



# **CRUDE OIL FUTURES Q&A**

2018

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# **CRUDE OIL FUNDAMENTALS**

# **01**





# CRUDE OIL FUNDAMENTALS

## 01 How to classify different types of crude oil?

Crude oil can be classified by several different criteria:

By chemical composition: Paraffinic, naphthenic, and intermediate;

By sulfur content: Ultra-low-sulfur, low-sulfur ("sweet"), medium-sulfur, and high-sulfur (the latter two are often known as "sour");

By relative density (or API gravity): Light, medium, and heavy.

## 02 What do "paraffinic base", "naphthenic base" and "intermediate" crude oils mean?

Paraffinic, naphthenic and intermediate crude oils are differentiated by the proportion of hydrocarbon elements they contain. Paraffinic crude contains a higher proportion of alkanes; naphthenic crude features a higher proportion of cycloalkanes and aromatics (also known as "arene"); intermediate crude falls somewhere between these two extremes.

## 03 How to differentiate between light and heavy crude?

Light and heavy crude oils are differentiated by relative density, which, in China, is the ratio of petroleum liquid's density at 20 °C to that of pure water at 4 °C under 101,325 Pa of ambient pressure. In the United States, it refers to the ratio of petroleum liquid's density at 60 °F (15.6 °C) to that of pure water of the same unit volume at 4 °C under 101,325 Pa of ambient pressure. The latter measure is generally known as specific gravity and the American Petroleum Institute (API) gravity, which is commonly used as a measure of how heavy or light a petroleum is, is derived from the specific gravity value. The conversion of the relative density (density of an oil at 60 °F / density of water) to API gravity follows:  $\text{API gravity} = (141.5 / \text{relative density of crude oil at } 60^\circ\text{F}) - 131.5$ .

By international convention, the API values for each weight usually are: ultra-light- API gravity  $\geq 50$ , light- API gravity between 35 and 50, medium- API gravity between 35 and 26, and heavy- API gravity between 26 and 10. However, not all parties use the same grading system and it may vary from country to country, or from company to company based more on practical grounds, such as the definition adopted by each oil pricing benchmark, than for theoretical reasons.

## 04 How to differentiate between low-sulfur and high-sulfur crude?

Low-sulfur and high-sulfur crude oil are categorized by sulfur content, which refers to the weight percent of sulfur (either sulfide or elemental sulfur) contained in a crude oil. Sulfur in crude oil impacts the quality of a crude oil because it causes difficulties in processing the oil, such as corrosion of metals, and air pollution from the burning of high-sulfur fuels. Generally, most crude oils contain a low level of sulfur. Based sulfur content, crude oil can be classified as low-sulfur ("sweet"), medium-sulfur, and high-sulfur crude oils (the latter two are often referred as "sour"), respectively containing less than 0.5%, between 0.5% and 2.0%, and more than 2.0% of sulfur by weight.

## 05 What types of crude oils are those from the North Sea, Middle East, and the Daqing and Shengli Oilfields of China?

Crude oils from the Brent and the Ninian oilfields in the northern Atlantic are light sweet crude oil.

Crude oils from the Middle East are mostly medium sour crude oil, such as Basra light of Iraq, Dubai of the United Arab Emirates, and Qatar Marine of Qatar.

China's Daqing Oilfield produces light sweet crude oil and the Shengli Oilfield produces medium-to-heavy sour crude oil.

# 06

## What is crude oil used for?

Crude oil can be processed and refined into a wide array of petroleum products. It has powered the world economy, is used for a variety of purposes, and is the most consumed energy source in the world today.

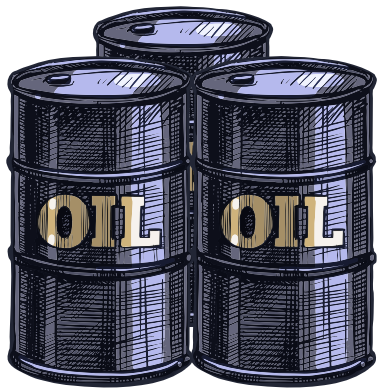
Products refined, produced, or derived from crude oil are: (i) combustible fuels that are used as main energy sources, such as gasoline, kerosene, diesel, fuel oil, and liquefied petroleum gas; (ii) high-molecular-weight polyethylene, a crucial pillar of the modern materials industry, and the vast majority of raw materials for industrial organic chemicals; (iii) a wide range of lubricant and ancillary materials extensively used in metal processing and machineries; and (iv) nitrogen fertilizers and other industrial chemicals used in agriculture. Other than being used as fuel, petroleum products are also widely applicable in the construction and building material industries, light industry and the textile industry. It plays vital roles in future development of novel materials, technique, and product invention.

## 07 What's the relationship between crude oil and gasoline or diesel oil?

Crude oil can be separated easily by fractional distillation, into gasoline, kerosene and diesel fractions, and other distillate products so that they can be further refined. These fuels then can be further blended or mixed with appropriate additives to create the finished products of gasoline and diesel we use every day.

## 08 How is crude oil transported?

Generally, intercontinental transportation of crude oil relies on marine tankers whose deadweight tonnage ranges from tens of thousands to hundreds of thousands of tons, while pipelines are usually used to transport oil on land. Rail and tank cars are also used for short-distance transportation.





# 09

## Why is crude oil measured in barrels? How much is a barrel? What's the relation between barrels and metric tons?

The measurement of crude oil in barrels originated in the early Pennsylvania oil fields, which were the first commercial U.S. oil wells, and permitted both British and American merchants to the same unit, based on the old English wine measure, the tierce.

In 1870, John D. Rockefeller founded the Standard Oil Company. Instead of buying oil barrels, Standard Oil built its own barrels for cost efficiency in standard size of 42 (About 3.7854 liters make a US gallon, therefore a barrel is approximately 159 liters). The standard measurement of oil "barrel" has been accepted globally and is used as standard unit of measurement and pricing for oil.

While many oil producing countries, such as OPEC and western countries like UK and US use the volume-based unit of "barrel" to measure crude oil, nearly all other countries including China and Russia use "metric ton", a weight unit. Since Crude oil's molecular characteristics varies greatly among different places of origin, weight of a barrel of crude oil may fluctuate from about 128 kg to 142 kg depending on its density, meaning there are about 7.0 to 7.8 barrels in a metric ton.



# GLOBAL CRUDE OIL DEMAND & SUPPLY AND TRADE

# 02

# GLOBAL CRUDE OIL DEMAND & SUPPLY AND TRADE

## 10 How much oil does the world produce and consume daily?

According to the International Energy Agency's (IEA) statistics, total global daily crude oil consumption in 2016 was 96.45 million barrels a day (about 12.36 to 13.78 million metric tons a day). Total global supply was 96.90 million bpd (about 12.42 to 13.84 million metric tons a day). In particular, China's daily consumption was 1.55 million metric tons a day (11.90 million bpd), while the country's production output was 550,000 metric tons a day (4 million bpd).

According to the BP Statistical Review of World Energy 2017, global daily oil consumption in 2016 was 96.56 million barrels (12.10 million metric tons), up 1.56 million bpd from the year before and reaching its highest level since 2011. Production also hit a record level since 2011, showing an increase of 450,000 bpd year-on-year to 92.15 million bpd (12.01 million metric tons a day). China's daily oil consumption was 1.59 million metric tons (12.38 million barrels), and daily output was 550,000 metric tons (4.00 million barrels).

# 11

## How long will the world's oil reserves last?

The calculation of oil reserves expressed in time usually adopts reserves-to-production ratio, a value derived from the amount of remaining proven reserves divided by the amount of oil production in one year at the current rate. BP Statistical Review of World Energy 2017 estimates that the total global proven oil reserves are at 1,706.7 billion barrels, which would be sufficient to last for 50.6 years of global production at 2016 levels of 33.7 billion barrels .

However, estimates of remaining years before the oil supply is exhausted vary from year to year as new discoveries are made. If the oil reserves are higher and the production remains constant, then the ratio will increase. In fact, this ratio has been increasing in recent years.

# 12

## What factors will affect the crude oil reserves depletion rate?

There are three main factors that impact depletion of oil reserves: changes in global supply and demand, alternative energy sources, and oil prices.

According to data from BP World Energy Outlook Beyond 2035, world energy demand may increase at 1.3% p.a. between now and 2035 in the base case. The main proportion of this growth is expected to come from emerging economies, with China and India accounting for more than half of the increase, while energy use in the advanced economies of North America, Europe and Asia as a group has peaked and will remain flat. Increasing energy efficiency from unlocking technology and innovation helps to curb the world's energy needs.

On the supply side, new oil exploration has been shifted to open sea, deep-water, and onshore deep well drilling among other new drilling technologies. After the U.S. Shale Revolution that later led to the oil and gas production boom since 2011, producers have shifted their focus to the oil and gas resources previously locked away in shale, greatly increasing U.S. total recoverable reserves over the next few centuries.

In addition, the use of coal, natural gas, wind power, hydropower, and other alternative sources of energy will also affect the oil reserves depletion rate.

Lastly, the price factor. While Brent crude from North Sea was traded at as low as less than \$10 per barrel in November 1998, the oil price has been through several sharp price shocks over the past ten years. In July 2008, the price climbed to nearly \$150, followed by a free-fall to just over \$30 in December of that same year. Then in 2012, it rebounded to \$129, only to fell significantly in 2014 to below \$40 due to several key factors including the high supply and low demand imbalance at then . High oil prices can curb oil demand to a certain extent and encourage investment in new energy sources. Low oil price, on the other hand, can accelerate the depletion of oil.

# 13

## What is the global geographical distribution of major oil production and consumption?

As can be seen from the map below, global oil consumption is mainly concentrated in the Asia-Pacific, North America, Europe, and Eurasia. The Middle East, North America, Europe, and Eurasia are the main supplying regions.

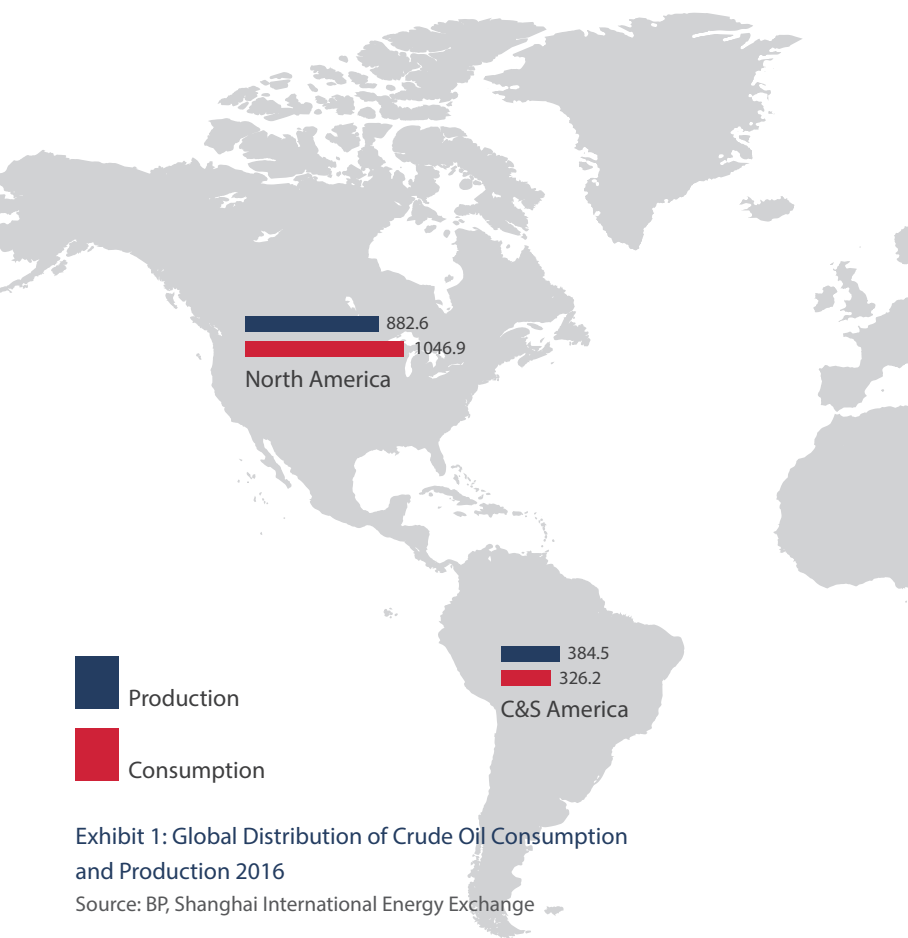


Exhibit 1: Global Distribution of Crude Oil Consumption and Production 2016

Source: BP, Shanghai International Energy Exchange

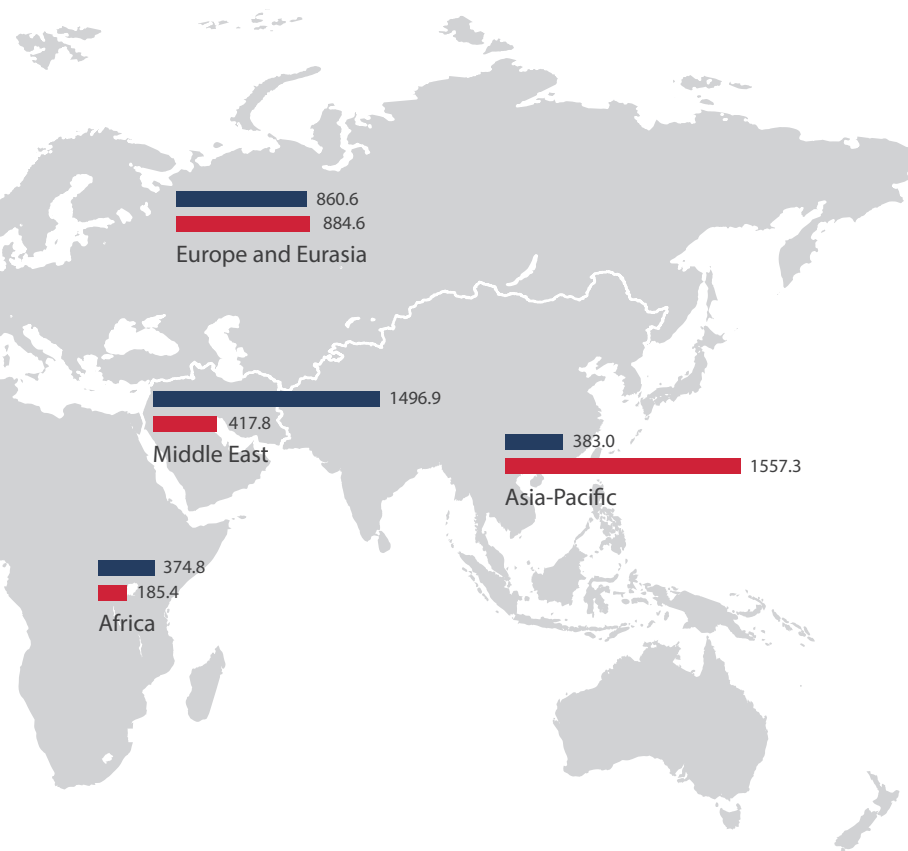


Table 1: Global Crude Oil Consumption and Production 2016

Region	North America	C&S America	Europe and Eurasia	Middle East	Africa	Asia-Pacific	Global Total
Consumption	1046.9	326.2	884.6	417.8	185.4	1557.3	4418.2
Production	882.6	384.5	860.6	1496.9	374.8	383.0	4382.4

Source: BP Statistical Review of World Energy 2017

Unit: million metric tons per annum



# 14

## What are the largest oil producing and consuming countries?

According to the BP Statistical Review of World Energy 2017, the main producers of crude oil are the United States (12,354,000 bpd), Saudi Arabia (12,349,000 bpd), Russia (11,227,000 bpd), Iran (4,600,000 bpd), Canada (4,460,000 bpd), and China (3,999,000 bpd).

Table 2: Global Crude Oil Production and Consumption 2016

Crude Oil Production		Crude Oil Consumption	
USA	12,354	USA	19,631
Saudi Arabia	12,349	China	12,381
Russia	11,227	India	4,489
Iran	4,600	Japan	4,037
Canada	4,460	Saudi Arabia	3,906
China	3,999	Russia	3,203

Source: BP Statistical Review of World Energy 2017

Unit: thousand bpd

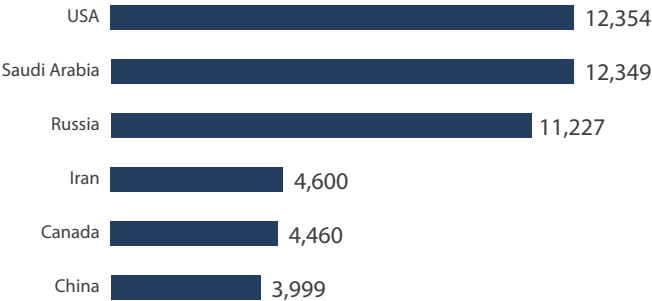
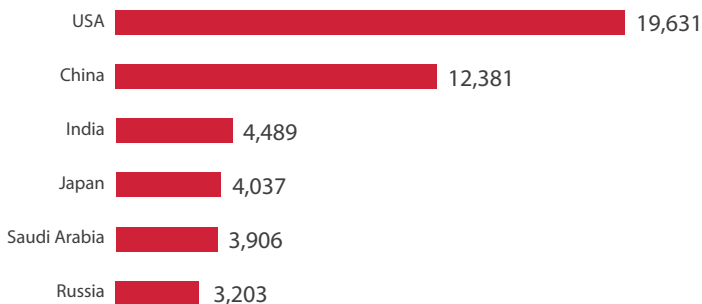


Exhibit 2: Global Distribution of Crude Oil Production 2016

Source: BP, Shanghai International Energy Exchange

Unit: thousand bpd

The main consumers of crude oil are the United States (19,631,000 bpd), China (12,381,000 bpd), India (4,489,000 bpd), Japan (4,037,000 bpd), Saudi Arabia (3,906,000 bpd), and Russia (3,203,000 bpd).



### Exhibit 3: Global Distribution of Crude Oil Consumption 2016

Source: BP, Shanghai International Energy Exchange

Unit: thousand bpd

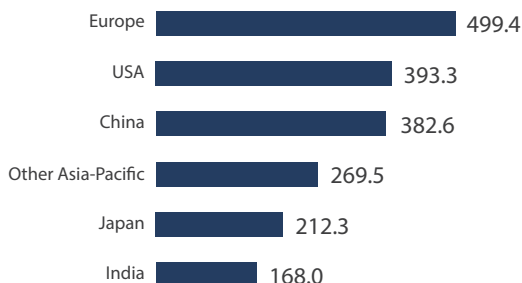
## 15 What is the global trade share of world petroleum consumption?

According to the BP Statistical Review of World Energy 2017, in 2016, the international petroleum trade was 65,454,000 bpd and the total consumption was 96,558,000 bpd, meaning 68% of the oil consumed worldwide was delivered by international trade. More than half of the oil trade growth in 2016 was from China and India. In particular, China's net oil import increased by 10.6%, to 9,216,000 bpd.

# 16

## What are the world's top oil imports and exports by regions?

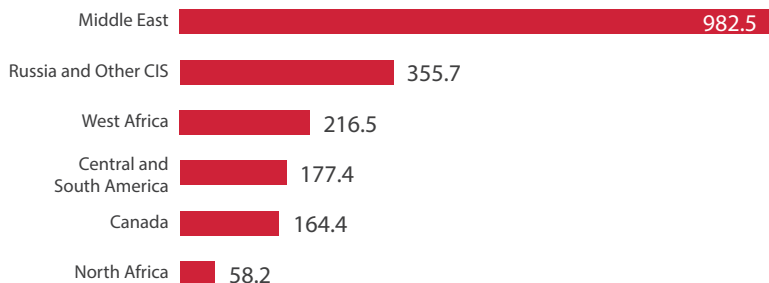
According to the BP Statistical Review of World Energy 2017, the top three countries/regions by oil imports are Europe, the United States, and China. As for the list of countries/regions by oil exports, they are the Middle East, Russia and former Soviet Union except Russia. Please see the table below for import and export data by regions.



**Exhibit 4: World's Top Oil Imports by Countries/Regions in 2016**

Source: BP Statistical Review of World Energy 2017

Unit: million metric tons



**Exhibit 5: World's Top Oil Exports by Countries/Regions 2016**

Source: BP Statistical Review of World Energy 2017

Unit: million metric tons

# 17

## What are the world's oil majors?

The supermajors are considered to be ExxonMobil Corporation, Royal Dutch Shell plc, BP plc, Total SA, Chevron Corporation, and Eni SpA .

# 18

## What are the world's major national oil companies (NOCs)?

The world's major NOCs include Saudi Aramco (Saudi Arabia), Iranian Oil Corporation, China National Petroleum Corporation, Sinopec (China), Public Joint Stock Company Gazprom (Russia), Pemex (Mexico), Kuwait National Petroleum Company, Abu Dhabi National Oil Company, Sonatrach (Algeria), Petrobras (Brazil), Eni (Italy), Rosneft (Russia), State Organization for Marketing of Oil (SOMO, Iraq), Qatar Petroleum, and Statoil (Norway).

# 19

## What are the major chokepoints that are critical to the world's oil trade?

Huge quantities of petroleum are transported by ship between production sites, refineries and points of consumption . They moved through set maritime routes that pass through certain chokepoints in order to minimize shipping costs. Altogether, there are now eight major maritime oil chokepoints throughout the world:

### **Choke point 1 Strait of Hormuz**

The Strait of Hormuz, where Iran and Oman share territorial rights, is the world's most strategically important chokepoint, and is also considered a vital sea route for oil seaborne trade . A significant portion of oil from Saudi Arabia, the United Arab Emirates, Qatar,

Iran, and Iraq is shipped to international buyers, mostly to Asia through the strait.

The Strait of Hormuz is deep and wide enough to handle the world's largest crude tankers.

As the Strait of Hormuz has been a strategic chokepoint for many years, it has often been the site of conflict and there have been many threats by neighboring countries to close it.

### **Choke point 2 Strait of Malacca**

The Strait of Malacca is the shortest waterway connecting the Indian Ocean, the South China Sea and the Pacific Ocean. Singapore, Malaysia, and Indonesia share the territorial right of the strait. Most of the Middle Eastern crude shipped through this passage is headed to China, Japan, and Indonesia. This strait is also vital oil sea route for Japan.

In contrast to the Strait of Hormuz, the Malacca Strait is one of the narrowest sea routes in the world with only 1.7 miles wide at its narrowest point, creating a natural bottleneck for shipping. It has recently seen increasing number of pirate attacks.

### **Choke point 3 Cape of Good Hope**

Although not a chokepoint, the Cape of Good Hope, located on the southern tip of South Africa, is a major trade route for Asia-bound West African crude.

The Cape of Good Hope is an alternate sea route for vessels traveling westward that need to bypass the Suez Canal or Bab el-Mandeb when they are closed. However, diversion around the Cape of Good Hope incurs significantly higher transport cost and shipping time. For shipments from Saudi Arabia to the United States, this route around adds 2,700 miles to transit distance.

#### **Choke point 4 Bab el-Mandeb**

Bab el-Mandeb Connects the Red Sea and the Gulf of Aden and is the strategic link between the Mediterranean Sea and the Indian Ocean. It is only 18 miles wide at its narrowest point. Closure of the Bab el-Mandeb could keep tankers originating in the Persian Gulf from reaching the Suez Canal, diverting them around the southern tip of Africa, which would add to transit time and cost.

According to the US Energy Information Administration (EIA), most exports from the Persian Gulf that transit the Suez Canal also pass through Bab el-Mandeb, so closure of the strait would lead to serious consequences.

#### **Choke point 5 Danish Straits**

Danish straits, formed out of a series of channels around Danish Islands, are the straits connecting the Baltic sea to the North Sea and are among the most secure crude oil chokepoints in the world.

Despite rising tensions between Russia and Europe, and particularly in the Baltics, shipping is unlikely to be affected by regional security issues. The Straits are an important route for Russian seaborne oil exports to Europe. Russia shipped a significant portion of its crude oil to its Baltic ports. A relatively small portion of oil primarily from Norway and the United Kingdom flowed eastward through the Danish Straits to Scandinavian markets. But if Russia ever blocked the Danish Straits, it would mostly just be blockading its own oil trade to Europe as well.

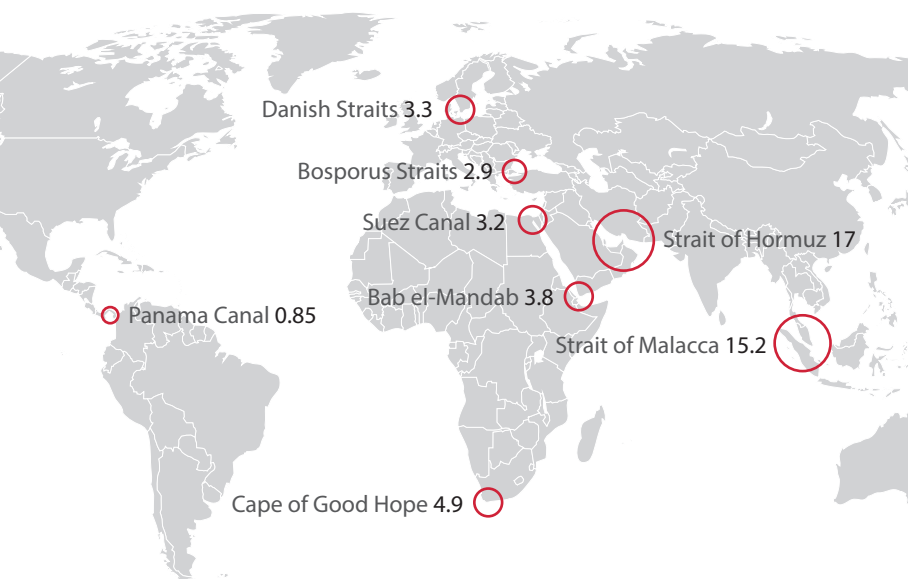
#### **Choke point 6 Suez Canal**

The Suez Canal passes through Egypt and the Isthmus of Suez and connects the Red Sea to the Mediterranean. Most of the oil passing through the canal is sold to markets in Europe and North America.

According to the EIA, the Suez Canal was expanded in 2010 to allow 60% of the world's tankers to pass through more effectively. The fall of President Hosni Mubarak in Egypt in 2011 and the resulting unrest did little to deter international shipping through the canal, but security of this vital link remains a primary concern.

### Choke point 7 Bosphorus Strait

The Bosphorus Strait is a narrow stretch of water connecting the Black Sea to the Mediterranean. It splits Istanbul's Asian and European halves. Only half a mile wide at the narrowest point, the strait is among the world's most difficult waterways to navigate and an average of about 48,000 ships pass transit the strait each year.



**Exhibit 6: Daily Transit Volumes through World Maritime Oil Chokepoints<sup>1</sup>**

Source: EIA

<sup>1</sup>"Eight Major Sea Routes for Global Oil Trade", Wall Street CN, 2015.  
<http://wallstreetcn.com/node/216198>



According to the EIA, Russia has been shifting its oil exports away from the Black Sea and toward the Baltic Ports, while Azerbaijan and Kazakhstan have increased shipping through the Bosphorus Strait.

### **Choke point 8 Panama Canal**

The Panama Canal connects the Pacific Ocean with the Caribbean Sea and the Atlantic Ocean. The utility of the Panama Canal has waned in the years since it was built. The narrowest point of the canal was only 110-feet wide, forcing larger supertankers to avoid the canal entirely. With an expansion program of Panama Canal completed on Jun. 26, 2016, it now allows larger ships to transit the canal.

## **20** How are freight rates for oil tankers calculated?

The international ocean freight cost of oil tankers is expressed in terms of value of Worldscale with main components being flat rates, differentials, demurrage rates, and terms and conditions.

### **(1) Nominal freight rates**

Worldscale is used to calculate freight rates for oil tankers and product carriers . Rates are prepared based upon a round trip voyage from loading port or ports to discharging port or ports and return to the location of first loading.

## **(2) Differentials**

Differentials are used to cover costs that do not fit in the Worldscale flat rate or their application may be dependent on particular factors. Costs that are not covered, such as canal dues differentials for Panama and Suez, different terminal costs that vary within the same port among other things, are enlisted in the Worldscale and will be added to the freight calculation when needed.

## **(3) Laytime and demurrage**

In Worldscale, standard time allowed for loading and discharging is 72 hours. The demurrage rate is multiplied by the number of days (or part of day) in excess of agreed laytime and calculated in USD. The demurrage rates in Worldscale depend on the size of the vessel (SDW. in tonnes). The demurrage rate table, like other schedule of Worldscale, is revised annually to reflect the latest market rates.

## **(4) Other terms and conditions**

In accordance with traditional practice for international chartering, ship taxes or other charges levied on the ship are usually borne by the ship owner, while other taxes or charges levied on the goods are borne by the charterer. At present, the Worldscale is used to calculate freight rates for oil shipping. Market levels of freight are expressed in terms of a percentage or Worldscale equivalent or the nominal freight rate.

## 21 What are the types of regular oil tankers?

Based on the Average Freight Rate Assessment (AFRA) scale, tankers can be classified by deadweight tonnage as follows: General Purpose (10,000–25,000 DWT), Medium Range (25,000–45,000 DWT), Long Range 1 (45,000–80,000 DWT), Long Range 2 (80,000–160,000 DWT), Very Large Crude Carrier (160,000–320,000 DWT), and Ultra Large Crude Carrier (over 320,000 DWT). Other common types of oil tankers include Panamax (50,000–80,000 DWT) usually classified as LR1 tanker, and Aframax (80,000–120,000 DWT) and Suezmax (120,000–150,000 DWT) classified as LR2.

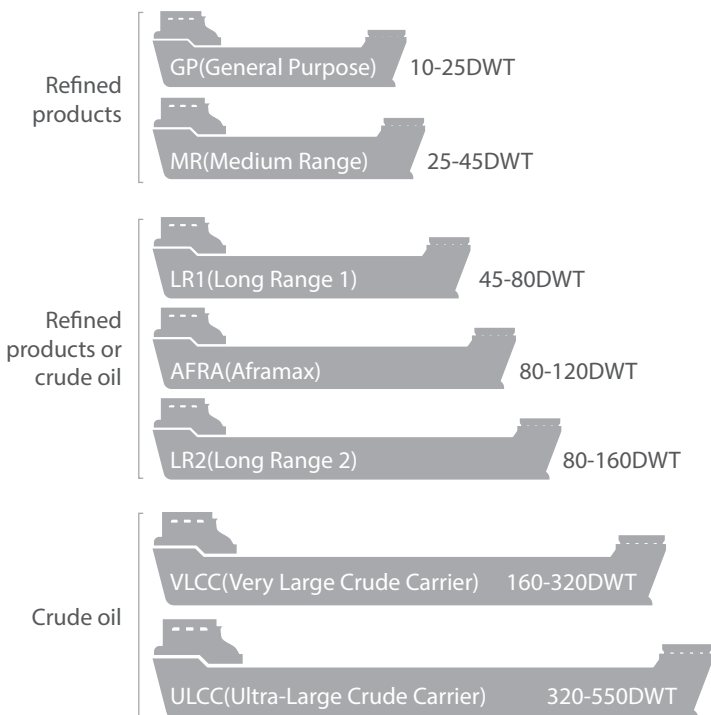


Exhibit 7: AFRA Scale of Tanker Capacity

Source: EIA

Unit: thousand DWT





# CRUDE OIL GEOPOLITICS

# 03

# CRUDE OIL GEOPOLITICS

## 22 Which international organizations play primary roles in the crude oil market? What are their roles in the oil market?

### **Organization of the Petroleum Exporting Countries (OPEC)**

OPEC was founded in September 1960, and is an intergovernmental organization of 14 member states as of December 2017 . Since its formation, OPEC's decisions have several times impacted oil prices significantly and sometimes caused far-reaching consequences for the global economy . It continues to have a voice in world politics.

According to the OPEC 2016 Annual Statistical Bulletin, its production in 2015 was 1,806.6 million metric tons (168,899,799 barrels), 43% of the global total, and its proven oil reserves are estimated at 169,900 million metric tons (1,211,432mb), 81.2% of the global total.

### **International Energy Agency (IEA)**

The IEA is a Paris-based autonomous intergovernmental organization established within the framework of the Organisation for Economic Co-operation and Development (OECD) in 1974 in the wake of the 1973 crude oil crisis. They have 29 member countries with 16 original founding members and 13 other countries joining in the following years. All OECD countries are IEA's members. IEA member countries are required to maintain total oil stock levels equivalent to at least 90 days of the previous year's net imports and to release stocks, restrain demand, switch to other fuels, increase domestic supply or share available oil if

necessary in the event of a major oil supply disruption . By end of 2011, IEA member countries held a combined stockpile of almost 4.3 billion barrels of oil, including 1.5 billion barrels of stocks held or owned by member country governments (public stocks) for emergency purposes and 2.6 billion barrels of industry stocks composed of both stocks held to meet government stock holding obligations and stocks for commercial purposes , i.e. 198 days of oil stock levels in days of imports. Thus, the IEA stock draw potential for both public and compulsory industry stocks is sufficient in magnitude and sustainability to cope with the largest historical supply disruption experienced to date. According to IEA annual statistic of 2016, OECD oil consumption accounts for 49.15 % of the global total.

While a majority of surplus oil production capacity is controlled by OPEC, IEA member countries control significant amount of Strategic Petroleum Reserves (SPR). Either of them is capable of changing short-term market supply levels, which results in volatility in oil price.

## 23 Who are the member states of OPEC?

As of December 2017, OPEC has 14 members and now is headquartered in Vienna, the capital of Austria. Membership includes the five founding members of Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela and members that joined later are Qatar (1961), Libya (1962), United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (joined in 1973, suspended its membership in 1992, but reactivated it in 2007), Angola (2007), and Gabon (joined in 1975, terminated in 1995, rejoined in 2016) and Equatorial Guinea (2017) . Indonesia is a former member (joined in 1962, suspended in 2008, reactivated in 2015, but decided to suspend it again in 2016).

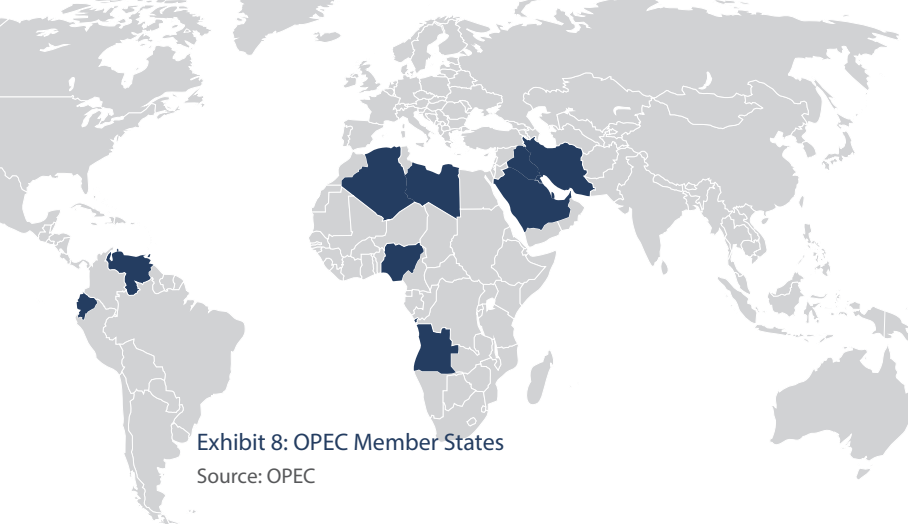


Exhibit 8: OPEC Member States

Source: OPEC

## 24 What are the components of the OPEC Reference Basket (OPEC Basket)? What is the OPEC Basket pricing system used for ?

The OPEC Reference Basket (ORB, also referred as OPEC basket) is made up of the following: Saharan Blend (Algeria), Girassol (Angola), Oriente (Ecuador), Zafiro (Equatorial Guinea ), Iran Heavy (Islamic Republic of Iran), Basra Light (Iraq), Kuwait Export (Kuwait), Es Sider (Libya), Bonny Light (Nigeria), Qatar Marine (Qatar), Rabi Light (Gabon), Arab Light (Saudi Arabia), Murban (UAE), and Merey (Venezuela).

OPEC's mission is to coordinate and unify the petroleum policies of Member Countries and to determinate the best means for safeguarding their interests, individually and collectively. To ensure an efficient, economic and regular supply of petroleum to consumers and a steady income to producers, OPEC has implemented a group production ceiling divided among Member Countries and the ORB. OPEC has often attempted to keep the ORB between upper and lower limits, by increasing and decreasing production . This makes the measure important for market analysts. The OPEC Basket, including a mix of light and heavy crude oil products, is heavier than both Brent and West Texas Intermediate crudes.



## 25 Why do Middle East geopolitics have such an influence on the oil market?

The main reasons why Middle East geopolitics can move the oil market are:

The Middle East has enormous proven oil reserves. This is especially true of Saudi Arabia which has 266 billion barrels of oil reserves, accounting for 15.7% of the global total, and it produces about 12 million barrels a day on average. The countries with next three largest proven reserves are Iraq, Iran, and Kuwait with 143.1 billion, 157.8 billion and 101.5 billion barrels of oil reserves respectively.

Secondly, the region produces and exports huge volumes of crude oil, on which most of oil consuming countries are highly dependent. According to OPEC's January 2017 monthly report, OPEC member countries in the Middle East had an average daily crude oil output of 24.85 million barrels, which was nearly 77.7% of total OPEC production and more than 25.8% of the total global supply.

Thirdly, the region has considerable spare oil production capacity, giving it a major influence on global oil prices. Saudi Arabia, the largest oil producer within OPEC and the world's largest oil exporter, has historically had the greatest spare capacity. It has regularly wielded this spare capacity for influence on the world stage and has helped set oil prices. Thus, it's been given the name of the "central banker" of oil.

As such, when there is turmoil or a destabilizing event in the Middle East or in other OPEC countries that causes supply disruption, it will have dramatic impact on the global oil market. An example of this is the EU's announcement of sanctions and embargoes on Iran in early 2012, and the Libyan civil war in 2011 that almost brought the nation's daily output of 1.6 million barrels to a complete halt. Despite continuing difficulties in Libya for some years, crude oil price fluctuations did not last long, reflecting the role of other influences on markets, including higher production in Saudi Arabia, seasonally lower demand in October due to refinery maintenance and outages, and slower global economic growth at that time.

## 26 Why does the United States have important geopolitical influence on the global oil market?

The United States controlled oil prices for a majority of the previous century, only to cede it to the OPEC countries in the 1970's. It may regain predominant influence on the oil market due to the following reasons: For one, it is the biggest oil-consuming country in the world. In 2016, its petroleum consumption reached 7.165 billion barrels/year, an average of about 19.631 million barrels per day. Secondly, it's also one of the leading oil importing countries with up to 9.45 million barrels imported a day<sup>2</sup>. Thirdly, as one of global superpowers, the United States has the power and the desire to influence oil prices, thus it makes the United States an important player in oil geopolitics. Lastly, the recent oil drilling technological advances in North America are expected to rapidly increase U.S. domestic energy supply, make the country energy independent, and even provide it with enough oil output to replace Saudi Arabia as the world's leading crude oil producer and exporter by 2020.

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<sup>2</sup>Source: BP Statistical Review of World Energy 2017

## 27 How may the United States influence oil prices?

The United States may affect international oil prices in a number of ways:

First, the United States has established a sound Strategic Petroleum Reserve (SPR) system that constitutes the largest strategic and commercial petroleum reserve in the world, and systematically and regularly releases SPR data. As an IEA member, its obligation to contribute 43.9% of its SPR in any IEA coordinated release while maintaining a petroleum stock equivalent to at least 90 days of US import mitigates future temporary supply disruptions.

Second, the United States has a sophisticated energy and financial market. Its oil futures have become global oil benchmarks.

Third, more than half of the "supermajors" (Big Oil) and a large number of small- and medium-sized oil companies are headquartered in the United States.

# 28 What is the scale of SPR of OECD Countries?

The table below shows closing oil stocks of OECD member states as of October 2017.

Table 3: Closing Oil Stock of OECD Countries

	2015	2016	4Q2016	1Q2017
Canada	17286	16591	16591	16933
Chile	1489	1432	1432	1527
Mexico	6526	6261	6261	6240
United States	229204	233845	233845	237486
<b>OECD Americas</b>	<b>254505</b>	<b>258129</b>	<b>258129</b>	<b>262186</b>
Australia	4325	4348	4348	4266
Israel	-	-	-	-
Japan	75951	73291	73291	71195
Korea	28034	28900	28900	29350
New Zealand	1064	1236	1236	1134
<b>OECD Asia Oceania</b>	<b>109374</b>	<b>107775</b>	<b>107775</b>	<b>105945</b>
Austria	3246	3048	3048	3236
Belgium	6717	6321	6321	6417
Czech Republic	2725	2698	2698	2767
Denmark	4302	4103	4103	3628
Estonia	232	314	314	349
Finland	5970	5628	5628	5969
France	22594	21761	21761	22429
Germany	37679	37638	37638	37065
Greece	4804	4894	4894	5111
Hungary	2678	2986	2986	2948
Iceland	-	-	-	-
Ireland	1628	1657	1657	1679
Italy	15825	16719	16719	18088
Latvia	586	320	320	316
Luxembourg	93	88	88	86
Netherlands	16398	16337	16337	17661
Norway	3477	3003	3003	2967
Poland	8890	8607	8607	8931
Portugal	3172	3008	3008	3546
Slovak Republic	1304	1373	1373	1478
Slovenia	582	581	581	630
Spain	17872	17658	17658	18695
Sweden	5387	5016	5016	7397
Switzerland	4303	4374	4374	4422
Turkey	10044	10619	10619	10978
United Kingdom	10821	10927	10927	10746
<b>OECD Europe</b>	<b>191329</b>	<b>189678</b>	<b>189678</b>	<b>197539</b>
<b>Total OECD</b>	<b>555208</b>	<b>555582</b>	<b>555582</b>	<b>565670</b>

2Q2017	3Q2017	Oct2016	Oct2017
16971	17006	17310	16906
1430	1617	1632	1584
6452	6164	5846	6456
232074	225229	236073	220518
<b>256927</b>	<b>250016</b>	<b>260861</b>	<b>245464</b>
4547	4340	4509	4397
-	-	-	-
73688	74235	76309	74804
29996	30538	28851	29892
1248	1108	1255	1062
<b>109479</b>	<b>110221</b>	<b>110924</b>	<b>110155</b>
2923	2948	2893	2910
6249	5937	6430	5877
2638	2635	2733	2658
3624	3112	4082	2841
361	287	291	340
5775	5884	5390	5536
22073	22083	21807	21962
36688	36376	37797	36176
4772	4739	4355	4732
3053	3175	2993	3109
-	-	-	-
1586	1341	1608	1369
17986	17126	17169	16722
441	204	656	279
94	83	87	64
17367	16149	15598	16114
2865	2838	3297	3032
8898	8859	8843	8557
3202	3216	3224	3255
1506	1369	1307	1302
655	599	570	594
17683	17475	18576	16933
7569	6204	4870	6046
4290	4410	4513	4359
11287	11266	10322	11220
10682	10278	10279	10503
<b>194267</b>	<b>188593</b>	<b>189690</b>	<b>186490</b>
<b>560673</b>	<b>548830</b>	<b>561475</b>	<b>542109</b>

Canada
Chile
Mexico
United States
<b>OECD Americas</b>
Australia
Israel
Japan
Korea
New Zealand
<b>OECD Asia Oceania</b>
Austria
Belgium
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Luxembourg
Netherlands
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
<b>OECD Europe</b>
<b>Total OECD</b>

Source: IEA Unit: Thousand metric tons



# 04

## CHINA'S OIL MARKET





# CHINA'S OIL MARKET

## 29 What are the major oilfields of China? What are these major SOE oil producers' shares of domestic crude oil production?

China's state owned oil companies, mainly China National Petroleum Corporation (CNPC), China Petroleum & Chemical Corporation (Sinopec), and China National Offshore Oil Corporation (CNOOC), own most large oil and gas fields in China. CNPC owns the Daqing, Changqing, Xinjiang, Liaohe, Jilin, Tarim oilfields; Sinopec has the Shengli, Zhongyuan, and Henan oilfields; and CNOOC controls the Bohai Oilfield. The table of China's major oilfields and their production in year 2016 is provided in Appendix 1.

In 2015, CNPC, Sinopec, and CNOOC accounted for, respectively, 52%, 19%, and 20% of total domestic crude oil production.

## 30 What is China's share of global crude oil production and consumption?

According to the BP Statistical Review of World Energy 2017, as of 2016, China produced 3.999 million barrels per day<sup>3</sup>, accounting for 4.3% of the global share and ranked eighth in the world. It consumed 12.381 million barrels per day<sup>4</sup>, representing 12.8% of the global oil consumption and is the second biggest oil consumer in the world.

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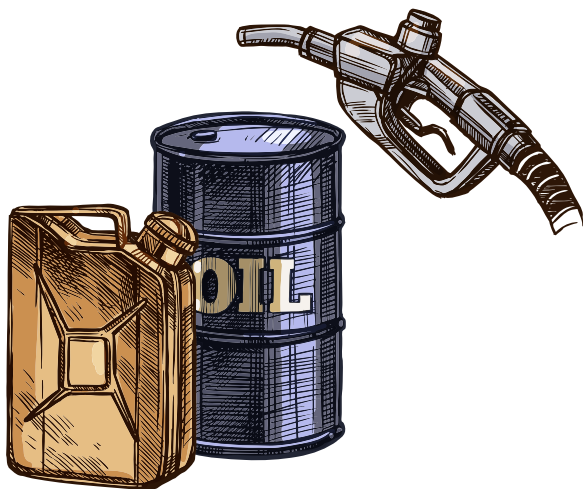
<sup>3</sup>Includes crude oil, shale oil, oil sands and NGLs (natural gas liquids, the liquid content of natural gas where this is recovered separately). Excludes liquid fuels from other sources such as biomass and derivatives of coal and natural gas.

<sup>4</sup>Inland demand plus international aviation and marine bunkers and refinery fuel and loss. Consumption of bio gasoline (such as ethanol), biodiesel and derivatives of coal and natural gas are also included.



# 31 What are the oil production and import volumes of China in 2016? How much does China depend on foreign oil?

According to the China National Bureau of Statistics, in 2016, China produced 197.71 million metric tons of crude oil, imported 381 million metric tons, and exported 2.94 million metric tons, equating to an apparent consumption of 556 million metric tons with an import dependence over 65% of its total oil consumption.



## 32 Who are the top crude oil suppliers to China? What are their respective shares of Chinese crude imports?

China's oil imports are mainly from the Middle East, Former Soviet Union (FSR) region, as well as Africa. According to the statistics from the China General Administration of Customs, in 2016, China imported 381 million metric tons of oil, an increase of 13.6% from the year before.

The chart below illustrates those oil exporting countries accounting for more than 2% of China's oil imports.

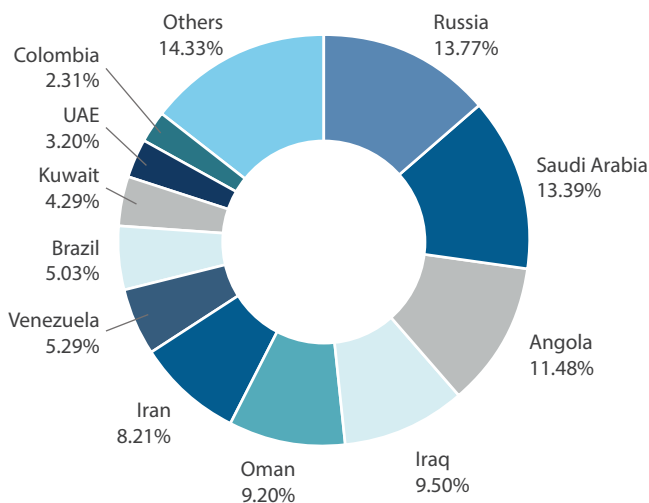


Exhibit 9: Sources of Imported Crude Oil of China in 2016

Source: General Administration of Customs

China is heavily energy dependent on the Middle East, with nearly 50% of its imported crude oil coming from the Middle East in 2016 (A breakdown of China's crude oil imports from the Middle East and rest of the world is shown in Appendix 2.) As such, the Shanghai International Energy Exchange (INE) chose medium sour crude oil, predominant type of oil imported from the Middle East to China, as the underlying for the crude futures contract.

## 33 Who is entitled to import and export crude oil in China? Is a crude oil import quota approved by the government authorities required?

China oil SOEs are entitled to import and export oil freely for their own needs. However, crude oil imports for privately owned entities are subject to quota and licensing control.

Oil imports and exports for SOEs and privately-owned entities are regulated independently. SOEs are granted automatic import and export licensing by the Ministry of Commerce (MOFCOM) and quota control are not applicable. SOEs that have automatic import and export licensing include SinoChem Group, Sinopec, CNPC, Zhuhai Zhenrong Co., and CNOOC.

Following China's December 2001 entry into the World Trade Organization and consistent with its principles to support trade liberalization and oppose to trade protectionism, China has promised to gradually liberalize its foreign trading system. According to China's amended Foreign Trade Law which went into effect from July 2004, all types of enterprises, including private enterprises, can register for a trading right/ trading license. This rule also applies to privately-owned oil companies and the annual import quota has been raised continually since 2002.

In 2015, the National Development and Reform Commission (NDRC) and the MOFCOM respectively issued the *Notice of the National Development and Reform Commission on the Use and Management of Imported Crude Oil* (FGYX [2015] No. 253) and the *Notice on Works Related to Application by Crude Oil Processing Enterprises for the Non-State-Owned Trading Import License* (SMH [2015] No. 407), further ruling in that qualified independent refineries shall be granted refinery quotas using imported crude oil and licenses for privately-owned oil entities to import crude oil.

As of January 3, 2018, a total of 29 independent refineries have obtained a combined quota of 91.25 million metric tons of using imported crude for refinery in the year of 2018. Besides, there are 7 other refiners pending for the NDRC's approval for refinery quota using imported oil. For a complete list of private-owned oil companies with their approved refinery quota using imported crude and crude import quota as of Jan. ,2018, please see the Appendix 4).

## 34 What is China's Strategic Petroleum Reserve (SPR) management? What is the current SPR stockpiling level and future direction?

China's crude reserve system consist of government controlled strategic reserves, Commercial Social Reserves and mandated commercial reserves owned by major Chinese oil companies and medium and small Chinese oil enterprises separately . Generally speaking, government controlled reserves and the Commercial Social Reserves are the official SPR, and the mandated commercial reserves are extra petroleum reserves held by major Chinese and medium and small oil companies above the Commercial Social Reserves. The government controlled reserves are managed by a three-layered group of government offices consisting of the China Petroleum Reserve Office, Petroleum Reserve Administration Center, and local government reserve facility units under the National Development and Reform Commission (NDRC). The government-controlled reserves will be completed in three 5-year phases, entailing investing over RMB 100 billion to bring its SPR level to 70 million cubic meters.



# GLOBAL OIL PRICING

# 05



# GLOBAL OIL PRICING

## 35 Why are futures market prices the references prices for most of the oil traded around the world?

Oil price fluctuations impact the global economy and geopolitics. To manage the risk of price fluctuation , financial markets around the globe have introduced crude oil futures for refiners, government buyers as well as other market participants. Trading of these benchmark crude futures has soared rapidly since launch, as has their influence on the physical market for the following reasons:

Firstly, the crude oil futures market has a wide range of participants, including producers, refineries, traders, consumers, investment banks, hedge funds and other types of investors. Therefore, the price of oil futures reflects expectations of a wide variety of both buyers and sellers.

Secondly, highly liquid crude futures are traded publicly and transparently on Exchanges, and the trade data is published/ distributed in real time. All of which promote more efficient price discovery and effective safeguards from market manipulation.

Therefore, oil trading is increasingly relying on the futures price with a certain premium or discount to account for quality variation, geographical location, and other factors , thus making futures prices an oil benchmark.



## 36 Are the prices of refined products anchored to the price of crude futures in global oil market?

Crude futures prices are key references in defining prices of refined products in the global oil market. In fact, the crude oil price is the single most important factor in determining the price of refined products, as it represents the largest component of the underlying cost of producing and marketing gasoline and other refined products. Thus, these prices are highly correlated and mutually influential:

(1) The spread between the prices of crude futures and oil product futures often stays within a narrow range, thus changes in crude oil futures prices can lead to changes in prices of refined products. As a result, the price expectation of refined oil product futures is often set as a premium or discount value against the price of crude oil futures.

(2) Intuitively, the crude oil price should be equal to weighted average market price of refined oil products by production yield minus gross profit . In freely-traded oil market the theoretical crude oil price and crude oil futures price can be implied from the market prices of refined products.

## 37 Who are the world's major oil price reporting agencies (PRA)?

Platts and Argus play a crucial role in determining how oil prices are set, while agencies including ICIS and RIM also offer similar services. Global information vendors such as Reuters and Bloomberg broadcast PRAs' oil prices and industry updates.

Platts and Argus prices of energy are widely used by oil companies and government agencies.

## 38 How do PRAs like Platts and Argus assess oil prices and how do their prices influence oil market?

Taking Singapore market as an example, Platts reporters consider information collected through the day, with a particular focus on the half hour prior to 16:30 Singapore time, which makes its price more relevant to the Asia futures market's closing price. Platts claims that its assessment takes into account the effect of time on price. While Argus typically reflects physical market prices across the entire trading day as a volume-weighted average of deals done. Argus tracks as many transactions as possible. Argus believes an entire trading day price is a reliable indicator of physical market values as it incorporates the broadest possible pool of spot market liquidity and has acceptance from industry

Currently, Platts prices have taken a significant role in the determination of oil prices in the Asia-Pacific region, as their Dubai-Oman is a pricing benchmark applied to the vast majority of sour crude oil trading east of Suez. As for Argus, its Argus Sour Crude Index (ASCI) has become the pricing benchmark for sales of crude oil by Saudi Arabia, Kuwait, and Iraq to the United States, and its ESPO (East Siberia – Pacific Ocean) and AFEI (LPG) (Argus Far East Index) prices also have major influence in the Far East.

## 39 What are the pricing conventions used by Middle Eastern countries and Russia for oil exports?

### **Middle Eastern countries:**

International oil trade is organized either through the spot (cash) market or through long-term contracts, however, bilateral long-term contracts are the leading form of oil trading. For spot market transactions, the trading parties typically base the pricing of an oil delivery to a benchmark (marker) price with an agreed price differential applied at the time the shipment is loaded. For long-term contracts, most oil exporting countries publish their official selling prices (OSP) on a monthly basis against their long term export contracts. The OSP could either be an absolute price for that particular stream of crude (such as Oman, Qatar, and UAE), or a formula price linking the crude grade to a market benchmark (such as Saudi Arabia, Iran, Iraq, Kuwait, Yemen, and Syria). The formula usually takes the form of an OSP differential, which is added as a premium or discount to the selected benchmark value.

Of the two, the formula-based pricing is the mostly used in long-term oil contract transactions.

The principal oil pricing formula is  $P = A + D$ , where P refers to the settlement price for a delivery of crude oil, A the benchmark price, and D the premium or discount.

It is worth noting that benchmark (marker) crude price is not a traded price of certain crude stream at a specific time, but rather a reference price calculated by reference to a set of spot markets, a futures price, or a PRA's index (such as MOPS or Means of Platts Singapore) prices during an agreed sampling period . For a list of pricing benchmarks used by major Middle East oil producers please see Appendix 5 of this document.

**Russia:**

Since Europe has traditionally consumed the bulk of Russian oil exports due to its geographic proximity and its extensive pipeline linkages with Russia's main producing regions. Urals crude oil, Russia's flagship crude stream, is traded at the international market as a differential to Dated Brent. .

Some ESPO (Eastern Siberia–Pacific Ocean pipeline) Blend is traded through tender auctions, where producers will announce a tender notice, enlist the auction procedure and invite certain buyers to bid. Goods are sold to the highest bidder.

## 40 What are the major benchmarks for oil trading in the Asia-Pacific region?

At present, there are several benchmark prices are used in Asia-Pacific oil trading. They are Platts Dubai/Oman and Platts Oman and Dated Brent. Dated Brent is adopted in pricing Asia-Bound West Africa Crude.

## 41 What is the difference between Asia-Pacific North American and European oil trading prices? What is the opportunity for China's oil market?

Pricing mechanisms for US/EU-bound and Asia-bound shipments are different: US/EU-bound delivery is usually priced based on an oil futures benchmark price in the consumption market, while the pricing of Asia-bound crude is based on FOB price at ports in the Middle East. Asia does not yet have a widely accepted crude oil futures benchmark for commercials or proprietary traders to apply to and hedge against their shipments to Asia, which makes hedging the risk exposure of oil bound for Asia relatively difficult.

At present, about 50% of China oil imports is originated in the Middle East, and a major portion of their quality is middle (heavy) and sour. With China's growing and huge oil demand (middle (heavy) and sour crude remaining as mainstream) and lack of an Asia oil futures benchmark, it may be a good timing for China to build an oil futures market reflecting Asia demand and supply and playing an influential role in globe.

## 42 What are the pricing models for crude imports and domestic production in China?

### **Import Market:**

The Platts Dubai/Oman price is often used as a benchmark for China crude imports from the Middle East and Dated Brent for oil imported from West Africa.

### **Domestic Production:**

The prices for trading domestic produced oil is negotiated between CNPC and the Sinopec Groups, who are the two biggest of China State-owned Oil Companies (SOE) and own most of China's inland oilfields. For intra company transactions of domestically produced crude, the price will be determined by the corporate headquarters. Because there currently is no regional/ domestic oil benchmark, prices of different quality oil are usually determined in reference to nearby overseas benchmarks of similar quality. In China, crude oil is usually classified into four categories: Light, Medium I, Medium II, and Heavy Oils; and respective nearby overseas oil benchmarks for these four categories of oil are Tapis, Minas, Cinta, and Duri. The timely introduction of China's own crude oil futures may help China move away from this indirect pricing model.



06

# FUTURES AND DERIVATIVES MARKET



# FUTURES AND DERIVATIVES MARKET

## 43 What are the basic attributes of a successful futures contract?

Nearly all successful futures products share certain common attributes, including: underlying commodities traded must be homogeneous and/or have a well-defined grading system; there is a large enough cash market; the cash market must be active with frequent transactions ; there is no absolute dominant power on either the buyer or seller's side; there is high price volatility that gives rise to hedging needs; and user base is fully diversified to provide good liquidity to the futures market.

China has become the second largest oil consumer and biggest importer in the world and has a remarkable oil trading volume. Plus oil price remains quite volatile as usual. Hence domestic oil-related enterprises have strong hedging needs. In China futures market, there is already a very diversified and large number of market participants. Therefore, China crude oil has been equipped with many natures for a successful futures contract.



## 44 What are the arbitrage strategies commonly used by futures dealers?

In contrast to directional trading which involves holding one side (long/short) of the market, arbitrage trades generally involve simultaneous execution of buy and sell orders of multiple contracts and make profits from normalizing an abnormal price or price relationship between two correlated contracts. Common forms of arbitrage trades include calendar spreads, inter-market or inter-commodity spreads, which can be executed by simultaneously placing buy and sell orders or trading a spread contract.

Here is a demonstration of arbitrage trading using a calendar spread example: A merchant finds that the ICE July ULSD futures is traded at \$3 per barrel lower than the August contract. After counting in the monthly storage cost of \$1 per barrel and other cost factors for carrying over a July contract, there is still almost a \$2 per barrel arbitrage window. As such, the merchant may immediately buy the July contract and simultaneously sell the August. If the spread converges by the end of July, the merchant can make a profit by closing out his positions. Otherwise, the merchant can choose to take physical delivery in July and pay \$1 per barrel for storage and other carry cost, then make delivery at August for his short positions, making a risk-free net profit of \$2 per barrel.

## 45 Why are arbitrage strategies more popular to proprietary traders than directional trades?

Reasons for proprietary traders and speculators prefer arbitrage strategy include:

1. The price risk of directional are generally larger than arbitrage strategy, as up/down-side risk of uncovered position is unlimited;
2. Other than fundamental factors of oil supply and demand, there are other factors that will impact the result of a directional trade, including the strength of the US dollar, macro-economic events, investors' risk taking limits, and volatility passed through from other financial markets (such as stock markets). By contrast, arbitrage strategies involving oil contracts may be relatively more impacted by the relationship of demand and supply as simultaneous long and short positions offset many other risk factors.
3. Arbitrage trading typically reduces the capital requirement for margining purposes compared to directional trades, enhancing client's capital efficiency.

## 46 What is the speculators' market share in futures market trading volume?

While it is safe to say that speculative trading account for a relatively high share of oil market volume, accurate public statistics are rare, and the number may vary from market to market.

The only widely accepted data today are the Commitments of Traders (COT) reports published weekly by the Commodity Futures and Trading Commission (CFTC). Only the reportable positions are collected in COT report. And the reportable position holders are classified into "Non-commercial traders": usually fund managers and led by hedge funds that hold speculative positions and "Commercial traders": commercial traders with hedging positions. "Non-reportable positions" are generally taken as positions held by non-institutional investors or retail investors<sup>5</sup>. Usually non-commercial positions are viewed as speculation, thus one can conclude the positions held by speculators as a percentage of the open interest was maintained at a stable 50–55% in 2012. Speculative trading would account for an even higher stake in market trading volume because they generally trade more actively than other types of market participants. However, the distinction between hedging and speculation in futures market is less clear than it may appear, as commercial traders may also engage in speculative trades and non-commercial positions may likewise be held for hedging purposes.

The speculative trading activity also varies by market. In a sophisticated and very liquid futures market, speculators are primary participants bringing liquidity to the market and providing liquidity is a crucial market function that enables participants to easily enter or exit the market.

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<sup>5</sup>Since September 2008, CFTC has begun to provide a disaggregated report which separates swap dealers from the category of commercial positions and reclassifies traders into four types: Producer/Merchant/Processor/User, Swap Dealers, Managed Money, and Other Reportables. The average market shares of the four trader types were 16%, 26%, 29%, and 24%, respectively, by long positions and 20%, 36%, 19%, and 21% by short positions.

## 47 What role does speculators play in the development of futures markets and the price discovery process? Do they manipulate the futures market?

Futures market function less efficiently without speculative traders providing liquidity and assisting with price discovery. Moreover, the liquidity brought by speculative traders' frequent trading activity may attract more hedgers or investors to participate in futures trading. Therefore, speculation is indispensable in the futures trading ecosystem.

Speculation is often mistaken for price manipulation, but this view lacks objectivity and fairness. Under certain market conditions—such as low market liquidity, inefficient regulation, or excessive speculation, speculation may create an opportunity for market manipulation. What a futures market really needs is a solid regulatory infrastructure and robust surveillance system to inhibit market manipulation.

## 48 What are common forms of market manipulation? What regulatory countermeasures are adopted to prevent such behavior?

Market manipulation is considered criminal/illegal activity and prohibited in the *Chinese Criminal Law*, the *CSRC's Regulations on the Administration of Futures Trading* and in Exchange Rules, where the Exchange is a self-regulatory body. Market manipulation comes in many forms. In the *Regulations on the Administration of Futures Trading*, examples of price manipulation in futures markets are defined below:

1. acting individually or in concert to engage in ongoing trading activity in order to exploit a relative capital advantage, relative significant long or short sided position-holding, or using inside information to squeeze the market or manipulate futures prices;
2. colluding with other traders to conduct wash trades, simultaneously executing trades at a pre-arranged time(s), and/or price(s) in order to artificially affect futures trading prices and/or trading volume;
3. churning or wash trading by using self-owned accounts or other accounts under common controlling interest to change futures prices and/or trading volumes significantly;
4. violating Exchange position limits in order to control of the supply or the underlying commodity asset and corner/squeeze the futures market; and
5. other forms of manipulation as prescribed by the CSRC under the State Council.

To address manipulative activity, China futures exchanges implement enforced rules of "one trader one ID" rules, position limit, large trader position reporting (LTPR), require filing documents attesting to ownership and control of accounts and other preventive rules. In practice, the Exchange is empowered to conduct real-time market surveillance and monitor media manipulation, investigation on possible ownership and controlling relationship cases, on-site inspection, and other actions to detect, investigate, and take actions against manipulative activities. As the market continue to evolve, regulators and Exchange may be obligated to take additional steps to guard against fraud and market violation.

## 49 Why do foreign futures exchanges list other exchange's contracts? Does this embody a form of competition or cooperation?

In 2006, ICE took the lead in listing the WTI Crude Oil Futures on its electronic platform; soon thereafter, the New York Mercantile Exchange (NYMEX) also listed the Brent Crude Futures for trading. For investors, to trade futures contracts cleared at a single exchange has many benefits: (1) they will enjoy a higher margin efficiency in inter-commodity trading; (2) It helps to solve issue of different tax policies for futures trading income if two legs of an arbitrage trades are executed on different boards of trading belonged to two jurisdictions; and (3) It also simplifies account opening procedures and trading position reporting with different exchanges, while increasing trading and capital efficiency.

Cross-listing of contracts agreed by two different exchanges could embody competition and cooperation in the same time. On one hand, by listing another exchange's product, one may dilute customers from another competitor exchange. On the other hand, a more complete and various productline on single platform may appeal more potential investors to participate in. It also stands for mutual recognition of successful contracts originated from other exchanges, which may attract more diversified investment and enhance market liquidity of the market overall.

## 50 What are other common derivatives contracts traded on exchanges?

In addition to futures contracts, other common oil-related contracts traded on foreign exchanges include options, swap futures, and spread contracts. Below are definitions of these derivative products:

### **Options:**

Options are contracts between a buyer and a seller, wherein the buyer, after paying a certain sum (known as the "premium") to the seller, acquires the right, but not the obligation, to, depending on the option, either buy from or sell to the seller a specific quantity of the underlying asset at a pre-determined price ("strike price"), either at any time before the option expires (in the case of an American option) or at a particular future date (in the case of an European option). For example, if a company buys, at \$1 per barrel, a call option for 100,000 barrels of Brent which expires in one month with a strike price of \$50, the company can be assured that, with the \$1 per barrel it has paid, it will only cost the buyer at a maximum price of \$5,000,000 to buy 100,000 barrels by the expiry of the call option (excluding the cost of the option premium and any transaction fees). If the market price of Brent increases to \$60 per barrel prior to expiry of this contract, the buyer may exercise the option and get the 100,000 barrels of Brent and pay \$10 dollars below the current market price. If, on the other hand, the price of Brent drops below \$40 per barrel, the company may choose to buy Brent in spot market rather than to exercise the option.

**Swap Futures :**

Commodity swaps are mostly traded in the over-the-counter (OTC) market and represent over 80% of OTC transactions. An increasing number of them are centrally cleared. Contrary to many futures, swaps are cash settled. A typical swap is often an agreement whereby a floating price is exchanged for a fixed average price of certain corresponding benchmark (such as a futures contract marker prices or settlement prices) over a specified period . For example, if party A (physical buyer) does a one-month long swap with party B for buying 100,000 barrels of Brent crude at \$50 per barrel against ICE Brent in April, the swap will be settled to the arithmetic mean of the futures daily settlement prices from April 1 to April 30. If the mean comes out to be \$55 a barrel, it means party A's average cost of buying Brent is \$55 dollar/barrel in April, however party B will pay the \$5 per barrel to party A for settlement of the swap of \$500,000 (100,000 barrels \* \$5/barrel). Conversely, if the mean is \$45, then party A's average cost of purchase the spot crude is lower, however, it has to pay \$5 per barrel to party B for settlement of the swap deal (totaling \$500,000).

**Spread contract:**

Spread trades are a popular trading strategy. There are three main types of spread trades: calendar spreads, inter-exchange spreads, and inter-commodity spreads. For instance, a spread trade using the March and the April Brent Futures Contracts is a calendar spread; a spread trade of Singapore Fuel Oil versus SHFE's Fuel Oil futures is an inter-exchange spread; and spread trade involving buying and selling of Singapore Fuel Oil 180 CST and Singapore Fuel Oil 380 CST futures contracts is an inter-commodity spread.



## 51 Is there any relationship between OTC derivatives and exchange-traded futures?

Common OTC transactions include swaps, options, and exotic options, some of which are settled against/derived from exchange-traded futures prices. Compared to exchange-traded derivatives, OTC markets are characterized by market participants trading directly with each other and may be more customized in terms of underlying asset quality, contracted quantity, contract expiry date, (for options or forwards) strike price. However, exchange-traded futures have advantage of higher liquidity, transparency, and lower counterparty credit risk with an exchange as a Central Counterparty (CCP). Sometimes market makers in OTC transactions will back-to-back hedge OTC market exposure using exchange-traded futures contracts, thus generating symbiotic relationship between the two markets .

## 52 What are the respective trading volumes of the OTC market and the exchange-traded derivatives market?

In terms of nominal value, OTC market is by far the larger of the two, both in terms of volume and product range, while the exchange market only serves as a supplementary market for derivatives trading. According to the Bank for International Settlements (BIS), in 2016, the notional principal of exchange-traded foreign exchange and interest rate futures and options amounted to \$67.25 trillion; that of OTC-traded FX and interest rate derivatives amounted to \$476.76 trillion. This means that nearly 89% of the \$535 trillion financial derivatives transactions were done in OTC market.

## 53 What are the future for OTC and exchange-traded derivatives markets? What is the centralization of the OTC market?

During the financial crisis of 2008, a large number of companies suffered losses from trading derivatives in the OTC market due to misleading market information and inadequate risk management. As a result, certain OTC markets contracted in the wake of the financial crisis, while the centralized trading platforms for futures and options maintained a relatively stable growth in trading volume.

OTC derivatives are bilateral agreements often traded by customers directly with banks. Historically, OTC markets were largely unregulated characterized by little transparency and subjected participants to substantial counterparty credit risk. More recently, countries around the world have been strengthening the regulation of OTC derivatives markets. In July 2010, the *Dodd–Frank Wall Street Reform and Consumer Protection Act* was signed into United States federal law, which is perceived as the most comprehensive and stringent financial reform law yet introduced since the Great Depression. Among its many reform measures, this Act particularly provides for enhancing the regulation of OTC derivatives and promoting the standardization and central clearing of OTC trades. Singapore then followed and imposed similar requirements. All major exchanges such as ICE and CME Group have also started listing contracts that were used to be traded in OTC market—such as swap futures and options, and providing clearing services for OTC trades. Thus, in the order to support enhanced regulation of OTC markets and lower counterparty risk, of the concept of centralized OTC markets is now gaining prominence.



# INTERNATIONAL CRUDE OIL FUTURES MARKET

# 07



# INTERNATIONAL CRUDE OIL FUTURES MARKET

## 54 What are the international exchanges that currently list crude oil futures? How are their trading scales and extent of market influence?

There is a total of 12 overseas exchanges listing oil futures on their own platforms. The most influential are the West Texas Intermediate futures contract (WTI) traded on the New York Mercantile Exchange (NYMEX), a subsidiary of the Chicago Mercantile Exchange Group (CME Group), and Brent traded on the Intercontinental Exchange (ICE). WTI and Brent contracts have become regional benchmarks for the US and European crude markets respectively. In addition, Oman futures listed on the Dubai Mercantile Exchange (DME) is also an important oil market benchmark.

Other crude oil contracts are: Two Crude Oil Futures of the Multi Commodity Exchange of India (MCX) that reference WTI and Brent prices; both the India National Commodity and Derivatives Exchange's (NCDEX) and Thailand Futures Exchange's (TFEX) crude contracts are pegged to the Brent price; Dubai (Middle East) crude oil futures on Tokyo Commodity Exchange (TOCOM); Brent and Urals crude oil futures listed by the Moscow Exchange (MOEX); both of Singapore Mercantile Exchange's (SMX) and Argentina Rosario Futures Exchange's (ROFEX) crude oil futures contracts are pegged to WTI; and the crude oil futures on the South Africa's Johannesburg Stock Exchange (JSE). Annual trading volume of above contracts in year 2016 is provided in Appendix 6.

## 55 What is the underlying crude or quality for WTI and Brent futures?

The underlying for West Texas Intermediate (WTI) futures listed on NYMEX is a light sweet crude that is delivered into Cushing, Oklahoma, USA . The underlying for Brent futures is a light sweet crude produced in the Brent and Ninian oilfields in the North Sea region of the North Atlantic Ocean.

## 56 Who are the main participants in the international crude oil physical and futures markets?

Main players in physical market include oil producers (e.g., Qatar Petroleum), refineries (e.g., CNPC), international oil companies (e.g., Shell), trading houses (e.g., Mercuria), investment banks (e.g., Morgan Stanley) and so on.

Participation in crude futures market is more extensive, including not only the above-mentioned participant types, but also hedge funds, mutual funds, insurance companies, investment banks, commercial banks , retail investors, and end-user/downstream industries, such as airlines and shipping companies.

## 57 Why is there a trading price differential between different crudes? Is there a reasonable range to the spread between two crude streams?

Different crudes indeed trade at different prices in spot market, for a number of reasons. Firstly, the quality characteristics of different crudes (API gravity, sulfur content, and other indicators) varies greatly. In general, light sweet crude oils are priced higher than heavy sour crude oils. Secondly, the same crude produced at different stages of time may vary in quality and cause a change in the price differential from its marker. Thirdly, changes in supply and demand for different crude streams may also lead to changes in the spread. For example, when a huge refinery that only processes one certain crude is shut down by fire, it may weaken the demand and price for that crude, which may widen its spread against its marker. Lastly, the same crude may be traded at different prices in different locations. Thus, there may be a geographical price spread for the same crude stream.

Oil price differences generally will trade within a certain range over a given time frame, otherwise it may produce arbitrage trade opportunity. Also, market forces are such that the combination of, oil producers' reluctance to produce and increased consumers' demand will tend to force prices higher when oil price is too low, and vice versa. This interplay between supply and demand typically bring the price differentials back into a reasonable range.

## 58 What is a market maker? How do market makers contribute to the futures market? Will market makers be introduced in the Chinese crude oil futures market?

To maintain market liquidity and address the investment needs of public investors, market making was introduced in the futures



market long ago. A market maker is a designated institutional principal trader that meets certain quality criteria and has good faith to continuously provide bid/offer quotes in specified futures contracts, and stand ready to buy and sell those contracts on a regular and continuous basis at a publicly quoted prices using their house accounts. The function of market making is to provide and maintain market liquidity at all time when market is open and enhance liquidity of all contracts, especially for those that may lack liquidity. As such, market making is crucial for newly listed contracts and inactive far-month contracts.

To ensure the smooth function of the market maker system, robust market making laws and regulations are required to define the rights and obligations of market makers. INE is studying and developing market making rules.

## 59 Is physical delivery necessary for a crude oil futures?

No, cash settlement may also work. For instance, Brent crude has a sophisticated and liquid spot market, and its futures contract that is traded on ICE is cash-settled against ICE Brent Index (cash market price of Brent) at contract expiry.

Compared with cash settlement, physical delivery will better link its futures prices to the spot market. As physical delivery will force the prices of futures and cash to converge, the integrity of the contract enables the futures market to better support the physical market.

Commodity futures already listed in China, including crude oil futures, are all physically deliverable.

# DESIGN OF CHINA'S CRUDE OIL FUTURES CONTRACT

# 08





# DESIGN OF CHINA'S CRUDE OIL FUTURES CONTRACT

## 60 What is the significance of developing China's own crude oil futures market?

In order to provide a marketplace for the wide variety of investors who need to manage price risk, and to help to support business sustainability, China needs to form its own crude futures market. Though there are sophisticated and highly liquid oil futures markets in Europe and North America already, their prices do not reflect the supply and demand of crude oil in the Asia-Pacific region. A Chinese crude oil futures contract may help create an oil benchmark price capturing the dynamic of China and the Asia-Pacific oil market. Thus it will optimize oil resource allocation in this regional market and better serve commerce and the economy. Establishment of the crude oil futures market is one of the key steps taken by China to open up and internationalize its futures market.

## 61 What are the government policies for supporting China's crude oil futures?

China's crude oil futures are made possible by strong support from various agencies under the State Council, including the Ministry of Finance (MOF), State Administration of Taxation (SAT), China Securities Regulatory Commission (CSRC), People's Bank of China (PBC), State Administration of Foreign Exchange (SAFE), and General Administration of Customs (GAC). These agencies have released a wide range of supporting policies, including:

The *Notice on the Value-Added Tax Policies for the Bonded Delivery of Crude Oil and Iron Ore Futures Contracts* issued by MOF and SAT in April 2015, which provides that the bonded delivery of crude oil futures is to be VAT-exempt until further notice; the *Interim Measures for the Administration of Overseas Traders' and Overseas Brokers' Engagement in the Trading of Specified Domestic Futures Products* issued by CSRC in June 2015, setting out the requirements for futures account opening, clearing and settlement, margining and collateral management with respect to overseas participation and overseas brokerage business; the *Announcement on Matters Concerning the Administration of Cross-Border Settlement of Domestic Crude Oil Futures Trading* published by PBC in July 2015, which specifies the denominated currency for trading and settlement of crude oil futures, specific-purpose RMB & FX bank account opening, and the scope of revenues and expenditures, interest accrual principals, Bank's specific monitoring and management requirements, and anti-money laundering and anti-terrorism financing practice for such accounts; the *Circular of the State Administration of Foreign Exchange on Foreign Exchange Administration for Overseas Traders and Brokers Engaging in Futures Trading under Specific Domestic Categories* issued by SAFE in July 2015, which clarifies matters relating to specific-purpose FX bank account opening, and the scope of revenues and expenditures, interest accrual principals, Bank's specific monitor and management requirements, balance of payments reporting for such accounts; and the *Announcement Regarding the Bonded Delivery of Crude Oil Futures Contracts*, released by GAC in August 2015 to support the physical bonded delivery practice of crude oil futures.

These policies have laid a solid foundation for INE to provide a more convenient and international standard trading platform for China's crude oil futures, and a user friendly futures trading environment for domestic and overseas traders.



## 62 What are the general principles behind the contract design of China's crude oil futures?

The design of China's crude oil futures contract is based on four principles: Creation of an Internationalized Platform, Net (of tax) pricing, Bonded Delivery, and RMB Price Denomination. "Internationalized Platform" means trading, clearing & settlement, and delivery at INE adopts global standard so the market is freely, efficiently, and conveniently accessible to onshore as well as offshore investors— including global oil companies, oil trading houses, and investment banks. The aim is to accelerate the formation of a new oil benchmark that reflects the supply and demand characteristics in China and the Asia-Pacific region via active international participation and acceptance of the new futures contract. "Net Pricing" means a clean price prior customs duty and VAT, different from after-tax pricing of other futures contracts listed on other China futures exchanges. This arrangement facilitates direct comparison with other global oil futures prices, and eliminates the impact on the futures price of any tax policy change. "Bonded Delivery" means physical delivery performed using a commodity which is under bonded supervision and within the bonded supervision premises as the underlying product for delivery. The main purpose for this practice is that the spot market of bonded commodity goods is net priced prior to the imposition of tax, and more types of participants are allowed to trade in this market than in the Chinese domestic market. As such, bonded oil terminals act as a link between the domestic and overseas oil markets, making trading and delivery of bonded commodity goods more accessible to global spot market and derivative traders. "RMB Denomination" means daily settlement variation and physical delivery settlement of crude futures contract are denominated in Renminbi, while US dollar and other foreign currencies specified by the Exchange are acceptable as margin collateral.

## 63 What is the role of INE as a central counterparty (CCP)?

As a Central Counterparty (CCP), INE will interpose itself between counterparties upon execution of a futures trade, becoming the seller to the buyer and the buyer to the seller, adopt the net settlement method, and ensure all settlement and delivery for centralized futures trading. Furthermore, the General Exchange Rules of INE provide that the legal attributes of property rights derived from activities such as trading, clearing and delivery of executed orders, positions closed, cash received as margin, assets either pledged or transferred as margin collateral, standard warrants paired for delivery, or those actions adopted by the Exchange against any default event, shall not be revoked or considered null and void due to initiation of bankruptcy proceedings against any Member, and that in the event that a Member enters into a bankruptcy proceedings, the Exchange may still conduct net settlement for such Member's positions in accordance with the General Exchange Rules and the other specifically related rules..

## 64 How will INE strengthen its risk management systems to support the globalized futures market?

INE will strictly implement measures that have been proven effective in China's other futures markets, such as pre-margining, One-Trader-One-ID coding policy, position limits, and large trader reporting. In addition, given the different risk profile of overseas traders and the new trading framework of crude oil futures, INE has adopted robust Know Your Customer procedures, including the trader's identity authentication system, ownership & control reporting, and strengthen the management of customer fund segregation and the closed circuit cash flow of margin fund. INE will also work with overseas futures regulators to establish joint regulatory mechanisms to develop effective cross-border supervision and to enable investigation of suspicious trading activity.

## 65 What common China futures rule principles will be carried over to the crude oil futures market? What new rules will be formulated and applied?

China's crude oil futures market carries over certain practices common to China's other futures markets, such as, the One-Trader-One-ID coding policy, pre-margining, position limit, physical delivery, and the risk management framework.

In terms of regulating overseas participants and futures brokers, the relevant authorities have created policies and rules regarding trader's eligibility, use of other currencies other than RMB for futures trading, and risk control and management. INE implements rules based on these policies to regulate overseas participation.



## What are the Chinese crude oil futures contract specifications?

The specifications for Chinese crude oil futures contract are as follows:

Table 4: Specifications of China's Crude Oil Futures contract

Product	Medium Sour Crude Oil
Contract Size	1,000 barrels per lot
Price Quotation	Yuan (RMB) per barrel (exclusive of taxes and customs duty)
Minimum Price Fluctuation	0.1 yuan/barrel
Daily Price Limits	±4% from the settlement price of the previous trading day
Listed Contracts	Monthly contracts of 12 consecutive months followed by eight (8) quarterly contracts
Trading Hours	9:00-11:30 a.m., 1:30-3:00 p.m. Beijing Time, and other trading hours as prescribed by INE
Last Trading Day	The last trading day of the month before the delivery month, subject to change by INE in view of China national holidays
Delivery Period	5 consecutive trading days after the last trading day
Grades and Quality Specifications	Medium sour crude oil with API gravity of 32° and sulfur content of 1.5% by weight. Deliverable grades and the price differentials are stipulated by INE
Delivery Venues	Delivery Storage Facilities designated by INE
Minimum Trading Margin	5% of contract value
Settlement Type	Physical delivery
Product Code	SC
Listing Exchange	Shanghai International Energy Exchange

Source: Shanghai International Energy Exchange

## 67 Why has INE chosen medium sour crude oil as the underlying for its crude futures?

The medium sour crude oil has been chosen for the following reasons: (1) reserves of this type of petroleum is relatively abundant and accounts for about 44% of global oil production; (2) Due to geographical differences in production and consumption of medium sour crude compared with light sweet crude, their respective market supply and demand dynamics also differ. Currently there is still not a global benchmark market price for medium sour crude; and (3) It is the primary crude stream imported by China and its neighboring countries. The creation of a benchmark for medium sour crude oil may benefit and enhance oil trade in Asia Pacific Region.

## 68 How does INE set the deliverable grades, crude quality criteria and price differentials for each deliverable grade of crude futures?

Based on relevant rules prescribed in the contract specifications for the "*Standard Crude Oil Futures Contract of the Shanghai International Energy Exchange*" and the "*Standard Crude Oil Futures Contract of the Shanghai International Energy Exchange*", the deliverable grades, crude quality criteria and price differentials for each deliverable grade of crude futures are set as follows:

Table 5: INE Crude Futures' Deliverable Grades, Crude Quality Criteria & Price Differentials

Country	Grades	Minimum API	Maximum Sulfur Content (%)	Price Differential (RMB/Barrel)
UAE	Dubai	30	2.8	0
UAE	Upper Zakum	33	2.0	0
Oman	Oman	30	1.6	0
Qatar	Qatar Marine	31	2.2	0
Yemen	Masila	31	0.8	5
Iraq	Basrah Light	28	3.5	-5
China	Shengli	24	1.0	-5

Note:

1、 API Gravity =  $(141.5/SG \text{ at } 60^\circ F) - 131.5$ . Gravity as determined by ASTM D1298 or its latest revision.

2、 Sulfur as determined by ASTM D4294 or its latest revision.

INE closely monitors key changes and market developments for each deliverable grade, and will adjust Deliverable Grades, Crude Quality Criteria & Price Differentials accordingly.

## 69 Why wasn't domestically produced crude chosen as the deliverable grade for Chinese crude futures contract?

Because domestically produced crude oil is consumed on-site and/or refined by nearby the oil company that also owns the oil field, China does not currently have a crude oil spot market. Moreover, the crude oil business in China is still highly controlled by the government so there is no freely-traded market for domestic oil that reflects demand and supply conditions.

Therefore, sufficient supply of more deliverable grades including imported oil streams for meeting the physical settlement of the crude futures is necessary, rather than solely rely on domestic produced crude streams.

## 70 Why is multiple deliverable grades from different countries/locations adopted in the Chinese crude oil futures contract?

Trading volume in any single imported crude stream may not be significant enough to avoid price irregularity, and be representative of the oil trading in the Asia Pacific region. Having a single crude stream as the only deliverable grade for China's crude oil futures contract may materially impact the oil trading flow and spot price of that single crude stream. Over the long term, delivery of a single grade may create source dependence for the crude futures physical delivery and may have significant impact on seller ability to make delivery and create distortions in the contract price. Furthermore, oil producing countries usually do not wish to create a monopolistic market that controlled by other party. Therefore, for these reasons, multiple deliverable grades for China's crude oil futures contract has been adopted.

## 71 What contract months are listed for trading for China's crude futures? How is it different from other international markets?

The INE lists 12 consecutive monthly followed by 8 quarterly crude futures contracts, spanning a period of three years. In comparison, time length of contract months of overseas oil futures contracts generally is much longer. For example, 96 consecutive monthly contracts of Brent Crude futures are listed on ICE; for CME WTI futures, as of May-2018, nine years of contracts are listed consistent with the following schedule: monthly contracts listed for the 9 consecutive calendar years and 2 additional consecutive contract months; and For DME Oman futures, consecutive months

are listed for the current year and the next five years and a new calendar year will be added following the termination of trading in the December contract of the current year.

Considering the fact of the illiquidity of far-month contracts in China's futures market, the time-length of contract months of the crude oil futures is set at 3 year long in the beginning phase. It will be adjusted by INE going forward in response to market developments and investors' needs.

Exchange / Contract	Contract Months
CME WTI	monthly contracts listed for the current year and the next 8 calendar years and 2 additional consecutive contract months
ICE BRENT	96 consecutive months
DME OMAN	Consecutive months are listed for the current year and the next five years. A new calendar year will be added following the termination of trading in the December contract of the current year
SHFE SC	12 consecutive near-term monthly followed by 8 quarterly of crude futures contracts

## 72 What is the last trading day and delivery period of China's crude oil futures contract? How do they differ from those of overseas contracts?

The last trading day for China's crude oil futures contract is the last trading day of the month preceding the contract month. For example, the last trading day for the Jun-2017 contract is May 30, 2017. The delivery period (delivery of crude warrants) is the five consecutive business days after the last trading day.

Trading in the current delivery month of NYMEX WTI contract ceases on the third business day prior to the twenty-fifth calendar day of the month preceding the delivery month. If the twenty-fifth calendar day of the month is a non-business day, trading ceases on the third business day prior to the last business day preceding the twenty-fifth calendar day. For example, the last trading day for the Jun-2017 contract (delivery month) is May 22, 2017. The NYMEX WTI contract calls for physical delivery; the delivery period is from the first business day to the last business day of the delivery month.

The last trading day for the ICE Brent contract is the last business day of the second month preceding the contract month. For example, the last trading day of the Jun-2017 contract is April 28, 2017. The ICE Brent contract is cash settled against the ICE Brent Index Price, a well-developed spot market price which provides an authoritative price for the final settlement of the futures contract.

The last trading day for the DME Oman contract is the last trading day of the second month preceding the delivery month. For example, the last trading day for the Jun-2017 contract is April 28, 2017. The DME Oman contract calls for physical delivery defined in the following way: Intention notices for delivery and matching are completed on the first business day after the last trading day, and delivery shall be completed within the delivery month.

Exchange / Contract	Last Trading Day
CME WTI	Trading in the current delivery month ceases on the third business day prior to the twenty-fifth calendar day of the month preceding the delivery month. If the twenty-fifth calendar day of the month is a non-business day, trading ceases on the third business day prior to the last business day preceding the twenty-fifth calendar day
ICE BRENT	The last business day of the second month preceding the contract month (e.g., March contract will expire on the last business day of January)
DME OMAN	Trading ceases on the last trading day of the second month preceding the delivery month
INE SC	The last trading day of the month preceding the delivery month, subject to change by INE taking into account of China national holidays

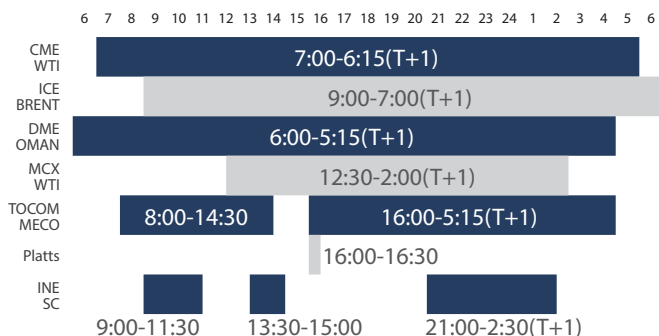
# 73 How do the daily trading hours of China's crude oil futures differ from those of major international crude oil futures contracts?

CME WTI on Globex: Sunday to Friday 18:00—17:00 (+1 day) New York Time/ET, with a 60-minute break each day beginning at 17:00 ET.

ICE Brent: Sunday to Friday 20:00—18:00 (+1 day) New York Time; 01:00—23:00 London Time; and 08:00—06:00 (+1 day) Singapore Time.

DME Oman: Electronic trading is open from 16:00 CST/CDT Sundays and from 16:45 CST/CDT Monday to Thursday and closes at 16:00 CST/CDT the next day, Monday to Friday.

INE Crude Oil Futures: Monday to Friday 9:00—11:30, 13:30—15:00 Beijing Time and other trading hours (Continuous Trading Hours) as prescribed by the INE. INE will continue to observe the needs for extension of trading hours for the market development.



Note:

1. All hours shown above are based on Beijing time.
2. CDT refers Central Daylight Time. The time difference is reduced by one hour when CDT is in effect.



# 74

## Is there any crude spot price that serves as the underlying price for China's crude oil futures contract?

Chinese crude oil futures facilitate physical delivery through crude stored in designated bonded oil depots, which are located in the coastal regions of China. Thus the China's crude oil futures price should reflect the CIF (i.e. cost, insurance and freight) China bonded port's spot oil price.

For sellers intended to make delivery, the delivery price is the CIF price (from the origination) at bonded oil depots; and for buyers intending to take delivery, it is the FOB price (for the next shipping destination) at bonded oil depots. Take Oman crude as an example, the FOB price of Oman crude at the port of loading plus the applicable freight, insurance fee and other expenses for shipment to a Chinese port, and the applicable fees of port, dock and load-in after arrival at the Chinese port shall equal to the theoretical delivery price of Oman crude at a Chinese port.

# 75 How does China's crude oil futures differ from and relate to other major international contracts?

China's crude oil futures differ from major international crude oil futures in a number of areas, including deliverable grades, contract size, quotation method, trading hours, and listed contract months. A summary of comparison is given in the table below:

**Table 6: Comparison of China's and Other International Crude Oil Futures Contracts**

	INE MSC (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OQD)
Underlying Product	Medium sour crude oil with API gravity of 32° and sulfur content of 1.5% by weight. Deliverable grades and premiums / discounts will be separately set by INE	BFOE (Brent, Forties, Oseberg, Ekofisk)	Light sweet crude oil with API gravity of 37° — 42° and sulfur content not above 0.42%. Deliverable grades can be any of the six domestic crudes and five foreign crudes (premiums / discounts apply) <sup>6</sup>	Oman Crude Oil
Contract Size	1,000 barrels per lot	1,000 barrels per lot	1,000 barrels per lot	1,000 barrels per lot
Price Quotation	Yuan per barrel	U.S. Dollars and Cents per barrel	U.S. Dollars and Cents per barrel	U.S. Dollars and Cents per barrel
Minimum Price Fluctuation	¥0.1 per barrel	\$0.01 per barrel	\$0.01 per barrel	\$0.01 per barrel
Settlement Method	Physical delivery	Cash settlement	Physical delivery	Physical delivery
Delivery Method / Type	Warrant Delivery of crudes stored at INE-designated delivery storage facilities in bonded zones	Optional delivery by Exchange of futures for physical	FOB at pipeline or storage facility in Cushing	FOB at the Loading Port
Daily Settlement Price	daily volume-weighted average price (VWAP)	VWAP from 19:28 to 19:30 London time	VWAP from 19:28 to 19:30 ET	VWAP from 16:25 to 16:30 Singapore time
Last Trading Day	The last trading day of the month preceding the contract month	The last business day of the second month preceding the contract month (e.g., March contract expires on the last business day of January)	Trading in the current contract month ceases on the third business day prior to the twenty-fifth calendar day of the month preceding the contract month. If the twenty-fifth calendar day of the month is a non-business day, trading ceases on the third business day prior to the last business day preceding the twenty-fifth calendar day	Trading ceases on the last trading day of the second month preceding the contract month

	INE MSC (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OOD)
Delivery period	Five consecutive business days after the last trading day <sup>7</sup>	Cash settled on the next day following the last trading day for the contract month	From the first calendar day to the last calendar day of the contract month	Delivery matching and tanker selection in the month preceding the contract month; delivery in contract month
Price Limit	± 4% from the settlement price of the previous day	None	\$5 above or below the settlement price of the previous day. When price limit is hit trading will halt for 2 minutes, upon resumption price limit will be set to twice the original value, and a total of 4 escalation level with five dollar increment at each level. After the fourth level price limit is hit, the circuit break will be exempted for the day	None
Minimum Trading Margin	5% of contract value	\$2,700 — \$3,700/lot	Initial margin of \$2,700/lot, and maintenance margin of \$2,300/lot for the spot month contract; Margin requirements for far month contracts gradually decrease	Initial margin: \$4,750/lot; maintenance margin: \$3,750/lot
Contract Months	12 consecutive near-term monthly followed by 8 quarterly of crude futures contracts	96 consecutive months	monthly contracts listed for the current year and the next 8 calendar years and 2 additional consecutive contract months	Consecutive months are listed for the current year and the next five years. A new calendar year will be added following the termination of trading in the December contract of the current year
Trading Hours	Beijing Time 9:00 — 11:30, 13:30 — 15:00, and other trading hours as prescribed by INE	New York Time: 20:00 — 18:00 (+1 day) London Time: 01:00 — 23:00 Singapore Time: 08:00–06:00 (+1 day)	CME Group Globex electronic trading platform Sunday to Friday, New York Time/ET 18:00 — 17:00 (+1), with a 60-minute break each day beginning at 17:00	Electronic trading is open from 16:00 CST/CDT Sundays and from 16:45 CST/CDT Monday to Thursday and closes at 16:00 CST/CDT the next day, Monday to Friday

Source: Shanghai International Energy Exchange, as of October 2017

<sup>6</sup>U.S. domestic crudes: 1. West Texas Intermediate (WTI); 2. Low Sweet Mix (Scurry Snyder); 3. New Mexican Sweet; 4. North Texas Sweet; 5. Oklahoma Sweet; 6. South Texas Sweet. Foreign crudes: 1. Brent Blend (U.K.); 2. Bonny Light (Nigeria); 3. Qua Iboe (Nigeria); 4. Oseberg Blend (Norway); and 5. Cusiana (Columbia).

<sup>7</sup>Because China's crude oil futures are delivered through standard warrants, "five consecutive business days after the last trading day" refers to the period for the transfer of warrants, while the actual loading of goods (either onto a vessel or into a storage facility) would have been completed before then.



# TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

09

# TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

## 76 Why does the China crude oil futures market need global participation?

First, crude oil is freely traded by a wide variety of global participants on a multilateral basis. An internationalized crude oil futures market in China may more accurately reflect the spot market, thereby better support the real economy.

Second, China is a net oil importer, with imports exceeding 60% of its total consumption. Globalizing the futures market and allowing international participation helps re-balance the relative power of oil buyers and sellers, resulting in a more robust market mechanism.

Third, with the participation of international investors, the crude oil futures market may help China to gain a voice in the international crude oil market.

## 77 What are the major oil spot and derivative trading hubs globally?

Most international oil spot trading takes place in the region of North Sea and the Mediterranean Sea in Europe, the United States, Singapore, and the Middle East. Meanwhile, Europe, the United States, and the Asian Pacific are the top oil-consuming regions in the world. The global top three crude oil futures are West Texas Intermediate (WTI) futures traded on the New York Mercantile



Exchange (NYMEX), a subsidiary of the Chicago Mercantile Exchange Group (CME Group), Brent crude futures traded on the London-based Intercontinental Exchange (ICE), and Oman crude oil futures traded on the Dubai Mercantile Exchange (DME) in the United Arab Emirates.

## 78 How can an overseas participant access and trade the China's crude oil futures ?

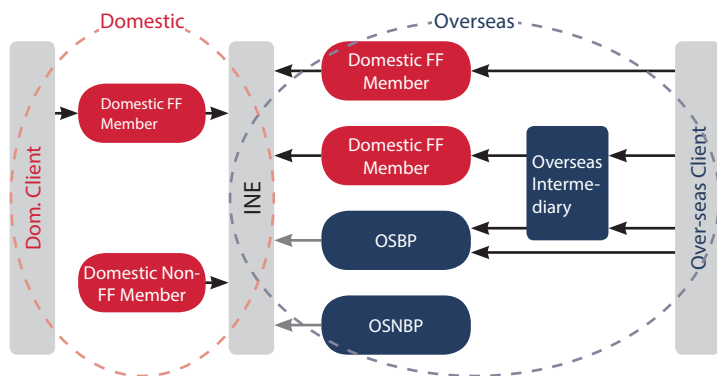
Global Participation Accesses to INE are:

**Access 1:** Global customer may trade through a domestic Futures Firm Member (FF Member) of INE;

**Access 2:** An INE-recognized Overseas Intermediaries may help its global customers execute and clear trades through a carry broker, either a domestic FF Members or an Overseas Special Brokerage Participant (OSBP) of INE, following the principle of "One Trader, One ID" regime;

**Access 3:** An INE OSBP having direct trading right on the Exchange may help their global customers execute trades on the Exchange but clear and settle trades through its contracted carry broker, who must be an INE's FF Member;

**Access 4:** Or being an Overseas Special Non-Brokerage Participants (OSNBP) of INE that trades directly on the Exchange but clear and settle trades through its contracted carry broker, who must be an INE's FF Member.



Note: Black arrows indicate direct access of trading, clearing and settlement. Grey arrows indicate direct access of trading directly, but clear and settle trades through a carry broker who must be a domestic FF Member.

#### Exhibit 10: Accesses of Participation of Overseas Investors

Source: Shanghai International Energy Exchange

## 79 What is the trader eligibility criteria for overseas institutional customers to participate in China's crude oil futures market and how may eligible overseas traders trade on the Exchange?

Any overseas institutional investor intending to participate in China's crude oil futures market should meet the requirements set in the *Futures Trading Participant Eligibility Management Rules of the Shanghai International Energy Exchange*, including but not limited to the following: having relevant business professionals who understand the essentials of futures trading and the rules of INE and have passed relevant tests; having futures trading history and record; having a cash balance of no less than RMB 1 million or its foreign currency equivalent in its margin account last for more than five business days before applying for a trading code; having in place sound futures trading management rules; having no material adverse credit record and not banned from the futures



market by competent regulatory authority; having never been prohibited or banned from engaging in trading futures pursuant to any laws, rules and regulation of China or rules of INE .

All Eligible traders need to abide by the laws and regulations of China, the rules of INE, as well as the laws, regulations, and regulatory rules of their home jurisdiction. INE encourages investors and oil-related commercial clients to engage in hedging trades in China's crude oil futures market.

Overseas investors may participate in China's crude oil futures market using any of following accesses: (a) Global customer may trade through a domestic Futures Firm (FF); (b) An INE-recognized Overseas Intermediaries may help its global customers execute and clear trades through a carry broker, either a domestic FF or an Overseas Special Brokerage Participant (OSBP); (c) An INE OSBP having direct trading right on the Exchange may help their global customers execute trades on the Exchange; or (d) an Overseas Special Non-Brokerage Participants (OSNBP) of INE that trades directly on the Exchange.

## 80 How may overseas futures brokers participate in China's crude oil futures market?

An overseas futures broker may either apply to the INE to be an OSBP and direct connect to the Exchange for execution of trades or execute trades and clear through a carry broker who is either a domestic FF Member or an OSBP on behalf of its overseas customers.

# 81

## How may overseas individual investors participate in China's crude oil futures market?

Any overseas individual investor intending to participate in China's crude oil futures market should meet the requirements set in the *Futures Trading Participant Eligibility Management Rules of the Shanghai International Energy Exchange*, including but not limited to the following: having full capacity for civil conduct; understanding the essentials of futures trading and the rules of INE; having passed relevant tests; having futures trading history and record; having a cash balance of no less than RMB 500,000 or its foreign currency equivalent in his/her margin account last for more than five business days before applying for a trading code; having no material adverse credit records and not banned from the futures market by competent regulatory authority; having never been prohibited or banned from engaging in futures trading pursuant to any laws, regulations, and rules of China or any rules of INE.

All Eligible traders need to abide by the laws and regulations of China, the rules of INE, as well as the laws, regulations, and regulatory rules of their home jurisdiction.

An overseas individual investor may participate in China's crude oil futures market through a domestic FF Member, an OSBP, or an Overseas Intermediary.

## 82 Is there any trader eligibility requirement for domestic institutional investors in participating in China's crude oil futures market?

Any domestic institutional investor intending to participate in China's crude oil futures market should meet the requirements set in the *Futures Trading Participant Eligibility Management Rules of the Shanghai International Energy Exchange*, including but not limited to the following: having relevant business professionals who understand the essentials of futures trading and the rules of INE and have passed relevant tests; having futures trading history and record; having a cash balance of no less than RMB 1 million or its foreign currency equivalent in its margin account last for more than five business days before applying for a trading code; having in place sound futures trading management rules; having no material adverse credit record and not banned from the futures market by competent regulatory authority; having never been prohibited or banned from engaging in trading futures pursuant to any laws, rules and regulation of China or rules of INE. INE encourages investors and oil-related commercial clients to engage in hedging trades in the crude oil futures market

## 83 How do domestic individual investors participate in China's crude oil futures market? What are the restrictions?

Any domestic individual investor intending to participate in China's crude oil futures market should meet the requirements under the *Futures Trading Participant Eligibility Management Rules of the Shanghai International Energy Exchange*, including but not limited to the following: having full capacity for civil conduct; understanding the essentials of futures trading and the rules of INE; having passed relevant tests; futures trading history and

record; having a cash balance of no less than RMB 500,000 or its foreign currency equivalent in his/her margin account last for more than five business days before applying for a trading code; having no material adverse credit records and not banned from the futures market by competent regulatory authority; having never been prohibited or banned from engaging in futures trading pursuant to any laws, regulations, and any rules of INE.

All Eligible traders need to abide by the laws and regulations of China, the rules of INE, as well as. In addition, an individual investor is not allowed to engage in physical delivery of the crude oil futures.

## 84 Is it required for those investors, who are under the jurisdiction of Europe and participating in China's crude oil futures market through an European Overseas Intermediary, to register to relevant authority for participation of overseas futures market by observing the European Market Infrastructure Regulation (EMIR)?

According to the guiding principle given by the CSRC, INE prioritized and have completed the analysis work about cross-border regulation of Hong Kong, Singapore and the United States on participation in overseas futures market. The Exchange has launched further regulation study on overseas futures market participation of other global financial trading hubs.

There are many countries and financial regulators in the region of Europe or under the league of European Union (EU). Thus an European participant may face double layers of regulation from its jurisdiction as well as from the European Securities and Markets Authority (ESMA) when participating the China crude futures trading, It's highly recommended to such participant to provide information about his/her nationality and desired participation mode on INE, so that the Exchange may conduct relative regulation study and provide advice accordingly.

## 85 Can a Non-FF Member that is approved by INE to use other futures broker(s) to execute their trades on INE?

According to Article 37 of "*Membership Management Rules of the Shanghai International Energy Exchange*," that states "except otherwise approved by the Exchange, a Non-FF Member shall not open another account as a Client to engage in futures trading," A trader, that has already gained the status of being an INE's non-FF member and directly trades and clears on the Exchange, shall not trade through a broker using a client account.



# 10

## SETTLEMENT AND RISK MANAGEMENT OF CHINA'S CRUDE OIL FUTURES TRADING





# SETTLEMENT AND RISK MANAGEMENT OF CHINA'S CRUDE OIL FUTURES TRADING

## 86 How are the daily settlement price and final settlement price of China's crude oil futures contract determined? How are settlement prices of major international crude oil futures contracts determined?

The daily settlement price of INE's crude futures is a volume-weighted average price of all trades executed in a trading day and the final settlement price is the arithmetic mean of the daily settlement prices of the last five trading days that have trades executed.

The daily settlement price of ICE Brent crude futures is the volume-weighted average price from 19:28 to 19:30 London Time, while that of WTI crude futures is the volume-weighted average price from 14:28 to 14:30 New York Time, i.e., from 19:28 to 19:30 London Time, the same window of data collection as ICE. The daily settlement price of DME Oman crude futures is the volume-weighted average price from 16:25 to 16:30 Singapore Time; the cut-off time corresponds to 12:30 Dubai Time, 2:30 US CST, or 3:30 US CDT.

Brent crude futures are mostly cash-settled based on the ICE Brent Index price recorded on the expiry day for the relevant futures contract month. The index represents the average price of trading in the BFOE (Brent Blend, Forties, Oseberg, Ekofisk) cash of forward



market in the relevant delivery month as reported and confirmed by the industry media. Only published cargo-size (600,000 barrels) trades and assessments are taken into calculation. The index is an average of the following elements: (1) a weighted average of first month (front month) cargo trades in the BFOE market; (2) a weighted average of second month cargo trades between the BFOE Cash market plus a straight average of the spread trades between the first and second months; and (3) a straight average of designated assessments (mid-point of each quote) published in media reports.

The final settlement price of WTI crude futures is the final settlement price of the last trading day. that of Oman crude futures is a volume-weighted average price of expiring contracts from 16:25 to 16:30 Singapore Time.

## 87 What's the requirement on money exchange offshore participants in the crude futures trading?

The crude futures on INE is denominated in Renminbi (RMB) and it's cleared and settled in RMB as well. For offshore investors and qualified overseas brokers, they are allowed to post cash in RMB or USD as margin. During the daily clearing and settlement cycle, the USD cash will be exchanged to RMB for mark to market, if a trading account's daily mark-to-market result is in a loss and the RMB balance is not sufficient to cover the loss.

Any purchase and sales of foreign exchange shall match the crude futures' trading result of an offshore traders or a qualified overseas brokers. The money exchange can only be executed for mark to market for crude futures trading, futures trading related fees, physical delivery, and other money exchange needs related to cruder futures trading.

## 88 What's the flow of inbound/outbound fund transfer for crude oil futures trading?

According to the PBOC Circular [2015] No.19 of People Bank of China (PBOC) and the circular of Huifa [2015] No. 35 of the State Administration of Foreign Exchange (SAFE), offshore investors and overseas brokers may remit offshore RMB or USD to onshore specific-purpose bank account to participate the crude futures trading. Such funds shall be placed in segregated accounts and isolated from unauthorized access and operations while they are within China, and may not be used for any purpose other than futures trading. Remittance of fund in a specific-purpose bank account shall observe the scope of receipts and payments as prescribed in relevant policies.

## 89

## How does China's crude oil future contract differ from other major crude oil futures contracts in the world in terms of the price limit?

A price limit of 4% (minimum limit) above or below the preceding day's settlement price. The Exchange may, in its sole discretion, adjust the price limit for such futures contract in response to market risk conditions. In general, international markets either do not prescribe a price limit, or implement a lenient one to complement circuit breakers.

There is no price limit for ICE Brent crude futures and DME Oman crude futures. For WTI crude futures contract, there is a initial price fluctuation limit of \$5 above or below the settlement price of the previous day. When price limit is hit, trading will halt for 2 minutes. Upon resumption price limit will be set to twice the original value, and a total of 4 escalation level with five dollar increment at each level. After the fourth level price limit is hit, the circuit break will be exempted for the day.

Exchange / Contract	Price Limit
CME WTI	\$5 above or below the settlement price of the previous day. When price limit is hit trading will halt for 2 minutes, upon resumption price limit will be set to twice the original value, and a total of 4 escalation level with five dollar increment at each level. After the fourth level price limit is hit, the circuit break will be exempted for the day
ICE BRENT	None
DME OMAN	None
SHFE SC	4% above or below the previous day's settlement price

## What is the margining methodology for the China's crude oil futures market? How is it different from that for major crude oil futures in the world?

INE applies pre-margining. The Exchange applies different rates of trading margin for a futures contract based on different periods of trading from its listing to its last trading day. The Exchange may, in its sole discretion, adjust the price limit for a futures contract in response to market risk conditions and it shall issue a public announcement of the adjustment. The management of Clearing Deposit shall be managed in accordance with the *Clearing Rules of the Shanghai International Energy Exchange*.

Both the ICE Clear of ICE Europe and the Clearing House of CME Group use CME's proprietary margining system – the Standard Portfolio Analysis of Risk (SPAN) system. The system calculates the initial margin requirement by organizing all positions which share the same ultimate underlying to grouping referred to as a "Combined Commodity Group" and calculating and aggregating, by like scenario, the risk of each position (including in the price volatility of different contract positions) within a Combined Commodity, with that scenario generating the maximum theoretical loss. As a result and which also meets the needs of clearing member's netting settlement procedure, the level of initial margin can be minimized without putting clearing houses at unreasonable risks, ensuring capital-efficiency in futures market.

As of year 2017, the margin requirement of ICE Brent contract is around \$2,700—\$3,700 set by the ICE Clear. For CME WTI contract, the requirement is \$2,700 of initial margin and \$2,300 of maintenance margin per nearby month contract, progressively reduced for contract months further out. DME clearing and settlement is provided by the Clearing House of CME Group, and requires \$4,750 of initial margin and \$3,750 of maintenance margin per an Oman contract.

## 91 Will trading positions of multiple trading accounts that are owned separately by related entities under same business group be combined together in the Exchange's risk management of large trader reporting or position limit?

INE adopts "one trader, one ID" principle, and issues trading ID code to each futures trader. The position holding of each trading ID owner shall be in accordance with the position limit set in the Exchange Rules. The exchange calculates each trader's position in a gross base method, i.e. long and short positions of different contracts will be summed up individually. For accounts that have ownership and controlling relationship, account holders shall declare to the Exchange, and position holding of accounts that have ownership and controlling relationship will be combined in the Exchange's risk management of large trader reporting or position limit.

## 92 What is the procedure in applying the hedge trading quota and the Exchange's principles in evaluating and approving the hedge quota application?

INE requires hedge traders to apply to the Exchange for hedge trading quota exceeding the normal position limit. In terms of identifying the appropriate amount of hedge quota and principles of evaluating and approving the hedge quota application, the Exchange will take into consideration historical data and future plan of an applicant's true production, trading, and consumption, as well as spot and futures market conditions. An applicant shall provide information about crude production plan, oil trading contract/agreement, or run plan.

When a contract enters into "near delivery months (two months prior to the contract expires)" phase, the exchange system will automatically adjust the value of approved hedge quota to the one of position limit of near-delivery-month contract, if the original approved hedge quota is higher than the near-delivery-month position limit. The measure is implemented for the Exchange to better manage the market risk for the near-delivery-month contracts. However, if a commercial client have higher hedge trading needs than the position limit described above, it may apply for hedge quota for nearby delivery months separately to the Exchange.

## 93 Is it applicable for letter of credit being posted as margin collateral?

At current stage, INE does not accept letter of credit as margin collateral.

## 94 Is it necessary for an FX for the futures trading be conducted in a Designated Depository Bank? Can FX be conducted in one bank that offer better rate and then transferred into the account of the designated depository bank account that such customer has account with?

Money Exchange for futures trading must be conducted in a Designated Depository Bank. When an Exchange Member conducts money exchange, it may check rates offer by different Designated Depository Banks and choose the one with best bid/offer rate to conduct the money exchange.

95

For a trader who holds long and short position at one time, is his position margined on a gross or net base, or using the principle of "Combined Commodity Group"?

INE adopts margining on long or short side of position that has bigger nominal value.

According to Article 29 of the "*Clearing Rules of the Shanghai International Energy Exchange*", the Exchange may collect trading margin in accordance with the gross positions, net positions or the portfolio. Under the following circumstances, the Exchange may collect trading margin from one side only:

1. For a Client holding both long and short positions in the same product and on the books of the same Member or OSBP, the Exchange may collect trading margin solely from the side for which a larger amount of trading margin is required, except for the contract held after the closing of the fifth (5th) trading day prior to the last trading day;
2. For a Non-FF Member or an OSNBP holding both long and short positions in the same product, the Exchange may collect trading margin solely from the side for which a larger amount of trading margin is required, except for the contract held after the closing of the fifth (5th) trading day prior to the last trading day.

According to Article 40 of the "Clearing Rules of the Shanghai International Energy Exchange", margin call will be issued when an Exchange's Member's clearing deposit balance is lower than the prescribed minimum requirement, and such member shall make it up prior to the market opening of the next trading day. What action will the Exchange take, if a Member fails to make up and meet the margin requirement?

As prescribed in Article 40 of the "*Clearing Rules of the Shanghai International Energy Exchange*," in the event that a Member fails to make up the clearing deposit balance as required, the Exchange will take action against the member, including the corresponding Member or OSP that uses such Member as its carry broker shall not open any new position, if the clearing deposit balance of the Member with the Exchange is no less than zero; and the Exchange will implement forced position liquidation or take other measures according to the "*Risk Management Rules of the Shanghai International Energy Exchange*," if the clearing deposit balance of the Member with the Exchange is lower than zero.

As of now, the timing that the Exchange takes action of forced position liquidation against member whose clearing deposit balance with the Exchange is lower than zero is at 10:15 AM to 10:30 AM Beijing Local Time (a short break during the first session of Day Trading Hours)



## 97 After a Member completes the internal endorsement procedure for making such payment, will the fund remittance made by such member from its margin account to the Exchange clearing account be instant transfer?

A member can submit the fund remit request on the INE's Member Service System, using the function of electronic fund transfer, for fund transfer in between such Member's margin account and the Exchange clearing account.

Fund remit instruction into the Exchange's clearing account during market hours will be automatically processed in real time. For fund withdrawal instruction from the Exchange's clearing account, it will only be processed after daily clearing and settlement on the same day.

## 98 Can a domestic/overseas broker provide financing service to its customers in futures trading?

An overseas broker shall conduct its business in accordance the rules and regulation of its jurisdiction. As for domestic futures brokers, they shall follow the policy and regulation of the CSRC.

## 99 Is it required for an offshore institutional investor who trade on INE through an onshore/offshore broker to set up an specified bank account for futures trading purpose?

If an offshore institutional investor, either a futures trader or a brokerage firm, trade on INE through a domestic broker, it's required for such investor to set up a specified bank account for futures trading purpose with a designated depository bank for margin depository business of its overseas clients.

## 100 Can a non-FF Member use foreign currency in trading the crude futures?

No. For domestic traders, including a non-FF Member, they can only use RMB in trading the crude futures.

According to the SAFE's circular of Huifa [2015] No. 35, overseas traders, overseas brokers, or FF Members and other institutions that can execute and clear trades for its overseas clients who trade on behalf of themselves or conduct brokerage business (execute trades for its customers) are allowed to set up foreign currency account for specific purpose.

# 101

Is it true that an OSP can only post FX fund as margin collateral and the trading expenses and daily mark to market result from futures trading can only be settled in RMB?

According to the rule 2 of PBOC's Notice [2015] No. 19, Crude oil futures traded within China shall be denominated and settled in Chinese Renminbi (RMB). Also Rule 9 of PBOC's Notice [2015] No. 19 states that Any Overseas Trader or Overseas Broker may directly use its foreign exchange as margin. Or the foreign currency fund balance on such person's margin account must be exchanged into RMB before it can be used to settle trades involving domestic crude oil futures.

According to Article 23 of the "*Clearing Rules of the Shanghai International Energy Exchange*," the clearing currency of the Exchange is Renminbi (hereinafter referred to as the RMB). Once approved by the Exchange, foreign exchange and assets with both stable value and high liquidity, including standard warrants and treasury bonds (hereinafter collectively referred to as "margin collateral assets"), may be used as margin collateral.





An aerial photograph of a large industrial facility, likely a refinery or petrochemical plant, situated along a body of water. The facility features numerous large white storage tanks, complex piping, and industrial structures. A large red number '11' is overlaid on the right side of the image. In the foreground, there is a lush green area with a winding path and a body of water with some barges. The background shows more industrial areas and a distant city skyline.

11

# CRUDE OIL FUTURES DELIVERY

# CRUDE OIL FUTURES DELIVERY

## 102 What is the delivery mechanism used by China's crude oil futures?

China's crude oil futures contracts employ physically delivery. Position holders of expired contracts will enter into physical delivery by following the standard delivery procedures prescribed by the Exchange. Alternatively, a position holder can execute an Exchange of Futures for Physicals (EFP) transaction to offset an open position before contract expiration. China's crude oil futures employ bonded delivery system, meaning the physical delivery of the underlying commodity underlying a futures contract position takes place with bonded status within the Customs Special Supervision Areas or on Bonded Supervision Premises. Standard delivery procedures refer to the process by which the buyer and seller complete physical delivery using bonded standard warrants in accordance with prescribed delivery procedures upon contract's expiration.

In essence, sellers need to load the commodity into a designated delivery storage facility and have a bonded standard warrant issued accordingly before the contract expires. Within the five business days following contract expiration, sellers and buyers exchange the delivery payments and warrants. The Exchange matches and allocates available standard warrants in accordance with the principles of "time priority, quantity rounding, nearest matching, and overall arrangement".

## 103 What are China's crude futures deliverable crude grade origination locations?

- 1、Dubai, UAE: Fateh Terminal;
- 2、Upper Zakum, UAE: Zirku Island;
- 3、Oman, The Sultanate of Oman: Mina Al Fahal;
- 4、Qatar Marine, Qatar: Halul Island;
- 5、Masila, Yemen: Ash Shihr;
- 6、Basrah Light, Iraq: Basrah Oil Terminal of designated Single Point Mooring Systems (SPM);
- 7、Shengli, PRC: Dongming Oil Terminal of Sinopec Shengli Oilfield Company.

## 104 What are the expenses and fees related to crude oil futures delivery?

- 1、Storage fees at a designated delivery storage facility are capped at 0.20 RMB per barrel per day, shall be paid by the goods title owner, and will be collected by the designated delivery storage facility owner. INE may adjust the storage fee based on market conditions and will announce any change in advance.
2. Inspection fees will be charged by the designated inspection agency to the title owner of commodity goods or its designated agent who request the inspection service at load-in or load-out of goods.
3. Other expenses, such as harbour dues, harbour tolls, shifting charge and other relevant expenses will be charged by the relevant service provider to the title owner of commodity goods or its designated agent.

# 105 What are the designated delivery storage facilities for China's crude oil futures?

The table below lists current Designated Delivery Storage Facilities for crude oil futures (capacity unit: 10,000 M<sup>3</sup>)

No.	Name	Storage Name	Approved Storage Capacity	Active Storage Capacity
1	Sinopec Petroleum Reserve Co., Ltd.	Rizhao Base	120	40
2		Cezidao Reserve	80	60
3	PetroChina Fuel Oil Company Limited	Ningbodaxie Branch	40	40
4		Zhanjiang Branch	70	40
5	Sinochem-Xingzhong Oil Staging (Zhoushan) Co., Ltd.	Sinochem-Xingzhong Aoshan Depot	100	35
6	Dalian PetroChina International Warehousing & Transportation Co., Ltd.	Dalian PetroChina Bonded Depot	115	40
7	Qingdao Shihua Crude Oil Terminal Co., Ltd.	Qingdao Port DJK	40	40
8	Yangshan Shengang International Oil Logistics Co., Ltd.	Yangshan Depot	30	20
Total			595	315

# 106 Who are the designated inspection agencies of China's crude oil futures?

The table below lists current Designated Inspection Agencies for crude oil futures:

No.	Name of Designated Inspection Agency
1	China Certification & Inspection Group Inspection Co., Ltd.
2	SGS-CSTC Standards Technical Services Co., Ltd.
3	Intertek Testing Services Shanghai, Co., Ltd.
4	Technical Center for Industrial Products and Raw Materials Inspection and Testing, Shanghai Entry-Exit Inspection and Quarantine Bureau



## 107 What are the designated delivery storage facilities for China's crude oil futures?

What is the difference between the warrant-based delivery for China's crude oil futures market and physical delivery in foreign oil futures markets?

Crude warrant delivery in China's crude oil futures market is intended to moderate the default risk in the delivery process, thus helping to ensure a stable, orderly futures market. As a trade-off, this method of delivery complicates the Exchange's management responsibilities with regard to the delivery process after a contract expires, the maintenance of the warrant management system, and the supervision of the designated delivery storage facilities.

In foreign futures markets, once the delivery intentions are matched, the futures exchange will no longer intervene in the actual delivery process, allowing buyer and seller to complete the exchange of payment and goods by themselves. While this approach comes with a higher possibility of default risk. This delivery mechanism is sustainable in markets where legally binding power of a contract is undisputed, and it may alleviate the exchange responsibility in delivery process.

## 108 What is the logic behind the design of the choice of delivery locations and the capacities of the storage facilities used for China's crude oil futures?

INE's Designated Delivery Storage Facilities are located at major oil ports in the Liaoning Peninsula, Jiaodong Peninsula, Yangtze River Delta, and Pearl River Delta. These oil depots include the oil terminals of State-owned corporations and terminals which are joint venture with domestic and foreign shareholders.

The key elements considered in selecting delivery location are: Oil depots need to be in locations where marine tankers can discharge their cargo, close to oil refineries or an oil trading hub, and depots need to reach a geographical balance between North and South China. The Exchange will keep exploring qualified oil terminals and adding new designated oil terminals to meet the market needs.

## 109 Will the Exchange designate an offshore delivery storage facility for China's crude oil futures?

This is not on the agenda for the first phase of the market, but it is a possibility once conditions permit. A globalized trading platform with global contract with overseas delivery oil depots may attract more overseas participation in the futures market from neighboring countries and regions.

## 110 How can falsified crude oil warrants be identified and how to mitigate the risk of receiving one ?

The physical delivery process established for China's crude oil futures required the seller to submit to the Exchange a certificate of origin and bill of lading from the port of loading, a Customs declaration documented form, the ship's loading and discharging records, and other required information. Information contained in these documents must be accurate, without conflicts or inconsistencies. Furthermore, no overside loading or discharging is permitted between the origin and destination in the delivery oil depots. The load-in and load-out inspection of futures-related commodities shall be conducted by the Designated Inspection Agencies in accordance with the inspection standards and

methods specified in the Inspection Rules of the corresponding futures products. Standard warrants will only be issued after the crude quality inspection is passed and other documents are verified.

# 111

## What is the load-out/delivery speed of China's crude oil futures measured in barrels per day?

There are two main methods for load-out of crude oil: pipeline transport and shipment. The handling capacity of these two methods will depend on the equipment and facilities available at the storage facility in question.

Under normal circumstances, pipeline delivery has a capacity of 3,500 m<sup>3</sup>/hr, or about 530,000 barrels per day; and the rate of loading to a ship is about 3,000 m<sup>3</sup>/hr, or 450,000 barrels per day.

# 112

## What are the expenses and fees related to crude oil futures delivery ?

The costs of physical delivery of crude oil include: (a) a delivery fee of ¥0.05 per barrel paid separately by both the buyer and the seller to INE; (b) storage fees paid to a designated delivery storage facility are capped at 0.20 RMB per barrel per day ; (c) other fees such as port dues, shifting fees, harbour tolls, inspection fees, and any other relevant expenses. For those fees and expenses related to item (b) and (c), they will be set at the prevailing rate by the Designated Delivery Storage Facilities and relevant organizations and collected from the commodity owner individually.

## What are the main features of China's crude oil futures delivery mechanism?

The features for the delivery mechanism of China's crude oil futures are summarized in the table below:

Table 7: Characteristics of Crude Oil Futures Delivery of the Crude Oil Futures

Mixing	Because the price differential for different crude streams will vary depending on the quality of each stream, each deliverable grade of crudes must be stored separately and no mixing is permitted
Quality Premium and Discount	Due to quality differences, there will be a fixed price differential established for each deliverable grade. The price differential will be added to/subtracted from the final settlement price for physical delivery
Water-Free Settlement	Water content will be deducted when settling overfill and underfill with the oil depot
Loss Allowance	A 1.2‰ loss allowance is arranged with the commodity owners at time of load-in and at time of load-out each assumes 0.6‰
Minimum Load-In and Load-Out Quantity	200,000 barrels. Spot commodity can be combined with the commodity meant for futures delivery to meet the minimum requirement
Load-In Intention Notice	A load-in intention should be submitted 30 days in advance of actual load-in along with a deposit of ¥1.5 per barrel (tentative rate)
Qualification for Conducting Delivery	Domestic clients who are not able to issue or take specified invoices required by the Tax Bureau are not allowed to participate in physical delivery
Expiry of Standard Warrant	Warrants have no expiration date
Listing Exchange	Shanghai International Energy Exchange

Source: Shanghai International Energy Exchange

# 114

For spot commodity goods imported as a result of an EFP transacted in the futures market, which price base will be used to calculate the Custom tax? Is it based on the settlement price of such EFP or will the traded price when buyer opened its futures position will be adopted?

According to Announcement [2015] No. 40 of the General Administration of Customs (the Customs), in the case of EFP transactions, the dutiable value for the commodity goods is the sum of (a) the settlement price for the crude oil futures contract in the nearest delivery month, as published by the Shanghai International Energy Exchange on the trading day immediately preceding the application date for the EFP transaction, and any delivery premiums or discounts applied to applicable crude stream.

# 115

In the case when a futures deviates sharply from the spot market price, the EFP price and/or final settlement price for the crude futures contract may diverge significantly from the spot market price. How does the China Customs rule on the dutiable value?

According to the term 5 of the Announcement [2015] No. 40 of the General Administration of Customs:

Customs shall determine the dutiable value of bonded crude oil for futures contracts based on:

(1) the sum of (a) the bonded final settlement price for bonded crude oil as determined by the Shanghai International Energy Exchange, and (b) any delivery premiums or discounts if the bonded crude oil is to be delivered in the delivery month under a Bonded Standard Warrant;

(2) the sum of (a) the settlement price for the crude oil futures contract in the nearest delivery month, as published by the Shanghai International Energy Exchange on the trading day immediately preceding the application date for the Exchange for Physicals (EFP) transaction, and (b) any delivery premiums or discounts, if the bonded crude oil is to be delivered subject to an EFP transaction under a Bonded Standard Warrant;

(3) provisions on domestic sales of bonded goods currently in effect, if the bonded crude oil is either to be delivered in an EFP transaction under a non-standard warrant, or to be transferred under a Bonded Standard Warrant without being delivered against futures contracts in bonded areas; or

(4) the sum of (a) the settlement price for the crude oil futures contract in the nearest delivery month, as published by the Shanghai International Energy Exchange on the trading day immediately preceding the completion date for the load-out of the bonded crude oil, and (b) any delivery premiums or discounts, for and in relation to quantity of any overfill and underfill present during the delivery and import of the bonded crude oil.

# 116

How will the final settlement price be determined in the case where a contract closes at limit up or down on one of the last trading? Shall the calculation of mean average of 5 daily settlement prices that have trades executed on each sampling trading day exclude the sample of settlement price that is closed at limit high or low?

According to Article 154 of the "*Delivery Rules of the Shanghai International Energy Exchange*," the final settlement price of the crude oil futures is the benchmark price for the delivery settlement of crude oil futures, and is calculated as the arithmetic mean value of the settlement prices of that contract during the last five (5) trading days based on executed transactions in the futures contract.

# 117

In a situation where the load-in deadline is missed due to anchoring, can the seller make a request for relaxing the terms of delivery following the principle of Article 35 of the "*Delivery Rules of the Shanghai International Energy Exchange*"?

Yes, a relaxation of the terms of delivery can be arranged. However, sellers still need to adhere to the deadline for physical delivery.

To prevent this situation from happening, the load-in application is required to be submitted to the Exchange at least 30 days prior to the actual load-in of goods. Once the load-in application is approved, the oil tanker of the seller should be included in the port unloading schedule. INE has requested all the designated

delivery storage facilities to prioritize the unloading of oil tanker involved in making physical futures delivery. Thus if oil tanker arrives at the discharging port on schedule, the unloading shall be completed as scheduled. However, if the oil tanker fails to arrive the discharging port in time, it loses its priority status and must reschedule the unloading time with the port and queue in line with other oil tankers carrying spot goods.

118

Explain the meaning of the following: "load-in futures commodities shall be shipped directly from the port of the place of origin" as prescribed in Article 39 of the "Delivery Rules of the Shanghai International Energy Exchange." Can a deliverable grade of crude stored in a floating storage of crude for over a six month period be shipped to a designated oil terminal and used for futures delivery?

In the appendix of the Practice Rules of Inspection Procedure, the origination locations and loading ports of deliverable crude grades are listed. Only goods of deliverable grades loaded in specified oil terminals can be used in the physical delivery of Chinese crude futures.

Floating storage that has carried deliverable grade goods from origination for an extended period is not allowed to be used in the physical delivery, as the Exchange has no control or supervision power over goods during the floating storage period. If an oil terminal is suspicious about the origination of the crude stream and goods owner cannot provide reasonable explanation regarding the provenance of the shipment, an oil terminal can decline the oil tanker's unloading request.



119

How does a designated delivery storage facility conduct supervision and management of the transportation of commodities as prescribed in Article 39 of the "Delivery Rules of the Shanghai International Energy Exchange"?

A designated delivery storage facility may supervise the transportation of commodities by checking an oil tanker's shipping time and ship's.

120

In Article 131 of the "Delivery Rules of the Shanghai International Energy Exchange", it states that certain registered commodities approved by the Exchange for exemption from inspection may be exempted from quality inspection at delivery. Is this applicable to any of the seven deliverable grades?

No. Though the INE Delivery Rules are applicable to all the products that are listed or will be listed on the INE, the rule of commodity registration is not applied to the crude futures contract.

In Article 80 of the "Delivery Rules of the Shanghai International Energy Exchange", it states that a Designated Delivery Storage Facility shall cooperate with the commodity owners to coordinate relevant agencies including the terminal, port, pipeline company, Customs and commodity inspection agency and other relevant institution to prioritize the load-in and load-out of commodities for futures delivery. Can the Exchange specify the practicable measures prescribed by this rule to ensure the prioritized load-in and load-out of commodity goods?

A spot commodity is the underlying and base of a commodity future contract. The loading and unloading of commodity goods for future physical delivery in the futures market shall also be consistent with regular spot market practices. A designated delivery storage facility shall carry out the duty of disclosure and provide professional grade service to the commodity owner for futures physical delivery in its power.

Guarantee on the prioritized load-in and-out of commodity goods for futures delivery will only be applicable when ships of spot goods and commodity goods for futures delivery arrive an oil terminal at the same time.

To solve the issue of demurrage, the load-in application for goods for futures delivery is required to be submitted to the Exchange at least 30 days prior to the actual load-in of goods. Once the load-in application is approved, the oil tanker of the seller should be included in the port unloading schedule.

In coordination with the Customs and the commodity inspection authority or other relevant authorities, the commodity goods owner and oil terminal shall follow the regular spot market practice.

# APPENDIX

## Appendix 1: Chinese Major Oilfields' Annual Production

Oil & Gas Fields / Producer	2014	2015	2016
CNPC Daqing Oilfield Co., Ltd.	40,000.0	38,386.0	36,560.0
CNPC Jilin Oilfield Company	4,930.0	4,662.0	4,045.0
CNPC Liaohe Oilfield Company	10,219.0	10,371.0	9,741.0
CNPC Huabei Oilfield Company	4,223.0	4,201.0	4,110.0
CNPC Dagang Oilfield Company	4,647.0	4,441.0	4,079.0
CNPC Jidong Oilfield Company	1,700.0	1,600.0	1,350.0
CNPC Zhejiang Oilfield Company	51.0	50.0	30.0
CNPC Xinjiang Oilfield Company	11,800.0	11,800.0	11,130.0
CNPC Turpan-Hami Oilfield Company	2,000.0	2,100.0	2,000.0
CNPC Tarim Oilfield Company	5,902.0	5,900.0	5,500.0
CNPC Changqing Oilfield Company	25,050.0	24,808.0	23,920.0
CNPC Qinghai Oilfield Company	2,200.0	2,230.0	2,210.0
CNPC Yumen Oilfield Company	490.0	440.0	380.0
CNPC Southwest Oil & Gas Field Company	169.0	137.0	100.0
CNPC South China Exploration & Development Company	286.0	301.0	295.0
CNPC Total	113,669.0	111,426.0	105,450.0
Sinopec Shengli Oilfield Company	27,871.0	27,100.0	23,902.0
Sinopec Zhongyuan Oilfield Company	2,310.0	1,826.0	1,478.0
Sinopec Henan Oilfield Company	2,410.0	2,310.0	1,691.0
Sinopec Jiangnan Oilfield Company	975.0	885.0	739.0
Sinopec Jiangsu Oilfield Company	1,710.0	1,555.0	1,330.0
Sinopec Northwest Oilfield Company	7,355.0	7,030.0	5,943.0
Sinopec Southwest Oil & Gas Field Company	23.0	17.0	7.0
Sinopec Huadong Oilfield Company	350.0	350.0	330.0
Sinopec Huabei Oilfield Company	506.0	370.0	72.0
Sinopec Northeast Oilfield Company	193.0	147.0	35.0
Sinopec Huabei Petroleum Bureau	29.0	27.0	23.0
Sinopec Total ①	43,733.0	41,617.0	35,550.0
CNOOC ②	39,637.0	47,732.0	45,550.0
Shaanxi Yanchang Petroleum (Group) Co., Ltd.	12,555.0	12,540.0	11,060.0
National Total I (as reported by enterprise) ③	209,594.0	213,316.0	197,610.0
National Total II (as reported by National Bureau of Statistics) ④	210,096.0	214,742.0	199,690.0

Notes: Source: Issue 2017-4, International Petroleum Economics, China Economic Analysis of China Petroleum and Chemical Industry

Unit: Thousand metric tons

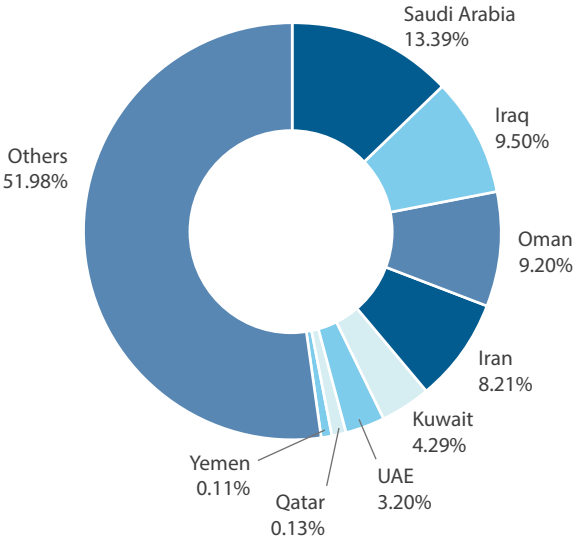
① Equity Production of China East Sea Sector of the joint venture with CNOOC is not included (Equity Production of year 2016 is 105,000 DWT).

② All China offshore oil production of all joint ventures are included in.

③ The value of "National Total I" is the sum of oil production of all companies listed in the table above.

④ The value of "National Total II" is an annual statistic data published by the Statistic Bureau, however for the data of year 2016, the data source is from the China Petroleum and Chemical Industry Federation (CPCIF).

Appendix 2: Shares of China's Crude Oil Imports from Middle East Countries of Total Imports



Source: General Administration of Customs

### Appendix 3: 2016 China Crude Oil Imports and Exports

Source / Destination Country	Imports	Import Value	Exports	Export Value
Russian Federation	52,478.3	16,870		
Saudi Arabia	51,005.7	15,569		
Angola	43,737.4	13,849		
Iraq	36,211.8	10,651		
Oman	35,060.9	11,127		
Iran	31,297.7	9,351		
Venezuela	20,156.7	4,548		
Brazil	19,155.2	6,012		
Kuwait	16,339.1	4,829		
United Arab Emirates	12,181.5	3,864		
Colombia	8,805.7	2,222		
Republic of the Congo	6,942.1	2,126		
South Sudan	5,364.3	1,466		
United Kingdom	4,954.6	1,780		
Vietnam	4,266.0	1,513		
Australia	3,236.1	1,157	78.2	34
Kazakhstan	3,234.0	833		
Gabon	3,178.5	1,048		
Ghana	2,560.5	920		
Malaysia	2,408.0	820		
Argentina	1,609.5	488		
Equatorial Guinea	1,166.8	370		
Ecuador	1,144.0	332		
Mongolia	1,086.7	280		
Sudan	1,043.7	338		
Libya	1,015.4	345		
Mexico	999.0	237		
Azerbaijan	953.1	375		
Thailand	889.5	298	204.7	75
Norway	824.8	308		
Egypt	656.1	253		
Qatar	479.6	157		
Yemen	402.2	143		
Brunei	359.0	114		
South Korea	-	-	1,067.4	318
Others	5,807.6	1,876	1,590.3	517
2016 Total	381,011.3	116,469	2,940.6	943

Source: General Administration of Customs

Unit: Thousand metric tons/ million dollar

Appendix 4: 2017 Approved Independent Refineries and Their Refinery Quota of Using Imported Crude Oil by NDRC and Crude Import Quota by MOFCOM

Company Name	Refinery Quota of Using Imported Crude Oil	Crude Oil Import Quota
Shandong Dongming Petrochemical Group Co., Ltd.	750	675
Panjin North Asphalt Fuel Co., Ltd.	700	630
Sinochem Hongrun Petrochemical Co., Ltd.	530	530
Shandong Kenli Petrochemical Group Co., Ltd.	252	227
Lijin Petrochemical Plant Co., Ltd.	350	315
Dongying Yatong Petrochemical Co., Ltd.	276	248
Baota Petrochemical Group Co., Ltd.	216	108
Shandong Wonfull Petrochemical Group Co., Ltd.	416	416
Shandong Tianhong Chemical Co., Ltd.	440	396
Shandong Shouguang Luqing Petrochemical Co., Ltd.	258	232
Shandong Chambroad Petrochemicals Co., Ltd.	331	298
Dongying Qi Run Chemical Co., Ltd.	220	198
Shandong Haiyou Petrochemical Group Co., Ltd.	320	320
Wudixinyue Fuel & Chemical Co., Ltd.	240	192
Shandong Hengyuan Petrochemical Co., Ltd.	350	315
Shandong Qingyuan Group Co., Ltd.	404	364
Hebei Xinhai Chemical Group Co., Ltd.	372	335
Shandong Jincheng Petrochemical Group Co., Ltd.	300	270
Shandong Shenchì Petrochemical Group Co., Ltd.	252	227
Dongying Haike Ruilin Petrochemical Co., Ltd.	210	189
Shandong Zhonghai Fine Chemical Co., Ltd.	186	186
Henan Fengli Petrochemical Co., Ltd.	222	200
Shaanxi Yanchang Petroleum (Group) Co., Ltd.	360	360
Jin' ao Technology (Hubei) Chemical Co., Ltd.	230	230
Rizhao Lanqiao Port Petrochemical Co., Ltd.	180	180
Shandong Shengxing Petrochemical Co., Ltd.	220	220
Shandong Qicheng Petroleum Chemical Industry Co., Ltd.	160	160

Company Name	Refinery Quota of Using Imported Crude Oil	Crude Oil Import Quota
Shandong Dongfang Hualong Group Co., Ltd.	300	300
Dalian Jinyuan Petroleum Chemical Co., Ltd.	80	80
Shandong Yuhuang Chemical (Group) Co., Ltd.	144	144
Shandong Qingyishan Petrochemical Technology Co., Ltd.	300	300
Zibo Xintai Petrochemical Co., Ltd.	200	200
Total	9769	9045
Fuyu Chemical Raw Materials Co., Ltd.	164	
Dongying Hualien Petrochemical Co., Ltd.	170	
Shandong Haike Chemical Group Co., Ltd.	96	
Jiangsu Xinhai Petrochemical Co., Ltd.	230	
Total	660	

Date: s of Jan, 2018

Unit: Thousand metric tons

Source: Includes data from NDRC and MOFCOM

## Appendix 5: Crude Oil Pricing Benchmarks for Major Middle Eastern Oil-Producing Countries

Country	Destination		
	Asia	Europe	United States
Saudi Arabia	Platts Oman/Dubai Average	ICE BWAVE from Jul. 2000; Dated Brent until Jun. 2000	ASCI from Jan. 2010; WTI until Dec. 2009
Kuwait	Platts Oman/Dubai Average	ICE BWAVE from Jul. 2000; Dated Brent until Jun. 2000	ASCI from Dec. 2009; NYMEX WTI until Nov. 2009
Iran	Platts Oman/Dubai Average	ICE BWAVE from Jan. 2001; Dated Brent until Dec. 2000	
Iraq	Platts Oman/Dubai Average	Dated Brent	ASCI from Apr. 2010; NYMEX WTI Second Month until Mar. 2010

Source: Bassam Fattouh, An Anatomy of the Crude Oil Pricing System, Jan 2011. The Oxford Institute for Energy Studies.



## Appendix 6: Trading Volume of Major Global Crude Oil Contracts in 2016

Exchange	Contract	2016 Trading Volume
Chicago Mercantile Exchange Group (CME Group)	Crude Oil (physical delivery) (CL)	276,768,438
	E-mini Crude Oil (QM)	3,380,972
	Brent Last Day Financial Futures (BZ)	23,713,109
	Crude Oil Financial Futures (WS)	94,928
Intercontinental Exchange (ICE)	Brent Crude Futures (B)	210,561,053
	WTI Crude Futures (T)	47,289,665
	Mini Brent Crude Futures (BM)	1,694,092
	Mini WTI Crude Futures (TM)	187,530
Dubai Mercantile Exchange (DME)	Oman Crude Oil (OQD)	1,949,004
Tokyo Commodity Exchange (TOCOM)	Middle East Crude Oil	5,963,788
Multi Commodity Exchange of India (MCX)	Crude Oil Mini	67,401,974
	Crude Oil	53,256,420
	Brent Crude Oil	0
National Commodities and Derivatives Exchange (NCDEX)	Light Sweet Crude Oil (WTI)	0
	International Brent Crude Oil	0
Moscow Exchange (MOEX)	Brent Oil	435,468,923
Thailand Futures Exchange (TFEX)	Brent Crude Oil	19,076
Johannesburg Stock Exchange (JSE)	Brent Crude Oil	59,511
	Crude Oil	17,236
	Quantro Crude Oil (QBRN)	24,453
Rosario Futures Exchange (ROFX)	Light Sweet Crude Oil (WTI)	178,855

Source: FIA

## Appendix 7: Characteristics of Major Imported Crude Oils of China

Crude	Country of Origin	Density at 20 ° C (kg/m <sup>3</sup> )	API Gravity (° )	Sulfur Content (%)	Classification
Arab Medium	Saudi Arabia	875.3	29.41	2.63	High Sulfur, Medium, Intermediate
Arab Light	Saudi Arabia	866.0	31.11	2.03	High Sulfur, Medium, Intermediate
Cabinda	Angola	864.5	31.39	0.13	Low Sulfur, Medium, Paraffinic
Iran Heavy	Iran	883.9	27.85	2.15	High Sulfur, Medium, Intermediate
Iran Light	Iran	859.4	32.35	1.49	Sour, Medium, Intermediate
Sirri	Iran	859.5	32.33	2.08	High Sulfur, Medium, Intermediate
Urals	Russia	864.5	31.39	1.38	Sour, Medium, Intermediate
Oman	Oman	860.6	32.12	1.03	Sour, Medium, Paraffinic
Basrah	Iraq	885.4	27.58	3.10	High Sulfur, Medium, Intermediate
Dar Blend	Sudan	904.5	24.50	0.11	Low Sulfur, Heavy, Paraffinic
Mesa	Venezuela	872.9	29.85	1.06	Sour, Medium, Paraffinic
Kuwait	Kuwait	873.2	29.79	2.68	High Sulfur, Medium, Intermediate
Murban	UAE	828.2	38.50	0.74	Sour, Light, Intermediate

Source: General Administration of Customs

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