Commodity trading: The role of physical assets acquisitions for energy trading companies

Bachelor Project submitted for the Bachelor of Science HES in Business Administration with a Major in International Management

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Declaration

This Bachelor Project is submitted as part of the final examination requirements of the Geneva School of Business Administration, for obtaining the Bachelor of Science HES-SO in Business Administration, with major in International Management. The student accepts the terms of the confidentiality agreement if one has been signed. The use of any conclusions or recommendations made in the Bachelor Project, with no prejudice to their value, engages neither the responsibility of the author, nor the adviser to the Bachelor Project, nor the jury members nor the HEG.

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Geneva, May 30th, 2014

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Research Question and Methodology

The purpose of this research is to understand the rationale behind the decision of energy trading companies to invest in physical assets. They take ownership and operate logistic and infrastructure assets such as production fields, port terminals, storage facilities or refineries. In particular, this report will answer to the following questions:

1. What are the assets acquired by energy trading companies?
2. What role do these assets play in the supply chain?
3. Where are the assets purchased by traders located?
4. What are the benefits that trading companies gain from owning these assets?
5. From whom are commodity traders buying physical assets?
6. How do commodity traders finance assets acquisitions?
7. What are the risks and challenges associated with ownership of assets?
8. Are commodity traders vertically integrated?
9. Are investments in physical assets profitable?

The first section of this report will set the context in which commodity traders are active. Secondly, this paper will give a description of the different components of the energy supply chain and discuss the role of each asset. The third section will discuss multiple aspects of assets acquisitions, such as the benefits physical assets give to trading companies, the risks and trade-offs that result from investing in fixed assets, and the challenges of integration and financing. Lastly, two case studies will illustrate the current evolution of trading companies. At the end of each section, the reader will find a *take-away* that underlines the key elements and answers directly to the above-mentioned questions

Since the academic documentation on the physical side of commodity trading is relatively limited or out-dated, alternative resources have been of particular relevance to conduct this research. The resources used for this Bachelor Project include companies' annual reports (when published), group brochures and corporate websites, reports from consulting firms or mandated by companies in the energy industry, press articles from specialized institutions, and presentations by professionals held at the Haute Ecole de Gestion in the scope of the Major in Commodity Trading. Finally, I also had the opportunity to interview and discuss several issues with Mr Benoît Lioud, from Mercuria Energy Trading.

Executive Summary

Commodity trading companies exist because natural resources are not well allocated. Producing countries are not those that consume the most, and the largest consuming regions are not supplied enough by their own natural resources reserves. In order to smooth out regional imbalances and fulfil supply and demand mismatches, commodity traders have to perform several activities in the supply chain. In addition to managing the logistics, their role has evolved over the years.

Traditionally, trading firms relied only on pure trading, with asset-light structures, to make profits with arbitrage opportunities. Recently, they diversified in terms of the activities they perform, the geographical markets they target and the commodities they trade. To answer to the increasing complexity of markets and an intense competition, independent trading houses are increasingly investing in physical assets throughout the value chain: they now own and operate production fields, storage facilities, port terminals, refineries and distribution networks.

With industrial and infrastructure acquisitions, energy trading firms can obtain several benefits. They are able to develop market knowledge, they diversify their activities, they secure access to sourcing and they optimise their supply chain. Ultimately, traders that engage in the supply chain are able to gain flexibility to quickly take advantage of changing market opportunities and generate extra profits. The assets they target are also the ones that provide *optionality*, in countries where infrastructure and logistical challenges discourage other actors to invest.

As they improve the capacity of traders to spot market imbalances, physical assets also bring an increased level of risk and new challenges. In particular, trading firms have to mitigate higher operational and country risks, integrate new competencies and find alternative sources of financing.

By investing in physical assets, energy traders extend their scope and become involved at various levels of the supply chain. However, their business model remains distinct from those of vertically integrated producers, as their objectives when investing follow different business logics. Whether investment strategies are profitable remains to be evidenced and will require further research, as the direct impact of physical assets acquisitions on margins is difficultly quantifiable. Moreover, the way the firms' profits evolve may take different paths: some companies have seen their bottom line increase in the past few years, while others recently posted their worst results in a decade.

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Glossary

Some terms used in this Bachelor Project might be unfamiliar to the reader. In order to improve the comprehension but all the while keeping this report free from an overwhelming number of definitions, this glossary will regroup all the terminology, abbreviations and references that require further explanations.

In the report, an asterisk (*) will follow terms that are explained in the glossary when they appear for the first time.

ABCD The four main trading companies active in agricultural markets: *Archer Daniels Midland*, *Bunge*, *Cargill*, and *Louis Dreyfus B.V*.

ARA Stands for *Amsterdam, Rotterdam,* and *Antwerp*. "These three ports form a key oil trading area. Crude oil from the North Sea, Africa and the Middle East is refined into oil products" (Reuters 2014). It is one of the most important hubs in the trade of commodities.

Bakken The Bakken formation is one of the most important shale oil plays in the United States. It stretches across North & South Dakota, Montana and Canada.

Bâle III A regulation on *Global regulatory standard on bank capital adequacy*, which requires banks to increase their capital requirements for trade finance activities. The principal consequences of this regulation are an increase of financing costs for trading companies and a decrease of credit availability due to banks' limited exposure to trade finance activities (Ascher, Laszlo, Quiviger 2012).

Barrel (bbl.) A barrel is a unit of measure used for crude oil. One barrel of crude oil is equivalent to 159 litres, or 42 US gallons (PWC 2008). See Appendix 1 – Crude oil barrel.

Brent Brent is a crude oil from the North Sea of high quality (*sweet* and *light*). Being one of the most traded crude oils, it is used as a benchmark to determine oil prices. The other most commonly used benchmark is the West Texas Intermediate (WTI) that is traditionally used for crude oils traded in America.

Biofuels Biofuels are renewable fuels that are derived from agricultural crops (corn, soybeans, sugar cane) or from biomass resources (agricultural or animal wastes). Once produced, biofuels are mainly used for transportation and consist

primarily of bioethanol (blended with gasoline) or biodiesel (blended with diesel). Because they are produced from agricultural crops, biofuels are bridging the gap between soft and energy markets. In 2012, biofuels represented 4% of global transport fuels (Lioud 2013).

Bottleneck A market imbalance or a logistical challenge that creates an arbitrage opportunity for commodity trading companies.

Chokepoints In maritime transportation, oil chokepoints are critical locations with regard to global energy security due to the large amount of oil that transits through. Chokepoints are narrow channels that are widely used as global sea routes. The U.S. Energy Information Administration (EIA 2012) has identified seven strategic chokepoints, where disruption of transit would have severe influence on global oil trade and prices. For example, The Strait of Hormuz, leading out of the Persian Gulf, is described as the *world's most important oil chokepoint*, with more than 17 million barrels per day in transit in 2011 (at that time, it was the equivalent of 35% of all seaborne traded oil).

Credit Crunch One of the first consequences of the 2008 financial crisis was the shortage of funds made available by banks to finance the economy. As many small and medium-size businesses, commodity trading companies have been hit by this lack of financing as banks and lenders rationed credit availability. As a result of this situation, many of the small trading companies went bankrupt, while the largest groups could partially absorb the shortage of financing and started to seek alternative sources of funds.

Distressed assets Physical assets that are not economically viable anymore for industrial or independent owners but can be still valuable for energy trading companies.

Documentary credit Documentary credits are banking instruments that manage credit and counterparty risk for buyers and sellers. It is an undertaking by a bank to pay a given seller, provided that he has shipped the correct goods as per contract terms.

Dodd-Frank Act The regulatory changes caused by the U.S. Dodd-Frank Act had important implications for commodity trading companies as they increased the complexity and cost intensity for financial instruments used in commodity trading (Ascher, Laszlo, Quiviger 2012).

Feedstock The raw commodities that are used to produce refined products. Corn and soybeans, for example, can be used as feedstock for the production of biofuels.

Freight Cost of sea transportation paid for the use of a vessel.

Hedging The process of using financial instruments to manage price risk.

Initial public offering Or IPO. When companies are looking for capital and decide to be listed on the stock market, to go from being a private company to a publicly traded one, the IPO is the first sale of companies' public shares.

Net Profit Margin Net profit divided by turnover. This indicator is used to compare companies' profitability and generally differs from one industry to another.

Oil Grades The quality of crude oil is defined based on its technical specifications. The most important factors are the API degree, which defines the density, and the sulphur content, which is also important because several refineries are not built to process crude oil with a too high content of sulphur. The API degree will define if the crude oil is *Light* (higher quality) or *Heavy* (lower quality), while the sulphur content will differentiate between *Sweet* (higher quality) and *Sour* (lower quality). Crude oils of higher quality will trade at a premium and those of lower quality at a discount.

Oil Terminal "A large industrial complex where oil is stored and from which oil is transported elsewhere; an oil depot" (Collins 2014).

OPEC The Organization of the Petroleum Exporting Countries regroups most of the world's largest oil producing countries. These countries gathered in 1960 in order to better protect their interests and try to keep oil prices at levels that are beneficial for them, notably by monitoring crude oil output. Saudi Arabia, Venezuela, Iran and the United Arab Emirates (U.A.E) are among the most prominent members. Together, OPEC members control 81% of the world's proven crude oil reserves (OPEC 2013). See Appendix 2 – OPEC share of oil reserves.

Off-take Agreement An off-take agreement deal is a way for commodity traders to pre-finance commodities. The buyer will pay in advance for a future production to a producer, who will in turn reimburse with commodities once they are produced. These agreements are often concluded on a long-term basis, sometimes even before the mine starts the extraction phase, or before an oil field can provide an output.

Seven Sisters The seven Anglo-American international oil majors: Exxon, Mobil, Chevron, Texaco, Royal Dutch Shell, Anglo-Persian Oil Company (renamed BP) and Gulf Oil. Together, they controlled around 90% of world oil trade by World War I (Puma Energy 2013b).

Shale Oil & Gas It is an unconventional form of oil that comes from rock formations. Technology advances have recently made large-scale production of shale oil and gas economically profitable, most notably in the United States.

VLCC *Very Large Crude Carrier*. This is the second-largest type of oil tanker to date. VLCCs can carry around 2 millions barrels and are well suited for international oil transportation across oceans. The size of a ship for commodity transportation has two principal impacts. First of all, with low margins, commodity trading is driven by economies of scale. The largest ships will enable to reduce the transportation fee per unit. Secondly, not all ports are built to accommodate all sizes of ships. It is therefore essential for commodity traders to ensure that the vessels they charter can berth where they need.

Volcker Rule As part of the Dodd-Frank Act, the Volcker Rule limits the banks' activities in commodity trading. In particular, it bans proprietary trading for banks (trading of commodities for their own account) and limits banks' ownership and control of physical assets. After the Volcker Rule was enforced, U.S. banks have reduced or closed their commodity trading unit, leaving the market full of opportunities for trading companies (Ascher, Laszlo, Quiviger 2012).

1. The context of commodity trading

1.1 History of energy commodities[1]

The development of large-scale energy production and trade started in the 1800s, when crude oil became widely used in the industry and daily life. In 1859, for the first time in U.S. history, oil was successfully drilled by Colonel Drake in Western Pennsylvania. This breakthrough revealed the availability of crude oil resources, which were then transported and refined for commercial use. During these early days of oil production, logistics issues quickly arose and created opportunities for firms specialised in storage or transportation.

At the same time, John D. Rockefeller's company, Standard Oil, started to trade oil and quickly developed operations throughout the value chain, by integrating refining, storage and transportation activities in an attempt to stabilize the industry. It was the first step towards consolidation and vertical integration, and a key feature of the company's success. Such control in the supply chain gave Standard Oil a key competitive advantage and by 1879, 90% of U.S. refining capacity, as well as many storage and transportation facilities (including pipelines), was controlled by Rockefeller's firm. The company became fully integrated (from extraction to end-users) later on when it entered into production activities and produced up to 25% of U.S. crude output by the late 1800s.

By the end of the century, international competition increased from oil-rich regions and with the growth of international oil companies. In 1911, however, Standard Oil was dissolved into more than 30 companies because of its quasi-monopolist position in the U.S. industry. These firms started to diversify geographically and it resulted in a situation of rapid international trade development and the establishment of the so-called "Seven Sisters*", in the early 20th century.

World War I and II demonstrated the significance of controlling strategic production assets, which were soon to be owned by major oil companies. Their dominant position (in 1949, 88% of oil traded worldwide was supplied by wells owned by the Seven Sisters), together with investments towards vertical integration, created strong barriers to entry to prevent new competitors to participate in the industry. This oligopoly situation lasted until the 1960s, when the oil industry was transformed again.

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[1] Unless otherwise stated, Source: Puma Energy 2013b

[2] See Appendix 3 – Crude Oil Prices 1861-2012

[3] Chevron, British Petroleum, ConocoPhillips, Royal Dutch Shell, Total and ExxonMobil

Booming economies in North America, Europe and Asia resulted in increased competition in the energy industry and many actors entered the market, including state-owned firms. Producing countries claimed independence over their natural resources as the world oil consumption more than doubled between 1960 and 1970. As a result, international commodity companies either had their producing assets nationalised by several nations in emerging countries or were forced to renegotiate their long-term contracts. The creation of the OPEC*, in 1960, also played a significant role in the control of oil production by national oil companies. Geopolitical instability in the Middle East during the following period had severe consequences on the uncertainty of supply and the volatility of oil prices[2], as international oil companies were not able to compensate the disruption of supply anymore.

The Seven Sisters also faced an increased competition from independent oil trading companies following oil shocks in the 1970s. The market structure changed again with the emergence of more fragmented buyers and sellers, which enabled the development of trading houses to better meet specific market needs and later led to the development of spot markets.

In the 1990s, several political and economic factors including the end of the Gulf War, the collapse of the former Soviet Union and the sustained growth in emerging countries, influenced the global oil industry. The collapse of the Soviet Union created many opportunities for international oil companies and independent trading houses, as they could access newly oil-rich countries and invest in exploration and production assets. The newly established relative stability in the Middle East saw the production in the region increase by more than 40% between 1990 and 2011. The booming demand for all commodities in emerging countries, in particular in Asia, fuelled by industrialisation and urbanisation, required the reshaping of trading flows to meet the growing demand. Major companies invested heavily in exploration and production activities to secure supply, which led to a new industry structure consisting in the rise of the "Super Majors[3]". However, even though the Super Majors play a significant role in the oil supply chain, it is the national oil companies who really control oil and gas reserves (in 2005, an estimated 77% of oil and gas reserves were held by national companies) after an increased nationalisation of producing assets. The involvement of international oil companies and independent trading houses is nevertheless capital for national oil companies. As the experience and knowledge to operate assets efficiently

[2] See Appendix 3 – Crude Oil Prices 1861-2012

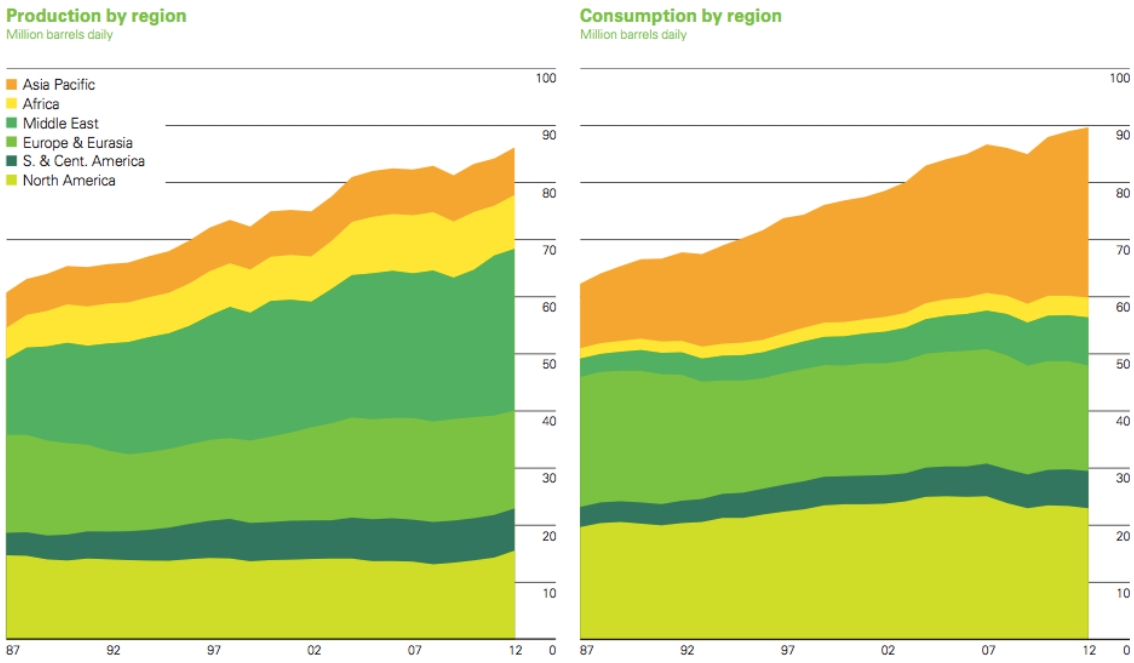
[3] Chevron, British Petroleum, ConocoPhillips, Royal Dutch Shell, Total and ExxonMobil

is held by these companies, governments are forced to negotiate joint ventures or other types of agreements to benefit from their substantial expertise in extracting commodities and bringing them to international markets.

Today, the energy environment is one of intense competition. National oil companies are strengthening their production activities and investing in assets and technology. International oil companies have also adapted their strategy to focus on core competences and divest from some less strategic activities and assets to free capital for other exploration projects. Independent trading houses are developing their flexibility with strategic investments at different levels of the supply chain and by diversifying into a wider range of geographies and commodities.

1.2 Fundamentals and key drivers of the energy industry

FIGURE 1 - WORLD OIL CONSUMPTION AND PRODUCTION BY REGION



Source: BP 2013

1.2.1 World energy supply

The world oil production amounted to 86.2 million barrels* per day in 2012 (BP 2013). The Middle East is the largest crude oil producing region with 28.3 million barrels per day produced in 2012, ahead of Russia (10.6 million) and the United States (8.9 million).

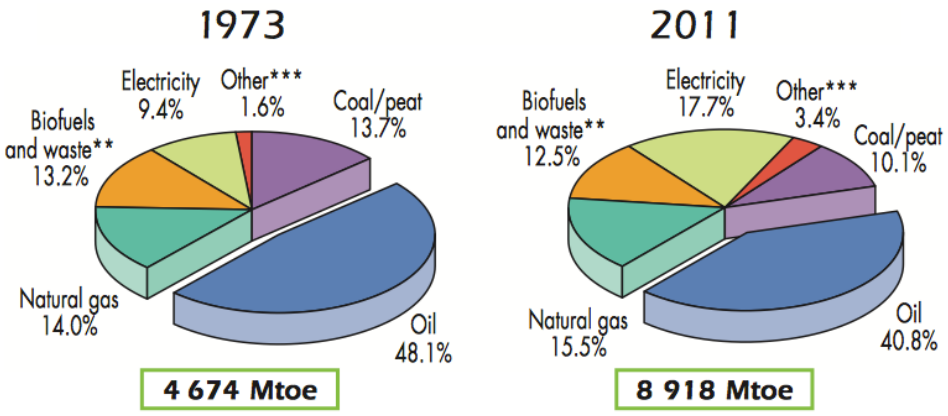
In addition to production levels, it is important to mention the levels of proven reserves to determine global supply of crude oil. The large majority of crude oil reserves are still held by countries of the OPEC, with more than 81% of world's proven crude oil reserves. See Appendix 2 – OPEC share of crude oil reserves.

According to BP's calculations (BP 2013), the level of proved reserves reached 1,668.9 billion barrels in 2012, which represents approximately 52.9 years of global production at current levels. It is nevertheless important to note that such estimations are to be taken carefully since the level of crude oil reserves is constantly evolving with technology developments and new field discoveries.

1.2.2 Global energy consumption

Crude oil (and petroleum products) is the commodity that contributes the most to world energy consumption and is followed by coal and natural gas. In 2012, the total consumption in all countries almost reached 90 million barrels per day, and has been in constant evolution for many years (BP 2013). In 2012, Asia Pacific was the largest consumer of crude oil and petroleum products with 29.8 million barrels per day, ahead of North America (23 million barrels per day) and Europe & Eurasia (18.5 million barrels per day) (BP 2013). In the future, fossil fuels will likely remain the first source of energy consumption, which could represent as much as 75% of total energy demand by 2035 (Puma Energy 2014a).

FIGURE 2 - WORLD ENERGY CONSUMPTION BY COMMODITY[4]



Source: IEA 2013

[4] "Other" includes geothermal, wind, solar, heat etc. "Mtoe" means "Million tons of oil equivalent"

1.2.3 Current trends and trade patterns

A) Rise of Asia Pacific[5]

The Asia Pacific region has been at the heart of the development of commodity markets for many years, in particular in the energy sector. The driver and centre of influence of the global economy growth has shifted to the East over the past ten years, with the emergence of China and India. At the same time that growth in the old guard of leading economies – Europe and the United States – was hindered by the financial and economic crisis, the GDP growth in Asia Pacific reached impressive levels[6]. However, countries with booming economies such as China are relatively poor with regard to their natural resources. By consequent, these countries have become dependant on commodity imports in order to fuel their growing appetite for resources in their race for industrialisation and urbanisation. Today, Asia Pacific accounts for approximately 40% of the world energy demand, and it is expected by economists that its demand for energy will increase by 50% over the 20 coming years.

As demand will likely continue to increase, most of the countries will remain energy importers since few are expected to come close to energy self-sufficiency. Concerning oil, for example, almost half of the crude oil that is openly traded on international market was imported to Asia in 2010. It is expected that, by 2035, oil imports will triple to reach over 31 million barrels per day (from 11 million barrels per day in 2010).

The consequences and opportunities for commodity traders are therefore enormous, and it will not come as a surprise that most of the leading energy trading firms are seeking to take part in this huge market. One of the challenges they will be facing is the current level of infrastructure development. If infrastructure assets are world class in some countries, they can be quite poor or not optimized for large import volumes in others. Investment in infrastructure is therefore widely expected, in particular in the transport and energy sectors. Eventually, such investments might also encourage internal trade within Asian countries.

B) Sustained growth in Africa[7]

Another region of high economic growth is Africa. If the continent has historically been mainly a producing region, its economic development results in an increased demand for energy. With an economic growth that averaged between 5% and 7% over the past

[5] Source: Puma Energy 2014a

[6] The GDP growth of China almost reached 10% each year since 1978, while Indian's GDP growth was 7.2% per year on average from 2000 to 2007.

[7] Source: Puma Energy 2013c

10 years, Africa is the home of some of the fastest-growing countries in the world. At the opposite of the Asian economy that is based on manufactured products exports, several countries in Africa have seen their economy grow thanks to an abundance of natural resources such as crude oil and metals.

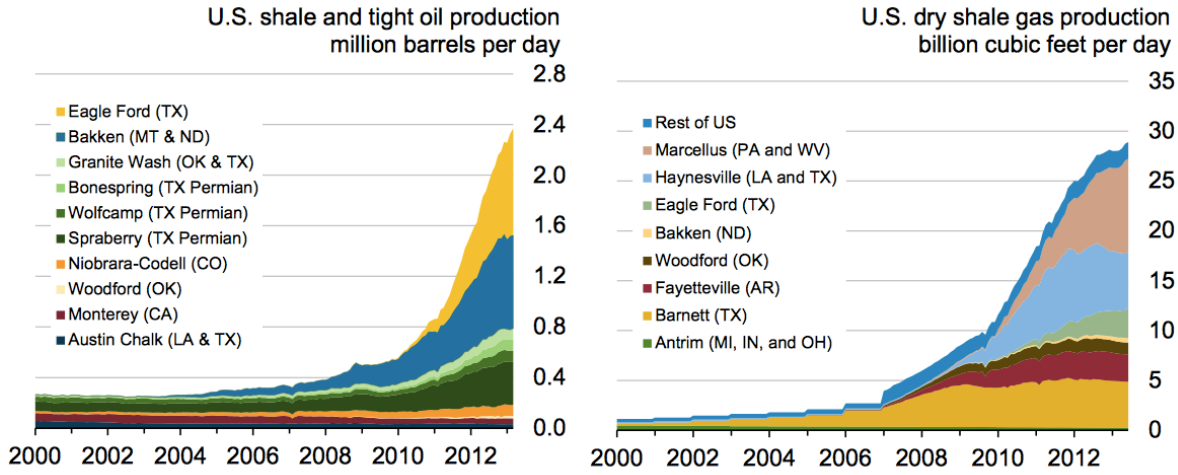
Several oil-rich countries, including Nigeria and Angola in West Africa are facing great challenges with regards to their infrastructure, with consequences for export of crude oil and transformation into refined products for local markets. Oil theft, for example, is an issue that has recently led major oil companies to sell some of their production assets to local companies or international trading firms. The state of the refining industry in those countries is also a challenge, as the few existing refineries are old, often mismanaged and operating far below full capacity. As an illustration, Nigeria, who is Africa's largest oil producer, needs to import the majority of the oil products it consumes because of the incapacity of refineries to fuel the country's growing energy demand.

Africa is the region with the world's second-highest growth rate and is likely to become one of the most influent centres for energy demand, with the world's second-largest population. As producing countries need energy companies to extract their resources and export them to international markets, Africa is also likely to evolve to meet its growing demand for commodities (oil demand is forecasted to grow by 23% by 2020). The region is therefore likely to continue to be full of opportunities for energy trading companies, but infrastructure challenges will require significant investments at several levels of the supply chain.

C) U.S. Shale oil and gas* revolution

U.S. production of shale oil and gas is a major development on the supply side of commodity fundamentals. It has had a critical impact on trade patterns across several geographical markets and different commodities. Following technological breakthroughs, new extracting methods have made the production of shale oil and gas from rock formations possible and economically profitable. This revolution has seen U.S. oil and gas production skyrocket since 2006. In a few years, the United States has gone from being in a situation where it was pondering new sources of foreign imports to a state near self-sufficiency (Financial Times 2010) that has led the country to take actions to review its ban on crude exports, which dates back to 1975 (Meyer, Crooks 2014).

FIGURE 3 - U.S. SHALE OIL AND GAS PRODUCTION



Source: EIA 2014b

Shale oil production, for example, jumped from less than 300,000 barrels per day in 2004 to almost 2.4 million barrels per day in 2013, which represented 27% of U.S. total oil production in the same year (BP 2013; EIA 2014b). This revolution also illustrates the impact that technology improvements can have on commodity trading, in particular in the exploration and production industry. According to EIA estimates, the shale oil resources in the U.S. have been revised from 4 billion barrels in 2007 to 33 billion in 2010 (PWC 2013).

In a country that has imported an important share of its oil needs from external markets and whose infrastructures are designed to bring oil into the national market, there are several challenges that are the consequences of the shale oil revolution in the United States. Multiple infrastructure and logistics changes are to be made, as export facilities are limited. It will also have influences on global markets. As imports to North America will significantly decrease, additional quantities will therefore be available to other locations with high-energy demand, such as China. In addition to the challenge of logistics and transportation, the United States also has to consider the impact on its refining industry. U.S. refineries are built to optimize transformation of low-quality crudes, with high sulphur content, whereas oil produced from shale formations is of a higher quality, light and with low sulphur content (Van Der Hoeven 2013). This situation results in an oversupply of high quality crude oil, a mismatch between supply and demand in terms of quality. As we will discuss in this report, such situations of market imbalances represent profit opportunities for energy trading companies.

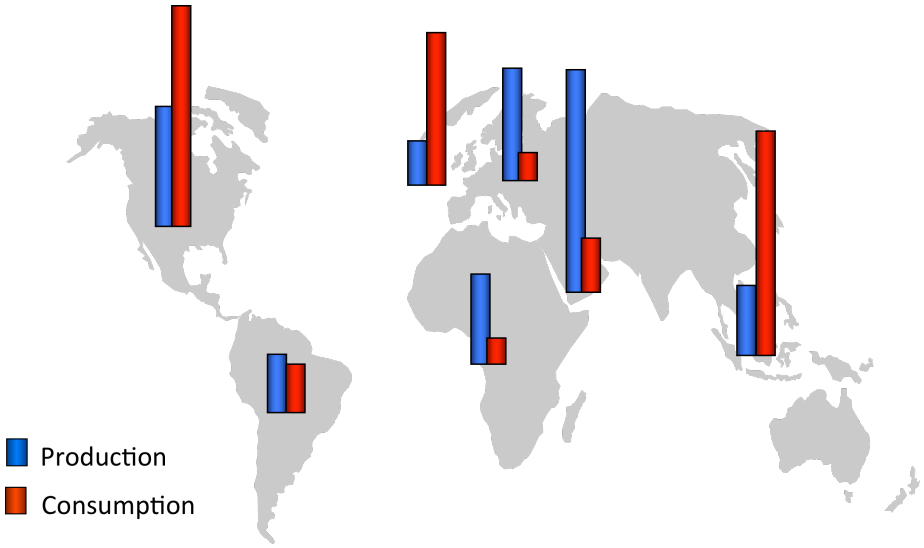
1.3 Commodity traders

1.3.1 The role of commodity traders

A) Smooth out regional imbalances

The reason why traders are important actors in the commodity industry is due to the fact that natural resources are not allocated equally among countries and among continents. In addition, the largest producing countries are often not those that consume most of the commodities they produce. The example of crude oil gives a good illustration of this paradoxical situation. The largest consumers (North America, Asia Pacific and Europe) are not enough supplied by their own reserves whereas producing regions such as Africa, the Middle East or Russia consume by far less than what they can produce. In addition to imbalances in terms of location, there are also imbalances with regards to the quality of commodities. Oil produced in different regions will have different qualities and there are also supply and demand imbalances concerning the quality of the crude oil across different regions of the world.

FIGURE 4 - WORLD OIL PRODUCTION AND CONSUMPTION IMBALANCES



Source: Jaeggi 2013

This situation results in a need for international trade and in the opportunity for commodity traders to use their knowledge and experience to smooth out supply and demand imbalances. In other words, the trader will link producers and consumers of different regions. Commodity traders have an added value in the sense that they can offer producers an access to international markets thanks to their global network. Therefore, they offer an economic gain for producers, who can sell at a higher price than on the local market. A similar economic gain is offered to importers, who are

guaranteed a regular supply and can buy at a lower price than what they would have to pay on a limited regional market as they have the opportunity to gain access to a wider, better supplied, international market. To make this possible, as Mercuria's CEO Mr Marco Dunand explains, traders have to take a new role and face new risks as supply chain managers.

The role of logistics has become key in commodity trading. Traders need therefore to be able to source raw materials upstream where they are produced, to store them, transform them if needed and finally transport and deliver them to the final users, *when* and *where* they are most useful (Dunand 2014). In fulfilling mismatches between supply and demand, traders contribute to a better utilization and allocation of resources, while generating a profit for the services they provide.

B) Act as a supply chain manager

> *"Oil in the ground in the wrong place has little value. It only becomes valuable if you can move it to where something can be done to make it useful"*
>
> Daniel Jaeggi, Co-founder of Mercuria Energy Trading (Pictet 2013)

In order to move oil to where it is useful, commodity traders play an increasingly essential role in the supply chain. Before being available to the end-user, this oil must be extracted, refined and distributed. In addition, since these operations do not take place at the same location, the oil will be transported (with different means of transportation) and stored several times throughout the whole process. Trading companies can take an active role in many operations of the value chain in organizing logistics to optimize trade flows. Commodity traders will also work closely with other actors of the value chain and support functions such as banks, insurances, shipping companies, certification firms or information providers. As supply chain managers, trading firms play a central role in organizing this global network of partners.

C) Masters of optionality

As the role of energy traders evolved, their network of logistical assets has also became global. The term *optionality* is used to describe the advantage that traders derive from the use of a complex web of assets. In order to generate the best profits with the services they provide to the market, they have a range of options that can be used to react quickly to market imbalances or to extract opportunities. As explained in an article in the Risk Journal, traders earn higher profits with options related to the time, location, quality, lot size and logistics of the sourcing or delivering of commodities (Meersman, Rechtsteiner, Sharp 2012). Trading companies that can provide the greatest flexibility across the supply chain will be able to offer customized services,

such as creating a specific blend with crude oils of different qualities, providing delivery during a specific time period, breaking-up large shipments into smaller cargoes or guaranteeing special financing conditions to their customers. All these services create extra value added for an additional fee (Meersman, Rechtsteiner, Sharp 2012).

By re-establishing the equilibrium and matching imbalances, traders will generate their sources of revenue with arbitrage opportunities, which can be divided in three categories (Jaeggi 2013):

- **Geographical arbitrages**: traders move excess quantities of products from producing regions to undersupplied consuming countries and sell it at a higher price.
- **Quality arbitrages**: traders transports un-adapted quantities from one region to the other, where the consuming habits and refineries technical requirements are different.
- **Time arbitrages**: traders are able to store and deliver products at a later date to take advantage of price differences between immediate delivery and delivery at a future date.

With a global network of physical assets that provide better optionality, traders can take advantage of more arbitrage opportunities throughout the value chain. When looking at the arbitrage process, we understand that traders are more interested in the price differences –*spreads* – among various locations, between loading & delivery times or across qualities, rather than in the flat price of commodities. In addition to spreads, the volatility of the market is also of importance for trading companies. When the market is reasonably volatile, more arbitrage opportunities will be available for traders. When traders reduce bottlenecks* with the service they provide, they bring more stability to markets.

1.3.2 Risk management

The different activities that are carried out by traders along the supply chain will create several sources of risks. In order to secure their margin, energy merchants have to manage these risks carefully and apply strict risk management policies. The main risks in commodity trading can be subdivided in two categories.

A) Financial risks

Price risk: energy trading houses, when defined as traders that take ownership of physical goods, are not willing to take price risks. For commodity traders that are looking for long-term evolution of markets and stability, their business model must allow them to "*profitably deliver services regardless of the absolute level or direction of prices*" (Trafigura 2013). Independent energy traders are not speculators betting on the

direction of the price and will therefore protect themselves against positive or negative price fluctuations as they monitor price risk. In order to do so, traders will use corresponding financial products – *derivatives* – to take an opposite position to the one they take on the physical side of a transaction (Simon 2014). By hedging*, price fluctuations on one side will be offset by opposite price fluctuations on the other side. This operation is possible thanks to the assumption that the financial products that are used (*futures contracts,* for example) are correlated with the physical commodity. In other words, prices should fluctuate similarly. When this is not perfectly the case, traders are exposed to a **basis risk**.

Liquidity/Hedging risk: To mitigate price risk efficiently, trading companies need to have access to hedging instruments, such as futures contracts. There can be a liquidity risk when there are no futures contracts available for every commodity or when the market is not enough liquid to provide efficient hedging.

Counterparty & Credit risk: the next main financial risk taken by traders is the counterparty and credit risk. It represents the risk taken by traders with regards to the other party involved in a transaction. The solvability of business partners should be assessed to prevent a counterparty to default. This risk can be partly mitigated by secured payment methods such as letters of credit that are guaranteed by banks (who are assumed to represent a lesser risk). The credit and counterparty risks are transferred to banks. The bank undertakes to pay a given seller provided that he had sent the correct goods according to the terms of the sales contract.

Funding/Liquidity risk: In order to be able to trade high volumes and earn profits, traders need to have sufficient financing means available. Financial institutions, such as trade finance banks, have traditionally been the first provider of financing for short-term transactions. Depending on the size and credit rating of trading companies, as well as other factors that influence the willingness of banks to provide funds, there is a risk that trading companies will not have sufficient credit available to generate enough trade flows.

B) Operational risks

Transportation & Storage risk: Commodities can be moved by several means such as ship transportation for sea voyages, or by pipeline, railway or truck for inland movements. Different logistical risks can be associated with each of these methods. Vessels, for example, can be subject to delays in ports, accidents, bad weather conditions or, in certain regions of the globe, pirate attacks. Political instabilities, theft or armed conflicts can also cause serious damages to trade flows. In Nigeria, which is

the largest producer of crude oil in Africa (BP 2013), it is estimated that in recent years up to 150,000 barrels (approximately 7% of the national production) of oil were stolen each day from pipelines (Faucon 2013). Such risks are part of the business of traders, who can partly mitigate them thanks to their knowledge and experience. However, traders cannot take unconsidered risks and will therefore use the services provided by insurers or other risk mitigating institutions. These actors play a key role in the commodity supply chain as they enable to mitigate the risk of loss during transportation or storage (Gubbay, Arman 2013).

Quality & Quantity risk: In an environment where the notion of *trust* is very relative, is it important for traders to be able to rely on strategic partners. In particular when it comes to the assessment of the quantity and the quality of a cargo. Since traders cannot physically inspect the commodities they buy and sell by themselves, they will mandate independent certification & inspection companies such as SGS to certify the nature of a shipment, or the conformity of a storage facility. Based on these essential assessments, traders will be able to determine if a delivered cargo corresponds to the terms and requirements of their contract. If inspectors are able to reduce risks for traders, it nevertheless never risk-free, as cases of fraud still exist or because different inspection procedures among inspection companies can lead to diverging assessments that could cause damages to the trading company (Belton 2014).

Lastly, there is a risk that is common to financial and operational risks: **country risk**. Trading companies play an essential role in taking country risks that other actors are not ready to take. Commodity traders are exposed to credit, counterparty and operational risks in countries with low ratings, political instability, poorly managed institutions or underdeveloped infrastructures. By managing those risks, traders are able to generate trade flows and gain extra profits.

1.3.3 The main independent energy trading companies[8]

A) Vitol Group ("Vitol")

Founded in 1966 and headquartered in Geneva, the Vitol Group is the largest independent energy trader. Its portfolio includes many different forms of energy commodities as the company trades crude oil, natural gas, LPG, LNG, naphtha, gasoline, gas oil & jet fuel, fuel oil, coal, power, carbon, ethanol, methanol, chemicals, shipping and sugar. Crude oil and petroleum products accounted for the major part of

[8] In descendant order with regard to the size of turnover. Otherwise stated, information comes from companies' websites or annual reports

the $307 billion turnover of the group in 2013[9]. The company traded a volume of 276 million metric tons of crude oil & oil products in the same year. The headcount of employees within Vitol Group was 3,316 in 2012. The group is strongly integrated in the supply chain with physical assets including port terminals*, refineries and storage facilities.

B) Glencore Xstrata ("Glencore")

The group Glencore Xstrata was founded following the completion in may 2013 of a merger between Glencore International plc, one of the largest trading companies, and Xstrata plc, which operated a large portfolio of mining assets. The newly formed company is now listed on the stock market and has grown into one of the largest diversified natural resources firms. Glencore Xstrata owns and operates over 150 mining & metallurgical sites, oil production assets, farms & agricultural facilities. The energy segment is the greatest contributor to the group total turnover of $240 billion with revenue of $142 billion in 2013 for a profit before tax of $1.87 billion. The metals & minerals sector, however, represents the largest source of profit with a profit before tax of $5.66 billion for a turnover of $67 billion in 2013. It is interesting to analyse the source of revenue inside each segment to give an accurate analysis of Glencore's activities. In the metals & minerals segment, industrial activities account for 46.4% of the turnover, whereas in the energy sector, it represents only 8.6% of revenue (the remaining part coming from marketing activities). Glencore Xstrata employed over 190,000 people in 2013, with the great majority working in industrial operations. Glencore Xstrata is often considered as a vertically integrated mining group. In the scope of this study, we will focus on its energy-trading business.

C) Trafigura Beheer B.V. ("Trafigura")

Created in 1993, Trafigura has grown to be one of the major independent energy trading firms. In two decades, the group expanded into a global trading house, with more than 160 offices in 58 countries, for a total employee headcount of 8,773 worldwide. Trading a wide range of crude oil and petroleum products, the company is also significantly involved in non-ferrous and bulk commodities, as well as shipping and chartering. Trafigura's turnover reached a group-record $133 billion in 2013[10] for a total volume of crude oil & petroleum products of 117.8 million metric tons (which represents 78% of all volumes traded by the group). The trading house is also very present in its supply chain with several investments in industrial and logistics assets (currently $7.8

[9] + 1.32% compared to a turnover of $303 billion in 2012

[10] + 10.47% compares to a turnover of $120.4 billion in 2012

billion investment in non-current assets), with the objective of supporting and enhancing trading activities.

D) Mercuria Energy Trading ("Mercuria")

Established in 2004 by two Swiss citizens who have studied at the University of Geneva, Mercuria has become one of the top five energy trading houses in less than a decade. Even though crude oil and refined oil products have been at the heart of Mercuria's business since its foundation, the company has diversified into a global energy merchant, trading the full spectrum of energy-related commodities including crude oil, fuel oil, middle distillates, gasoline & naphtha, biofuels*, natural gas, LNG, power, coal, dry bulk (freight*), hard commodities (thermal & coking coal, iron ore), carbon allocations[11], base metals (copper, aluminium, lead, zinc) and soft commodities (grains, oil seeds & vegetable oils). The company has its headquarters located in Geneva and employs more than 1,000 people. In 2013, the trading house recorded a turnover of $112 billion[12] for a total trading volume of 195 million metric tons, which generated $273 million in net profit (Hume 2014a). The company recently increased its presence in the supply chain as it acquired logistical and industrial physical assets to support its trading activities. It owns a global network of oil storage facilities with a capacity equivalent to 40 million barrels[13]. Mercuria is 100% owned by its original shareholders and employees.

E) Noble Group

Noble Group defines itself as a global supply chain manager. The commodity trading firm, established in 1987, is trading several commodities in each of the three sectors – agriculture, energy and metals & minerals. In 2013, the group reached record revenue of nearly $98 billion[14] for a volume of 233 million tonnes traded. The profit from operating activities, however, is in decline since 2012 ($349 million profit). The energy activity is the most important in terms of revenues ($65 billion) and tonnage (140 million tons). Metals and agriculture activities follow with similar revenue and volume levels (approximately $16 billion for 46.5 million tons traded each). Noble Group's total headcount in 2013 was 15,649 employees in 140 locations.

[11] Nearly 10% of carbon allocations in Europe are traded by Mercuria

[12] - 12.5% compared to a turnover of $98 billion in 2012

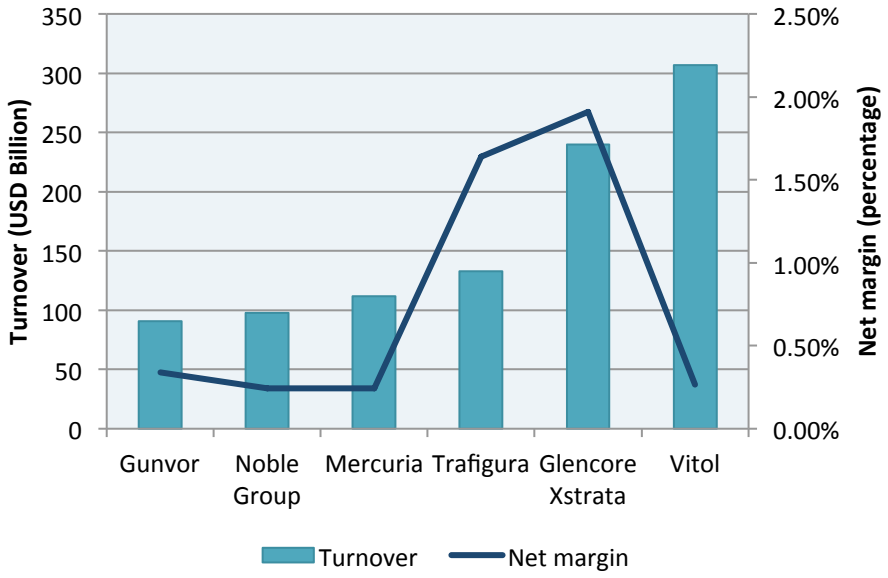
[13] To put this figure in perspective, it represents 46.43% of the average world daily production of crude oil in 2012 (total world crude oil production: 86,152,000 barrels/day – BP 2013, p. 8)

[14] +4.06% compared to a revenue of $94 billion in 2012

F) Gunvor Group ("Gunvor")

Gunvor Group was created in 2000 to support the development of Russian oil exports with logistics and infrastructure services. From a niche player position, the group expanded into an integrated and diversified energy trading company, driven by strategic investments in physical assets. Today, Gunvor is active worldwide in all major energy markets, including crude oil and petroleum products, coal, freight and biofuels. In 2013, the company recorded revenue of $91 billion[15] and a net profit of $308 million[16]. At the same time, the total trading volumes remained at the same level as in 2012, at 131 million metric tons. Gunvor Group employs more than 1,600 people worldwide. The company also indicates that the value of its industrial assets base is now greater than $2 billion.

FIGURE 5 - 2013 TURNOVER AND NET PROFIT MARGIN* FOR SELECTED COMPANIES



Source: Corporate websites ; Annual reports ; Hume 2014a; Hume 2014b

Vitol and Glencore are the two largest commodity trading companies in regards to their turnover. It is interesting to note that in an industry where profits are made on volumes, companies who have the largest revenues are not necessarily those that will have the highest profit margins. In 2013, Trafigura had half of Vitol's turnover, but managed to record a much better profit margin. This report will also help us to understand the different profiles of energy trading companies.

[15] - 2.15% compared to a turnover of $93 billion in 2012

[16] + 2.33 compared to $301 million in 2012

1.3.4 New challenges for trading houses

A) Interconnected markets and commodities

An evolution of traders' environment is the growing interconnection between markets and commodities. It has become more and more difficult to identify tomorrow's market trends in commodities as they have stronger influences on each other and can become substitutes of each other. Price fluctuations and dynamics of commodities are also more complex than ever to understand.

For example, given the use of agricultural crops such as corn or soybeans in the production of biofuels, energy traders have to consider interconnections between agricultural and energy markets (Lioud 2013a). Mr Marco Dunand explains another example of these links, which underlines the reasoning behind trading houses' strategies:

> *"You can't be in oil and gas if you're not in coal[17], and if you're in coal, you have to be in the dry bulk shipping markets as well as in tankers[18], so you should be in iron ore because it uses the same type of shipping and smelters are big users of coal. Similarly, if you are in petroleum, a percentage of biofuel is usually mandated, so you need to be in grain, which also uses dry bulk shipping. And once you have offices in different countries, there are minimal costs in diversifying into additional commodities in those countries – diversification which reduces risk"*
>
> Marco Dunand, Co-founder of Mercuria Energy Trading (Pictet 2013)

As we will analyse later in this report, Mercuria, as other trading companies, has made several investments and acquisitions to become a diversified energy merchant. As commodities are more interconnected, having a global presence across different markets and different commodities can be a key element for traders to gain a better knowledge, identify market opportunities and react quickly to arbitrage possibilities, which also move between markets (Jaeggi 2010). This willingness to gain a better global understanding has also pushed traders to build closer relationships with their business partners. This is also a great challenge for trading houses that have traditionally been reluctant to share knowledge and know-how (Lioud 2014).

B) Evolution of technology

In the early days of commodity trading, information was the main competitive advantage of traders. Those who knew trading routes and price differentials between

[17] Oil and coal are substitutes for each other.

[18] Coal is transported by dry bulk vessels, while oil is transported by tankers. Since the price of freight is determined in function of the supply and demand for vessels, the market fundamentals for coal and oil will respectively have an influence on dry bulk and tanker markets.

locations had a key competitive advantage. With technological advancements, information has been made available for everyone, at any time. Every actor now knows the price of any commodity, at any time. This evolution contributes to the diminution of traders' margins (especially for "pure traders") and has two main impacts on their activities. First of all, to survive, trading houses had to find a way to add value by optimizing their value chain and by taking a more active role throughout the supply chain to identify arbitrage opportunities and secure profits (Dunand 2014).

A second implication of the development of information technology is described by Javier Blas: with information abundantly available everywhere to everyone, these arbitrage opportunities last only for a few days, whereas they could be profitable for a few months in the past (Blas 2013c). The first consequence for trading house is that their supply chain must not only optimize trade flows but also provide solutions to react quickly (quicker than their competitors) to benefit from these opportunities. In order to be able to identify and analyse market opportunities, demand & supply patterns or price structures, traders have invested significantly in information systems. As they trade an increasing number of commodities, with different prices and at multiple times or locations, trading companies require complex systems to collect and process quantitative data. Investments in Information Technology for Trafigura alone amounted to $550 million during the last three years (Pirrong 2014).

The evolution of technology has also had a significant impact on exploration and production activities in the energy sector. New extracting techniques and advancements in technology have recently revolutionized the exploration process, in particular by improving the accuracy of potential reserves estimations. This development had a significant impact in lowering the exploration costs, as fewer exploration wells are needed to find profitable oil fields. Moreover, technology advancements have also a great influence on the extraction activities. Depending on the geology of a region and the difficulty to access crude oil, different oil fields will have different production costs. In the past, the economic burden to access certain oil fields was so high that it was common to recover only 10% of the crude oil available in reserves. In the same reservoirs and with the advanced technology available today, it has become possible to extract about 60% of the existing resources (API 2014b). The most recent technological breakthroughs can lift production in regions that were historically not considered as producing regions. This is particularly true for unconventional shale fields and other tight formations in the United States, which have been made possible by technological advances ("fracking", or hydraulic fracturing) supported by a sustained high level of prices.

C) Reduced margins

As mentioned above, the evolution of information technology, together with additional factors, has contributed to a decrease of profits for independent trading companies in recent times. One of these additional factors is the increased competition caused by the entry of new actors in trading activities. Olivier Wyman's report (Frankl, Rechtsteiner, Sharp 2013) predicts that, in the future, more commodity producers and national companies from the Middle East, from the former Soviet Union and from Southeast Asia will follow SOCAR, the in-house trading arm of the Azerbaijani national oil company, to develop "*more sophisticated trading capacities*" and become active to optimize their own production assets or take advantage of arbitrage opportunities. By becoming more active in trading, these companies will be able to reduce their level of dependency on a restricted number of buyers and, as traders do, identify and cash in on price differentials between locations or among qualities. Olivier Wyman's study estimates that between five and ten companies of a significant importance will enter trading activities in coming years. These new entrants will be able to partially exit long-term supply contracts to price volumes better, which will consequently see commodity traders face a greater competition.

In addition to increased competition, the trading industry has also experienced a challenging year of relatively low volatility and slower growth in energy markets, as reported by the Chairman of Trafigura, Mr Claude Dauphin (Trafigura 2013a). Volatility is important for traders because it creates opportunities and arbitrages possibilities. Finally, costs of financing are also high, which has a direct influence on the volumes that can be traded. The consequence of these factors is a struggle for energy traders to turn volumes into profits. Margins in commodities are usually low, between 0.5% and 1% in oil, or around 5% in metals and minerals (Frankl, Rechtsteiner, Sharp 2013). Trading companies such as Vitol have recorded low profit margins in recent years, showing the difficulty to turn growth and volumes into profits (Zhdannikov 2013b).

2. Role of physical assets

We have seen so far that, during the last decade, commodity traders have experienced fundamental structure changes that led them to make their business model evolve. They became more diversified in terms of the activities they perform, the geographical markets they engage in and the commodities they trade. The largest trading houses have also accelerated their presence at different levels of the supply chain, by acquiring physical logistics and industrial assets to build an expandable network.

Commodity trading houses have been involved in physical assets for a long time. The difference with the evolution of the past few years is in terms of sophistication and scale, as well as the frequency of assets acquisitions by traders. The reach of the largest international traders is now global and diversified in scope (different markets and commodities) throughout the whole supply chain (Deloitte 2013).

Trafigura, for example, is a telling illustration of this industry evolution. The energy trading firm has invested continuously in fixed assets since 2007. The group now owns and operates coal mines, oil storage facilities, warehouses, oil terminals, refineries, blending facilities and retail oil stations in emerging markets. In the last section of this report, we will analyse in detail the effects of assets acquisitions for this company (See section 4.2 – Trafigura). For now, this report will focus on the different components of the supply chain.

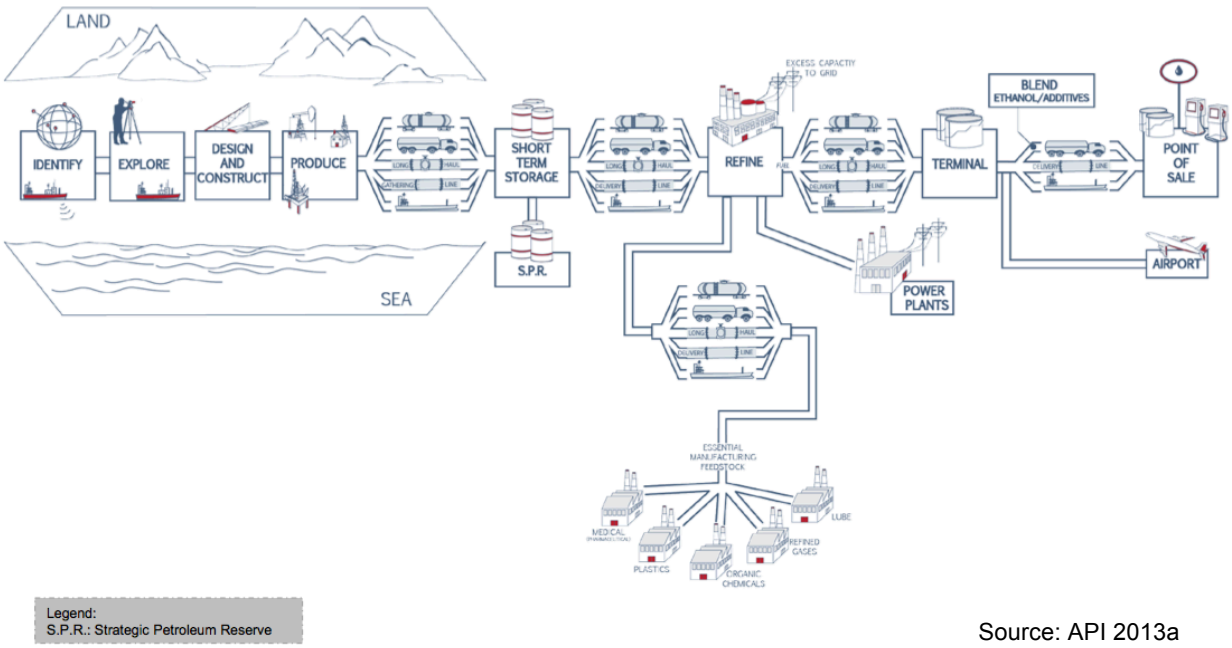
2.1 The components of the energy supply chain

The supply chain of commodity industries can be divided in three sectors: upstream activities, mainstream activities and downstream activities[19]. Upstream activities enclose all the tasks related with the exploration and production of onshore and offshore oil fields. Midstream activities include the gathering, transportation and storage of raw materials. Finally, downstream activities refer to the refining of crude oil into products and their distribution to end-consumers. One should note that the organisation and the actors active in each segment, as well as the dynamics can be slightly different for the energy industry, the agriculture industry and the metals & minerals industry.

[19] See appendix 4 for a visual representation of these three levels for the oil & gas industry

The components of the assets portfolio of each energy trading company are represented on mind maps[20] created with information available on companies' websites and annual reports. They give a global picture of their physical investments.

FIGURE 6 - ELEMENTS OF THE OIL SUPPLY CHAIN



Source: API 2013a

At each step of this process, different types of physical assets will have different functions. The analysis of industrial and logistical assets owned by the main energy traders clearly demonstrates a trend relative to trading houses' acquisitions: companies who have traditionally been focusing on midstream activities have extended their reach to upstream and downstream assets.

2.1.1 Upstream: Exploration & Production

A) Exploration

The very first step of the supply chain of energy commodities is the phase of exploration and production. In the earliest stages, energy companies must find underground accumulations of resources and identify the potential of oil fields or coal mines. The appraisal process that will determine the potential of a field by giving estimations of the oil reserves underground requires the involvement of highly qualified engineers and technologies. In addition, companies will need to obtain exploration & production permits or licenses from governments or to access these permits by acquiring interests in (often local) subsidiaries. As a result, the exploration activity is a

[20] See Appendix 5 - 10

costly and risky business, as the return on investment is never guaranteed. It is a long process that requires capital-intensive, long-term investments.

B) Production

The production from inland or offshore fields is the process of recovering hidden resources and includes drilling and extraction operations before crude oil and gas can be processed and marketed. According to the American Petroleum Institute, the majority of oil and natural gas wells reach their economic limit after 15-30 years of production (API 2014b). Other forms of producing assets in relation with energy commodities will include coal mines or farms for biofuel feedstocks*.

If traders have traditionally been active early in the supply chain through long-term purchase contracts or off-take agreements*, the analysis of the assets owned by trading houses shows that companies are now making several acquisitions of upstream assets. In fact, most of the trading houses included in this research have a presence upstream, both in exploration *and* production. They are present both by operating fields that they fully own or by having minority interests in other companies that have access to production sites.

For example, Mercuria owns upstream assets in two distinct sectors: *upstream oil & gas* and *coal & iron ore mining*. While metal assets are both situated in Asia, with the PT KEL thermal coal mine in Indonesia and the CAA Resources iron ore products supplier (which is active in exploration, mining, processing and distribution) in Malaysia, Mercuria's oil & gas assets are located in very different regions around the globe. In North America, the company has a joint venture in North Dakota, USA, which is active in shale oil production in the Bakken*, as well as one in Canada, which is active in the exploitation of heavy oil prospects. In South America, the trading firm has four oil production & exploration assets in Argentina. It is also present in Africa with stakes in companies in Nigeria and Equatorial Guinea.

At the opposite of Mercuria's activities, Vitol's are focused on oil production in only two regions and its upstream assets are managed by two separate entities, organised according to the geographical location of assets. Arawak Energy supplies the group with crude oil and gas from production fields in Former Soviet Union countries (Russia, Ukraine, Kazakhstan and Azerbaijan). The second subsidiary is Vitol E&P, which deals with West African oil assets in Ivory Coast, Ghana, Cameroon, Nigeria and Congo-Brazzaville). The company's assets are both onshore and offshore, and consist in oil fields that are already producing and providing an output as well as exploration projects in their early stages.

Other trading companies that have upstream oil assets include Glencore – which owns assets in Russia, Chad, Cameroon and Equatorial Guinea – and Gunvor with participation in oil fields in the Caspian Sea, in Russia. In addition to oil & gas production, energy trading companies have also interests in coal extraction, with several of the selected firms owning and operating coal mines. It includes Gunvor's three mines in Russia, USA and South Africa, Noble Group's four coal mines in Indonesia and Mercuria's above-discussed mines in Asia. The company that is the most involved in coal, however, is Glencore with its expertise in mining. It operates 14 production sites in Australia, and 7 others in South Africa and Colombia.

With the possible exception of Glencore, who produced 138 million tonnes of coal and 22.5 million barrels in 2013 (Glencore 2013), the volumes produced by trading companies' assets are relatively limited in comparison to oil, gas or coal producers (Mercuria's oil production represents only between 10,000 and 15,000 barrels per day (Lioud 2013b)). These investments are nevertheless sufficient to have a presence in upstream assets at key locations. Among other benefits that we will discuss later in this report, these investments help to gain a better understanding of upstream activities and a strategic insight to identify potential sources of bottlenecks.

2.1.2 Midstream: Logistics & Storage

A) Logistics

Commodities can be moved using different types of transportation, which vary depending on the nature of the goods. In oil, the main means of transportation include ships, barges, pipelines, railways and trucks. The commodity industry being a business of volumes, the means that can transport the largest quantities of goods are the most profitable. Therefore, the majority of international trade is made by seaborne vessel transportation. According to a study by Lloyd's Marine Intelligence Unit (IMSF 2014), in 2006, 75% of the world trade was done by sea (in terms of volume). Consequently, port terminals are of major importance in the commodity industry and the analysis of assets owned by trading companies confirms their interest in logistical facilities. In their role of matching market imbalances, energy trading companies bring added value by organizing the logistics of trade flows and moving commodities from regions of supply to regions of consumption. Investments into logistical assets enable trading companies to optimize flows and to reduce bottlenecks, while benefiting from arbitrage opportunities.

The analysis of assets owned by energy trading companies shows that they have a strong presence in ownership and operation of midstream assets such as storage

facilities and terminals. The nature of the value added that they provide to the trading activity – moving commodities from places of surplus to places of shortage and buying or selling at the time that benefits producers and consumers – is primarily enhanced by the capacity of trading houses to optimize their logistics network. Consequently, midstream assets play an essential role in supporting trading activities and independent energy traders have increased their investments in such assets.

To manage their storage & terminal businesses independently, some of the energy trading firms analysed have set up or acquired subsidiaries. Vitol owns 50% of a joint venture, VTTI, which operates an extensive network of storage facilities and terminals worldwide. Noble Petro (Noble Group's subsidiary) operates terminals as well as storage facilities for refined petroleum products in the United States. Puma Energy, the distribution subsidiary of Trafigura, also has a significant presence in global storage capacity. Finally, Mercuria's subsidiary Vesta manages the storage business of the group in Belgium, in Estonia and in the Netherlands. This model, however, is not a generality as every trading company has its own dynamic and strategy.

An important feature to consider is the location of logistics assets. A strategic location to have midstream assets is near chokepoints*, trading hubs and transhipment places. Such places provide traders with high flexibility, which enhances their ability to react rapidly to take advantage of market opportunities. The ARA* region in the North of Europe is a key trading hub for commodities and provides a direct entry point into European markets. It is therefore not surprising to find several assets owned by Vitol or Mercuria there, including port jetties, storage facilities, blending complexes and processing plants. Several assets are situated within short distance of international chokepoints, such as VTTI's Fujairah Terminal near the Strait of Hormuz or the ATB Terminal in Malaysia, which is in Asia's energy largest hub, Singapore, next to the Strait of Malacca. This world-class facility opened recently, in 2012, and can accommodate VLCCs*. Other assets at chokepoints include Gunvor's Petroterminal de Panama. There are also several oil terminals in the Baltic Sea, which is an important region with regards to Russia's oil and gas exports, including Vitol's SIA Ventspills Nafta Terminal in Latvia and BNK terminal in the Russian exclave Kaliningrad, Mercuria's Vesta Terminals Tallinn in Latvia or Gunvor's terminal Ust-Luga in the Russian Baltics. All the crude oil exported from Russia through these facilities has to go through the Danish Straits, which is another world chokepoint with no less than 3 million barrels per day flowing through this waterway in 2010 (EIA 2012).

In addition to facilities designed for vessels, other modes of transportation are concerned by energy traders' expansion. For instance, Gunvor has ownership and capital interests in three pipeline infrastructures: Petroterminal de Panama S.A. runs a 131 kilometres oil pipeline, the TAL Pipeline goes through Italy, Austria & Germany, and the Nevskaya Pipeline Company across Russia. Through its terminals' arm VTTI, Vitol is also involved in a pipeline project with the 120 kilometres RotAn pipeline, which will link the ports of Rotterdam and Antwerp.

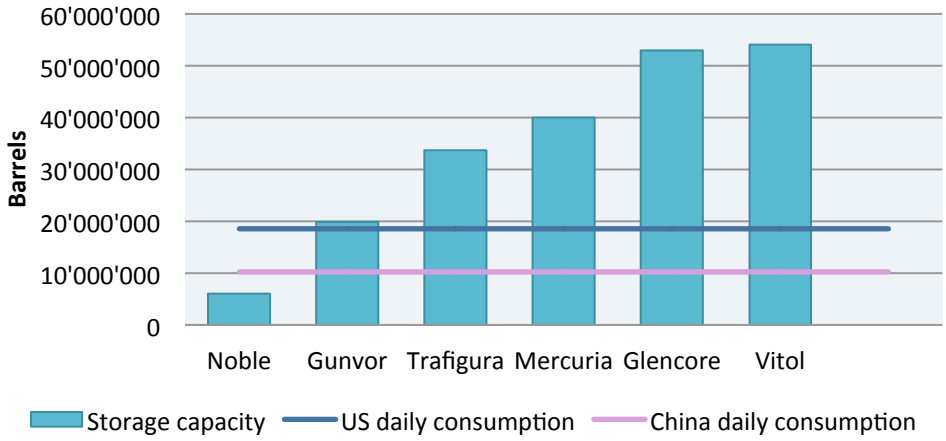
B) Storage

Commodities can be stored at several places in the supply chain, between the production and the end-user consumption. Crude oil and petroleum products are typically stored at refineries where they are also transformed, at port terminals before or after being shipped for seaborne transportation, in tanker vessels during sea voyages or in the pipeline system. In the United States alone, statistics from the American Petroleum Institute (API 2013a) estimate that the country has a storage capacity of 950 million barrels at oil terminals, 650 million barrels near refineries and 89 million barrels in the pipeline system.

Storage facilities play an essential role in the activity of commodity traders as they enable to absorb supply and demand disruptions. When traders can access storage facilities quickly, they are able to answer to these fluctuations efficiently. For example, when the demand in a given market is unexpectedly high, or the supply is unexpectedly low, this shortage will tend to push prices up. Traders that own storage facilities nearby can benefit from this situation if they can provide additional quantities to a demanding market. Oppositely, when supply is particularly high, or demand particularly low, the oversupply will push prices down. It will therefore make economic sense for traders to store their supply flow to sell it later at a better price.

The consequence of this economic logic is that storage facilities will be likely situated near centres of consumption and centres of production. In addition, as these export and import centres are often located in emerging countries, where the infrastructure is not always well developed, it makes sense for trading companies to invest and operate logistics assets more efficiently. This is confirmed by the analysis of the assets owned by the energy houses we refer to in this study. For example, Vitol owns several port terminals with storage facilities, including some in Kenya, in Argentina or in Nigeria. Mercuria is also present in regions of high demand with oil terminals in Qingdao, China.

FIGURE 7 - OIL STORAGE CAPACITY FOR SELECTED PLAYERS



Sources: Corporate websites of companies; Meersman, Rechtsteiner, Sharp 2012; Author's research

TABLE 1 - OIL STORAGE CAPACITY BY COMPANY

	Subsidiary	Barrels	Cubic meters[21]
Mercuria	Vesta Terminals	10,063,680	1,600,000
	Others	29,936,303	4,759,500
Trafigura	Puma Energy	29,983,735	4,767,041
Glencore	-	55,000,000	8,744,316
Gunvor	Petroterminal de Panama	9,200,000	1,462,686
	Novorossiysk	754,776	120,000
	Ust-Luga	4,214,166	670,000
	IBR Refinery	5,700,000	906,229
Vitol	VTTI	54,092,280	8,600,000
Noble Group	NoblePetro	6,000,000	953,925
Total		204,944,7957	26,224,197

Sources: Corporate websites of companies ; Meersman, Rechtsteiner, Sharp 2012; Author's research

One consequence of the strategic function of storage facilities is the growing interest of energy trading firms for the expansion of their storage capacity. The estimated storage capacity owned by the largest energy trading houses is therefore considerable, with over 200 million barrels, which represents more than two days of the world total oil consumption[22]. Vitol, which is already the trading company with the greatest oil storage capacity, plans to continue investments in order to double the storage capacity of VTTI in the next three years (Vitol 2013a). If commodity traders have different investment strategies regarding oil storage capacity – Noble Group's assets are almost entirely situated in the U.S. Midwest while Puma Energy is mainly focused on emerging markets – they all have acknowledged the importance of owning midstream activities,

[21] Conversion using CME Group conversion calculator (CME Group 2014)

[22] Calculated at 89.8 million barrels per day in 2012 (BP,2013)

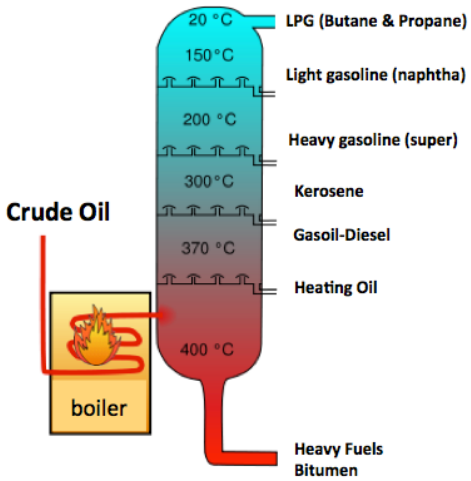
which is where they have more expertise and experience to add value to the market and gain profit opportunities.

2.1.3 Downstream: Transformation & Distribution

A) Transformation

Before commodities can be used by end-consumers, raw materials must be transformed into refined products. For oil, this operation will be done in refineries, where crude oil will be processed into a pre-defined range of consumable petroleum products. With various chemical and heat reaction processes, crude oil is refined into multiple products such as gasoline, jet oil or fuel oil. The range of refined products that can be produced depends on the technical characteristics and set up of each refinery. The set up of each refinery depends, in turn, on the regional consumption needs where refineries are located, and on the grade* of crude oil that serves as feedstock. In terms of qualities, light and sweet crude oils will generate higher yields of greater quality refined products (gasoline, diesel and aviation fuels) and will therefore be more expensive. On the other hand, crude oils that are heavier and sourer will be less expensive as they generate higher yields of petroleum products that have a lower value (fuel oils and bitumen). Consequently, most of the refineries are configured to maximize only the yields of certain types of oil grades (Neste Oil 2014). Refineries will not necessarily maximize the yields of the products with the highest market value.

FIGURE 8 - CRUDE OIL REFINING PROCESS



Source: Jaeggi 2014

The geographical location of a refinery also plays an important role in determining the value added it can provide to the supply chain of a diversified energy trader. As it

determines how well feedstocks can be accessed and where distilled products can be distributed, the location also impacts the logistics and infrastructure needed to support the refinery. For traders willing to optimize trade flows, it is important to determine how well refineries are linked to the transportation system and if crude oil and products can be transported by pipeline, sea, rail or road. As explained by Neste Oil (2014), refineries that are situated on the coast can benefit from lower logistic costs since they can be directly reached by oil tankers, which reduces transaction costs. In addition, those that are based near significant areas of consumption can take advantage of the proximity with local demand.

TABLE 2 - OIL REFINING CAPACITY BY COMPANY

	Refinery	Location	Barrels/day	Cubic meters/day
Trafigura	MANREF	Nicaragua	20,000	3,180
Gunvor	GRI	Germany	110,000	17,489
	IBR	Antwerp	107,500	17,091
Vitol	Antwerp	Netherlands	22,300	3,545
	Cressier	Switzerland	68,000	10,811
	Fujairah	U.A.E	80,000	12,719
	Geelong	Australia	120,000	19,079
Mercuria	None			
Glencore	None/No information available			
Noble Group	None/No information available			
Total	7 refineries		527,800	83,914

Source: Corporate websites

Several trading companies own crude oil refining assets in their portfolio but their profile differs in terms of location and refining capacity. For example, Trafigura's refinery in Nicaragua is operated to support the other distribution activities of the group in a specific region where Puma Energy also owns storage facilities and retail oil stations. The 80,000 barrels per day refinery owned by Vitol in the Middle East has a role requiring more flexibility. The facility that was initially designed to run heavy sour crude has been developed to process a wider range of crude oil grades, in addition to a new blending facility. The other important feature of the Fujairah refinery is its strategic location in the Indian Ocean; near the Strait of Hormuz, which is the most important and busy chokepoint in oil trading. Having a flexible asset that can process a diversified basket of crude oils in a strategic location is of high value for an international trading company. Other refineries owned by trading firms are situated near places of consumption. For example, Gunvor's Independent Belgian Refinery (IBR) and Vitol's plant, both in Antwerp, give them a presence in one of the major oil-trading hub, the ARA region.

If energy trading companies are primarily concerned by crude oil and refined products, some companies are also involved in the transformation of different (but nevertheless related) commodities. Mercuria is involved in the transformation process with two biofuels plants in Northern Europe. This Geneva-based energy merchant, who has important trading activities in biofuel markets, has invested in Germany and in the Netherlands (again, in the ARA area, which is also an important hub for hydrocarbons) to become a biodiesel producer. If this move comes with benefits such as an increased control on quality and a better flexibility in operations, this investment also comes with extra risks and trade-offs that must be taken into consideration. Noble Group is another firm that has taken several steps into the production of biofuels. The company, who has a significant part of its activities in agriculture products, owns several ethanol plants in America. In addition to the Pine Lake Corn Processor in the United States (the first producer of fuel ethanol), the portfolio of physical assets of Noble Group also counts four ethanol production facilities in Brazil (the second-largest producer of fuel ethanol). Such investments make sense for energy trading companies that are already involved in soft commodities. Biofuels are an important bridge between energy and agricultural products, as the feedstocks needed to produce biofuels are composed of agricultural crop, such as corn, or sugar or oilseeds.

Several trading companies have engaged into refining activities but their impact on the processing industry must be considered with some degree of perspective. Oil majors, as well as independent refineries, have been for a long time involved at this level of the supply chain. In comparison, the significance of trading firms' acquisitions remains relatively limited. The seven refineries owned by the trading firms analysed in this thesis account for a cumulated refining capacity of 527,000 barrels per day. In comparison, the new "mega-refineries" that have been built recently in Asia can process significantly larger quantities of crude oil. For example, the world largest refinery complex to date, the Reliance Industries Jamnagar complex located in India, can process up to 1,240,000 barrels per day (RIL 2014), more than twice the capacity of trading firms. Therefore, trading companies cannot compete on volumes with such ultra-modern refining plants, but their objectives when purchasing such assets are different. In fact, at the opposite of other refinery owners, trading companies are not only focused on refining margins, as they benefit from the ownership of refineries in other ways. The rationale behind these acquisitions will be discussed in further details later in this report.

B) Distribution

Distribution is the last level of the energy supply chain and includes all the remaining activities that take place once the commodity has been processed or refined. Refined petroleum products must be transported to the places where they will be consumed by end-users, be it in retail stations for diesel or gasoline, in airports for jet fuels or in road construction projects with bitumen needs.

Recently, several actors of the energy trading industry have engaged in retail and distribution operations. The most notable example is the development of Puma Energy. This subsidiary supplies petroleum products to retail customers in almost 40 countries. Strong of an extensive logistics network (including storage facilities, airport supply and over 1500 service stations), it supplies a wide range of products, including jet fuels, bitumen, LPG and bunkering for vessels (Puma Energy, 2014b).

Vitol is another trading company that has invested in distribution assets. In 2011, the oil trader reached an agreement to create a joint venture with Helios Investment Partners and Shell (Vitol 2011). With the purchase of Shell's downstream assets in Africa, Vitol entered a high-potential market and the joint venture, now known as Vivo Energy, operates retail sites in 14 countries in the continent. In 2014, Vitol acquired another oil stations business from Shell, including 870 retail sites in Australia.

Distribution assets owned by energy trading firms are essentially located in emerging markets or developing countries. Puma Energy's business is primarily focused on such markets, with the majority of its retail stations in Latin America and Africa. In addition, the firm has also a significant presence in North-East Europe, Asia Pacific and the Middle East, where it holds port terminals and important storage facilities for petroleum products.

As noted by Professor Craig Pirrong (2014) in a report mandated by Trafigura, such markets are sometimes quite limited in size, and logistics infrastructures are not well developed. To operate these assets, trading companies need to make additional investments that require capital and management resources. Consequently, distribution assets – and all downstream assets – in emerging countries provide smaller returns than upstream activities. The increased interest of commodity trading firms should also be analysed in parallel to the divestment of oil majors, who were the original owners of these assets and are now exiting downstream activities to focus on production operations that generate higher returns. To make downstream assets economically profitable, trading companies must therefore find new ways to get additional benefits.

- *Take-away 1: What are the assets acquired by energy trading companies?*

Energy traders have invested in assets at each level of the supply chain: upstream, midstream and downstream.

They are present in exploration projects and own production assets such as oil fields or coal mines. The main activity of trading companies is to manage the logistics of international commodity trade flows. Therefore, it comes as no surprise that the majority of their investments concern midstream assets. Energy trading houses have acquired or built warehouses, storage facilities, oil port terminals, or transportation systems. In addition, trading companies have also extended their presence to fields that are less familiar to them. Some of them have invested in processing and refining assets, such as refineries or ethanol plants. Finally, at the end of the supply chain, an increase of investments in distribution assets and networks has been noticed. Oil companies are setting distribution subsidiaries to target B2B businesses, or B2C activities with expanding networks of retail stations.

- *Take-away 2: What role do these assets play in the supply chain?*

Each of these assets is a component of the commodity value chain. Together, they enable commodities to be extracted from production regions, to be refined into consumable products, to eventually be transported to regions with high demand for energy products where the commodity will be consumed by the end-user. In some cases, however, it will be interesting to observe that assets can be managed and used differently than their initial role by trading companies.

- *Take-away 3: Where are the assets purchased by traders located?*

Upstream assets are generally situated in emerging countries – Africa, Latin America or Asia Pacific – where infrastructure is often not well developed and where local governments need the expertise of oil majors or large energy traders to produce and export commodities. In countries that were historically state-controlled, and where markets opened up only recently, trading companies can play a pivot role in the development of the economy. An article published in the Financial Times illustrates the role traders can play in emerging countries. Mr Alex Beard, who runs Glencore's oil desk, explains that the company has no real competitive advantage in the "*below-the-ground*" expertise required for technically or geologically complex projects. The company is therefore not likely to acquire assets in the Gulf or Mexico, or in the North Sea. However, he says that the real value of Glencore is to be able to deal with "*above-the-ground*" challenges, including political and logistical issues in West Africa, Central

America or Former Soviet Union (HUME 2013b). Trading houses are not the best at dealing with technical issues, but they have an edge in mitigating country risk.

As the largest energy trading companies are global and diversified, they also have a worldwide presence in terms of midstream assets. Emerging countries are regions where, again, with the limited availability of infrastructure, the presence of trading companies makes sense. In addition, trading companies are also investing in regions where they can provide innovative solutions to logistical challenges. Logistics are necessary for both import and export activities and, therefore, physical assets owned by trading firms are located in producing countries as well as near consumption centres. Another strategic location where trading companies have invested in midstream assets is near chokepoints and trading hubs, where rapid access to port terminals or storage facilities provides trading companies with a valuable competitive advantage.

Downstream assets such as refineries or distribution retail networks are principally situated to access local markets. The first expected observation is that trading companies investing in such assets are primarily focusing in developing regions such as Africa or Asia Pacific, where there is a strong growth in energy consumption but infrastructure networks are not sophisticated and logistical challenges do not attract oil majors (anymore). However, Vitol's three refineries in Europe also prove that it is impossible to draw general conclusions.

3. Acquisitions and Integration

3.1 Acquisition rationale

3.1.1 Targeting and valuation strategy

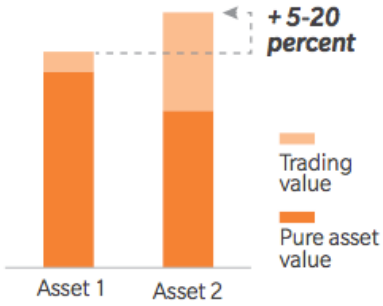
The reasons behind a firm's decision to purchase a physical asset are multiple, but are unlikely to be publicly discussed in details by trading companies. In a general manner, however, some of them are willing to communicate on their strategy with regards to assets acquisitions.

Mercuria's strategy, for example, is based on the willingness to diversify activities in order to be able to better identify market opportunities and gain an understanding of global markets dynamics. With the expansion of its portfolio of trading activities and physical assets, the company is able to be active in the majority of energy (and energy-related) commodities. The company has grown into a global energy merchant with the belief that commodities prices in the energy sector are converging and follow similar price patterns. In addition to providing tools to quickly take advantage of arbitrage opportunities, this diversification strategy also enables Mercuria to avoid being over-committed to a single commodity, namely, oil (Pictet 2013). The case of Mercuria also shows that acquisitions of assets can be driven by historical ties between a company and its prospects. When Mercuria announced the purchase of the physical commodity unit of JPMorgan Chase in early 2014, it reached a deal that also made sense with regards to the positioning and the tradition of the company. The North American market, where most of JPMorgan's assets are situated, is a market where the company is willing to develop its business even further. The bank's unit also included activities of the trading firm Sempra, which is a company where Mercuria's founders have worked together (Schneyer, 2011). Finally, the acquisition also gives Mercuria a direct entry in a market that is evolving quickly following the shale revolution. Many trade patterns have moved due to this development and the company sees opportunities to export petroleum products to Asia, a region where it opened trading desks to develop business activities.

An important role that trading companies take when investing in logistics assets is to try to solve market inefficiencies, or *bottlenecks*. Sometimes, by acquiring, upgrading or building an asset, a trading firm is able to solve inefficiencies in the supply chain and extract a profit by doing so. Some of these arbitrage opportunities require investments in physical assets to be realized. When analysing prospects, trading companies must

ensure that such arbitrage possibility is sustainable and will justify the investment, while providing a profitable return. The targeting strategy must therefore ensure that the entry of the trading company will not remove this arbitrage in the short or mid-term. When anticipating the impacts of a new project, successful energy trading firms should think several steps forward.

FIGURE 9 - ADDITIONAL TRADING VALUE OF PHYSICAL ASSETS



Source: Frankl, Rechtsteiner, Sharp 2013

Physical assets are governed by different rationales if they are operated from a trading perspective, as opposed to an industrial perspective. Typically, the owner of an independent refinery will only be concerned by refining margins and the profit he can make for processing crude oil. He will be interested by the market price for crude oil, and the market price for refined products to determine if the difference between both is greater than his operating expenses. With their global network of logistics, trading companies owning refineries have different options with regards to their use of commodity flows. Processing crude oil in their refinery will be one option, but if refining it does not make sense economically, traders might prefer to sell it somewhere else, or store it in one of their storage facilities. Commodity traders that are able to understand and take advantage of the options provided by physical assets can therefore optimize their commodity flows to generate the greatest return. Consequently, trading houses will try to determine the trading value of assets and will not only focus on its economical value from a purely industrial point of view. This situation can lead industrial assets to be “undervalued” from a trading perspective and this results in such assets being high potential prospects for those that are able to identify this trading value, the value of the *optionality* they provide. As traders see additional benefits in physical assets, they are also able in certain cases to pay more for an asset than its industrial market value.

"We see asset valuations as having declined from excessive to realistic ones – and in some cases to levels that look attractive to us as investors."

Claude Dauphin, Trafigura Chairman (Trafigura 2013a)

Trading companies, who define themselves as "*opportunists*", are likely to be looking for *distressed assets** when searching for new investments. When difficult market conditions reduce the profitability of industrial assets such as refineries, independent owners are often in financial pain and cannot absorb the economic losses. This situations can reveal full of opportunities for large trading companies as they can buy assets cheaply. In this example, "size matters" as it allows large trading companies to absorb losses in the short run, with the goal of extracting trading value later. Glencore, for example has been able to profit from deals in the metal industry following a period of low commodity prices. In the energy industry, Vitol and Gunvor have invested following the 2012 crisis in the oil refining industry due to declining commodities prices to purchase Petroplus' assets (BLAS 2012c). The struggle of the refining industry also involved Vitol more recently, as it purchased an Australian refinery from Shell in early 2014. The sale of Shell comes in a period of divestment of oil majors from unprofitable assets and illustrates the trading value that can be extracted from industrial distressed assets. It will be further discussed under section 4.1 – *Vitol and Trafigura invest in Australia*. With regards to distressed assets acquisitions, trading firms are able to add value to the assets by providing financial support in addition to their integration to a wide international trading network.

3.1.2 Benefits

There are several reasons why energy trading companies engage into physical assets ownership and operation. The next section identifies the most relevant benefits that drive physical assets acquisitions.

A) Develop market knowledge

The ownership of assets across the supply chain is an additional source of information for trading companies. With insights and a strong presence in logistics and infrastructures activities, the learning process is improved and companies have the opportunity to gain a great expertise and a better understanding of markets and economic trends. This knowledge is also fundamental for the commodity analysts in trading houses to understand better the interconnectivity across markets and across commodities. Investing in storage facilities, for example, give valuable information regarding markets' demands, in particular in strategic locations near production or consumption hubs. Having a presence in shipping, as Mr Daniel Jaeggi explains, also

gives additional knowledge regarding bottlenecks and potential sources of arbitrage opportunities, as well as information about current trade flows (Jaeggi 2010).

B) Diversify activities

The common idiom "*don't put all your eggs in one basket*" applies in commodities as well. As explained before, in order to manage risk, one objective of trading companies is to limit their exposure to certain commodities or countries. The largest firms, which are able to build diversified trading positions, can benefit from the diversification of activities to reduce risk. Trading houses can engage into diversification by participating in multiple geographies (which they have all been doing for many years), by trading several commodities[23], or by engaging into activities at different levels of the supply chain. By acquiring and operating a variety of assets, in different locations and for distinct commodities, trading companies limit their risk exposure. Diversifying in terms of new geographies or new commodities is relatively easier compared to acquiring new assets. For firms that are already trading globally and have expertise in energy products, the marginal cost to open a new trading desk is low in comparison with the benefits it brings to the company. On the other hand, the capital and time investment required to purchase, integrate and operate physical assets is substantial and must be justified by the added-value it will provide to the firm.

C) Secure access to supply

Access to supply is necessary for traders to secure volumes and perform their activities. In certain markets, the only way to obtain access to sourcing is by owning production assets. Since these resources are limited, there will be a strong competition and competitors have the opportunity to prevent other trading companies to access their assets (Jaeggi 2010). This is particularly the case for the coal industry, where there is a limited availability of production assets – coal mines – and where traders can easily be prevented to access sourcing. This reason also explains why, in this situation, trading companies cannot only rent certain assets but must acquire them to gain control and market their own production.

Strengthening the supply chain can also be done with storage facilities as Mr Rob Nijst, CEO of VTTI, explained to the AGEFI (De Joncaire 2013a). The objective of developing crude oil storage facilities in strategic locations such as Rotterdam and Fujairah (U.A.E) was to control supply with storage located near major production or consumption hubs. By storing reserves, VTTI helps to reduce the volatility of supply

[23] Commodities are driven by different market fundamentals, which are not equally correlated. This becomes a challenge since, as we have discussed, commodities, in particular within the same group – energy, agricultural or metals – are becoming increasingly interconnected.

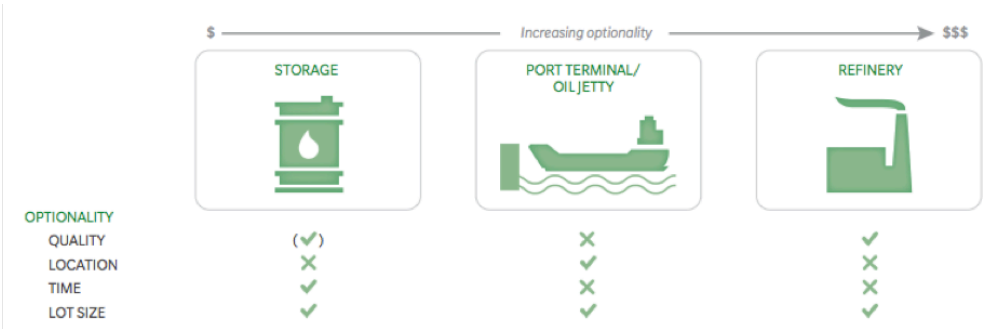
due to production, transportation or refining delays. In addition, it can allow Vitol to absorb consumption fluctuations due to seasonality. Storage tanks bring stability and reduce uncertainty for various actors, which foster their autonomy vis-à-vis markets. It is therefore a strong advantage for Vitol, who can, in turn, provide this service to its clients.

As sometimes, dysfunctions in the supply chain can happen, storage facilities can help to prevent delayed access to goods. We know that in order to benefit from supply and demand imbalances, traders must be able to timely access storage products. However, as Professor Craig Pirrong explains, when external suppliers operate storage, the facility operator might have a bargaining power and threaten to delay access to goods (Pirrong 2014). This argument also applies to port terminals, which require unplanned and quick access as well as efficient operations. Oppositely, the bargaining power of an asset owner is less important for oil tankers. As this market is very liquid and it is easy to find vessels to charter, the strong competition prevents carriers to put pressure on shippers.

D) Strengthen optionality

Global economic conditions have changed dramatically in the past years as we have seen with the rise of China, or the shale gas revolution in the United States. Established trade flows are evolving at a quicker pace than it was before and, to be successful, traders need flexibility to react promptly to structural changes. With industrial and logistical assets, traders are capable of reacting rapidly to an instable environment and shifting markets. This is something heavier structures such as national oil companies, oil majors or investment banks who own physical assets have more difficulties to do. According to their functions and characteristics, each type of asset will improve traders' optionality in a different way. The more options traders have, the more flexible they will be to take advantage of market opportunities.

FIGURE 10 - OPTIONALITY OF PHYSICAL ASSETS



Source: Meersman, Rechtsteiner, Sharp 2012

Optionality of storage facilities

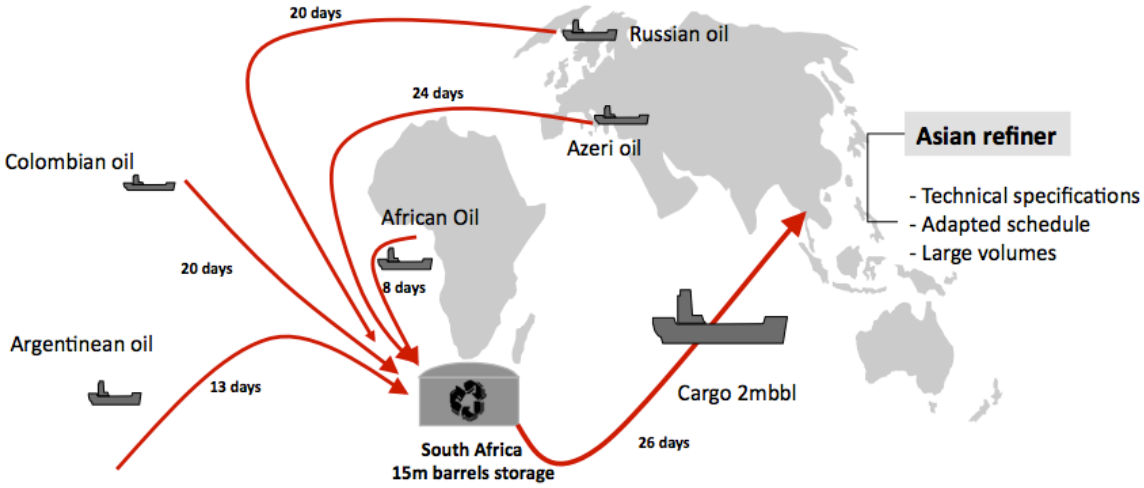
Storage facilities, for example, provide traders with the advantage of being able to react quickly to market imbalances by holding on to the goods. In situations of shortages in supply when demand is unexpectedly high, traders who dispose of commodities stored at the right location will be able to take advantage of prices fluctuations and extract an extra margin if they can rapidly dispose of their inventory (Meersman, Rechtsteiner, Sharp, 2012).

Time optionality: Storage facilities provide options to take advantage of spreads between prices for immediate delivery and prices for delivery in the future. Certain commodities are subject to seasonal price fluctuations. Even though it is more common to see such trends in soft commodities, for which the level of supply is linked with seasonal harvests, such seasonality also exists in energy commodities. It is the case for the demand of Californian gasoline, which is a special blend that is only produced in local refineries (Meersman, Rechtsteiner, Sharp, 2012). In winter, demand expectations are low, and traders may be willing to buy gasoline and store it until the summer, when demand and prices will be higher. With storage facilities, traders have the option to choose between selling now and storing to sell later.

Quality optionality: Traders also have options in terms of quality with the blending possibilities offered by storage facilities. For certain commodities such as oil, it is possible to blend products from different sources to obtain different specifications. The proportion of sulphur in crude oil is important because refineries are often not built to process all types of crude oils. Despite the fact that the most modern refineries can process a wider range of products, most of them are specialized in certain grades. It is therefore crucial for refiners to obtain the grades that correspond to their capacity and traders can provide added value with the options they offer through their services. With blending activities, trading companies are able to take advantage of price differentials between crude oil grades to create new qualities with matching technical specifications at cheaper prices than those refiners could find in the market. Thanks to large tank storage facilities owned in South Africa, Mercuria has been able to create new blends of crude oil that were not available in the market, using crude oil from different locations including grades sourced in Argentina, Colombia, Russia, West Africa and Azerbaijan. The new oil technical specifications matched the demand of an Asian refiner, at a better price than existing alternatives. In addition, with its control of logistics (access to supply, transportation, storage and blending facilities), Mercuria was able to provide adapted delivery schedules and large volumes to its client. The blending expertise of

the trading company enabled it to provide customized service, adding great value to the pure trading activity.

FIGURE 11 - MERCURIA'S BLENDING OPERATIONS



Source: Jaeggi 2013

The complexity of the operation did not involve only the blending part. In order to be able to source and transport the other crude grades, the global network of Mercuria was key to make the operation economically viable (Jaeggi 2013).

Lot size optionality: The previous example of Mercuria's blending operations also underlines the importance of storage facilities in relation with lot size optionality. Asian refineries, which requires continuous and large supply, are a typical example of the value added that could be provided by traders owning physical assets. Cargoes of 2 million barrels cannot be supplied by small nearby producers and delivered at the same time in one lot. With large storages facilities in South Africa, Mercuria was able to buy multiple small cargoes and deliver them in one lot to the refinery to accommodate needs specific to the refining business. Traders can also provide the opposite service, by buying large quantities of a commodity and divide it in smaller cargoes to be delivered in locations where the infrastructure cannot accommodate large ships. By handling these logistical operations, traders can provide customized services and charge extra fees.

Optionality of refineries

Quality optionality: Refineries provide the greatest optionality in terms of quality as they enable traders to take advantages of price differentials between inputs and outputs.

According to price spreads and market trends, refineries can adapt their transformation activities to use different qualities of products. Biofuels refineries, such as those owned by Mercuria, provide flexibility as they enable traders to take advantage of the price spreads among different substitutable agricultural commodities that constitute the feedstock. Depending on market prices of each commodity that can be used to produce biofuels, traders can benefit from multiple opportunities of capturing margins. In addition to increasing flexibility, being a biofuel producer also provides a diversification of activities, which reduces risk and gives a better control on quality.

Lot size optionality: Since refineries have large storage capacities at disposal, they can also break bulks to adapt lot sizes and provide the same benefits as storage facilities.

Optionality of port terminals

Location optionality: Port terminals are key elements in the logistical chain of commodities trading. They provide optionality by giving traders access to regional markets, or to import and export platforms in regions where the infrastructure in place could not allow large vessels to berth. As trading flows are moving, logistics are not always adapted to new requirements. This situation can create bottlenecks, which trading houses can partially remove by investing into terminals and extract an additional margin. In certain locations, terminals have been built by trading firms to accommodate larger ships, which enabled them to make exports from these regions economically viable as they reduced handling costs per metric ton. Port terminals are directly linked with the transportation system and are essential for geographical arbitrages.

Lot size optionality: Since they are located in strategic transportation hubs, port terminals are built with large storage facilities, which also enable their owner to break up large cargoes into smaller quantities and extract value by distributing it on the domestic market (Meersman, Rechtsteiner, Sharp, 2012).

In summary, optionality enhances flexibility and enables traders to react more quickly to take advantage of an arbitrage opportunity or a market imbalance. In order to benefit from these situations, trading companies need to be able to coordinate a global network of logistical and industrial assets.

E) Improve credibility vis-à-vis counterparties

For traders' business counterparties, owning assets such as refineries also inspires confidence and helps to build credibility. With the knowledge and expertise being retained internally, traders have a better control on operations and can guarantee

reliable activities, tailor-made services such as special delivery schedules or customized quality specifications (Lioud 2013a).

In addition, from a financial perspective, fixed assets are also valuable for potential lenders as it can be seen as a mean to bring stability in the balance sheet. Investing in physical assets can have an influence on credit ratings, to obtain bank loans or credit lines. Long-term resources can bring trust with counterparties and strengthen the financial position of trading firms.

Finally, owning fixed assets can also help energy trading companies to raise capital without threatening the independence of the trading house. If they are able to develop their subsidiaries and increase their value, commodity trading firms may have the opportunity to attract investors and sell part of their industrial or logistics businesses in order to allocate capital to other projects.

F) Optimize the supply chain

In an industry that is driven by cost optimization and where profits are made on volumes, economy of scale is an important factor in the reasoning of trading houses when it comes to reducing transaction costs of commodity flows. By acquiring physical assets, traders are able to optimize their value chain at many levels and improve the efficiency of their operations.

Owning and operating port terminals is one way to optimize the supply chain of commodities. By having a direct control on operations, trading companies can, for example, improve loading and unloading processes (De Joncaire, 2013a). In modern countries, it can be of a lesser importance as operations are generally already well managed. However, owning terminal facilities in busy ports where delays can occur, such as Rotterdam, will give the priority to the vessels chartered by the trader who owns the terminal and enable this company to gain time. In places such as Lagos in Nigeria, where operations are not always optimized, controlling operations at terminals can also represent a potential gain of time.

The objective of Vitol's terminal arm, VTTI, is to provide better and quicker conditions in the terminals they own than in other terminals, as well as the flexibility and the reliability required by the needs of a trading house. In addition to optimized activities, the trading house will also contribute to implement and raise health and safety standards in operations. In its subsidiary's facilities, Vitol applies European quality standards, including control of greenhouse gas emissions. Inspection risk is also an element that can be better managed when owning a terminal. With its subsidiary Impala, Trafigura

acquired the Burnside coal terminal in Louisiana in 2011. Following the transaction, the company invested to upgrade the facility into a state-of-the-art complex. With the new equipment, the company will gain control on the inspection procedures and reduce the risk of sampling bias.

Another example of operations optimization is the development of Trafigura's subsidiary Puma Energy. The distribution company has experienced a large growth in recent years, driven by Trafigura's appetite for assets acquisitions. In addition to providing access to energy supply, Trafigura also implemented an integrated operating model. Puma Energy invested massively in improving the performance of systems, such as stronger logistics, IT, management and knowledge sharing, and replicated this successful model globally, in each country where it operates. The company also implemented ISO norms in terminals and storage facilities, which eventually raised the value and quality of assets in markets with high growth and where experience and knowledge can energise acquired assets (Puma Energy 2013a).

Improving ship-operating efficiency is another major challenge for the shipping industry of commodity trading. With the majority of international trade flows done by sea, and the bunker fuel prices having quadrupled since 2000 (Ballou 2013), efficiency management is under strong scrutiny and several maritime services companies, as well as trading companies, are trying to find innovative strategies to optimize shipping operations and minimize the use of energy. A solution to improve voyage planning is called "*Just-In-Time Shipping"* or "*Virtual Arrival*" and consists in reducing the speed of the vessel during a voyage to a port of destination that is usually congested. Instead of rushing to busy ports and wait because of delays, vessels would agree to reduce their speed, which will save a significant amount of energy and reduce fuel costs, and arrive at a later time when a berth is available (OCIMF 2010). This process can only be fully efficient if the vessel is guaranteed to have a berth available at the time he arrives at the port. In order to do so, traders that own terminals have the possibility to give priority to their vessels, and therefore optimize their operations.

When looking at trading companies' investments in physical assets, it is important to remember that they help to optimize infrastructure and improve inefficiencies. By solving bottlenecks, traders add value to the supply chain.

G) Create synergies

In addition to improving the efficiency and reliability of operations, physical assets acquisitions can create synergies within a trading group. Creating an interconnected web of assets that supports and enhances trading activities is a critical objective for

independent energy traders. For Trafigura, the synergies derived from the interconnection between components of the value chain constitute a key competitive advantage that must be sustained through a diversification strategy (De Joncaire 2013d). With its direct access to global markets, the company is therefore able to create synergies with its subsidiary Puma Energy by supplying its worldwide distribution network. (Puma Energy 2013a)

H) Increase volumes and widen sources of revenue

Ultimately, the ownership of physical assets will enable traders to increase the volumes of their trading activities by better sourcing commodities. Commodity trading being an industry where profits are made on volumes, by being active in more markets, traders can widen their reach and increase their bottom line.

Another value of logistics and infrastructure assets is the possibility for traders to offer more services to their clients. Having a global footprint and an integrated network of assets enables traders to offer customized solutions and to provide support at different levels of the supply chain. Capturing value from the place of production to the end-consumer increases the profitability of trading companies that are struggling with decreasing margins. By offering better conditions to their customers with extra services, trading companies are also able to obtain deals and secure sourcing, with the same objective of improving profit margins.

- *Take-away 4: What are the benefits that trading companies gain from owning these assets?*

To own and operate physical assets provide trading firms with several benefits, but each type of assets has different characteristics. Above all, Logistics assets create greater flexibility for trading companies, who can react quickly to market evolutions.

Another benefit of operating assets is that it enables to identify bottlenecks so traders can optimize the supply chain or create synergies within their group. Ultimately, the goal of assets acquisitions is to trade more volumes and provide additional services to customers. In markets where competition increases and margins are smaller, trading companies need to find alternative solutions to improve profit margins.

In general, physical assets enable traders to increase market knowledge and enhance their capacity to understand markets and trade flows, as well as interconnections among commodities. With regard to risk management, having assets at different levels of the supply chain, in different commodities and in different geographies is also a way to diversify and reduce risk.

3.1.3 Ownership structure

By analysing the assets owned by selected trading companies, we could identify different patterns with regards to their level of participation to the capital of acquired assets. These patterns can be divided into tree distinct categories. The strategic choice depends on several factors from the trading company point of view, such as its level of investment or its objectives:

- 100% ownership
- Joint ventures
- Minority interests

Full ownership is more likely to occur when the involvement and investment of the trading company are high, in terms of financing for example. It will ensure a total control of the asset and operations. However, such control might also be an additional risk that the trading company takes by being the only actor in charge, which can be problematic in the future, when the trading house decides to exit its investment.

Joint ventures provide a greater risk sharing instrument, as well as the ability to share experience and expertise with the strategic partner(s). As explained in a report issued by Ernst & Young (2011), there are multiple drivers behind the decision of entering joint ventures. For capital-intensive upstream projects, financing cannot always be done by a single entity. In terms of risk management, joint ventures reduce the exposure of companies. For trading companies entering unfamiliar fields, it also provides access to technology and resources that are essential to run such projects but are not yet owned internally by trading firms. Another benefit of joint ventures is that they allow trading houses to comply with regulations in certain countries, where foreign companies are required to partner with local entities to participate in the market. Joint ventures are a useful tool for traders to optimize their supply chain and develop their portfolio of assets. As a result, the oil and gas industry has seen a sharp increase in joint ventures partnerships in many markets in recent years (Ernst & Young 2011).

In many cases, acquiring only a minority interest can satisfy the objectives of the trading company. This level of ownership is sufficient to access information and to be present in a certain markets. The fact that traders can participate in the assets' activities is important, as they are able to gain knowledge and experience, for certain commodities or in certain locations. The percentage of the participation to the capital depends on the negotiation between the asset owner and the trading company. In production assets, for example, it depends on the willingness of the owner to give up the marketing of the supply in favour of the trading company, whose main concern

remains to be able to secure trade flows. The objective of the trader is to minimize its participation while being assigned the access to trade flows.

3.1.4 Divestment of other actors

It is important to consider the acquisitions of physical assets by trading companies in a more global picture to understand the dynamics of the energy trading industry. The involvement of independent trading companies in the supply chain must be analysed in parallel to the divestment, for different strategic reasons, of other actors such as investment banks and vertically integrated oil majors.

The former, following the financial crisis and an increased regulation, was forced to limit or exit its activities in commodity markets. The latter has been divesting mainly from downstream activities. For economic reasons, downstream activities have become less profitable than exploration and production activities upstream. Oil majors have therefore re-focused their business on upstream activities, where capital-intensive activities provide improved profits. To focus on strategic activities and regions, these actors have exited several levels of the supply chain, or certain countries, and have given trading companies opportunities to buy their assets. Similarly, independent refineries in Europe have experienced seriously diminishing returns, forcing refiners to shed capacities while others went bankrupt (Pirrong 2014).

As a result, many logistical and industrials assets were available on the acquisition market and were purchased by independent energy trading companies, who could extract added value thanks to their global trading network and their ability to supply inputs more efficiently. In addition, contrary to previous owners, trading companies see additional value of optionality in certain assets, which makes those assets more valuable for trading companies than for oil majors or independent refiners.

An important lesson of this Bachelor Project is that, when looking at commodity trading companies, it is important to consider the global picture with the specific situation and economics of other actors as well.

- *Take-away 5: From whom are commodity traders buying physical assets?*

Investment banks have reduced their exposure to commodities. At the same time, oil majors have also divested to focus on core competencies. Finally, several independent actors went bankrupt because of distressed assets that were not economically profitable. Consequently, many physical assets have been made available to trading firms.

3.2 Challenge of Financing

3.2.1 Traditional lenders

The financing of trading operations was traditionally secured by banks, as the capital and liquidities of commodity traders have always been limited. Since the 1980s, trade flows have been financed by credit lines, which are guaranteed by the commodity they finance as a collateral. The role of banks is not limited to commercial operations as they also support the organic growth of trading houses, the growth through assets acquisitions or the pre-financing of producers who need funds before they are able to produce and sell raw materials.

However, following the 2007-2008 financial crisis and a new set of regulations (including the Dodd Frank Act*, the Volcker Rule* and Bâle III*), banks reduced their capital exposure to commodities and the financing of trading operations was reduced dramatically. As reported by Yves Simon (Simon 2013), BNP Paribas, one of the most active banks in the financing of commodity trading, announced in February 2012 the sale of a portfolio of credit lines in favour of American and Canadian oil companies for an amount of $9.5 billion. Crédit Agricole had the most extreme reaction as it decided in December 2011 to stop all activity related to commodity trading for its own account. The consequences of the *credit crunch** were severe for the largest independent trading houses, who had to find alternatives, and dramatic for smaller entities as many of them went bankrupt or were acquired by their competitors.

The situation improved later as some commercial banks resumed their financing activity. However, their risk profile had changed and trading houses understood the need to find alternative sources of financing.

3.2.2 Increasing needs

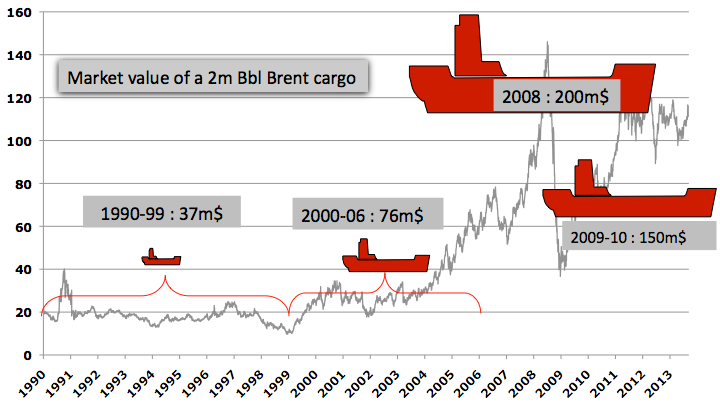
Since the middle of the 2000s, trading houses have seen their financial needs rise sharply for two main reasons: a growing appetite for physical assets acquisitions and the increasing price of commodities.

At the time banks reduced their financing of commodities, trading houses' appetite for capital increased dramatically as they started to invest significantly in logistical and industrial assets. Traders' business model has been changing and they are moving away from their traditional role. As commodity traders are becoming increasingly more integrated vertically, they seek long-term investments at different levels of the supply chain, from exploration and production to refining and distribution. These investments,

coupled with the financial situation of the past few years, accentuated the need for traders to find new solutions to raise funds and increase equity capital on the long run. "*C'est un nouveau défi*" (Simon 2014).

The second reason for the increase in financing requirements is the increasing price of commodities and the growing need of liquidities. This argument can be illustrated by the example given by Mr Daniel Jaeggi (2013) of a common operation in crude oil trading. The price for Brent* has continuously increased since 1990 and reached its peak in 2008. The following graph shows evolution of the financing required for a shipment of 2 million barrels of Brent crude oil. The average market value of this cargo was $37 million in the 1990-1999 period. In 2008, the same cargo was valued at $200 million.

FIGURE 12 - INCREASED FINANCING NEEDS FOR CRUDE OIL CARGOES



Source: Jaeggi 2013

Though renewable, the credit lines that traders had with banks were pushed to record heights but could not be extended infinitely at a time when the financial system was unable to provide additional funds.

At this point, we are able to distinguish the two factors of the increase in financial needs. On one hand, the increasing price of commodities is a short-term need that can be satisfied by short-term loans for commercial activities, *liquidities*. This is part of the working capital, which enables to finance trade flows on a limited time frame. On the other hand, the acquisition of industrial assets requires a longer investment that cannot be only supplied by short-term bank loans.

3.2.3 Alternative sources of financing

The inability of traditional financing partners to satisfy alone a growing demand led traders to look for new alternatives and diversify their sources of financing. To fuel their growth, traders could not only rely on borrowing, which was sufficient so far to fund their trades, but rather started to seek long-term access to capital. To acquire storage capacities (around $20 million for 400,000 barrels capacity[24]), port terminals (between $50 million and $200 million for 150,000 barrels per day capacity) or refineries (more than $500 million for 100,000 barrels per day capacity), trading houses now need to access hundreds of millions of dollars for long periods.

The first way to get financing is the listing of the company on the stock exchange to access capital markets. This is the choice that Glencore has made as it raised its equity by $10 billion in 2011 with an initial public offering* (Riseborough, Wu 2011). In his article on unregulated finance, Yves Simon (2013) identifies four benefits of being publicly listed for a trading house. First, it obviously raises capital and eases access to funds. Second, it forces a company to be valued. This provides useful information that can ease further emissions of bonds. Third, it eases acquisitions of other entities with facilitated capital increases. Lastly, it constrains the company to open its books and to share substantial financial information. In its article, Simon argues that being scrutinized by many financial analysts could prove useful for the company. However, the main drawbacks of being publicly listed and the main reasons that refrains several trading houses to follow Glencore's example are the obligations to disclose financial information and the loss of control in the decision process that comes with bringing in external shareholders who have shorter-term concerns.

These reasons explain why independent traders are seeking other ways to access financial resources. The second solution is to target bonds markets in an attempt to increase capital without diluting the control of the current shareholders. Trafigura confirmed that it will not get listed on the stock exchange and keep its current employee ownership (Trafigura 2013a). However, the company still needs funds to continue its expansion into industrial assets and raised €500 million with a bond issue in 2013 (Hume 2013a). This operation could be the first of many as the Chief Financial Officer of Trafigura declared in an interview in 2012 that the trading house will become a regular issuer of similar bonds (Pellegrinelli 2012). Other independent traders such as Gunvor or Noble Group have followed. According to the Risk Journal, by issuing

[24] Estimates from Meersman, Rechtsteiner, Sharp 2012

bonds, these three companies have raised together an amount in excess of $2 billion in 2013 (Frankl, Rechtsteiner, Sharp 2013).

Third, securitisation can help traders to meet their financing needs. This consists in the funding of receivables. Once the obligation of a trading company under a sales contract has been performed, the company can seek investors to fund a portfolio of receivables that are secured by a collateral. This process enables trading firms to rotate credit lines more quickly and finance other activities (Trafigura 2013a).

A fourth alternative to bank borrowing is to sell stakes in subsidiaries. This allows trading houses to protect the independence of their trading business – their core activity – while still benefiting from external investors and grow further. Trafigura decided to sell a large stake of Puma Energy for $1.43 billion (Zhdannikov 2013a). Similarly, Mercuria also opened up to external investors when it sold 50% of its Vesta Terminal business to form a joint venture with Sinopec Kantons in 2012. This deal is said to be worth €128.6 million paid in cash and values Mercuria's terminal business at $442 million (Blas 2012b).

Lastly, traders are also evaluating a fourth alternative, which consists in selling minority stakes of their trading arm, their core activity. It is the case of Mercuria, whose CEO Mr Marco Dunand declared in 2011 that, even though the company was not considering an IPO*, it has evaluated the potential of long-term private-equity investments. (Schneyer 2011). In 2013, Mercuria concretised this interest as it appointed Credit Suisse for a partial sale to institutional investors (Blas 2013a). This last way to increase private equity requires a long and cautious approach for companies that are seeking long-term partnerships. It is not an easy task to find and evaluate a single – or a group of – investor(s) that will share the corporate culture and have the common long-term objectives that are necessary to become the right strategic partner.

3.2.4 Consequences of external financing

Most trading houses have clearly identified the need for increased equity and financial resources. Their approaches differ with regards to the different options that are available to them. When they decide to open their capital to external investors, traders (with the exception of Glencore who decided to be publicly listed) tend to favour "patient investors" (Simon 2013) who are willing to take a longer interest in the company and will not be pressing for short-term objectives. Traders have turned to sovereign wealth funds and private equity funds (Blas 2013c), many of them having already taken stakes in trading companies.

Even though traders tend to turn more often to alternative sources of financing, many of their acquisitions of physical assets are still financed by banks, which have always been the first financial partner of merchants. However, as traders' involvement in the supply chain has evolved, the relationship between traders and bankers also needs to be adapted to the new needs of the industry. The business of trading houses cannot only be addressed with the same logic as project finance for industrial assets since this view does not take the business model of trading companies into account.

The example of Mercuria's acquisition of a biodiesel plant in Europe illustrates this new challenge. When buying this industrial asset, the primary purpose of the energy trading company was not to focus on the refining margins. These margins being often insufficient to make profit on the refinery only, this acquisition must be considered as an addition to a global network. A biofuel refinery acquired by a trading company might not, as such, provide high returns, but its value-added to the *portfolio* of the company might be useful to optimize trading flows (Lioud 2013). Even when operating at a negative margin, the additional benefits that such refinery would provide to the trading house make it able to absorb the loss. Optionality is, again, an essential element of the business model of traders such as Mercuria. Therefore, their activities should be assessed by considering this "portfolio model", which is composed of logistics and industrial assets, commodity flows and financing activities. With this model, commodity trading houses have access to an investment platform with different tools to take advantage of arbitrage opportunities. Therefore, banks and lenders must understand this business evolution and adapt their financing to complex operations.

- *Take-away 6: How do commodity traders finance assets acquisitions?*

The financial crisis has also had negative effects on the ability of trading companies to fund their acquisitions or find sources of liquidity. At the same time trading firms' needs increased, banks and financial institutions reduced their activities and exposure to commodities. Energy houses found alternative sources of financing, by becoming listed on the stock market, by targeting bonds and securitisation markets, by selling stakes of their subsidiaries or by bringing new long-term investors in.

3.3 Challenge of Integration

It is essential to understand the value of physical assets and the benefits they bring to commodity traders. On the other hand, it is also interesting to understand what is the value added by trading firms to their acquisitions when they integrate physical assets.

When discussing with Mr Benoît Lioud, he explained that Mercuria is willing to take an active role when buying assets. The trading house does not want to act only as a "bond holder" looking at an investment that will bring a yield, but rather as an asset that must be operated and integrated in order to add value to both sides and create synergies. Mercuria is also looking at what value or competences the company can bring to potential acquisitions. Above all, traders bring a portfolio where assets will find a way to bring a value added. To be part of an integrated network is essential for certain assets to become fully efficient and profitable. There are also other ways to maximize the value of an acquisition and structure a partnership. It can consist in providing additional pre-financing solutions or sharing managerial skills. In addition, when trading companies manage the output of a producing asset, their presence will increase the credibility of the asset and facilitate bank financing.

To integrate successfully purchased assets, trading companies must also mitigate additional risks and face new challenges:

A) Mitigate increased risks

Generally speaking, large energy trading companies have always been involved in the logistics of trade flows, and are therefore already exposed to operational and country risks. By entering into industrial activities, the level of risk to which these firms are exposed is increased, but the nature of the risk is the same and risk management is already a key activity undertaken by trading houses. The new dimension of country risk is particularly significant when investing in upstream projects in certain developing regions as many countries are politically unstable and require constant attention when measuring and mitigating risk. New risks such as expropriation must also be considered.

In order to manage risks, it is necessary to identify, measure and mitigate them carefully. Some risks that commodity traders are not willing to bear can be transferred to third parties (through insurance contracts, or by using bank instruments such as documentary credits*). However, not all risks can be covered with insurances and it then becomes necessary that trading firms implement standards, procedures and policies to manage, for example, risks linked with industrial activities. If transportation and storage activities are well known by energy trading firms (storage facilities can be relatively well controlled with the assistance of established inspection companies), industrial activities add a new dimensions to risk management. To address this issue, companies such as Trafigura have implemented group-wide initiatives to mitigate risks linked with health, safety, environment and community (Pirrong 2014). To manage risks

that are not transferrable and could be damaging to the reputation of companies, best practices, compliance and management initiatives are essential.

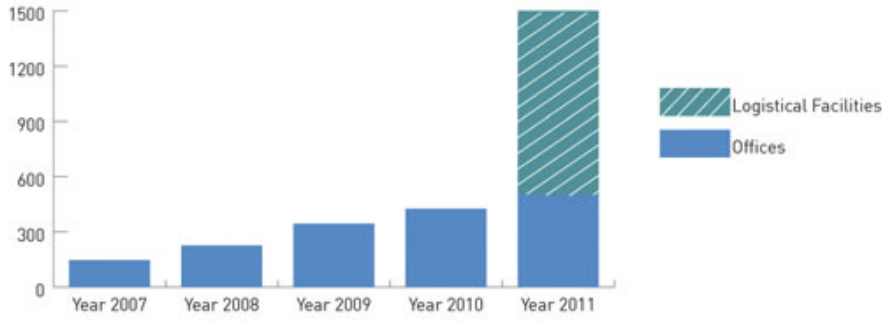
B) Long-term commitment of capital

Commodity trading is an activity that traditionally requires short-term capital for transactions that last for few months, if not less. When entering into long-term projects of physical assets acquisitions, traders have to find solutions to absorb long-term commitment of capital and find alternative funding solutions to be able to cover the high investment costs of industrial projects.

C) Expansion of companies' headcounts

The size of trading companies' organisation is often relatively limited with a small number of employees in comparison to industrial activities. When they acquire logistics and industrial assets, trading firms see their headcount expand rapidly, as we can see on the graph illustrating Gunvor's headcount evolution over the past few years.

FIGURE 13 - MANPOWER GROWTH FOR GUNVOR GROUP



Source: Gunvor 2014

One consequence of this evolution is the need for commodity firms to develop management, by implementing good working practices and processes, to optimize operations on a larger scale. As they will also be exposed to different cultures and behaviours, trading companies must set clear objectives and expectations and be ready to take time to adapt their message to their new partners.

D) Integration of new competences

When traders moved away from their *pure trading* model and increased their global reach along the supply chain, they also entered into business areas that were less familiar to them. The skills necessary to acquire and operate industrial assets are not the same as those required for trading activities. An important step of the integration of

industrial assets into the portfolio of energy trading companies is the addition of complementary competences and expertise within the trading house. In terms of operations, investments in physical assets imply that traders have to coordinate their competences with those of their partners in order to optimize these assets.

For example, managing oil storage and blending facilities cannot be done without taking chemical and legal issues into consideration, as well as the economics behind blending activities. Refineries require very specific skills to be managed, skills that have not been traditionally part of the trading activity. As for the traders themselves, the integration of physical assets into their business structure modifies and creates new dynamics that must be learned and understood to be able to take advantage of opportunities and secure benefits from the wider range of options that became available (Meersman, Rechtsteiner, Sharp 2012).

The complexification of energy trading activities and the impact on the competences required to trade commodities has made talent recruitment and retention critical for independent energy traders. By acquiring the expertise that is capital to the trading activity in various fields such as logistics operators, electric network specialists, meteorologist or refinery managers (Dunand 2014), traders are able to strengthen their flexibility and optimize trade flows. However, it is important to note that not all of the competences needed by traders present at different steps of their value chain must be owned internally by trading companies. When assessing potential acquisitions, they will be assisted by consulting experts in order to determine the potential and value of a prospect. After the deal is concluded, the knowledge of the new partners will also benefit the trading parent in a knowledge sharing and learning process.

The internalization of competences will only come gradually at a later stage when the recurrence of activities will justify it. The mix of skills, expertise and experience used by trading companies to assess, acquire and operate physical assets is therefore both internal and external to their organization. Lastly, it is mandatory that a strong emphasis is put on communication between traders and managers of industrial assets. Even though they are part of the same industry, traders and managers (of a refinery, for example) have two different business approaches. The culture of traders and the industrial expertise of managers can become complimentary but only under the condition that they share common objectives. Trading houses have specific needs which refinery managers have not always been exposed to and that might be counterintuitive to them. Refinery managers must understand the dynamics of a trading company with regards to commodity flows. By communicating constantly with their

partners, explaining their way of operating and letting everyone understand their purpose and objectives in relation to a given asset, trading houses can ensure acquired assets are operated in a way that adds value to their portfolio of options.

When integrating physical assets, trading houses may also face difficulties to find certain competences locally. As highlighted by VTTI's CEO Rob Nijst (De Joncaire 2013a), it is particularly the case in Africa, where ahead planning is required to recruit people on site and train them abroad on other facilities already in operation. This example illustrates the willingness of trading firms to benefit from local expertise, which cannot be done without a strong input from the headquarters to bring knowledge and experience.

E) Capacity to exit investments

Trade flows, bottlenecks and arbitrage opportunities are moving, and they all have a limited lifespan. Consequently, assets acquired are also likely to exit the portfolio of trading companies after a certain time and to be resold. Depending on the ownership structure, exiting physical assets investments can reveal more or less complicated.

Joint ventures being commonly used by trading companies to acquire full or partial interest into physical assets, it is interesting to address the exit mechanism. Ernst & Young report (2011) identifies three distinct exit situations: (1) to sell the joint venture to a third party, (2) to sell the joint venture to one of the partners or (3) to separate the joint venture and share assets between the different partners. Even though the last option is potentially the most complex joint venture dissolution process, we can consider that it is a less common situation. When trading companies decide to exit an investment, it is likely that they will not be willing to keep only a part of the assets and would rather sell the joint venture to their partner or a third party.

With regards to exiting assets investments, the case of Noble Group is of a particular interest. The company's stated strategy vis-à-vis investments in physical assets is defined as "*assets re-cycling*" (Noble Group, 2013; 2012; 2011). It consists in focusing on investments in assets that enhance the company's trade flows and distribution channels, but without the willingness to keep them on a long-term basis. Noble Group is willing to remain relatively asset-light and will, once an acquisition has been integrated and developed, reduce its capital exposure by selling its shares in the subsidiary. This strategy is consistent with the nature of trading activities, as the objective of trading companies is to secure trade flows. By re-cycling assets, Noble Group is able to reduce its capital exposure and use it to develop other assets, while having secured trade flows that it will continue to market.

F) Increased tax complexity

From a tax perspective as well, the integration of physical assets brings an additional level of complexity. As global and diversified companies, commodity traders are operating in many countries with different legislations and tax regimes. Entering into acquisition of industrial and logistics assets brings an additional layer of tax complexity that must be mastered by large energy trading firms. Such actors have already taken necessary measures with the development of experienced tax departments and by working closely with audit and consulting companies locally. To this respect, global tax strategy and centralized teams can prove key to manage increased tax complexity successfully (KPMG 2012).

G) Information Technology as a key asset

IT resources can empower communication and information gathering & sharing. To take full advantage of the different options of the value chain, information is critical to the decision-making process of traders. The integration of physical assets to trading houses cannot be maximized without integrated IT solutions that will reduce the complexity of systems and allow a higher profitability of the whole chain. Trading activities have become more complex and diversified. Consequently, the information handled by IT systems has also reached a global scale. Gathering and processing information from different regions, commodities, subsidiaries and time zones is a challenging exercise that is essential to the coordination of daily activities. It is therefore not surprising that, according to Deloitte's report *Trading Up*, IT costs for diversified trading companies are now a significant proportion of total costs (Deloitte 2013).

- *Take-away 7: What are the risks and challenges associated with ownership of assets?*

Energy trading companies have always been exposed to operation and country risk due to the nature of their business: physical movement of goods. By engaging into physical assets ownership, traders must mitigate an increased level of risk, but the nature of this risk is similar to what they have been used to face.

There are several trade-offs that trading companies investing upstream or downstream have to consider. Assets ownership requires commitment of capital for a longer term than traditional short-term trading operations. It also brings a need for acquiring new competences – internally or externally – and an increased level of tax complexity.

3.4 Vertical integration in the energy industry

Following multiple acquisitions of physical assets by trading companies, much discussion focused on the increased integration of traders in the supply chain. The term "*vertical integration*" has been repeatedly used to describe traders' acquisition strategy. According to the analysis and findings that came out of this Bachelor Project, there are different profiles of energy trading companies that require more explanation.

3.4.1 Definition of Vertical integration

Vertical integration is described as a form of corporate strategy that consists in "*entering activities where the organisation is its own supplier*" (Johnson, Whittington, Scholes 2011). By investing in assets or by acquiring subsidiaries, a company will expand its scope of activities and become involved at different stages of the value chain. In the energy industry, vertical integration can follow two different paths. When investing upstream, a firm will develop its business by integrating activities related with its inputs. On the other side of the supply chain, when a company invests downstream, it will acquire activities in relation with its outputs.

Vertical integration is considered when economies of scale can be realised to gain efficiency by controlling different stages of the value network. Firms successful at owning a great part of their supply chain extract additional margins that would otherwise be part of the profits of the companies to which they outsource the activities that are not their core competences. Fully vertically integrated companies, in theory, would own and operate all the different industrial and logistics assets, from production to distribution to the end customer, for a given commodity, in a given market.

3.4.2 Traders' integration model

Recent developments in the energy environment have demonstrated that complete vertical integration is not a solution synonym of sustained growth and increased profits. International oil majors have historically invested heavily at different levels of their supply chain to integrate more activities but they have recently divested from existing businesses to adopt different strategies, such as focusing on upstream activities that are more capital-intensive.

Even though it is correct that trading houses have benefited from majors' divestures, their approach is opportunistic rather than relying on a vertical integration strategy. The objectives of independent energy trading regarding physical assets acquisitions are different and are more accurately defined as a diversification strategy, or

"*horizontalisation*" as would Mr Marco Dunand refer to (Dunand 2014). The dynamics of trading companies are different from those of extraction or distribution industries. For energy trading firms, physical assets must first bring flexibility and optionality to support trading activities, whereas relying heavily on vertical integration would make corporate structures heavier and less adaptable to changing trade flows and markets trends. An interesting indicator of a company's level of integration in the supply chain is to compare the assets reliance of firms in the energy industry (see Figure 15). With the possible exception of Glencore, the profile of independent traders, who have relatively low reliance on fixed assets, is very distinct from the one of national producers or international oil companies that are significantly more vertically integrated.

It is also important not to give a unique description of traders' integration in the supply chain since every company has a different profile and a different business approach. The following graph gives a global representation of energy traders' activities.

TABLE 3 - TRADING ACTIVITY AND PHYSICAL ASSET OWNERSHIP

		Corn	Wheat	Oilseeds	Cotton	Sugar	Cocoa	Coffee	Industrial Metals	Iron Ore	Petroleum	Coal	Natural Gas	Power
		Soft							Metals		Energy			
Glencore	Trading	x	x	x	x	x			x	x	x	x		
	Upstream								x		x	x		
	Midstream	x	x	x		x			x		x	x		
	Downstream			x		x			x	x				
Gunvor	Trading											x	x	
	Upstream										x	x		
	Midstream										x			
	Downstream										x			
Mercuria	Trading	x	x	x					x	x	x	x	x	x
	Upstream										x	x		
	Midstream										x	x	x	
	Downstream													
Trafigura	Trading								x	x	x	x	x	
	Upstream								x					
	Midstream								x	x	x	x		
	Downstream										x			
Vitol	Trading										x	x	x	x
	Upstream										x	x		
	Midstream										x	x	x	
	Downstream										x			
Noble	Trading	x	x	x	x	x	x	x	x	x	x			x
	Upstream			x				x		x				
	Midstream	x	x	x	x	x	x	x	x	x	x			
	Downstream			x		x		x						

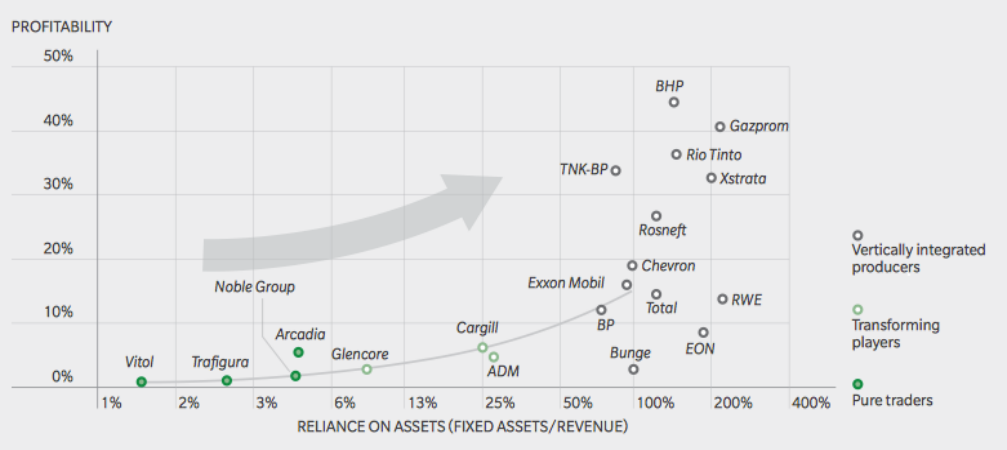
Source: Pirrong 2014

The business model of trading companies such as Mercuria, for example, is not to be integrated at every level of the supply chain (as vertical integration would mean) but to have a diversified presence and activities at strategic places in the supply chain. In addition to reducing risks, investing in different sectors, markets and commodities creates the opportunity to spot value and provide extra services throughout the value chain (Pictet 2013). With regards to the objective of diversification, vertical integration represents a greater risk than having a presence only at some levels of the value chain. In vertical integration, all the investments in physical assets for a given commodity, in a given market, would be subject to similar (and correlated) market fundamentals.

A characteristic of energy commodities, in particular in the oil industry, is that trade flows as well as supply and demand patterns are constantly evolving. The booming energy demand in Asia during the last decade, or the recent shale revolution in the United States on the supply side are two examples among others that demonstrate the flexibility and reaction capacity required to succeed as a trading group. Consequently, the structure of trading houses and their approach to assets acquisition must take into consideration the constant evolution of the economic environment, as well as geopolitical factors that have a significant influence on the supply side. The situation in soft commodities is somehow different, as trade patterns have a longer-term horizon. In agriculture commodities, it is therefore more common to see vertically integrated trading companies reduce transaction costs and maximize margins throughout the whole supply chain by owning farms, logistics and processing facilities.

3.4.3 Consequences on trading companies' balance sheet

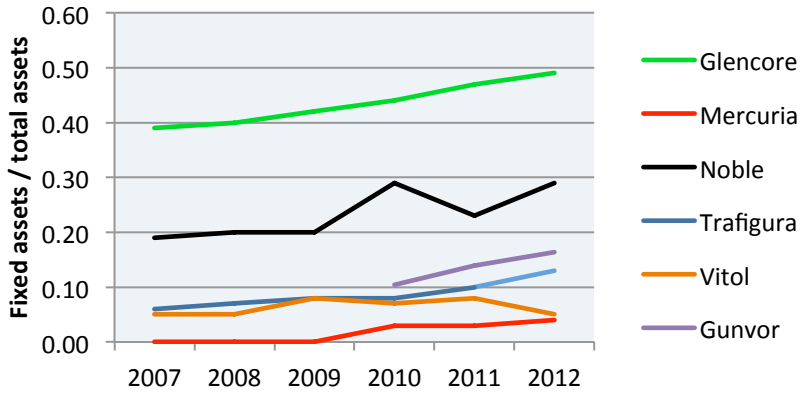
FIGURE 14 - PROFITABILITY AND RELIANCE ON PHYSICAL ASSETS



Source: Meersman, Rechtsteiner, Sharp 2012 (2008-2010 average)

Independent energy trading companies, who have historically relied upon “pure trading” and assets-light structures have also been the companies with the smallest margins, as the opportunities for profits were limited to their trading activities, in comparison to mining companies, pure producers or international oil companies that have a direct access to oil fields and focus on producing activities, which generate higher returns.

FIGURE 15 - RELIANCE ON PHYSICAL ASSETS



Source: Pirrong 2014

As trading companies grow bigger, they are diverging from a complete pure trading model with no fixed assets and close the gap with vertically integrated producers. In order to try to quantify their integration in the supply chain and draw different profiles of companies, one indicator is the comparison of fixed assets (including plant, plant and equipment) as a proportion of total assets, as well as the evolution of the firms’ reliance on non-current assets over the years.

The first point to be made is the upward trend of almost all of the selected trading companies since 2007. Except Vitol, whose fixed assets intensity increased in 2009-2011 before returning to the level of 2007 with fixed assets representing just 5% of total assets, all other firms have regularly increased their reliance on physical assets as they invested in the supply chain.

The second observation is the separation of energy trading companies into two distinct groups. The first one is composed of trading companies that focus essentially on oil trading and oil-related assets (as well as some limited interests into metals): Mercuria, Vitol, Trafigura and Gunvor. These companies are much less assets intensive than other actors, with fixed assets accounting for less than 15% of total assets, in comparison to a vertically integrated producer such as Lukoil, whose fixed assets account for 78.6% of total assets (Lukoil 2013). The second group consist of traders

that are less dependant on oil trading and more assets intensive. Glencore, who is much more integrated in its supply chain, has almost 50% of fixed assets as its business is importantly related to the mines it owns and operates.

There are two interpretations of the global picture of commodity firms in relation to vertical integration. First of all, we can divide the trading companies by the nature of their business model and the place they want to have in the supply chain. On one hand, there is the *merchants' logic*, which implies an asset-light structure. With this approach, trading companies need to be flexible and will rather take the lowest participation in physical assets. They believe that markets are quickly evolving, and that they will continue to evolve over the years. To be successful in a dynamic environment, these companies need to use their portfolio of assets to enhance their ability to react and adapt quickly. *If you wish to travel far and fast, travel light*. Trading companies with asset-light balance sheets (less than 15% of fixed assets) include Mercuria, Vitol, Trafigura and Gunvor. These companies do not bet on the level of flat prices, but rather on the fact that trade patterns and markets will continue to move.

On the other hand, there is the *producer's logic*, which implies having a strong control on upstream assets, such as mines or oil fields. These companies will invest significantly in physical assets, and move towards what we defined as *vertically integrated* groups. With this approach, it makes sense to be listed on the stock market, as these investments require long-term commitment of capital. Glencore's strategy corresponds to this model, with almost 50% of fixed assets and numerous investments in mines. The company is also willing to focus investments on oil. Glencore's CEO announced in 2013 that the company was going to invest $650 million in upstream oil business over two years (Hume, 2013b). Glencore's approach is based on the assumption that oil flat prices will be high in the future, in comparison to other commodities, and that the company can benefit from having a long position.

The second way of interpreting the vertical integration of trading companies is by comparing commodity sectors. Oil trading is driven by arbitrage possibilities across locations, qualities and delivery periods. Simplistically, traders will buy where it is the cheapest, to sell where prices are the highest. Trade flows are therefore likely to evolve quickly, and require more flexibility. In this industry, it makes sense to optimise the structure to be flexible to identify market opportunities. As we have seen, trading firms that are focused on energy commodities are less asset-intensive.

In soft commodities, agriculture trade patterns are usually well defined. Food habits are specific to each region, and are not likely to react to price fluctuations. Therefore, this

industry will focus on optimizing the existing trade routes and reduce transaction costs, by integrating components of the supply chain together. It is therefore likely that trading companies active in soft commodities will have an approach similar to a vertically integrated group. In fact, if we look at the *ABCD**, these companies are more asset intensive than oil traders, with 34.8% of fixed assets in average in 2012 (Pirrong 2014).

- *Take-away 8: Are commodity traders vertically integrated?*

Despite the fact that they invest in the supply chain, trading companies are not vertically integrated at levels comparable to those of oil majors or pure producers, and they are not willing to be. Even though Glencore is comparable to a mining group and has underlined its willingness to invest more in oil production, the majority of energy trading companies are keeping asset-light structures with less than 15% of fixed assets.

4. Case studies

4.1 Vitol & Trafigura invest in Australia

"Vitol buys Shell's Australian downstream assets for $2.6bn"

Jamie Smyth & Emiko Terazono, Financial Times, February 14, 2014

In February 2014, Vitol announced that the company had reached an agreement to purchase downstream assets in Australia from Shell. The deal, including the purchase of the Geelong Refinery near Melbourne, and 870 retail stations across the country, was said to be worth $2.6 billion (Vitol 2014b).

"Trafigura bets $800m on Australia Energy"

Javier Blas, Financial Times, February 3, 2013

One year before, in February 2013, Trafigura had announced a similar deal with the acquisition of two companies, including retail oil stations and a seaborne import terminal. The deals added 230 retails sites, storage facilities and import terminals to Trafigura subsidiary Puma Energy's already existing activities in the Australian market, as the firm became the largest independent fuel retailer of the country (Blas 2013b).

4.1.1 Australian oil market

The investments from Vitol and Trafigura come at a time when the oil industry in Australia is poised to change significantly in the next few years. The country, which is already the top importer of diesel in Asia, is expected to soon overcome Indonesia and become the region's first importer of petroleum products (Xie, Paul 2014). The already important energy demand in Australia (the island-continent is currently the third fuel consumer worldwide and has the second car ownership per capita) will continue to expand as the country's refinery capacity is quickly diminishing.

Ageing refineries in Australia are facing tough times as Royal Dutch Shell and Caltex, two of the principal refinery owners, have announced in 2013 the closure of two refineries (Blas 2013b). These old refineries required substantial maintenance and upgrading investments and oil majors were reluctant to conduct such investments in a market where refining margins are decreasing because of the intense competition of "mega refineries" in other regions of Asia. As a result of these closures, the refining capacity of Australia was reduced by one third (Blas 2013b) and the country is becoming a market short of oil products. From being self-sufficient at the beginning of

the 2000s, Australia is forecasted to be only 18% self-sufficient by 2030, which means the country will have to dramatically increase its oil imports (QER 2013) and become one of the rare products importer of Asia Pacific.

FIGURE 16 - AUSTRALIA'S FORECASTED DECLINE IN OIL SELF-SUFFICIENCY

Source: QER 2013

4.1.2 Rationale behind Vitol & Trafigura acquisitions

With their acquisitions, Vitol and Trafigura seek to take advantage of several opportunities in the Asia Pacific market. First of all, as a Vitol spokeswoman declared, the company will have the opportunity to use its "*ability and expertise to source crude*" better than its predecessor (Reed 2014). In contrast to majors, trading companies have access to a wider global network of options to source oil. Thanks to optionality, Vitol and Trafigura will have the ability to take advantage of their trading business to supply crude oil into Australian operations more efficiently. By adding Australian activities into their portfolio of physical assets, the traders might be able to get extra value in their supply chain and will not be dependent on refining margins only to make these investments profitable.

Another opportunity for Vitol and Trafigura in Australia is due to a market imbalance in the growing Australian economy, which a situation where traders usually thrive. The fact that the country consumes more oil products than it produces means that it largely depends on international trade to fulfil this mismatch. As international traders, Vitol and Trafigura can contribute to reduce this gap and will enhance their capacity to do so with downstream assets.

Finally, these investments must not only relate to national issues but should also be considered with regards to the global dynamics of the oil industry. Many big, ultra-modern refineries have been built in the past few years in Asia, particularly in China

and India[25]. These significant refining capacities additions will bring even more refined products in a region where oil market is already in a surplus. Consequently, importing petroleum products in Australia will become a profitable option and it is therefore understandable that two of the largest independent energy traders are willing to play in this market and have invested in logistical assets designed (or adaptable) to import oil and petroleum products.

Vitol, who is expanding its activities in the Asia Pacific region (Xie, Paul 2013), has also created a different option with its investments in Australia. The refinery purchased can also be used as an import terminal. Therefore, when importing crude oil in the region, Vitol will have the opportunity to decide whether they want to sell to big refineries in Asia, or process it in its own Australian assets and distribute products on the local market if the price structure is not interesting enough to sell it in Asia. As the United States might become self-sufficient thanks to the shale oil and gas boom, certain exporting regions such as West African countries will have to find other clients and Asia Pacific might become the main destination of sweet light crude.

At the same time that actors such as oil major or investment banks are reducing their activities in physical assets, this transaction reflects the increased involvement of energy trading in the supply chain. Vitol has been active and invested at different levels, including upstream, midstream and downstream activities. The addition of Shell's business to Vitol's portfolio complements an already well-developed presence in refining activities. The company already owns and operates three refineries in Switzerland, Belgium and the United Arab Emirates. In addition, Vitol entered into a joint venture in Africa, which is involved in downstream activities (blending plants and retail businesses in 14 countries) with Shell (Vitol 2011). Developing a network of downstream activities can provide profitable options for Vitol, as these businesses can be supplied by its trading activities.

An interesting feature to discuss regarding Vitol's investment is the fact that the company decided to keep Shell's brand, management and staff. The business being already well developed, the trader has no added value to bring with regards to the operations efficiency and management. The main value that the trading house will bring is its knowledge of trade flows and global markets, as well as the sourcing options obtained from its diversified network. This contrasts with other downstream acquisitions in emerging markets where, as discussed previously in this report,

[25] These two countries are planning to increase their refining capacity by 2.5 million barrels per day in 2014-2015 (Xie, Paul 2014).

investing trading companies are willing to train their own management to improve the efficiency of operations and bring higher quality standards. It is also different from Trafigura's investment in Australia, where the assets purchased were regrouped under the "Puma Energy" brand. This illustrates the different integration strategies of different trading houses. Even though they invest in similar regions and operations, they will all have their own approach and different profiles, which makes generalizations irrelevant.

4.1.3 Majors divest from downstream and focus on upstream activities

The divestment of major international oil companies from physical assets is a trend that has already been discussed in this report. This case study illustrates the strategy of an oil major with regards to its downstream business. Shell, among others, has been recently selling a significant part of its downstream activities as part of a new strategy. Many international companies are selling less profitable oil assets in order to focus on core activities that generate greater returns such are capital-intensive upstream investments.

With disappointing results in its European and Asian refinery businesses, the strong pressure from shareholders resulted in Shell's restructuration of its refinery business (Reed 2014). As part of its divestment strategy[26], the company recently sold refineries in Europe (United Kingdom, Germany, France, Norway and Czech Republic), where refining margins have been particularly low in the recent years, as well as other downstream businesses in Egypt, Spain, Greece, Finland and Sweden (Vitol 2014b). In regards to Shell's strategy, it is interesting to note that the company is only selling a part of its activities in Australia. It will still own, invest and operate in upstream operations, which are not impacted by Vitol's acquisition.

[26] Shell is planning to of $15 billion in physical assets by the end of 2015 (Paton 2014).

4.2 Trafigura[27]

Trafigura is one of the only large independent – privately owned – oil-trading firms to publish annual and financial reports. In 2013, the company opened its accounts to the public for the very first time. The analysis of this annual report, which gives valuable qualitative and quantitative insights, is therefore interesting to understand the role of assets acquisitions for energy trading companies.

4.2.1 Stated strategy

The trading firm describes itself as "*one of the world's leading independent commodity trading and logistics houses*" and defines its activities with four building blocks:

FIGURE 17 - TRAFIGURA'S CORE ACTIVITIES

Source: Trafigura 2013a

The company is primarily involved in the trade of crude oil and petroleum products (78% of all volumes traded) and has also a significant activity in non-ferrous and bulk commodities, in particular in coal and non-ferrous metal concentrates (See Figure 23 – Trafigura commodities traded volumes).

To succeed in continuously changing market conditions and business environment, Trafigura has identified six elements that constitute its competitive advantages that enhance its responsiveness to the evolution of global markets: A *global scale*, *world-class knowledge & systems*, an *access to diversified funding*, *tailored services*, *world-class assets & infrastructure* and *efficient logistics*.

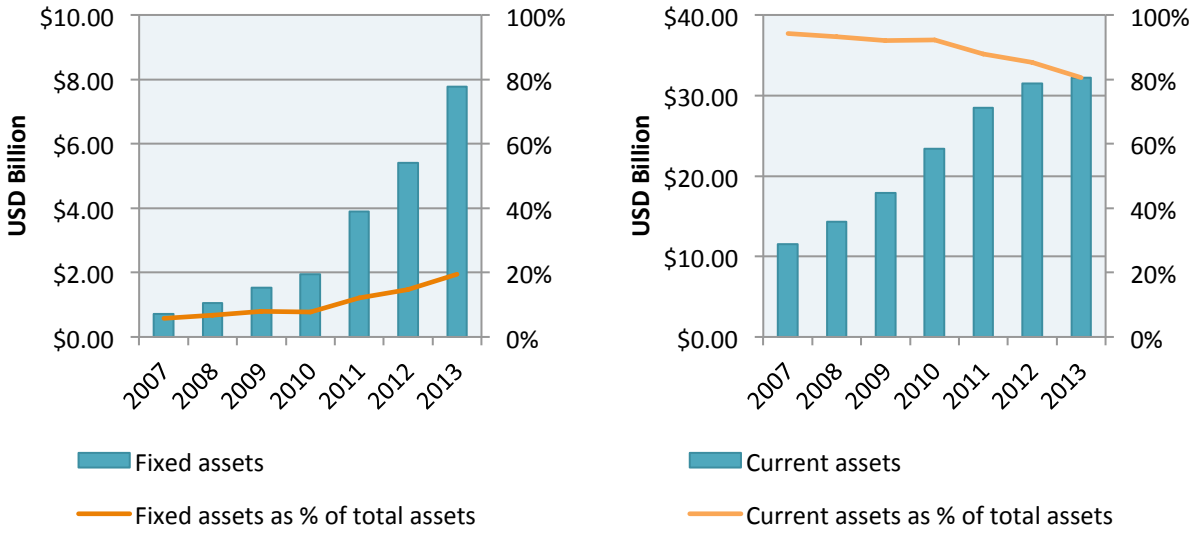
The company has a worldwide presence and is active in every continent. However, it is particularly focused on emerging regions with regards to both its trading activities and ownership of physical assets. More than 60% of its revenue for oil and petroleum

[27] Unless otherwise stated, Source: Trafigura 2013a; 2013c

products is done in Africa, Asia Pacific and Latin America, while for non-ferrous and bulk commodities, Asia and Australia alone represented 58% of turnover in 2013.

4.2.2 Assets

FIGURE 18 - TRAFIGURA'S CURRENT AND FIXED ASSETS

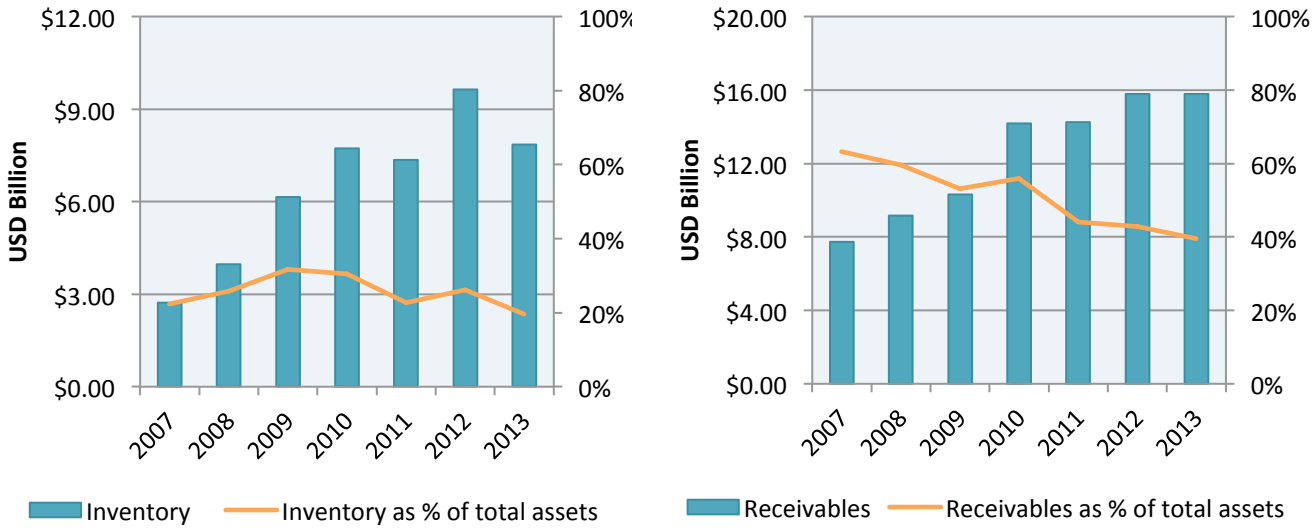


Source: Trafigura 2013a; 2013c

Current assets of Trafigura give a very representative illustration of the commodity trading industry, in particular of oil trading. For an industry where trading margins are particularly low – around or less than 1% – it is therefore on volumes that profits are made. As the company's activities are growing and reach new markets, this growth can be observed in the increase of current assets over the years.

Oil trading is also a short-term business, where operations last between one and three months and commodities are constantly bought and sold. Therefore, commodities are not owned by trading firms for a long time. To own goods for an extended period of time is costly, since the goods would have to be financed and would use liquidities that could be allocated to other trades. Consequently, current assets mainly consist of inventories and receivables.

FIGURE 19 - TRAFIGURA'S INVENTORIES AND RECEIVABLES



Source: Trafigura 2013a; 2013c

As expected, the level of inventories relative to total assets has remained constant at around 20% since 2007. In absolute terms, inventories have increased constantly in parallel to Trafigura's growth and increase in turnover. A similar explanation can be given for the evolution of receivables, with the exception that the increase in receivable has been slower than the increase of total assets. Consequently, rate of receivables as a percentage of total assets has therefore a downward slope. With regards to receivables, we have also seen that, as they grow bigger, the large energy trading companies have also started to offer financing solutions to clients. One way to provide additional services to increase profits or to secure supply is to finance smaller entities. By keeping more receivables, Trafigura is lending money to their clients. This could also be a factor of the constant increase in receivables.

To come back to current assets in general, we can see that, until 2010, the percentage of current assets as a proportion of total assets has remained the same, above 90%, which – again – is expectable for energy trading companies. The decline in percentage from 2010 has to be considered in parallel to the rise of fixed assets. The sharp increase of Trafigura's fixed assets between 2007 and 2013 illustrates the central theme of this Bachelor thesis: trading companies are increasingly investing in fixed – upstream, midstream and downstream – assets.

The increase in fixed assets we can observe on the graph is due to Trafigura's strategy to invest in several logistics and industrial projects. Since 2011, the group has been investing continuously as part of its development program, in oil projects as well as in

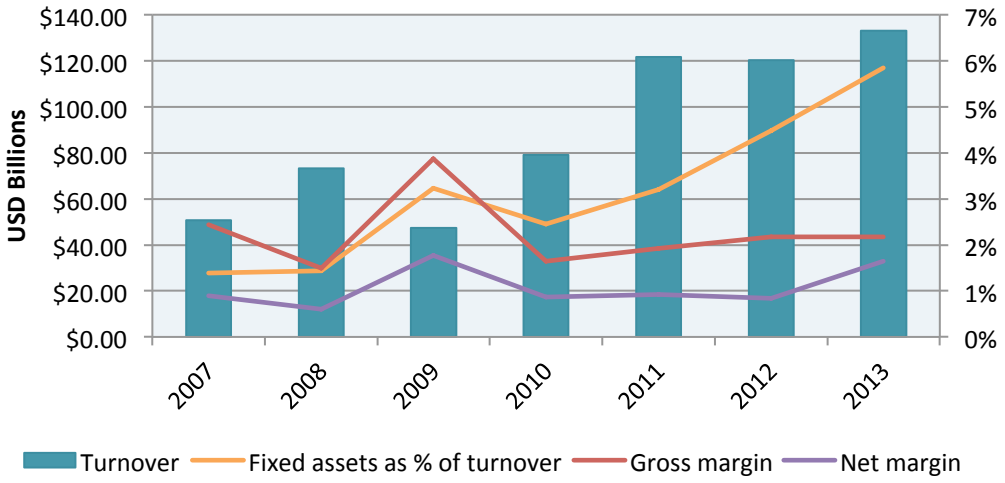
assets related to non-ferrous and bulk commodities. It acquired and expanded its oil storage terminal and dock in Corpus Christi (Texas, USA), acquired ExxonMobil's downstream business in Central America through its subsidiary Puma Energy, which also expanded its reach in Asia and Australia. Trafigura also invested in mining assets with the expansion of its flagship mine MATSA in Spain, in coal exports with a new Burnside Terminal built in Louisiana, USA, or a transportation system in Colombia. The majority of Trafigura's investments are made in midstream assets, as the management of logistics is part of its core activities. Nevertheless, the company is well aware of the benefits that upstream and downstream assets provide to a global diversified trading group and includes such projects in its investment program, with the ownership of mines upstream, or oil distribution assets downstream with Puma Energy.

Another aspect of the evolution of fixed assets is interesting with regards to the financing services offered by large trading companies to other actors of the supply chain. In Trafigura's non-current assets, $1.5 billion accounts for a prepayment transaction between the company and the Russian producer Rosneft. This deal is part of a large off-take agreement, where the loan is agreed in exchange of crude oil supply, to which Vitol and Glencore participated for $10 billion against five years of supplies (Pinchuk 2013).

When we consider the evolution of the percentage of fixed assets relative to total assets, we can notice that the impact on the balance sheet is relatively limited for Trafigura, and – as we have seen previously – for other oil traders. If we look at fixed assets, even though they are increasing in both relative and absolute terms (Trafigura's fixed assets grew by 44% between 2012 and 2013), we must acknowledge that the recent investments have not radically changed the structure of their balance sheet. Trafigura, with less than 20% of fixed assets, remains a trading company and has not become a group that is strongly vertically integrated comparable to producers. As commodity trading is about short-term trade flows, the majority of energy trading houses' assets is still composed of current assets despite a noticeable increase of investments in fixed assets.

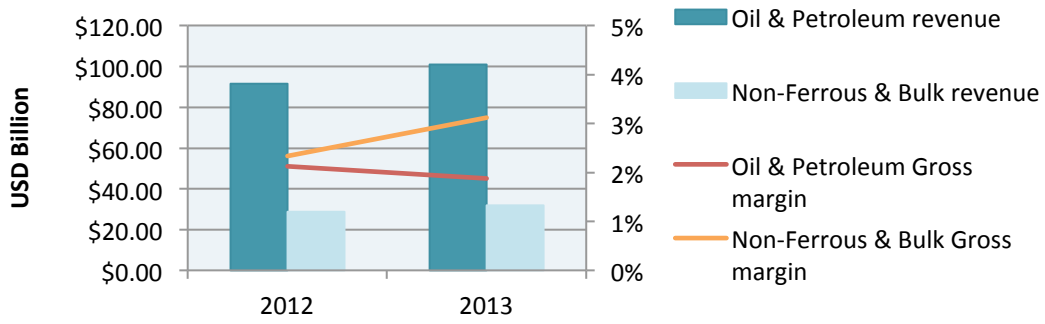
4.2.3 Financials

FIGURE 20 - TRAFIGURA'S TURNOVER AND PROFIT MARGINS



Source: Trafigura 2013a; 2013c

FIGURE 21 - TRAFIGURA REVENUE AND PROFIT MARGIN BY COMMODITY



Source: Trafigura 2013a

In comparison to oil majors and integrated producers, the reliance of fixed assets as a percentage of the turnover of Trafigura, as for the other oil trading companies, is relatively low, with less than 6% in 2013. The profit margins by commodity are also very representative of the commodity trading industry, with a net margin below 2% for oil and petroleum products. As Trafigura trades mainly oil and petroleum products, the gross and net margin are logically in the same range.

In general, the turnover of Trafigura has been relatively steadily increasing since 2007. The low turnover recorded in 2009 can be explained by the fact that, after the peak in commodities prices in 2008, the level of prices dropped significantly. The decline in turnover for Trafigura is therefore mainly due to the low level of oil prices. This is

confirmed by the fact that, during this same period, volumes of oil and petroleum products remained relatively stable. At the same time, however, it might seem surprising to see a jump in profit margins. This can be explained by the fact that, even though prices of oil were low, the market was very volatile at this period, and many small trading companies went bankrupt in these difficult times. For the largest trading companies that can absorb such environment shocks, periods with relatively high volatility present many profit opportunities.

We have seen previously that investments of energy trading companies in physical assets and their increased presence at various levels of the supply chain have had a relatively limited impact on their level of vertical integration, and has not fundamentally changed the structure of their balance sheet. The second question is to know whether these investments have had a positive effect on profit margins. After analysing the evolution of Trafigura's profit margins, we cannot conclude that it is the case, as profit margins have remained constant over the past few years. Between 2012 and 2013, the net margin increased by 97.6%, but it is not possible to conclude on a one-year comparison that this increase is due to acquisitions of physical assets, even though this increase is recorded after two years of investments. In addition, other trading companies such as Vitol and Mercuria, who have also been investing in physical assets, have posted decreasing earnings in 2013[28] (Hume 2014a; Hume 2014b).

- *Take-away 9: Are investments in physical assets profitable?*

The final question is to know whether energy trading companies are successful at improving their margins and if investment strategies are profitable and should be carried on. When looking at companies' financials, effects on balance sheets and profits margins are not obvious. Some companies have seen their profit increase in certain commodities, while others have recently recorded their worst results in a decade. In addition, it is difficult to determine which profit is attributable to which acquisition, as the objective of traders is to increase the global value of their portfolio and improve flexibility and reactivity, which also consists of intangible, unquantifiable benefits. Also, it is possible that without these investments profits would be even lower, or that the effects on the bottom line will be seen in the long term.

It is therefore important to remember that, in order to determine the value and the benefits of a physical asset, it must be considered with a portfolio approach and not as an individual industrial investment.

[28] Mercuria : -12% in annual profits in 2013, Vitol : -20% in annual profits in 2013, its lowest profit in a decade.

Conclusion

The environment of commodity trading is constantly evolving. Trade patterns are moving, supply and demand fundamentals are also changing as reserves dry up and new resources are discovered thanks to technological breakthroughs. Trading companies are also facing increased competition and see profit margins reduce.

The actors of the energy supply chain had to adapt their business model to redefine the role they play in a more complex commodity landscape, where markets and commodities are converging. To find alternative profit sources, trading firms evolved from a *pure trading*, asset-light, model to play a greater role in the supply chain.

Today, trading encompasses more activities and services, across markets. To provide these services and be able to continue their trading activities, energy firms must acquire industrial and logistics assets. The assets they target are those that enhance flexibility and the capacity to quickly react to rapidly changing business environment. Assets give alternatives and increase *optionality*, in particular in countries where there are infrastructure challenges, or where other actors are not willing to invest or be exposed to. Thanks to their global network and expertise, energy trading companies are able to mitigate country risks to trade and invest in emerging markets.

In the future, energy markets will likely continue to evolve, and trading companies have different approaches to meet challenges ahead. On one hand, the *merchant logic* will see trading houses remain less asset-intensive, favouring flexibility and adaptability. On the other hand, the *producer logic* will see trading firms integrate more components of the supply chain and fill the gap with vertically integrated groups with trading arms.

Whether one strategy or the other will be more successful depends on many unpredictable factors. The *producer logic* is based on the assumption that producing companies can benefit from much higher prices in energy than in other commodities. However, if revolutions such as the shale oil and gas boom in the United States happen in other regions, the oil industry might face an oversupply of products that will eventually push prices down. The *merchant logic* will see trading firms thrive as long as there are market inefficiencies to solve. However, by optimizing supply chain operations and contributing to the development of infrastructures in emerging countries, trading companies might also be removing their last market opportunities. It is possible that both approaches will have to converge and that the energy firm of tomorrow will have to find the right balance between integration and flexibility.

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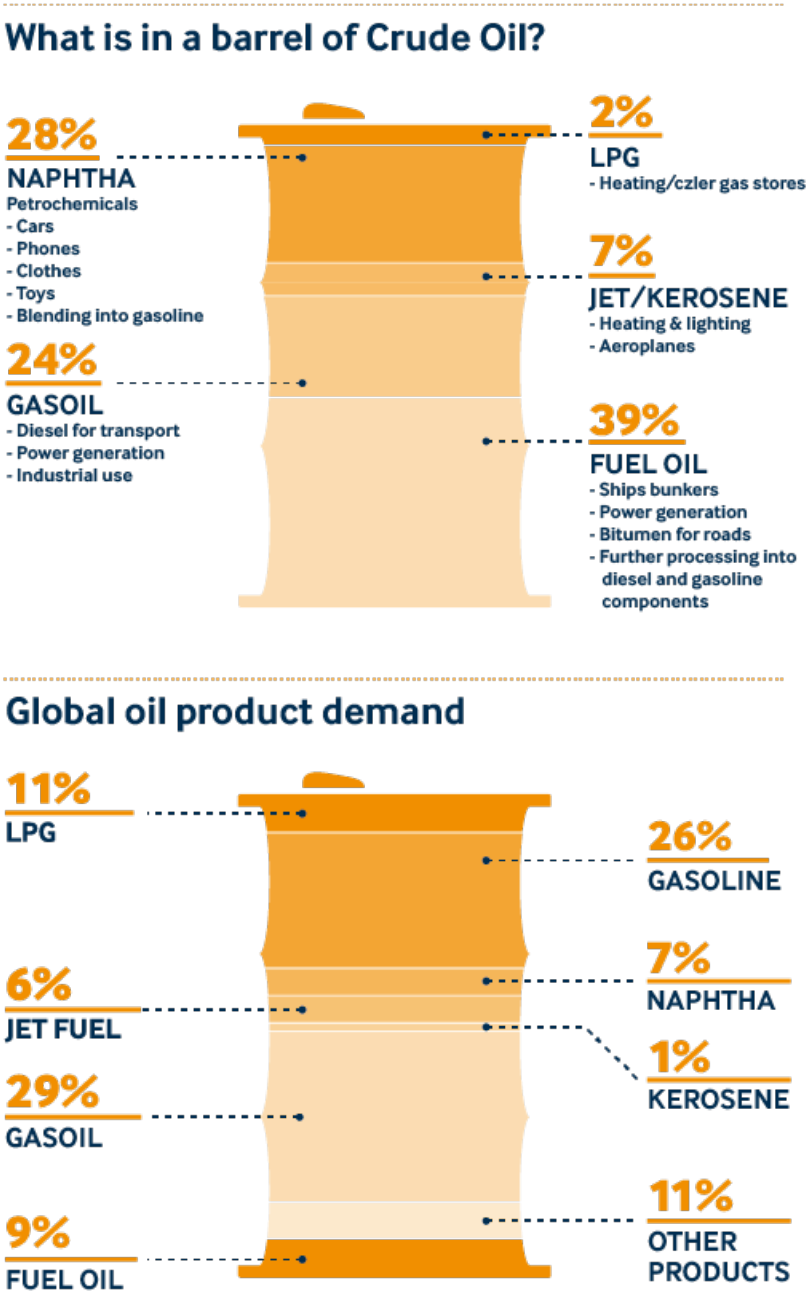
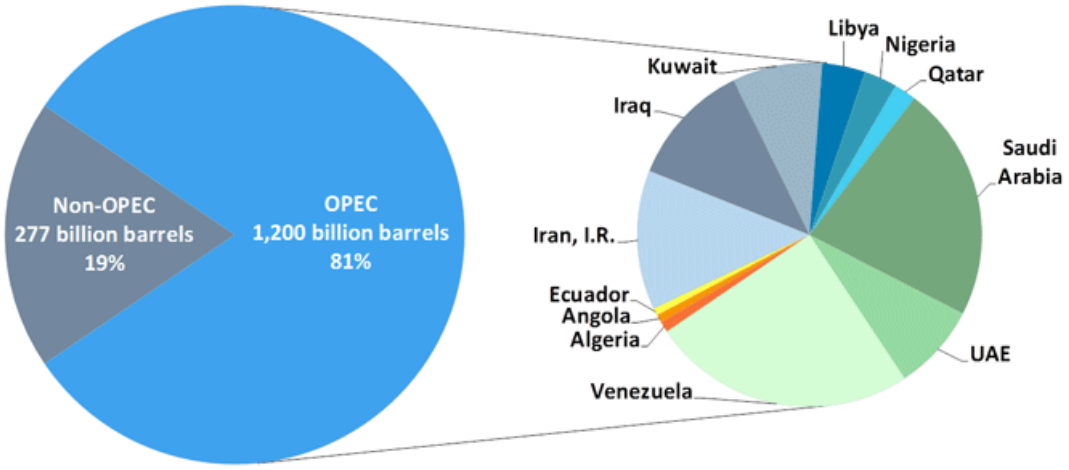
Appendix 1 – Crude oil barrel



Source: Vitol 2014a

Appendix 2 – OPEC share of crude oil reserves

FIGURE 22 - OPEC SHARE OF WORLD CRUDE OIL RESERVES 2012

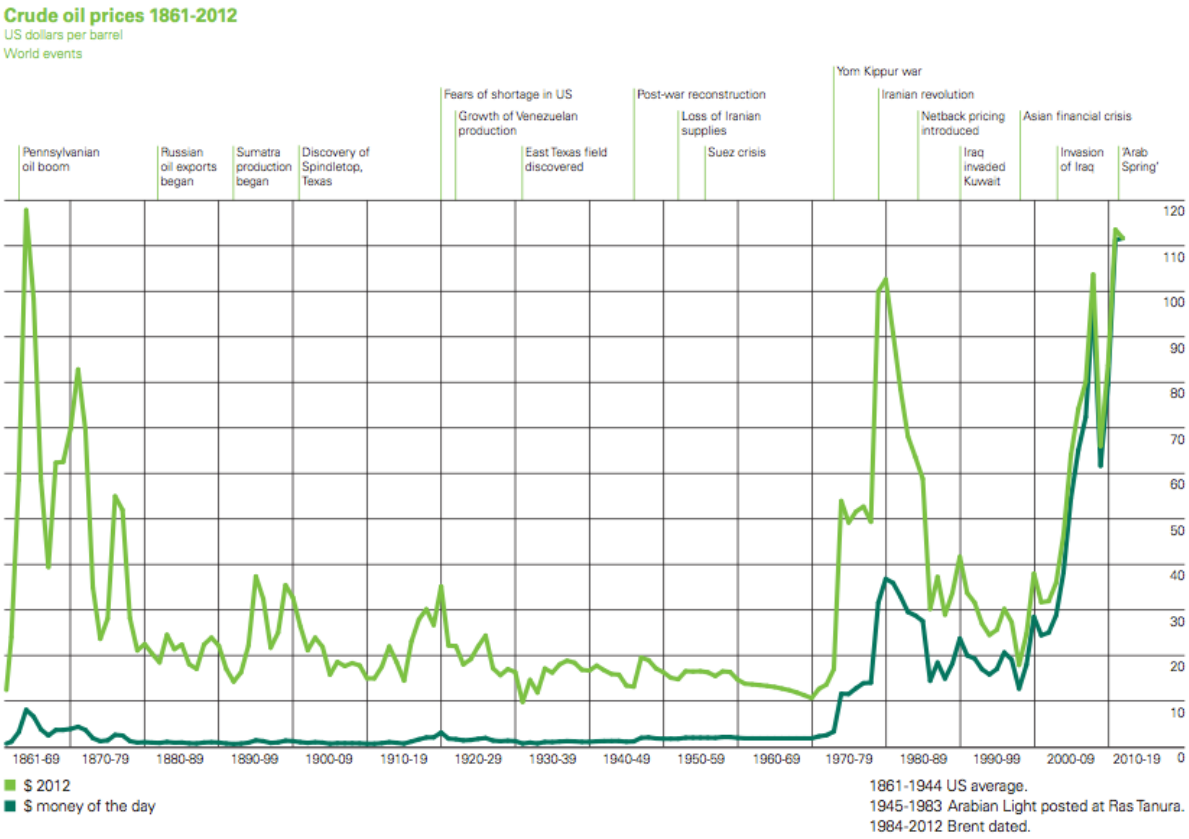


OPEC proven crude oil reserves, end 2012
(billion barrels, OPEC Share)

Venezuela	297.7	24.8%	Iraq	140.3	11.7%	Libya	48.5	4.0%	Algeria	12.2	1.0%
Saudi Arabia	265.9	22.1%	Kuwait	101.5	8.5%	Nigeria	37.1	3.1%	Angola	9.1	0.8%
Iran, I.R.	157.3	13.1%	United Arab Emirates	97.8	8.1%	Qatar	25.2	2.1%	Ecuador	8.2	0.7%

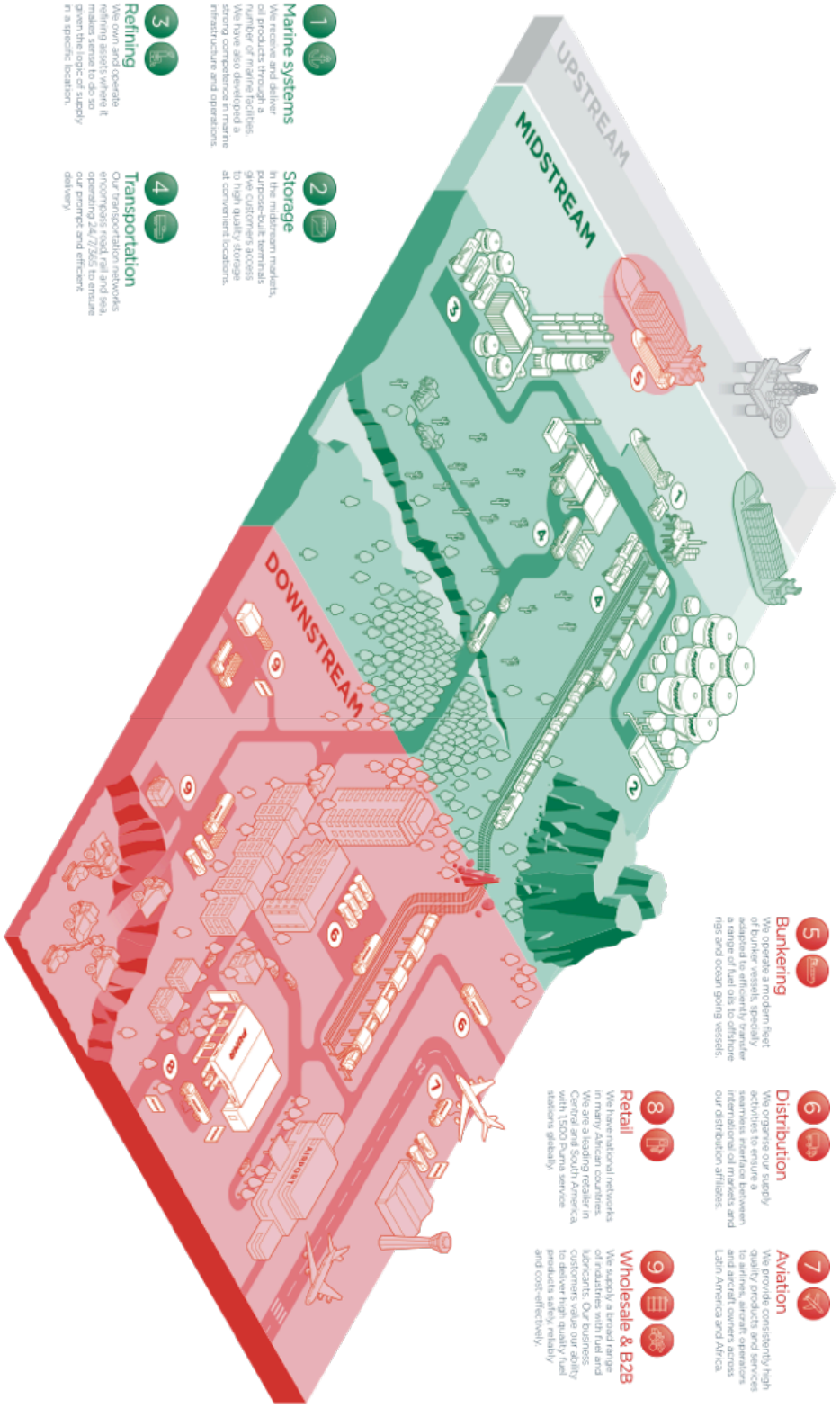
Source: OPEC 2013

Appendix 3 – Crude oil prices 1861-2012



Source: BP 2013

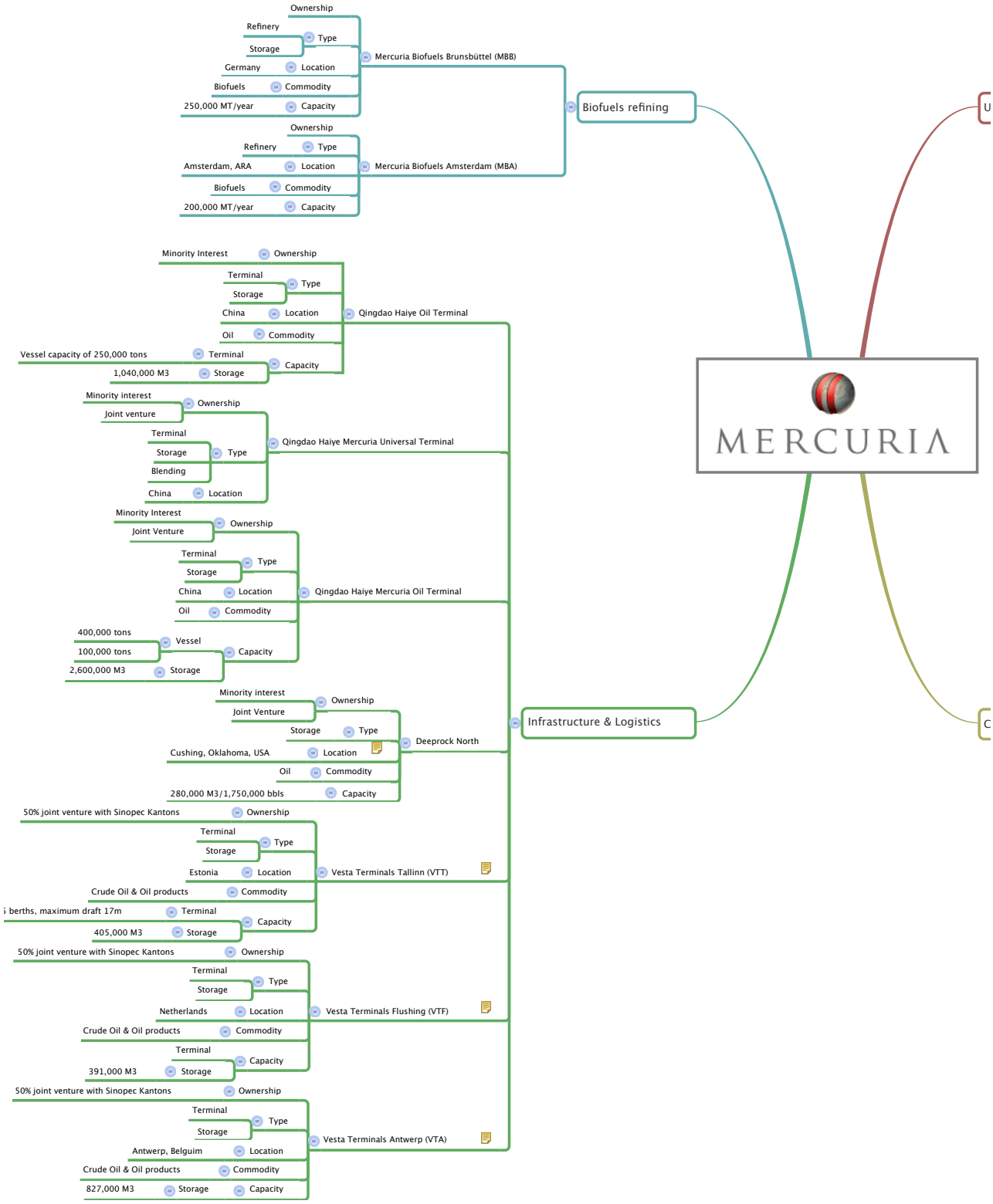
Appendix 4 – Supply chain of the energy industry

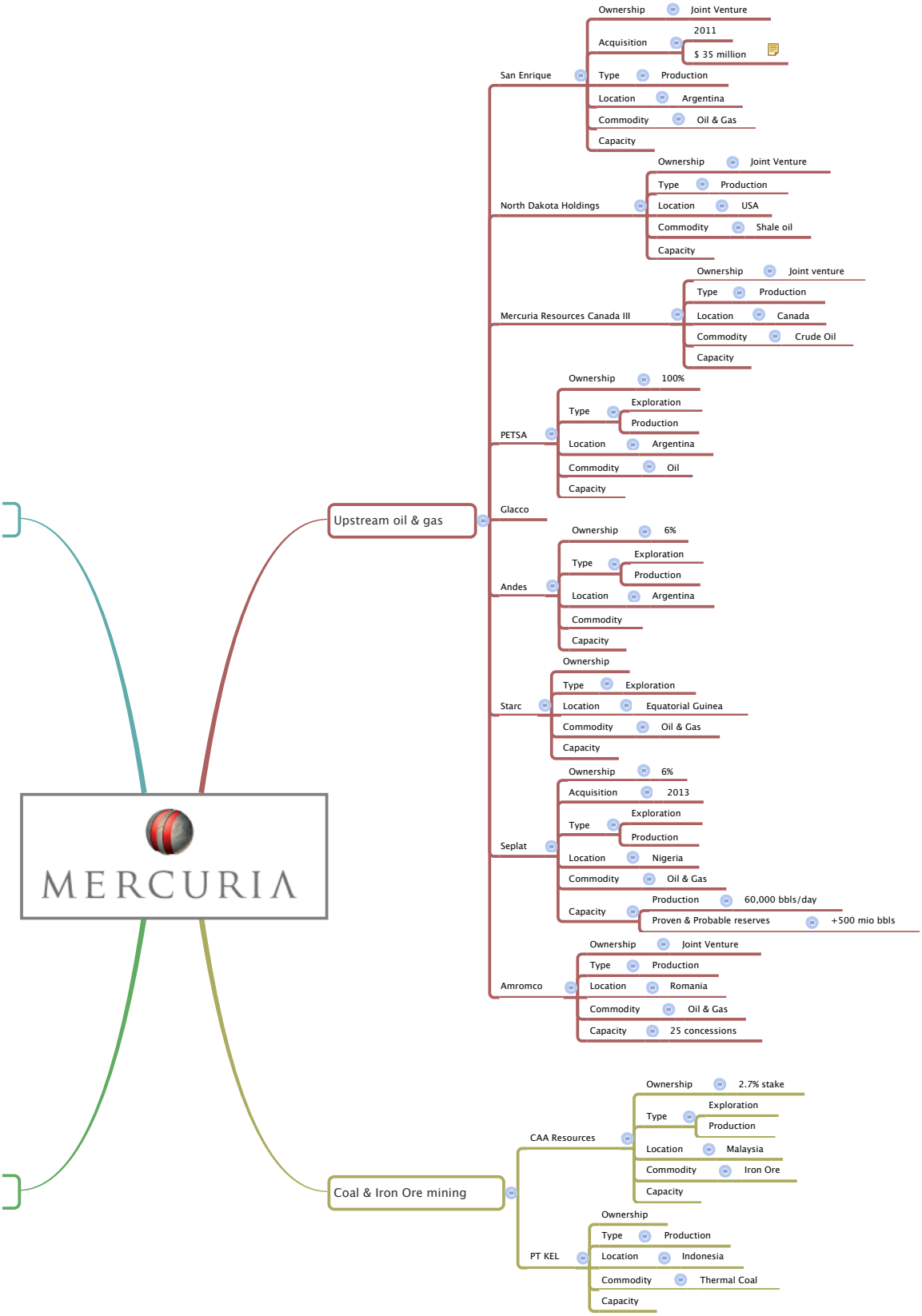


Source: Puma Energy 2014b

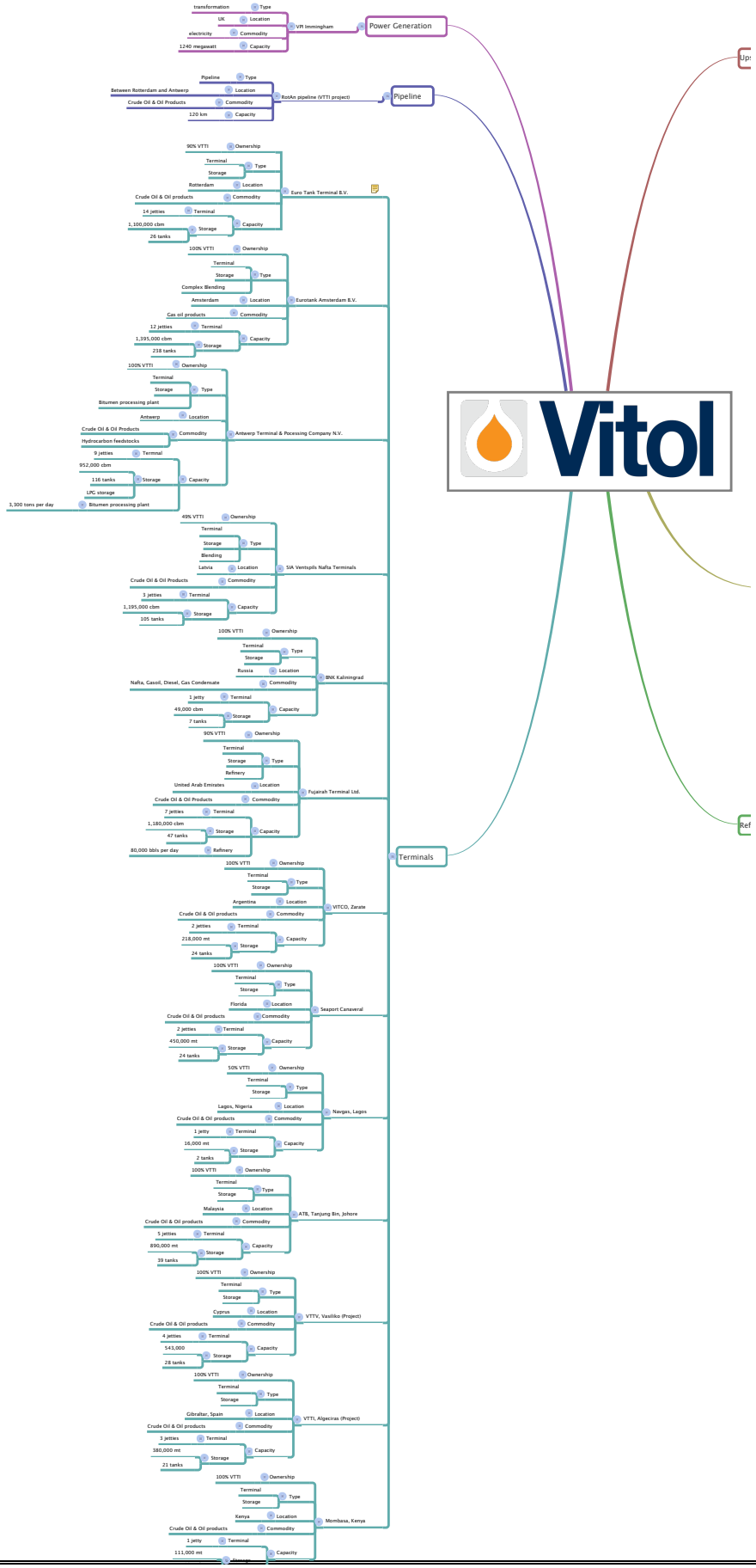
Appendix 5 – Assets map of Mercuria

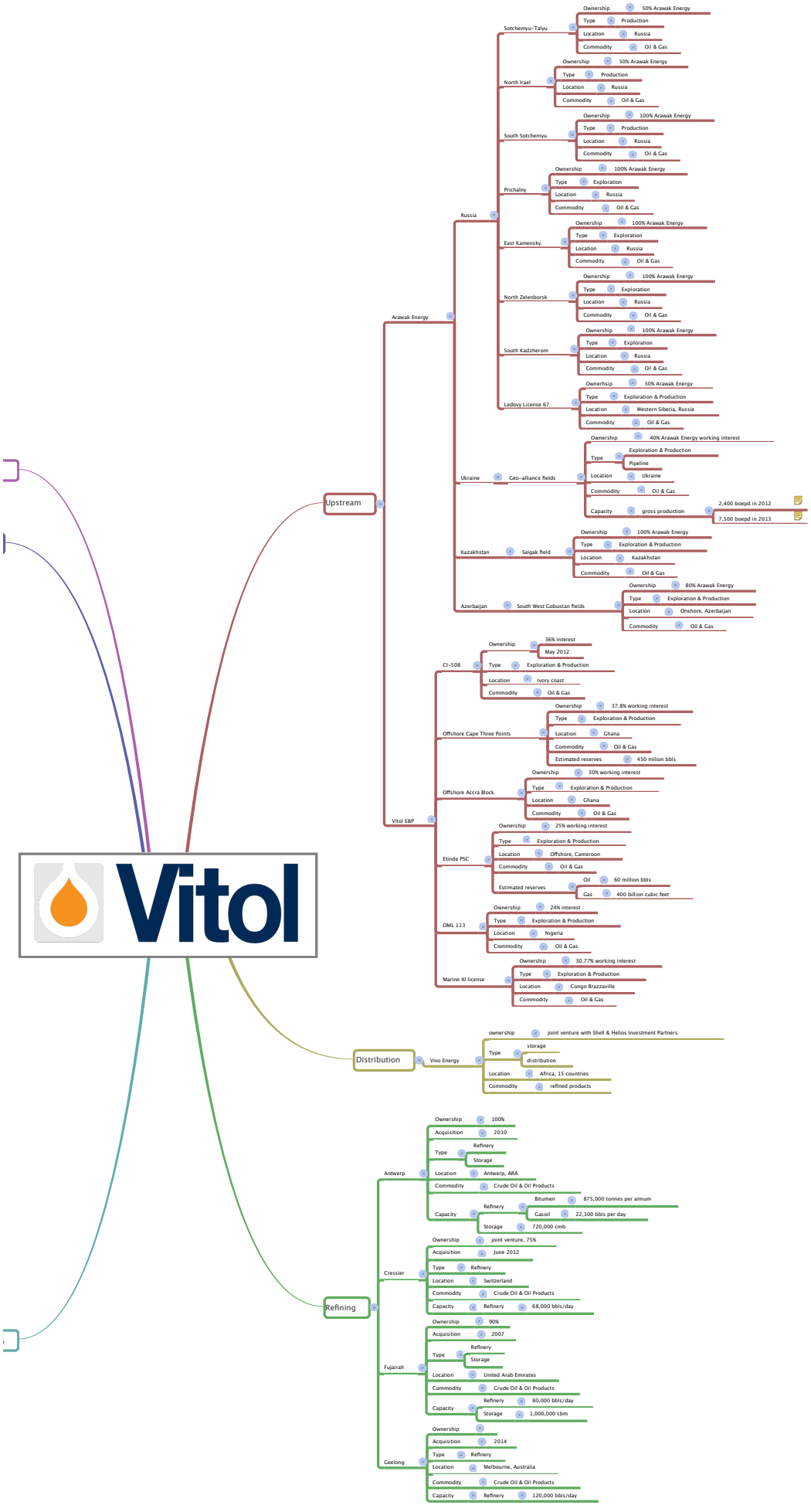
The following mind maps were created with information available on companies' websites and annual reports. They give a global picture of their physical investments.



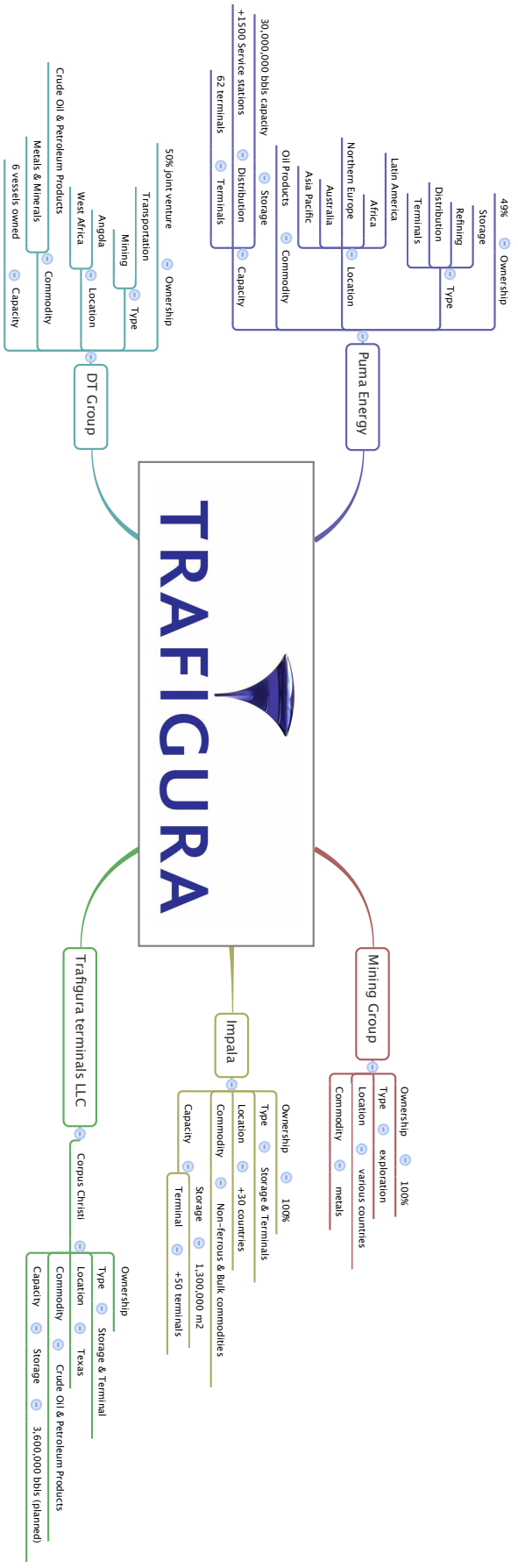

MERCURIA
Upstream oil & gas
Coal & Iron Ore mining
San Enrique
Ownership
Joint Venture
Acquisition
2011
$ 35 million
Type
Production
Location
Argentina
Commodity
Oil & Gas
Capacity
North Dakota Holdings
Ownership
Joint Venture
Type
Production
Location
USA
Commodity
Shale oil
Capacity
Mercuria Resources Canada III
Ownership
Joint venture
Type
Production
Location
Canada
Commodity
Crude Oil
Capacity
PETSA
Ownership
100%
Type
Exploration
Production
Location
Argentina
Commodity
Oil
Capacity
Glacco
Andes
Ownership
6%
Type
Exploration
Production
Location
Argentina
Commodity
Capacity
Starc
Ownership
Type
Exploration
Location
Equatorial Guinea
Commodity
Oil & Gas
Capacity
Seplat
Ownership
6%
Acquisition
2013
Type
Exploration
Production
Location
Nigeria
Commodity
Oil & Gas
Capacity
Production
60,000 bbls/day
Proven & Probable reserves
+500 mio bbls
Amromco
Ownership
Joint Venture
Type
Production
Location
Romania
Commodity
Oil & Gas
Capacity
25 concessions
CAA Resources
Ownership
2.7% stake
Type
Exploration
Production
Location
Malaysia
Commodity
Iron Ore
Capacity
PT KEL
Ownership
Type
Production
Location
Indonesia
Commodity
Thermal Coal
Capacity

Appendix 6 – Assets map of Vitol

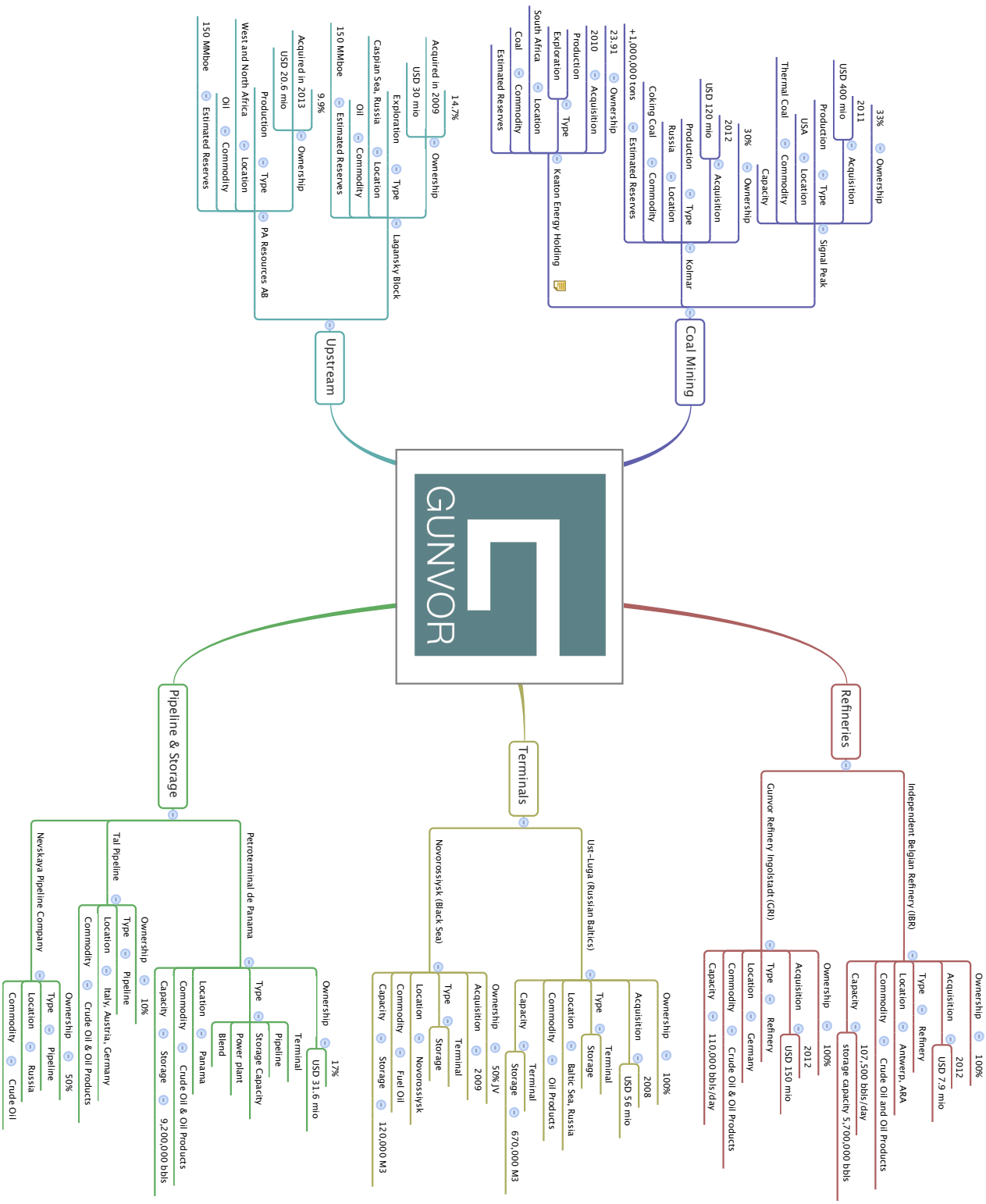



Vitol
Upstream
Arawak Energy
Russia
Sotchemyu-Talyu
Ownership 50% Arawak Energy
Type Production
Location Russia
Commodity Oil & Gas
North Irael
Ownership 50% Arawak Energy
Type Production
Location Russia
Commodity Oil & Gas
South Sotchemyu
Ownership 100% Arawak Energy
Type Production
Location Russia
Commodity Oil & Gas
Prichalny
Ownership 100% Arawak Energy
Type Exploration
Location Russia
Commodity Oil & Gas
East Kamensky
Ownership 100% Arawak Energy
Type Exploration
Location Russia
Commodity Oil & Gas
North Zelenborsk
Ownership 100% Arawak Energy
Type Exploration
Location Russia
Commodity Oil & Gas
South Kadzherom
Ownership 100% Arawak Energy
Type Exploration
Location Russia
Commodity Oil & Gas
Ledovy License 67
Ownerhsip 50% Arawak Energy
Type Exploration & Production
Location Western Siberia, Russia
Commodity Oil & Gas
Ukraine
Geo-alliance fields
Ownership 40% Arawak Energy working interest
Type Exploration & Production
Location Ukraine
Commodity Oil & Gas
Capacity gross production
2,400 boepd in 2012
7,500 boepd in 2013
Kazakhstan
Saigak field
Ownership 100% Arawak Energy
Type Exploration & Production
Location Kazakhstan
Commodity Oil & Gas
Azerbaijan
South West Gobustan fields
Ownership 80% Arawak Energy
Type Exploration & Production
Location Onshore, Azerbaijan
Commodity Oil & Gas
Vitol E&P
CI-508
Ownership 36% interest
May 2012
Type Exploration & Production
Location Ivory coast
Commodity Oil & Gas
Offshore Cape Three Points
Ownership 37.8% working interest
Type Exploration & Production
Location Ghana
Commodity Oil & Gas
Estimated reserves 450 milion bbls
Offshore Accra Block
Ownership 30% working interest
Type Exploration & Production
Location Ghana
Commodity Oil & Gas
Etinde PSC
Ownership 25% working interest
Type Exploration & Production
Location Offshore, Cameroon
Commodity Oil & Gas
Estimated reserves
Oil 60 million bbls
Gas 400 billion cubic feet
OML 113
Ownership 24% interest
Type Exploration & Production
Location Nigeria
Commodity Oil & Gas
Marine XI license
Ownership 30.77% working interest
Type Exploration & Production
Location Congo Brazzaville
Commodity Oil & Gas
Distribution
Vivo Energy
ownership joint venture with Shell & Helios Investment Partners
Type storage
distribution
Location Africa, 15 countries
Commodity refined products
Refining
Antwerp
Ownership 100%
Acquisition 2010
Type Refinery
Storage
Location Antwerp, ARA
Commodity Crude Oil & Oil Products
Capacity
Refinery Bitumen 875,000 tonnes per annum
Gasoil 22,300 bbls per day
Storage 720,000 cmb
Cressier
Ownership joint venture, 75%
Acquisition June 2012
Type Refinery
Location Switzerland
Commodity Crude Oil & Oil Products
Capacity Refinery 68,000 bbls/day
Fujairah
Ownership 90%
Acquisition 2007
Type Refinery
Storage
Location United Arab Emirates
Commodity Crude Oil & Oil Products
Capacity
Refinery 80,000 bbls/day
Storage 1,000,000 cbm
Geelong
Ownership
Acquisition 2014
Type Refinery
Location Melbourne, Australia
Commodity Crude Oil & Oil Products
Capacity Refinery 120,000 bbls/day

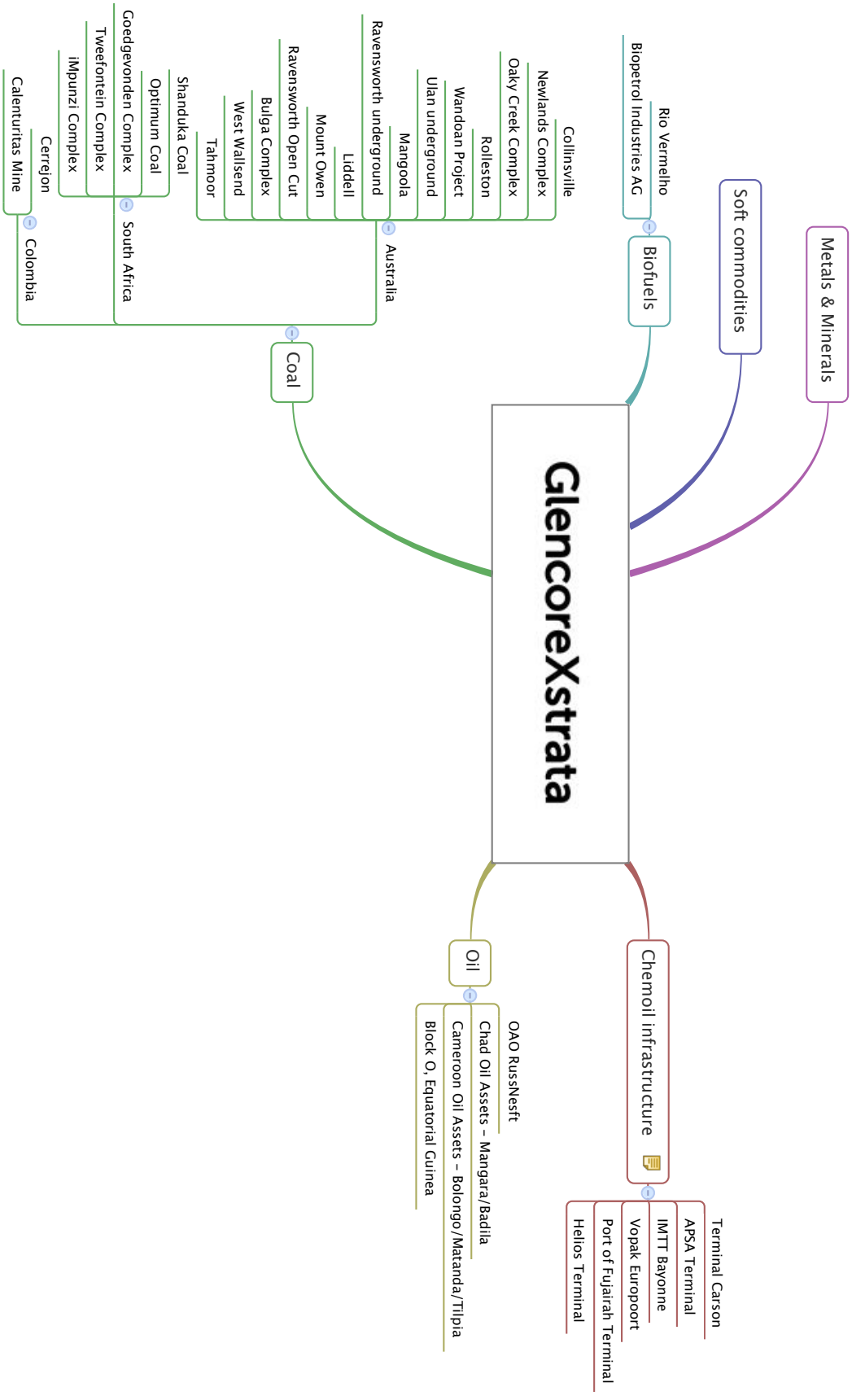
Appendix 7 – Assets map of Trafigura



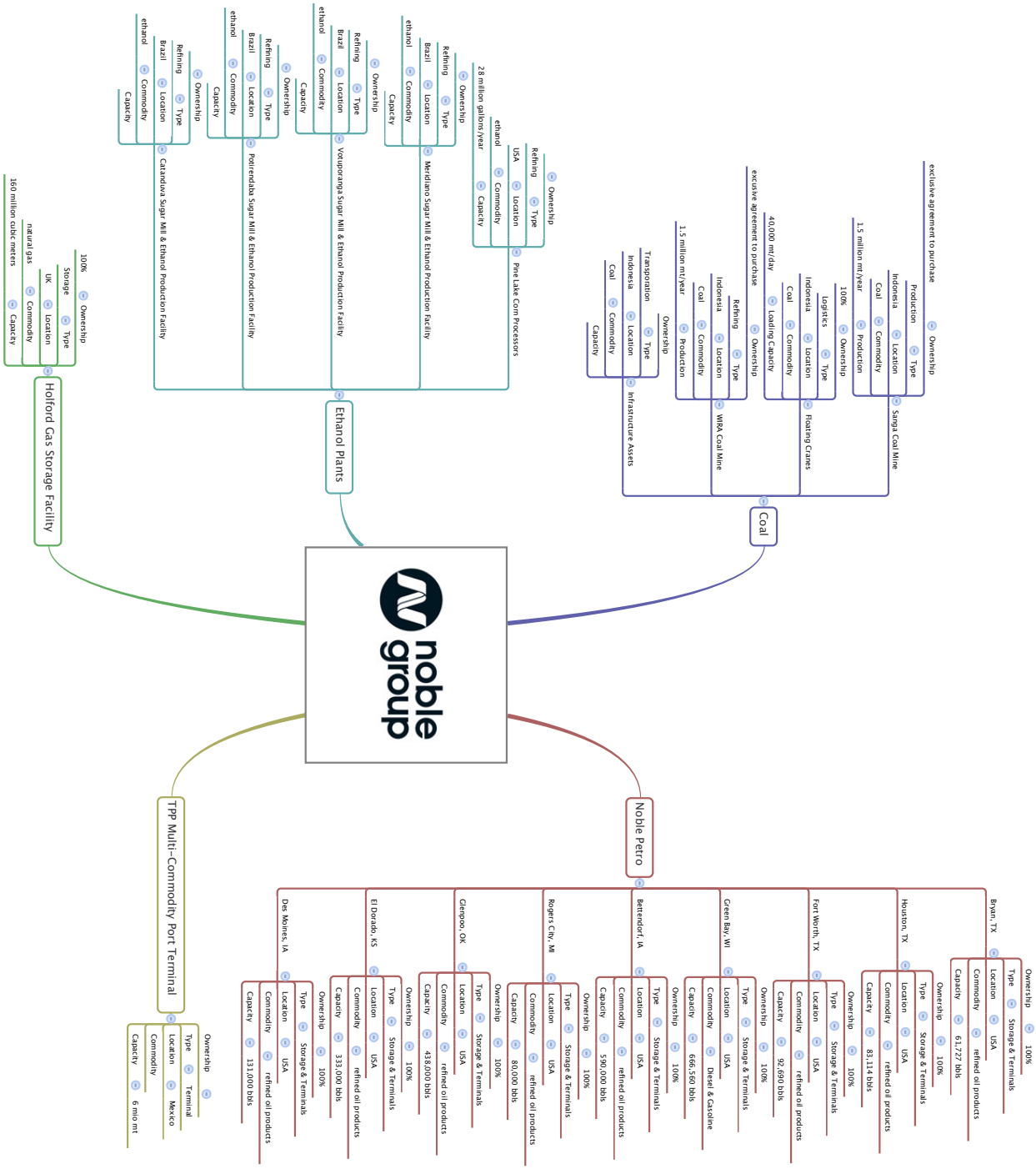
Appendix 8 – Assets map of Gunvor



Appendix 9 – Assets map of Glencore



Appendix 10 – Assets map of Noble Group



Appendix 11 – Trafigura financials & key commodities

TABLE 4 - TRAFIGURA FINANCIALS

USD billion	2007	2008	2009	2010	2011	2012	2013
Gross margin	2.43%	1.49%	3.87%	1.65%	1.92%	2.18%	2.17%
Net margin	0.89%	0.60%	1.77%	0.87%	0.92%	0.83%	1.64%
Inventory	$2.73	$3.98	$6.16	$7.73	$7.36	$9.63	$7.86
Inventory as % of total assets	22.35%	25.91%	31.75%	30.49%	22.75%	26.10%	19.63%
Receivables	$7.73	$9.16	$10.31	$14.19	$14.26	$15.79	$15.79
Receivables as % of total assets	63.27%	59.61%	53.14%	55.96%	44.05%	42.80%	39.46%
Current assets	$11.52	$14.31	$17.87	$23.40	$28.46	$31.49	$32.25
Current assets as % of total assets	94.22%	93.19%	92.13%	92.32%	87.94%	85.34%	80.57%
Fixed assets	$0.71	$1.05	$1.53	$1.95	$3.90	$5.41	$7.78
Total assets	$12.22	$15.36	$19.40	$25.35	$32.36	$36.90	$40.03
Fixed assets as % of total assets	5.78%	6.81%	7.87%	7.68%	12.06%	14.66%	19.43%
Fixed assets as % of turnover	1.39%	1.43%	3.23%	2.46%	3.21%	4.49%	5.85%
Turnover	$50.86	$73.17	$47.27	$79.24	$121.59	$120.42	$133.03

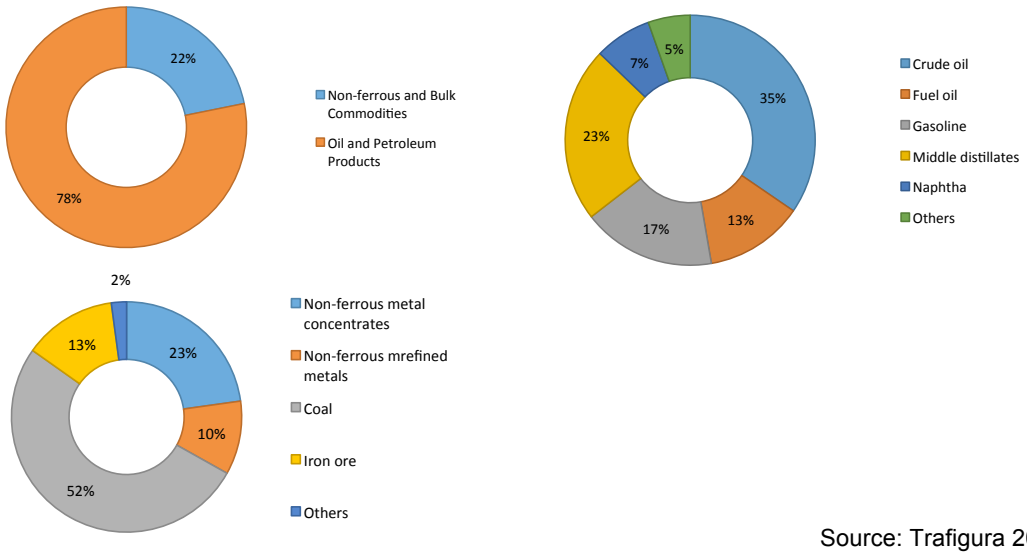
Source: Trafigura 2013a; 2013c

TABLE 5 - TRAFIGURA REVENUE AND PROFIT MARGIN BY COMMODITY

USD billion	2012	2013
Oil & Petroleum revenue	$91.64	$101.14
Oil & Petroleum Gross profit	$1.95	$1.90
Oil & Petroleum Gross margin	2.13%	1.88%
Non-Ferrous & Bulk revenue	$28.78	$31.88
Non-Ferrour & Bulk Gross profit	$0.67	$1.00
Non-Ferrous & Bulk Gross margin	2.34%	3.12%

Source: Trafigura 2013a

FIGURE 23 - TRAFIGURA COMMODITIES TRADED VOLUMES



Source: Trafigura 2013a