

# US and China: energy interdependence

The US shale revolution is set to provide the feedstock for China's next phase of economic development.

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Despite increasing rivalry and trade frictions, the world's two largest economies, China and the United States, are becoming increasingly interdependent when it comes to energy. On the supply side, the US shale revolution is reshaping global energy markets, while China is the epicenter of demand growth.

Simply put, China is where demand meets US supply.

S&P Global Platts Analytics forecasts that global liquids production needs to rise from just under 95 million b/d in 2015 to over 105 million b/d by 2025 to meet rising world demand. Much of this supply growth will be light crude, and in particular US light crude, which will account for just over 40% of growth in global crude output over this period.

The increase will come almost entirely from the US' shale plays, using the innovative drilling and extraction techniques developed over the last two decades. The most prolific of these, the Permian Basin in West Texas, will account for most of the growth.

Moreover, significant volumes of associated gas, rich in natural gas liquids (NGLs), will be produced alongside the light crude. The products produced from

NGLs — propane, butane and increasingly ethane — compete with petrochemical feedstocks like naphtha and are used to produce gasoline blending components.

NGLs' role in helping balance global demand for petroleum liquids will be significant. When NGLs are included, US light crudes' share of the increase in global liquids production between 2015 and 2025 rises from just over 40% to just under 50%.

Meanwhile, on the demand side, despite its new focus on environmentally sustainable technologies, China last year still overtook the US to become the world's largest importer of crude. China's crude imports rose 780,000 b/d year on year to 8.43 million b/d, a trend which is set to continue.

Platts Analytics forecasts that Chinese oil demand will rise by more than 4.5 million b/d over 2015-2025, making the country the single biggest driver of global oil demand well into the next decade.

## Sweet versus sour

There are good reasons why US light crude in particular will flow to China.

US refineries are designed to process a slate of crudes from light, sweet (low sulfur) grades to heavier, sourer (high sulfur) grades from the Middle East, Latin America and Canada. US refiners have been able to substitute a significant proportion of imported light crudes, like those from West Africa, with domestic shale oil, but they still need a significant proportion of cheaper, imported medium to heavy sour crudes to run their refineries at maximum efficiency.

This requirement means the US will continue to import heavy, sour crude even as its exports of light crude rise. S&P Global Platts Analytics forecast that by 2025 the US will be exporting more than 4 million b/d of light sweet crude, of which over 2.5 million b/d will go to Asia.

Unlike other large Asian refiners, which are primarily dependent on medium-heavy sour grades from the Middle East, China imports crude from a wide range of countries, including Angola, Russia, Brazil and Venezuela, in addition to imports from the major Middle Eastern oil producers. As a result, it has a crude slate that is both heavier and sweeter than other Asian refiners.

Aside from its vertically-integrated state-owned oil majors, China also has a sizeable independent refining sector, which accounts for more than a quarter of total refining capacity. Given the name “teapots” due to the perception that they were small-scale, with very simple refining units, many of the independents now have a more complex configuration than their name suggests. Many are capable of producing high quality products and petrochemicals.

Once barred from importing crude, they invested in secondary refining units to help them process the heavier crudes and residues like fuel oil that historically

formed the baseload of their refining slate. But, in 2015 restrictions on the independents’ crude imports started to ease. Since then, they have accounted for most of the growth in Chinese crude demand. By March 2018, independent refineries’ crude imports had reached an all-time high of 2.34 million b/d.

They are now able to access lighter crudes, which has allowed them to run their refineries more efficiently and maximize their yield of lighter more valuable products. They have invested in additional processing units to produce the higher quality products like gasoline blending feedstocks that China increasingly needs.

However, as a whole the sector is unable to process high sulfur crudes, owing to a lack of desulfurization capacity. They therefore typically run on a sweeter slate than other Asian refiners.

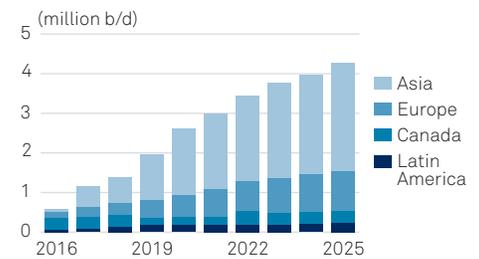
### Light end of the barrel

There are two other factors that make China the natural home for US crude.

First, to cut pollution, the government has mandated the use of much cleaner fuels across the country. Last year, the maximum level of sulfur allowed in both gasoline and gasoil fell from 50 to 10 parts per million. For many of China’s independent refiners, unable economically to remove the sulfur from the crudes they process, sourcing sweeter grades, like those from the US, is the solution.

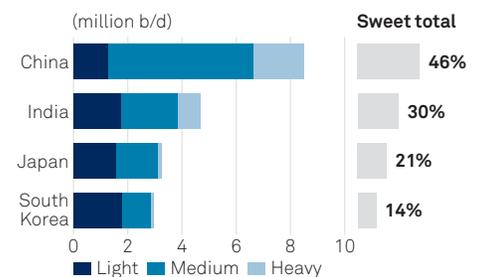
Second, the pattern of Chinese demand is changing as the country shifts from an investment-led economy to one based more on consumption, which will require more gasoline and petrochemicals than it will gasoil and heavy fuel oil. Although

### US CRUDE OIL EXPORTS 2016 - 2025\*



\*Includes condensates  
Source: S&P Global Platts Analytics

### ESTIMATED REFINERY RUNS BY TYPE OF CRUDE, 2015



Source: S&P Global Platts Analytics

middle distillates demand will continue to grow, demand for light products will grow faster.

Shale crudes tend to be paraffinic, with good naphtha and ethylene yields, which make them particularly well-suited for petrochemical feedstock production.

Some of China’s new oil product demand will be met by new complex refineries, like those being built in Dalian and Zhoushan, which will be able to process heavier, sour crudes. But they alone will not be able to meet all new demand, forcing China’s existing refineries to look westwards to source lighter crudes.

In short, the US will optimize its refinery operations by exporting light sweet grades, while China’s refining sector will reach maximum efficiency by importing them.