

Section B

# HOW COMMODITY TRADING WORKS

Chapter 5

Sourcing commodities:  
working with producers  
*p.3*

Chapter 6

Transporting commodities:  
transformation in space  
*p.5*

Chapter 7

Storing commodities:  
transformation in time  
*p.11*

Chapter 8

Blending commodities:  
transformation in form  
*p.15*

Chapter 9

Delivering commodities:  
meeting customer specifications  
*p.23*

# How Commodity Trading Works

## INTRODUCTION

This guide sets out to present a thumbnail portrait of commodities trading. The aim is to inform readers about the specialist nature of the business and the services it provides, as well as to dispel some of the myths that have grown up around trading over the years.

It makes clear that this is at its core, a physical and logistical business, and not the dematerialised, speculative activity that is sometimes suggested.

The Trafigura Group, one of the world's largest independent commodity traders, with a focus on oil and petroleum products and metals and minerals, is at the centre of the narrative.

The company focus is designed to provide concrete case studies and illustrations. We do not claim that this is a definitive guide to all facets of the industry. Other firms than Trafigura will have their own unique characteristics, which are not

reflected here. Deliberately and inevitably, we have focused on energy, metals and minerals trading, and have made only passing reference to trading agricultural products.

We have tried as far as possible to capture factors that are generic to commodity trading firms and their basic functions and techniques.

This section explores the nuts and bolts of the trading business and the links in the supply chain, from sourcing the commodities from producers, transporting them by land and sea, and storing them in terminals, tanks and warehouses, to blending them to meet ever-varying customer specifications and delivering them to the right places at the right time.

## Chapter 5

# SOURCING COMMODITIES: WORKING WITH PRODUCERS

*Trading firms aim to maximise the price differential between the price they pay for (untransformed) commodities and the revenue they earn by selling (transformed) commodities. Minimising the overall cost of acquiring commodities is therefore a priority. They work with producers to secure long-term, cost-effective supply.*

### **Reducing overall cost**

Despite changed market dynamics, the majors\* still control a sizeable proportion of commodity supply chains. They operate many of the largest mines and oilfields. They have long-term customers with processes optimised to meet their output. They use tried-and-tested trade routes and invest in specialist logistics. It all helps to minimise the total cost of delivery.

Most independent traders do not own their own sources of production. They search far and wide to identify and acquire low-cost, marketable product.

To do that, they need boots on the ground – people who understand the local culture, who are able to adapt to its priorities.

Independent traders can incur significant costs when they bring new producers to market. It is not just about the headline price. Lower cost producers may be smaller operations with limited access to global markets. The trader has the task of making their products globally competitive.

*Trading firms need to factor in shipment, processing and scaling costs*

Trading firms have to deliver shipments at their customer's preferred location and they have to meet grading criteria and quality thresholds. If they buy from producers in remote, inaccessible locations, transportation costs are likely to be high. If they buy from smaller mines, it is harder to achieve economies of scale. Traders often work with producers to optimise or scale up production.

### **Focusing on quality**

The pace of growth in Chinese demand has forced traders to look further afield for supplies and quality has suffered. The average copper content in ores has fallen from 2 percent to less than 0.6 percent over the last two decades. With low-quality raw materials, smelters require more concentrate to produce the same amount of copper. The concentrate may include impurities, arsenic for instance, which need to be managed. It all adds to delivery costs.

Process quality is equally important. There are high-quality deposits in Africa's copperbelt, but trading firms need to be careful where they source these. Some mines, especially in conflict areas, do not conform to international health and safety standards.

\*Mining majors: BHP Billiton, Glencore, Rio Tinto. Oil majors: BP, Chevron, Exxon Mobil, Shell, Total

This matters for the trading firm. In a world that is moving towards increased transparency, suppliers that source from mines with poor social, environmental and production performance run a significant reputational risk.

### Improving competitiveness and marketability

Many trading firms develop specialist logistics to support multiple, smaller producers. Trafigura is investing heavily in Colombian transport infrastructure. In Brazil, its state-of-the-art multimodal cargo terminal, a joint venture with Mubadala, has direct rail links to miners in the country's iron ore quadrangle.

Traders can gain a sustained competitive advantage by developing advanced logistics in countries where there are no viable alternatives. Their logistics networks can transform and transport commodities at lower cost than their competitors. But these are long-term investments and they need to work in partnership with local communities.

Firms will also provide technical or financial resources to help producers modernise and extend production. These are often linked to long-term purchase arrangements, known as offtake agreements, where the trader agrees in advance to buy a minimum percentage of the mine's output over several years.

### Securing supply

There are many ways of securing supply, one of which is ownership of oil and gas fields and mines. Common ownership of the raw material and of all the means to process, transport and market it can make sense.

There are several examples of upstream integration. Glencore, after its merger with Xstrata, has effectively become an integrated mining company. Mercuria has upstream oil and coal assets, and Vitol owns upstream oil assets. Trafigura owns mines in Spain and Peru.

*Offtake agreements and upstream integration secure long-term supply*

However, a more usual way to secure supply is through long-term offtake agreements with producers. Sometimes such agreements follow on from a spell of asset ownership by the commodity trading firm. Trafigura, for example, bought a Peruvian mine in 1997 and spent the following 16 years improving efficiency and extending its life. When it sold the mine in 2013 it signed an agreement to take 100 percent of its output.

Commodity trading firms sometimes combine an initial investment (perhaps in the form of a joint venture) with offtake agreements to get supply flowing.

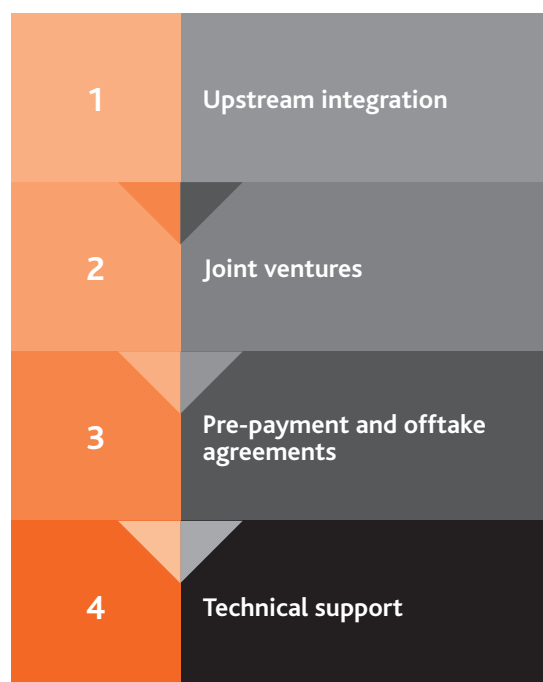
### Pre-payment agreements

More typically the commodity trading firm makes a pre-payment for future supply. This arrangement is popular in many resource-rich but cash-poor developing countries that might resist outright foreign ownership of their natural resources.

Commodity pre-payments are a useful substitute for the loans that emerging economies find increasingly hard to get from international banks. For commodity traders making the pre-payment there is a risk that the commodity to be delivered will fall in value. However, there are mechanisms to deal with this. The producer can for instance agree to make up any fall in commodity value with a cash payment or extra supply of the commodity.

Offtake agreements give producers security of demand and commodity traders security of supply. Commodity traders are unlikely, in every case, to tie a specific volume of crude to a specific agreement to supply one particular refinery, or dedicate copper concentrate to serve a particular smelter. They wouldn't be traders if they were to forego the opportunity of getting the best price for their offtake volumes. But the existence of some steady long-term supply coming into their commodity portfolios does allow traders to sign longer-term supply agreements with refiners, smelters and processors. ■

### WAYS COMMODITY TRADING FIRMS SECURE RELIABLE LOW-COST SUPPLIES



## Chapter 6

# TRANSPORTING COMMODITIES: TRANSFORMATION IN SPACE

*Many producers are found in remote locations, often in emerging economies. Traders need to deliver commodities to consumption centres on the other side of the world. They can increase their profitability and generate more physical arbitrage opportunities by lowering transportation costs.*

### **Developing infrastructure**

Commodity trading firms rely on efficient logistics to transport commodities cost-effectively. Where the existing infrastructure is sub-optimal, there are strong commercial grounds for investing in midstream assets – road, rail or river transportation linked to modern ports and terminals – that increase the efficiency of their supply chains.

### **Multimodal logistics**

Trading firms design multimodal logistics systems to optimise economies of scale and reduce shipment costs. They select the most efficient transportation for each stage along the supply chain to reduce the overall cost of the delivered commodity. Multimodal terminals optimise the transfer of shipments between different modes of

transport. These may be situated inland or at the coast and will usually take advantage of automated processes that streamline transferral. For instance, small-scale miners in Brazil's iron ore quadrangle transport their cargo on trucks to a local collection terminal at an inland railway station. The product is transferred directly onto rail freight carriages. It then travels by rail to an Atlantic terminal, where it is automatically unloaded onto a conveyor belt. This conveys the product to a feeder system for a bulk dry freight tanker, which is berthed and ready for export.

*Multimodal logistics networks optimise transportation and minimise transferral costs at each stage of the supply chain*

### Inland transportation

Getting product from one part of the world to another brings many different modes of transport into play. The main inland modes of transportation include:



#### Trafigura reinvents logistics in Colombia

Following the collapse of the state-owned railway company in 1990, Colombia's rail network disintegrated. It put immense strain on the road system as the only viable means for transporting cargo.

It led to a situation where transporting freight 500km overland by road from Bogotá to the country's main Pacific port at Buenaventura was more expensive than shipping that same load the 15,500 kilometres by sea to China.

Trafigura has invested over \$1 billion to help to develop the country's strategic infrastructure and reduce its reliance on an overloaded, inefficient road network.

Its ambitious plan is revolutionising Colombia's logistics. Trafigura subsidiary Impala Terminals is coordinating an operation to connect the Caribbean Sea to the country's hinterland by opening the 1,500-kilometre Magdalena River to freight traffic.

With its multimodal logistics network in Colombia, the trading firm can move product to and from Colombia's interior. A giant oil terminal at Barrancabermeja on the Magdalena river is exporting and importing crude and naphtha using motorised pushers and barges.

Trafigura's river transport system is helping Colombia to unblock the logjam that has constrained its economic development. In return, the company gets access to a sizeable new market.

#### Trucks

Delivery by road is probably the most flexible mechanism, but individual shipments are not easily scalable. Trucks are best deployed to manage complex routes and difficult terrain.

#### Rail

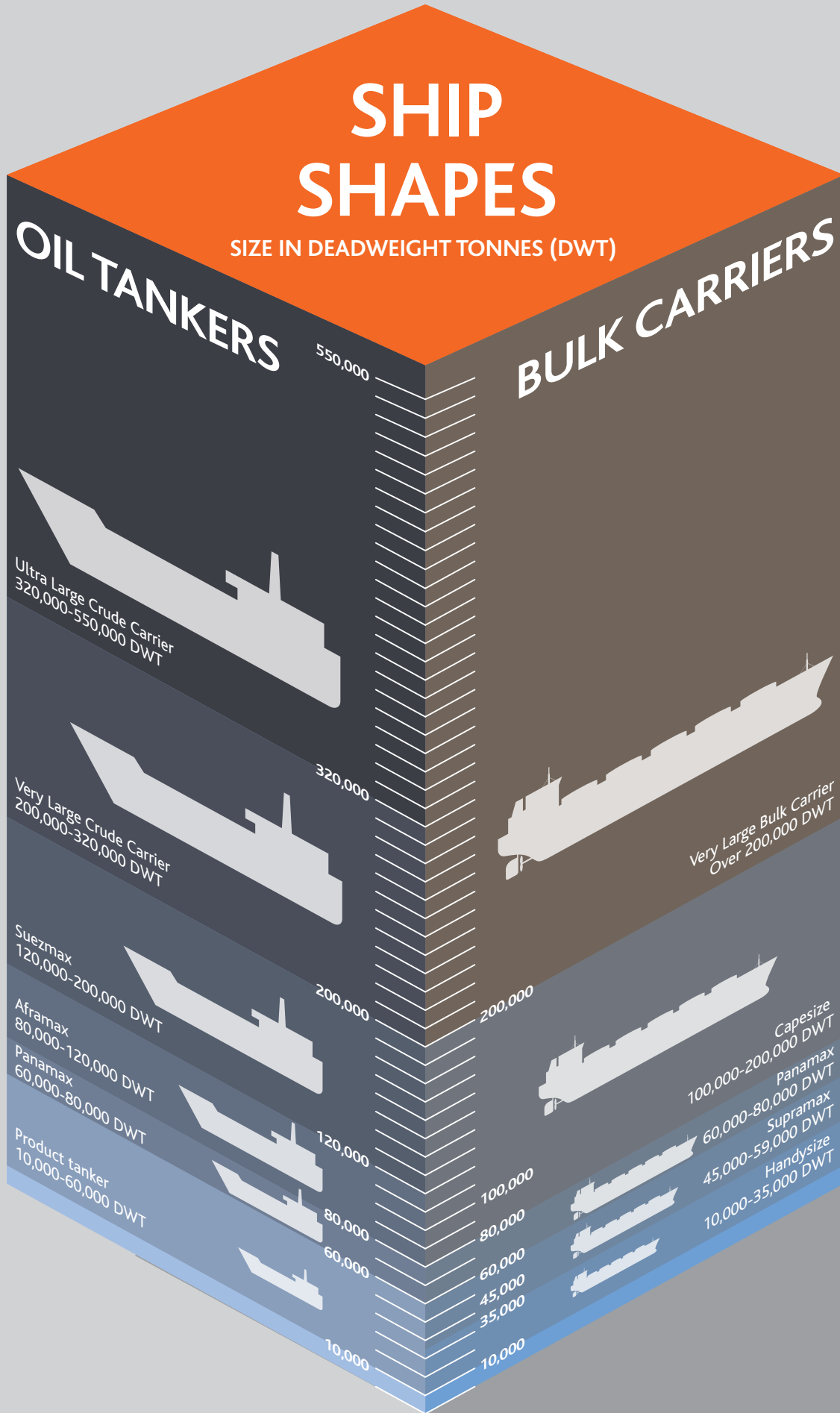
Low unit cost, large-scale shipments. Rail also offers high-speed delivery and the ability to build direct rail links between producer and ports. It may require a high initial investment.

#### Barge

Like rail, this is a low unit cost transportation alternative where there is a suitable river. This will also require substantial initial investment. Terminals and barge fleets are needed. The ability to arrange direct river-to-ship transfers at seaports can be advantageous.

#### Fixed pipeline

Low unit cost, but high capital costs. Pipelines ensure continuous supply and are most suitable for traders with a steady flow of consumer orders and control of substantial terminal capacity.



**Overseas transportation**

Just as commodity trading firms need onshore facilities to load, offload, store and blend cargoes, so they need ships to carry their cargoes across the oceans. However, unlike terminals, commodity trading firms do not need to own their own vessels. Ships are interchangeable and port facilities are not.

They may charter wet freight tankers to transport oil and petroleum products. Metals and minerals – dry freight – are transported in bulk carriers.

There are two main ways of doing this:

- **A time charter** is like renting a car: you pay for the daily hire, fuel and any parking fees, while the cost of maintenance, insurance and licensing is paid by the rental company.

- **With a voyage charter**, the charterer pays a metric tonne freight rate for the cargo to be carried from point A to point B. The ship's owner or time charterer pays fuel and port charges.

Time chartering is extremely flexible.

Time chartering a ship – for a month, a year or more – gives the charterer full commercial control. He pays for fuel and port charges. At any time during that period he can put it out for re-hire for individual voyages or indeed for another time charter. The owner retains the technical responsibilities of crewing, insuring and maintaining the ship.

Most trading firms supplement time charters with voyage charters to maximise their ability to take advantage of short-term and spot market trading opportunities.

**Shipping and chartering desks**

Commodity trading firms normally operate shipping or freight desks.

They act as service providers to the company's traders, getting them competitive freight rates and hedging freight rate risk.

They will often also trade a portfolio of shipping services for third-party customers, booking voyage and time charter clients when they have unused capacity, and pursuing freight arbitrage opportunities for the company.

**Wet and gas freight**

In certain markets there is a need for specialist carriers and here it can sometimes make sense for traders to own their own shipping. LNG, LPG, propane and butane are transported in refrigerated carriers to keep the gas as a supercooled liquid. Bitumen carriers are specially adapted to allow the cargo to be heated so it doesn't solidify. Having its own fleet of special purpose carriers helps a firm to avoid the risk of chartering vessels in a narrow, illiquid market and means it is better able to keep commercially sensitive transactions confidential.

**Freight market dynamics**

Freight specialists aim to minimise transportation costs, but supply and demand factors can greatly affect operational expenses for particular vessel types. With voyage charters, they need to locate a vessel with the ability to load their cargo and berth at the required locations at the agreed times.

Time chartering provides more flexibility, but to be cost-effective, these vessels need to be fully utilised across the chartering period. Trading firms often have freight desks that make idle time-chartered vessels available to third parties. Freight traders aim to mitigate freight risk by hedging their future freight obligations using swaps or forward freight agreements (FFAs). Bunker fuel, another major cost of chartering, is also subject to market volatility. Traders use bunker derivatives to hedge their future fuel costs.

Chartering terms are set out in Contracts of Affreightment (COAs). These include Incoterms, which specify rights and responsibilities. They also specify penalties, such as the demurrage fee payable to the owner if the vessel takes longer than agreed to load and unload.

Newer, cleaner and more efficient vessels are progressively replacing older ships in the current global fleet. Many regulators have reduced the maximum permissible sulphur content in bunker fuel in recent years in response to environmental concerns. In the medium term, these dynamics may lead to a shortfall in the supply of suitably located and equipped vessels, with a consequent increase in chartering costs.

*Trading firms use time charters and voyage charters for overseas transportation as needed*



### Liquefied Natural Gas (LNG) markets

Gas, the greenest of the fossil fuels, is difficult to transport globally and that restricts its tradability. Russia, the most landlocked of major energy producers, delivers most of its gas by pipeline. Pipeline gas generally goes straight from the producer to the consumer, with no real role for intermediaries.

But pipelines are impractical where producers and consumers are separated by sea. LNG transportation provides an effective solution.

LNG works by cooling natural gas to minus 162 degrees centigrade. This liquefies the gas and shrinks it to 1/600<sup>th</sup> of its gaseous volume. The liquid concentrate is transportable in purpose-built refrigerated tankers.

The technology was developed several decades ago and began to be used commercially in the mid-1960s. Liquefaction and re-gasification capacity developed rapidly until the 1980s, then stagnated until the mid-1990s, but has picked up since.

Qatar is the global industry leader, but is now being joined by new exporters, chiefly Australia but also the US and countries in east Africa.

Early LNG contracts were long-term arrangements, locking producer and consumer into a virtual pipeline that did not allow any intermediary trading.

Commercial arrangements limited sales to a defined set of buyers (who in turn would often have monopolistic franchise areas).

As more re-gasification capacity has come on-stream, particularly on floating barges, international LNG trading is opening up, taking on more of the characteristics of a standard commodity market. A small but growing share of international LNG trade is taken by trading firms selling gas from a global portfolio and benefiting from arbitrage opportunities between the various regional import prices.

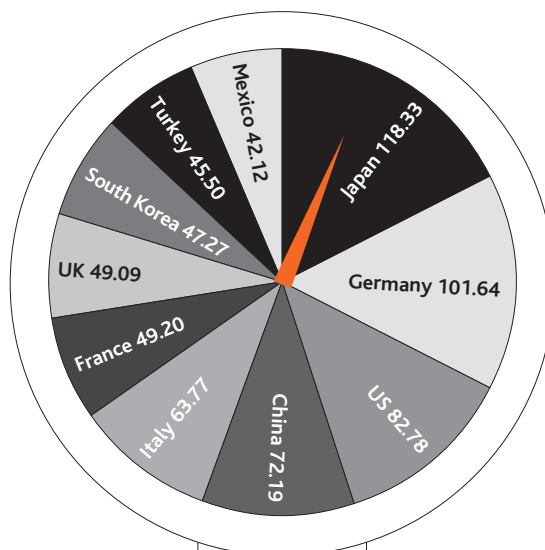
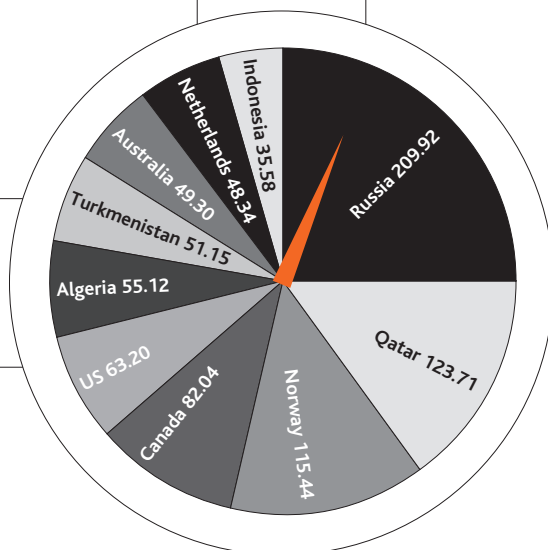
An estimated 20 percent of LNG volumes is now traded on the spot market (though in this long-term business, spot contracts can last up to four years) through aggregators and traders.

The evolution of LNG markets demonstrates that a requirement for significant investment in long-term capital projects technology is no bar to the development of effective traded markets. Craig Pirrong has observed that "expensive, durable investments in specialised capital [projects] are completely compatible with spot market pricing complemented by market risk transfer mechanisms. In essence, liquid markets create security of supply and security of demand<sup>3</sup>".

<sup>3</sup> Fifty Years of Global LNG, Craig Pirrong, 2014

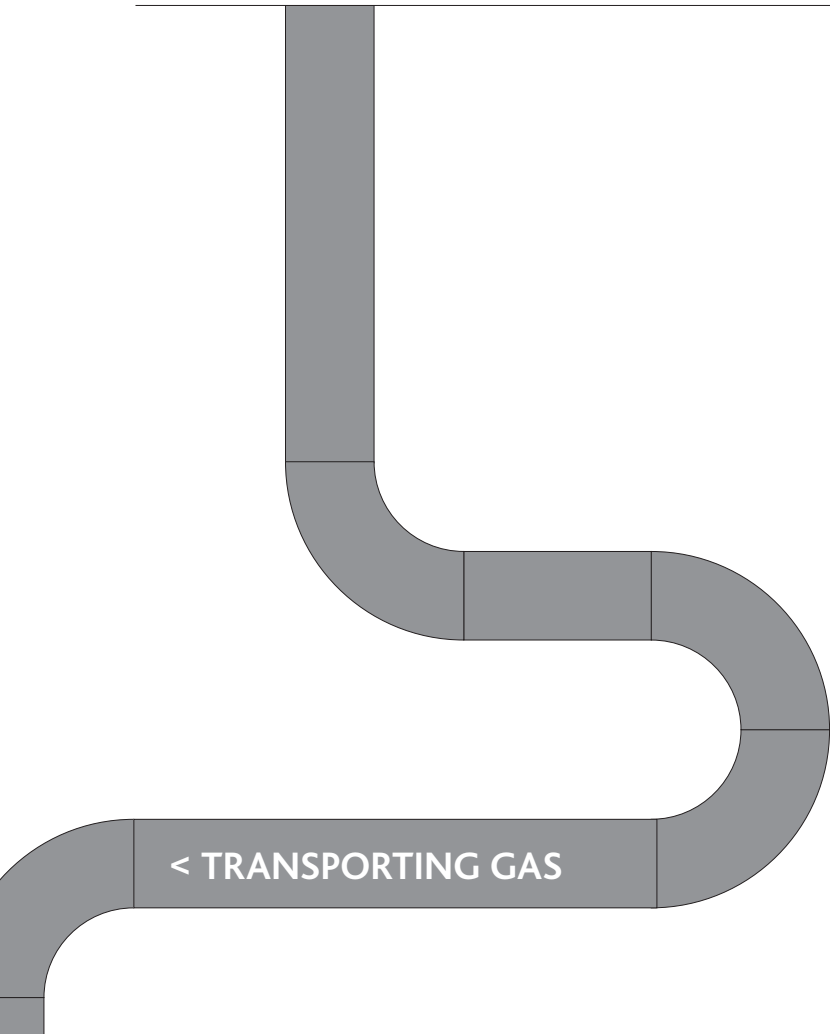
**Top ten exporters of gas  
(pipeline and LNG combined) in 2016  
(billion cubic metres)**

Source: World Oil and Gas Review 2017, ENI



**Top ten importers of gas  
(pipeline and LNG combined) in 2016  
(billion cubic metres)**

Source: World Oil and Gas Review 2017, ENI



**Bitumen markets**

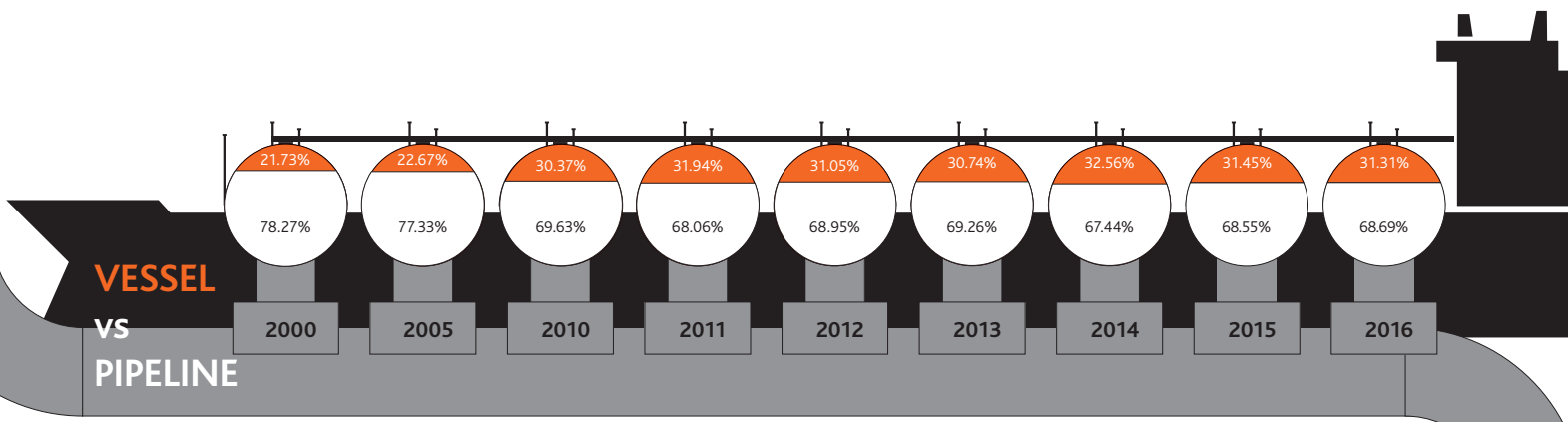
Not too long ago, the bitumen trade was regarded as a regional business. The specialised ships required to transport the product tended to be relatively small, making it difficult to achieve the economies of scale needed to make global trade worthwhile. In recent years, however, this has started to change.

Bitumen shipping and trading go hand in hand, because the ship is needed to make the trade. And bitumen carriers are highly specialised, built with containers that continually heat the bitumen at 150°C so it does not solidify.

Puma Energy’s bitumen carriers are some of the largest in the world. Weighing in at 30,000 tonnes each and 40 percent more fuel-efficient than their traditional counterparts, these kinds of ships are helping to globalise the market. They can transport bitumen from the US Gulf to Australia and back again without having to stop to refuel.

Budgets for road construction and maintenance – which account for about 85 percent of bitumen use globally – are largely tied to government spending. Public investment has been lacking since the 2008 financial crisis in the developed world, but China and countries in Africa are major growth markets. ■

**GLOBAL LNG SHARE OF TRADED GAS**



Vessel ■  
Pipeline

Source: World Oil and Gas Review 2017, ENI

## Chapter 7

# STORING COMMODITIES: TRANSFORMATION IN TIME

*With inelastic supply and demand in commodity markets, supply and demand shocks have the potential to create volatile market conditions. Trading firms store commodities to help bridge this gap and keep markets in balance. They own and control midstream infrastructure and maintain large inventories at strategic locations around the globe.*

*Traders earn profits over time by reducing stocks when there is excess demand and building up inventory when there is excess supply.*

### **Why trading firms invest in midstream infrastructure**

Commodity traders consider the full control of midstream facilities that comes with outright ownership vital to their trading business. All major commodity traders own midstream infrastructure, including loading and offloading terminals at ports, and storage and blending facilities, which are also usually at ports.

There are considerable positive synergies between their core trading function and ownership of this kind of logistical infrastructure.

### **Temporal specificity**

The economic concept of temporal specificity helps to explain why midstream infrastructure is strategically important.

A strike at a mine, political unrest, unseasonal temperatures – supply and demand shocks in commodity markets can have many different causes, and they can occur at any time. What is more, both supply and demand are price inelastic. Producers cannot easily open or close mines or wells; for consumers, commodities are typically seen as necessities.

These conditions can make for highly volatile markets. Commodity storage plays a vital economic role by helping to dampen volatility and bring markets back into balance. Market participants can offset the effect of market shocks by adjusting inventory levels. When demand exceeds supply they reduce storage levels. In oversupplied markets they can bolster underlying demand by increasing inventories.

*Traders want to control fixed assets to be able to move commodities swiftly when market conditions dictate*

Trading firms facilitate the process. They earn arbitrage profits by releasing or increasing inventories while simultaneously creating offsetting positions in futures markets.

Trading firms gain a competitive advantage by maintaining inventories their own facilities. Arbitrage opportunities are, by definition, transient. The cost of even a short delay in obtaining goods can be considerable. Firms that store their commodities in a facility they do not own or control risk not being able to exploit such opportunities.

To execute arbitrage successfully, traders need instant access to their assets. Knowing this, facility owners may try to charge premium rates by, for example instituting delivery delays and enforcing an artificially high price for an 'express' service. Such hold-ups don't occur if the firm executing the arbitrage also owns the storage facility.

As markets become more transparent, arbitrage opportunities are increasingly transient. The more acute this temporal specificity becomes the greater the incentive to invest in midstream infrastructure.

Traders do not face the same risks with floating storage facilities. Most commodity traders own terminals and storage facilities, but very few have their own bulk carriers or tanker fleets. The owners of fixed logistic assets face little competition. There is little to stop them holding up delivery. However, bulk ships and tankers are mobile. If a ship owner tried to delay delivery the charterer would simply take their business to a competitor.

### Adding value though logistics

As commodity producers have got better access to price information and become more sophisticated at marketing their products, the profit margin on pure trading activities has declined. Trading firms increasingly need to add value by offering integrated logistical services for their customers. They are better equipped to do that if they invest in infrastructure.

Global trading firms with substantial throughput are best placed. Trading firms that control a substantial fraction of the assets at a particular midstream facility benefit from the advantages of scale. Being able to deliver more efficiently gives them a competitive edge in the region.

*Trading firms benefit more from investing in midstream assets where they have substantial throughput*

### Security and optionality

Control of midstream infrastructure also gives traders security of supply. This enhances their strategic flexibility and improves their ability to deliver globally at times that suit their customers.

### Partnerships and trading relationships

Infrastructure to make exports more competitive is welcome in many economies, especially in those that do not have the resources or the expertise to do this themselves. This kind of investment unlocks new markets and opens doors to new suppliers.

Trafigura subsidiary Impala Terminals' investment, along with Mubadala, at Porto Sudeste in Brazil offers smaller independent iron ore miners an export outlet. It is also a platform for the company to develop new relationships in the region. Its river infrastructure programme is strategically vital for Colombia. Its involvement is generating goodwill in the country and helping it forge crucial long-term partnerships with private and public sector concerns.

### Ownership and control

All of these factors help to explain the increased asset intensity of trading firms in recent years. It also raises a question: if midstream infrastructure assets are so valuable, why do commodity trading firms sometimes choose to sell them?

It partly comes down to culture. Trading firms exist to service the need of producers and consumers as such they buy and sell opportunistically. That extends to fixed assets, especially when there is a capital gain that outweighs the trading advantage of holding onto the asset.

It is also strategic. Unlike Glencore and Noble, the four big private commodity trading firms, Vitol, Gunvor, Mercuria and Trafigura, cannot raise equity finance on stock markets. They need regular capital infusions to build up their balance sheets or make further infrastructure investments. Asset sales can be an important cash-raising tool.

And it is important to remember too that control does not necessarily require ownership. A good illustration is Trafigura's construction, then partial sale, of an oil storage and export facility at Corpus Christi, Texas (see page 54). The company sold a majority stake to a specialist operator in 2015, but before doing so it made sure it retained the rights to all future production.

### Contango and backwardation

A trader can buy a commodity for delivery on a date in the future in one of two ways. He could either borrow money now to buy the commodity today, and store it until the desired delivery date (at which point he repays the borrowing) or he could buy a commodity futures contract.

Since these are different ways of achieving the same objective, their relative costs are connected. Prices in commodity spot and futures markets are linked by arbitrage. When one purchase method becomes relatively cheap, traders can arbitrage the price differential. They buy in the cheaper market while simultaneously selling in the more expensive market. This adjusts supply and demand, and therefore relative pricing, in the two markets.

But there are also times when, for technical reasons, the markets can move apart. When futures prices drift higher than spot prices, markets move into contango. The opposite situation, when futures

fall below the current spot price, is known as backwardation.

The period starting in mid-2014 was one of extreme volatility in crude. The oil price collapsed from over \$100 per barrel in June to less than \$50 at the end of the year. And the market moved into a contango pricing structure.

Traders were incentivised to buy physical oil in the spot market and increase storage levels. In doing this, they were also helping to balance supply and demand.

All the leading traders sought to make the most of the situation by taking on additional storage capacity. As most of the world's available on-land storage tanks filled up, some fixed long leases on supertankers to store surplus oil on the high seas for periods of up to 15 months. This practice was last seen when oil demand collapsed during the 2008 financial crisis. ■

#### Impala Terminals

Trafigura's wholly owned logistics and infrastructure industrial investment Impala Terminals manages the group's metals and minerals infrastructure assets. It designs, builds, owns and creates multimodal logistics chains that link inland ports and deep sea terminals across many countries globally.

It has three main areas of operation – South America, Africa and the US.

In Peru, it has expanded a warehousing and blending facility at Callao, the country's main commercial port, into one of the country's largest sites for copper, zinc and lead concentrates. In Colombia, it is helping to create multimodal (barge, truck and rail) transportation across the country.

The Magdalena river project, once completed, will handle 1.5m tonnes of cargo a year. In Brazil, Impala's \$2bn joint venture investment with Mubadala, the UAE sovereign wealth fund, to operate a new port facility at Porto Sudeste is giving smaller independent miners a cheaper and more convenient outlet to world markets.

In Africa, Impala is getting copper concentrates out of the central copper belt of the DRC and Zambia by road and rail to the key southern African ports for export.

In Louisiana, US, Impala has bought and expanded the Burnside terminal. It is now the only terminal on the Mississippi big enough to load coal, bauxite and aluminium between barges and ocean-going vessels, and in the future, directly to and from rail cars.

#### Global storage for oil and petroleum products

Trafigura stores petroleum products on land and in floating storage at strategic facilities around the globe at third-party owned terminals, and with its midstream and distribution partner Puma Energy.

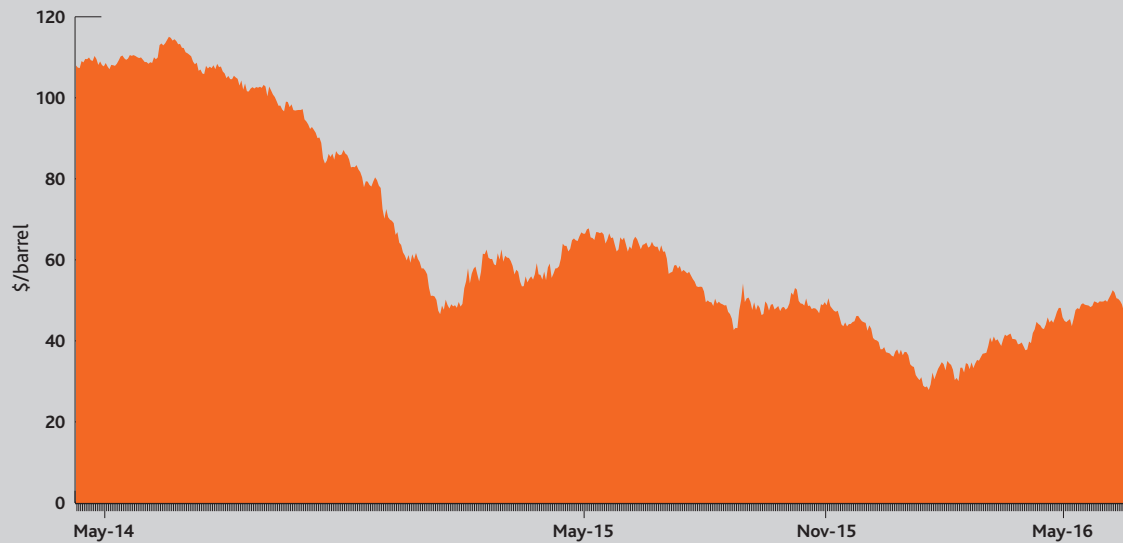
Independent audits and regular due diligence ensure that all storage facilities meet international best practice standards.

Puma Energy manages close to 8 million m3 of storage at modern facilities at over 45 countries across the Americas, Europe, Africa, the Middle East and Asia-Pacific. These are strategically placed at global energy hubs and locations with strong multimodal transport links.

Puma Energy handles many different products, including crude, fuel oil, clean refined products, bitumen, LPG and petrochemicals. Its high-volume bulk-building and bulk-breaking services allow traders to split or combine products for resale. It also provides access to infrastructure with rail, truck, pipeline and discharging services.

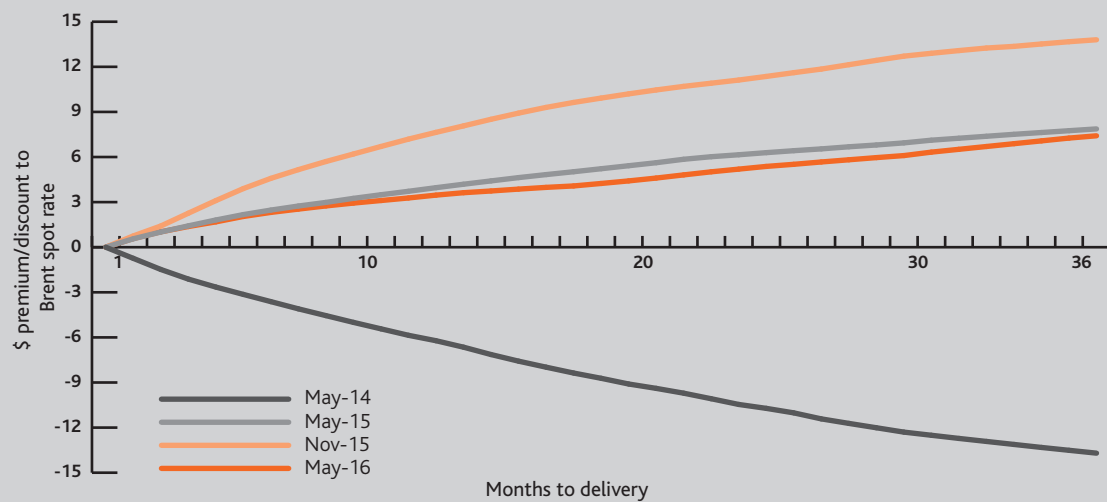
## The Brent futures curve moved from backwardation in May 2014 to contango in May 2015 to super-contango in November 2015 and back to contango in May 2016

**BRENT CRUDE OIL SPOT PRICE: MAY 2014 - MAY 2016**



Source: <http://www.tradingeconomics.com/commodity/brent-crude-oil>

**BRENT FUTURES CURVES: MAY 2014 - MAY 2016**



Source: *Trafigura research, 2016*

## Chapter 8

# BLENDING COMMODITIES: TRANSFORMATION IN FORM

*Since commodity producers derive their product from the ground, its quality and characteristics are variable. To be fit for purpose, physical commodities need to be matched to customer specifications.*

Traders and intermediaries bridge the quality gap by blending commodities from multiple sources to make products that match customer requirements. They earn profits by identifying and exploiting market inefficiencies in the price / quality relationships between different shipments of a physical commodity.

Suppliers provide products that at least meet the customer specification, but the complexity of the refining process is such that to do this they will sometimes present an over-specified product. Traders and intermediaries use blending to optimise shipments so they can meet customer specifications at a competitive price.

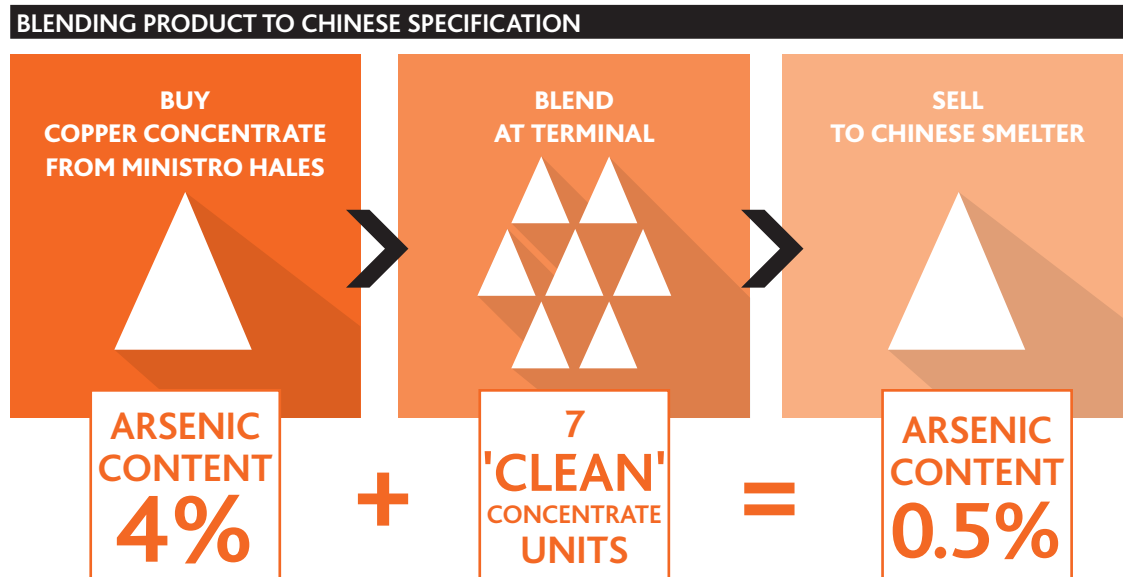
### **Strategic infrastructure**

In metals and minerals markets, traders often combine materials from two or more mines to create commodities with the desired qualities synthetically. In concentrates markets – copper in particular but also zinc, lead and other metals – they use blending

techniques to reduce the levels of arsenic, phosphorous and other unwanted materials in shipments in return for a higher price. In iron ore and coal markets, blending is primarily a mechanism for enhancing profitability.

Traders need to be able to store products from multiple sources at a strategic location where there is the capability to blend at scale. They could in theory rent such facilities from third parties, but most prefer to control or own their own infrastructure. Transaction economics and the concept of temporal specificity shed light on the reason for this.

Arbitrage opportunities are fleeting. If a change in relative pricing between two grades of a commodity creates a blending opportunity the trader must be able to react swiftly to exploit that. If its product is held in a third-party owned facility the trader's interests may not be prioritised. There is a risk that the third party may even use the situation to extract premium rates.



### Blending in copper markets

Chinese copper consumption has grown markedly since 2000. In 2002, China had already overtaken the US to become the world's largest copper consumer. By 2014, it was consuming 8.7 million metric tonnes of refined copper products, 40 percent of global demand.

China processes increasing amounts of its copper domestically; it accounts for over a third of global smelter production. But with few exploitable reserves domestically, it has to source most of its copper overseas.

The quality of concentrate available has suffered with the growth in demand. As existing mines get depleted, smelters are more reliant on new, sometimes arsenic-rich, sites for their concentrate. The Toromocho mine in Peru, which came on stream in 2014, and Codelco's Ministro Hales project in northern Chile, which began production in 2015, are significant new sources of copper supply. Both produce concentrate with high arsenic content: 1 percent at Toromocho and around 4 percent at Ministro Hales.

These new flows of arsenic-rich copper concentrate present fresh challenges for the industry. Concentrate containing arsenic poses health and safety risks for smelters and China insists on a maximum 0.5 percent arsenic content for imports. Although processing

techniques such as oxidation can reduce arsenic content, these are costly and they also affect copper levels. For instance, processing at Toromocho which reduces arsenic from 1 percent to 0.7 percent, also cuts the copper grade in the concentrate from 26 percent to around 22 percent.

*Blending concentrates reduces toxicity*

Another solution is to blend the concentrate. Mines producing arsenic-rich concentrate sell at a discount to trading firms, like Trafigura, which also have access to cleaner stocks. The traders then blend the material with cleaner concentrates before selling on to smelters.

Low-quality concentrate requires larger inventories and more extensive processing. This is reflected in the price. The premiums payable on cleaner concentrates vary according to market conditions.

### Blending coal for power plants

The rationale for blending coal is purely economic. Trading firms source products from multiple locations and blend to meet customer specifications in the most cost-effective way possible. Utilities running coal-fired power plants are important customers.

Japanese and Korean plants have more exacting quality requirements. They typically negotiate long-term contracts, often direct with producers, to secure consistent quality product.



Power plants in China, which face less exacting environmental standards and stretching demand conditions, are often more flexible about the grades of coal they use. They are also active in spot markets and prepared to deal with multiple suppliers. Global trading firms sell direct or via intermediaries. They blend coal from different sources to supply the right quality product as cost-effectively as possible.

### Iron ore and steel mills

The steel industry is a major source of demand for coal and iron ore. Its market dynamics differ from the utility business in one key respect: demand is much more volatile.

Historically, steel mills maintained large iron ore inventories, allowing them to respond rapidly to shifting demand conditions. But in recent years, as it has become more difficult for the steel mills to obtain credit, inventories have shrunk from 40 to 10

days. The mills increasingly rely on steel sales to generate cashflow and have outsourced storage to trading firms.

*Steel mills have outsourced storage to trading firms*

Their lack of inventory contributes to a see-sawing iron ore price. Rather than consuming iron ore and coal at a constant rate, the mills ramp up production when pricing is advantageous and slow it down as steel demand falls.

Trading firms maintain large stocks and supply the mills according to need. They buy ore with different purity levels from various suppliers and blend it according to customer demand.

Iron ore can be supplied as lumps or in a fine-ground powder (fines) at various grades of purity. Mills pay a premium for high-quality lump ore as it can be charged directly into the blast furnace. Fines first have to be agglomerated into lumps, in a process known as sintering, to prevent it smothering the furnace. Lower grade ores must go through a series of processes before they can be used to make pig iron and ultimately steel.

Market forces dictate spreads between lumps and fines and for the different grades. Trading firms blend accordingly to maximise their margins, aiming to source the most economic and supply the most popular grades by adjusting combinations of lumps and fines. This is a scale business, which is most profitable for firms with access to blending terminals and multiple sources of supply.

Most traders have cornerstone contracts with key customers for the bulk of the ore they supply. They build up inventories comprising different grades and types of ore to meet their requirements and will supplement this by trading on spot markets with intermediaries and other steel mills.

### Crude oil benchmarks and characteristics

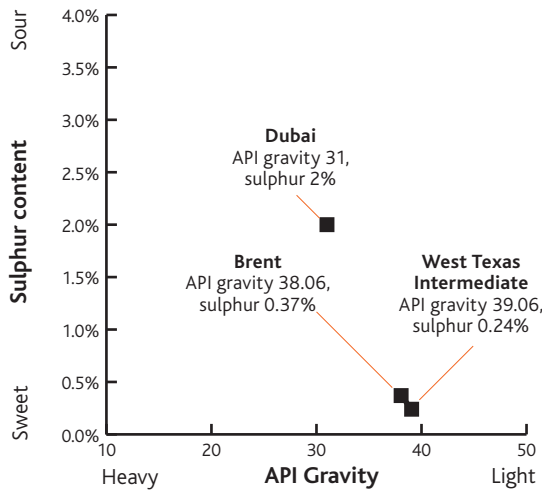
In its natural, unrefined state, crude oil ranges in density and consistency, from a very thin, lightweight fluid to a thick, semi-solid oil. There is tremendous variation in colour, from golden yellow to very dark black. The viscosity, toxicity and volatility (i.e. tendency to evaporate) of oils determine how they can be used and transported.

Key measurements for crude include American Petroleum Institute (API) gravity (inversely related to density) and sulphur content (low sulphur grades, known as sweet, are less toxic).

Grades are described by location and specified in detail. Benchmark grades are used as pricing indices and for hedging.

With over 160 tradeable crude oil products, many different refined products and numerous end-users with highly specific requirements, blending opportunities abound in oil markets.

**THREE BENCHMARK CRUDES**

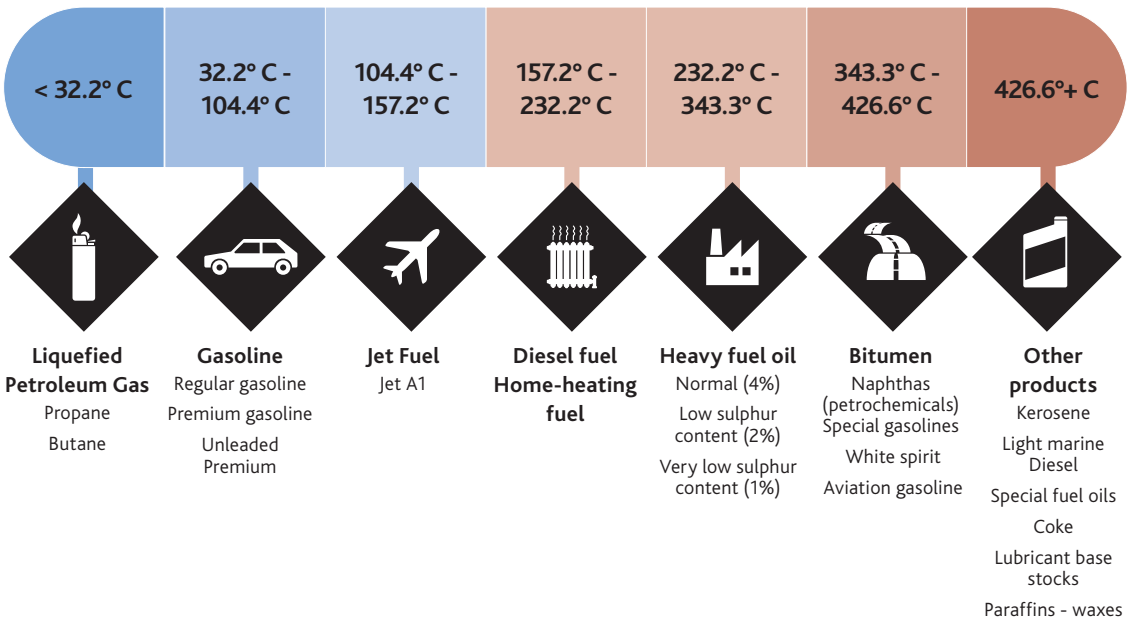


Source: Industry reports

**CRUDE OIL BENCHMARKS AND CHARACTERISTICS**

CHARACTERISTICS	UNITS	VALUES
Gravity	°API	>31.1 = light 22.3-31.1 = medium 10-22.3 = heavy < 10 = extra-heavy
Sulphur	WT %	<.5% of mass = sweet >1% of mass = sour
Kinematic viscosity	CST	Varies from light-liquid to tar-like, nearly solid
Vanadium	ppm	Useful for classification
Neutralisation number	Mg KOH/gr	Measure of acidity
Pour point	°C	Temperature at which a liquid becomes semi-solid and loses its flow characteristics

**MAIN PETROLEUM PRODUCTS BY DISTILLATION TEMPERATURE**



Source: US Energy Information Administration and IFP

### Blending oil products

There is no set mechanism for blending. Traders own or lease storage or pipeline capacity. They work with partners, including the refiners themselves, to modify the gasoline blend so that it corresponds closely to pockets of demand. They may sell components for the fuel to the end-user themselves.

*Traders blend crudes to make synthetic grades for their customers*

Traders often make synthetic grades of crude by blending sourced grades. In the Mediterranean, the segregation of Basrah crude into light and heavy blends has resulted in traders blending heavy Basrah with light crude oils to arrive at a proxy for the Urals grade. In Louisiana, with precious little virgin Light Louisiana Sweet (LLS) crude remaining, but with many local plants set up to take it, traders have been blending crudes sourced elsewhere to make cocktails for the refiners. While most blending takes place at energy hubs that enjoy strong connectivity with energy transportation routes – a typical hub would be near leasable tankage and have ocean trade routes accessible – blending happens at every stage in the supply chain. It occurs at the refiner, at terminals near the plant, at terminals near points of consumption and at various points along the way.

Sometimes traders do the blending themselves. For example, the trader may be able to buy discounted barrels from a refiner who is producing too much summer-grade gasoline as winter approaches. By adding in butane he can create a more cost-effective fuel that meets the winter-grade specification.

On other occasions, knowledge of blending requirements informs trading opportunities. Heavy and extra-heavy crudes need to be blended with light crudes to reduce viscosity and improve pipeline transmission. This is typically done at source by the producer.

This happens in Canada and also in Colombia and in Venezuela, where state-run producer PDVSA is keen to export its diluted crude oil (DCO). To do that it needs to obtain naphtha and light crude that can serve as diluent. This is a costly and logistically complex exercise, but it is willing to engage in this trading to get its supplies to major market centres. Traders and intermediaries get to participate in the supply of the diluent.

Similarly, downstream, with ethanol and biodiesel, two mandatory fuel mix products for US gasoline and diesel products, distributors do the blending. Traders get to participate by selling them the required renewables.

### Refiners and optimisation

Plants are constantly optimising their throughput processes based on feedstock costs, most profitable yields, operational issues and availability. In the US, it is common for plants to blend shale oil with heavy crude barrels. In the Far East, plants optimise their inputs by blending fuel oils with crude when fuel oil gets very cheap. Traders are continually looking to identify shortages in particular components at specific locations so they can source and sell these to the refiners.

Blending is widely used to transform residual fuel streams that come out of refinery units into products for end-users. Supplies coming from refineries vary in quality due to differences in refining unit configuration and feedstock choices. Fuels have to meet different regulatory standards depending on the use of the product (the quality requirements for fuel used for vessels, for instance, differ from those at power plants) and they vary across regions. Blending is often the cheapest way to bridge the gap between demand and supply.

*They blend residual fuel streams to make viable products for end-users*

### The rise of the super refineries

The rise of the super refinery is changing the dynamics of international oil trading.

Refinery operations are increasingly consolidating into regional mega-hubs. The world's twenty largest (often newly-built) super refineries today are located in Asia (nine), the US (five), the Middle East (four), Latin America (one) and Europe (one).

Super refineries benefit from economies of scale. They have the capacity to meet growing demand needs and the flexibility to handle up to 50 types of crude oil.

Smaller refineries across the developed world – which historically refined its crude locally – are closing in many countries, including in Australia, Canada and the UK. Former refineries are being repurposed. Puma Energy, for example, recently acquired a refinery in the UK, which it has converted into a terminal and storage facility for refined products.

Modern refineries are better equipped to produce a wider range of refined products as well as meeting more stringent environmental requirements, for instance on sulphur. Local oil markets today need to be connected to these global super refineries. But with fewer refineries available they can be thousands of miles away from the ultimate market for the refined product.

*Super refineries have more throughput, accept more types of feedstock and make more diverse products*

Products need to be shipped reliably and safely over large distances. Efficient hub-and-spoke refinery network and global operations offer great flexibility, and are highly responsive to changes in demand, supply shocks and other market adjustments.

Transportation and storage are increasingly pivotal in today's global oil market, but blending still plays an important role. With the emergence of the super refineries, more blending opportunities have opened up as plants gain the ability to accept a wider range of input.

### The great gasoline giveaway

Refiners try to manipulate ingredients to meet market specifications, but they cannot always achieve this precisely. Depending on the ingredients available and the processes they employ they may arrive at an over- or under-specified blend. For the refiner, it may make economic sense to deliver an over-specified blend. It could be that there is a shortage of raw materials or perhaps the complexity of optimisation outweighs its economic benefits.

Even so, these are market inefficiencies and they create profitable opportunities for traders and other intermediaries. In oil trading parlance these sub-optimal blends are known as "giveaways". By modifying such blends with other ingredients traders are able to supply products that meet market specifications more precisely and more cost-effectively.

*Gasoline giveaways are profitable for traders*

Giveaways erode refiner margins. A 150,000 barrels-per-day refinery may forego anything up to \$30 million annually in giveaways on gasoline, distillate and heavy oil sales. For gasoline blending, refiners often focus on minimising octane giveaways. Other dimensions of giveaways can be more complex to manage.

Volatility in fuel fluctuates according to altitude and ambient temperature. Far more than in, say, Europe, the US caters for these fluctuations by allowing states or regions to specify particular blends to reflect climatic differences; not only seasonal, but also geographic, such as between the low-lying sub-tropical Gulf, the high plains near the Rockies, and California's Mediterrean-type climate. A refiner producing gasoline for multiple US states may have to make blends with several different volatilities and change the volatility from month to month.

Not surprisingly, given the amount of capital involved, optimisation is going on all the time. It is not always a case of the traders physically combining elements themselves but the aim is always the same:

to develop a product that meets the specification more precisely and therefore more cost-effectively.

### Balkanisation and US gasoline markets

Most of us don't think twice about the fuel we put into our cars, but the convenience of the local service station and the ubiquity of this seemingly simple product belie the complexity of the markets and processes required to deliver it.

It is a common misconception to think of gasoline simply as an oil product derived from crude oil through the refining process. While straight-run gasoline, also called naphtha, is distilled directly from crude, gasoline as a product is far more complex.

The product specification varies according to where it is consumed, by whom and for what purpose. At the top level, refiners make at least two versions. Regular gasoline is blended for standard vehicles. Premium grade gasoline is blended for high-performance vehicles with high-compression engines that require high-octane fuel to operate at peak efficiency.

In the US there is a proliferation of standards. Several states have regional regulatory requirements. The Environmental Protection Agency (EPA) enforces strict environmental controls. Unique fuel regulations have created gasoline zones across the country where only certain fuels can be sold. This balkanisation of the US fuel supply has made it more expensive to produce and deliver fuel, but it also creates trading opportunities.

*There are different fuels in different US states at different times of the year*

Gasoline is a blend of 15 to 20 different components. The aim is to produce a clean-burning, energy-efficient, cost-effective grade with low toxicity levels. Achieving the right combination is a complex process. Often, adding one ingredient strengthens one attribute at the expense of other desired characteristics.

Butane for instance is a relatively cheap fuel with good burning properties. Gasoline with more butane is cheaper to produce and has higher octane levels, but butane's high Reid vapour pressure (RVP) makes it prone to rapid evaporation. That limits the extent to which it can be incorporated into blends.

Volatility – a gasoline's tendency to vaporise – is the key gasoline characteristic for good driveability. Liquids and solids don't burn; vapours do. Gasoline has to vaporise before it can ignite in an engine's combustion chamber. In cold conditions, gasoline that vaporises easily helps a cold engine start quickly and warm up smoothly. Warm-weather gasoline is blended to vaporise less easily to prevent fuel

handling problems and control evaporative emissions that contribute to air pollution.

Refiners therefore produce blends with lower RVPs for use in warmer regions. Gasolines with higher RVPs are more suitable for colder climates. The US maintains different RVP standards for summer and winter to reflect temperature-related changes in performance.

Summer-grade gasoline typically contains just 2 percent butane. It costs refiners several cents more per gallon to produce than the winter-grade gasoline, which may contain up to 3.5 percent butane.

As the science has developed, new environmental standards have emerged. In the 1980s, scientists discovered that adding certain oxygenate compounds, including methyl tertiary butyl ether (MTBE) and ethanol, made gasoline an easier-to-burn product with reduced polluting output. MTBE has since been withdrawn, because of other polluting effects, but ethanol is widely used. This oxygenated blend is known as reformulated gasoline (RFG).

Environmental legislation in the US requires all gasoline to be blended with ethanol or some other non-fossil component before it can be sold to customers. The Environmental Protection Agency (EPA) has set a 5.9 percent legal minimum level of ethanol. Some states have imposed a 10 percent legal minimum. Reformulated gasoline is now mandatory in many parts of the US, particularly in urban areas prone to smog.

But ethanol has a problem: it attracts water. When gasoline mixed with ethanol is pushed through steel pipelines or plumbing at oil refineries they become much more prone to corrosion. For this reason, ethanol blending normally happens at or near the point of consumption.

**Refiners make BOBs that are ready for blending**

US refiners therefore produce a type of gasoline ready for blending with ethanol on delivery. CBOB (Conventional blendstock for oxygenated blending) and RBOB (reformulated blendstock) are the two base gasoline stocks. On the adjacent map, all of the colour-coded areas require different formulations based on RBOB. The white areas use CBOB as the base stock. Other BOBs include EuroBOB (refined in Europe for use on the US east coast) and CARBOB (a special RBOB formula mandated by the state of California).

The complex nature of the US market creates many opportunities for gasoline traders. Operating profitably in these markets requires a multi-disciplinary approach. A successful gasoline trader is part-chemist, part-distributor, part-salesperson and part-logistics expert. ■

### Opportunity and optionality at Corpus Christi

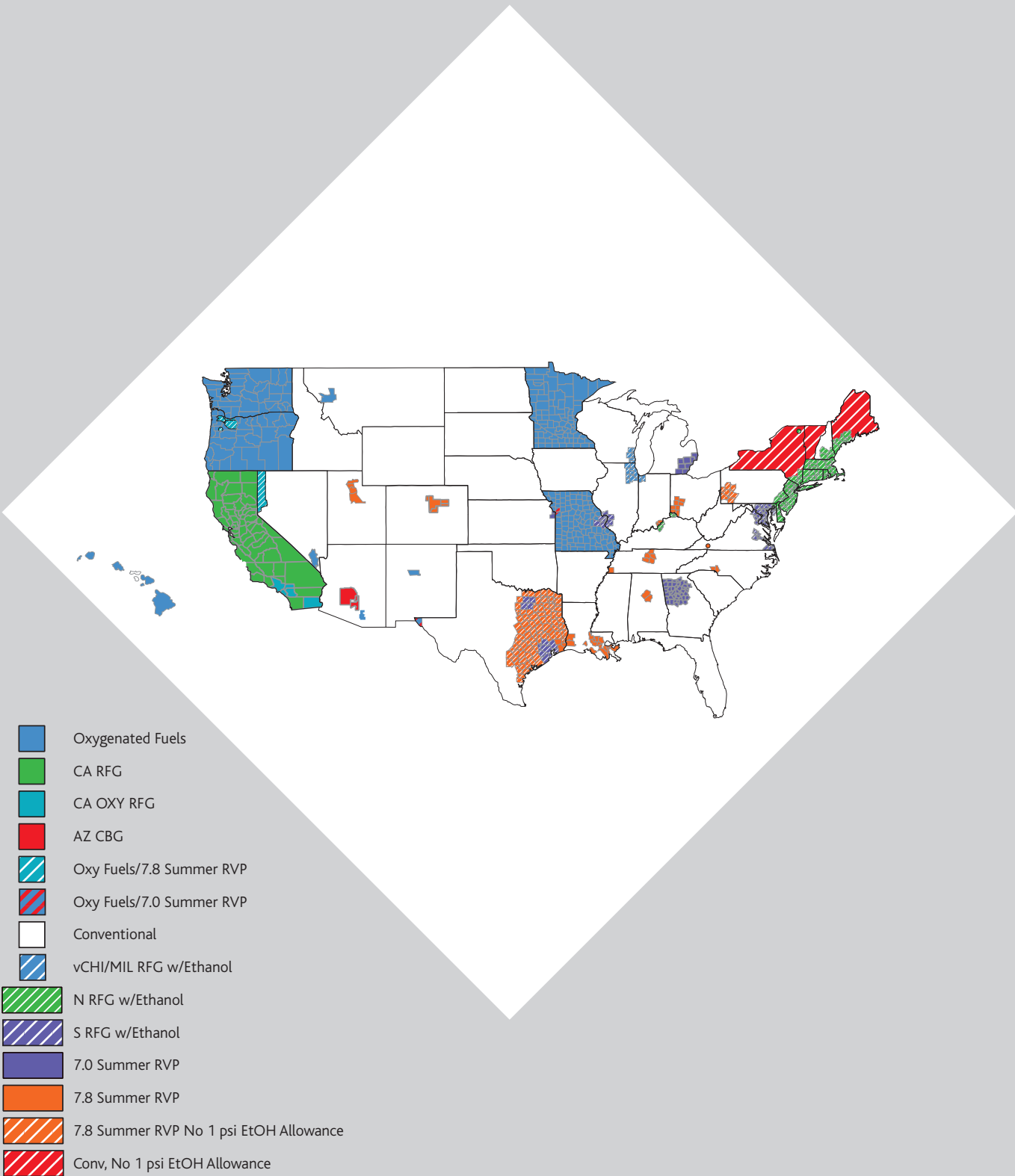
In 2011, Trafigura identified an opportunity at Corpus Christi in Texas to provide a faster, cheaper outlet than the often congested port of Houston for the output of the Eagle Ford shale formation. In seizing the opportunity, Trafigura transformed its role in the US energy markets from importing African crude to handling sizeable quantities of domestic crude and exporting naphtha and LPG.

Trafigura bought out Texas Dock and Rail which had a ready-made deep water dock that could accommodate big tankers as well as a tank farm. The latter particularly needed expanding as the highly variable output of Eagle Ford called for a terminal with blending facilities. Over the next three years, Trafigura invested in a pipeline system from Eagle Ford to Corpus Christi, and planned two 'splitter' mini-refineries, producing refined product for export.

Control of this infrastructure gives Trafigura a lot of optionality. It can choose to send crude to its splitters and then export the product. It can sell crude into foreign markets. It can also sell it regionally to be blended with Light Louisiana Sweet. And it can export naphtha to Asia, Latin America and Europe where this is a popular feedstock.

This optionality – beloved of commodity traders because it enables them to make opportunistic arbitrage trades – was preserved in 2014 when Trafigura sold 80 percent of its Corpus Christi operation to Buckeye Partners for \$860 million. Trafigura retained a 20 percent stake and commercial rights to 100 percent of the throughput.

**US GASOLINE REQUIREMENTS VARY BOTH REGIONALLY AND SEASONALLY**



Source: ExxonMobil, June, 2015.

This map is not intended to provide legal advice or to be used as guidance for state and / or federal fuel requirements, including but not limited to oxy fuel or RFG compliance requirements. ExxonMobil makes no representations or warranties, express or otherwise, as to the accuracy or completeness of this map.

## Chapter 9

# DELIVERING COMMODITIES: MEETING CUSTOMER SPECIFICATIONS

*As markets become more efficient, commodity trading is evolving into a low-margin service business. Increasingly, traders make their living by providing a solidly reliable logistics service between producer and consumer.*

There is growing emphasis on service in the commodity industry. With more intense competition and better information, markets are more transparent, margins thinner and arbitrage opportunities more fleeting. The most successful trading firms are focusing on producer and end-user priorities.

In an industry governed by economies of scale and close trading relationships, there is space for niche players that cater to specialist markets and regions, and for larger global trading firms that can afford to invest in logistics and infrastructure that benefit their customers. Market conditions are much more challenging for medium-sized trading firms.

**Key tenets for  
successful delivery**

The customers for commodity trading firms are often strategic organisations in their respective economies, such as government agencies, energy-intensive manufacturers and utilities. Any disruption in their supply chains can have far-reaching consequences.

Reliability is fundamental. If a trading firm wants to forge strong trading relationships, it has to be able to deliver commodities on spec and on time, every time. If it is supplying coal to a power generating

company, for instance, it needs to deliver its cargo in the right volumes, at the right quality, at the agreed time and at the agreed place. Should it fail to deliver, there is a high price for the end-user, with the risk of power outages and even popular unrest.

This is a low-margin business. Trading firms typically earn 3 percent or less on a given transaction. Given the cost of transportation, insurance and the operational risks they take on, this is by no means excessive. The trading firms that deliver service most efficiently will gain a competitive advantage.

The trading firm's role is far broader than that of a mere broker. It justifies its involvement by the high level of service it provides to commodity producer and consumer alike. Ensuring execution progresses smoothly and within budgeted parameters is therefore critical to business profitability.

**Trading firms rely on  
high-quality  
operations to  
execute  
transactions  
profitably**

Like any other multinational business, commodity traders may be operating in places that are blighted by geopolitical division, subject to international political sanctions, and prone to corruption and money laundering.

While most commodity consumers are in industrialised nations and emerging economies, mines and wells are scattered across the globe. They are usually located away from major urban areas, often in developing economies. Trading firms may need to create, supplement or enhance local infrastructure to make transportation affordable.

Commodity trades span the globe. They can involve counterparties that may not know each other, let alone trust each other. One way that trading firms add value is by building up trusting relationships with their counterparties. They set up detailed protocols for trading and delivery to minimise risk and maximise certainty. These need to be followed to the letter.

Large trading firms manage significant numbers of transactions. They must consider all aspects of operational risk, put systems in place, take out insurance and audit the delivery process. A company like Trafigura takes on more than 2,000 ship voyages a year. The sheer volume of activity makes it hard to monitor each and every risk on a given flow of business without a clear system and well-understood, carefully thought through procedures.

Commodity trading firms employ a relatively small number of people to handle numerous high-volume, high-value transactions. They put protocols in place to supervise and monitor processes so they can identify and pre-empt any problems or issues that may arise.

Once the trader concludes the deal, he hands the execution to an operator. The operator coordinates logistics to make sure all the right resources are in place for the right dates. That means working with the contracts department and the shipping department, appointing inspectors to measure the quantity and quality of what's in the tanker, appointing vessel brokers and agents, dealing with those responsible for loading and discharge, the terminal operator and, of course, maintaining relations with the customer. The operator also has to keep the deals desk up to date with any information that could affect hedging strategy or the profitability of the trade.

Operations teams focus in depth on cargo certification. They assess whether the quantity and quality of the cargo needs to be certified by an independent inspector. This may be specified as a requirement in an accompanying letter of credit. Trading firms will normally appoint agents to act as their representatives, certify cargo and manage delivery of shipments.

All documentation needs to be accurate and up to date. The firm's trade finance department ensures that the documents accompanying a letter of credit are in order. Before the ship carrying its cargo can embark its master needs to sign a bill of lading, a standard form document that confirms the title holder of a cargo shipment and obliges the carrier to release it to them on arrival at the destination port. Insurance provision needs to be in place.

It takes great care and skill to execute deals precisely, managing continuing operational risks while preserving corporate reputations. Companies not disciplined enough to fulfil their various obligations and responsibilities may find themselves taking on large risk exposures quite unintentionally.

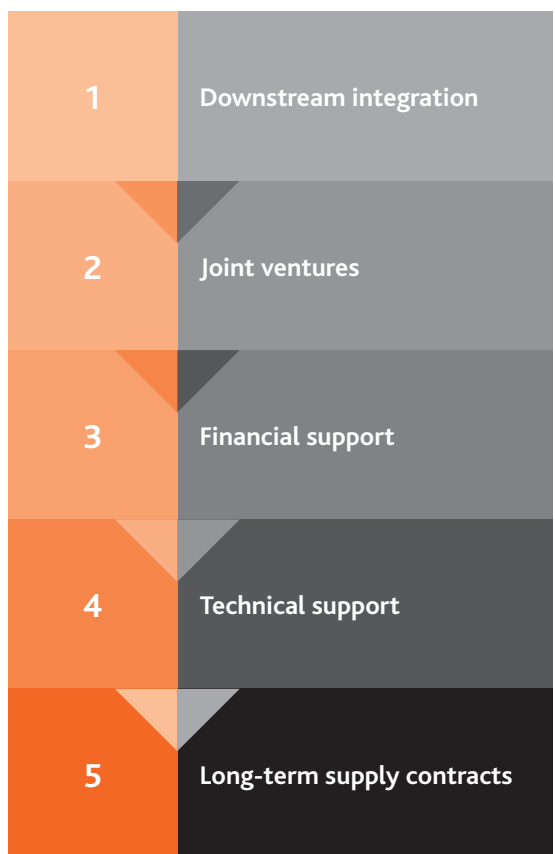
As competition has intensified, alliances between trading firms and other market participants – based on shared interests, complementary capabilities and mutual benefit – have become increasingly common.

*They strengthen supply chains by supporting their customers*

For consumers, long-term arrangements increase certainty and reduce volatility. The trading firms gain from having consistency of supply.

*They appoint specialists and independent inspectors to manage processes on the ground*

**WAYS COMMODITY TRADING FIRMS SECURE RELIABLE CONSUMPTION OUTLETS**

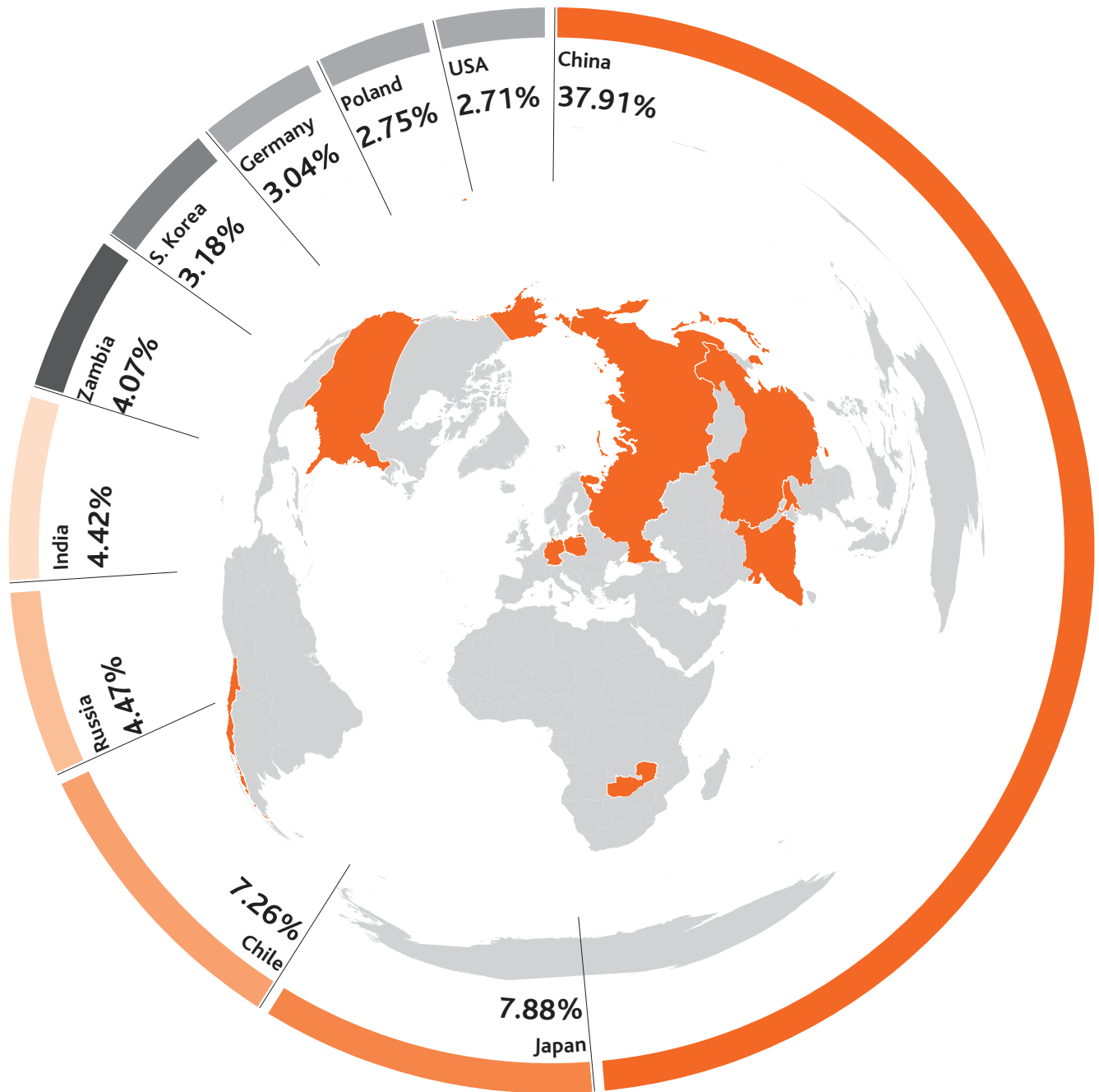




**Top ten copper smelter producers in 2017**

In 2017, world copper smelter production reached over 19 million tonnes. Asia's share of world copper smelter output more than doubled from 27 percent in 1990 to 56 percent

in 2017 as smelter production in China expanded rapidly. Primary smelters use mine concentrates as their main source of feed. Secondary copper smelters use copper scrap as their feed.



Trading is a volume business. By locking in long-term trading patterns they are better able to invest in infrastructure, improve economies of scale and gain competitive advantage.

But they cannot achieve this simply by providing goods at the lowest price. They have to engage with customer problems and demonstrate how they add value.

As arbitrage becomes more fleeting, there are greater incentives to acquire assets and integrate downstream.

Developing new marketing outlets is a core part of the trading firm's business model. They pursue various strategies to strengthen consistency of supply.

They provide technical expertise and infrastructure support. For instance, where utility companies are migrating from coal to cleaner fuels, trading firms work with them to adapt their facilities to new fuel types. In LNG markets, trading firms are working with consumers to internationalise the gas business by encouraging take-up of FSRUs (floating storage and re-gasification units).

In other cases, financial support can help forge closer links. In 2015, Trafigura took a minority stake in Nyrstar, Europe's largest zinc mine and smelter group. The two companies announced that Trafigura would market its zinc concentrate to Nyrstar's smelting business. Trafigura also acquired rights to Nyrstar's zinc output via a \$150 million prepayment deal.

*They extend supply chains by acquiring downstream assets*

A notable development in energy markets in recent years is the integration of some large trading firms into downstream distribution in emerging markets.

There is a strong economic case for the integration of midstream and downstream functions in emerging markets. These markets are typically relatively small with underdeveloped infrastructure requiring additional investment. In many cases they were previously controlled by vertically integrated oil majors. When the majors exited these markets to focus on their upstream activities, trading firms, which can supply downstream markets in emerging economies very efficiently, were natural buyers.

Puma Energy, originally a wholly owned subsidiary of Trafigura, has acquired significant midstream and downstream capacity. It owns and operates fuel storage and marketing businesses over 45 countries. Trafigura retains a substantial minority interest in the business and remains its most important fuel supplier, as it is in turn Trafigura's largest customer (see adjacent box). ■

### **Puma Energy**

Puma Energy is Trafigura's industrial go-between in the oil sector. Founded in 1997, it has grown from modest roots retailing petrol in Argentina into one of the largest independent global downstream companies, operating over 48 countries.

Trafigura took majority control in 2000 and made it the vehicle for acquiring fixed assets in the oil sector. In order to assist Puma Energy's growth, Trafigura has subsequently opened up the capital to outside investors, and in 2017 held 49.6 percent of the company's shares.

Puma Energy provides logistics and services to third parties as well as Trafigura from its midstream assets, such as bulk storage depots and offshore mooring systems.

In its downstream business supplying petrol stations, mining companies, airlines, shipping companies and so on, Trafigura is Puma Energy's preferred source of supply.

It has storage facilities in the major hubs of Singapore and Rotterdam-Antwerp. But it has focused its growth in countries from where the oil majors have retreated, where markets are opening up and where oil demand remains strong.

It invests in territories where there is a logistical bottleneck in the market. In Namibia, for example, it bought up BP's downstream business then rebuilt its outdated storage facility. In Australia, it has bought a large network of retail service stations and is building new terminals to accommodate big ships from international hub ports.

# Executing the trade: operations in action

*Structuring and maintaining an efficient operating model is at the heart of profitable commodity trading. The operations team of any commodity trader has an important role in helping to define and refine protocols that allow the trading firm minimise risk and reduce costs.*



## Managing efficient execution

In commodity trading firms, the trading operation is at the hub of the company. It controls the commodity inventory and has overall responsibility for managing the supply chain activities required to transform transactions into profit for the company and value for its customers. From the moment the deal is closed until ultimate delivery, the operations team is responsible for execution of the myriad processes required to achieve this objective.

### 1 Loading and discharge

Every day a vessel remains in dock or at sea waiting to load or discharge results in both opportunity costs and actual costs for the trading firm. The contract between the charterer and the shipowner specifies agreed time for loading and unloading (laytime). The operations team needs to coordinate chartering dates, arrival and loading, and destination and discharge schedules to minimise lost time.

### 2 Demurrage

Trading in the physical world doesn't always go according to plan. Ships develop faults, and

weather systems affect shipping speeds, fuel consumption and trade routes. Charterers that exceed the agreed rental period must pay a demurrage fee. The operations team monitors demurrage risks and notifies trading teams when schedules come under pressure.

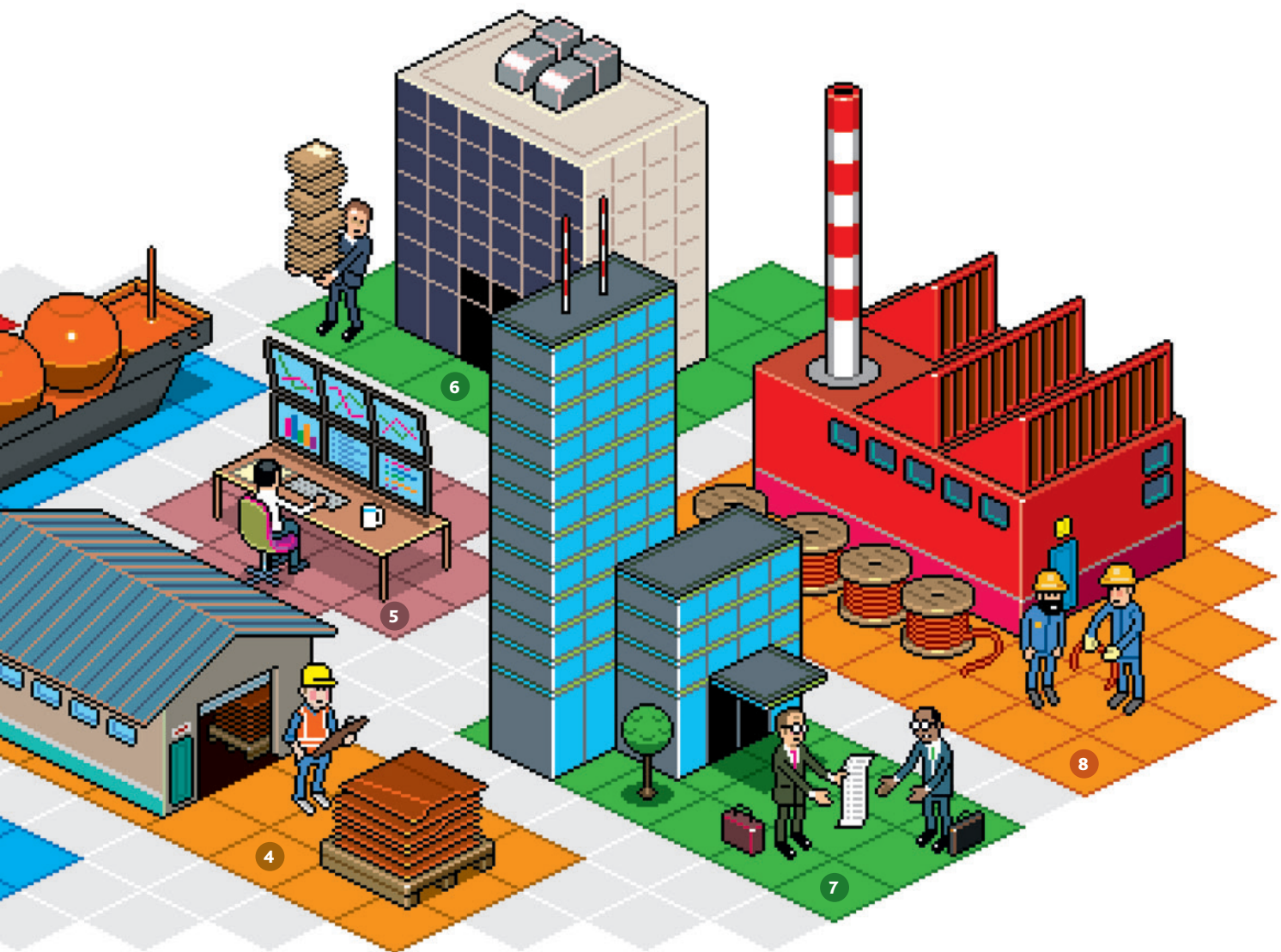
### 3 Vessel brokers and agents

Global trading firms undertake numerous high-volume, high-value transactions involving thousands of journeys each year. They liaise with brokers to charter vessels. They use agents to manage logistics and represent their interests while their ships are in port. They oversee administrative

tasks, supervise loading and unloading of cargo, and are responsible for arranging pilot and tug-boat services.

### 4 Appointing inspectors

Both the volume and the quality of commodity shipments can change while in transit. Sometimes, this is anticipated – with crude oil shipments for instance, there is always some residue left in the tanker. In other cases, the cargo may have been stored incorrectly, its chemical properties may have changed, or there is a discrepancy in volumes loaded and unloaded at various stages. To prevent the expense and disruption of disagreements



between buyers, sellers and logistics providers, trading firms appoint independent inspectors to certify the quality and the quantity of cargo.

#### 5 Accounting for physical flows

Profit and loss (P&L) can be affected by many known or unknown factors. Effective and vigilant contract management is mandatory. The operations team will keep the trading back office up to date with the latest news while monitoring the life cycle of the trade. This includes tracking payments and receipts for known costs such as port fees, agency fees, inspection costs,

warehousing rental and chartering costs as well as for the material itself via suppliers and receivers. Financing arrangements are put in place (e.g. letter of credit) and if applicable an operator tracks and controls the pricings of cargo and allocates them to shipments for invoicing purposes, while monitoring exposures. There will also be unknown or unpredictable factors, such as force majeure by a supplier, bad weather or engine failure, which may result in P&L impact.

#### 6 Insurance

The operations team checks that insurance provides adequate coverage. Trading firms maintain

separate insurance programmes for property, liability, political risk and trade credit general insurance. The shipper may cover a specific cargo with its own policy. If not, the trading firm may take out special marine policies to cover shipment.

#### 7 Troubleshooting

Most transactions work like clockwork, but when things get more complex the operations team has to negotiate the best remedial action. Who is at fault if a correctly loaded cargo arrives off-spec or the quantities can't be reconciled? Does the trader sue the inspector, claim insurance or accept the loss? And what is the

best strategy to recover value on distressed cargo?

#### 8 Auditing

Most operations go to plan but where this does not happen it is the job of the operations team to work out who is at fault and establish how best to recoup money for the firm. With a complex supply chain, issues can arise during storage, blending and transportation. The operations team will reconcile volumes and qualities at every stage in the process to pinpoint discrepancies.



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