



CRUDE OIL FUTURES Q&A

2022 Edition

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CRUDE OIL FUNDAMENTALS

01



CRUDE OIL FUNDAMENTALS

01 What are the 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", "naphthenic" and "intermediate" crude oils mean?

Paraffinic, naphthenic and intermediate crude oils are differentiated by the proportion of hydrocarbon molecules 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 in-between the two.

03 How to differentiate between light and heavy crude?

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

By international convention, the API values for each weight usually are: ultra-light- API gravity ≥ 50 , light- API gravity between 35 and 50, medium- API gravity between 26 and 35, and heavy- API gravity between 10 and 26. 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 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.

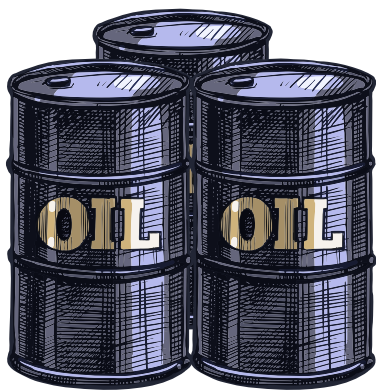
Products refined, produced, or derived from crude oil are: (i) combustible fuels that are used as main energy sources, such as gasoline, kerosene, diesel, fuel oil, and liquefied petroleum gas; (ii) high-molecular-weight polyethylene, a crucial pillar of the modern materials industry, and the vast majority 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 trucks 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 2021, total global crude oil consumption in 2020 was 4.007 billion metric tons (88.48 million bpd), down 9.121 million bpd from the year before. Total global production was 4.165 billion metric tons (88.39 million bpd), down 6.57 million bpd. In particular, in 2020 China consumed 669 million metric tons of oil and produced 195 million metric tons, equaling a daily consumption level of 14.225 million barrels and daily production level of 3.901 million barrels.

According to the September 2021 monthly report from the Organization of the Petroleum Exporting Countries (OPEC), the global daily demand for crude oil in 2021 was 96.68 million bpd. The total supply from the non-OPEC countries was 69.01 million bpd and the supply from OPEC countries was 29.48 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 2021 estimates that the total global proven oil reserves were at 173.24 billion barrels as of the end of 2020, which could last for 53.5 years at the current production level.

However, estimates of how many years remain before the oil supply is exhausted change from year to year as new deposits are found. If new discoveries of the oil reserves outpace the output, then the ratio will further increase. In fact, this ratio has been going up instead of down 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 2020, 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, oil exploration has been moving to open seas, deep waters, and onshore deep drilling. With the coming of the U.S. oil revolution in 2011, producers are setting eyes on the oil and gas resources formerly locked away in shale, which has greatly increased the total recoverable reserves in the U.S.

In addition, natural gas, wind power, and other alternative sources of energy will also affect the demand for oil.

Lastly, the price factor. Brent crude from North Sea was trading for less than \$10 a barrel in November 1998. But since we entered the 21st century, the oil price has gone through several sharp price movements. In July 2008, the price climbed to nearly \$150, followed by a free-fall to just over \$30 in December in that same year. Then in 2012, it rebounded to \$129, only to nosedive in 2014 to below \$40, partly due to a “high supply, low demand” expectation. 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 resources.

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.

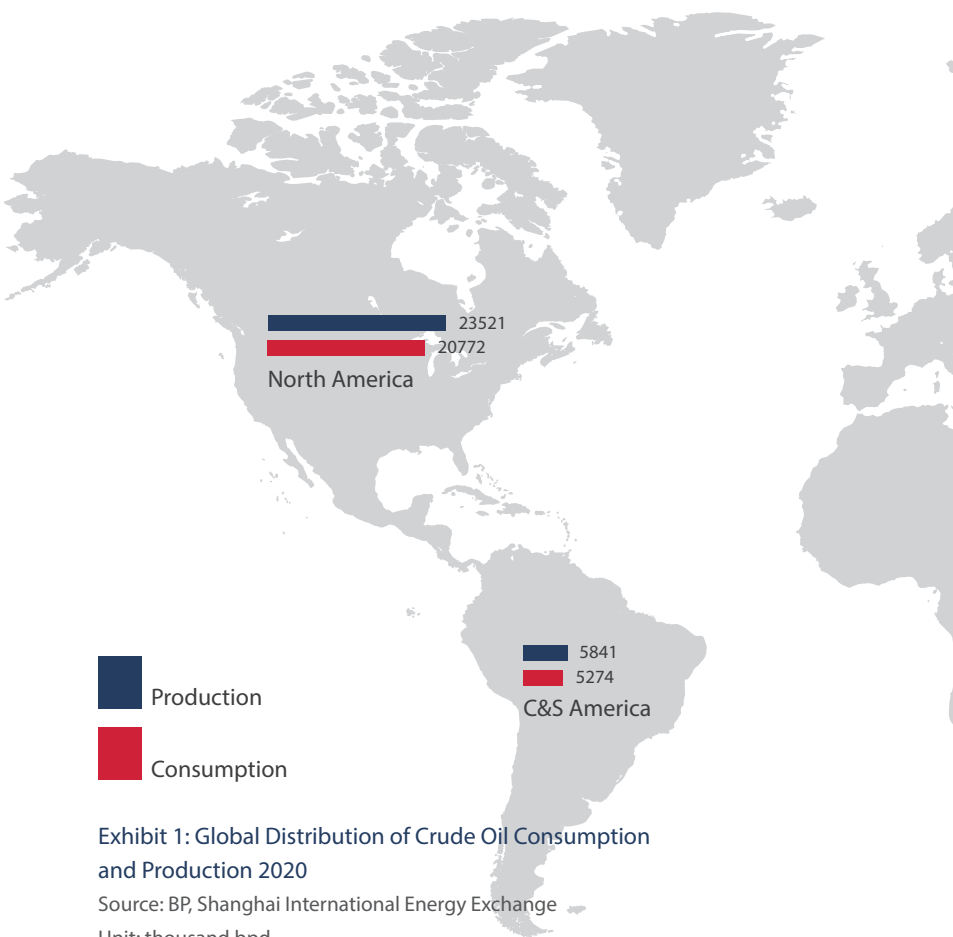


Exhibit 1: Global Distribution of Crude Oil Consumption and Production 2020

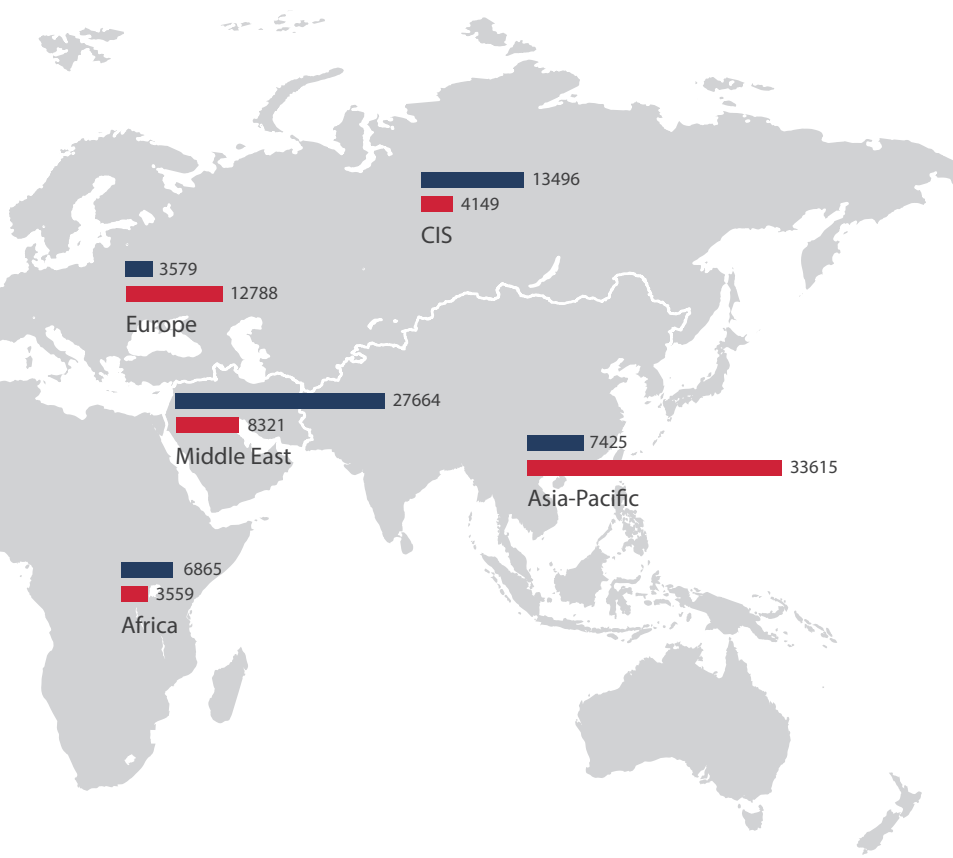
Source: BP, Shanghai International Energy Exchange

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	20772	5274	12788	4149	8321	3559	33615	88477
Production	23521	5841	3579	13496	27664	6865	7425	88391

Source: BP Statistical Review of World Energy 2021
Unit: thousand bpd



14

What are the largest oil producing and consuming countries?

According to the BP Statistical Review of World Energy 2021, the main producers of crude oil are the United States (16.48 million bpd), Saudi Arabia (11.04 million bpd), Russia (10.67 million bpd), Canada (5.13million bpd), Iraq (4.11 million bpd), China (3.90 million bpd), United Arab Emirates (3.66 million bpd) Iran (3.08 million bpd), Brazil (3.03 million bpd) and Kuwait (2.69 million bpd).

Table 2: Global Crude Oil Production and Consumption 2020

Crude Oil Production		Crude Oil Consumption	
US	16479	US	17178
Saudi Arabia	11039	China	14225
Russia	10667	India	4669
Canada	5135	Saudi Arabia	3544
Iraq	4114	Japan	3268
China	3901	Russia	3238
UAE	3657	South Korea	2560
Iran	3084	Brazil	2323
Brazil	3026	Canada	2282
Kuwait	2686	Germany	2045

Source: BP Statistical Review of World Energy 2020

Unit: thousand bpd

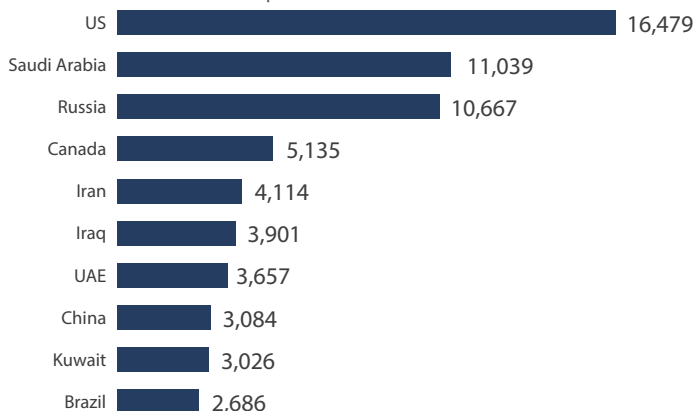


Exhibit 2: Global Distribution of Crude Oil Production 2020

Source: BP, Shanghai International Energy Exchange

Unit: thousand bpd

The main consumers of crude oil are the United States (17.18 million bpd), China (14.23 million bpd), India (4.67 million bpd), Saudi Arabia (3.54 million bpd), Japan (3.27 million bpd), Russia (3.24 million bpd), South Korea (2.56 million bpd), Brazil (2.32 million bpd), Canada (2.05 million bpd), and Germany (2.05 million bpd).

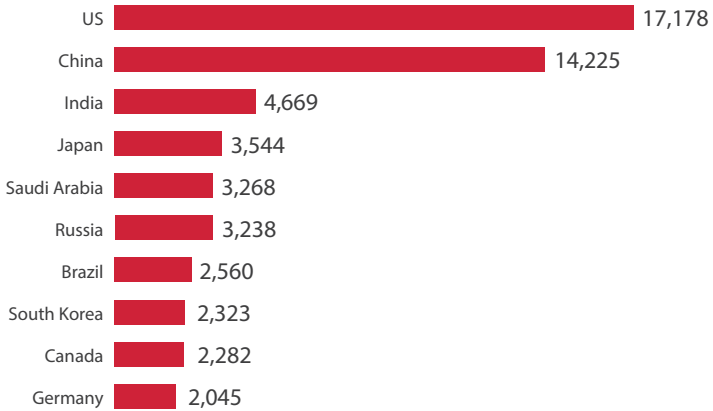


Exhibit 3: Global Distribution of Crude Oil Consumption 2020

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 2021, in 2020, the international petroleum trade was 65,061,000 bpd and the total consumption was 88,477,000 bpd, meaning 73.5% of the oil consumed worldwide was delivered by international trade. More than 40% 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 2021, the top three countries/regions by oil imports are Europe, China, and the United States. As for the list of countries/regions by oil exports, they are the Middle East, the U.S., and Russia. Please see the table below for import and export data by regions.

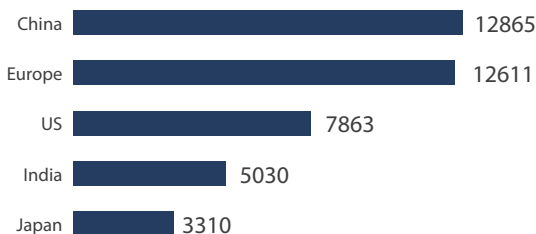


Exhibit 4: World's Top Oil Imports by Countries/Regions in 2020

Source: BP Statistical Review of World Energy 2021

Unit: thousand bpd

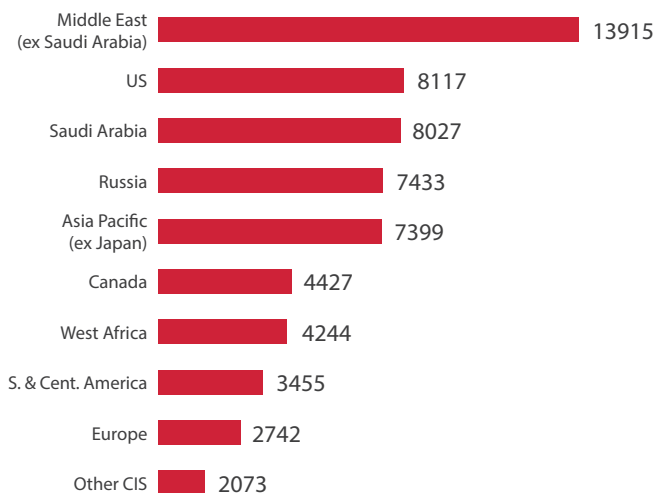


Exhibit 5: World's Top Oil Exports by Countries/Regions 2020

Source: BP Statistical Review of World Energy 2021

Unit: thousand bpd

17

What are the world's oil majors?

The supermajors are ExxonMobil, Shell, BP, TotalEnergies, and Chevron, plus a few others.

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), 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 shipping lanes for the global oil trade?

Affected by where oil is produced and consumed, there are currently eight major shipping lanes for crude oil:

Conduit 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.

Conduit 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.

Conduit 3 Cape of Good Hope

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

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

Conduit 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.

Conduit 5 Danish Straits

The Danish straits connect the Baltic Sea to the North Sea and are among the most secure crude oil shipping routes in the world.

The Danish Straights also carry a relatively small portion of oil from Norway and the United Kingdom eastward to the Scandinavian markets. This means if Russia ever shut down the Danish Straits, it would also be cutting off its own oil export route to Europe.

Conduit 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.

Conduit 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.

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.

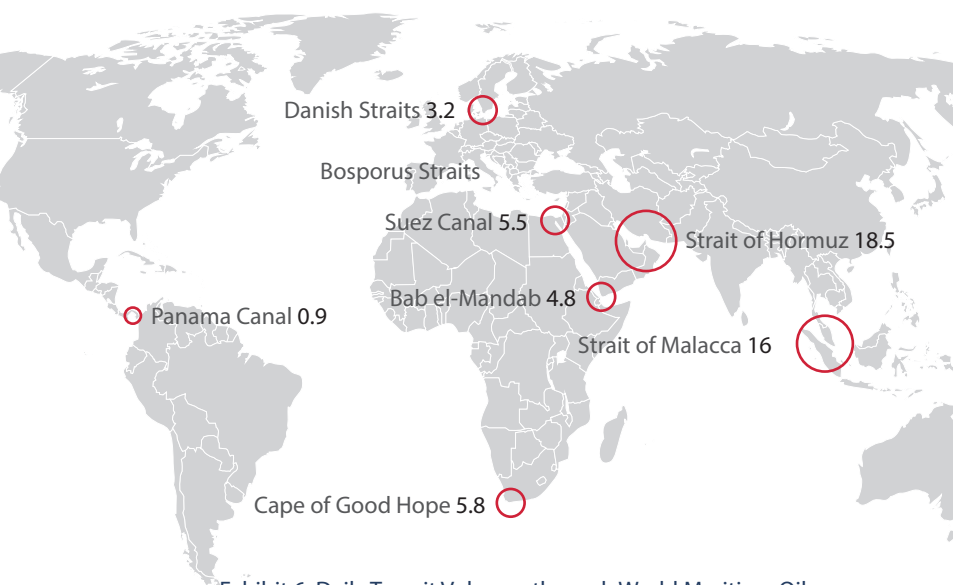


Exhibit 6: Daily Transit Volumes through World Maritime Oil Chokepoints¹

Source: EIA Unit Million bpd

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

Conduit 8 Panama Canal

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

20

How are freight rates for oil tankers calculated?

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

(1) Nominal freight rates

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

(2) Differentials

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

(3) Laytime and demurrage

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

(4) Other terms and conditions

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

21 What are the types of regular oil tankers?

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

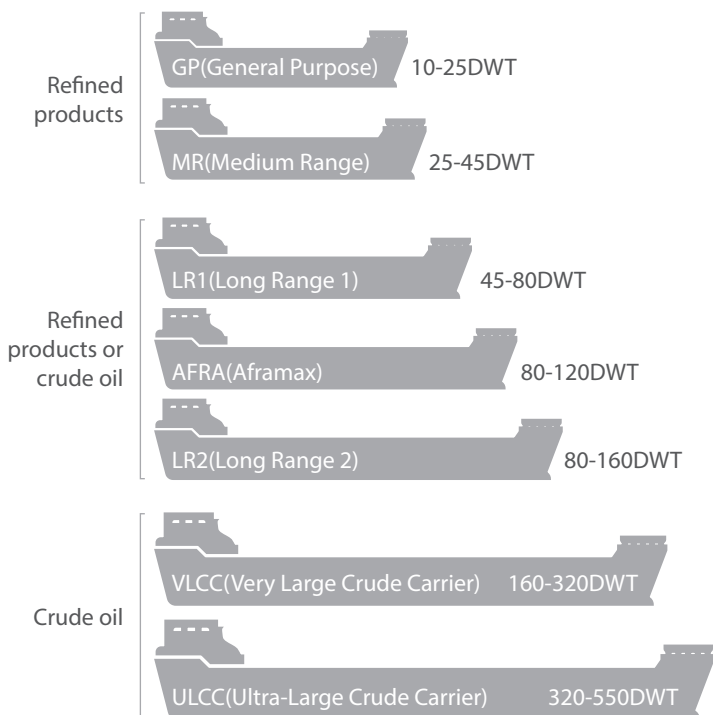


Exhibit 7: AFRA Scale of Tanker Capacity

Source: EIA

Unit: thousand DWT



CRUDE OIL GEOPOLITICS

03

CRUDE OIL GEOPOLITICS

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

Organization of the Petroleum Exporting Countries (OPEC)

OPEC was founded in September 1960, and is an intergovernmental organization of 13 member states as of March 2022. 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 2021, OPEC production in 2020 was 1474 million metric tons, 35.4% of the global total, and its proven oil reserves are estimated at 171,900 million metric tons, 70.2% of the global total.

International Energy Agency (IEA)

The IEA is a Paris-based autonomous intergovernmental organization established within the framework of the Organisation for Economic Co-operation and Development (OECD) in the wake of the 1973 oil crisis. It is composed of 31 member countries and 8 association countries. These member countries maintain a large stock of crude oil, mostly stored in the U.S., Europe, Japan, and South Korea, for emergencies.

In recent years, IEA member countries are holding as much as 1.3 billion barrels for emergency purposes and another 2.5 billion barrels for commercial purposes. This is equivalent to 114 days of their import needs. Since the IEA can release 12 million barrels of crude oil per day, the organization helps stabilize the market and mitigate price increases. IEA member countries account for 73.1% of the global total consumption.

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 is headquartered in Vienna, Austria. Membership includes the five founding members of Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela and the eight acceding members of Libya (1962), United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Angola (2007), Gabon (joined in 1975, terminated in 1995, rejoined in 2016), Equatorial Guinea (2017) and the Republic of the Congo (2018). There were three former members: Indonesia (joined in 1962, suspended its membership in 2008, rejoined in 2015, and suspended again in 2016), Qatar (withdrawn in January 2019), and Ecuador (joined in 1973, suspended its membership in 1992, reinstated in 2007, and withdrawn in January 2020).

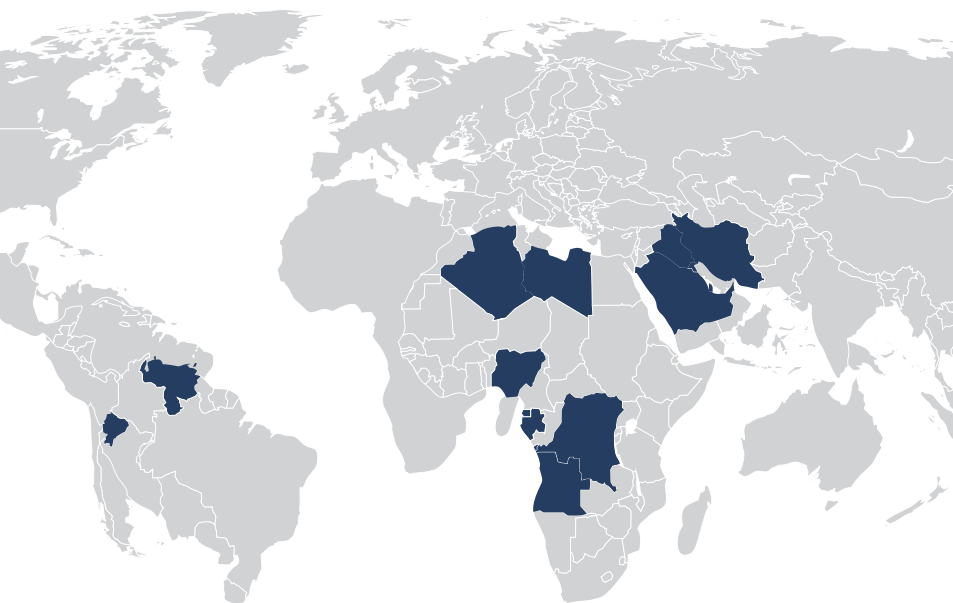


Exhibit 8: OPEC Member States

Source: OPEC

24

What are the components of the OPEC Reference Basket (OPEC basket)? Why was the OPEC basket pricing system introduced?

The OPEC Reference Basket (OPEC basket or simply ORB) 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).

The OPEC basket is a comprehensive index reflecting the price of international oil trade. In the 1980s, oil prices plummeted due to the rising output from non-OPEC countries—oil revenues of OPEC countries fell 49.2% year-on-year in 1986. In response, in December 1986, OPEC chose the weighted average price of seven crude streams around the world as the target marker price for the organization. Members could use it as a basis for further adjustment based on their individual output quality and freight prices. The seven crude oils at the time were: Arab Light (Saudi Arabia), Saharan Blend (Algeria), Minas (Indonesia), Bonny Light (Nigeria), Dubai Crude (UAE), Tia Juana Light (Venezuela), and Isthmus (Mexico).



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 297.5 billion barrels of oil reserves, accounting for 17.2% of the global total, and it produces about 11.04 million barrels a day on average. The countries with next three largest proven reserves are Iraq, Iran, and Kuwait with 145.0 billion, 157.8 billion and 101.5 billion barrels of oil reserves respectively.

Secondly, the region produces and exports huge volumes of crude oil, on which most of oil consuming countries are highly dependent. According to OPEC's March 2022 monthly report, OPEC member countries in the Middle East had an average daily crude oil output of 27.664 million barrels, which was nearly 88% of total OPEC production and about 29% 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, any turmoil or social unrest in the Middle Eastern oil producers will have a dramatic impact on the global oil market. An example of this is the Libyan civil war in 2011 that brought the nation's 1.6 million barrels of daily output to a near complete halt and drastically lifted the global oil price. In the ensuing months, Saudi Arabia quickly ramped up its production to make up for the Libyan supply disruption, playing a decisive role in taming further price hikes around the world. Another example is the EU's announcement of sanctions on Iran in early 2012 which caused an immediate spike in international oil prices.

26 Why does the United States have such a large influence on the global oil market?

The United States has a predominant influence on the oil market for several reasons. First, it is the biggest oil consumer in the world. According to the BP Statistical Review of World Energy 2021, in 2020, its petroleum consumption reached an average of 17.18 million bpd.

Secondly, it's also one of the leading oil importers with up to 7.86 million barrels imported a day, making it a major influencing factor in global supply and demand. Thirdly, as a superpower, the United States wields considerable influence in energy geopolitics². Lastly, the United States has very sophisticated oil shale technologies that briefly made the country import-oil-independent in 2019 (though shale oil production has declined since then due to COVID-19).

²Source: BP Statistical Review of World Energy 2021

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, the United States can also sway the international market as a supplier, owing to its considerable output level and the shale revolution.



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. China's major oilfields and their production in year 2020 is tabulated in Appendix 1.

According to the International Petroleum Economics (Volume 4, 2021), the crude oil production of CNPC, Sinopec, CNOOC, and the Yanchang Petroleum Group in the first nine months of 2020 were 102.253 million metric tons (52.7%), 35.144 million metric tons (18.1%), 45.418 million metric tons (23.4%), and 11.202 million metric tons (5.8%), respectively.

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

According to the BP Statistical Review of World Energy 2021, as of 2020, China produced 3.9 million barrels per day³, accounting for 4.4% of the global share and ranked sixth in the world. It consumed 14.22 million barrels per day⁴, representing 16.1% 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?

China's National Bureau of Statistics reports that in 2021, China produced 199 million metric tons of crude oil, an increase of 2.4% year-on-year. Net import reached 513 million metric tons, a year-on-year decrease of 5.4%. The apparent oil consumption was 712 million metric tons, down 4.43%. The dependence on foreign oil was 71.95%, 1.6 percentage points less than the year before.

³Includes 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.

⁴Inland 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 2021, the top 10 crude oil exporters to China were Saudi Arabia, Russia, Iraq, Oman, Angola, UAE, Brazil, Kuwait, Malaysia, and Norway.

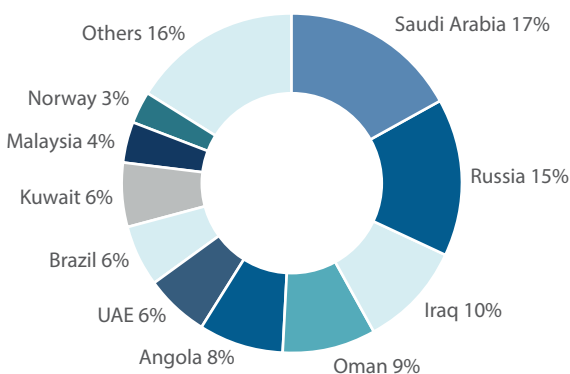


Exhibit 9: Sources of Imported Crude Oil of China in 2021

Source: General Administration of Customs

The Middle East is China's largest oil supplier at 48.6% of the country's total import volume in 2021 (Appendix 2). For this reason, the Shanghai International Energy Exchange (INE) chose medium sour crude oil, the predominant oil type China imports from the Middle East, as the underlying of its 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.

Non-state import volume is in line with China's committed figure at its accession to the WTO. Starting from 2002, China began to issue the annual quota for crude oil import by non-state-owned enterprises. This quota is adjusted year-to-year. In 2015, the National Development and Reform Commission (NDRC) and the MOFCOM respectively issued the Notice on the Use and Management of Imported Crude Oil (FGYX [2015] No. 253) and the Notice on the Application by Crude Oil Processing Enterprises for the Non-State Trading Import License (SMH [2015] No. 407), to formalize the right to use and import crude oil by qualified local refineries.

According to the announcement of the Ministry of Commerce of China, the quota for non-state trade import of crude oil in 2022 is 243 million metric tons. (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 the government's strategic reserves, enterprises' mandated commercial reserves, and enterprises' inventories for production and operating activities. The reserve system is managed through a hierarchical system composed of decision-making, implementation, and execution. China has created a three-phase plan for building up the strategic reserves, which reports say will reach 70 million cubic meters over 15 years at a projected investment of more than RMB 100 billion. Currently, China's dependence on foreign oil has exceeded 70%. In the long run, the demand for oil will fall as China works toward the Dual Carbon Goals, but oil will remain a key energy and chemical raw material, thus the SPR stockpile will still be critical to China's energy and economic security.



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 the expectations and judgements of market participants.

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

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

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

Crude oil futures prices are key references in defining prices of refined oil products. In fact, because the oil price is one of the most important determinant of the price of refined products, they 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 and taxes. 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 be either an absolute price for each crude stream (such as Oman), or a formula-based price consisting of a published premium or discount to a specified reference price (such as Saudi Arabia, Iran, Iraq, or Kuwait). 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:

The export price of Russian Urals crude oil is quoted as a floating price relative to Brent, the marker crude in the European market. Russia has listed Urals crude oil futures contracts for trading.

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, Reuters reports that since the listing of the DME (Dubai Mercantile Exchange) Oman crude futures (OQD), the pricing reference for oil exports from Iraq, Saudi Arabia, and Kuwait to Asia has switched to the average monthly OQD prices and the average spot price assessed by Platts, rather than the average Oman and Dubai prices assessed by Platts as before.

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

At present, about 50% of China oil imports is originated in the Middle East, and a major portion of their quality is middle (heavy) and sour. With China's growing and huge oil demand (middle (heavy) and sour crude remaining as mainstream) and lack of an Asia oil futures benchmark, it 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:

For oil imports from the Middle East, the pricing benchmark is primarily the Platts Oman/Dubai average price; for oil imports from West Africa, its Brent.

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 directional 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). The COT classifies futures traders into four categories: Producer/Merchant/Processor/User, Swap Dealers, Managed Money, and Other Reportables. If Other Reportables and Managed Money are attributed to speculators, then based on the position holding of NYMEX WTI futures in March 2022, speculators account for 50% of the total open interest. 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 other traders may also engage in speculative trades

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.

⁵On 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? Is this 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, trading the futures products of multiple exchanges through a single platform brings many benefits: (1) The margin required will be significantly lower; (2) It helps prevent the situation where one has to pay a large tax in one market and cannot obtain a corresponding tax refund in another; 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 product line on a single platform may draw in more potential investors. 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 a 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 per barrel, the company can be assured that, with the \$1 per barrel it has paid, it will only cost the buyer at a maximum price of \$5,000,000 to buy 100,000 barrels by the expiry of the call option (excluding the cost of the option premium and any transaction fees). If the market price of Brent increases to \$60 per barrel prior to expiry of this contract, the buyer may exercise the option and get the 100,000 barrels of Brent and pay \$10 dollars below the current market price. If, on the other hand, the price of Brent drops below \$40 per barrel, the company may choose to buy Brent in spot market rather than to exercise the option.

Swap Futures:

Commodity swaps are mostly traded in the over-the-counter (OTC) market and represent over 80% of OTC transactions. An increasing number of them are centrally cleared. Contrary to many futures, swaps are cash settled. A typical swap is often an agreement whereby a floating price is exchanged for a fixed average price of certain corresponding benchmark (such as a futures contract marker prices or settlement prices) over a specified period. For example, if party A (physical buyer) does a one-month long swap with bank 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 per barrel, it means party A's average cost of buying Brent is \$55 dollar/barrel in April, however bank 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 per barrel, then party A's average cost of purchase the spot crude is lower, however, it has to pay \$5 per barrel to bank 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?

OTC market is by far the larger of the two, both in terms of volume and product range, while the exchange market only plays a supplementary role.

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



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. In addition, Shanghai International Energy Exchange's (INE) Shanghai crude oil futures (SC) and Dubai Mercantile Exchange's (DME) Oman crude oil futures are also important benchmark contracts. After years of rapid development, INE's SC crude oil futures has become the third most-traded oil benchmark in the world.

According to the latest data from the Futures Industry Association (FIA) in 2021, the top crude oil futures contracts in terms of trading volumes are Brent crude oil futures from the Moscow Exchange, WTI crude oil futures from NYMEX, Brent crude oil futures from ICE, Shanghai crude oil futures from INE, WTI crude oil futures from ICE, Brent crude oil futures from NYMEX, and mini crude oil futures and crude oil futures from Multi Commodity Exchange (MCX). Annual trading volume of above contracts in 2021 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.

Participation 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 the spot market, for a number of reasons. Firstly, the quality 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, changes in supply and demand may also lead to changes in the price differentials, and oil companies will adapt sales strategies to the specific supply and demand situation of each region. For example, when a huge refinery that only processes one certain crude is shut down by fire, it may weaken the demand and price for that crude, which may widen its spread against its marker. Lastly, the same crude may be traded at different prices in different locations. Thus, there may be a geographical price spread for the same crude stream.

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

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 Rules 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

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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 do not reflect the supply and demand of crude oil in the Asia-Pacific region. A Chinese crude oil futures contract may help create an oil benchmark price capturing the dynamic of China and the Asia-Pacific oil market. Thus it will optimize oil resource allocation in this regional market and better serve commerce and the economy. Establishment of the crude oil futures market is one of the key steps taken by China to open up and internationalize its futures market.

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 CSRC 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 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 Customer procedures, including the trader's identity authentication system, ownership & control reporting, and strengthen the management of customer fund segregation and the closed circuit cash flow of margin fund. INE will also work with overseas futures regulators to establish joint regulatory mechanisms to develop effective cross-border supervision and to enable investigation of suspicious trading activity.

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

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

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

65 What are the Chinese crude oil futures contract specifications?

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

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

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

Source: Shanghai International Energy Exchange

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

Nation	Deliverable Crudes	API Gravity	Sulfur (%)	Price Differential (Yuan / Barrel)
United Arab Emirates	Dubai	≥30	≤2.8	0
	Upper Zakum	≥33	≤2.0	0
	Murban	≥35	≤1.5	5
Sultanate of Oman	Oman	≥30	≤1.6	0
State of Qatar	Qatar Marine	≥31	≤2.2	0
Yemen Yemen	Basrah Light	≥28	≤3.5	-5
	Basrah Medium	≥26	≤4.0	-10
The Federative Republic of Brazil	Tupi	≥28	≤0.8	10
People's Republic of China	Shengli	≥24	≤1.0	-5

Note:

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

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

3 Existing Basrah Light standard warrants at $28 \leq API < 29$ can still be used for delivery.

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 oil company that also owns the oil field, China does not currently have a crude oil spot market. Instead, the country mostly relies on imported oil. In view of how crude oil is produced and sold in China and in the interest of market stability, INE recognizes both imported and domestically produced crude as deliverables.

69 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

70 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 delivery 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 fourth 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 terminates 3 business day prior to the 25th calendar day of the month prior to the contract month. If the 25th calendar day is not a business day, trading terminates 4 business days prior to the 25th calendar day of the month prior to the contract month.
ICE BRENT	The last trading day is the last business day of the second month preceding the contract month.
DME OMAN	The last trading day is the last day of trading in the second month preceding the delivery month.
INE SC	The last trading day is the last trading day of the month preceding the delivery month, subject to change by INE taking into account of China national holidays.

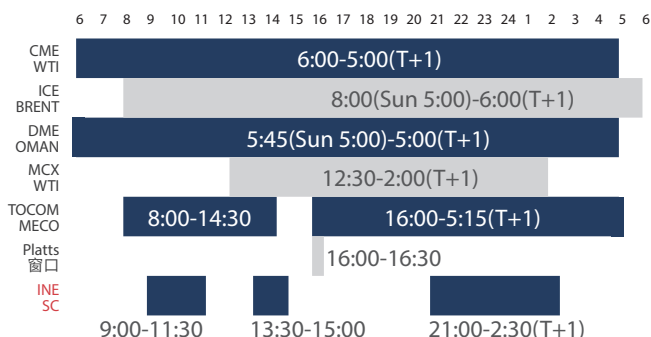
71 How do the daily trading hours of China's crude oil futures contracts differ from those of major international crude oil futures contracts?

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.

72 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.

73 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, 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)	ICE Futures Abu Dhabi Murban (ADM)
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	Murban crude oil
Contract Size	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels
Price Quotation	Yuan per barrel	U.S. Dollar and Cents per barrel	U.S. Dollar and Cents per barrel	U.S. Dollar and Cents per barrel	U.S. Dollar and Cents per barrel
Minimum Price Fluctuation	¥0.1 per barrel	\$0.01 per barrel	\$0.01 per barrel	\$0.01 per barrel	\$0.01 per barrel
Settlement Method	Physical delivery	Cash settlement	Physical delivery	Physical delivery	Physical delivery
Delivery Method / Type	Delivery at INE-designated delivery storage facilities in bonded zones	EFP	FOB at pipeline or delivery at depot	FOB at the loading port	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)	Released daily at 13:30 CST/CDT at the same time as that of the NYMEX light sweet crude oil futures	VWAP from 19:28 to 19:30 London 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	3 business day prior to the 25th calendar day of the month prior to the contract month. If the 25th calendar day is not a business day, trading terminates 4 business days prior to the 25th calendar day of the month prior to the contract month	The last trading day of the second month preceding the delivery month	Trading ceases at 16:30 Singapore time on the last trading day of the second month preceding the delivery month. If that day is the trading day preceding New Year's Day, then trading ceases on the next preceding trading day
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	The first Terminal Loading Day of the delivery month to the third Terminal Loading Day prior to the end of the said delivery month

⁶ WTI/DSW shall meet the grade and quality specifications on sulfur, API, viscosity, RVP, basic sediment, pour point, carbon residue, total acid number (TAN), 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)	ICE Futures Abu Dhabi Murban (ADM)
Price Limits	Within $\pm 4\%$ from the settlement price of the previous day	Interval price limits (IPL) functionality acts as a temporary circuit breaker feature on the electronic platform, to diminish the likelihood and extent of short-term price spikes or aberrant market moves. While designed to be in force throughout each trading day, it is expected the protections will be triggered only in the case of extreme price moves over very short periods of time	A circuit breaker that triggers a 2-minute trading halt upon touching a specific price range. Price limit is removed after the fourth triggering on a trading day	None	Interval price limits (IPL) functionality acts as a temporary circuit breaker feature on the electronic platform, to diminish the likelihood and extent of short-term price spikes or aberrant market moves. While designed to be in force throughout each trading day, it is expected the protections will be triggered only in the case of extreme price moves over very short periods of time
Minimum Trading Margin	5% of contract value	Initial margin: \$4,000–\$12,000/lot, progressively lower for the longer-dated contracts ⁸	Initial margin: \$4,000–\$12,000/lot, progressively lower for the longer-dated contracts ⁹	Maintenance margin: \$11,800–\$9,000/lot, progressively lower for the longer-dated contracts ¹⁰	Initial margin: \$3,259.1–\$8,890/lot ¹¹
Contract Months	Monthly contracts of recent 12 consecutive months followed by 8 quarterly contracts	96 consecutive months	Monthly contracts listed for the current year and the next 8 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 5 years. A new calendar year will be added following the termination of trading in the December contract of the current year	48 consecutive months
Trading Hours	9:00–11:30, 13:30–15:00 Beijing Time and other hours specified by INE. Continuous trading hours are 21:00–2:30 (+1 day)	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: 18:00–17:00 New York Time (Eastern Time) Sunday to Friday with a 60-minute break each day beginning at 17:00	Electronic trading is open from 16:00 CST/CDT Sundays and from 16:45 CST/CDT Monday to Thursday and closes at 16:00 CST/CDT the next day, Monday to Friday	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

⁸ Margin data as of March 21, 2022. Subject to change by the exchange. See <https://www.theice.com/products/219/Brent-Crude-Futures/margin-rates> for details.

⁹ Margin data as of March 21, 2022. Subject to change by the exchange. See <https://www.cmegroup.com/markets/energy/crude-oil/light-sweet-crude-margins.html> for details.

¹⁰ Margin data as of March 21, 2022. Subject to change by the exchange. See <https://www.cmegroup.com/clearing/margins/outright-vol-scans.html#pageNumber=1&sortField=exchange&sortAsc=true> for details.

¹¹ Margin data as of March 21, 2022. Subject to change by the exchange. See <https://www.theice.com/products/75443578/Murban-Crude-Oil-Futures/margin-rates> for details.



TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

09

TRADING ACCESS TO CHINA'S CRUDE OIL FUTURES

74 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.

75 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 dominant 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 Shanghai crude oil futures trade on INE, a subsidiary of Shanghai Futures Exchange (SHFE).

76 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.

77

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

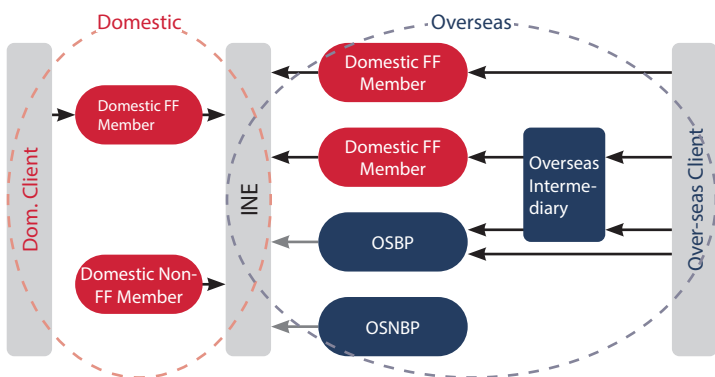
Global Participation Accesses to INE are:

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

78 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 the relevant 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.

79 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.

80 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 the relevant 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.

81 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.

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

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

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

Any domestic individual investor intending to participate in China's crude oil futures market should meet the requirements under the Futures Trading Participant Eligibility Management Rules of the Shanghai International Energy Exchange, including but not limited to the following: having full capacity for civil conduct; understanding the essentials of futures trading and the rules of INE; having passed relevant tests; futures trading history and record; having a cash balance of no less than RMB 500,000 or its foreign currency equivalent in his/her margin account last for more than five business days before applying for a trading code; having no material adverse credit records and not banned from the futures market by the relevant 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, clients not able to accept or issue the tax invoices required by INE are not allowed to engage in physical delivery of the crude oil futures.

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

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.

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

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

86 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 clients who open trading account already.

87 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, "All written materials submitted by overseas special participants to INE shall be in Chinese, and 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.

88 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.

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

Overseas trading platforms including CQG, PATs, Bloomberg, Tradex, Esunny, and TT are now connected to the INE market. 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

90 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 oil futures is the volume-weighted average price from 19:28 to 19:30 London Time, while that of WTI crude oil 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 oil 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.

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 for the relevant delivery month. Only block trades (600,000 barrels or more) declared to the market and verified by the exchange are included in the calculation. The ICE Brent Index is the simple average of the five constituent values.¹²

The final settlement price of WTI crude oil futures is the settlement price on the last day of trading; that of the Oman crude oil futures is the volume-weighted average price of the expiring contract from 16:15 to 16:30 Singapore Time.

91 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. Overseas investors and qualified overseas brokers can also post USD as margin.

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.

¹² The detailed calculation method can be found at: https://www.theice.com/publicdocs/futures/ICE_Futures_Europe_Brent_Index.pdf

92 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.

93 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 do not prescribe a price limit but most have established 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

94 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 taking into account the profit and loss under different trading strategies such as calendar spread, crack spread, and arbitrage, as well as the volatility of the different contract months. As a result and which also meets the needs of clearing member's netting settlement procedure, the level of initial margin is minimized to ensure capital efficiency.

95 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. Long/short positions under the corresponding trading codes of each entity are managed according to the position limits stipulated by regulations. Long/short positions are calculated separately rather than net position. If multiple account holder do not actually have the ownership and controlling relationship, total positions are managed separately. For accounts that have ownership and controlling relationship between each other, 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.

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

INE implements an approval system for hedging activities.

According the Article 38 of its Trading Rules, clients should apply for hedging quota through their account opening institutions and Non-FF Members and OSNBPs should do so directly through INE. 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, and if the hedging amount of the near delivery months is not approved, then 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.

97 The SC 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.

98 Is it applicable for letter of credit being used as margin collateral?

According to INE's General Exchange Rules, subject to approval by INE, foreign currencies, standard warrants, Chinese government bonds, and other stable, liquid assets may be used as margin. INE may determine the value of the margin collateral. At current stage, INE does not accept letter of credit as margin collateral.

99 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.

100 For a trader who holds long and short position at the same 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 larger nominal value. However, when the contract enters the fifth trading day prior to the last trading day, INE will collect the margin from both long and short side.

According to Article 28 of its *Clearing Rules*, INE may collect trading margin from one side only under the following circumstances:

1. For a Client holding both long and short positions in the same product and on the books of the same Member or OSBP, INE 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, INE 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; and

3. Other circumstances as deemed necessary by INE.

101

Margin call will be issued when a Member's clearing deposit balance is lower than the required minimum. What action will INE take for failure to meet the margin call before market open on the following trading day?

As provided in Article 40 of its *Clearing Rules*, "in the event the Member fails to make it up, the following shall apply:

1. If the clearing deposit balance of any internal ledger of the Member with the Exchange is no less than zero, the corresponding Member or OSP of such internal ledger shall not open any new position;
2. If the clearing deposit balance of any internal ledger of the Member with the Exchange is lower than zero, the Exchange shall implement forced position liquidation or take other measures according to the *Risk Management Rules of the Shanghai International Energy Exchange*."

102 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.

103 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.

104 Is it required for an offshore institutional investor who trade on INE through an onshore/offshore broker to set up a 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.

105 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.

106 Is it true that an OSP can only use 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.



An aerial photograph of a large industrial facility, likely a refinery or petrochemical plant, situated along a body of water. The facility features numerous large white storage tanks, complex piping, and several tall distillation columns. A red ship is docked at a pier on the right. In the foreground, there is a lush green area with a winding path. The background shows a distant city skyline across the water.

11

CRUDE OIL FUTURES DELIVERY

CRUDE OIL FUTURES DELIVERY

107 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".

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

1. Dubai, UAE: Fateh Terminal;
2. Upper Zakum, UAE: Zirku Island;
3. Murban UAE: Fujairah Terminal or Jebel Dhanna Terminal
4. Oman, The Sultanate of Oman: Mina Al Fahal;
5. Qatar Marine, Qatar: Halul Island;
6. Basrah Light, Iraq: Basrah Oil Terminal or SPM
7. Basrah Medium, Iraq: Basrah Oil Terminal or SPM
8. Tupi, Brazil: Angra Dos Reis, Port Acu, STS Santos, STS Sao Paulo, Sao Sebastian, and FPSO of Brazil, La Paloma of Uruguay, and other loading ports recognized by INE
9. Shengli, PRC: Dongming Oil Terminal of Sinopec Shengli Oilfield Company.

109 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. Currently, from January 8, 2022 to January 8, 2023: 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.

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

The table below lists the capacity of Designated Delivery Storage Facilities for crude oil futures as of end of 2021.

No.	Storage Facilities	Depot	Storage Location	Approved Capacity (10,000 m ³)	Nominal Volume		Active Capacity 10,000 bbl
					10,000 m ³	10,000 bbl	
1	Sinopec Petroleum Reserve Co., Ltd.	SPRC Caofeidian	Caofeidian Industrial Zone, Tangshan, Hebei	100	40	251.6	200
2		SPRC Rizhao	Lanshan North Port Area, Rizhao, Shandong	120	100	629	520
3		SPRC Zhoushan	Cezi Island, Zhoushan, Zhejiang	80	70	440.3	350
4		SPRC Zhanjiang	Xinggong Avenue, Lingang Industrial Zone, Zhanjiang, Guangdong	90	80	503.2	416
5		SPRC Hainan	83 Bin Hai Avenue, Yang Pu Economic Development Zone, Hainan	100	60	377.4	300
6	PetroChina Fuel Oil Co., Ltd.	PetroChina Zhanjiang	Operating Area 2, Zhanjiang Port, 1 Youyi Road, Xiashan District, Zhanjiang, Guangdong	70	50	314.5	311
7	Sinochem-Xingzhong Oil Staging (Zhoushan) Co., Ltd.	Sinochem Xingzhong	Aoshan Island, Lincheng, Dinghai District, Zhoushan, Zhejiang	100	35	220.15	210.1
8	Dalian PetroChina International Warehousing & Transportation Co., Ltd.	PetroChina Dalian	Dalian PetroChina Bonded Depot, New Port, Dalian Bonded Zone, Dalian, Liaoning	145	145	912.05	829.5
9		PetroChina Dalian Intl	Dalian PetroChina International Reserve Depot, New Port, Dalian Bonded Zone, Dalian, Liaoning	180	180	1132.2	1080
10		PetroChina Guangxi Intl	Guangxi PetroChina International Reserve Depot, Qinzhou Bonded Area, Guangxi Zhuang Autonomous Region	20	20	125.8	120

No.	Storage Facilities	Depot	Storage Location	Approved Capacity (10,000 m ³)	Nominal Volume		Active Capacity 10,000 bbl
					10,000 m ³	10,000 bbl	
11	Shandong Port Group Co., Ltd.	Qingdao Port Shihua	Dongjiakou Depot Phase I, Qingdao, Shandong	40	40	251.6	239.2
12		Qingdao Port Mercuria	88 Gangrun Avenue, Dong Jiakou Port, Huangdao District, Qingdao, Shandong	100	40	251.6	239.2
13	Yangshan Shengang International Oil Logistics Co., Ltd.	Yangshan Oil	Shenjiawan, Yangshan Deep-Water Port, Shanghai	30	20	125.8	126
14	Dalian North Oil Petroleum Logistics Co., Ltd.	North Petroleum	Sha Tuozi, New Port, Dalian Bonded Zone, Dalian, Liaoning	40	10	62.9	54
15	Sinochem-Hongrun Oil Staging (Weifang) Co., Ltd.	Sinochem Hongrun	North of BoHai Street, West of HaiFeng Road, Production Industrial Zone Binhai Economic Developing District, Weifang, Shandong	500	300	1887	1800
16	Dading Petroleum Logistics Co., Ltd.	Dading Petroleum	496 Aoshan East Road, Lincheng Sub-District, Dinghai District, Zhoushan, Zhejiang Province	44	22	138.38	130

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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 Product and Raw Material Inspection and Testing, Shanghai Customs

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

Delivery in China's crude oil futures market is conducted through warrants. For the standard warrants submitted by sellers, INE allocates them to buyers based on rules and the buyers' declared intents. The buyers will receive the standard warrants upon payment; the sellers will receive the payment and submit all tax invoices corresponding to the delivered goods.

In overseas markets, futures exchanges do not take part in the specific delivery process after matching buyers with the sellers. The trading parties will need to complete the exchange of payment and goods by themselves.

113 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.

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.

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 Conducting Delivery	Domestic clients who are not able to issue or take specified invoices required by the Tax Bureau are not allowed to participate in physical delivery
Expiry of Standard Warrant	Warrants have no expiration date
Listing Exchange	Shanghai International Energy Exchange

Source: Shanghai International Energy Exchange

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 the price differential between the two places, freight, and the shipping schedule before trading futures. 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.

117

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.

118

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.

119

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 152 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.

120 In a situation where the load-in deadline is missed due to port congestion, can the seller request in advance for relaxing the delivery window?

Yes, a relaxation of the delivery window 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.

121 Please explain what is the meaning of “the applied load-in futures commodities shall be shipped directly from the port of the place of origin” (Article 39 of the INE Delivery Rules)? Can crude oil in a floating storage for half a year be used in delivery?

The appendix of the Inspection Rules lists the requirements on the loading port of each deliverable crude stream. Only deliverable crude loaded from the designated ports can be used in the physical delivery of INE crude oil futures.

122 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.

123 Article 128 of the INE Delivery Rules states that quality inspection at delivery is waived for certain registered commodities specially approved by INE. Does this exemption apply to all of the deliverable crude oils?

No, because commodity registration does not apply to crude oil futures.

124

Article 80 of the INE Delivery Rules states that Designated Delivery Storage Facilities should cooperate with the commodity owners in coordinating with the terminal, port, pipeline company, customs, and commodity inspection agency to ensure priority for the load-in and load-out. Can INE be more specific about what arrangements it has with the customs and inspection agencies to ensure owners are given such priority in practice?

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

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

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

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

125 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 underlying 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 overseas institution. The underlying 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.

126 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.

12

TRADE AT SETTLEMENT (TAS)





127 What is TAS?

TAS, short for Trade at Settlement, is an order type that allows a trader to buy or sell an eligible futures contract during specified trading hours at the current day's settlement price or a certain number of ticks of the outright above or below that price.

128 Why does INE launch TAS orders?

TAS order aims to provide an efficient and effective risk management tool in the market which can lower traders' risk management costs, so as to enhance the proportion of brick-and-mortar enterprise investors and the crude oil price influence.

For brick-and-mortar enterprises, the futures settlement price is often used as the benchmark price in spot trading. These enterprises used to place orders frequently to simulate the settlement price, which is difficult to execute as well as inefficient for hedging. TAS orders enable investors to trade at or near the settlement price during specified trading hours, which will greatly reduce the uncertainty they used to face when hedging. As a result, they can exercise better risk management easily with TAS.

In western financial markets, in addition to brick-and-mortar enterprises, institutional investors including ETFs and long-term capital management funds also use TAS for position transfers which require lower fees for hedging purposes. Moreover, it will also reduce the short-term adverse effect of position transfers to the market.

To sum up, TAS trading will enhance the hedging efficiency for entities as an efficient risk management tool, attract more diversified market participants and enhance the proportion of brick-and-mortar investors. As it is more convenient for global investors to refer to China's futures prices, the price influence will surely be improved.

129 Who can place TAS orders for crude oil futures?

Any trader of crude oil futures can place TAS orders.

130 Which crude oil futures contracts are eligible for TAS orders?

TAS order is only available to the first and the second nearby crude oil futures contracts(hereinafter referred to as the eligible contracts), and will no longer be available after the market close on the eighth trading day preceding the last trading day of the eligible contract.

131 What is the price quote of TAS orders for crude oil futures?

TAS orders are only for the current day's settlement price of the eligible contract, and any other prices of a certain number of ticks above or below that price will not be accepted for the time being.

132 What are the trading hours of TAS orders for crude oil futures?

TAS orders for crude oil futures are available during the opening auction and the first trading session (including the continuous trading hours. Currently the first trading session runs through 10:15 a.m.). At the end of the first trading session, all unmatched TAS orders are automatically cancelled by the system.

133 What are the matching rules of crude oil TAS orders?

TAS orders may only be matched with other TAS orders for the same contract. During central auction (i.e., call action), TAS orders will be matched by the principle of “maximum trading volume”; during continuous trading, TAS orders will be matched by the principle of time priority.

134 What are the attributes of TAS orders for crude oil futures?

Same as other orders, TAS orders may be indicated as “open”, “close today”, or “close previous”; and “general” or “hedging.”

135 Can other properties be attached with a TAS order for crude oil futures?

TAS orders cannot be attached with the properties of fill-or-kill (FOK) or fill-and-kill (FAK) for the time being.

136 How will INE collect the margin of a TAS trade for crude oil futures?

During the trading hours, INE will calculate the margin to be frozen or released for a TAS trade based on the previous settlement price of the underlying contract, and will include the margin into the larger-side margining.

At the end of a trading day, INE will collect the margin for a TAS trade based on that day's settlement price of the underlying contract, and will include the margin into the larger-side margining.

137 How will INE collect the transaction fees of a TAS trade for crude oil futures?

Please refer to the provisions on TAS-eligible crude oil futures contracts.

138 How to access the market data of TAS trades for crude oil futures?

Traders can find relevant market data on the official websites and member service systems of SHFE and INE, or through the apps of other data providers. Market data of TAS-eligible contracts published during trading hours does not include turnover and trading volume from TAS transactions. Statistics following market close and settlement do reflect TAS transactions in the turnover and trading volume of the corresponding contracts.

139 If the eligible contract is traded only by TAS order, how would the daily settlement price be determined? How to determine the settlement price of the TAS order?

If the eligible contract is traded only by TAS order, it will be considered as no trade on that day, and its daily settlement price will be determined in accordance with the method of determining the settlement price for futures contracts with no trade price stated in the Clearing Rules of the Shanghai International Energy Exchange. For example, if the settlement price for SC2010 is \$305.0/bbl, then the TAS order will be settled at \$305.0/bbl.

140

How to open positions using TAS?

Example 1:

Assume a client has no existing position in SC2008, and places a TAS order for 40 lots in SC2008 as “long, general, open”, which is then matched with an existing TAS order for short 15 lots. As a result, the client will hold 15 lots of long, general, and today’s position in SC2008. The remaining 25 lots will be automatically cancelled by the system if they cannot be matched within the first trading session.

If at market close the settlement price of SC2008 is determined to be 285 yuan/barrel, then the 15 lots matched through the TAS order will be traded at 285 yuan/barrel.

Example 2:

Assume a client has no existing position in SC2009, and places a TAS order for 10 lots as “short, general, open”. After 5 lots are matched, the client will hold 5 lots of short, general, and today’s position in SC2009. If now the client places and executes a limit order for 3 lots of SC2009 as “long, general, and close today”, then the client will hold 2 lots of short, general, and today’s position in SC2009.

If at market close the settlement price of SC2009 is determined to be 300 yuan/barrel, then the 5 lots matched through the TAS order will be traded at 300 yuan/barrel.

141

How to close out today's position using TAS?

Assume a client has no existing position in SC2009, and places a limit order for 10 lots of SC2009 as "short, general, and open". After 4 lots are matched, the client will hold 4 lots of short, general, and today's position in SC2009. If now the client places and executes a TAS order for 1 lot as "long, general, close today", then the client will hold 3 lots of short, general, and today's position in SC2009. If at market close the settlement price of SC2009 is determined to be 305 yuan/barrel, then the 1 lot matched through the TAS order will be traded at 305 yuan/barrel.

142

How to close out previous positions using TAS?

Assume a client holds 50 lots of long, hedging, and previous position in SC2010, and places a TAS order for 50 lots as "short, hedging, close previous". Once 40 lots of the TAS order are matched, the client will hold 10 lots of long, hedging, and previous position in SC2010.

If at market close the settlement price of SC2010 is determined to be 310 yuan/barrel, then the 40 lots matched through the TAS order will be traded at 310 yuan/barrel.

143

How to Use TAS Orders for Hedging?

Case Study 1:

On September 12, refinery A purchased 100,000 tons of medium sour crude oil from trader B, and it was agreed that the oil would be delivered on October 15-24 at the average settlement price of SC1912 in October with a discount rate of RMB 7 per barrel. Refinery A was supposed to pay after the market close on October 31.

As the OPEC cut their production and supply went tight, refinery A believed that the price of SC1912 would go up. To hedge the risk of higher prices in October, refinery A decided to long 720 lots of SC1912 on September 12 at 437.9 yuan per barrel.

The SC1912 begun trading on October 8 after China's national holidays. In October, refinery A closed out the positions using TAS orders. (100,000 tons of medium crude oil are equivalent to 720,000 barrels, or approximately 720 lots of futures contracts. Since there were a total of 18 trading days in October, 40,000 barrels or 40 lots were hedged in each trading day.)

Date	Futures Market	Price (yuan/bbl)	Gain on Futures Positions (yuan/bbl)	Barrels Calculated in the Spot Market
Sept. 12	Long 720 lots	437.9	N/A	N/A
Oct. 8	Short 40 lots using TAS	432.9	-5	40,000
Oct. 9	Short 40 lots using TAS	440	2.1	40,000
...
Oct. 16	Short 40 lots using TAS	455.7	17.8	40,000
Oct. 17	Short 40 lots using TAS	448.5	10.6	40,000
...
Oct. 30	Short 40 lots using TAS	454.2	16.3	40,000
Oct. 31	Short 40 lots using TAS	452.2	14.3	40,000
Total (in October)	Short 720 lots using TAS	449.57 (monthly average)	11.67	720,000
Outcome	The gain in the futures market is $449.57-437.9=11.67$ yuan/barrel. The settlement price was locked in to 437.9 yuan/barrel. The actual trading price was $437.9-7=430.9$ yuan/barrel.			

Case Study 2:

On September 12, refinery A purchased 100,000 tons of medium sour crude oil from trader B, and it was agreed that the oil would be delivered on October 15-24 at the average settlement price of SC1912 in October with a discount rate of RMB 7 per barrel. Refinery A was supposed to pay after the market close on October 31.

The SC1912 begun trading on October 8 after China's national holidays. As the price went up, refinery A believed it was overvalued and would drop at some day in late October. Therefore, on October 11, refinery A decided to short the futures when the price was over 450 yuan/barrel and to lock in the price when it dropped below 450 yuan/barrel.

As shown in the table below, by using TAS orders, refinery A shorted the same amount of oil as calculated in the spot market on October 11-16, and closed out on October 18-23 to lock in the settlement price. (100,000 tons of medium crude oil are equivalent to 720,000 barrels, or approximately 720 lots of futures contracts. Since there were a total of 18 trading days in October, 40,000 barrels or 40 lots were hedged in each trading day.)

Date	Settlement Price (yuan/bbl)	Barrels Calculated in the Spot Market	Futures Market	Gain on Futures Positions (yuan/bbl)	Barrels Calculated in the spot Market after Hedging
Oct. 8	432.9	40,000			40,000
...			
Oct. 11	451.8	40,000	Short 40 lots using TAS		N/A
Oct. 14	464.8	40,000	Short 40 lots using TAS		N/A
Oct. 15	459.4	40,000	Short 40 lots using TAS		N/A
Oct. 16	455.7	40,000	Short 40 lots using TAS		N/A
Oct. 17	448.5	40,000			40,000
Oct. 18	444.9	40,000	Close out 40 lots using TAS	6.9	80,000
Oct. 21	446.3	40,000	Close out 40 lots using TAS	18.5	80,000
Oct. 22	442.4	40,000	Close out 40 lots using TAS	17	80,000
Oct. 23	444.7	40,000	Close out 40 lots using TAS	11	80,000
...			
Oct. 31	448.56	40,000			40,000
Total	449.57 monthly average	720,000			
Outcome	The gain of 160 lots in the futures market is 4×13.35 yuan/barrel. Considering the profit in the futures market, the average settlement price per barrel was brought down from 449.57 yuan to 446.6 yuan. The actual trading price was $446.6 - 7 = 439.6$ yuan/barrel.				

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How to Use TAS Trading in Fund Management by ETFs ?

On November 8, market maker A purchased one million shares of crude oil ETF from a fund manager B (the minimum purchasing volume is 500,000 shares). These shares would be effective on November 9, and be settled according to the actual buying price of from the exchange by fund manager B. On November 8, the settlement price of SC 2012 was 462.1 yuan/barrel, and thus the price of one share was 0.9242 yuan.

To avoid price fluctuations, market maker A shorted two lots of crude oil futures at 461.6 yuan/barrel on November 8. On November 9, the futures price went up by 1% to 466.7 yuan/barrel (assume that the secondary market move simultaneously with the futures market). Market maker A sold all the EFT shares and closed out the positions on crude oil futures. Suppose that fund manager B purchased the shares from the exchange at 465 yuan/barrel, the overall profit/loss of market maker A was calculated in the table below (without considering any transaction fees):

Profit/ Loss (yuan)	Spot Market		Futures Market	
	Buy	465*2,000=930,000	Short	461.6*2,000=923,200
	Sell	0.9242*1.01*1,000,000=933,400	Close out	466.7*2,000=933,400
Total	933,400-930,000=3,400		923,200-933,400=-10,200	
Outcome	Market maker A lost 6,800 yuan in total due to the difference between the short price in the futures market and the purchasing price in the spot market.			

With TAS, market maker A could require that fund manager B should trade the SC2012 contract by using TAS orders on November 9, and market maker A would short the same amount of contracts using TAS orders too. Suppose that the settlement price on that day was 465.9 yuan/barrel, the overall profit/loss of market maker A is calculated in the table below (without considering any transaction fees):

Profit/ Loss (yuan)	Spot Market		Futures Market	
	Buy	$465.9 \times 2,000 = 931,800$	Short	$465.9 \times 2,000 = 931,800$
	Sell	$0.9242 \times 1.01 \times 1,000,000 = 933,400$	Close out	$466.7 \times 2,000 = 933,400$
Total	Breakeven			

APPENDIX

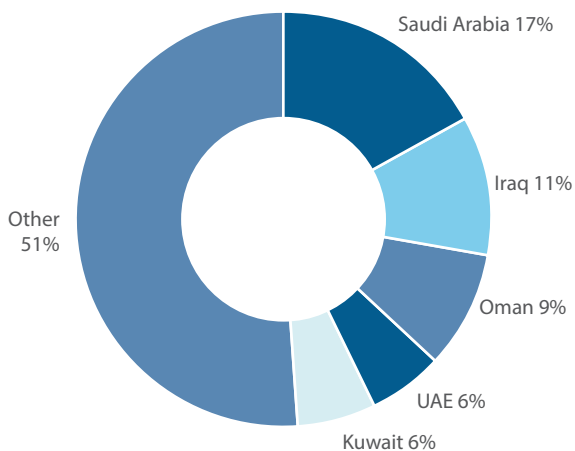
Appendix 1: 2016-2020 Annual Production of China's Major Oilfields
(1,000 metric tons)

Oil & Gas Fields / Producer	2016	2017	2018	2019	2020
CNPC Total	10,545	10,253.7	10,101.7	10,176.9	10,225.3
Daqing Oilfield	3,656	3,400	3,204.4	3,090	3,001
Jilin Oilfield	404.5	390	393.7	396.7	400
Liaohe Oilfield	974.1	1,000.1	995.1	1,007.6	1,004.3
Huabei Oilfield	411	403.1	407.2	413	416
Dagang Oilfield	407.9	402.8	407	417	415
Jidong Oilfield	135	136	130	137	127.5
Zhejiang Oilfield	3	3	3	2.1	2
Xinjiang Oilfield	1,113	1,131	1,147	1,247	1,320
Turpan-Hami Oilfield	200	190	185	165	157
Tarim Oilfield	550	520.2	551.5	576	602
Changqing Oilfield	2,392	2,372	2,377	2,416	2,467.2
Qinghai Oilfield	221	228	223.3	228	228.5
Yumen Oilfield	38	40	41	45.2	49
Southwest Oil & Gas Field	10	7.4	5.9	5.7	5.2
South China Exploration & Development	29.5	30	30.5	30.5	30.6
Sinopec Total	3,565.5	3,505.4	3,506	3,513.1	3,514.4
Shengli Oilfield	2,390.2	2,341.6	2,341	2,340.5	2,340.1
Henan Oilfield	168.9	156.5	136	130	120
Zhongyuan Oilfield	146.7	126.4	125.3	124	125.1
Jiangnan Oilfield	73.7	69.6	68.1	67.9	68
Jiangsu Oilfield	128	115.1	109.2	102.4	101
Northeast Oilfield	3.5	1.8	3	5.1	4.4
Huabei Oilfield	7.2	8.6	11.3	14.5	16.4
Northwest Oilfield	594.3	630	650	662	670
Huadong Oilfield	33	36	42.2	45.3	46
Southwest Oil & Gas Field	0.7	1.3	2.2	2.7	2.7
Shanghai Offshore Oil & Gas	10.5	11	11.1	12.9	15.8
Unlisted and Other Companies	8.8	7.4	6.7	5.7	4.8
CNOOC Total ⁽¹⁾	4,565.4	4,278	4,200.7	4,301.4	4,541.8
Shaanxi Yanchang Petroleum (Group) Co., Ltd.	1,105.6	1,107.2	1,120.1	1,120.1	1,120.2
National Total I (as reported by enterprise) ⁽²⁾	19,771.1	19,133.2	18,917.5	19,093.8	19,377.7
National Total II (as reported by National Bureau of Statistics) ⁽³⁾	19,968.5	19,150.6	18,932.4	19,101.4	19,476.9

Source: CNPC, Sinopec, CNOOC, Shaanxi Yanchang Petroleum (Group), National Bureau of Statistics.

Notes: Crude oil production figures includes NGLs. (1) Production in Chinese offshore regions of all joint ventures are included. (2) The total production of all companies listed in the table minus the double-counted working interest production of Sinopec in CNOOC's total figure. (3) The annual data published by the Statistic Bureau of Statistics.

Appendix 2: Share of China's Crude Oil Import from Middle Eastern Countries in 2021



Source: General Administration of Customs

Appendix 3: 2017-2021 China Crude Oil Imports and Exports

	2017	2018	2019	2020	2021
Import	41957	46190	50572	54973	51298
Export	486	263	81	0	0
Net Import	41471	45927	50491	54973	51298

Source: General Administration of Customs

Unit: 10,000 metric tons

Appendix 4: 2021 Approved Refinery Quota with Imported Crude Oil

	Company	2021 batch 1	2021 batch 2	2021 batch 3	2021 batch 4
1	Shandong Dongming Petrochemical Group	525	225		300
2	Panjin Beifang Asphalt Fuel	350	175		257
3	Sinochem Hongrun Petrochemical	371	159		200
4	Lihuayi Lijin Refining & Chemical	245	53	35	124
5	Shandong Kenli Petrochemical Group	176	38		100
6	Dongying Yatong Petrochemical	138	138		72
7	Shandong Wonfull Petrochemical Group	291	0	138	66
8	Shandong Shouguang Luqing Petrochemical	181	77		56
9	Shandong Tianhong Chemical	308	66		52
10	Shandong Chambroad Petrochemicals	233	49	220	49
11	Dongying Qirun Chemical Co. Ltd.	154	66		45
12	Shandong Haiyou Petrochemical Group	224	0		38
13	Shandong Hengyuan Petrochemical	175	175		38
14	Wudi Xinyue Chemical	96	72		34
15	Shandong Qingyuan Group	283	0		34
16	Shandong Shenchì Chemical Group	176	38		24
17	Shandong Jincheng Petrochemical Group	210	45	76	1489
18	Hebei Xinhai Chemical Group	260	56	90	
19	Dongying Haïke Ruilin Chemical	147	63		
20	Shandong Zhonghai Fine Chemical	130	0		
21	Henan Fengli Petrochemical	89	133		
22	Jiniao (Hubei) Science & Technology Chemical Industry	161	35	111	
23	Rizhao Landbridge Port Petrochemical	126	54		
24	Shandong Shengxing Chemical	154	66	108	
25	Shandong Qicheng Petrochemical	112	24	110	

	Company	2021 batch 1	2021 batch 2	2021 batch 3	2021 batch 4
26	Shandong Dongfang Hualong Industry & Trade Group	150	75	48	
27	Dalian Jinyuan Petroleum and Chemical	40	40		
28	Shandong Yuhuang Chemical	0	0		
29	Shandong Qingyishan Petrochemical Technology	210	0	72	
30	Zibo Xintai Petrochemical	140	60		
31	Jiangsu Xinhai Petrochemical	161	35		
32	Shandong Hualian Petroleum & Chemical	119	26		
33	Shandong Fuyu Chemical Industry	115	25		
34	Shandong Haikē Chemical Group	67	29		
35	North Huajin Chemical Industries Group	581	125		
36	Shandong Chengda New Energy Technology	105	105		
37	Guangrao Kelida Petrochemical Technology	105	45		
38	Shandong Wantong Petrochemical Group	98	97		
39	Shandong Liahed Chemical Industry	196	42	97	
40	Hengli Petrochemical (Dalian)	1400	300	84	
41	Zhejiang Petroleum & Chemical	1400	300	200	
42	China National Chemical Corporation	1198	257	240	
43	Shaanxi Yanchang Petroleum Group	252	54	860	
44	SINOPEC Zhanjiang Dongxing Petrochemical	0			
45	Fujian Refining & Petrochemical	8	2		
46	SINOPEC International Petroleum Exploration & Production	40			
47	CNOOC (Beijing) Trading	22			
48	Heilongjiang United Oil & Chemicals	9			
49	Huayue Group	36			
50	China Zhenhua Oil	4			
51	PetroChina International Guangxi	35			
52	PetroChina International	83			
53	Sinochem Energy	64			
54	PetroChina International Horgas	45			
55	PetroChina International Alashankou	32			
56	Erlan Gaolu Foreign Economic & Trade	16			
57	China Concord Energy Trading	13		5	
58	Tenglong Aromatic Hydrocarbon (Zhangzhou)	200	100		
59	PetroChina Fuel Oil	0		190	

Unit: 10 000 metric tons

Source: National Development and Reform Commission; Ministry of Commerce; compiled by INE.

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

Country	Destination		
	Asia	Europe	United States
Saudi Arabia	Oman/Dubai Average ⁽¹⁾	ICE BWAVE from Jul. 2000; Dated Brent until Jun. 2000	Argus ASCI from Jan. 2010; NYMEX WTI until Dec. 2009
Kuwait	Platts Oman/Dubai Average	ICE BWAVE from Jul. 2000; Dated Brent until Jun. 2000	Argus 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 ⁽²⁾	Dated Brent	Argus ASCI from Apr. 2010; NYMEX WTI Second Month until Mar. 2010

- (1) Starting from October 2018, official pricing formula has been changed to the average monthly price of DME’s Oman crude oil futures and the average spot price of Dubai crude oil provided by Platts, each with a weighting of 50%.
- (2) According to Reuters, Iraq told its customers that it planned to switch its price benchmark for Asia-bound Basrah Light to DME’s Oman crude oil futures from January 2018.

Appendix 6: Trading Volume of Major Global Crude Oil Contracts in 2021

	Exchange	Contract	Trading Volume (lot)
1	Moscow Exchange	Brent Oil Futures	579,590,791
2	New York Mercantile Exchange	WTI Sweet Crude Oil (CL) Futures	248,314,481
3	ICE Futures Europe	Brent Crude Oil Futures	243,666,353
4	ICE Futures Europe	WTI Light Sweet Crude Oil Futures	51,721,597
5	Shanghai International Energy Exchange	Medium Sour Crude Oil Futures	42,645,180
6	New York Mercantile Exchange	Crude Oil (LO) Options	30,006,061
7	ICE Futures Europe	Brent Crude Oil Options	29,017,774
8	New York Mercantile Exchange	Brent Crude Oil Last Day Financial (BZ) Futures	24,184,136
9	Multi Commodity Exchange of India	Crude Oil Futures	19,083,426
10	Multi Commodity Exchange of India	Crude Oil Options	15,798,979

Source: FIA

Note: MOEX Brent Crude Oil futures is 10 bbl/lot; MCX's crude oil futures is 100 bbl/lot.

Appendix 7: Characteristics of Major Imported Crude Oils of China

Crude	Country of Origin	Density at 20 ° C (kg/m³)	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 Total Proved Reserves of OECD Countries 2020

	单位: 10 亿桶	单位: 10 亿吨	(按桶) 占比
Canada	168.1	27.1	9.70%
Mexico	6.1	0.9	0.40%
US	68.8	8.2	4.00%
Total North America	242.9	36.1	14.00%
Argentina	2.5	0.3	0.10%
Brazil	11.9	1.7	0.70%
Colombia	2	0.3	0.10%
Ecuador	1.3	0.2	0.10%
Peru	0.7	0.1	◆
Trinidad & Tobago	0.2	^	◆
Venezuela	303.8	48	17.50%
Other S. & Cent. America	0.8	0.1	◆
Total S. & Cent. America	323.4	50.8	18.70%
Denmark	0.4	0.1	◆
Italy	0.6	0.1	◆
Norway	7.9	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	13.6	1.8	0.80%
Azerbaijan	7	1	0.40%
Kazakhstan	30	3.9	1.70%
Russian Federation	107.8	14.8	6.20%
Turkmenistan	0.6	0.1	◆
Uzbekistan	0.6	0.1	◆
Other CIS	0.3	^	◆
Total CIS	146.2	19.9	8.40%
Iran	157.8	21.7	9.10%
Iraq	145	19.6	8.40%
Kuwait	101.5	14	5.90%
Oman	5.4	0.7	0.30%
Qatar	25.2	2.6	1.50%
Saudi Arabia	297.5	40.9	17.20%
Syria	2.5	0.3	0.10%
United Arab Emirates	97.8	13	5.60%
Yemen	3	0.4	0.20%
Other Middle East	0.2	^	◆
Total Middle East	835.9	113.2	48.30%

	单位：10 亿桶	单位：10 亿吨	(按桶) 占比
Algeria	12.2	1.5	0.70%
Angola	7.8	1.1	0.40%
Chad	1.5	0.2	0.10%
Republic of Congo	2.9	0.4	0.20%
Egypt	3.1	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	36.9	5	2.10%
South Sudan	3.5	0.5	0.20%
Sudan	1.5	0.2	0.10%
Tunisia	0.4	0.1	◆
Other Africa	3.8	0.5	0.20%
Total Africa	125.1	16.6	7.20%
Australia	2.4	0.3	0.10%
Brunei	1.1	0.1	0.10%
China	26	3.5	1.50%
India	4.5	0.6	0.30%
Indonesia	2.4	0.3	0.10%
Malaysia	2.7	0.4	0.20%
Thailand	0.3	^	◆
Vietnam	4.4	0.6	0.30%
Other Asia Pacific	1.3	0.2	0.10%
Total Asia Pacific	45.2	6.1	2.60%
of which: OECD	260	38.3	15.00%
Non-OECD	1472.4	206.1	85.00%
OPEC	1216	172	70.20%
Non-OPEC	516.4	72.4	29.80%
European Union	2.4	0.3	0.10%

Source: BP Statistical Review of World Energy 2021

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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