, by 2014 Canada was exporting 37.85% of all the U.S. crude imports. This was coming by rail, pipeline and tanker.

US Crude Oil Sector Charts
Maps and tables showing the changing distribution of countries exporting crude oil to the U.S.
Crude Oil Characteristics Compared

Crudes with API gravity between 32 and 40 degrees are typically categorized as light, these represent many crude oils from the U.S. shale basins which have relatively high API gravity (above 40 degrees, and many cases ultra-light or above 50 degrees - generally known as condensate). Heavier North American crude oil, such as those from the oil sands in Canada have lower gravities below 22 degrees and medium oils have API gravity of between 22 and 31 degrees. In general heavier crudes require more complex processing to break down into refined products and lighter crudes produce more valuable gasoline and diesel components through atmospheric distillation. Since heavier crudes tend to contain more sulfur and are complex to process their price is usually lower than light "sweet" crudes that have low sulfur. Instead of just one crude feedstock refiners typically use a blend or "cocktail" of oils with quality characteristics that best compliment refinery configuration and market prices for refined products in order to optimize refining margins.

Based on pre-fracking crude sourcing (imports, plus conventionally drilled U.S. oil), much of the refining capacity along the Gulf Coast features coking units. These complex units upgrade (break down) the higher levels of residual fuel components that are output from vacuum distillation of heavier crudes into lighter higher value components used in gasoline and distillates. Most of the refineries in the Midwest and along the West Coast have cokers too, while the Rockies, a minor player in refining is more evenly split. The East Coast in contrast, has historically depended on imported light (high API gravity) crudes from West Africa and the North Sea among other places, and only one of its biggest refiners has a coker.

The shale revolution has brought with it a challenge for U.S. refineries because of the generally lighter quality of shale crudes. As a result, in order to take advantage of new cheap domestic crude oil, refineries in the U.S. have had to adapt to a lighter quality crude slate. Incorporating more domestic light crude from shale was initially just a matter of pushing out imports of similar lighter crudes from West Africa, the North Sea and elsewhere, and after that refineries needed to adapt their configurations to process more light domestic crude. But refineries configured to process heavier crude cannot simply switch over to a diet of light crude without investing in new processing capacity, tweaking their operating parameters, or reducing their throughput capacity. Through a combination of all these factors, a greater proportion of light crude is being run. Refiners have increased the quantity of light crude that they process, in part because attractive prices for abundant light crude have made it profitable to do so. In April 2015, the average API gravity of the crude refined in the U.S. rose to its highest level 32.18 degrees; since March 1990. In July 2008, before the shale era began in earnest, the average API gravity bottomed out at 29.9 degrees. (That difference of 2.28 degrees may not sound like much, but in the refining industry it is huge.) – RBN Energy

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