The crude oil spectrum

S&P Global Platts has created a periodic table of oil highlighting the vast array of crude qualities that make up the global barrel. Eklavya Gupte and John-Laurent Tronche look at some of the key grades making waves in the market today.
The crude oil spectrum

The global oil market is brimming with a smorgasbord of crudes, from the Canadian tar sands extracted with the help of steam and sand, to the lightest US condensates whose color mirrors a glass of fine white wine.

Each crude stream possesses its own unique characteristics, and when refined yields varying proportions of different refined products. Understanding crude-quality has never been more important, following the dramatic rise in US shale output, which has transformed the composition of the global oil market.

To reflect this change, S&P Global Platts created a periodic table of oil cataloguing 120 of the most important grades on international markets. Like the periodic table of elements, the list starts with the lightest crudes and ends with the heaviest. The grades are classified by their specific gravity, or density, and sulfur content.

Light crude oils have an American Petroleum Institute (API) gravity of 34 degrees or more, medium crudes have a gravity between API 25-34 degrees, and heavy crudes have a gravity of 34 degrees or more.

Medium sour

Medium sour crudes form the staple diet of complex refineries. They generally trade at a discount to Platts Dated Brent but recently prices for some grades have strengthened, due to the supply tightness of such crudes globally.

Arab Light

Arab Light is the key export grade for Saudi Arabia, the world’s largest exporter of crude. This crude is a mainstay of the key Asian refining hubs of China, India, Japan and South Korea, making it very significant for the world oil market.

Despite being a high-sulfur crude, it boasts a medium gravity API, making it a well-rounded grade for refiners to process. When refined it produces a wide variety of products, especially for those with complex processing units.

Arab Light is mainly produced from the giant Ghawar and Khurais fields, but it also contains volumes from other fields. The Saudi grades most affected by attacks on the country’s oil infrastructure in September were Arab Light and Arab Extra Light.

The Abqaiq facility, which was damaged in the attacks, helps process Arab Light and also Arab Extra Light. The Abqaiq plant has the ability to depressurize, desulfurize, and de-gas crude production, making it safe for pipeline transport.

Medium sweet

Medium sweets are very attractive to both simple and complex refineries due to their high middle distillate yields, and are generally priced at a premium to Platts Dated Brent.

Bonny Light is one of the most prized crudes in the world due to its high gasoline content. Produced onshore in Nigeria’s oil-rich rich Niger Delta, it is very popular with refiners globally and production has averaged around 250,000 b/d recently.

India, the main driver of oil demand growth, is the largest buyer of this Nigerian grade. However, militants in the Niger Delta have caused disruptions to pipelines, regularly targeting the key infrastructure tied to the crude and export flows. Bonny Light crude loadings have been under force majeure at least three different times in the past 12 months due to pipeline leaks caused by attacks by militants.

Many Nigerian crudes are either light or medium sweet, yielding generous amount of diesel, jet fuel and gasoline, making them more expensive than sour crudes. Crudes like Bonny Light are now competing with US shale, due to the quality similarities, and this has greatly altered the direction of crude flows globally.

Heavy sweet

Heavy sweets are traditionally priced at a discount to Platts Dated Brent but their popularity has broadened. They have become more valuable ahead of the IMO 2020 sulfur cap due to their very low sulfur content.

Dob Doba

Dob Doba is a heavy sweet crude produced in Equatorial Guinea. Due to the properties of the crude, it is well suited for complex refineries. With a low sulfur content, it is an attractive option for refiners.
Doba’s demand used to be limited to complex refiners due to its extremely acidic profile, but its quality has changed over the years due to new fields Badila and Mangara coming on stream.

This change in quality has broadened the customer base for Doba. The crude’s appeal has increased sharply ahead of the IMO 2020 sulfur cap due to its fuel oil-rich but low-sulfur content, which makes it an ideal grade for producing marine gasoil.

This crude is finding homes in refineries all over the world and has been particularly popular in the storage hubs of Fujairah, UAE and Rotterdam in the Netherlands, where the crude is processed at topping facilities to make IMO-compliant fuel oil. The price of Doba has risen dramatically as a result.

Crude differentials for this grade reached a record high of Dated Brent plus $1.65/b in late September, according to Platts data. Around four years ago, this Doba was trading just below Dated Brent minus $8.00/b.

Doba production has also risen over the year with production averaging around 150,000 b/d, compared to levels of around 80,000 b/d six years ago. Oil from landlocked Chad is pumped via the Kome-Kribi (Doba) pipeline to the coast of Cameroon, where it loads at a terminal around 10 km offshore.

Heavy sour

Heavy sours are popular in complex refineries as they can be tough to refine due to their high sulfur content. They are priced at a significant discount to light crude benchmarks such as Platts Dated Brent or the NYMEX light sweet crude futures contract.

As its name implies, Western Canadian Select is a select blend of heavy sour material produced in – you guessed it – Western Canada. There is no true production of WCS. Like the US grade WTI, WCS is a blended barrel, meaning its supply is based upon and controlled by the inputs available plus pipeline space and economics.

The primary consumers of this heavy sour crude are US Midwest and US Gulf Coast refiners, which have sufficiently complex plants to process it and enjoy the significantly depressed prices at which WCS trades.

Why are WCS values so low? Essentially, the crude is land-locked. There is more crude production in Western Canada than there are avenues to export it, which causes its price to fall to levels where rail cars are used to help clear the glut.

A shortage of heavy sour crude -- brought on by OPEC+ cuts, declining Mexican output and sanctions on Venezuela and Iran -- has increased the global interest for WCS. However, so far, US Midwest and USGC refiners have maintained a consistent appetite for WCS, preventing large-scale exports.

Go deeper

Explore the full interactive periodic table of oil, created by S&P Global Platts editors and data visualization specialists. The table brings together 125 grades representing the most diverse and important streams in global oil markets.