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SHANGHAI FUTURES EXCHANGE

上海国际能源交易中心  
SHANGHAI INTERNATIONAL ENERGY EXCHANGE



# CRUDE OIL FUTURES TRADING HANDBOOK

2020 Edition

# Crude Oil Futures Trading Handbook 2020 Edition

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## CRUDE OIL: INTRODUCTION

### General Properties and Composition

Crude oil is a mixture of liquid hydrocarbons and their other natural forms directly extracted from underground reservoirs. It is usually a flowing or semi-flowing viscous liquid.

Both the properties and appearance of crude oil vary with the region from which it is produced. In terms of color, most crude varieties are black, while some are dark grey, dark green, dark brown, or even reddish brown, light yellow, or colorless; in terms of specific gravity, most varieties fall between 0.8 and 0.98. Crude oil also tends to be smelly due to the sulfur compounds it contains.

Crude oil is mainly composed of carbon, hydrogen, sulfur, nitrogen, oxygen, and trace elements. Carbon and hydrogen are the main constituents, accounting for approximately 96–99% of crude oil by weight, with the rest accounting for no more than 1–4%. All these elements exist in crude oil in the form of organic compounds, most of which are hydrocarbons including alkanes, cycloalkanes, aromatics, and hydrocarbon mixtures having the molecular structures of all three. Crude oil doesn't normally contain alkenes or alkynes, but the former does exist in some products from the second stage of refining. Aside from hydrocarbons, crude oil also has a considerable amount of non-hydrocarbon compounds, mainly including compounds containing sulfur, oxygen, nitrogen, as well as gelatinous and asphaltic substances (resins and asphaltenes), which altogether representing 10–20% of crude oil by mass.



As a complex, multi-component substance, crude oil has a very wide boiling range from room temperature to above 500 °C. While each component has its own characteristics, it is unnecessary to break down crude oil into individual components to derive useful petroleum products. In general, simply separating crude oil by fractional distillation should be enough for research and processing purposes. The term “fractional distillation” means “cutting” crude oil into “fractions” by the different boiling points of its components. Such fractions are often referred to as gasoline, kerosene, diesel, lubricating oil, or some other petroleum products, but they are not petroleum products in the strict sense of the term because the latter must meet certain quality requirements, while the former is just intermediate or semi-finished products that require further processing before becoming true petroleum products.

## ■ Main Performance Indicators

The main performance indicators of crude oil and petroleum products include, among others, density, viscosity, solidifying point, asphaltene and resin content, sulfur content, wax content, wax appearance point (cloud point), water content, total acid number (TAN), flash point, specific heat, and explosive limit. For crude oil, the physical properties are key indicators in determining its quality (and that of the resulting products) and controlling the refining process.

### Density

The density of crude oil refers to its mass per unit volume. In general, lower density crude oil yields a higher ratio of light oil.

Because rising temperature increases a petroleum product's volume and thus reduces its density, density is only meaningful alongside a temperature. China's national standard (GB/T 1884) prescribes that the density at 20 °C, represented by  $\rho_{20}$ , is to be the standard density of petroleum and liquid petroleum products in China.



The specific gravity of a petroleum product refers to the ratio of its density to the density of water at a specified temperature, and is generally denoted as  $d_t^t$  for petroleum product at  $t$  °C. In China and Eastern Europe, the commonly used specific gravity is  $d_{4^{\circ}\text{C}}^{20^{\circ}\text{C}}$ , whereas in America and other European countries it's  $d_{60^{\circ}\text{F}}^{60^{\circ}\text{F}}$  i.e., the ratio of the density of petroleum product at 60 °F to that of water at 60 °F (approx. 15.6 °C).

Countries in this latter group often use a specific gravity index known as "API gravity at 60 °F" ("API gravity" for short) to indicate the standard density of petroleum products. API gravity is the opposite of density, in that a larger API gravity means a lower density. At present, API gravity is one of the primary factors in the global pricing of crude oil. Higher API gravity means a lighter crude oil and commands a higher price.

$$\text{API gravity} = (141.5 / d_{60^{\circ}\text{F}}^{60^{\circ}\text{F}}) - 131.5,$$

$$\text{where degrees Fahrenheit (}^{\circ}\text{F)} = 32 + \text{degrees Celsius (}^{\circ}\text{C)} \times 1.8$$

## Viscosity

The viscosity of crude oil can be expressed and measured in a number of ways which often vary across countries. China uses kinematic viscosity and the Engler scale; countries including the U.S. and Great Britain use the Saybolt and Redwood scales; most countries in Western Europe, including Germany, adopt the same standards as China. The International Standardization Organization (ISO) has named kinematic viscosity to be the universal standard, a brief overview for which is given below.

The kinematic viscosity of crude oil refers to the ratio of its dynamic viscosity to its density.

Dynamic viscosity is measured in pascal second ( $\text{Pa} \cdot \text{s}$ ) in the SI system and poise (P) or centipoise (cP) in the CGS system, interconvertible as follows:

$$1 \text{ Pa} \cdot \text{s} = 10 \text{ P} = 10^3 \text{ cP}$$

Kinematic viscosity, therefore, has a unit of  $\text{m}^2/\text{s}$  or  $\text{mm}^2/\text{s}$  in SI and stokes (St) or centistokes (cSt, or  $1/100$  St) in CGS. For example, “180 cSt fuel oil” means fuel oil with a kinematic viscosity of 180 cSt. The two systems of units are interconvertible as follows:

$$1 \text{ m}^2/\text{s} = 10^6 \text{ mm}^2/\text{s} = 10^6 \text{ cSt}$$

Viscosity measures the resistance of crude oil to flow, and will decrease with rising temperature. Viscous, high pour-point crude oil and gas oil should be heated during shipment to maintain fluidity.

## Low Temperature Performance

A petroleum product's low temperature performance is a vital quality indicator that directly affects how the product should be shipped, stored, and used. This performance is measured by a number of metrics, including cloud point, crystallization point, freezing point, solidifying point, pour point, and cold filter plugging point, with solidifying point and pour point being the most important.

Solidifying point refers to the highest temperature that a petroleum product under prescribed thermal and shearing conditions can maintain a flowing surface when cooled. Pour point refers to the lowest temperature that a petroleum product can maintain its fluidity under prescribed laboratory conditions. The solidifying point of crude oil ranges from  $-50$  °C to  $35$  °C depending on its composition. In particular, crude oil with a high proportion of light components has a lower solidifying point; conversely, crude oil with a high proportion of heavy components (especially paraffin) has a higher solidifying point.

## Combustion Performance

Most petroleum products are flammable and explosive. Indicators like flash point, fire point, and auto-ignition temperature define the level of fire hazard – with lower values indicate a more easily combustible product – and are essential for ensuring personal and property safety during the storage and shipment of crude oil and petroleum products.



## Sulfur Content

Nearly all crude oil and petroleum products contain some concentration of sulfur. Sulfur compounds negatively affect the refining process and the application of petroleum products; for instance, they corrode metallic equipment and pipelines, cause catalyst poisoning, and lower product quality. This is becoming a more prominent problem in recent years: as China's economic boom has catapulted car ownership to record levels, SO<sub>2</sub>, SO<sub>3</sub>, and other pollutants from the combustion of sulfur-containing fuel can cause serious harm to the environment. Hence, it is essential to limit the sulfur content in petroleum products; in particular, crude oil should undergo desulfurization before further processing.

## Solubility

Crude oil is insoluble in water but can be combined with it to form an emulsion; crude oil is soluble in organic solvents like benzene, essence, ether, chloroform and carbon tetrachloride, and partially soluble in alcohol.

# Crude Oil Classification

Crude oil can generally be classified by industrial, chemical, physical, or geological standards, with industrial (commodity) and chemical standards being the most common choice.

## Industrial (Commodity) Standard

This standard encompasses a wide range of classification schemes, including by density, sulfur content, nitrogen content, wax content, and resin content. Internationally, crude oil is commonly priced based on its classification as defined by its API gravity and sulfur content.

Crude Oil Classification by API Gravity			
Classification	API Gravity	Density at 15 °C (g/cm <sup>3</sup> )	Density at 20 °C (g/cm <sup>3</sup> )
Light	> 34°	< 0.855	< 0.851
Medium	20°–34°	0.855–0.934	0.851–0.930
Heavy	10°–20°	0.934–0.999	0.930–0.996
Extra-Heavy	< 10°	> 0.999	> 0.996

Source: *Storage and Shipment of Petroleum Materials*, China University of Petroleum Press

According to the internationally accepted classification standards, the API of ultralight crude oil is  $API \geq 50$ , the API of light crude oil is  $35 \leq API < 50$ , the API of medium crude oil is  $26 \leq API < 35$ , and the API of heavy crude oil is  $10 \leq API < 26$ . In practice, these numerical ranges are not strictly observed and may vary from country to country and from company to company, as other factors such as marker crude would also often play a role.

In China, Daqing, Shengli, Liaohe, and Dagang oilfields produce medium crude oil; oilfields at Gudao and Urho district yield heavy crude oil; and Shuguang Zone 1 of the Liaohe oilfields and certain oil wells at Gudao produce extra-heavy crude oil.

Crude Oil Classification by Other Industrial Parameters						
Parameter	Sulfur Content			Nitrogen Content		
Category	Low	Medium	High	Low	Medium	High
% by Mass	< 0.5	0.5–2	> 2	< 0.25	–	> 0.25
Parameter	Wax Content			Resin Content		
Category	Low	Medium	High	Low	Medium	High
% by Mass	0.5–2.5	2.5–10	> 10	< 5	5–15	> 15

Source: *Storage and Shipment of Petroleum Materials*, China University of Petroleum Press



## Chemical Standard

Chemical classification schemes are based on the chemical composition of crude oil, often focusing on some of the physical properties of crude oil that are directly related to its chemical composition.

### 1. By characterization factor

The characterization factor, or the K factor, is a function of the specific gravity and boiling point of crude oil and remains fairly constant for crude oils of similar chemical compositions. This property makes it suitable as a classification parameter.

K Factor	Category
> 12.1	Paraffinic
11.5–12.1	Intermediate
< 11.5	Naphthenic

Source: *Storage and Shipment of Petroleum Materials*, China University of Petroleum Press

### 2. By key fraction properties

This kind of classification is based on the specific gravities of two key fractions of crude oil. The two key fractions are obtained at 250–275°C and 395–425°C, respectively, from crude oil kept in a special apparatus and distilled under specified conditions.

Key Fraction	First Key Fraction	Second Key Fraction
Paraffinic	$\rho_{20} < 0.8210 \text{ g/cm}^3$ API gravity > 40	$\rho_{20} < 0.8723 \text{ g/cm}^3$ API gravity > 30
Intermediate	$\rho_{20} = 0.8210\text{--}0.8562 \text{ g/cm}^3$ API gravity = 33–40	$\rho_{20} = 0.8723\text{--}0.9305 \text{ g/cm}^3$ API gravity = 20–30
Naphthenic	$\rho_{20} > 0.8562 \text{ g/cm}^3$ API gravity < 33	$\rho_{20} > 0.9305 \text{ g/cm}^3$ API gravity < 20

Source: *Storage and Shipment of Petroleum Materials*, China University of Petroleum Press

## Crude Oil Refining

Crude oil refining is generally divided into primary refining and secondary refining.

Primary refining is a process during which crude oil is separated by distillation into fractions of various weights, taking advantage of the fact that different crude oil components have different boiling points. This process, commonly referred to as distillation, includes such stages as pretreatment, atmospheric distillation, and vacuum distillation. The products of primary refining include (1) light distillates, referring to distillates with a boiling point below about 370 °C, such as gasoline, kerosene, and diesel; (2) heavy distillates, referring to distillates with a boiling point between about 370 °C and 540 °C, such as gas oil, various lubricating oils, and cracking feedstock; and (3) residues (atmospheric residue, vacuum residue).

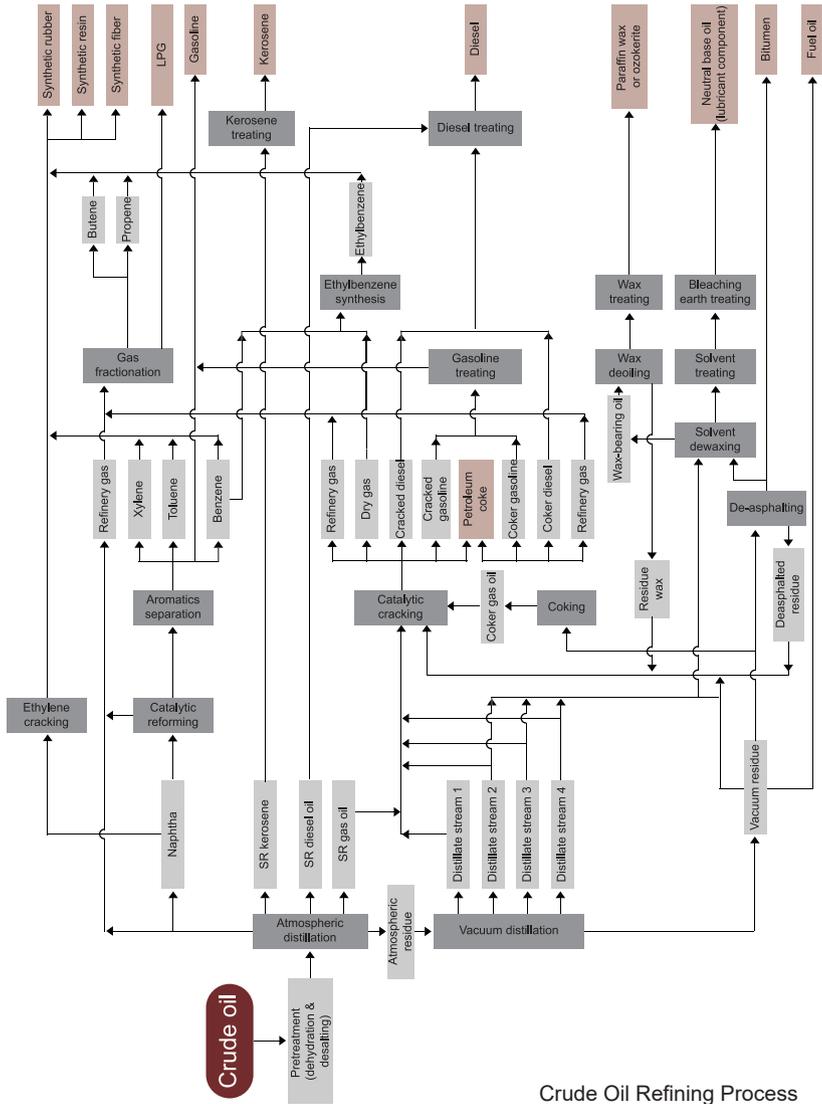
Secondary refining refers to further processing of products from primary refining. During this process, heavy distillates and residues are cracked by various means, including catalytic cracking, hydrocracking, and coking, to produce light oils. Catalytic reforming and petroleum product refining are also part of secondary refining.



## Petroleum Products and Main Applications

Petroleum products are the general name of all kinds of commodities directly produced by petroleum or some part of petroleum as raw materials, generally excluding petrochemical products synthesized from petroleum as raw materials, which are mainly divided into six categories: fuels, lubricants, bitumen, paraffin wax, petroleum coke, solvents, and industrial chemicals.

Products in the “fuels” category include engine fuels such as gasoline, diesel and jet fuel (aviation kerosene), as well as kerosene and fuel oils. In China, about 80% of the petroleum products are petroleum fuels, of which 60% are various types of engine fuels. Lubricants are the best represented in terms of variety (over 100), but only account for 5% of the total production. Solvents and industrial chemicals, including cracking feedstock used for producing ethylene, petroleum aromatic hydrocarbons, and various solvent oils, account for around 10% of the total production, while bitumen, paraffin wax, and petroleum coke account for the remaining 5%–6%.



Crude Oil Refining Process



## OVERVIEW OF THE DOMESTIC AND INTERNATIONAL OIL MARKETS

The oil industry has been around for more than 150 years, but true free trade in the international oil market did not begin until the late 1960s.

In the first 70 years of the 20th century, the price of oil remained fairly stable in spite of major global conflicts. This is in part due to the control of Western multinational oil companies over the vast majority of oil resources in the Middle East, and the oil prices by extension, through “concession agreements.” The establishment of the Organization of Petroleum Exporting Countries (OPEC) in 1960 marked the gradual shift of Western control of oil prices to OPEC. In the 1970s, the control of OPEC over most of the world’s oil supply was powerfully demonstrated in the two oil crises involving Saudi Arabia and Iran, when oil prices were pushed to record levels. Starting from the 1980s, however, non-OPEC countries gradually overtook OPEC countries in oil production, causing a global oversupply and the oil prices to plummet in a “reverse oil crisis.” This new market landscape signaled that the world’s oil prices would no longer be dictated by any single organization, but rather by a multitude of factors influenced by market forces.

The growing volatility in international oil prices in recent years has prompted a strong need for risk mitigation tools. The international crude oil futures market germinated to fill that void, and has been developing rapidly since the 1990s.

## International Oil Market

### Global Distribution of Oil Reserves

The overall distribution of the world's oil resources is extremely unbalanced: from the eastern and western hemispheres, about three quarters are concentrated in the eastern hemisphere, while the western hemisphere accounts for one quarter; from the northern and southern hemispheres, mainly concentrated in the northern hemisphere; from the perspective of latitude distribution, it is mainly concentrated in the 20°~40° and 50°~70° latitude bands. In particular, the Persian Gulf and the Gulf of Mexico – two major oil-producing regions – and oil fields in North Africa are all situated in the 20°–40° N band, which holds 51.3% of the global oil reserves, while the 50° N–70° N band encompasses key oilfields in the North Sea, the Volga region, Siberia, and Gulf of Alaska.

As new exploration technologies develop and the demand for crude oil increases, proven oil reserves in countries and regions around the world have also been on the rise.

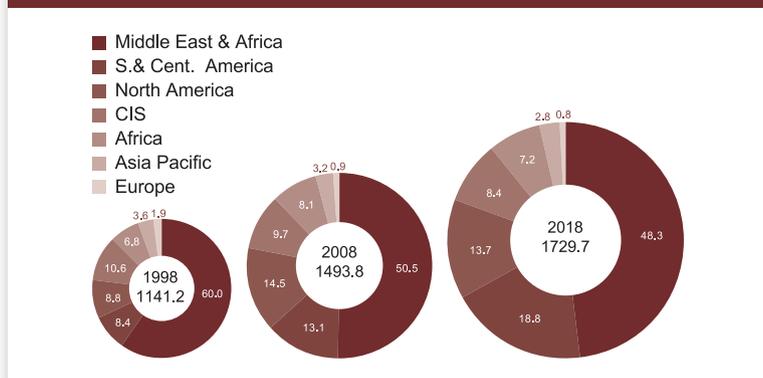
Data from recent years confirm this trend. According to the BP Statistical Review of World Energy 2019, global proven reserves increased from 1.49 trillion barrels in 2008 to 1.73 trillion barrels in 2018, representing an average annual growth rate of 1.58% in the past decade, a sizeable gain.

A geographical breakdown of proven oil reserves reveals significant variance from region to region. The Middle East holds 840 billion barrels, or 48.3% of the global total; Europe and Eurasia hold 160 billion barrels (9.2%); Central and South America 330 billion barrels (18.8%); Africa 130 billion barrels (7.2%); North America 240 billion barrels (13.7%); and the Asia-Pacific region only 50 billion barrels (2.8%). Central and South America have the world's fastest growing reserves, at an average rate of 6.6% per annum over the past decade.

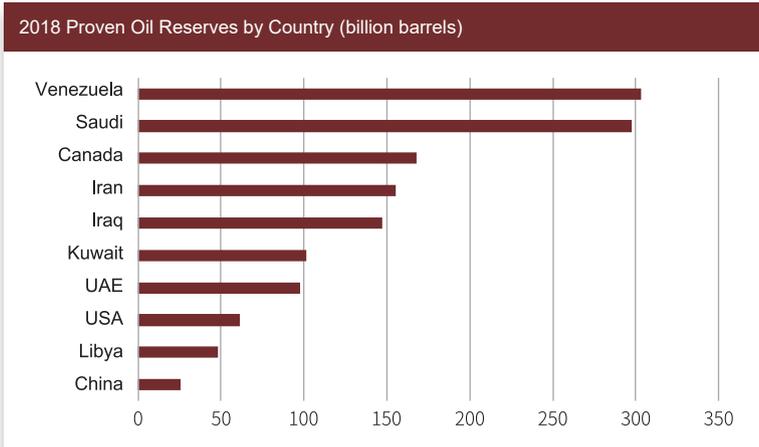


As for the country, by the end of 2018, Venezuela's total proven reserves reached 303.3 billion barrels, accounting for 17.5% of the world's reserves. It has the world's largest heavy oil deposit, the Orinoco heavy oil belt. Next are Saudi Arabia and Canada at 17.2% and 9.7%, respectively. Of special note are the oil sands in Northern Alberta, Canada. They are unconventional crude oil deposits but make up more than 96.4% of the country's total. Iran and Iraq complete the top-five list. China has 25.9 billion barrels of proven reserves, or 1.5% of the world's total. Recent advances in the extraction technologies for unconventional oil and gas, especially as exemplified by the exploration and exploitation of shale oil/gas and tight oil/gas in the United States, may once again change the global dynamics of energy supply.

Distribution of Proven Reserves in 1998, 2008 and 2018 (billion barrels)



Source: BP Statistical Review of World Energy 2019



Source: BP Statistical Review of World Energy 2019

## Global Oil Production and Consumption

### Global production and distribution

Global oil production and consumption have generally been rising year-on-year. The global production level reached 94.72 million barrels per day (bpd) in 2018, an increase of 2.4% from 92.50 million bpd in 2017, 14% from 83.07 million bpd in 2008, and 29.8% from 73 million bpd in 1998. Between 1999 and 2018, the world's total oil production increased by 1.6% per annum on average, with a notable 2.0% dip between 2008 and 2009, from 82.89 million bpd to 81.22 million bpd, due to the global economic crisis.

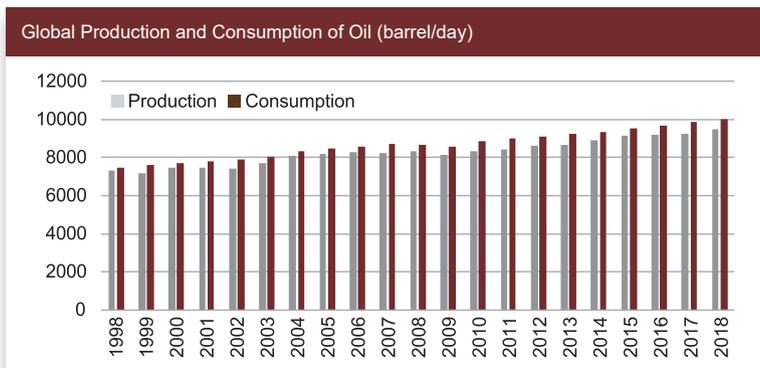
Geographically, the most active oil production regions are the Middle East, North America, Europe and Commonwealth of Independent States, contributing 31.76 million bpd, 22.59 million bpd, and 18 million bpd in 2018, respectively, representing 33.5%, 23.8%, and 19% of the global production.

Country-wise, in 2018, the United States, Saudi Arabia, Russia, Iran, Iraq, Canada, and the United Arab Emirates had a combined daily output of 57.52 million barrels, accounting for 60.7% of the global production.



### Global Consumption

The five biggest oil consuming countries in 2018 were the United States, China, India, Japan, and Saudi Arabia, which went through a collective 46.71 million bpd, or 46.8% of the global total. The United States was the world's largest oil consumer at 20.46 million bpd (20.5% of the global total); while the fastest growing oil consumer is China, whose daily consumption increased from 7.91 million barrels in 2008 to 13.53 million barrels in 2018 – an annual average growth rate of 7.1% – leapfrogging other countries in the 10-year span to the second spot.



Source: BP Statistical Review of World Energy 2019

It can be seen from the figure that global oil consumption is consistently greater than the production in the listed years. This supply-demand gap is made sustainable largely by inventory adjustments.

In 2018, global oil consumption rose by a respectable 1.5% or 1.44 million bpd, lower than the 1.67 million bpd in 2017. Weak demand from OECD countries was the main reason. Their consumption only rose by 0.27 million bpd, or 0.6%, much lower than the global average of nearly 1.2% in the past decade. The consumption in the U.S. grew by 0.5 million bpd, or 2.5%. Europe reduced by 0.16 million bpd, or 0.9%. Japan's daily oil consumption fell by 0.12 million barrels or 3.1%. Among the non-OECD countries, net oil importers saw significant growth in consumption. For example, China's appetite for oil rose by 0.69 million bpd (+5.3%), helping it to retain the title as the country with the greatest demand growth; India averaged an increase of 0.29 million bpd (+5.9%), surpassing Japan as the world's third largest oil consumer. However, these sizeable gains were partially offset by the slow growth of oil-producers among the non-OECD countries, resulting in an aggregate consumption growth rate of 2.3% among the group, lower than the decade average of 3.2%.

Growth in global oil production surpassed that of global oil consumption and reached 2.22 million bpd in 2018, a year-on-year increase of 2.4%. Affected by sanctions, production in Iraq and Venezuela dropped sharply, offsetting the growth in Iraq and Saudi Arabia. The overall production level of OPEC countries was therefore down by 0.34 million bpd, or 0.8%, to 39.34 million bpd, the biggest fall since 2014. The daily production level of non-OPEC countries rose by 2.55 million bpd, or 4.8%, from the record set in 2015. At an increase of 2.18 million bpd, or 16.6%, the U.S. led this group in production growth.



## Major International Crude Oil Futures Exchanges

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

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

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

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

Source: FIA and Official Websites of Exchanges



Comparison of Major Global Crude Oil Contracts 2020				
	INE (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OQD)
Underlying Product	Medium sour crude oil with API gravity of 32 and sulfur content of 1.5% by weight. Deliverable grades and premiums / discounts will be separately set by INE	BFOET (Brent, Forties, Oseberg, Ekofisk, Troll)	WTI / DSW <sup>1</sup>	Oman Crude Oil
Contract Size	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels
Price Quotation	Yuan per barrel	U.S. Dollars and Cents per barrel	U.S. Dollars and Cents per barrel	U.S. Dollars and Cents per barrel
Minimum Price Fluctuation	¥0.1 per barrel	\$0.01 per barrel	\$0.01 per barrel	\$0.01 per barrel
Settlement Method	Physical delivery	Cash settlement	Physical delivery	Physical delivery
Delivery Method / Type	Delivery at INE-designated delivery storage facilities in bonded zones	EFP	FOB at Pipeline	FOB at the Loading Port
Settlement Price	The daily volume-weighted average price (VWAP)	VWAP from 19:28 to 19:30 London time	VWAP from 14:28 to 14:30 Eastern time (US)	VWAP from 16:25 to 16:30 Singapore time

<sup>1</sup> WTI/DSW shall meet the grade and quality specifications on sulfur, API, viscosity, RVP, basic sediment, pour point, micro method carbon residue, TAN, total acid number, nickel, vanadium and HTSD

	INE (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OQD)
Last Trading Day	The last trading day of the month preceding the contract month	The last business day of the second month preceding the contract month (e.g., March contract expires on the last business day of January)	Trading in the current contract month ceases on the third business day prior to the twenty-fifth calendar day of the month preceding the delivery month. If the twenty-fifth calendar day of the month is a non-business day, trading ceases on the third business day prior to the last business day preceding the twenty-fifth calendar day	Trading ceases on the last trading day of the second month preceding the delivery month
Delivery Period	Five consecutive business days after the last trading day <sup>2</sup>	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
Price Limits	Within $\pm 4\%$ from the settlement price of the previous day	Interval price limits functionality serving as circuit breaker to reduce short-term price fluctuations. Although effective on every trading day, it can be only triggered in a very short time under extreme price fluctuations.	Introduce Dynamic Price Limit Functionality: The upper and lower price fluctuation limit will be calculated by utilize the dynamic variant in continuously rolling 60-minute look-back period. When the price exceeds the dynamic price fluctuation limits, then a two minutes trading halt will commence. After the fourth triggering event on a trading day, there shall be no further special price fluctuation limits.	None

<sup>2</sup> Because China's crude oil futures are delivered through standard warrants, "five consecutive business days after the last trading day" refers to the period for the transfer of warrants, while the actual loading of goods (either onto a vessel or into a storage facility) would have been completed before then.

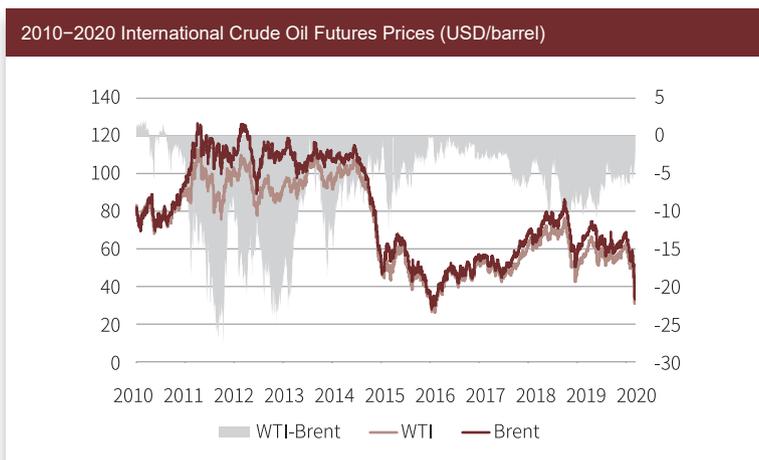


	INE (SC)	ICE Brent (B)	CME WTI (CL)	DME Oman (OQD)
Minimum Trading Margin	5% of contract value	Maintenance Margin: \$2,250-\$4,940/lot	Maintenance margin: \$2,325/lot-\$4,650/lot; Margin requirements for far month contracts gradually decrease	Maintenance margin: \$3,600/lot-\$5,000/lot
Contract Months	Monthly contracts of recent twelve (12) consecutive months followed by eight (8) quarterly contracts.	Up to 96 consecutive months	Monthly contracts listed for the current year and the next 10 calendar years and 2 additional contract months. List monthly contracts for a new calendar year and 2 additional contract months following the termination of trading in the December contract of the current year.	Consecutive months are listed for the current year and the next five years. A new calendar year will be added following the termination of trading in the December contract of the current year
Trading Hours	Beijing Time 9:00-11:30, 13:30-15:00; continuous trading hours are separately set by INE	New York Time: 20:00-18:00 (+1 day) London Time: 01:00-23:00 Singapore Time: 08:00-06:00 (+1 day) Sunday Open London:22:00	CME Globex: Sunday - Friday, 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. Chicago Time/CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT) CME ClearPort: Sunday - Friday 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. Chicago Time/CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT)	Electronic trading is open from 16:00 CST/CDT Sundays and from 16:45 CST/CDT Monday to Thursday and closes at 16:00 CST/CDT the next day, Monday to Friday

Source: Shanghai International Energy Exchange, CME, ICE and DME, current as of April 2020

## International Crude Oil Prices

From the beginning of 2019 to mid-May, OPEC production reduction agreement and US sanctions on Iran provided support for the rebound in international crude oil futures prices. From late May to early June, the risk of a “hard Brexit” in the UK increased significantly, triggering market concerns about the Euro area economy and plunging international crude oil futures prices. In August, Trump announced that he would levy another 10% additional tariffs on China’s 300 billion export products on September 1. The trade dispute between the two countries entered a stage of heating up. Crude oil prices fell and reached the lowest level during the year. On September 16, the Saudi oilfield was attacked, causing its crude oil output to lose nearly half in the short term, resulting in a sharp rise in crude oil prices. Since then, with the recovery of Saudi crude oil production capacity and the profit-taking operations of some investors, international oil prices have continued to fall. From mid-October to the end of the year, the Brexit agreement progressed smoothly. OPEC decided to expand production reductions. Sino-US trade negotiations had made positive progress. Iran’s expanded its nuclear activities. All these events had led to fluctuating oil prices. The average annual prices of Brent and WTI crude oil futures were 57.04 USD/bbl and 64.16 USD/bbl respectively, which decreased by 12.11% and 10.50% year-on-year. At the end of the year, oil prices rose by 31.2% and 20.2% respectively from their lowest at the beginning of the year, further narrowing the spread between the two. At the beginning of 2020, due to the coronavirus outbreak in China and the rest of the countries around the world, oil prices dropped sharply as a result of the reduction in market expectation of the global economy and oil demand. Besides, OPEC+ meeting failed to agree on production cuts, and later on Saudi Arabia launched oil price war, causing price slump further.



Source: Reuters

## Overview of China's Crude Oil Market

### Distribution of Oil Reserves

China's oil resources are concentrated in the Bohai Bay, Songliao, Tarim, Ordos, Junggar, Pearl River Mouth, Qaidam, and East China Sea Shelf basins. Together they boast 17.2 billion metric tons of recoverable reserves, or 81.13% of the country's total.

In terms of depth distribution, 80% of China's recoverable reserves are located in the shallow (< 2000 m) and medium-deep (2000–3500 m) range, with a comparatively small proportion situated at the deep (3500–4500 m) and ultra-deep (> 4500 m) range. In terms of geographical distribution, 76% are found in plains, shallow seas, Gobi and other deserts. In terms of quality, 63% are light oil, 28% are tight oil, and 9% are heavy oil.

In China, CNPC (China National Petroleum Corporation), Sinopec (China Petrochemical Corporation) and CNOOC (China National Offshore Oil Corporation) operate a number of large domestic oil and gas fields. In particular, CNPC owns the Daqing, Changqing, Yanchang, Xinjiang, Liaohe, Jilin, Tarim oil fields; Sinopec owns the Shengli, Zhongyuan, and Jiangnan oil fields; and CNOOC owns the Bohai oil fields, among others.



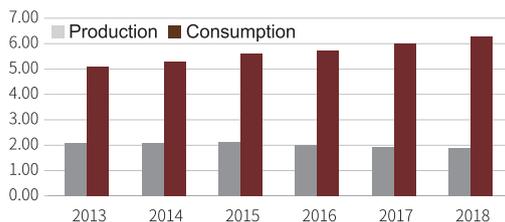
## Production and Consumption

China's crude oil production is heavily concentrated in the northern regions (northeast, northwest, and north China), Shandong, and the Bohai Bay. Consumption spreads across the whole country, but centers around the Bohai Bay, Yangtze River Delta, and Pearl River Delta.

China's biggest oil consumer is its industrial sector, followed by transportation, agricultural, commercial, and residential sectors. Industrial oil consumption has continuously accounted for at least 50% of total consumption; transportation comes in second, accounting for about 25%.

According to BP Statistical Review of World Energy 2019, from 2004 to 2018 China's crude oil production rose from 174 million to 189 million metric tons, achieving an average annual growth of 0.57%, and making China the world's eighth largest oil producer. China is now also the world's second largest oil consumer, with its consumption level increasing at an average annual rate of 6.30% over the same period, from 323 million to 628 million metric tons per annum. According to the General Administration of Customs, crude oil imports totaled 506 million tons in 2019.

Oil Production and Consumption in China(100 million metric tons)



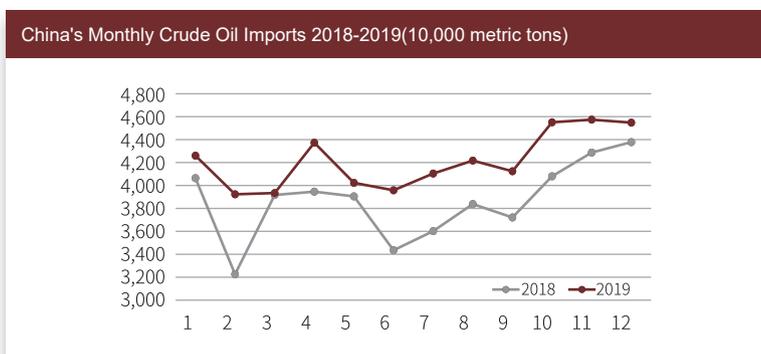
Source: BP Statistical Review of World Energy 2019

## Imports and Exports

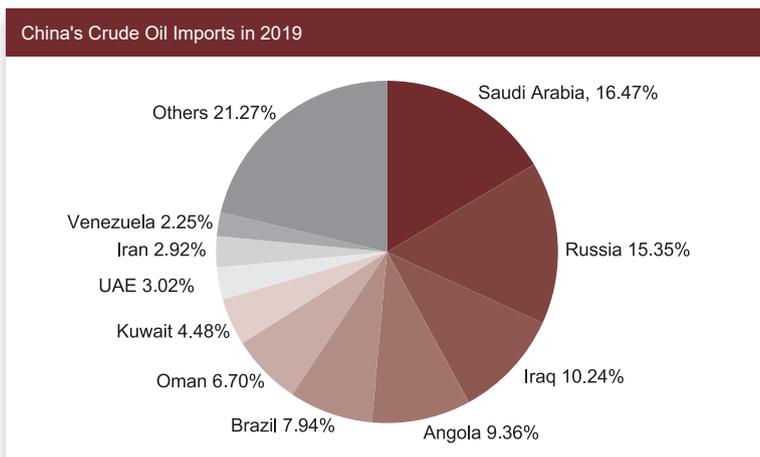
China became a net importer of petroleum products in 1993, and a net importer of crude oil in 1996. Since then, surging domestic demand has steadily driven up the country's crude oil imports.

According to statistics from China Customs, from 2004 to 2019, China's crude oil imports rose from 123 million tons to 506 million tons, with an average annual increase of 19.46%. At present, China has become the world's largest importer of crude oil. In 2019, the top ten crude oil import countries were: Saudi Arabia, Russia, Iraq, Angola, Brazil, Oman, Kuwait, United Arab Emirates, Iran, and Venezuela. Among them, crude oil imports from the Middle East increased by 3.58% month-on-month to 245 million tons, accounting for 48.46% of the total imports.

Prior to the 1990s, crude oil exports were an important channel for China's export earnings. With the increase of China's economic demand for oil, crude oil exports have gradually decreased since the mid-1990s. At present, a small amount of crude oil exports are mainly resulting from long-term trade agreements with relevant countries. According to the BP Statistical Review of World Energy 2019, China exported 4.64 million tons of crude oil in 2018, a year-on-year decrease of 4.53%.



Source: General Administration of Customs



Source: General Administration of Customs

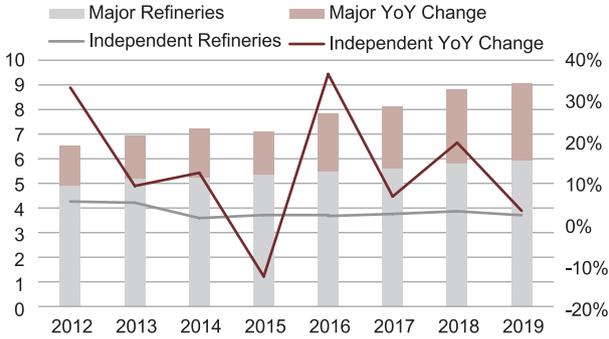
## Oil Refining

### Refining capacity

SCI survey indicates that, as of the end of 2019, China's 203 domestic refineries (including independent refineries) have a total crude oil refining capacity of 900 million metric tons per year, up 2.61% from the year before. This means China represents 17.8% of the global refining capacity, second only to the United States.

Excluding independent refineries (i.e., refineries without a steady source of crude oil and steady capacity utilization rate), the primary refining capacity of China's major refineries is 594 million metric tons per year, rising year-on-year by 2.24% and accounting for 11.7% of the global total. By the end of 2019, the independent refineries in China had a combined primary refining capacity of 311 million metric tons per year, up 13.32% and representing 34.36% of China's total refining capacity.

Primary Refining Capacity in China 2012–2019 ( 100 million metric tons/year)



Source: Sublime China Information(SCI)

Major Domestic Refineries

As of the end of 2019, the combined primary refining capability of refineries with capacity above 10 million metric tons a year is 460 million metric tons, or 50.8% of the total capacity of major refineries in China.

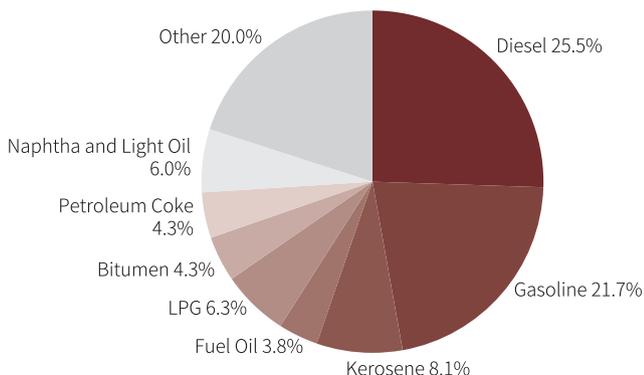


China's Top Ten Refineries with Primary Refining Capacity Above 10 Million Metric Tons/Year (million metric tons/year)

Rank	Refinery	Owner	Primary Refining Capacity	Region	% of Domestic Total
1	Zhenhai Refining & Chemical Company	Sinopec	23.00	Zhejiang	4.09%
2	Dalian Petrochemical Company	CNPC	20.50	Liaoning	3.64%
3	Jinling Petrochemical Company	Sinopec	18.00	Jiangsu	3.20%
4	Maoming Petrochemical Company	Sinopec	18.00	Guangdong	3.20%
5	Dushanzi Petrochemical Company	CNPC	16.00	Xinjiang	2.84%
6	Guangzhou Petrochemical Company	Sinopec	15.70	Guangdong	2.79%
7	Qilu Petrochemical Company	Sinopec	14.00	Shandong	2.49%
8	Shanghai Petrochemical Co., Ltd.	Sinopec	14.00	Shanghai	2.49%
9	Fujian Refining & Petrochemical Co., Ltd.	Sinopec	14.00	Fujian	2.49%
10	Sinopec Beijing Yanshan Company	Sinopec	13.50	Beijing	2.40%

Source: SCI

Production of Petroleum Products in China in 2019



Source: SCI

# COMPONENTS AND INFLUENCERS OF CRUDE OIL FUTURES PRICE

## Components of Crude Oil Futures Price

Like many other futures products, the price of crude oil futures has two main components: (1) costs, profits, and taxes related to the production process; and (2) costs, circulation expenses, and expected profits from futures trading. These can be further classified into five sub-components for ease of understanding:

### 1. Production Costs

As is the case with other commodities, the production of crude oil incurs costs such as equipment expenses, wages and salaries, and local taxes. These expenditures form the “foundation” of the oil price. However, it is important to note the two distinctive features in how the production of oil, or more precisely the production costs of crude oil, relates to the price of crude oil futures. First, in international markets, the price of crude oil futures is only weakly influenced by the production costs. This is due to the unevenness in the global distribution of oil resources and a strong baseline demand, which give rise to what is known in economics as a high “differential rent,” meaning the international oil price is generally aligned with the price of higher-cost crudes or alternative energy sources. In fact, crude oil’s production costs, which vary wildly depending on the deposit characteristics, oil qualities, and extraction techniques, are far less than its selling price.



Second, the exploration, exploitation, and other pre-production costs are linked to the market price only in the sense that they are a factor in the decision-making process that determines the output level of the oilfield, and therefore the market supply. Early stage investment warrants careful consideration because it is a major part of the production cost of crude oil, which can be broadly categorized into geological survey costs, construction costs for drilling equipment and ground facilities, and extraction expenses. In practice, early stage expenses are often more important than extraction expenses in the production cost equation.

## 2.Product Profits

A business has many operating objectives – economic, social, etc. The economic objective is what makes it an enterprise and at the center of that is profit. The price of crude oil futures includes profit from the production process, and because the formation of crude oil requires specific geological conditions, which results in extremely uneven distribution of oil resources around the world, this profit is much higher than in conventional industries, and more characteristic of those of monopolistic industries. According to economic principles, in a monopoly, the price of a product is no longer directly determined by or correlated to the cost of production or the intrinsic value of the product, but rather by the demand and purchasing power of the buyers. While the crude oil market is not fully monopolistic, the bulk of crude resources and output have long been under the control of a supplier group consisting of transnational oil companies, OPEC countries, and non-OPEC oil-producing countries, who have an interest to keep the oil prices at a high but not unbearable level to reap the maximum profit. This dynamic explains why, despite the vast differences in the production cost of crude oil around the world, almost all oilfields are put into operation: simply stated, a higher production cost only causes a minor dent to the bottom line, but nothing to make the whole enterprise unprofitable. This expected profit level is also reflected in the price of crude oil futures.

### 3.Trading Expenses

Futures trading expenses are those costs incurred or instigated during futures trading, such as commissions and transaction fees, that are payable by the traders. To trade crude oil futures, the trading parties need to have not only the appropriate personnel and equipment, but also a portion of their trading funds tied up as margin. This margin normally equals to about 5%-10% of the notional value of the contract. It is a form of "investment" required for trading on a futures exchange, not a component of the futures price. Traders also need to pay applicable commissions which, together with other trading costs, constitute an appreciable portion of the price of crude oil futures. The cost of these idle funds and service charges is ultimately reflected in the price of the futures product.

### 4.Expected Profits from Trading

Expected profit from futures trading includes both the average return that would be expected on the trading funds if they were invested elsewhere and the risk premium for assuming the trading risks. Accordingly, traders of crude oil futures can be classified as hedgers and speculators. While hedgers enter the market to primarily control their trading risks, without any excessive expectation for profit, speculators do so for the sole purpose of making a profit from price fluctuations. Because speculators are essential to market activity and the wellbeing of futures contracts, the price of crude oil futures also reflects their reasonable profit expectations.



## 5.Circulation Expenses

Circulation expenses include transportation and incidental expenses, packaging fees, and safekeeping fees for the underlying commodities. Given that futures trading is based on the deliverability of the underlying commodities at a future time, all futures contracts specify a delivery venue. For example, the delivery venue of NYMEX light sweet crude oil futures is Cushing, Oklahoma, USA. Because most of the crude oil being traded is not be produced at the point of delivery, its producers must either ship it to the designated location or provide a distance-based compensation to the buyers. These expenses are also an important part of the price of crude oil futures.

## Influencers of Crude Oil Futures Price

Because the futures market is built on the spot market, its further development is inextricably linked to the latter. They react very similarly to market updates, such that prices in these two markets shadow each other's movements both in direction and in magnitude of fluctuation. This kind of interactivity and sustained balance also apply to the futures and spot prices of crude oil.

International oil prices are determined by both the futures market and the spot market. Therefore, factors that influence the spot price, such as imbalance between the supply and demand, may also impact the futures price. In some cases, however, the two prices may diverge due to certain special factors that influence only the futures price, such as speculation by investment funds and other financial factors.

In addition, like other commodities, the price of crude oil is also swayed by market supply and demand. However, because crude oil has the dual status of being a key strategic resource, its price is also substantially influenced by political, economic, diplomatic, and military factors. In sum, the price of crude oil futures is impacted by:

- 1.spot market factors;
- 2.speculation by investment funds;
- 3.U.S. dollar, exchange rate, interest rate, and capital liquidity;
- 4.emergencies and political factors.

## Costs of Crude Oil Imported to Bonded Zones

China mainly uses the average of Platts Dubai and Oman prices as the pricing benchmark for crude oil imported from Middle East, and the Brent futures price for crude oil imported from West Africa.

The cost of crude oil imported to domestic bonded zones is generally calculated by the following formula:

Cost of imported crude oil in bonded zones = CIF × exchange rate + other expenses

- Exchange rate is based on the daily currency quotations;
- Other expenses include: import agency fees, port/dock charges, storage fees, commodity inspection fees, drayage, sanitation inspection fees, insurance, interest, urban maintenance and construction tax, educational surcharge, flood prevention fees, etc.

Crude oil traded on INE is based on “Net pricing, bonded delivery”, i.e., the trading price is net of VAT and customs duties. If the crude oil is transported from a bonded zone to within the territory of China, its price after tax (in RMB) will be as follows:

Crude oil price (incl. tax) = Bonded crude oil price × (1 + VAT rate) × (1 + Custom duty rate)

- VAT rate is 13%;
- Custom duty rate: 0 for the most favored nations; 85 yuan/metric ton otherwise.

\*As of March 2020



## HEDGING AND ARBITRAGE WITH CRUDE OIL FUTURES

### Hedging with Crude Oil Futures

Hedging is a futures trading practice aimed to mitigate price risks in the spot market. To create a hedge, the trader buys (or sells) futures contracts whose underlying asset is of identical quantity to that sold (or bought) in the spot market, so that losses in the spot market will be favorably offset by gains in the futures market and vice versa. The offsetting mechanism between the spot commodity and futures commodity so established helps minimize the price risk.

#### 1. Short Hedge by Oil Producers and Refineries

Oil producers and oil refineries, suppliers of crude oil and refined oil, respectively, have an interest to maintain a reasonable profit margin for the finished goods they are about to supply to the market and the in-process goods they intend to sell to the market in the future. To avoid potential losses at the actual time of sale due to price change, they can take a short hedge position on the corresponding futures product, i.e., first sell the same quantity of futures product, and then, at time of sale of the spot product, purchase the same quantity of futures product to close out their position.

Here is an example: an oilfield learned in July that the oil price was 350 yuan/barrel, which it believed to be quite favorable and increased its output as a result. However, the oilfield was also worried about an oversupply in the spot market would cause the oil price to fall, eroding its profit margin. To avoid the risk of falling prices, the oilfield decided to take a short hedge in crude oil futures on INE. This hedge and the resulting gains are illustrated below:

	Spot Market	Futures Market	Basis
July 1	Price of crude oil: ¥350 a barrel	10 lots of SEP crude oil contract sold at ¥370 a barrel	-¥20 a barrel
August 1	10,000 barrels sold at ¥325 a barrel	10 lots of SEP crude oil contract bought at ¥345 a barrel	-¥20 a barrel
Hedging Result	- ¥25 a barrel	+ ¥25 a barrel	
Net gain or loss: 0			

While the adverse price movement of RMB 25 a barrel in the spot market incurs a loss of RMB 250,000 to the oilfield, a gain by the same amount in the futures market has offset that, thereby eliminating the negative effect from the price change.

## 2. Long Hedge by Petroleum Product Processors and Refined Oil Consumers

Petroleum product processors and refined oil consumers – oil refineries, petrochemical companies, airlines, to name a few – are concerned about a price increase in crude oil or refined oil, which would raise their cost of raw materials. To avoid potential losses resulting from a price hike at time of purchase of such raw materials, they can take a long edge position in the futures market, i.e., first buy the same quantity of futures product, and then, at time of purchase of the relevant spot product, sell the futures product to close out their position.

Example: through a forward contract concluded on June 1, an oil refinery agreed to supply a local distributor with a shipment of goods in September. The contract stipulated a fixed price for such shipment, basing on the crude oil futures price of RMB 350 a barrel then prevailing on INE. At the time of contract execution, the oil refinery had neither the goods in stock nor any guaranteed source and price of raw materials. To control its cost and lock in profit, the oil refinery decided to enter into a crude oil futures trade on INE. The details of this trade are given below:



	Spot Market	Futures Market	Basis
June 1	Price of crude oil: ¥350 a barrel	10 lots of SEP crude oil contract bought at ¥370 a barrel	-¥20 a barrel
August 25	10,000 barrels bought at ¥375 a barrel	10 lots of SEP crude oil contract sold at ¥395 a barrel	-¥20 a barrel
Hedging Result	- ¥25 a barrel	+ ¥25 a barrel	
Net gain or loss: 0			

While the adverse price movement of RMB 25 a barrel in the spot market incurs a loss of RMB 250,000 to the oilfield, a gain by the same amount in the futures market has offset that, thereby eliminating the negative effect from the price change.

### 3. Hedging by Petroleum Product Dealers

Petroleum product dealers such as oil traders and storage and transportation service providers buy and sell spot commodities regularly. Because any mismatch in trading quantity and time will result in risks, petroleum product dealers often choose a hedging strategy based on their monthly net exposure in the spot market.

## Arbitrage with Crude Oil Futures

Arbitrage is a trading strategy in which a trader simultaneously buys and sells two different futures contracts to seek profit from a favorable change in the basis between the contracts. Arbitrage includes calendar arbitrage and cross-product arbitrage.

### 1. Calendar Arbitrage

In calendar arbitrage, the trader seeks to make a profit by offsetting positions in two futures contracts with the same underlying asset but different delivery months when there is any unusual deviation from the normal basis between the two contracts. Calendar arbitrage can be classified into bull spread and bear spread.

In a bull spread with crude oil futures, the trader goes long on a nearby month contract and simultaneously goes short on a far month contract, and stands to profit when the price of the front month contract rises more than that of the far month contract. In a bear spread, by contrast, the trader would go short on a nearby month contract and go long on a far month contract, making a profit when the price of latter falls less than that of the former.

Bull Spread			
			Spread
May 1	10 lots of AUG crude oil contract bought at ¥350 a barrel	10 lots of OCT crude oil contract sold at ¥356 a barrel	¥6 a barrel
June 1	10 lots of AUG crude oil contract sold at ¥360 a barrel	10 lots of OCT crude oil contract bought at ¥362 a barrel	¥2 a barrel
Arbitrage Result	+ ¥10 a barrel	- ¥6 a barrel	
Net gain = (¥10 a barrel - ¥6 a barrel) × 10,000 barrels = ¥40,000			



The above example shows that, in a normal market, the success of an arbitrage hinges on a narrower spread in the future. For crude oil futures, the spread between two consecutive month contracts is generally decided by the monthly carrying charge for crude oil warrants. For two such contracts within the same crude oil production year, if the spread between them is both greater than, and expected to fall back to, the carrying charge, then a profit can be made by simultaneously selling the far month contract and buying the nearby month contract. A larger spread would also mean a lower risk and higher profit.

The situation for an arbitrageur reverses in an inverted market, where a larger spread in the future becomes profitable. Moreover, whereas in a normal market the spread between two consecutive months is tethered to the carrying charge, here the premium of the front month over the far month is not capped, meaning that an arbitrage can have a substantial payoff at limited risks.

Bear Spread			
			Spread
July 1	10 lots of OCT crude oil contract sold at ¥354 a barrel	10 lots of DEC crude oil contract bought at ¥355 a barrel	¥1 a barrel
August 1	10 lots of OCT crude oil contract bought at ¥350 a barrel	10 lots of DEC crude oil contract sold at ¥352 a barrel	¥2 a barrel
Arbitrage Result	+ ¥4 a barrel	- ¥3 a barrel	
Net gain = (¥4 a barrel - ¥3 a barrel) × 10,000 barrels = ¥10,000			

Unlike the earlier examples, in a bear spread, the success of the arbitrage in a normal market hinges on whether the spread will widen. If the spread between two consecutive month contracts is both less than, and expected to rise up to, the carrying charge, then a profit can be made by simultaneously buying the far month contract and selling the nearby month contract. The smaller the spread is, the lower the risk and the higher the profit will be.

If it were an inverted market, the arbitrage would be profitable from a narrowing spread. And as described earlier, because the spread between the nearby month contract and the far month contract in an inverted market will not be reined in by the carrying charge as in a normal market, an arbitrage in this type of market has limited profit potential but unlimited risk.

## 2. Cross-Product Arbitrage

Cross-product arbitrage is designed to generate profit from the price difference between two futures contracts with different but related underlying commodities. Specifically, the arbitrageur first buys one futures contract and simultaneously sells another of the same delivery month and for a related commodity, then waits for an opportune moment in the future to offset both to make profit. To be effective, a cross-product arbitrage must satisfy the following conditions: (1) the two commodities should be related and interchangeable to some extent; (2) the commodities should be affected by the same factors; and (3) the futures contracts being bought and sold should generally have the same delivery month.

### ■ Arbitrage between related commodities

There is generally a reasonable spread between the prices of two related commodities. Any deviation from this reasonable spread creates arbitrage opportunities. For example, if the spread is expected to narrow, then buying the lower-price contract and selling the higher-price contract should generate a profit.

### ■ Arbitrage between raw material and finished product

Normally there is a price difference between a raw material and any finished product made from such raw material. An arbitrage opportunity exists between these two commodities if this price difference deviates from the normal range. As is the case above, if the spread is expected to narrow, then buying the lower-price contract and selling the higher-price contract should generate a profit.



# GUIDE TO CRUDE OIL FUTURES TRADING

## Modes of Access

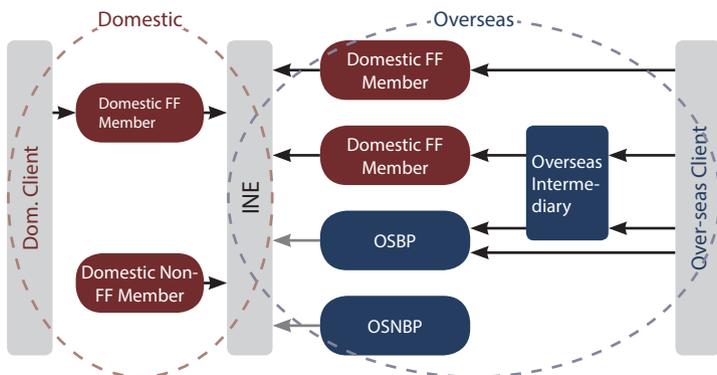
### Domestic Investors

Domestic investors can trade crude oil futures through a domestic Futures Firm Member; With regard to the domestic investors, who are eligible for INE membership, may apply to become a Non-Futures Firm Member to directly engage in the trading of crude oil futures.

### Overseas Investors

4 way of global participation accesses to INE are:

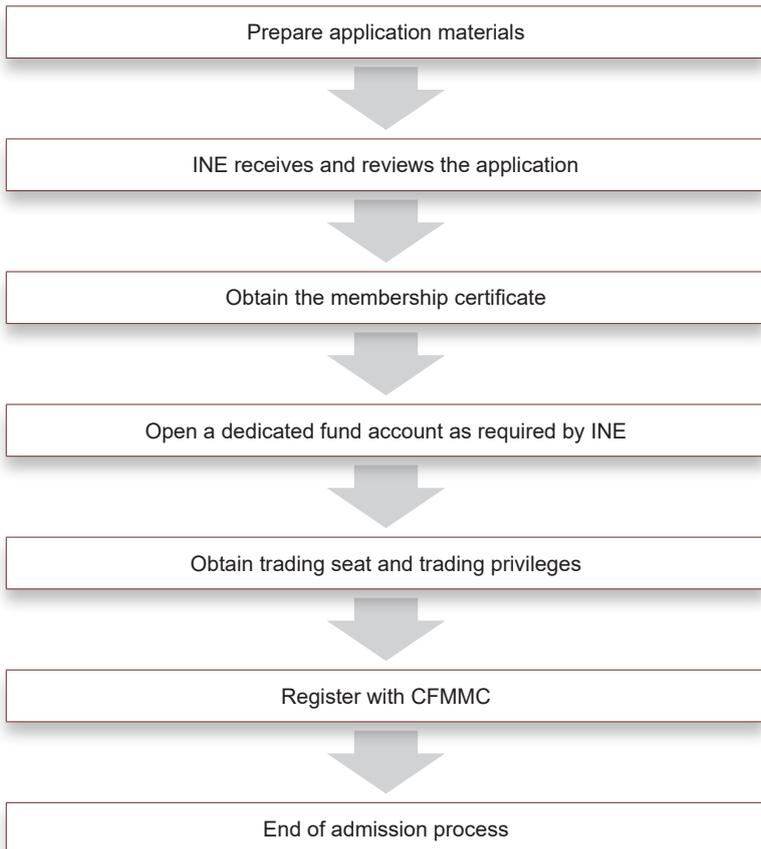
- I: through domestic futures firms authorized as their direct agents
- II: through Overseas Intermediaries who in turn engage domestic futures firms or Overseas Special Brokerage Participants (“OSBP”)
- III: through OSBPs as their agents
- IV: as Overseas Special Non-Brokerage Participants (“OSNBP”)



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.

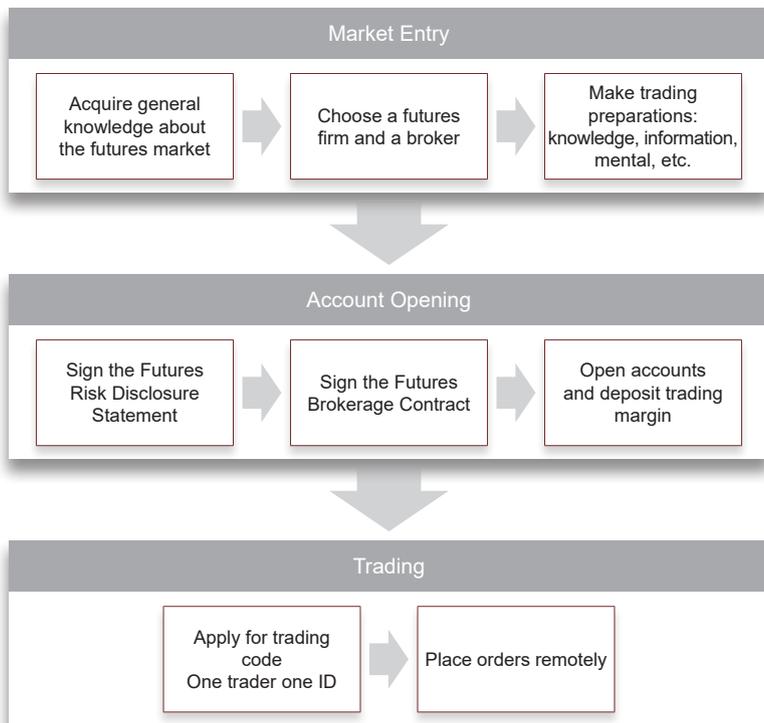
## Market Access for Domestic Members and Clients

### Membership Admission Procedures

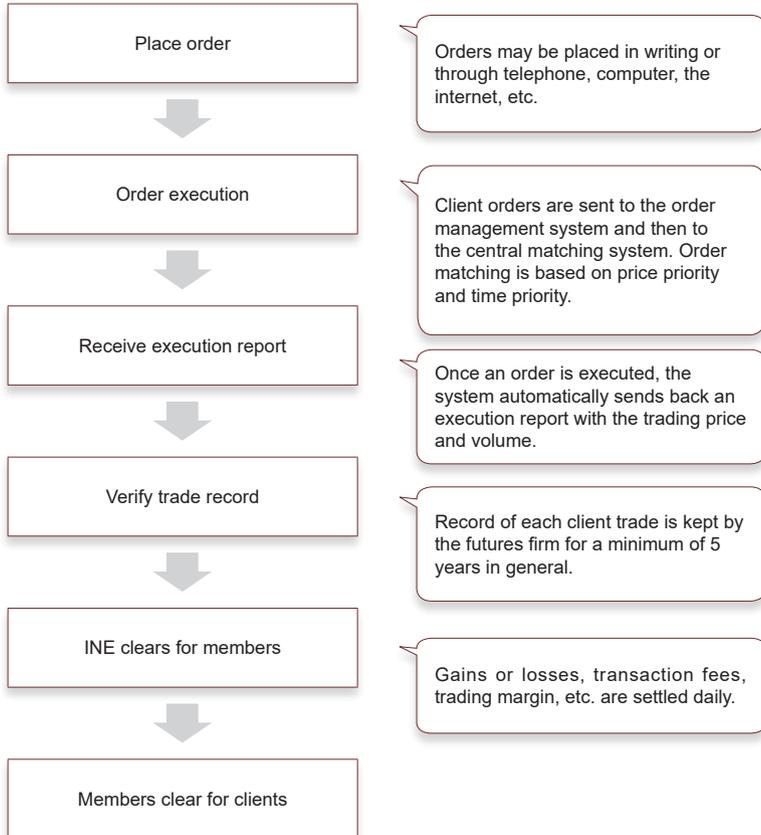




## Domestic Client Market Access and Trading Procedures

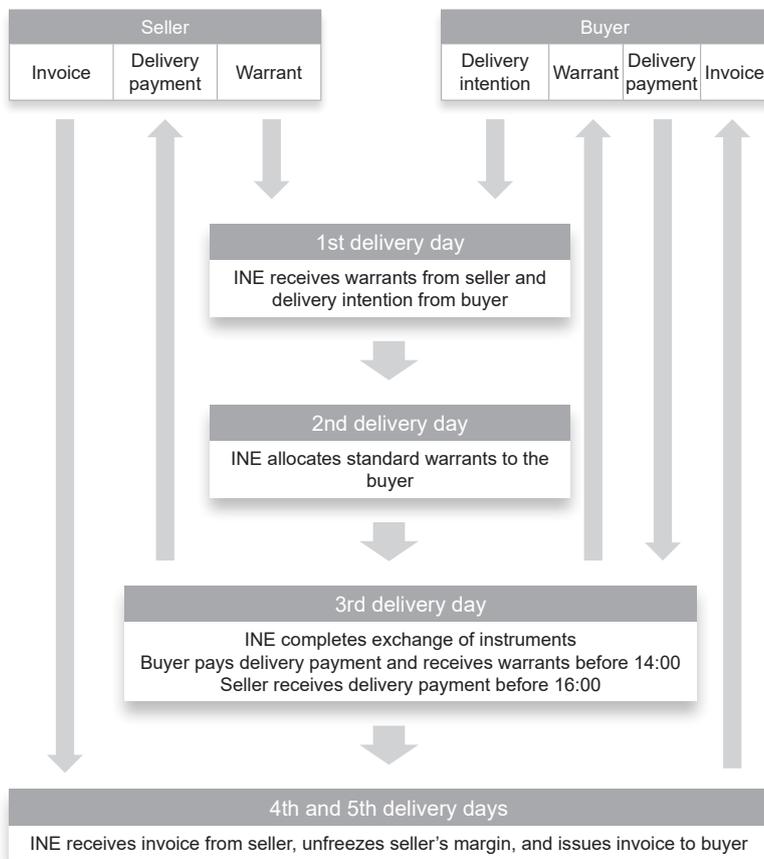


## Trading and Clearing Procedures





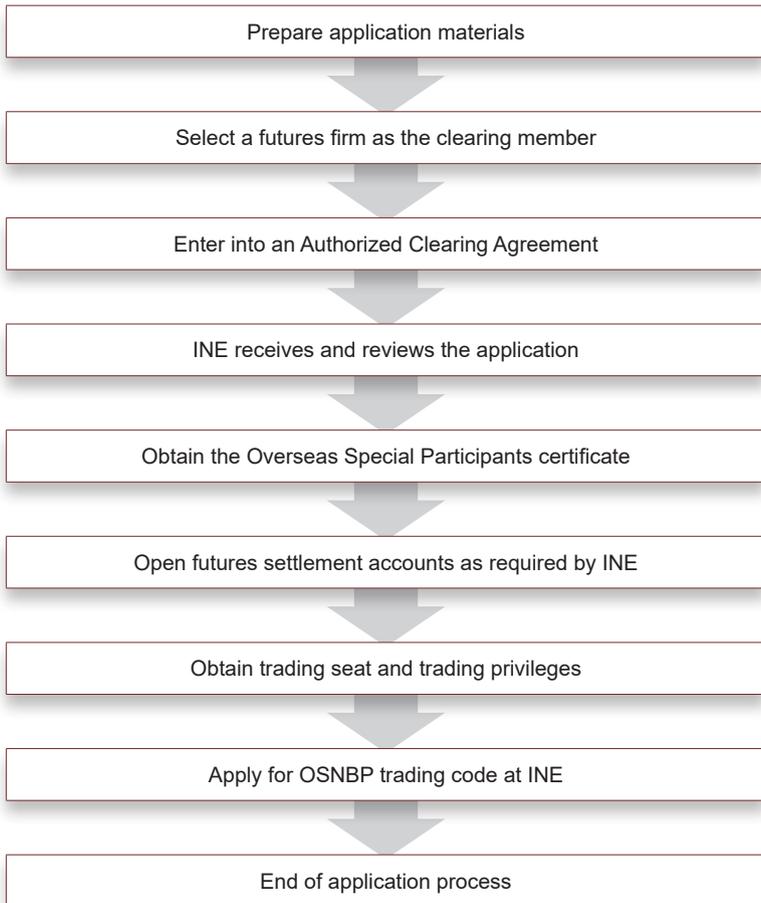
## Trading and Clearing Procedures



## Market Access for Overseas Clients and Brokers

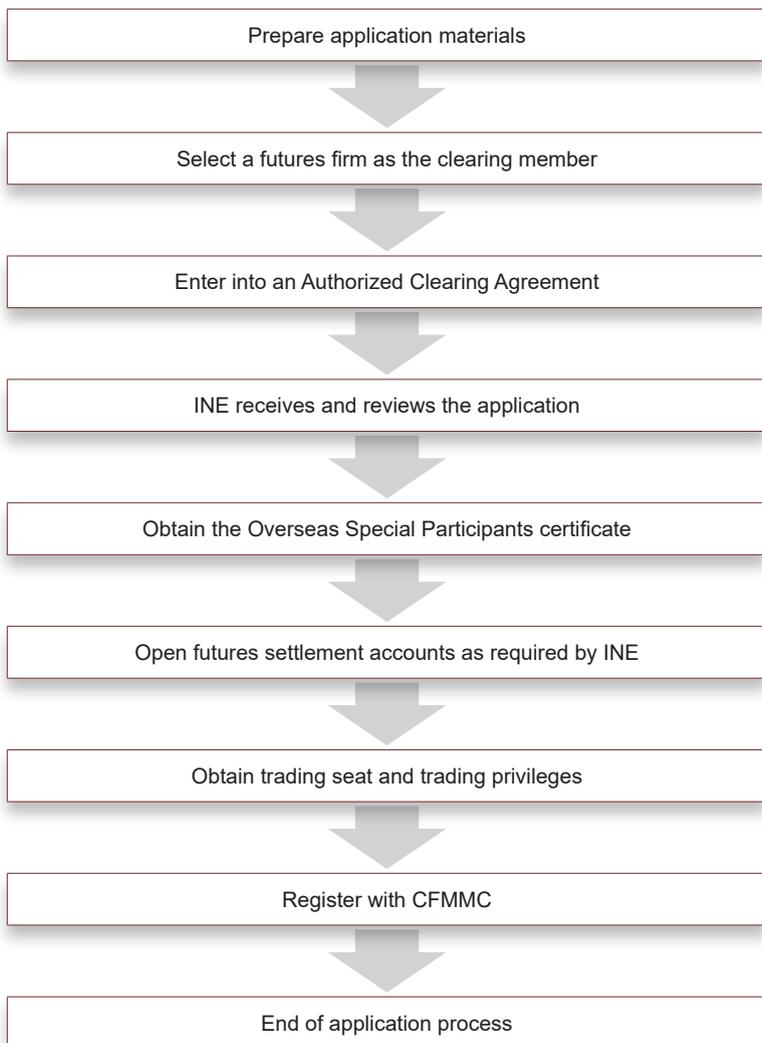
### Application/Registration Procedures for Overseas Special

#### 1. Approval Procedures for Overseas Special Non-Brokerage Participants

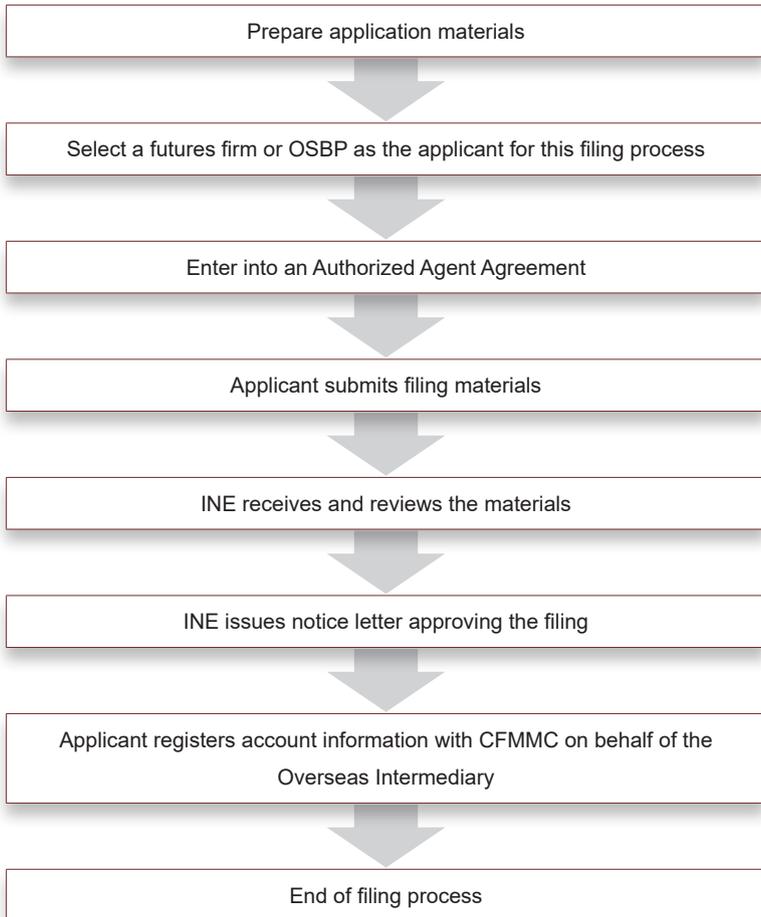




## 2. Approval Procedures for Overseas Special Brokerage Participants



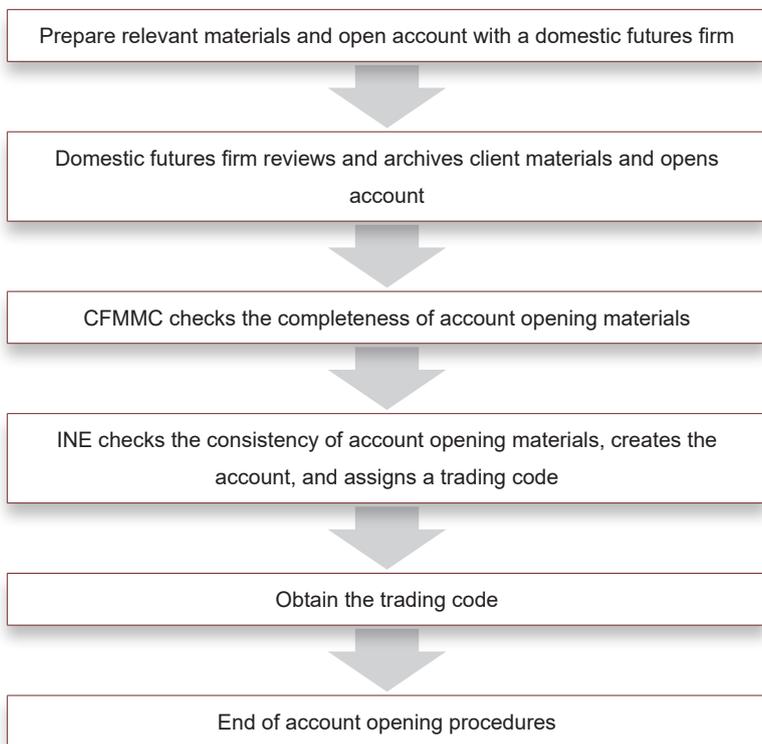
### 3. Filing Procedures for Overseas Intermediaries



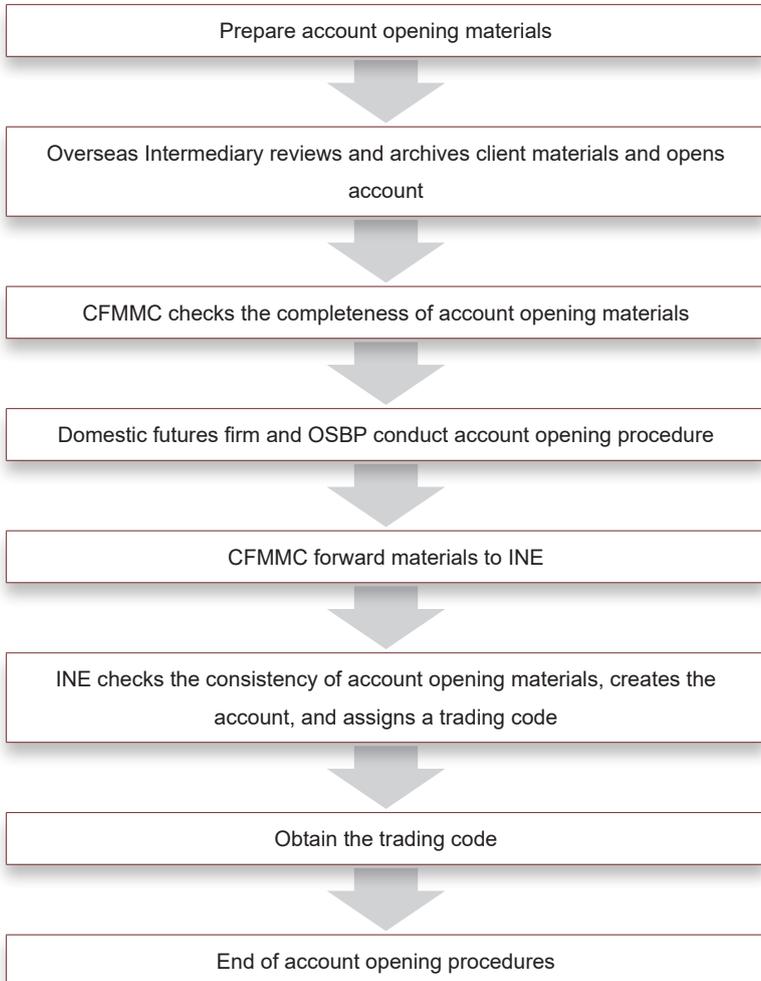


## Account Opening Procedures for Overseas Clients

### 1. Account opening procedures through a domestic futures firm

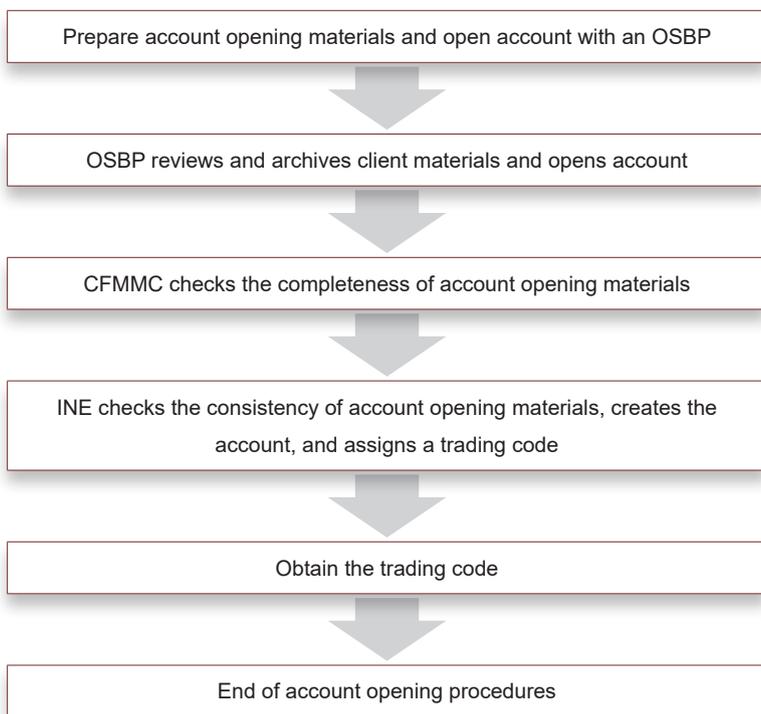


## 2. Account opening procedures for an Overseas Intermediary

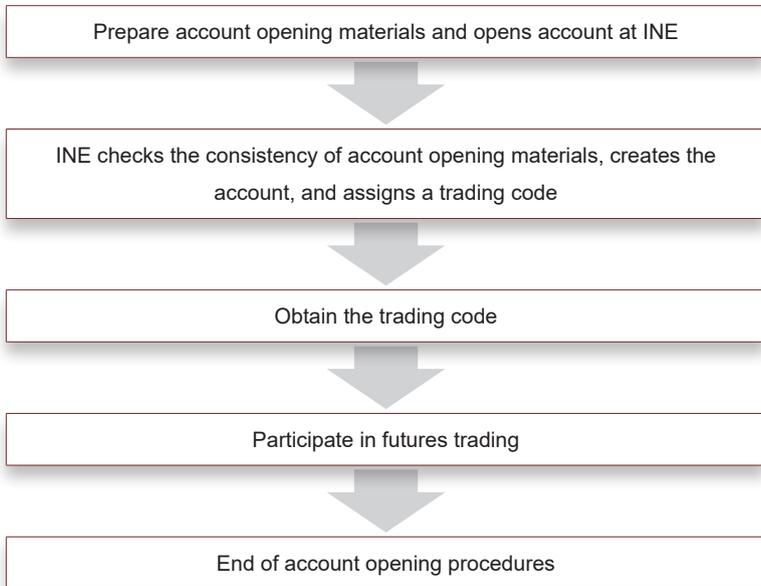




### 3. Account opening procedures for an Overseas Special Brokerage Participant



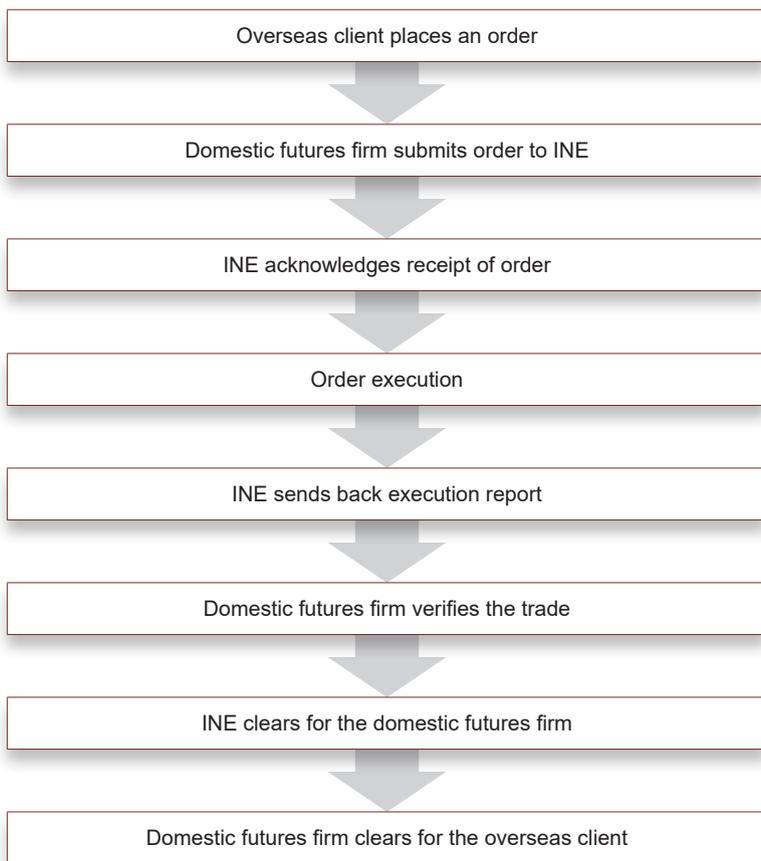
4. Account opening procedures for an Overseas Special Non-Brokerage Participant



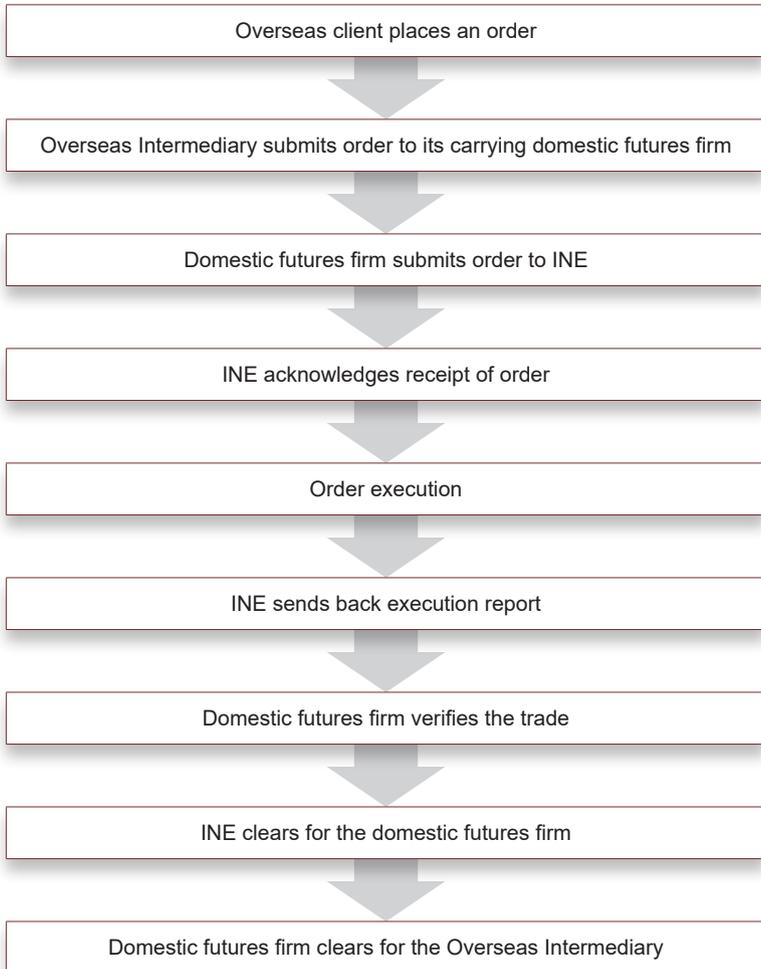


## Trading and Clearing Procedures for Overseas Clients

### 1. Trading directly through a domestic futures firm

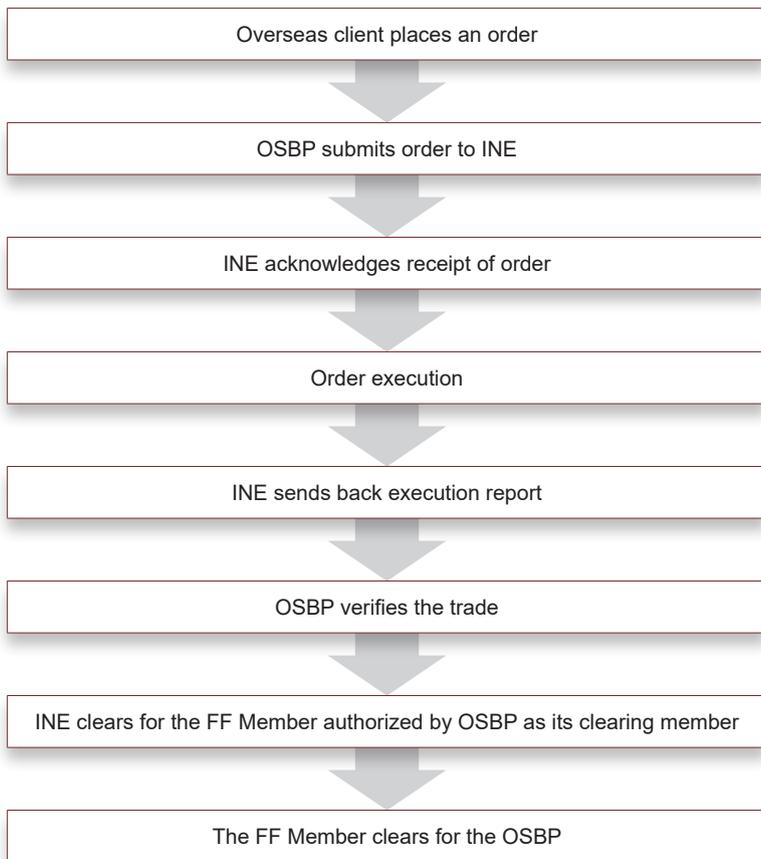


## 2. Trading through an Overseas Intermediary

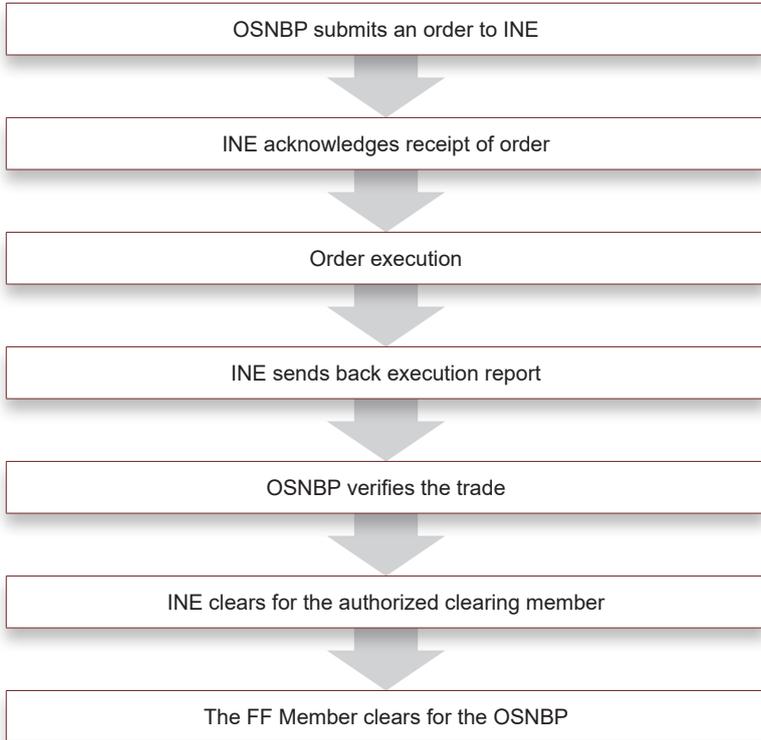




### 3. Trading through an Overseas Special Brokerage Participant



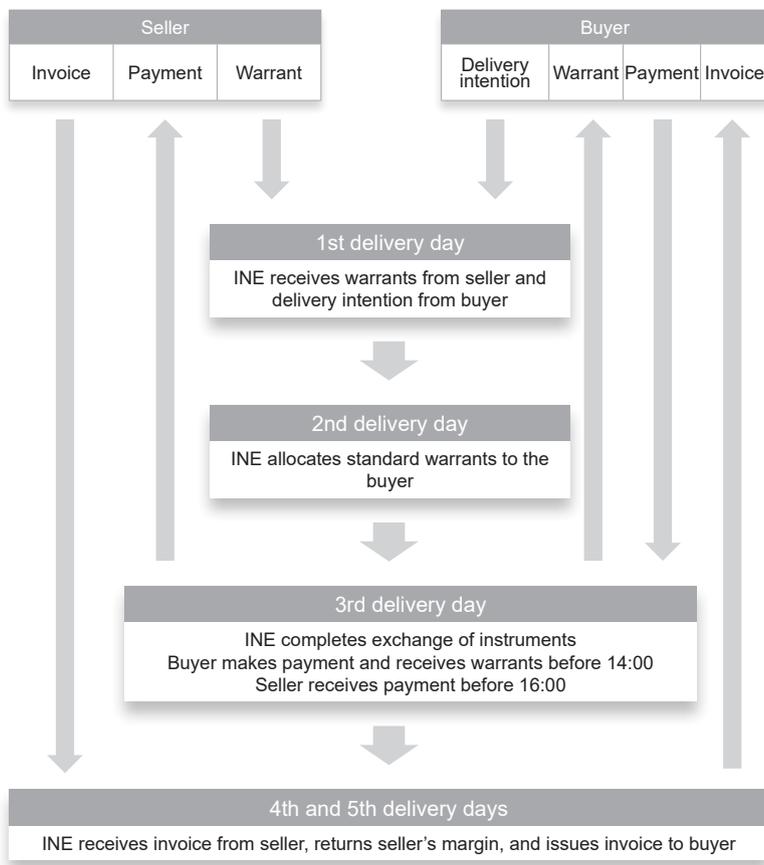
#### 4. Trading as an Overseas Special Non-Brokerage Participant



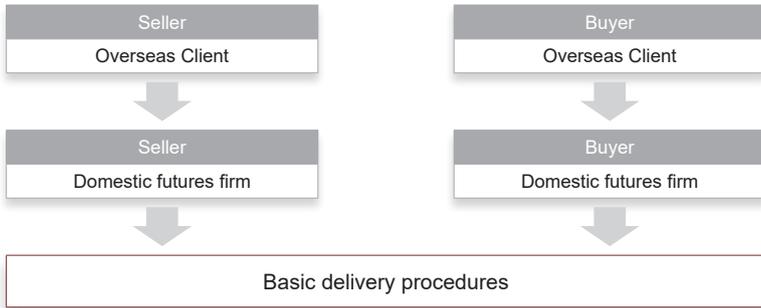


## Delivery Procedures for Overseas Clients

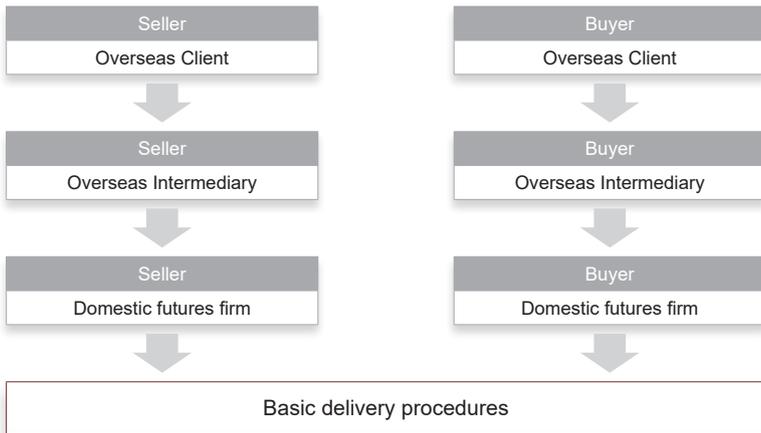
### 1. Basic Delivery Procedures



## 2. Trading directly through a domestic futures firm

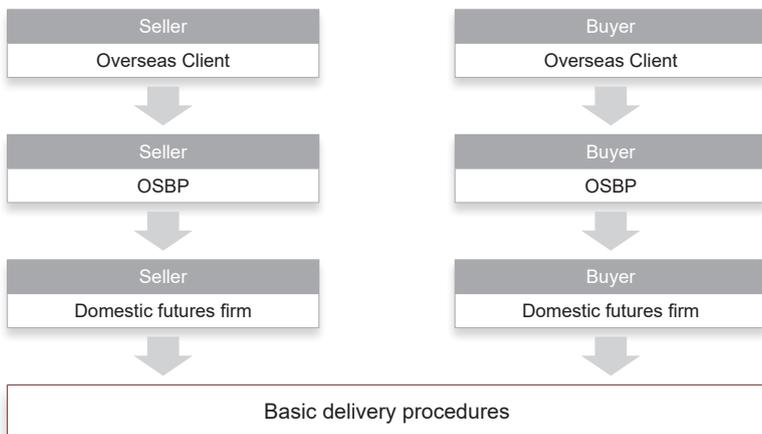


## 3. Trading through an Overseas Intermediary

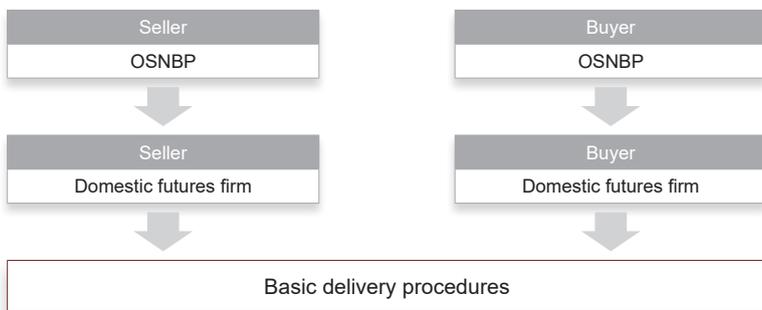




#### 4. Trading through an Overseas Special Brokerage Participant



#### 5. Trading as an Overseas Special Non-Brokerage Participant

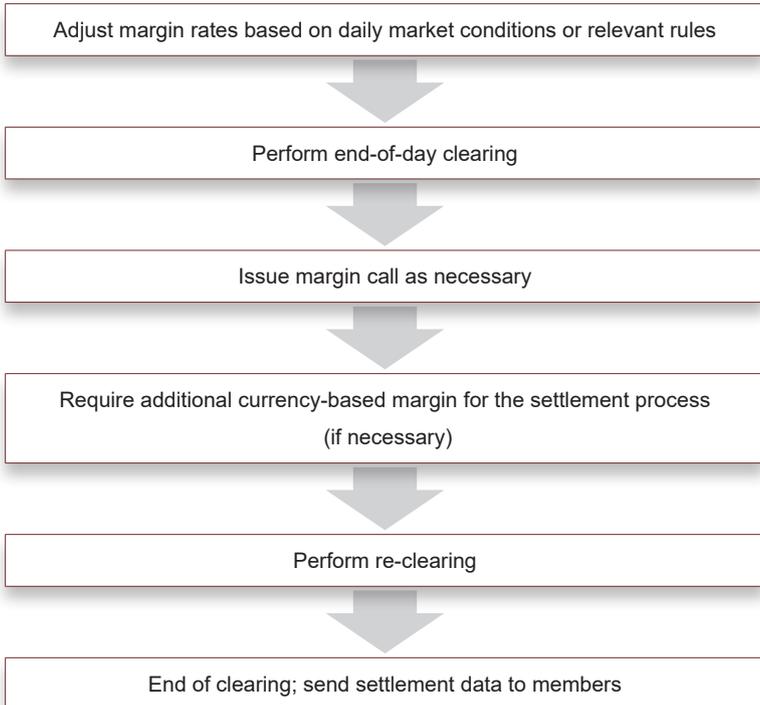


## Other Procedures and Key Rules

### Day-End Clearing Procedures

INE day-end clearing procedures

After the close of each trading day, INE settles the profit or loss, trading margin, transaction fees, taxes, and other fees for each member based on the settlement price of each contract, and transfer the net receivable or payable of each member by crediting or debiting its clearing deposit accordingly.





## Futures Trading Rules

### 1. Risk management rules

#### (1) Trading margin requirement

“Trading margin” refers to funds deposited by a member into the dedicated settlement account of INE to ensure the fulfillment of contracts and to maintain the positions being held by the member. The minimum trading margin for crude oil futures contract is 5% of the contract value.

The rate of trading margin for a futures contract will vary during its lifecycle, i.e., from the day of listing to the last day of trading.

Stage of Crude Oil Futures Contract	Rate of Trading Margin
From the day of listing	5%
From the first trading day in the month before the delivery month	10%
From the second trading day before the last trading day	20%

If the trading margin for a futures contract needs to be adjusted, INE will settle all open positions in the contract at the new margin rate during daily clearing on the trading day before the day on which the new rate is to take effect. Any member whose margin is below the updated minimum requirement should eliminate the shortfall before market open of the next trading day.

A seller may use standard warrants as the performance bond for its positions in any futures contract, provided both the type and quantity of the underlying are identical. In this case, the trading margin requirement for these positions will be waived.

## (2) Price limits

“Price limit” refers to the maximum upward and downward price movement permitted within one trading day for a contract compared with its settlement price from the previous day. Orders with price beyond this limit will be considered invalid and will not be executed.

If Limit-locked Market occurs to a crude oil futures contract on a trading day (denoted as D1, the trading days that follow will be referred to as D2, D3, etc.), INE will raise the price limit and the trading margin for the contract as follows:

### Example

	Contract Specification	D1	D2	D3
Price limit	4%	4%	4% + 3% = 7%	4% + 5% = 9%
Trading margin at close of trading session	5%	7% + 2% = 9%	9% + 2% = 11%	

If a same direction Limit-locked Market continues to exist on D3, then at daily clearing on D3, INE may suspend the withdrawal of funds by some or all of its members and take the following additional measures:

- (i) if D3 is the last trading day of the contract, the contract will directly proceed to settlement and delivery on D4;
- (ii) if D4 is the last trading day, the contract will continue to be traded on D4 at the price limit and trading margin for D3, and will directly proceed to settlement and delivery on D5;
- (iii) if neither D3 nor D4 is the last trading day, then after market close on D3, INE may implement the measures under either Article 19 or Article 20 of the Risk Management Rules of the Shanghai International Energy Exchange (the “Risk Management Rules”) in view of market conditions.



Article 19 of the Risk Management Rules provides that after market close on D3, INE may in its sole discretion announce that trading of the futures contract will continue D4, and concurrently take one or more of the following measures:

- (i) raising the trading margin requirement for one or both trading directions (long, short, or both) by the same or different percentage points for some or all of the members and/or Overseas Special Participants (“OSP”);
- (ii) suspending some or all of the members and/or OSPs from opening new positions;
- (iii) adjusting the price limit to 7 percentage points above the price limit on D1;
- (iv) limiting the withdrawal of funds;
- (v) requiring the liquidation of open positions by a prescribed deadline;
- (vi) performing forced liquidation; and/or
- (vii) taking any other measures INE deems necessary.

If INE implements any of the above measures, the trading of the contract on D5 will be as follows:

- (i) if same direction Limit-locked Market does not occur on D4, the price limit and the trading margin for D5 will return to their normal levels;
- (ii) if reverse direction Limit-locked Market occurs on D4, a new round of Limit-locked Market begins, i.e., D4 becomes D1 for this new round and the trading margin and price limit for the following trading day are set by referencing Article 16 of the Risk Management Rules;
- (iii) if same direction Limit-locked Market occurs again on D4, INE will announce that an abnormal circumstance exists and will take risk control measures per applicable rules.

Article 20 of the Risk Management Rules provides that after market close on D3, INE may announce to suspend the trading of the futures contract on D4, and announce on D4 its decision to take either of the measures stipulated in Article 21 or 22 of these Risk Management Rules.

Solution 1 (Article 20): INE may in its sole discretion announce that trading of the futures contract will be extended to D5, and concurrently take one or more of the following measures:

- (i) raising the trading margin requirement for some or all of the members and/or OSPs at the same or different rates for either long positions, short positions, or both;
- (ii) suspending some or all of the members and/or OSPs from opening new positions;
- (iii) adjusting the price limit to any value not more than  $\pm 20\%$ ;
- (iv) limiting the withdrawal of funds;
- (v) requiring the liquidation of open positions by a prescribed deadline;
- (vi) performing forced liquidation; and/or
- (vii) taking any other measures INE deems necessary.



If INE implements any of the above measures, the trading of the contract on D6 will be as follows:

- (i) if same direction Limit-locked Market does not occur on D5, the price limit and the trading margin for D6 will return to their normal levels;
- (ii) if reverse direction Limit-locked Market occurs on D5, a new round of Limit-locked Market begins, i.e., D5 becomes D1 for this new round and the trading margin and price limit for the following trading day are set by referencing Article 16 of the Risk Management Rules;
- (iii) if same direction Limit-locked Market occurs again on D5, INE will announce that an abnormal circumstance exists and will take risk control measures per applicable rules.

Solution 2 (Article 20): On D4, INE may in its sole discretion perform forced position reduction with respect to the futures contract by matching, at the D3 price limit and on a pro rata basis, (a) all orders placed at the limit price but remained unfilled by market close on D3, with (b) the open positions held by all traders (i.e., clients, Non-Futures Firm Members, and OSNBPs) who record net gains on their positions in the contract. Long and short positions held by any such trader will be mutually offset before being closed out in the foregoing manner.

(3) Risk management during major price fluctuations

When the cumulative price increase or decrease (“N”) on a futures contract reaches 12% over 3 consecutive trading days (denoted as D1–D3); or 14% over 4 consecutive trading days (denoted as D1–D4); or 16% over 5 consecutive trading days (denoted as D1–D5), INE may take one or more of the following actions in view of the market conditions, provided the CSRC is notified of the actions in advance:

- (i) raising the trading margin requirement for some or all of the members and/or OSPs at the same or different rates for either long positions, short positions, or both;
- (ii) limiting the withdrawal of funds for some or all of the members;
- (iii) suspending some or all of the members and/or OSPs from opening new positions;
- (iv) adjusting the price limit to any value not more than  $\pm 20\%$ ;
- (v) requiring the liquidation of open positions by a prescribed deadline;
- (vi) performing forced liquidation; and/or
- (vii) taking any other measures INE deems necessary.

N is calculated as follows:

$$N = \frac{P_t - P_0}{P_0} \times 100\% \quad t=3,4,5 \text{ and}$$

$P_0$  is the settlement price on the trading day preceding D1

$P_t$  is the settlement price on trading day Dt, where  $t = 3, 4, 5$ , i.e.,

$P_3$  is the settlement price on D3

$P_4$  is the settlement price on D4

$P_5$  is the settlement price on D5



#### (4) Position limits

“Position limit” refers to the maximum short or long positions allowed to be held in a contract by any one member, OSP, Overseas Intermediary, or client pursuant to INE rules.

Position Limits at Different Stages of a Crude Oil Futures Contract			
Crude Oil Futures			
From day of listing to the month before the delivery month	Open interest in any futures contract		≥ 75,000 lots
	Proportional position limit	FF Members, OSBPs, Overseas Intermediaries	25%
From day of listing to the last trading day of the third month before the delivery month	Position limit	Non-FF Members, OSNBPs	3,000 lots
		Client	3,000 lots
From the second month before the delivery month	Position limit	Non-FF Members, OSNBPs	1,500 lots
		Client	1,500 lots
From the month before the delivery month	Position limit	Non-FF Members, OSNBPs	500 lots
		Client	500 lots

Note: All numbers in lot are on a one-sided basis (long or short).

#### (5) Large trader reporting

A Member, an OSP or a Client whose general position in a futures contract reaches the general position limit set by the Exchange, or an Overseas Intermediary whose general position in a futures contract reaches or exceeds sixty percent (60%) of its general position limit, shall take the initiative to report to the Exchange by 15:00 of the following trading day. In view of the market risk profile, INE may require specific members, OSPs, Overseas Intermediaries, or clients to submit large trader position reports or other supporting materials, and may examine these documents from time to time.

## (6) Forced liquidation

INE will force liquidate open positions in the following situations:

- (i) the clearing deposit balance of a member recorded on any of the internal ledgers at INE which are whether to serve its own clients or its authorized clearing entities falls below 0, and the member fails to meet the margin requirement within the specified time limit;
- (ii) the open position of a Non-FF Member, OSNBP, or client exceeds the applicable position limit;
- (iii) a Non-FF Member, OSNBP, or client fails to round the positions held in a futures contract to multiples as required within the specified time limit, or is not qualified to conduct delivery for matured contracts in its possession;
- (iv) any violation of INE rules that warrants forced liquidation
- (v) any emergency happens that warrants a forced position liquidation; or
- (vi) any other conditions exist that makes the forced position liquidation necessary.

## (7) Risk warning

INE applies risk warning. INE may, as it deems necessary, resort to the following measures, alone or in combination, to warn against and resolve risks: requesting an explanation from market participants with respect to a specific situation; conducting an interview to give a verbal alert; issuing a risk warning letter; giving a reprimand; issuing a risk warning notice to the public; and/or other measures deemed necessary by INE.



## 2. Hedging rules

Hedging is a risk avoidance strategy wherein the trader buys (sells) futures contracts whose underlying asset is of identical type and quantity to that to be sold (bought) in the spot market, so that losses suffered in one market will be mostly equal to gains in the other market regardless of the price movement in the spot market.

Hedging positions in crude oil futures contract require the approval of INE. Hedge positions are classified into long hedge and short hedge. The hedge positions can be classified into regular months (i.e., from the day of listing to the last trading day of the third month before the delivery month) and the nearby delivery months (i.e., from the second month before the delivery month to the first month before the delivery month).

- (1) A Non-FF Member, an OSNBP or a Client shall provide the following materials to apply for the hedging quota for regular months in accordance with the contract:
  - (i) an Application (Approval) Form of Hedging Quota for Regular Months, including applicant's basic information, contracts applied, hedging quota applied for regular months and other information;
  - (ii) a copy of the business license, a certificate of incorporation, or other documents which may prove the applicant's business scope;
  - (iii) business performance of physical commodities in the previous year or the latest audited annual financial report;
  - (iv) a business plan of physical commodities for the current year or the following year, and any purchase and sale contracts or other valid certificates related to the application for hedging;
  - (v) a hedging strategy, including analyses of the source of risks and hedging objectives;

(vi) hedging management rules, if the applicant is a Non-FF Member or an OSNBP;

(vii) other materials required by the Exchange.

A Non-FF Member, an OSNBP or a Client may apply for hedging quota for regular months for multiple contracts once at a time.

(2) A Non-FF Member, an OSNBP or a Client, applying for hedging quota for the nearby delivery months, may apply for the quota of certain contract(s) and submit the following materials in accordance with the contract:

(i) an Application (Approval) Form of Hedging Quota for Nearby Delivery Months, including the applicant's basic information, the contracts applied, the hedging quota applied for nearby delivery months, etc.;

(ii) a copy of business license, a certificate of incorporation, or other documents which may prove the applicant's business scope;

(iii) relevant materials which can prove the authenticity of the hedging needs, including the production plan for the current year or the previous year, warrants for physical commodities, processing orders, purchase and sale contracts, purchase and sale invoices, or other valid certificates of the ownership of physical commodities corresponding to the application quota;

(iv) hedging management rules, if the applicant is a Non-FF Member, or an OSNBP;

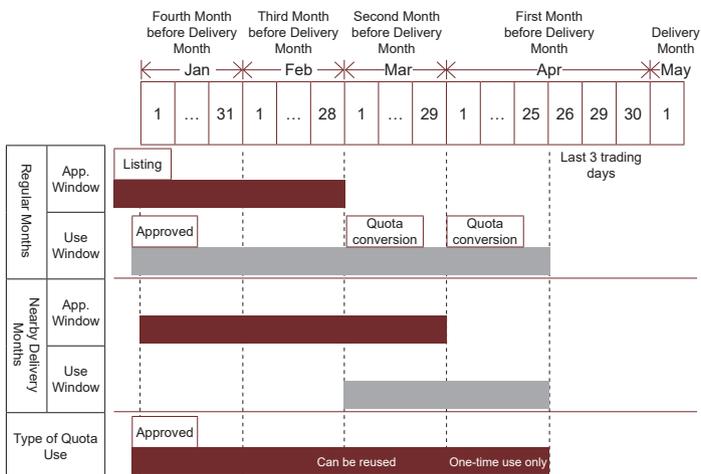
(v) other materials required by the Exchange.

If the above materials have been submitted to the Exchange and no change occurs thereafter, there is no need to re-submit the materials.



(3) Time of application and use of hedging quota

Using SC1905 as an example:



Note 1: "Quota conversion" refers to the conversion of a client's regular months hedging quota into nearby delivery months hedging quota, taking place if client is not granted the latter. In this circumstance, the hedging quota need to base on the lower of (a) the regular months hedging quota granted to the client and (b) the general position limit of the contract in nearby delivery months.

Note 2: Application deadline for nearby delivery months hedging quota is the 9th trading day before the last trading day.

3. Arbitrage rules

Arbitrage is the strategy of simultaneously buying a futures contract and selling another to make profit from the price difference between the two. Arbitrage trading is classified into calendar spread arbitrage, and cross-product arbitrage. Products available for cross-product arbitrage will be separately announced by INE. Arbitrage positions can be classified into arbitrage positions for regular months and arbitrage positions for nearby delivery months.

Arbitrage positions in crude oil futures contract require the approval from INE. A client should apply for the arbitrage quota at where it established its account; after verifying the client's application, the account opening institution will then complete the application process at INE. Non-FF Members and OSNBPs should apply to INE directly.

(1) A Non-FF Member, OSNBP, or client should submit the following materials when applying for regular months arbitrage quota for crude oil futures:

- (i) Application (Approval) Form of Arbitrage Quota for Regular Months;
- (ii) arbitrage trading strategies, including the description of fund source and size, calendar spread arbitrage or cross-products arbitrage and any other relevant factors; and
- (iii) other materials required by INE.

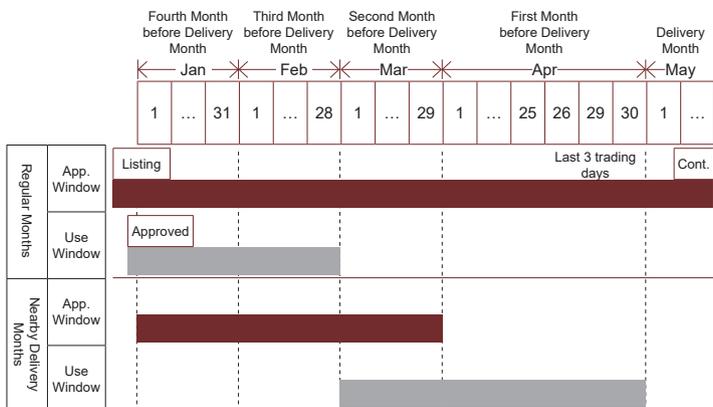
(2) A Non-FF Member, OSNBP, or client should submit the following materials when applying for nearby delivery months arbitrage quota:

- (i) Application (Approval) Form of Arbitrage Quota for Nearby Delivery Months;
- (ii) arbitrage trading strategies, including the description of fund source and size, calendar spread arbitrage or cross-products arbitrage, arrangement for position opening and reduction, intention of delivery and any other relevant factors;
- (iii) price deviation analyses for applied contract(s); and
- (iv) other materials required by INE.



(3) Time of application and use of arbitrage quota

Using SC1905 as an example:



4. Clearing procedures and rules

(1) Regular Operations

INE implements daily mark-to-market.

If the clearing deposit balance of a member in any internal ledger at INE is lower than the prescribed minimum after daily clearing completes, the clearing result will serve as a margin call from INE to the member, and the difference between the two amounts is the amount of additional funds required by the margin call.

Following the margin call, the Exchange may instruct Designated Depository Banks to debit the funds from the Member's dedicated fund account and credit the funds to the Exchange's dedicated settlement account. If a deficiency still exists, the Member shall make it up prior to the market opening of the next trading day. In the event the Member fails to make it up, the following shall apply:

- (i) 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;
- (ii) 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.

After the completion of daily clearing, the clearing deposit balance in RMB of any internal ledger of a Member shall not be lower than the minimum clearing deposit; otherwise, the Exchange may debit corresponding funds in RMB from the Member's dedicated fund account. If a deficiency still exists, the Member shall make it up prior to market opening of the next trading day. If the Member fails to make it up in time, the Exchange may impose forced foreign exchange conversion by converting the Member's foreign currency funds in its dedicated fund account or in the Exchange's dedicated settlement account into RMB.

## (2) Margin collaterals

Subject to INE's approval, a Non-FF Member, OSNBP, or client may use standard warrants, foreign currencies, and other assets as margin. The Clearing House of INE shall be responsible for margin collateral transactions. The cutoff time for deposit or withdrawal application submission is 15:00 of each trading day. In a special cases, INE may extend the processing time.



**Margin collaterals include:**

- Standard warrants.
- Foreign currencies (type of currency, haircut, and scope of application shall be prescribed by INE separately); and
- Other assets approved by INE.

**Procedures for margin collateral transaction:**

- Application: To collateralize assets as margin, a Non-FF Member or OSNBP should apply directly to INE; a client should apply to its FF Member, OSBP, or Overseas Intermediary, and authorize the latter to complete the application procedures on its behalf.
- Verification and deposit: INE will verify and deposit the margin collaterals.

**The value of the margin collateral shall be calculated as follows:**

- (i) For standard warrants used as margin collateral, the settlement price of the day for the front-month futures contract of the underlying product shall be used as the benchmark price for calculating the market value of the standard warrants. Prior to the market close of the day, the market value shall be calculated based on the benchmark price of the previous trading day. The haircut for standard warrants as margin shall be set at least twenty per cent (20%).
- (ii) The benchmark price for other margin collaterals shall be determined by INE.

The term “discounted value” means the after-haircut value of margin collaterals. During daily clearing, INE shall update the benchmark prices of the day and adjust the discounted values of margin collaterals according to the above-mentioned methodology.

## 5. Delivery procedures and rules

### (i) Final settlement price

The “final settlement price” is the benchmark price for the delivery settlement of a crude oil futures contract. At delivery settlement, the buyers and the sellers settle their trades based on the final settlement price plus the premium or discount to the specific type of crude oil being delivered.

(ii) The bonded final settlement price is the calculation and assessment basis of the duty-paid price after customs declaration by the holders of crude oil bonded standard warrant. The formula for the bonded final settlement price of the matured contract is:

Bonded Final Settlement Price = Final settlement price

(iii) When a bonded standard warrant is used for EFPs, the formula for the EFP bonded final settlement price is:

EFP Bonded Final Settlement Price = Settlement price of the previous trading day immediately before the EFP application day of the delivery month contract

(iv) When a non-standard warrant is used for EFPs, the final settlement price should be negotiated by the trading parties.

### (2) Mode of delivery

The delivery of the crude oil futures contract implements bonded delivery, which refers to the delivery of crude oil for the futures contract in bonded status and in bonded oil tanks at the Designated Delivery Storage Facilities. Besides, the delivery of the crude oil futures contract implements warehouse delivery.

Immature crude oil futures contracts may adopt EFP delivery procedures. To take this option, the buyer and the seller should submit their intentions and be paired with each other in advance.



### (3) Delivery unit

The delivery unit of a crude oil futures contract is 1,000 barrels. The Actual delivery quantity should be in multiples of the delivery unit.

### (4) Load-in and load-out units

The minimum load-in amount of the crude oil is two hundred thousand (200,000) barrels. The minimum load-out amount of the crude oil is two hundred thousand (200,000) barrels. If the load-out amount is less than two hundred thousand (200,000) barrels, the load-out operations may only be performed after the deficiency is supplemented by physicals.

### (5) Documentation required for load-in

When the bonded standard warrants are created at the time of crude oil load-in, the inspection reports issued by the Designated Inspection Agencies, bill of lading, certificate of origin, approval of load-in by the customs and other relevant documents shall be provided to INE for verification.

### (6) Delivery fee

To perform physical delivery, the buyer and the seller shall pay INE a delivery fee of 0.05 yuan/barrel respectively.

The storage fee is RMB 0.2 yuan/barrel • day, which is collected from the designated delivery warehouse or its authorized agent. INE may adjust the storage fees according to the market situation.

The inspection fee shall be collected by each designated inspection institution from the owner of crude oil or his authorized agent at the time of load-in and load-out the designated delivery storage according to the current charging standard.

Other charges such as port charges, port construction charges, loading charges, etc., shall be collected by the relevant authorities from the owner of crude oil or their authorized agents at the time of load-in and load-out of crude oil according to the current charging standards.

(7) Management of standard warrants

A members, OSPs, Overseas Intermediaries, Clients and Designated Delivery Storage Facilities shall use the Exchange's Standard Warrant Management System for all businesses related to standard warrants.

A Member, an OSP or an Overseas Intermediary shall appoint designated personnel to conduct delivery, clearing and settlement, and other standard warrant businesses through the Standard Warrant Management System.

The standard warrant account follows the trading code system; i.e. each standard warrant business participant shall have one exclusive standard warrant account.

A standard warrant may be used for physical delivery, margin collateral, pledge, transfer, taking delivery and other purposes prescribed by INE.

(8) Loss compensation and overfill/underfill standards

Loss compensation and overfill/underfill standards are as follows:



	Definition	Load-In	Load-Out
Loss	<p>A Designated Delivery Storage Facility shall assume the losses due to pipeline transportation, pump losses and volatilization during the load-in, load-out and storage of commodities. An owner shall compensate the Designated Delivery Storage Facility according to the loss compensation standards prescribed in the provisions regarding listed futures contracts in these Delivery Rules. The loss compensation at load-in or load-out of crude oil shall be made by the owners to the Designated Delivery Storage Facilities according to the following formula, and shall be settled between the owners and the Designated Delivery Storage Facilities within three (3) business days after the inspection reports are issued by the Designated Inspection Agencies.</p>	<p>Loss compensation at load-in = Quantities of issued crude oil bonded standard warrants x 0.6‰ x (settlement price of the previous trading day prior to the load-in completion day of the first-nearby crude oil futures contract + premiums or discounts of the delivery)</p>	<p>Loss compensation at load-out = Quantities of cancelled crude oil bonded standard warrants x 0.6‰ x (settlement price of the previous trading day prior to the load-out completion day of the first-nearby crude oil futures contract + premiums or discounts of the delivery)</p>
Overfill & Underfill	<p>"Overfill or underfill" during crude oil load-in is the difference between the quantity specified on the quantity certificate issued by Designated Inspection Agencies and the issued quantity on the bonded standard warrants. Crude oil "overfill or underfill" quantity during the load-in shall not exceed ±2% of the applied quantity. Within the allowed tolerance, bonded standard warrants are created with quantity rounded into thousand barrels. The owners shall directly settle with the Designated Delivery Storage Facilities according to the following formula within three (3) business days after the inspection reports are issued by the Designated Inspection Agencies.</p> <p>The payment for overfill or underfill during load-in = crude oil "overfill or underfill" quantity within tolerance x (settlement price of the first-nearby crude oil futures contract of the previous trading day prior to load-in completion day + premiums or discounts of the delivery)</p>	<p>Load-In</p>	<p>Load-Out</p> <p>"Overfill or underfill" during crude oil load-out is the difference between the quantity specified on the quantity certificates issued by Designated Inspection Agencies and the cancelled quantity on the bonded standard warrants. The crude oil "overfill or underfill" quantity during load-out shall not exceed ±2% of the quantity on bonded standard warrants. The owner shall directly settle with the Designated Delivery Storage Facilities according to the following formula within three (3) business days after the inspection reports are issued by the Designated Inspection Agencies.</p> <p>The payment for overfill and underfill during load-out = crude oil "overfill and underfill" quantity within tolerance x (settlement price of the first-nearby crude oil futures contract of the previous trading day prior to load-out completion day + premiums or discounts of the delivery)</p>

#### (9) Exchange of Futures for Physicals

The exchange of futures for physicals, or EFP, is the process where the buyers and the sellers who hold opposite positions of a futures contract expiring in the same month reach an agreement through negotiation to, upon approval of the Exchange, tender a notice of EFP to have their respective positions in such contract closed out by the Exchange at the price prescribed by the Exchange, and mutually agreed upon. The warrant of the underlying commodity has a quantity equivalent to and is identical to or similar with the underlying commodity of the futures contract.

The EFP application period is from the listing day of a futures contract to the second trading day (including that day) prior to the last trading day of the contract.

The Members, OSPs, Overseas Intermediaries and Clients may tender their EFP intentions via the Exchange's Standard Warrant Management System. The contents of the intentions shall include the Clients' trading codes, the products, the contract months, the directions of the transactions, the delivery methods of the EFPs, quantities, the contact information, etc. The buyers and sellers may reach an agreement on their own initiatives based on the EFP intentions published by the Exchange.

After the buyers and the sellers who hold opposite positions of a futures contract expiring in the same month reach an agreement, either party may submit the EFP application to the Exchange via the Standard Warrant Management System before 14:00 of any trading day (the application day) within the EFP application period, and perform the EFPs upon the approval of the Exchange.

If standard warrants are used for the EFPs and the EFPs are settled via the Exchange, the EFP application shall be submitted by the Members to the Exchange.



The final settlement price of the EFPs is the price agreed by the buyer and the seller, while in case the bonded standard warrant is used and the settlement is conducted through the Exchange, the final settlement price of the EFPs shall be calculated according to the specific provisions regarding the listed futures contract in these Delivery Rules.

If the standard warrants are used for the EFPs and the settlement is conducted via the Exchange, the trading margin shall be calculated based on the settlement price of the trading day before the application day for the corresponding delivery month contract. The exchange of the payment for the underlying commodities and the standard warrants shall be completed through the Exchange within the time agreed upon by the buyer and the seller.

If the standard warrants are used for the EFPs and the settlement is conducted directly between the buyer and the seller, the buyer and the seller shall make payment on their own, and transfer privately settled standard warrants outside the Exchange in accordance with the procedures prescribed in these Delivery Rules, or transfer the standard warrants on their own after they make or take delivery.

If the standard warrants are used for the EFPs and the settlement is conducted via the Exchange, the seller shall submit the invoices to the Exchange within five (5) trading days immediately after exchanging the payment for underlying commodities and the standard warrants. If the seller submits the invoices before 14:00, the Exchange shall return the corresponding margin during the settlement of the day to the seller after verification. If the seller submits the invoices after 14:00, the Exchange shall return the corresponding margin during the settlement on the next trading day to the seller after verification. After receiving the invoices from the seller, the Exchange shall issue the invoices to the buyer on the next trading day. If the seller fails to submit the invoices within the prescribed time, it shall be subject to the relevant provisions of the Clearing Rules of the Shanghai International Energy Exchange.

All delivery payments of the EFP settled through the Exchange shall be handled through internal transfer, bank transfer, etc.

# STANDARD CONTRACT

## Contract Specification

Product	Medium Sour Crude Oil
Contract Size	1,000 barrels /lot
Price Quotation	Yuan (RMB) per barrel (Net quotation price)
Minimum Price Fluctuation	0.1 yuan (RMB)/barrel
Daily Price Limits	±4% from the settlement price of the previous trading day
Listed Contracts	Monthly contracts of recent 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 prior to the delivery month. INE is entitled to adjust the last trading day in accordance with the national holidays.
Delivery Period	5 consecutive trading days after the last trading day
Grades and Quality Specifications	Medium sour crude oil with quality specifications of API gravity of 32 and sulfur content 1.5% by weight. The deliverable grades and the price differentials will be stipulated separately by INE
Delivery Venues	Delivery Storage Facilities designated by INE
Minimum Margin	5% of contract value
Settlement Type	Physical delivery
Product code	SC
Listing Exchange	Shanghai International Energy Exchange

Note: Product symbol "SC" stands for Shanghai Crude or Sour Crude.



## Appendix for the Standard Contract

### Delivery Unit

The delivery unit of the standard crude oil futures contract is 1000 barrels. The delivery quantity shall be integer multiples of the delivery unit.

### Last trading day

The Last Trading Day of a crude oil futures contract shall be the last trading day of the month prior to the delivery month. To protect the legitimate rights of all trading parties and public interests as well as to prevent market risks, Shanghai International Energy Exchange (INE) reserves the right to adjust the Last Trading Day in accordance with national holidays. For example, if a national holiday of more than three consecutive days falls between the second last trading day, the last trading day, and a delivery day, INE may either advance or postpone the Last Trading Day provided and shall announce in advance.

### Grades and Quality Specifications

Medium sour crude oil with API gravity of 32° and sulfur content 1.5% by weight. The deliverable grades and the price differentials will be stipulated separately set by INE and may be adjusted based on the market conditions.

The “Crude oil” in this contract refers to the liquid hydrocarbons exploited directly from underground natural reservoir, or a mixture of its natural forms.

### Designated Delivery Storage Facilities

Designated Delivery Storage Facilities will be designated and separately announced by INE.

## Deliverable Grades, Quality Specification and Price Differentials

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

Note:

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

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

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



## Origins for Crude Futures Deliverable Grade:

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

INE closely monitors key changes and market developments for each deliverable grade, and will adjust deliverable grades origination locations accordingly.

## APPENDIX

### Designated Delivery Storage Facilities and Designated Inspection Agencies for Crude Oil Futures Contract

Business Contacts Info of Designated Delivery Storage Facilities

No.	Name	Storage Name	Address	Contacts	Phone	Fax
1	Sinopec Petroleum Reserve Co., Ltd.	Rizhao Base	Lanshan North Port, Rizhao city, Shandong province	Wang, Peng Ji, Xianda	010-59969336 13521953358 010-59969370	010-59760206
2		Cezidao Reserve	Cezidao of Zhoushan city, Zhejiang province		15911175216	
3		Hainan Base	83 Binhai avenue, Yangpu economic development zone, Hainan province, China	Zhang, Zhi Bin Zhao, Longdan	0898-28839616 18117766005 0898-28839610 18117759065	0898-28839601
4	PetroChina Fuel Oil Company Limited	Ningbo Daxie Branch	No.16 Tianwan road, Daxie development zone, Ningbo city, Zhejiang province	Zhang, Haifeng Li, Jian	0574-86750918 15869586195 0574-86750936 15257403615	0574-86750909 0574-86750933
5		Zhanjiang Branch	Zone 2, Port authority, No.1 Youyi Road, Xiashan District, Zhanjiang city, Guangdong province	Shi, Jinming Li, Yong	0759-2658098 15889832944 0759-2658113 13726907857	0759-2658109
6	Sinochem-Xingzhong Oil Staging (Zhoushan) Co., Ltd.	Sinochem-Xingzhong Aoshan Depot	AoShan Island, Dinghai district, Zhoushan City, Zhejiang province	Xiao, Bin Wang, Kaiwei	0580-2061786 13906807550 0580-2061859 13646500154	0580-2036444
7	Dalian PetroChina International Warehousing & Transportation Co., Ltd.	Dalian PetroChina Bonded Depot	No.31, Nei Hai Ye road, New Port, Free trade zone, Dalian, Liaoning Province	Ma, Lei Ge, Wenyuan	0411-82828807 13840975333 0411-82828891 13390533777	0411-82828406
8	Qingdao Shihua Crude Oil Terminal Co., Ltd.	Qingdao Port DJK	Qingdao Dongjiakou phase one reservoir area	Wang, Peng Li, Xiaoliang	0532-82988371 15854200803 0532-82986733 13468287604	0532-82988522
9	Yangshan Shengang International Oil Logistics Co., Ltd.	Yangshan Depot	Shanghai Yangshan Shengang water port Shenjiawan	Dong, Wei Xu, Tingting	021-68405123 13788931707 021-68405060 15921888108	021-68405190



Business Contacts Info of Designated Inspection Agencies					
No.	Name of Designated Inspection Agency	Address	Contacts	Phone	Fax
1	China Certification & Inspection Group Inspection Co., Ltd.	17th floor, Sanyuan building, No.18, Xibahe Dongli, Chaoyang district, Beijing	Chen,Hong Gu,Chen	010-84603658 13801063685 010-84603548 13810060886	010-84603183
2	SGS-CSTC Standards Technical Services Co., Ltd.	16th floor, Century Yuhui building, No.73 Fucheng road, Haidian district, Beijing	Chen,Zhou Zhao,Qi	0574-89070154 13306678519 0755-26392411 13821643138	0574-87777875
3	Intertek Testing Services Shanghai, Co., Ltd.	North building T52-3-2, No. 1201, Guqiao road, Jinqiao development zone, Pudong area, Shanghai	Guan,Lianjun Zhang,Jian	0574-87836578 13306668721 0532-58715778 13869863179	0574-87840759
4	Technical Center for Industrial Products and Raw Materials Inspection and Testing, Shanghai Entry-Exit Inspection and Quarantine Bureau	1208 Minsheng road, Pudong area, Shanghai	Zhang,Jidong Li,Chen	021-67120903 13918256560 021-38620750 13331978879	021-67120902

## Transaction and Delivery Related Fees

Transaction and Delivery Related Fees	
Transaction Fee	20 yuan per lot, which is waived for closing out the position opened on the same day.
Delivery Fee	0.05 yuan/barrel. Currently, from April 10, 2020 to January 8, 2021: delivery fee will be adjusted to 0 ( including delivery related fees incurred from EFP and standard warrant transfer through INE clearing services)
Storage Fees	Storage fees are 0.2 yuan / barrel • day and shall be collected by the Designated Delivery Storage Facility from the commodity owner or its authorized representative. INE reserves the right to adjust the rate of storage fees through announcements in view of market development.
Inspection Fees	Inspection fees shall be collected at the prevailing rate by Designated Inspection Agencies from (with reference to the time of load-out) the commodity owner or its authorized representative.
Other Fees	Other fees, such as port dues, port construction fees, loading and unloading fees shall be collected at the prevailing rate by relevant authorities from (with reference to the time of load-out) the commodity owner or its authorized representative.

Note: The specific fees are subject to the actual announcement of INE

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