CRUDE OIL FUTURES Q&A

2020 Edition

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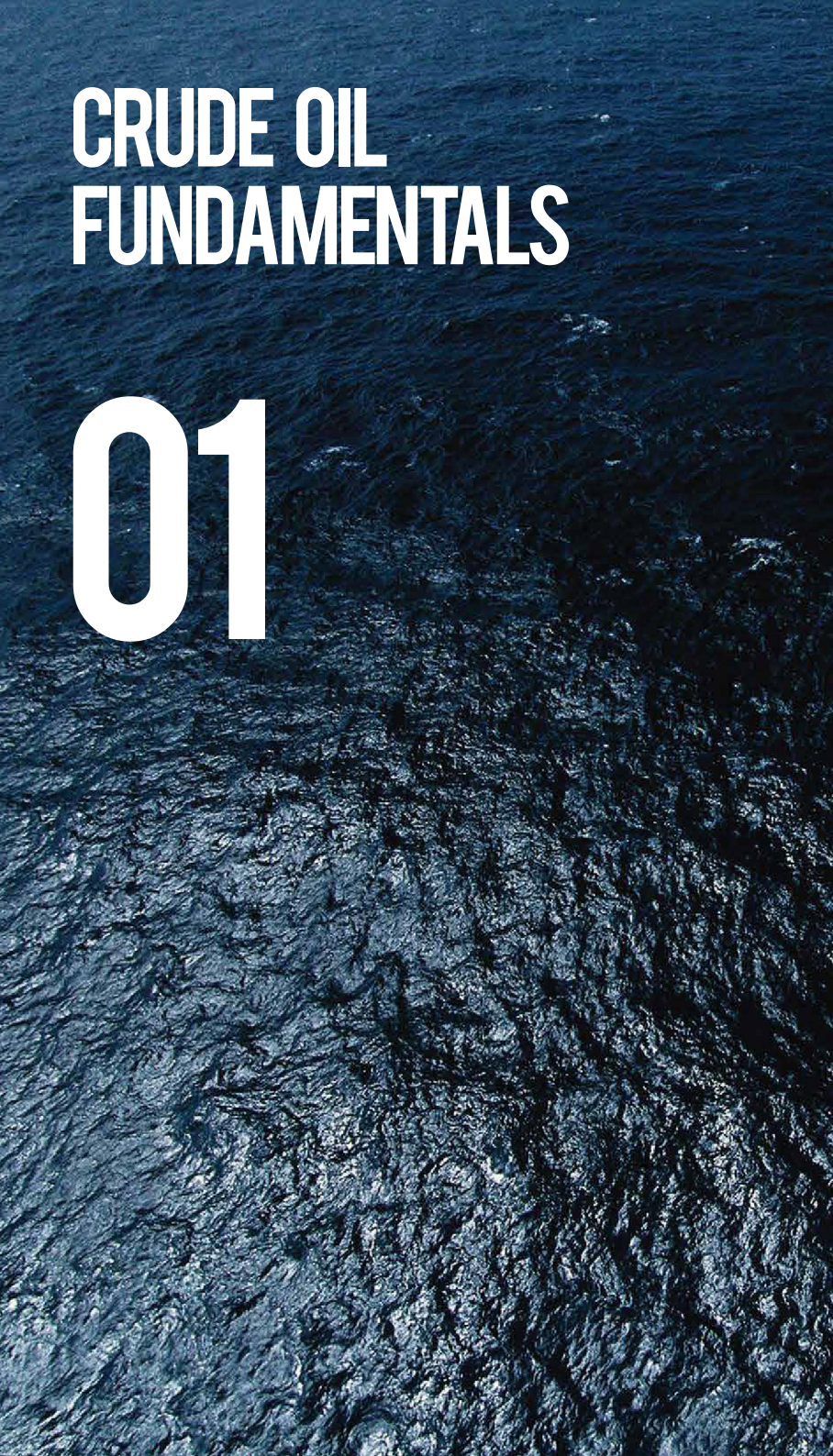
CRUDE OIL FUNDAMENTALS

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: API gravity = (141.5 / relative density of crude oil at 60 °F) – 131.5.

By international convention, the API values for each weight usually are: ultra-light- API gravity ≥ 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.

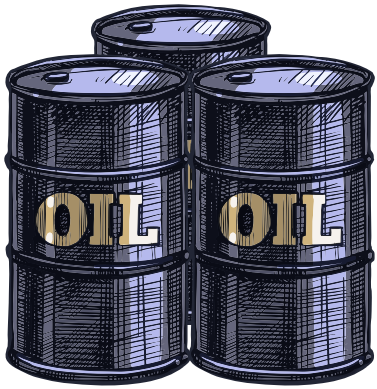
Products refined, produced, or derived from crude oil are: (i) combustible fuels that are used as main energy sources, such as gasoline, kerosene, diesel, fuel oil, and liquefied petroleum gas; (ii) high-molecular-weight polyethylene, a crucial pillar of the modern materials industry, and the vast majority 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 BP Statistical Review of World Energy 2019, total global crude oil consumption in 2018 was 4.53 billion tons (99.84 million bpd), with an increase of 1.44 million bpd. Total global supply was 4.47 billion tons (94.72 million bpd), with an increase of 2.22 million bpd. In particular, China's annual consumption was 628 million metric tons, and its annual production was 189 million metric tons, which is equivalent to consumption of 13.53 million bpd and production of 3.8 million bpd.

According to the data of February 2020 monthly report from the Organization of the Petroleum Exporting Countries (OPEC), the global daily demand for crude oil in 2019 was 99.74 million bpd (about 12.5 million metric tons per day). The total supply from the non-OPEC was 64.36 million bpd and the supply from the OPEC was 62.08 million bpd.

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 2019 estimates that the total global proven oil reserves are at 172.97 billion barrels, which would be sufficient to last for 50 years of global production at 2018 levels of 34.6 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.

On the demand side, according to the BP Statistical Review of World Energy 2019, in 1990, the OECD accounted for two-thirds of global energy consumption and the developing countries accounted for only one-third. However, by 2040, this proportion will be almost completely reversed, with the non-OECD countries accounting for two-thirds of the total energy demand. Most of the increase in energy demand is concentrated in Asian developing countries, such as India and China. The improvement in economic development and living standards of these countries stimulates the growth of energy consumption.

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.

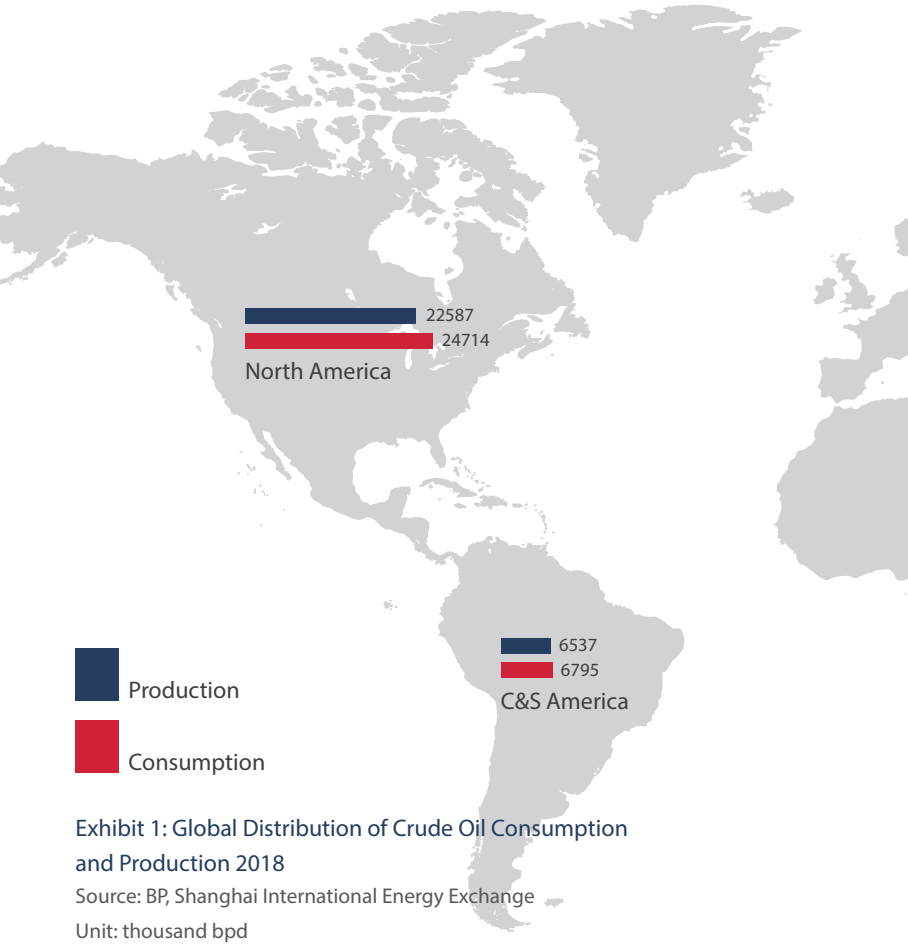


Exhibit 1: Global Distribution of Crude Oil Consumption and Production 2018

Source: BP, Shanghai International Energy Exchange

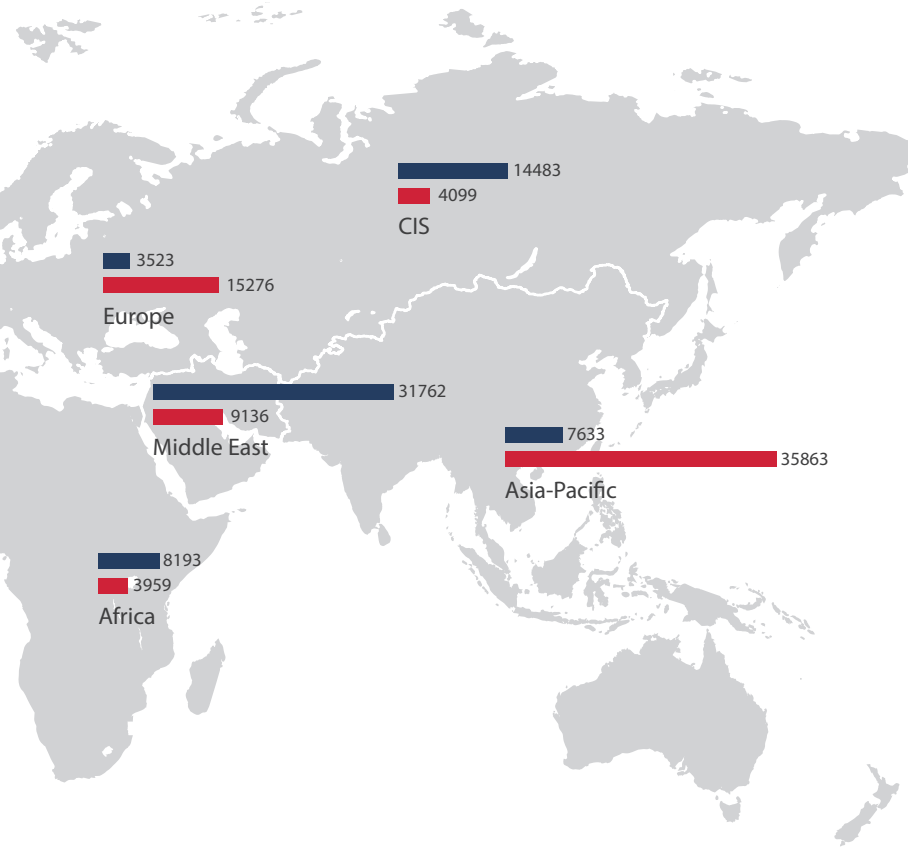
Unit: thousand bpd

Table 1: Global Crude Oil Consumption and Production 2018

Region	North America	C&S America	Europe	CIS	Middle East	Africa	Asia-Pacific	Global Total
Consumption	24714	6795	15276	4099	9136	3959	35863	99843
Production	22587	6537	3523	14483	31762	8193	7633	94718

Source: BP Statistical Review of World Energy 2019

Unit: thousand bpd



14 What are the largest oil producing and consuming countries?

According to the BP Statistical Review of World Energy 2019, the main producers of crude oil are the United States (15.3 million bpd), Saudi Arabia (12.29 million bpd), Russia Federation (11.44 million bpd), Canada (5.22 million bpd), Iran (4.72 million bpd), Iraq (4.65 million bpd), United Arab Emirates (3.94 million bpd) and China (3.80 million bpd).

Table 2: Global Crude Oil Production and Consumption 2018

Crude Oil Production		Crude Oil Consumption	
US	15311	US	20456
Saudi Arabia	12287	China	13525
Russian Federation	11438	India	5156
Canada	5208	Japan	3854
Iran	4715	Saudi Arabia	3724
Iraq	4614	Russian Federation	3228
United Arab Emirates	3942	Brazil	3081
China	3798	South Korea	2793
Kuwait	3049	Canada	2447
Brazil	2683	Germany	2321

Source: BP Statistical Review of World Energy 2019

Unit: thousand bpd

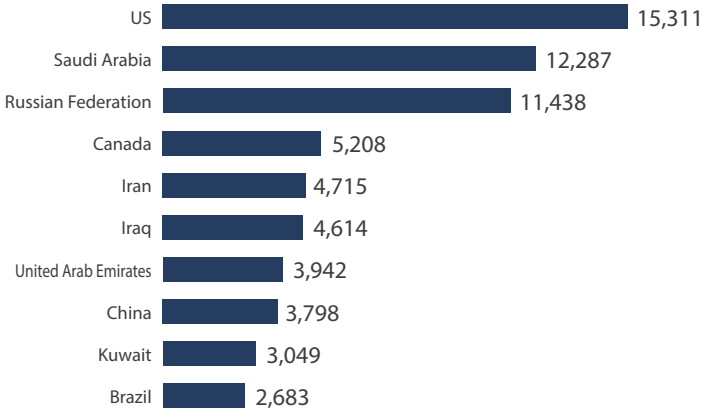


Exhibit 2: Global Distribution of Crude Oil Production 2018

Source: BP, Shanghai International Energy Exchange

Unit: thousand bpd

The main consumers of crude oil are the United States (20.456 million bpd), China (13.525 million bpd), India (5.156 million bpd), Japan (3.854 million bpd), Saudi Arabia (3.724 million bpd), Russia (3.228 million bpd), Brazil (3.081 million bpd) , and Canada (2.447 million bpd).

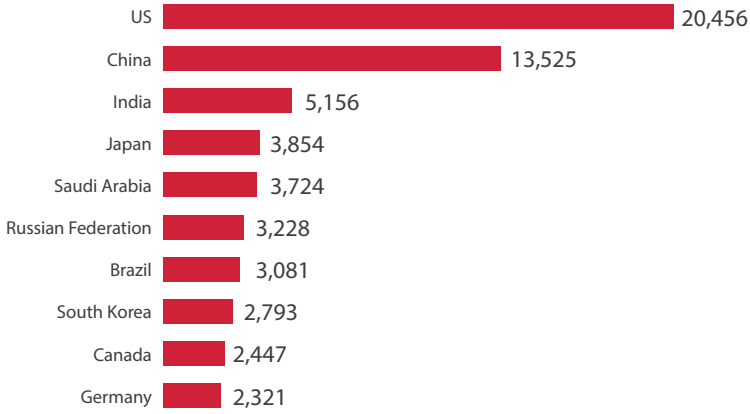


Exhibit 3: Global Distribution of Crude Oil Consumption 2018
Source: BP, Shanghai International Energy Exchange
Unit: thousand bpd

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

According to the BP Statistical Review of World Energy 2019, in 2018, the international petroleum trade was 71,344,000 bpd and the total consumption was 99,843,000 bpd, meaning 71% of the oil consumed worldwide was delivered by international trade. More than half of the oil trade growth was from China and India.

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

According to the BP Statistical Review of World Energy 2019, 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.

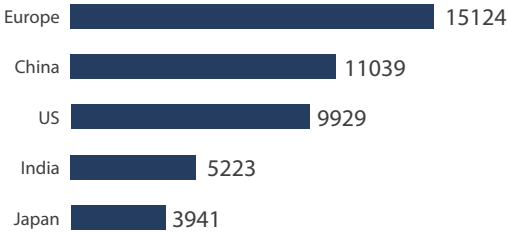


Exhibit 4: World's Top Oil Imports by Countries/Regions in 2018

Source: BP Statistical Review of World Energy 2019

Unit: thousand bpd

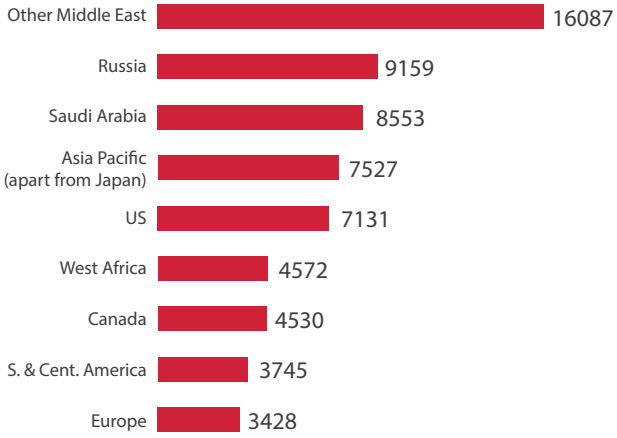


Exhibit 5: World's Top Oil Exports by Countries/Regions 2018

Source: BP Statistical Review of World Energy 2019

Unit: thousand bpd

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, divertion 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 distace.

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 and.

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 Kindom 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.

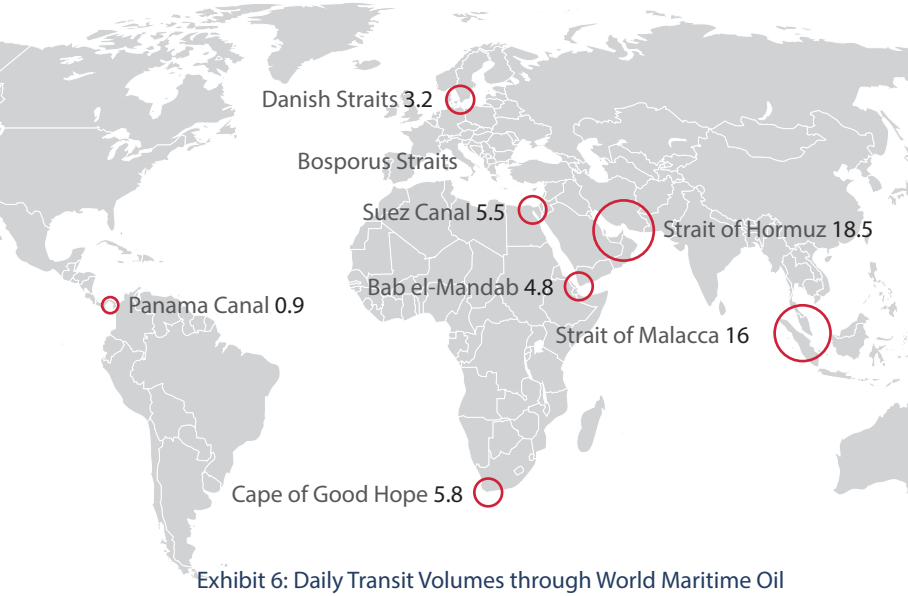


Exhibit 6: Daily Transit Volumes through World Maritime Oil Chokepoints[1]

Source: EIA Unit Million bpd

[1] "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 (80,000–1-0,000 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.

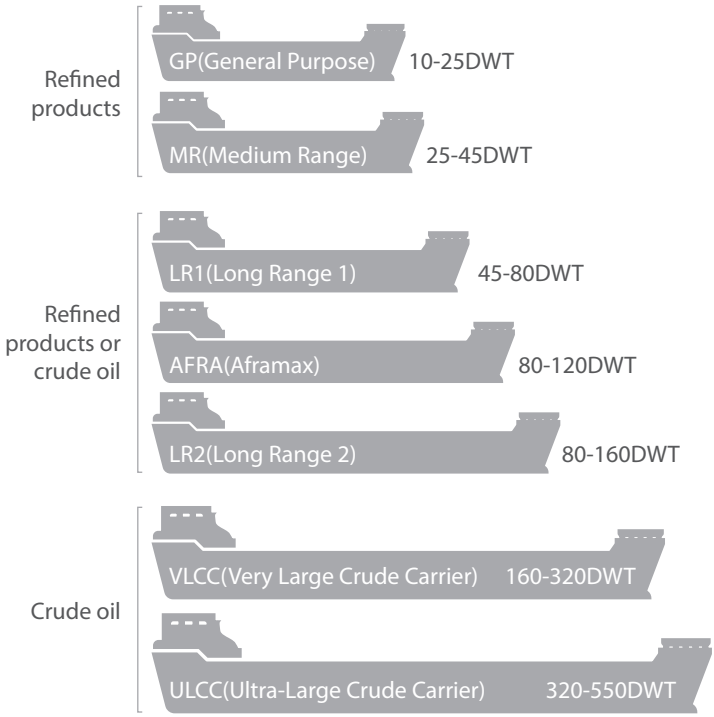


Exhibit 7: AFRA Scale of Tanker Capacity

Source: EIA

Unit: thousand DWT


SEDCO
710
VCSB
SEDCO
710

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 13 member states as of January 2020. The mission of OPEC is to coordinate and unify the petroleum policies of its Member Countries and ensure the stabilization of oil markets in order to secure an efficient, economic and regular supply of petroleum to consumers, as well as ensure a steady income to producers.

According to the BP Statistical Review of World Energy 2019, its production in 2018 was 1,854.3 million tons, 41.4% of the global total, and its proven oil reserves are estimated at 174,800 million tons, 71.8% 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 30 member countries with 8 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 of domestic supply or share available oil if necessary in the event of a major oil supply

disruption. In recent years, 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. 114 days of oil stock levels in days of imports. Thus, the IEA stockdraw 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. OECD oil consumption accounts for 51.5% 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.

International Energy Forum (IEF)

The International Energy Forum (IEF) is one of the important energy inter-governmental international organization in the world, and was founded in 2002, headquartered in Riyadh, Saudi Arabia. Currently, there are over 70 member countries in the IEF Charter, covering all six continents and accounting for around 90% of global supply and demand for oil and gas. The Forum's biennial ministerial meetings are the world's largest gathering of energy ministers. The IEF aims to foster greater mutual understanding and awareness of common energy interests among its members, promote dialogue between energy consuming countries and producing countries, and ensure the stability of global energy market.

23 Who are the member states of OPEC?

OPEC has 13 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 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), Equatorial Guinea (2017) and The Republic of the Congo (2018). There are three former members: Indonesia (joined in 1962, suspended in 2008, reactivated in 2015, but decided to suspend it again in 2016), Qatar (quitted in January 2019), and Ecuador (joined in 1973, and withdrew on January 2020).

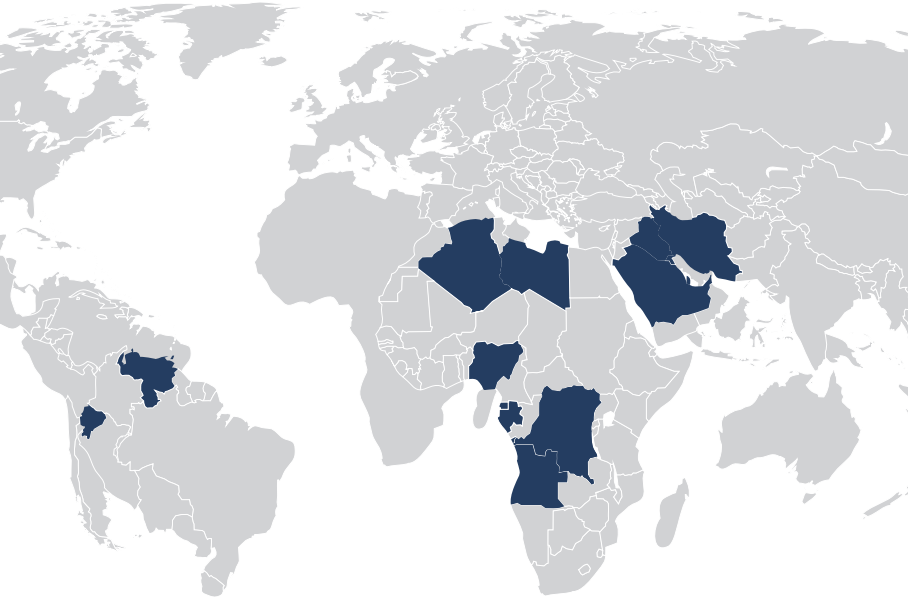


Exhibit 8: OPEC Member States
Source: OPEC

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 297.7 billion barrels of oil reserves, accounting for 17.2% of the global total, and it produces about 12.29 million barrels a day on average. The countries with next three largest proven reserves are Iraq, Iran, and Kuwait with 147.2 billion, 155.6 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 March 2020 monthly report, OPEC member countries in the Middle East had an average daily crude oil output of 23.68 million barrels, which was nearly 80% of total OPEC production and more than 48% 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. According to the BP Statistical Review of World Energy 2019, in 2018, its petroleum consumption reached 893 million tons/year, an average of about 20.46 million bpd. Secondly, it's also one of the leading oil importing countries with up to 9.93 million barrels imported a day. 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.

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.

04

CHINA'S OIL MARKET

CHINA'S OIL MARKET

28 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 2019 is provided in Appendix 1.

Oil fields	Thousand tons
CNPC Changqing	56410
CNPC Daqing	41670
CNOOC Bohai	30000
CNPC Talimu	26730
Sinopec Shengli	23830
CNPC Xinan	18120
CNPC Xinjiang	13790
Shanxi Yanchang	13100
CNOOC Nanhaidongbu	13050
CNPC Liaohe	10400

According to the report of the CNPC' s Institute of Economics and Technology: "The Development Report on Oil and Gas Industry in China and Abroad in 2018", the crude oil production of CNPC, Sinopec and CNOOC in the first nine months of 2018 were 89.77 million tons, 30.49 million tons and 38.8 million tons respectively.

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

According to the BP Statistical Review of World Energy 2019, as of 2018, China produced 3.8 million barrels per day[2], accounting for 4% of the global share and ranked eighth in the world. It consumed 13.53 million barrels per day[3], representing 13.5% of the global oil consumption and is the second biggest oil consumer in the world.

30 What are the oil production and import volume of China? How much does China depend on foreign oil?

In 2019, it is estimated that China produced 191 million tons of crude oil, with an increase of 1.2% year-on-year. The net oil import approached 465 million tons, with a year-on-year increase of 7%. The apparent oil consumption was approximately 660 million tons, with an increase of 33 million tons, which is a growth rate of 5.2%. The dependence of foreign oil reached 72.5%.

[2]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.
[3]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 Who are the top crude oil suppliers to China? What are their respective shares of Chinese crude imports?

In 2019, Saudi Arabia is China's largest supplier of crude oil, followed by Russia, Iraq, Angola, and Brazil. The total crude oil import from these five countries account for 59% of China's total crude oil import.

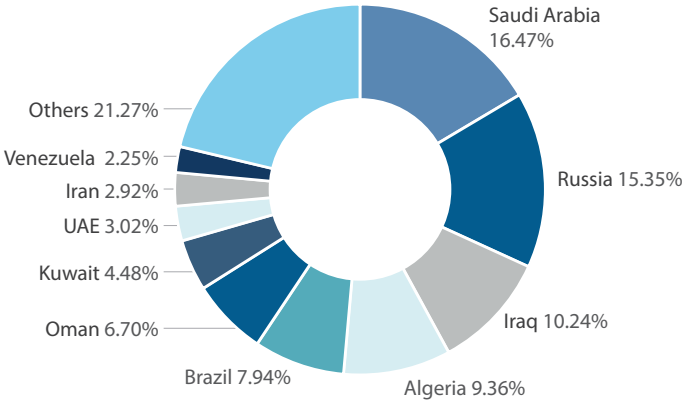


Exhibit 9: Sources of Imported Crude Oil of China in 2019
Source: General Administration of Customs

China is heavily energy dependent on the Middle East, with nearly 50% of its imported crude oil coming from the Middle East in 2019(A breakdown of China's crude oil imports from the Middle East and rest of the world is showed 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.

32 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 and freely. 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.

According to the announcement of the Ministry of Commerce Of China, the total allowed amount of non-state trade import of crude oil in 2020 is 202 million tons, and the first allowed amount of non-state trade import of crude oil in 2020 totals 103.83 million tons. (Please see the Appendix 4).

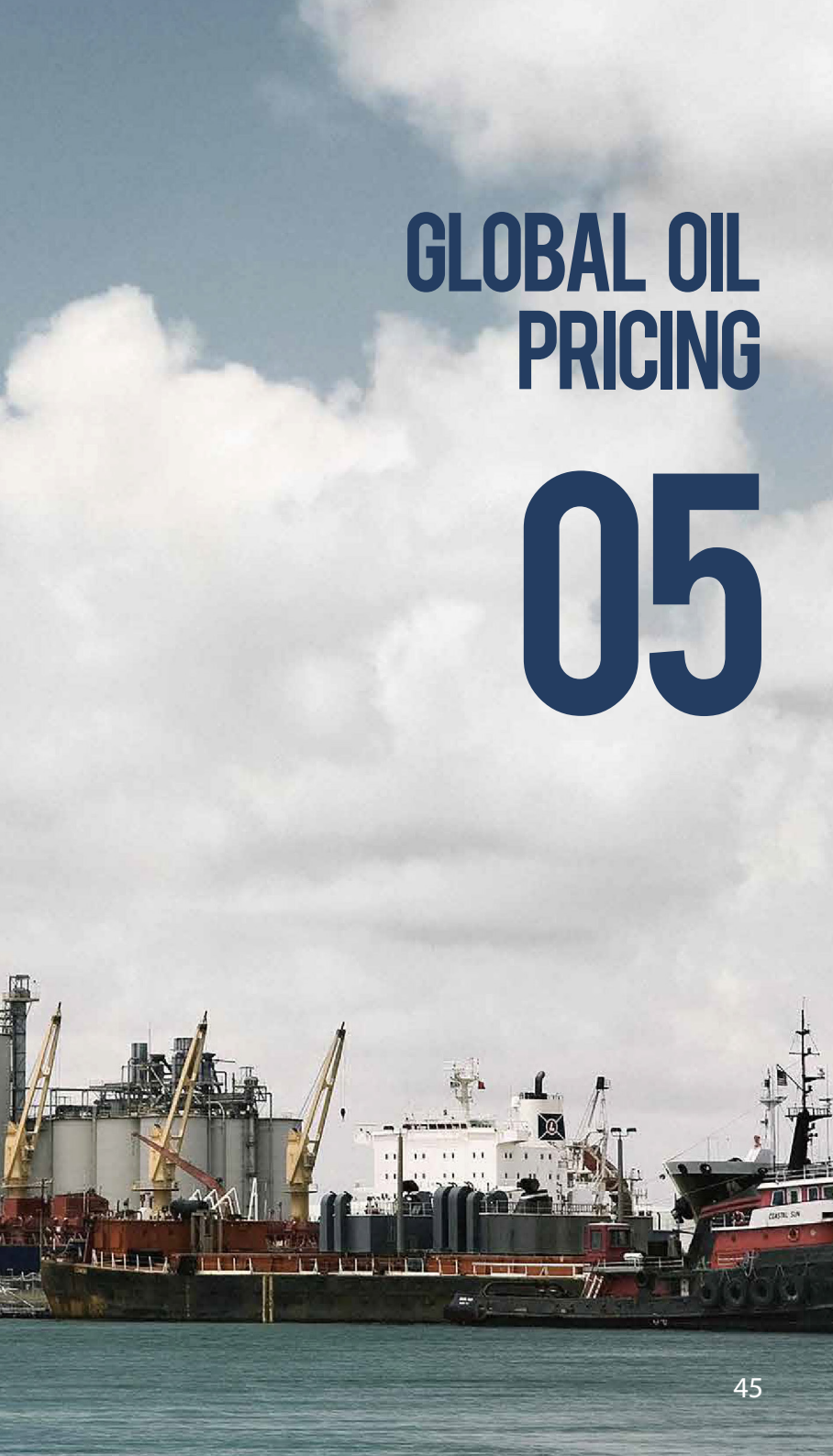
33 What is China's Strategic Petroleum Reserve (SPR) management? What is the current SPR stockpiling level and future direction?

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.


RINKER
CONTINENTAL

GLOBAL OIL PRICING

05



GLOBAL OIL PRICING

34 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 makeing futures prices an oil benchmark.

35 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.

36 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 also broadcast PRAs' oil prices and industry updates.

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

37 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.

38 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.

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

At present, there are several benchmark prices used in Asia-Pacific oil trading. They are Dubai/Oman and Platts Oman and Dated Brent. For example, the spot trade of crude oil exported from the Middle East to the Asia-Pacific region is mainly based on Dubai / Oman prices. Dated Brent is adopted in pricing Asia-Bound West Africa Crude. In addition, according to Reuters report, Iraq issued a notice to customers stating that from January 2018, price of Basrah crude oil exports to Asia will use DME (Dubai Mercantile Exchange) Oman crude oil futures as an indicator. In July 2018, Saudi Aramco announced readjustment of the benchmark crude oil price in Asia. The new Asia price is based on the average monthly Oman crude oil futures price traded at DME and the average spot price assessed by Platts, and is no longer based on average prices of Oman and Dubai assessed by Platts.

40 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/EUbound 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 is a good timing for China to build an oil futures market reflecting Asia demand and supply and playing an influential role in globe.

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

Import Market:

The Dubai/Oman average 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

42 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.

43 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.

44 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 dierectional trades 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.

45 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[4]. Usually non-commercial positions are viewed as speculation, and according to NYMEX WTI futures data, the open interests hold by commercial trader has account for 52% in March 2020. 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.

[4]Currently, 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.

46 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.

47 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.[5]

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.

[5]On February 15, 2010, the CSRC publicly solicited opinions on the draft of the provisions of article 70, paragraph 1, item 5 of The Regulations on Administration of Futures Trading (hereinafter referred to as the Provisions). There are seven articles in the Provision. Article 1 is the regulation basis, the second to fifth articles clearly prohibit four kinds of manipulation of the futures trading price, including false declaration, delude, insider trading, and squeeze. Article 2 prohibit any entity or individual asking/bidding a contract for the purpose of affecting the futures trading price, engaging in a transaction which is contrary to their declared direction, and seeking other illegitimate interests. Article 3 states any entity or individual is prohibited from fabricating or disseminating false or misleading information to affect the futures trading price, including conduct relevant transactions and seek other illegitimate interests. Article 4 prohibit any institution or personnel from engaging in futures investment consulting business, or any other subject with market influence, to make public evaluation, prediction or investment suggestions on the futures contract, in order to affect the futures trading price, and to conduct futures trading contrary to the direction of its evaluation, prediction or investment Suggestions; Article 5 prohibit any entity or individual, individually or jointly, to use improper means to circumvent the restriction on holding positions in the near delivery month or delivery month contract, so as to form an advantage of holding positions and affect the futures trading price. Article 6 is the liability clause. Article 7 states the effective date.

48 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 attract 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.

49 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 $5,0 00,000 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.

50 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.

51 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 the first half of 2019, the notional principal of exchange-traded foreign exchange and interest rate futures and options amounted to $120.27 trillion; that of OTC-traded FX and interest rate derivatives amounted to $640.44 trillion. This means that nearly 84.19% of the $760.72 trillion financial derivatives transactions were done in OTC market.

52 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


NABORS 21-E

INTERNATIONAL CRUDE OIL FUTURES MARKET

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

There are over ten exchanges around the world that provide crude oil futures. The most influential international crude oil futures exchanges today are the New York Mercantile Exchange (NYMEX), a subsidiary of the Chicago Mercantile Exchange Group (CME), and the Intercontinental Exchange (ICE). West Texas Intermediate (WTI) from NYMEX and Brent Crude from ICE are the benchmarks for U.S. and European crude oil contracts, respectively. Oman crude oil futures of Dubai Mercantile Exchange (DME) is also an important benchmark contract. After two years of rapid development, Shanghai crude oil futures has become the third most traded oil benchmark in the world.

Crude oil contracts listed elsewhere are: the WTI and Brent crude oil futures of the Multi Commodity Exchange of India (MCX); Middle East crude oil futures of Tokyo Commodity Exchange (TOCOM), Brent crude oil futures of Moscow Exchange; and Urals crude oil futures of St. Petersburg International Mercantile Exchange (SPIMEX), WTI crude oil futures from the Singapore Mercantile Exchange (SMX); WTI crude oil futures from the Rosario Futures Exchange (ROFX) in Argentina; crude oil futures listed on the Johannesburg Stock Exchange (JSE) in South Africa. In addition, CME launched the Houston WTI futures contract in the fourth quarter of 2018 based on the needs of refineries, traders and consumers.

According to the latest data from the Futures Industry Association (FIA) in 2019, the top crude oil futures contracts in terms of trading volumes are Brent crude oil futures contract from the Moscow Exchange, WTI crude oil futures from NYMEX, Brent crude oil futures contract from ICE, mini crude oil futures and crude oil futures contracts from Multi Commodity Exchange (MCX), WTI crude oil futures contracts from ICE, and Shanghai crude oil futures contracts from the INE. Annual trading volume of above contracts in year 2019 is provided in Appendix 6.

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

The underlying for WTI (West Texas Intermediate) futures listed on NYMEX is a light sweet crude oil. Besides, WTI futures contracts can also deliver other crudes included in the DSW (Domestic Sweet Streams). 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. Currently, the delivery grades of Brent include Brent blend, Forties, Oseberg, Ekofisk, and Troll (BFOET).

55 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.

Particiaption in crude futures market is more extensive, including not only the above-mentioned participants 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.

56 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 differenials back into a reasonable range.

57 What is a market maker? How do market makers contribute to the futures market? Are market makers 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 designated market maker require to meet certain quality criteria and must 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 has issued The Market-Making Management Rule on October 11th, 2018, and introduced the market-making mechanism for shanghai crude futures.

58 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

59 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 from 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 upand internationalize its futures market.

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

In April 2015, MOF and SAT issued The Notice on the Value-Added Tax Policies for the Bonded Delivery of Crude Oil and Iron Ore Futures Contracts, which provides that the bonded delivery of crude oil futures is to be VAT-exempt until further notice. In June 2015, the SFC issued the Interim Measures for the Administration of Overseas Traders' and Overseas Brokers' Engagement in the Trading of Specified Domestic Futures Products, which determines

shanghai crude oil futures as one of the specified domestic futures products and provides rules and regulation regarding the access of overseas investors and brokers, laying the foundation for the law of China's futures market opening to the world. Later on, in July 2015, the People's Bank of China issued the notice on the Administration of Cross-border Settlement for Onshore Crude Futures Trading. In the same year on July 31, the State Administration of Foreign Exchange has issued a Notice on the Administration of Foreign Exchange for Overseas Traders' and Overseas Brokers' Trading of Specified China Futures Contracts, which is different from QFII and shanghai-Hong Kong stock connect, providing an innovative and suitable method for futures market to supervise and manage the foreign exchange. In August 2015, the former General Administration of Customs issued the Customs Administration for Bonded Delivery of China Crude Futures Contract to support the development of bonded delivery business of crude oil futures.

In February 2018, the former General Administration of Quality Supervision, Inspection and Quarantine issued the Notice on the Administration of Quality Supervision and Inspection of Crude Oil Futures, which clarified the requirements of inspection and supervision of crude oil futures. In March 2018, the Ministry of Finance and the State Taxation Administration issued the notice on the Futures Trading and Income Tax Exemption for offshore institutional and individual traders temporarily.

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.

61 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.

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

In January 2019, the China Securities Regulatory Commission (CSRC) formally approved the Shanghai International Energy Exchange (INE) as a 'Qualifying Central Counterparty' (QCCP). This indicates that after taking the lead in listing the globalized crude oil futures, INE has further improved its international industry standards, enhanced the ability of market risk prevention and control, and laid a solid foundation for the future development.

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.

63 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 Cuctomer procedures, including thetrader'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.

64 What common China futures rule principles will be carried over to the crude oil futures market? What new rules 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.

65 What are the Chinese crude oil futures contract specifications?

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

Table 4: Specications 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

66 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.

67 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 at 60 °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.

68 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 rthe 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.

69 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 irregulation, 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.

70 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, monthly contracts are listed for the current year and the next 10 calendar years and 2 additional contract months; and a new calendar year and 2 additional contract months will be added following the termination of trading in the December contract

of the current year. 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 are listed for the current year and the next 10 calendar years and 2 additional consecutive contract months. A new calendar year and 2 additional contract months will be added following the termination of trading in the December contract of the current year.
ICE BRENT	Up to 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

71 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-2020 contract is May 29th, 2020. The delivery period (delivery of crude warrants) is the five consecutive trading 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-2020 contract (delivery month) is May 20th, 2020. 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-2020 contract is April 30th, 2020. 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-2020 contract is April 30, 2020. 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

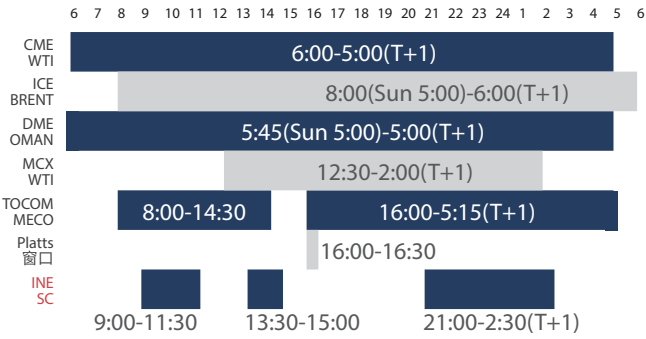
72 How do the daily trading hours of China's crude oil futures differ from those of major international crude oil futures contracts?

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 New York Time 20:00–18:00 (+1 day); London Time: 01:00–23:00; Singapore Time: 08:00–06:00 (+1 day) Sunday Open London: 22:00.

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.

73 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.

74 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 (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	BFOET (Brent, Forties, Oseberg, Ekofisk, Troll)	WTI / DSW[6]	Oman Crude Oil
Contract Size	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels
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	Delivery at INE-designated delivery storage facilities in bonded zones	Cash Settlement	FOB at Pipeline	FOB at the Loading Port
Settlement Price	The daily volume-weighted average price (VWAP)	VWAP from 19:28 to 19:30 London time	VWAP from 14:28 to 14:30 Eastern time (US)	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 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	Trading ceases on the last trading day of the second month preceding the delivery month
Delivery Period	Five consecutive business days after the last trading day[7]	Generally cash-settled through EFP before expiry	From the first calendar day to the last calendar day of the delivery month	Delivery matching and tanker selection in the month preceding the contract month; delivery in contract month

[6]WTI/DSW shall meet the grade and quality specifications on sulfur, API, viscosity, RVP, basic sediment, pour point, micro method carbon residue, TAN, total acid number, nickel, vanadium and HTSD

[7]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.

	INE (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OQD)
Price Limits	Within ±4% from the settlement price of the previous day	Interval price limits functionality serving as circuit breaker to reduce short-term price fluctuations. Although effective on every trading day, it can be only triggered in a very short time under extreme price fluctuations.	Introduce Dynamic Price Limit Functionality: The upper and lower price fluctuation limit will be calculated by utilize the dynamic variant in continuously rolling 60-minute look-back period. When the price exceeds the dynamic price fluctuation limits, then a two minutes trading halt will commence. After the fourth triggering event on a trading day, there shall be no further special price fluctuation limits.	None
Minimum Trading Margin	5% of contract value	Maintenance Margin $2,250–$4,940/lot	Maintenance margin: $2,325/lot-$4,650/lot; Margin requirements for far month contracts gradually decrease	Maintenance margin: $3,600/lot-$5,000/lot
Contract Months	Monthly contracts of recent twelve (12) consecutive months followed by eight (8) quarterly contracts.	Up to 96 consecutive months	Monthly contracts listed for the current year and the next 10 calendar years and 2 additional contract months. List monthly contracts for a new calendar year and 2 additional contract months following the termination of trading in the December contract of the current year.	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; continuous trading hours are separately set by INE	New York Time: 20:00–18:00 (+1 day) London Time: 00:00–22:00 Singapore Time: 08:00–06:00 (+1 day) Sunday Open London 22:00	CME Globex: Sunday - Friday, 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. Chicago Time/CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT) CME ClearPort: Sunday - Friday 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. Chicago Time/CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT)	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: INE, CME, ICE and DME, current as of March 2020

TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

09

TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

75 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 70% 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.

76 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.

77 Is the rule of "one trader one ID" applicable to different teams within the same institution, so as to provide a differentiated solution for transaction management between different sub-accounts of the institution?

At present, IT system vendors provide omnibus account and sub-accounts separation services in the global market. At the exchange level, one account one ID is a rule for establishing trading codes for only one individual or one institutional investor. If the institutional client has the demand for sub-accounts, it shall negotiate with the relevant IT system vendor.

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

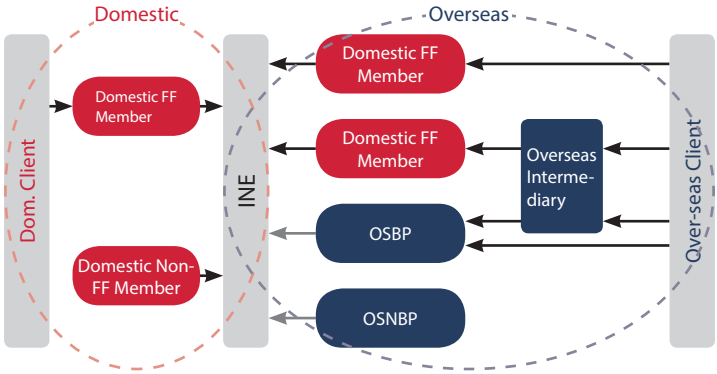
Global Participation Accesses to INE are:

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 Sometimes the filing process repeat the submission of same documents. Can we integrate, simplify and reduce the procedure and overlapped materials?

Current, INE has already integrated, simplify and reduce some of the application procedures. For example, for the same futures firm member, if they have been authorized by several overseas intermediaries regarding filing service, in the second time of providing these kind of services, futures firm can wave some of the specific materials regarding their carrying-brokerage management, internal and risk control management. For overseas intermediaries, in the second time of authorizing a futures firm member for filing service, they can wave the submission of the original copy of the notarized business registration certificate, and can use copy version instead.

82 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.

83 Do overseas individual investors have to open NRA accounts to trade crude oil futures?

Overseas individual investors can choose to trade in the following ways: 1. Trade through local Chinese futures firms; or 2. Trade through OSBP of INE. The former requires overseas individual investors to open a special futures settlement account in a domestic designated depository bank, which is "overseas individual RMB bank settlement account" or "overseas individual domestic foreign exchange account". The latter do not require a bank account in China.

84 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.

85 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.

86 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)?

Currently, INE has completed the registration of Hong Kong ATS and Singapore RMO. According to the guidance of the CSRC, the list of countries where accounts can be opened will be explored and continuously updated.

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.

87 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.

88 Public Offering Funds design various products such as ETF, which could increase the liquidity of futures contracts. Can Public Offering Funds participate in crude oil futures trading?

For domestic investors, the public offering fund has been categorized as special legal client and can open crude oil trading accounts. Currently, there are several fund products have participated in crude oil trading. In addition to this, INE also has overseas special legal clients who open trading account already.

89 Does INE accept English version of documents and files? Are regulations, articles, circulars and notices published by INE also available in English?

INE accepts feedback in English on drafting and revising business related rules. In terms of the application documents for account opening regarding overseas intermediaries and overseas special participants, INE accepts the application documents with both Chinese and English version. According to article 41 of the Overseas Special Participant Management Rules, the Chinese version shall prevail. Meanwhile, INE provides bilingual versions of laws, regulations, notices and circulars in both Chinese and English, but as legal texts, the Chinese version shall prevail.

90 Since it's difficult to obtain clients' overseas credit reports, besides the commitment letter, what are the other ways?

Futures firms shall conduct clients' due diligence (KYC) when develop overseas business, and should not be limited to the clients' commitment letter. Besides, FCMs can work with credit checking company in conducting background check, asking credit rating agencies to issue opinions, conducting verification on company's registered representatives, or accepting notarization and other forms of verification based on clients' situation.

91 For overseas investors, what are the available trading vendors that have been connected to the INE trading platform?

By the end of 2019, CQG, PATs, Bloomberg, Tradex,Esunny Information and other trading vendors have already been connected to the INE trading platform. In terms of the settlement system, FIS has completed both trading and settlement connection with CTP. In addition to this, INE will continue to cooperate with major international system vendors to facilitate their access.

10

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

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

92 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.

The delivery mechanism of Brent crude oil futures contracts includes employing Exchange of Futures for Physicals (EFP) and cash settlement based on the ICE Brent Index price. With EFP, the final settlement price is not declared to the market. The cash

settlement price for the ICE Brent Future is based on the ICE Brent Index on expiry day for the relevant ICE Brent Futures contract month. The Index represents the average price of trading in the BFOET (Brent-Forties-Oseberg-Ekofisk-Troll) cash or 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 consideration in the calculation. The calculation of the ICE Brent Index will be the average of five values.[8]

93 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.

[8] The detailed calculation method can be found at: https://www.theice.com/publicdocs/futures/ICE_Futures_Europe_Brent_Index.pdf

94 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) and its relevant provisions of the [Policy Q & A], 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.

95 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.

The ICE Brent adopts interval price limits functionality serving as circuit breaker to reduce short-term price fluctuations. Although it is effective on every trading day, it can be only triggered in a very short time under extreme price fluctuations. The WTI crude futures introduces Dynamic Price Limit Functionality: i.e. the upper

and lower price fluctuation limit will be calculated by utilizing the dynamic variant in continuously rolling 60-minute look-back period. When the price exceeds the dynamic price fluctuation limits, then a two minutes trading halt will commence. After the fourth triggering event on a trading day, there shall be no further special price fluctuation limits.

Exchange / Contract	Price Limit
CME WTI	Introduce Dynamic Price Limit Functionality: The upper and lower price fluctuation limit will be calculated by utilizing the dynamic variant in continuously rolling 60-minute look-back period. When the price exceeds the dynamic price fluctuation limits, then a two minutes trading halt will commence. After the fourth triggering event on a trading day, there shall be no further special price fluctuation limits.
ICE BRENT	Interval price limits functionality, serving as circuit breaker to reduce short-term price fluctuations. Although effective on every trading day, it can be only triggered in a very short time under extreme price fluctuations.
DME OMAN	None
SHFE SC	4% above or below the previous day's settlement price

By the end of 2019

96 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.

Currently, the maintenance margin requirement of ICE Brent contract is around $2,250–$4,940/lot. For CME WTI contract, the maintenance margin requirement is range from $2,325 -$4,650/ lots, and the margin requirements for far month contracts gradually decrease . DME clearing and settlement is provided by the Clearing House of CME Group, and requires maintenance margin around $3,600 -$5,000/lots.

97 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, if they belong to domestic non-FF members or OSNBP, the account holders shall declare to INE; if those accounts belong to general clients, the account holders shall declare to China Futures Market Monitoring Center (CFMMC). According to relevant regulation, INE then obtains the actual controlling relationship information of the general clients through CFMMC .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.

98 What is the procedure in applying the hedging quota and what are Exchange's principles in evaluating and approving the hedging quota application?

INE allows hedge traders to apply for hedging quota exceeding the normal position limit. In terms of identifying the appropriate amount of hedging quota and principles of evaluating and approving the quota application, INE will take into consideration regarding historical data and future plan of an applicant's actual production, trading, and consumption, as well as spot and futures market conditions. An applicant shall provide information about crude production plan, trading contract/agreement, or oil processing 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 hedging quota to that of position limit of near-delivery-month contract, and INE will apply the minimum quota for the adjustment, in order to better manage the market risk. When quota is not enough, hedge trader can re-apply for additional quota.

99 Without hedging quota, the position limit of front month contract is 500,000 barrels, while quota for Brent is above 6 million barrels. Can INE increase the position limit for oil companies' and other institutions' convenience?

Position limits of INE crude futures contracts are set for general clients. For companies with actual trade background who need to hedge in spot market, can provide documents such as spot trade contracts and production scheduling plans when apply to the INE hedging quota within the application period. Once approved, the position limit of 500,000 barrels can be exceeded. On the one hand, INE can restrict the speculators by applying the position limit, and on the other hand, INE can serves clients' needs to hedge risks through hedging quota.

100 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.

101 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.

102 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.

103 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)

104 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.

105 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.

106 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 though 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.

107 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.

108 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.

11

CRUDE OIL FUTURES DELIVERY

CRUDE OIL FUTURES DELIVERY

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

China's crude oil futures contracts employ physical 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".

110 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.

111 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 Delivery Fee is 0.05 Yuan/Barrel. andCurrently, from April 10, 2020 to January 8,2021: delivery fee will be adjusted to 0 (including delivery related fees incurred from EFP and standard warrant transfer through INE clearing services).

3 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.

4 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.

112 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^3)

No.	Name	Storage Name	Approved Storage Capacity	Active Storage Capacity
1	Sinopec Petroleum Reserve Co., Ltd.	Rizhao Branch	120	40
2		Zhoushan Branch	80	60
3		Hainan Branch	100	40
4	PetroChina Fuel Oil Company Limited	Ningbodaxie Branch	40	40
5		Zhanjiang Branch	70	40
6	Sinochem-Xingzhong Oil Staging (Zhoushan) Co., Ltd.	Sinochem-Xingzhong Aoshan Depot	100	35
7	Dalian PetroChina International Warehousing & Transportation Co., Ltd.	Dalian PetroChina Bonded Depot	115	40
8	Qingdao Shihua Crude Oil Terminal Co., Ltd.	Qingdao Port DJK	40	40
9	Yangshan Shengang International Oil Logistics Co., Ltd.	Yangshan Depot	30	20
Total			695	355

113 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

114 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.

115 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 list of INE's designated delivery storage facilities has been posted on the website, and INE will keep exploring qualified oil terminals and adding new designated oil terminals in a timely manner to meet the market needs.

116 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.

117 How can falsified crude oil warrants be identified?

The physical delivery process established for China's crude oil futures requires 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.

118 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 m3/hr, or about 530,000 barrels per day; and the rate of loading to a ship is about 3,000 m3/hr, or 450,000 barrels per day.

119 What are the relevant cost during the physical delivery process of crude oil futures?

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 fee paid to a designated delivery storage facility capped at ¥0.20 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. (The detailed delivery related fee can be found at Q111)

120 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: The Delivery Characteristics of Shanghai 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 Conduting 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

121 According to the rules of INE, September contract will delivery in September, that means crude needs to be stored at the designated delivery storage facility in August, and trader must planning purchase crude oil from the Middle East in May. Spot trades are hard to make changes when transactions are completed, hence the trade flexibility is low. How to handle this kind of situation?

For spot crude oil bought in the Middle East, if seller wants to delivery crude for September contract, the crude needs to be delivered into our designated storage facility and formed standard warrant by the end of August. For crude oil shipped in August, the transaction and price assessment process will take place in July. Therefore, the seller needs to consider multiple factors before participating in futures contact delivery process, such factors include the price difference of the two places, freight, shipping schedule, etc. For the crude oil that has already stored in INE designated facility and has already complete the crude storage filing process, seller can base on the market situation to sell crudes. At the meantime, seller also need to take storage fee into consideration.

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

According to Announcement [2015] No. 40 of the General Administration of Customs (the Customs), in the case of import after physical delivery, the dutiable value for the commodity goods is the sum of (a) the delivery settlement price for the crude oil futures contract as published by the Shanghai International Energy Exchange, and (b) any delivery premiums or discounts applied to applicable crude stream.

123 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.

124 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.

125 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.

126 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 35 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.

127 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 logbook.

128 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.

129 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 apot market practice.

130 Compared with the spot trade, the cost related to crude oil futures delivery (including storage fees, inspection fees and other expenses) is very high. Are there any alternative ways to lower the cost?

According to relevant regulations, currently INE can carry out Exchange for Physicals (EFP) for both standard warrants and non-standard warrants. At present, the following two types of non-standard warrants for EFP can be conducted:

1) Both the buyer and seller are domestic institutions. The underlaying delivery asset is the crude oil, which has been paid by seller in RMB and responsible by seller to conduct import customs procedure and formalities.

2) The buyer is a domestic institution, the seller is an oversea institution. The underlaying delivery asset is the crude oil, which has been paid by buyer in RMB or foreign currency and responsible by buyer to conduct import customs procedure and formalities.

131 Is it possible to use approaches such as oil lighterage, cargo assembly and etc. to reduce delivery costs?

According to the INE Delivery Rules, the applied load-in futures commodities shall be shipped directly from the port of the place of origin, only two of the deliverable crude grades are allowed to be assembled at the designated port of shipment. At present, the relevant regulatory policies and operational details of transferred crude oil lighterage load-in mechanism is under study.

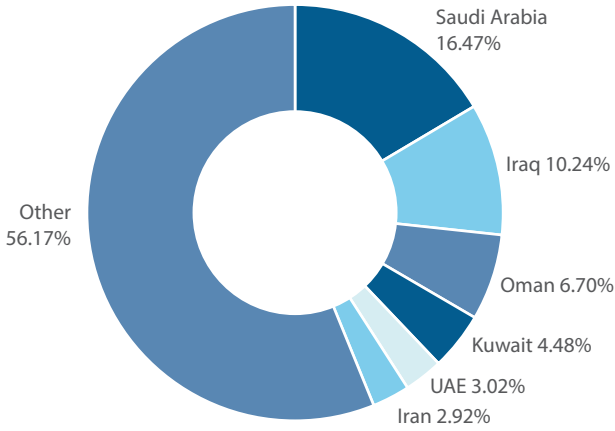
APPENDIX

Appendix 1: 2015-2018 China's Major Oilfields' Annual Production

Oil & Gas Fields / Producer	2015	2016	2017	2018
CNPC Daqing Oilfield Co., Ltd.	38,386	36,560	34,000	32,044
CNPC Jilin Oilfield Company	4,662	4,045	3,900	3,937
CNPC Liaohe Oilfield Company	10,371	9,741	10,001	9,951
CNPC Huabei Oilfield Company	4,201	4,110	4,031	4,072
CNPC Dagang Oilfield Company	4,441	4,079	4,028	4,070
CNPC Jidong Oilfield Company	1,600	1,350	1,360	1,300
CNPC Zhejiang Oilfield Company	50	30	30	30
CNPC Xinjiang Oilfield Company	11,800	11,130	11,310	11,470
CNPC Turpan-Hami Oilfield Company	2,100	2,000	1,900	1,850
CNPC Tarim Oilfield Company	5,900	5,500	5,202	5,515
CNPC Changqing Oilfield Company	24,808	23,920	23,720	23,770
CNPC Qinghai Oilfield Company	2,230	2,210	2,280	2,233
CNPC Yumen Oilfield Company	440	380	400	410
CNPC Southwest Oil & Gas Field Company	137	100	74	59
CNPC South China Exploration & Development Company	301	295	300	305
CNPC Total	111,426	105,450	102,537	101,017
Sinopec Shengli Oilfield Company	27,100	23,902	23,416	23,410
Sinopec Zhongyuan Oilfield Company	1,826	1,478	1,273	1,260
Sinopec Henan Oilfield Company	2,310	1,691	1,565	1,360
Sinopec Jianghan Oilfield Company	885	739	697	683
Sinopec Jiangsu Oilfield Company	1,555	1,330	1,201	1,132
Sinopec Northwest Oilfield Company	7,030	5,943	6,300	6,500
Sinopec Southwest Oi & Gas Field Company	17	7	13	22
Sinopec Huadong Oilfield Company	350	330	360	422
Sinopec Huabei Oilfield Company	370	72	86	131
Sinopec Northeast Oilfield Company	147	35	18	30
Sinopec Huabei Petroleum Bureau	27	23	14	0
Sinopec Total ①	41,617	35,550	34,943	34,950
CNOOC ②	47,732	45,550	42,780	42,007
Shaanxi Yanchang Petroleum (Group) Co., Ltd.	12,540	11,060	11,072	11,201
National Total I (as reported by enterprise) ③	213,316	197,610	191,332	189,175
National Total II (as reported by National Bureau of Statistics) ④	214,742	199,690	191,506	189,106

Notes: Source: Issue 2019-4, *International Petroleum Economics*, China Economic Analysis of China Petroleum and Chemical Industry
Unit: Thousand metric tons
①Equity Production of China East Sea Sector of the joint venture with CNOOC is not included (Equity Production of year 2016 is 105,000 DWT).
②All China offshore oil production of all joint ventures are included.
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 in 2019



Source: General Administration of Customs

Appendix 3: 2015-2019 China Crude Oil Imports and Exports

	2015	2016	2017	2018	2019
Import Value	33549	38104	41996	46399	50589
Export Value	287	293	486	264	80
Net Import	33262	37811	41510	46135	50509

Source: General Administration of Customs

Unit: 10,000 metric tons

Appendix 4: 2020 Approved Independent Refineries with Their Refinery Quota of Using Imported Crude Oil by NDRC and Crude Imported Quota by MOFOCOM

Name of the company	Refinery Quota of Using Imported Crude Oil	Crude Oil Import Quota
Dongming Shihua	525	750
Panjin Beiran	490	700
Zhonghuahongrun	371	530
Kenli Shihua	126	252
Lijun Shihua	175	350
Yatong Shihua	138	276
Baota Shihua		216
Huifeng Shihua	208	416
Tianhong Huaxue	220	440
Luqing Shihua	181	258
Jingbo Shihua	232	331
Qirun Huagong	154	220
Hautiy Shihua	128	320
Wudi Xinyue	120	240
Hengyuan Shihua	175	350
Qingyuan Jituan	202	404
Hebei Xinhai	260	372
Shandong Jincheng	210	300
Shandong Shenchi	176	252

Name of the company	Refinery Quota of Using Imported Crude Oil	Crude Oil Import Quota
Haike Ruilin	147	210
Zhonghai Jingxi	74	186
Henan Fengli	111	222
Shanxi Yanchang	180	360
Hubei Jinao	115	230
Lanqiao Shihua	72	180
Shengxing Shihua	110	220
Qicheng Shihua	112	160
Dongfang Hualong	210	300
Dalian Jinyuan	40	80
Yuhuang Shengshi	72	144
Xintai Shihua	140	200
Qingyishan Shihua	150	300
Hengli Group	83	2000
Zhejiang Oil	35	2000
Fuyu Petroleum & Chemicals	45	164
Huaian Petroleum & Chemicals	32	170
Haike Chemical		96
Jiangsu Xinhai	92	230
Kelida Petroleum & Chemicals	8	150
Chengda New Energy	22	210
Wantong Petroleum & Chemicals	581	195
Lianhe Petroleum & Chemicals	4	280

Source: Includes data from National Development and Reform Commision and Ministry of Commerce of The People's Republic of China

Unit: 10 000 metric tons

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

Country	Destination		
	Asia	Europe	United States
Saudi Arabia	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	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 2019

Exchange	Contract	2019 Trading Volume
Chicago Mercantile Exchange Group (CME)	Crude Oil Physical (CL)	291,465,320
	Mini Crude Oil (QM)	5,470,936
	Brent Crude Oil-Last Day (BZ)	25,616,925
	WTI Huston Crude Oil Futures (HCL)	183,204
	Crude Oil (WS)	16,884
Intercontinental Exchange (ICE)	ICE Brent Crude	221,331,490
	ICE WTI Crude	53,597,867
Dubai Mercantile Exchange (DME)	Oman	1,442,981
Tokyo Commodity Exchange (TOCOM)	Crude Oil	2,679,766
Multi Commodity Exchange of India (MCX)	Crude Oil Mini Futures	135,579,941
	Crude Oil	60,194,186
Moscow Exchange(MOE)	Brent	616,575,153
Johannesburg Stock Exchange (JSE)	Brent Crude Oil	3,142
	Crude Oil	20
Rosario Futures Exchange (ROFX)	WTI Crude	534,945
Shanghai International Energy Exchange(INE)	SC Crude	34,644,385

Source: FIA and Official Websites of Exchanges

Appendix 7: Characteristics of Major Imported Crude Oils of China

Crude	Country of Origin	Density at 20 ° C (kg/m^3)	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

Appendix 8: The Scale of SPR of OECD Countries

The table below shows closing oil stocks of OECD member states as of 2018.

	Unit：Billion barrels	Unit：Billion barrels	Percentage(by barrel)
US	61.2	7.3	3.50%
Canada	167.8	27.1	9.70%
Mexico	7.7	1.1	0.40%
Total North America	236	35.4	13.70%
Argentina	2	0.3	0.10%
Brazil	13.4	2	0.80%
Colombia	1.8	0.3	0.10%
Ecuador	2.8	0.4	0.20%
Peru	1	0.1	0.10%
Trinidad & Tobago	0.2	^	♦
Venezuela	303.3	48	17.50%
Other S. & Cent. America	0.5	0.1	♦
Total S. & Cent. America	325.1	51.1	18.80%
Denmark	0.4	0.1	♦
Italy	0.6	0.1	♦
Norway	8.6	1.1	0.50%
Romania	0.6	0.1	♦
United Kingdom	2.5	0.3	0.10%
Other Europe	1.6	0.2	0.10%
Total Europe	14.3	1.9	0.80%
Azerbaijan	7	1	0.40%
Kazakhstan	30	3.9	1.80%
Russian Federation	106.2	14.6	6.30%
Turkmenistan	0.6	0.1	♦
Uzbekistan	0.6	0.1	♦
Other CIS	0.3	^	♦
Total CIS	144.7	19.6	8.40%
Iran	155.6	21.4	9.00%
Iraq	147.2	19.9	8.50%
Kuwait	101.5	14	5.90%
Oman	5.4	0.7	0.30%
Qatar	25.2	2.6	1.50%
Saudi Arabia	297.7	40.9	17.20%
Syria	2.5	0.3	0.10%
United Arab Emirates	97.8	13	5.70%
Yemen	3	0.4	0.20%
Other Middle East	0.2	^	♦
Total Middle East	836.1	113.2	48.30%

	Unit：Billion barrels	Unit：Billion barrels	Percentage(by barrel)
Algeria	12.2	1.5	0.70%
Angola	8.4	1.1	0.50%
Chad	1.5	0.2	0.10%
Republic of Congo	1.6	0.2	0.10%
Egypt	3.3	0.4	0.20%
Equatorial Guinea	1.1	0.1	0.10%
Gabon	2	0.3	0.10%
Libya	48.4	6.3	2.80%
Nigeria	37.5	5.1	2.20%
South Sudan	3.5	0.5	0.20%
Sudan	1.5	0.2	0.10%
Tunisia	0.4	0.1	♦
Other Africa	3.9	0.5	0.20%
Total Africa	125.3	16.6	7.20%
Australia	4	0.4	0.20%
Brunei	1.1	0.1	0.10%
China	25.9	3.5	1.50%
India	4.5	0.6	0.30%
Indonesia	3.2	0.4	0.20%
Malaysia	3	0.4	0.20%
Thailand	0.3	^	♦
Vietnam	4.4	0.6	0.30%
Other Asia Pacific	1.2	0.2	0.10%
Total Asia Pacific	47.6	6.3	2.80%
Total World	1729.7	244.1	100.00%
of which: OECD	254	37.6	14.70%
Non-OECD	1475.8	206.6	85.30%
OPEC	1242.2	174.8	71.80%
Non-OPEC	487.5	69.4	28.20%
European Union	4.8	0.6	0.30%

Source: BP Statistical Review of World Energy 2019

List of OECD countries: United States, United Kingdom, France, Germany, Italy, Canada, Ireland, Netherlands, Belgium, Luxembourg, Austria, Switzerland, Norway, Iceland, Denmark, Sweden, Spain, Portugal, Greece, Turkey

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