DISCOUNT CASH FLOW VALUATION OF STAR PETROLEUM REFINING PUBLIC COMPANY LIMITED

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Kannika Phatisaran

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ABSTRACT

This thematic paper demonstrates how to value the stock price of Star Petroleum Refining Public Company Limited (SPRC) base on discounted cash flow valuation model (FCFF) which represents the concept that the stock price of the firm should reflect its fundamental value in term of cash flow, growth and risk. Considering with the growth opportunity from country demand and new regulation from The International Maritime Organization (IMO) will enhance SPRC's performance because SPRC has high portion of product which match IMO's requirement. The year ended 2019 target price of SPRC shall approximately equal to THB 15.90 with 31% from its closing price of THB 12.1 on November 30, 2018. Therefore, the valuation is indicative to "BUY". In addition, The Company positions itself as high dividend stock and attractive dividend yields with more than 50% of payout ratio. Its dividend yield for 2017 is 7.1% which is higher than an average of SETHD.

In conclusion, although the result of valuation shows the company intrinsic value, this method still has some limitations. Therefore, the value must be looked carefully. Besides, the study can only provide a guidance regarding intrinsic valuation for investors and interested person in energy companies.

KEY WORDS: SPRC / Energy/ Valuation / Discounted Cash Flow

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CHAPTER I
HIGHLIGHT

We issue a BUY recommendation on Star Petroleum Refining Public Company Limited (“SPRC”) with a one-year target price of THB 15.9 by determining the average price from Football Field Chart. Our target price offers a 31% upside from its closing price of THB 12.1 on November 30, 2018. With the company’s robust fundamental factors together with not only global but also Thailand’s positive economic outlook, SPRC will be able to grow modestly from its refining. Further explanation for our recommendation are provided below.

Growth opportunity from country demand

Thai economy has been improving at 4.6% of GDP growth rate in 2018, thanks to two sectors namely tourism and manufacturing. Chinese tourists are the top nation among other foreign tourists that generating the highest revenue for Thailand. For manufacturing sector, the country gains a lot from export goods. Furthermore, domestic demand is higher for some petroleum products primarily use in transportation. According to the statistic of new registered car in Thailand, the number of new registered car is still increasing every year. All of these indicate that Thailand continues consuming petroleum products.

The company strengths

It is due to the fact that refining companies compete each other in two aspects which are market share and product yields. SPRC cannot compete in the first aspect as it occupies only 13% of the country’s total market share, but the company is able to provide the products that can meet Thai market’s demand. The country intensively requires in light and middle fuels which match the company’s refinery. Its refinery is the complex cracking refinery which yields more in high value products (light and middle fuels). This can increase the opportunity for the company to cover that demand and gain much higher margin. Moreover, the company is in the process of expanding the capacity to be 175,000 barrel per day.

IMO 2020 enhances SPRC's main product values

IMO 2020 will force all shipowners to switch their marine fuel from high sulfur fuel oil to either 0.5% sulfur fuel oil or gasoil. This switching will lead both demand and price change. The price change from this situation will favor SPRC's financial performance because the distillation of SPRC yields more in light and middle fuels which match IMO's requirement. Therefore, the company will gain higher for a few periods, especially in the year 2020, until the demand and supply go to the equilibrium again.

Attractive dividend

SPRC is suitable for any investor who is looking for dividend play. The company positions itself as high dividend stock. Its dividend yield for 2017 is 7.1% which higher than an average of SETHD. The company has reputation for high plant reliability and has robust financial statements with low cost structure, minimal debt, and no strategic plan for major investment after 2019. Thus, the company deserves to trade at premium as it has potential to continue offering high and attractive dividend yields with more than 50% of payout ratio.

Table 1.1: SPRC's key financial highlight

Financial Analysis

Key financial data	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E	2024E
General										
Revenue (MB)	178,877	155,082	170,535	209,108	173,165	233,110	230,005	226,129	228,799	209,287
EBITDA (MB)	12,833	13,385	12,320	10,551	5,693	14,027	13,330	11,932	11,546	8,737
Net Income (MB)	8,227	8,688	8,895	6,812	2,311	9,032	8,525	7,479	7,213	4,997
Profitability										
GRM ($/bbl)	7.3	6.7	6.6	7.0	5.5	7.1	7.3	6.7	6.2	6.0
EBITDA margin	7.2%	8.6%	7.2%	5.0%	3.3%	6.0%	5.8%	5.3%	5.0%	4.2%
Net profit margin	4.6%	5.6%	5.2%	3.3%	1.3%	3.9%	3.7%	3.3%	3.2%	2.4%
ROE (%)	19.6%	22.0%	21.6%	15.0%	5.1%	18.7%	15.9%	13.2%	12.1%	8.1%
ROA (%)	11.6%	13.6%	13.1%	9.7%	3.6%	13.4%	11.2%	9.3%	8.6%	7.1%
Liquidity										
Current Ratio (CR)	2.8	2.6	2.8	3.3	2.8	3.5	3.1	2.9	2.9	2.6
Solvency										
Debt/Equity	0.11	0.15	0.06	-	-	-	-	-	-	-

Source: Annual Report and Team estimation Remark: MB = Million Baht

Long term vision

According to news, SPRC is seeking for opportunity for domestic expansion in 3 ways. First is to build another refinery with the capacity of 165,000 barrel per day. Second is to expand into petrochemical business. Last is to expand into oil retailing business. The company has a positive view that oil retailing business still has a growth although the country is preparing for the coming of EV car. The first two ways requires huge amount of investment approximately 2,000 - 3,000 MUSD. Therefore, only the expansion into oil retailing business is on the study stage to know its feasibility. The company will probably buy an oil company which already has its own gas stations and use them as distribution channels. (Thansettakij, 2018)

CHAPTER II
BUSINESS DESCRIPTION

Star Petroleum Refining Public Company Limited ("SPRC") was established in 1992 as a producer of petroleum products, mainly focuses on gasoline, diesel, jet fuel and fuel oil. Pre-IPO, 64% of the share capital was held by Chevron and PTT held the rest. The company was listed on the Stock Exchange of Thailand ("SET") on 8th December 2015. SPRC's shareholders were then changed. However, Chevron is still majority-owned with 60.56% and public shareholders own 39.44%.

Production facilities are located in Rayong province and its refinery is a complex cracking refinery which provides the company a much higher margin than hydroskimming refinery by upgrading low-value fuel oil into higher value transportation fuels such as gasoline, jet and diesel. The company operated with a capacity of 130,000 barrels per day at the commencement date. It currently own a capacity of 165,000 barrels per day, representing 13% of the total capacity in Thailand and ranking at the fifth largest refinery in Thailand (Figure 2.1). However, the company is in a process of expanding its capacity to 175,000 barrels per day and this process is expected to be completed in 2019, the same time as its next plant turnaround, which happens once every five years.

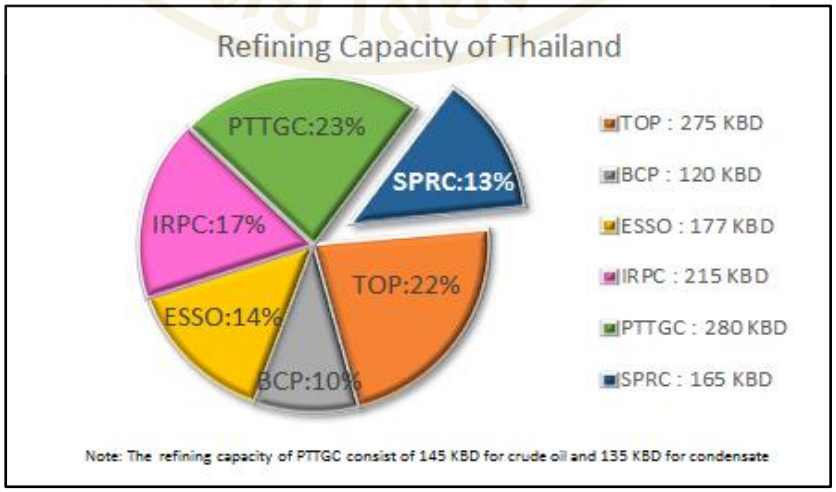


Figure 2.1: Refining capacity of Thailand

Source: EPPO website as of October 2018

2.1 Petroleum products

There are many petroleum products (Figure 2.2) generated from distillation and conversion of crude oil. The company's primary products are LPG, premium and regular grades of unleaded gasoline, diesel, jet fuel, fuel oil and asphalt, as well as petrochemical feedstocks used in the petrochemical industry including PGP, chemical grade naphtha, mixed C4, reformate and sulfur. The company intends to minimize fuel oil because of its unattractive spreads. Fuel oil that produced from Vacuum Distillation Unit ("VDU") needs a further process in either Fluid Catalytic Cracker ("FCC") or Hydrocracker Unit ("HCU") to convert into gasoline or gasoil, respectively.

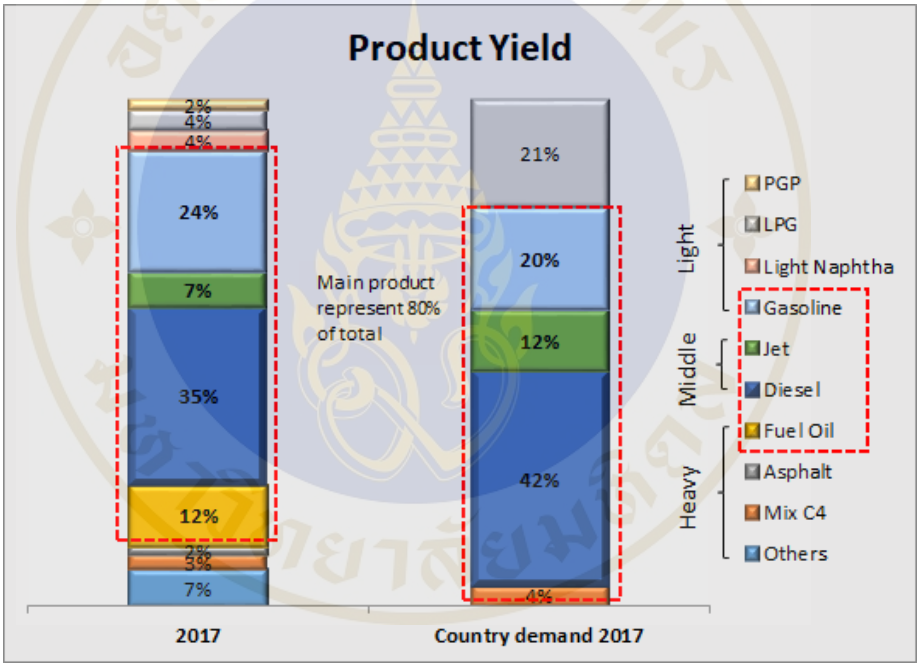


Figure 2.2: Product yield

Source: SPRC Opportunity Day 2017

The company's products are mainly sold to Chevron and PTT accounting for approximately 90% of sales by revenue through the Offtake Agreement (Figure 2.3). The remaining petroleum products are occasionally sold as petrochemical feedstock and intermediate product exchange through short-term agreements on a spot or term basis. The company focuses on domestic market but exports its products as well.

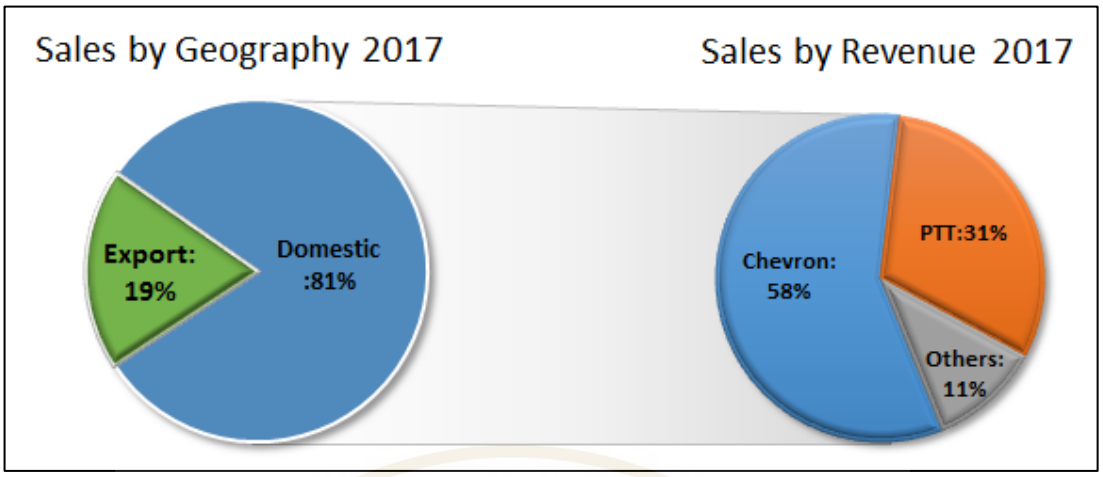


Figure 2.3: Sales by geography and sales by revenue

Source: SPRC Opportunity Day 2017

2.2 Petroleum product pricing

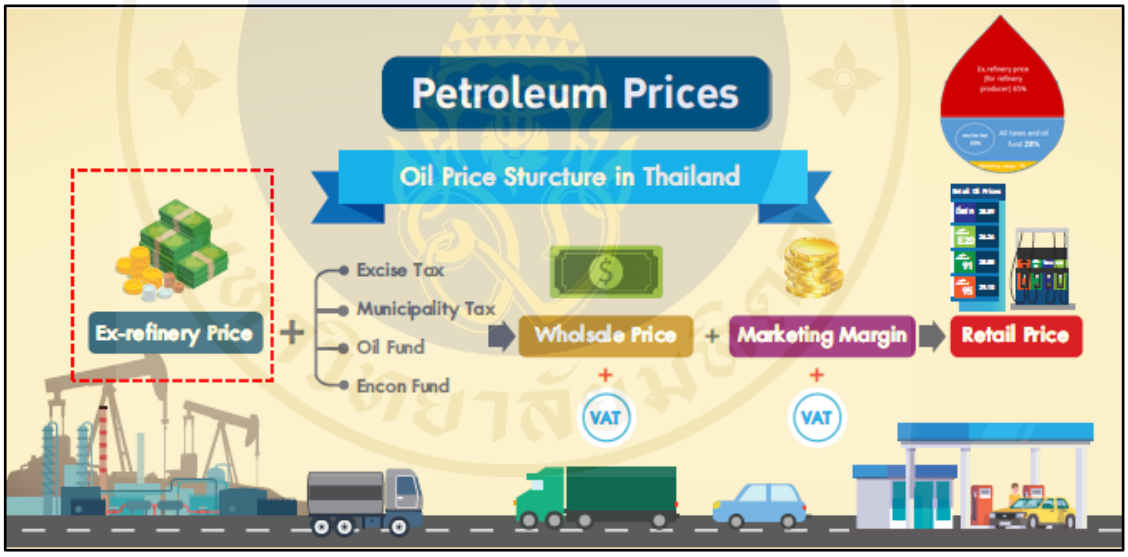


Figure 2.4: Petroleum prices

Source: https://energy.go.th/2015

The company benchmarks its products against the Mean of Platts Singapore ("MOPS") regardless of sales method (agreement, spot or term basis) and/or geography (domestic or export). Domestic petroleum product prices are normally adjusted from the benchmark with transportation, production, quality of product and market adjustments as appropriate. In contrast, export prices are also tied

to MOPS plus or minus premium or discount depending upon market conditions and negotiation power. Ex-refinery price at refinery is the real company's income. Wholesale price shown on invoice includes taxes and funds which in fact, are government's income. (Figure 2.4)

2.3 Feedstocks

SPRC sources over a half of total crude intake from the Middle East and the rest are taken from the Far East and domestic crudes. (Figure 2.5)

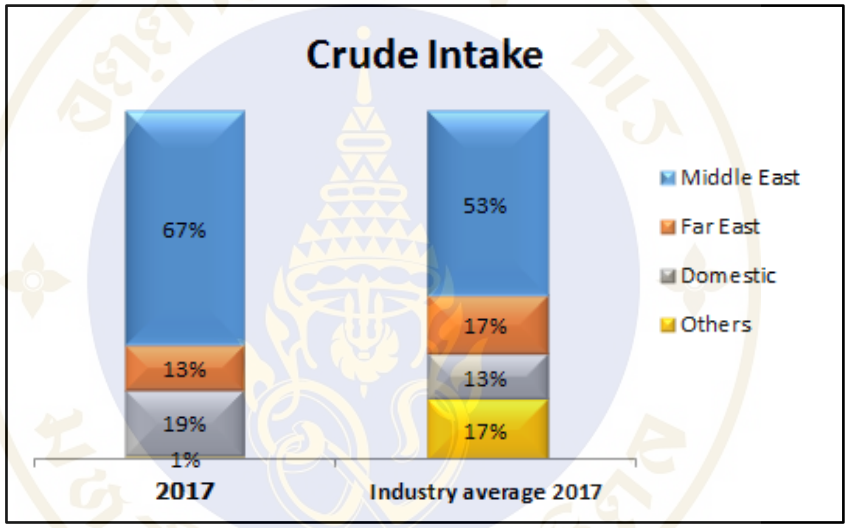


Figure 2.5: Crude intake

Source: SPRC Opportunity Day 2017

2.4 Company strategy

To hold competitive advantage, the company has decided to initiate one project named Bottom Line Improvement Program ("BLIP") and there are a few sub-projects under BLIP, aiming to boost the company's financial performance through a various ways such as crude optimization, product slate optimization, process optimization and so on. The importance of BLIP is to enhance margin continuously during strong markets and to minimize negative effect on margin during weak markets. Moreover, Lean Sigma as well as People Efficiency and Waste Elimination

("PEWE") are implemented so that the company will achieve cash operating cost reduction.

Furthermore, the company is able to generate power for internal use by using heat, leading to cost savings of 2-3 million dollar per annum. Besides the cost saving, the company is able to reduce water consumption as well by recovering Low Grade Condensate at the Sulfur Plant. Thanks to these strategies, SPRC will often withstand low GRM cycle.

CHAPTER III
MACROECONOMIC ANALYSIS

3.1 The world and the country's GDP

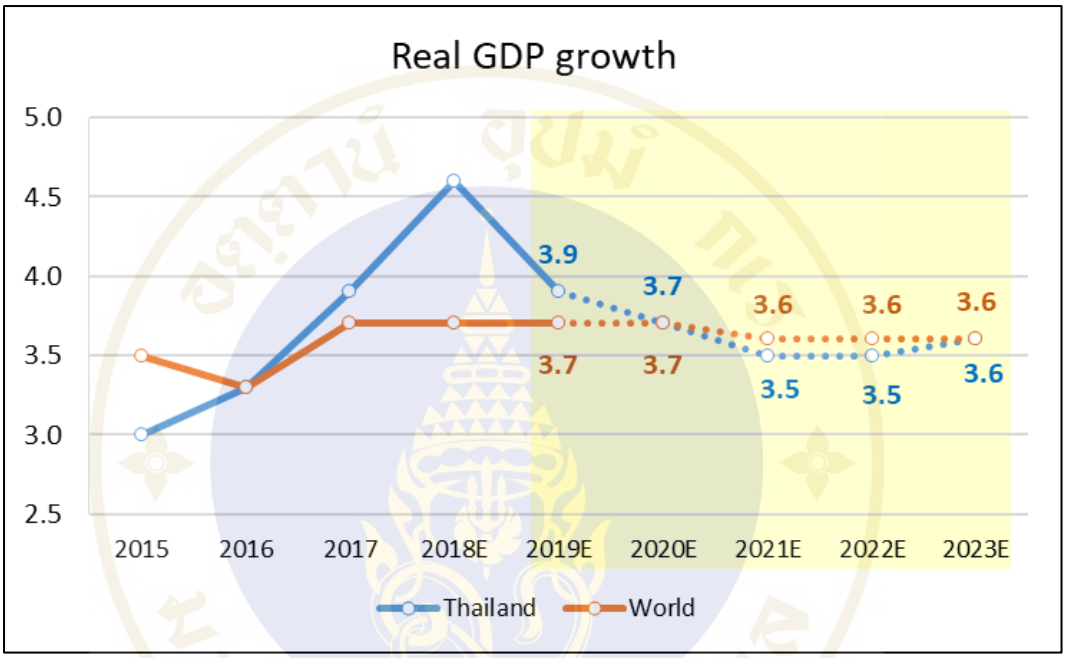


Figure 3.1: Historical and forecast of real GDP growth

Source: IMF

The future of world economy is believed to remain constant at 3.7 percent for short term until 2020 and for three years afterwards, is set to soften at 3.6 percent (Figure 3.1). The prospect for global growth is mainly sourced from emerging market and developing economies, led by India and China. Whereas fiscal stimulus of the United States will subtract momentum and substantially disrupt global supply chain. Especially, the recent trade measures including imposing tariffs on variety of Chinese goods. Moreover, growth in most advanced economies including eurozone and the United Kingdom is forecast to slow down. Therefore, despite the effect from US import restriction, there still have an opportunity for refiners to grow steadily.

Thailand's economy has continued growing since 2014 from 1% of GDP in 2014 to 4.6% in 2018 (Figure 3.1). Such a favorable growth in 2018 was mainly driven by agriculture sector with an increase in crop yields. In addition, non-agriculture including manufacturing and tourism related services such as hotels and restaurants, transport and communication also strongly supported that growth. Most accelerating expenditure expansion was originated from private sector. For the near future, Thai economy is expected to continue growing at an average of 3.6%, mainly due to exports of manufacturing goods and significant number of tourists, together with the upcoming elections that will stir expenditure in Thai economic system from following various activities. The positive economy will contribute greatly to oil consumption in the future.

3.2 Inflation rate

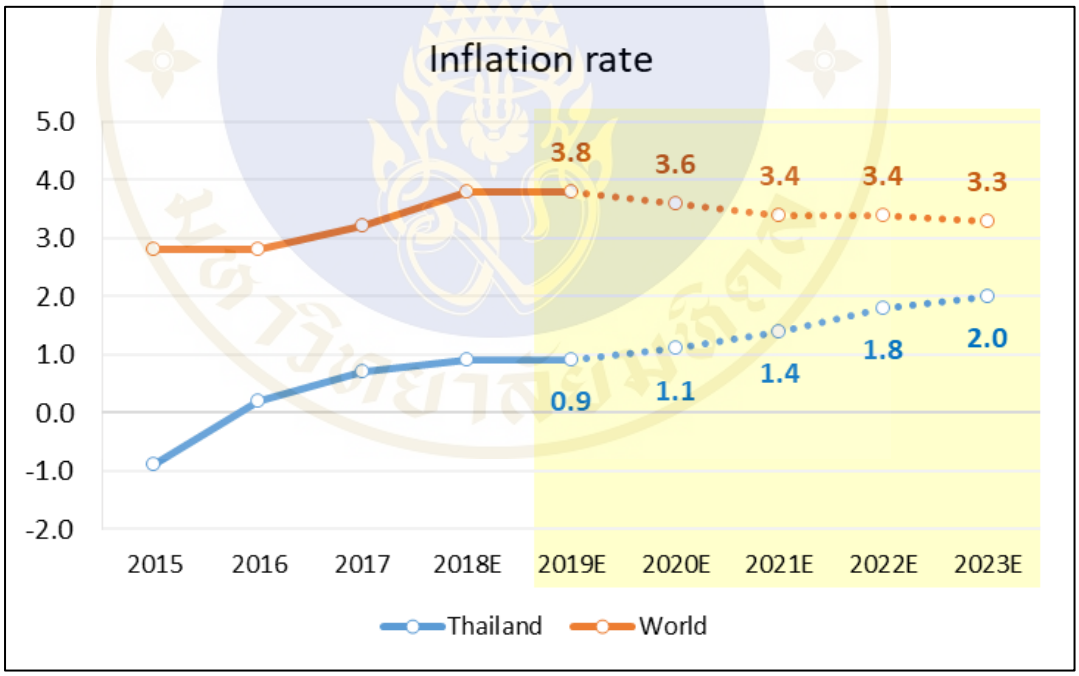


Figure 3.2: Historical and forecast of inflation rate

Source: IMF

The global inflation is expected to stand at an average rate of 3.5 percent for the next five years. Inflation in emerging market and developing economies is projected to increase to 5.2 percent in 2019, then gradually decline to 4.1 percent in

2023. Meanwhile, in advanced economies, inflation is projected to stay the same at 2 percent until 2023. For Thailand inflation forecast, it will move upwardly from 0.9 percent in 2018 to 2 percent in 2023. (Figure 3.2)

3.3 Exchange rate forecast

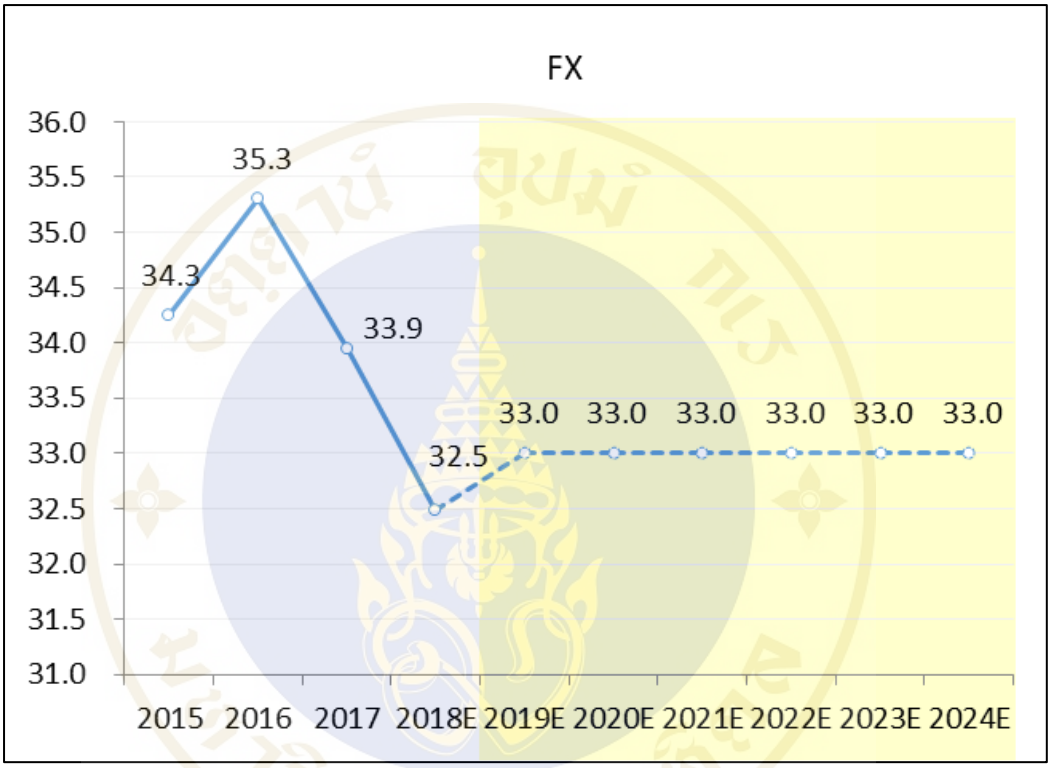


Figure 3.3: Historical and forecast of USDTHB

Source: Bloomberg as of December 2018

The U.S. dollar is expected to gradually appreciate against other currencies as a result of an increase in the federal funds rate that has been rising since the end of the year 2017 although the USDTHB has slightly fluctuate between 31 Baht per dollar and 34 Baht per dollar during 2018. Noted that SPRC applies U.S. dollar as its functional currency. Besides, its products and feedstocks are priced in USD. Hence, U.S. dollar is our main focus.

3.4 SPRC's stock price versus SET sentiment

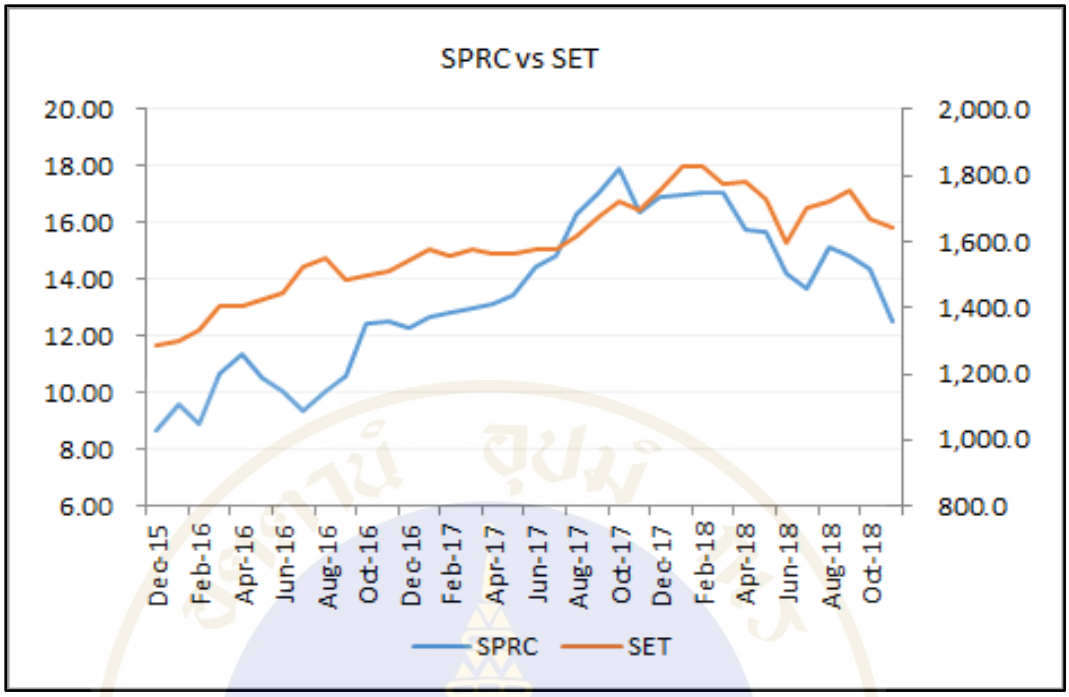


Figure 3.4: SPRC's stock price vs SET sentiment

Source: SET

As can be seen from the graph (Figure 3.4) that SPRC's stock price tend to move in line with the market sentiment since IPO, especially, during the year 2018.

CHAPTER IV
INDUSTRY ANALYSIS

4.1 Shale oil

The production of shale oil has significant effect on the oil market price. The greater it is produced, the lower the oil price because it causes the oil market oversupply. Shale oil is fuel trapped within shale formation about 1 mile deep from the earth's surface and it can be a substitute for oil as its characteristics are found no material difference from crude oil. Although we know about shale oil many years ago, the limitation of technology as well as high production cost makes us continue using crude oil extracted from old technology. Eventually, thanks to technology development and excavation innovation of the United States makes us economical to produce shale oil by using the combination of hydraulic fracturing and horizontal drilling to gain access to that target formation.

The increase of the U.S. shale oil production has an impact on the global oil price as mentioned. However, the reduction of the feed price contributes to the decrease in product price as well which means, refinery companies will gain less in gross refining margin ("GRM") from their products (processed oil) automatically if there is stable demand for petroleum products but excess supply from refinery companies. It is due to the fact that overall refining margins are mainly driven by the prices of global crude as well as its products.

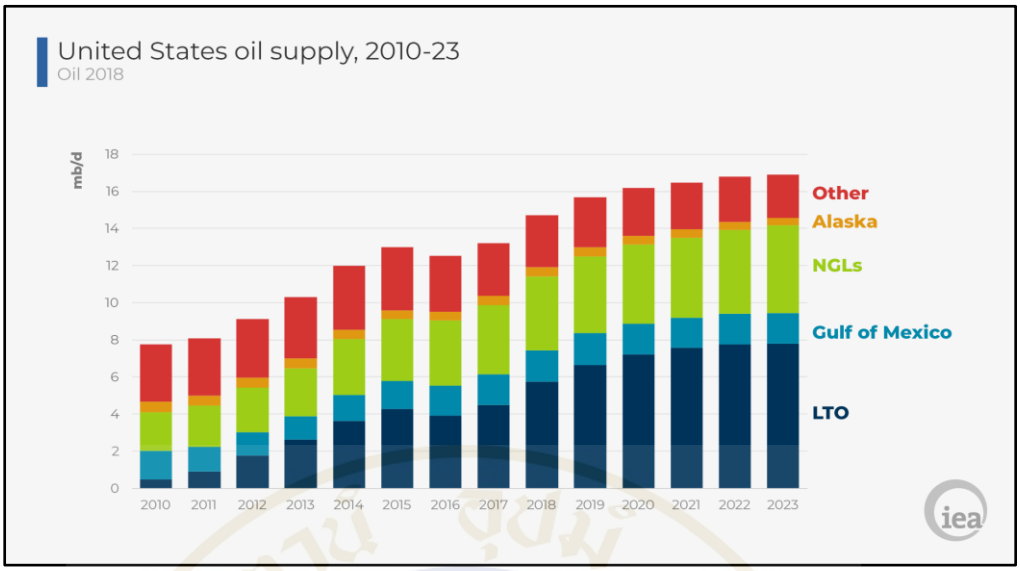


Figure 4.1: Historical and forecast of the U.S. oil supply

Source: IEA

This graph (Figure 4.1) shows that the U.S. shale oil (LTO) is increasing every year. Many people believe that the surge of the U.S. shale oil can change the situation of the U.S. from importer to exporter because the country proved that they are able to produce material amount of oil. (Figure 4.2).

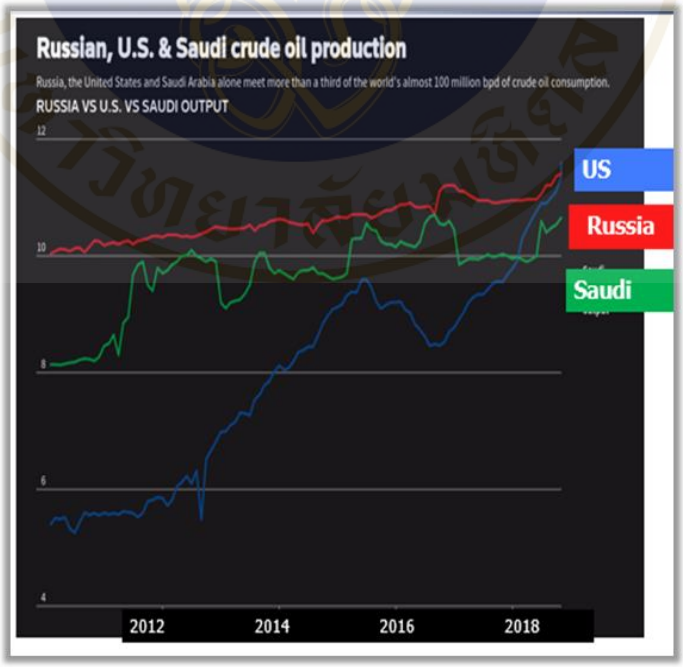


Figure 4.2: Russia, U.S. and Saudi crude oil production

Source: Reuters as of November 2018

4.2 IMO 2020

The International Maritime Organization (“IMO”) announced a global sulfur cap reduction on marine fuels from 3.5% to 0.5% for emission and air quality purpose. The effective date is on January 1st, 2020. This new regulation makes the maritime and refining industries face a huge challenge. There are a few solutions for shipping companies so as to comply with a particular sulfur emission control. For example, (1) investing in scrubbers will help shipowners remove sulfur from vessels’ exhaust which means, they can continue using high-sulfur fuel oil while still being in the control. (2) Using normally-used residual fuel oil with the lower sulfur content (“LSFO”). That residual fuel oil needs to be passed desulfurized process in order to meet 0.5% sulfur requirement. Simple refineries would have a massive impact on refinery configuration and operations, and also would require huge investment to upgrade and/or build new process units for fuel oil desulfurization. (3) Using marine gasoil (“MGO”) instead which is met by middle distillates. There is no penalty for non-compliance issued by the IMO itself so far. The air pollution control in international oceans to MARPOL ANNEX VI is currently enforced by individual parties as there is no global organization responsible for.

The total demand for oil products will not be dramatically altered, but the impact of the changes on the product mix is hard to forecast. Nevertheless, the OECD-affiliated International Transport Forum estimated a demand of LSFO and MGO will increase 2 mb/d in 2020 as shippers will switch from fuel oil to compliant fuel. This will lead to surge up in price of LSFO and MGO and in reverse for fuel oil. Afterward the price of fuel oil and gasoil will eventually adjust back to their normal points because shippers tend to invest in scrubber rather than purchase either 0.5% sulfur fuel oil or gasoil.

4.3 The coming of electric vehicle (“EV”)

It is because many people highly concern about global warming, one of the world big problems, caused by carbon dioxide. This air pollution also harms people’s health. As a result of aiming to get rid of carbon dioxide emission from the world’s atmosphere, many countries try to lower the use of oil, coal and gas which are the

source of carbon dioxide by issuing campaigns and policy as well as seeking alternative ways. Electric vehicle (“EV”) is one way to solve this problem as it uses electricity instead of burning oil in order to drive itself.

Thai government is also aware of an importance of transformation in automotive industry to electric vehicle, resulting in a policy issued in 2015 to promote electric vehicle in Thailand. Its goals are to encourage Thailand to be ASEAN BEV Hub, to promote the use of BEV passenger cars, to promote the production together with research and development for not only EV but also parts, charging station and other related equipment, and to give a grant for both public and private sectors. The government therefore has assigned other related units, including Ministry of Science and Technology, Ministry of Energy and Ministry of Industry, so that they will prepare action plans to support the policy. One clear goal is that Thailand must have electric vehicles of 1.2 million by 2036 according to the goal of Energy Efficiency Plan (“EEP 2015”) issued by Ministry of Energy. There are three stages to achieve that goal starting from 2016 to 2036.

Even though there are some good news coming out from many car producer companies such as BMW, Mercedes-Benz, FOMM about EV production, their production mainly focus on international market as Thailand is currently at the first stage of adaptation to electric vehicle. Infrastructure such as charging station has not been ready for that. It needs approximately 10 years for preparation.

4.4 Demand and Supply

4.4.1 Crude oil sentiment

World oil demand

The oil demand is expected to grow modestly, at an average annual rate of 1.2 mb/d. It is mainly due to the prospect world economy. The International Monetary Fund (“IMF”) has foreseen the global economic growth at 3.7% in the early part of the five-year projection. The price of oil is getting higher. India and China are main contributors to that particular growth with their combined consumption a bit less than 50% of global oil demand. However, the forecasting growth rate will slow down from

1.4 mb/d in 2018 to only 1 mb/d in 2023 because there is no sign of peak oil demand in the future. Instead of oil, there are other energy sources, which are being promoted in many countries due to emissions regulations. The use of alternative energy will significantly affect on downward growth.

World oil supply

The global oil demand and supply is balancing these days, thanks to the control of OPEC; a group of an oil-demand-supply controller. Even though the global demand will rise steadily for the next five years, the response from the supply side still needs to be concerned; otherwise, the world will probably face an inadequate supply. The world's oil supply is expected to add more 2.7 mb/d due to the future additional average oil demand required 1.2 mb/d as well as 1.5 mb/d for supply lost from the U.S. oil sanctions on Iran. Based on production capability and geopolitic, most of the future oil supply is foreseen to be sourced from non-OPEC countries, dominated by the United States where Light Tight Oil ("LTO") are produced amounting to 1.4 mb/d, over a half of the need. Besides the United States, Brazil, Canada and Norway can provide totaling to 0.4 mb/d. And the rest; 0.9 mb/d, is generated by OPEC+ alliance (cooperation agreement between OPEC; led by Saudi Arabia, and non-OPEC partners; led by Russia). The future situation seems to be bright as supply can be produced to cover demand. Nevertheless, as long as geopolitic or trade war among big three oil producers; OPEC, U.S. and Russia, can be occur any time, there is a chance of oil price volatility. Because it is highly sensitive to a change in demand and supply and the change substantially contributes to oil price volatility.

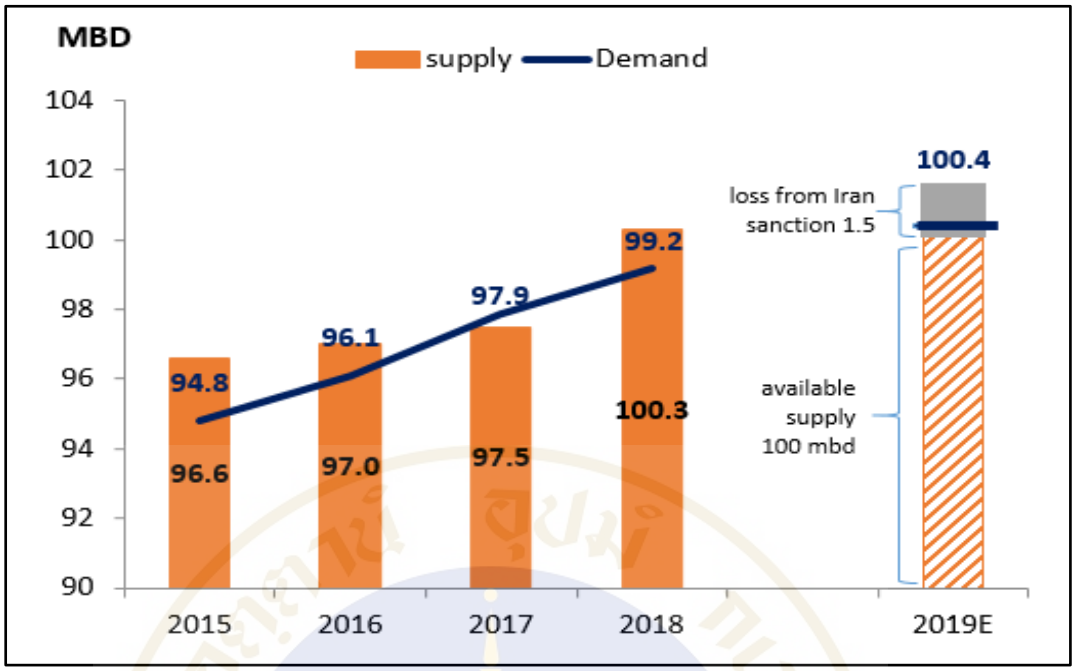


Figure 4.3: World oil demand and supply

Source: IEA Oil 2018 and team analysis

4.4.2 Refining product sentiment

Global demand and supply of petroleum product

Competition among refining companies is increasing since additional global capacity surge up, and this will cause an excess in global refining capacity get bigger due to refiner runs will grow faster than refining throughput demand growth, by 1.3 mb/d and 1 mb/d, respectively. Moreover, as stated above that the world will go toward a green planet, petroleum products for private cars such as gasoline will not be in a high demand anymore, even decelerating in consumption growth. While petrochemicals will be in demand. They are key drivers of future demand growth because they are crucial for manufacturing of many consumer goods including personal care items, food preservatives, furnishings and so on. Therefore, it is vital for refinery business to adjust themselves in order to serve such petrochemicals needs.

Demand and supply of petroleum product in Thailand

The growth of refined product consumption in Thailand steadily increases every year based on historical data. Moreover, the country's economic outlook is improving. GDP growth rate is at 4.6% in 2018, and expected to continue like this for the near future. Thanks to Chinese tourists for strong growth in tourism and

manufacturing exports that help enhancing the economy. Furthermore, except fuel oil, the other four main products; diesel, jet oil, gasoline and LPG, will continue to be consumed at higher rate. According to Department of Land Transport, the statistic for a number of new registered car in Thailand does not have any signal that people will use less gas car among encouraging to use EV car as the amount of new registered car is going up every year (Figure 4.4). In addition transport sector is the greatest oil consumption sector among all. Thai refiners therefore have an opportunity to expand their capacity so as to meet future demand. From all of these indicate that refinery in Thailand still has a growth but deceleration rate.

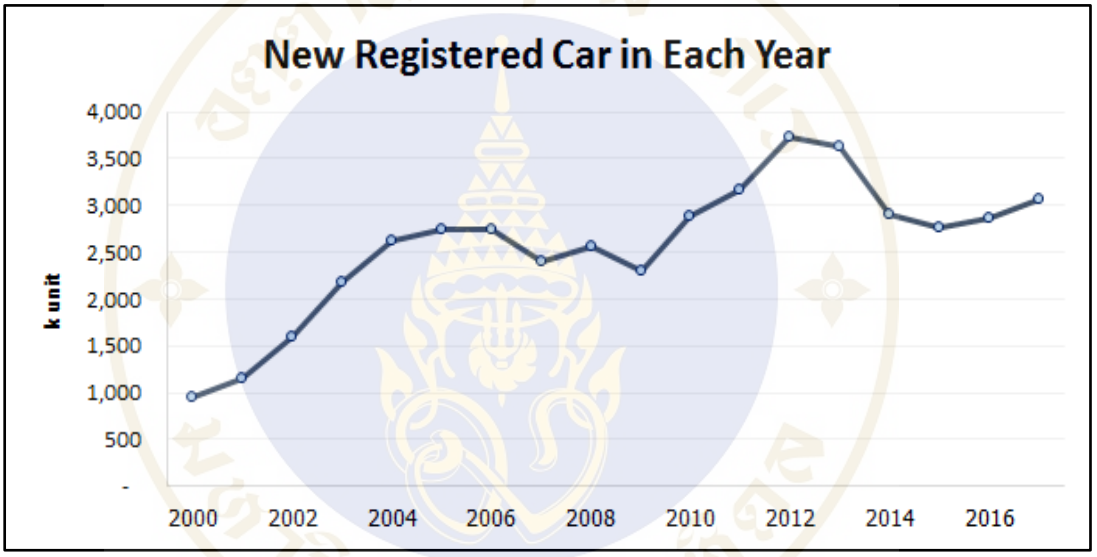


Figure 4.4: New registered car in each year

Source: Department of Land Transport

CHAPTER V
COMPETITION ANALYSIS

There are a few players in petroleum industry as refinery business requires large sum of capital for investment as well as a lot of regulations and environmental preventive measures to follow. For example, IMO 2020 which limit sulfur to only 0.5% on marine fuel, Energy Efficiency Development Plan ("EEDP") that aim to reduce energy intensity, the global trend to use electric vehicle, and so on. SPRC is a pure refining company in Thailand, while its competitors operate more than that. Most of them have bigger refining capacity than SPRC. Some have their own gas stations which can distribute their products to end-users. Some use the same level of technology as SPRC, while some operate with old technology that yield more in low value products. In part of industry competition, refining companies compete heavily in market share (Figure 5.1) and product yields (Figure 5.2). If a company gains more market share and able to produce more in high value products, that company is the winner.

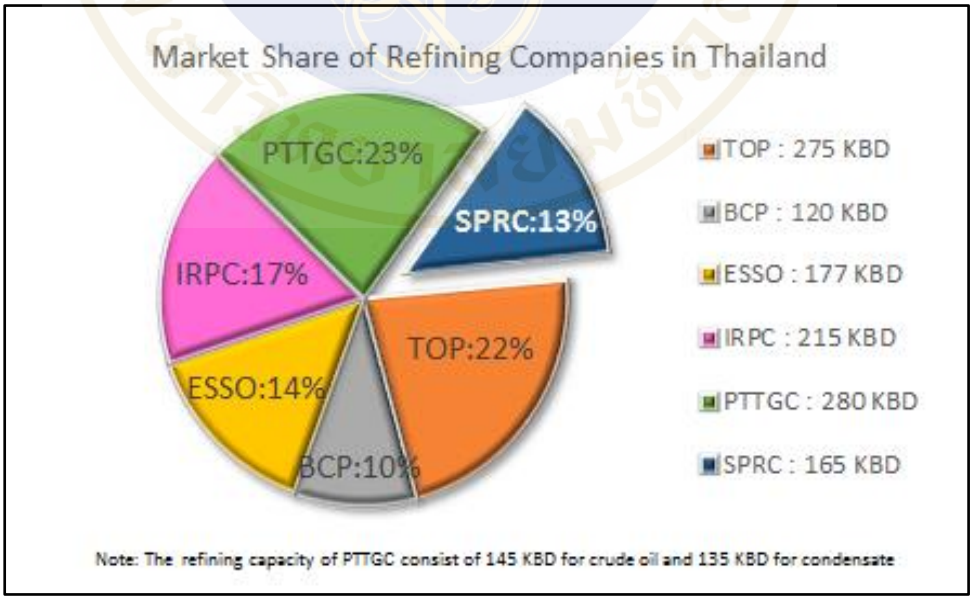


Figure 5.1: Market share of refining companies in Thailand

Source: Energy Policy and Planning Office

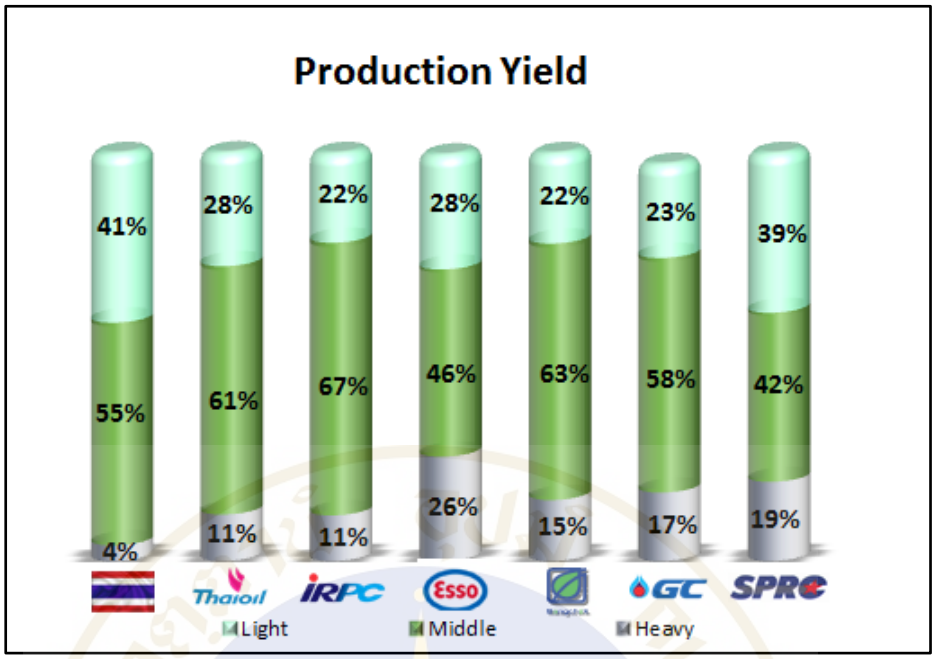


Figure 5.2: Product yield of each refining company and the country demand

Source: TOP, IRPC, ESSO, BCP, PTTGC, SPRC information as of Y2017

5.1 IRPC Public Company Limited

IRPC is a fully integrated petrochemical pioneer in Southeast Asia. There are three businesses; petroleum, petrochemical and supporting, operating under IRPC in its own Rayong industrial zone. Its oil refining units have a total capacity of 215,000 barrels per day. Its upstream products, which generated by olefins and aromatics, are used as downstream feedstock for polyolefins and styrenics. Final products are sold under the POLIMAXX brand. In case of the supporting business, there are three sub-businesses including power and public utilities, port and tank service, and asset management business, set up to facilitate itself and other investors in IRPC Industrial Zone.

5.2 Esso (Thailand) Public Company Limited

Esso operates its business over 120 years, since 1894. The company's main businesses include a complex refinery with a maximum capacity of 177,000 barrels per day, and aromatics plant as well as solvent production unit. These

productions are located in Sriracha, Chonburi province. The company also has direct commercial sales of petroleum products in the industrial, wholesale, aviation and marine sectors, and service stations around 580 throughout Thailand. Moreover, there is a strong lubricants presence under the Esso and Mobil brands.

5.3 Bangchak Corporation Public Company Limited

Bangchak's core business is petroleum refining with a current capacity of 120,000 barrels per day. The company distributes its refined products through its own retail stations more than 1,000 branches over the country. The company has expanded its operation to other businesses namely solar farm, bio-energy, petroleum exploration and production, and innovation-oriented businesses. Enhancing national energy security is the company's mission, in the meantime investing in new businesses to keep the organization moving forward and ensure sustainability.

5.4 Thai Oil Public Company Limited

Thaioil is the largest refinery in Thailand and the flagship refinery under PTT group, with a refining capacity of 275,000 barrels per day, single-site refinery. Its refinery is a complex one like SPRC, which was designed to create maximum value from the production system as well as has flexibility in using crude oil from various sources. There are three main production units which are crude distillation unit, upgrading unit and quality improvement unit. Their refinery can produce a variety of products including petroleum, petrochemical products, and lube base oil, which primarily serve domestic demand. The company also operates in other related business such as ethanol manufacturing, power generation, and marine and pipeline transportation. The Company's refinery is located in Sriracha, Chonburi. Thaioil has many subsidiaries such as Thai Paraxylene ("TPX"), Thai Lube Base ("TLB"), Thaioil Power ("TP"), TOP SPP, Thaioil Marine ("TM") and so on, that help the company generate revenue for the Thaioil group.

CHAPTER VI
INVESTMENT SUMMARY

We issue a BUY recommendation on Star Petroleum Refining Public Company Limited ("SPRC") with a one-year target price of THB 15.9 by determining the average price from Football Field Chart. Our target price offers a 31% upside from its closing price of THB 12.1 on November 30, 2018. With the company's robust fundamental factors together with not only global but also Thailand's positive economic outlook, SPRC will be able to grow modestly from its refining. More explanation for our recommendation are provided below.

6.1 Growth opportunity from country demand

Even though the government has the action plan to promote EV car, it is currently on the first stage; long way to achieve its goal. It is expected to take approximately 10 years to complete. Thus, EV car will not be a significant problem for now as it will not harm the refining business soon. Even though it comes faster, the government's goal to have EV passenger car of 1.2 million, is a very tiny proportion compared to total registered car in the country. Thai economy has been improving at 4.6% of GDP growth rate in 2018, thanks to two sectors namely tourism and manufacturing. Although the number of Chinese tourists in 2018 is less than the previous year, they are still the top nation among other foreign tourists that generating the highest revenue for Thailand. For manufacturing sector, the country gain a lot from export goods. Furthermore, domestic demand is higher for some petroleum products primarily use in transportation. According to the statistic of new registered car in Thailand (Figure 4.4), the number of new registered car is increasing every year. All of these indicate that Thailand continues consuming petroleum products especially jet oil and gasoline.

6.2 The company strengths

It is due to the fact that refining companies compete each other in two aspects; market share and product yields. SPRC cannot compete in the first aspect as it occupies only 13% of the country's total market share (Figure 5.1), but the company is able to provide the market with favorable product yields, in other words, Thai market consumes much in light and middle fuels (Figure 5.2) which the company's refinery is capable to serve that country's demand. Because its refinery is the complex cracking refinery which yields more in high value products (light and middle fuels). This increase the opportunity for the company to cover that demand and gain much higher margin. Moreover, the company is in the process of expanding the capacity to be 175,000 barrel per day.

6.3 IMO 2020 enhances SPRC's main product values

IMO 2020 will force all shipowners to switch their marine fuel from high sulfur fuel oil to either 0.5% sulfur fuel oil or gasoil. This switching will lead to higher demand for middle fuel (diesel/ gasoil) whereas, lower demand for heavy fuel (fuel oil) which is widely used for marine fuel. And any time demand changes, price will change. The price will rise for the required products and vice versa. The impact on price change will favor SPRC's financial performance because the distillation of SPRC yields more in light and middle fuels which match IMO's requirement. Therefore, the company will gain higher for a while, especially in the year 2020, until the demand and supply go to the equilibrium again.

6.4 Attractive dividend

SPRC is suitable for any investor who is looking for dividend play. SPRC is listed on SETHD which means, its stock is proved to be one of high dividend stocks for the previous three consecutive years. In the latest fiscal year; 2017, the company has dividend yield at 7.1%, higher than an average of SETHD (Figure 6.1). SPRC may not be an interesting stock at first glance because the company is only one pure

refinery operating in Thailand and it is the second smallest refiner in the country as well. Other companies in the same business are bigger and more complex. Some have diversified into other businesses. Some have integrated into downstream and even have their own gas stations. However, the company is well run, as well as has robust financial statements with low cost structure, minimal debt, and no strategic plan for major investment after 2019. Thus, the company deserves to trade at premium as it has potential to continue offering high and attractive dividend yields with more than 50% of payout ratio.

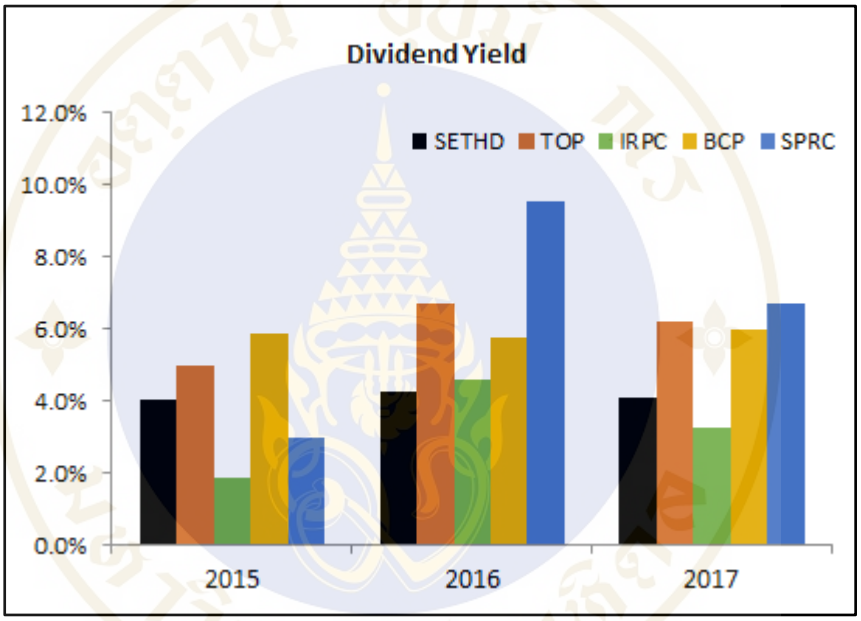


Figure 6.1: Historical dividend yield

Source: SET and team calculation

CHAPTER VII
VALUATION

In this valuation report, we divide this section into 2 parts. The first part is about the valuation of SPRC by discounted cash flow model. We will find what the company's values are by using discounted cash flow model. After the arrival of the outcome, the second part is about the conclusion. The conclusion will indicate what is the most appropriate value and how come of that value, as well as what technique that we use.

7.1 The first part of valuation: Discounted cash flow model ("DCF")

Discounted cash flow model ("DCF") is used to estimate the value of SPRC. This valuation method estimate the value based on the company's future cash flows to find its intrinsic value and incorporate time value of money as well as private information. We choose to value the entire business, in other words, we will discount expected free cash flows to firm ("FCFF") because of the company's nature of business that typically requires large sum of capital for either new investment or major turnaround. This huge funding requirement can affect a big change in the company's debt to equity ratio which means, there is a possibility to have unstable leverage anytime the company has a new investment project. Furthermore, the company's payment schedule is not published. It is, therefore, difficult to find an appropriate debt to capital ratio ("d") which is important for estimating free cash flows to equity ("FCFE").

There are two parts in this valuation. First part is the value of operating assets which aim for generating revenue to the firm. The company's core business is forecasted line by line in details since 2018 until 2023. This six-year projection period is assumed to be high growth period and we then apply constant growth rate from 2024 onwards, reflecting a normal business growth. Oil and gas industry is normally forecasted for 5 years like IEA's report and we assume constant growth later on

because of a deceleration in oil demand as well as no peak sign. So, the demand is expected to grow modestly at low rate in the long run. Second part is the value of non-operating assets.

7.1.1 Value of operating asset

Products price formula

Referring to product pricing that mentioned in the part of business description, the price of products is comprised of market price of refining products, premium or discount, tax and oil fund. The company benchmarks its products against the Mean of Platts Singapore ("MOPS"). To forecast the market price, we apply worldwide consensus outlook from information provider, international investment and financial services company such as JP Morgan, Barclay, HSBC and S&P Platt. For other components, we use an average of historical data. However, in this industry, spreads are the main focus when talking about product prices.

Products spread

Spreads are the main focus of petroleum products, not prices because petroleum prices typically move in the same way as crude price. Spread is a difference between crude oil price and products price. To forecast the spreads, we take the latest announced market spread and adjust them with impacts of significant foreseeable events. As can be seen, prices of gasoline, jet and diesel are expected to increase meanwhile fuel oil will decrease due to IMO 2020 (Figure 7.1) that force the shipowners to use gasoil instead of fuel oil. Therefore, the demand for each product will be changed and the change will affect the prices. After that year, the shipowners and refiners will adapt themselves and seek for the most suitable way. The prices will gradually be back to the normal.

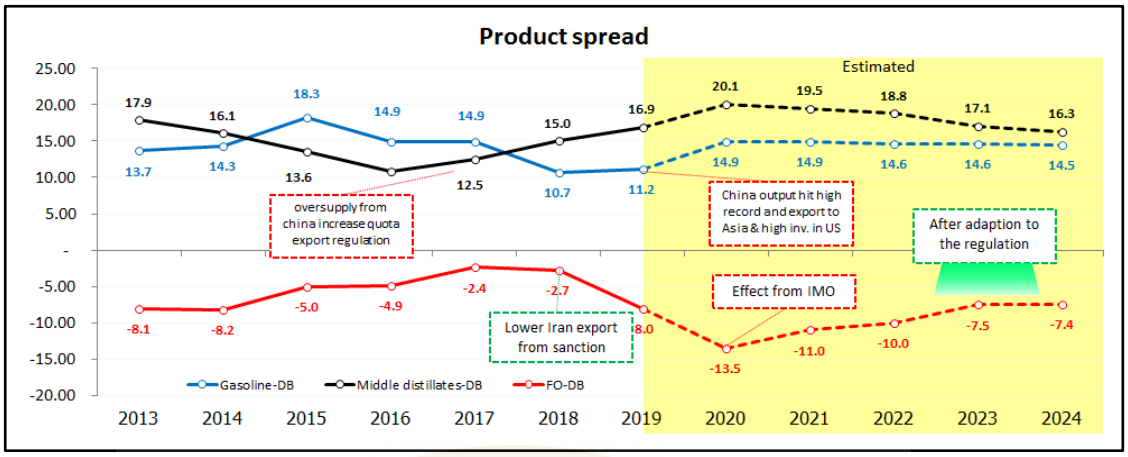


Figure 7.1: Historical and forecast of product spread

Source: Platt's and team forecast

Sales volume

We assume the company will utilize 100 percent of its distillation capacity every year except the year the company has turnaround. If turnaround is planned in any year, we will deduct 38 days; the same length of time as its last turnaround in 2014, from total capacity (Figure 7.2).

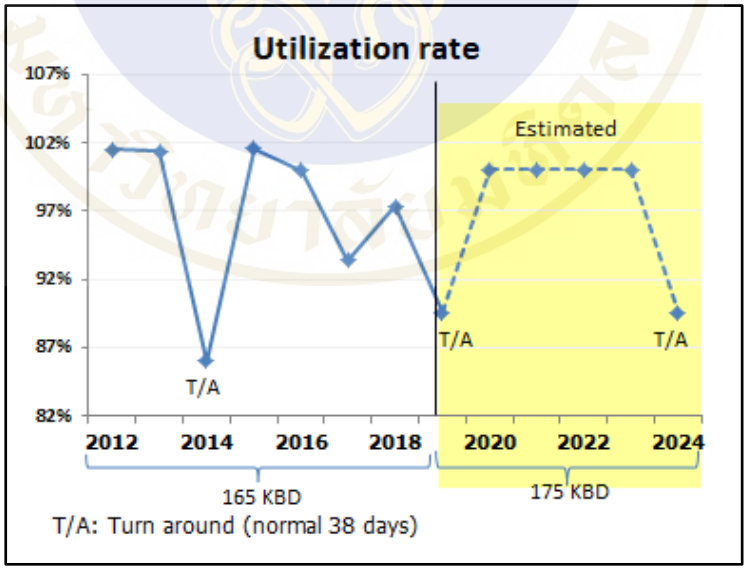


Figure 7.2: Historical and forecast of utilization rate

Source: SPRC annual report and team forecast

Feedstocks

There are 3 main types of feedstocks which are crude oil, hydrocracker bottom and others (such as VGO, LSFO, Naphtha). Price and quantity are forecasted as described below.

Type	Components		Assumption
Crude oil	Price	Base price	Market crude Dubai price as stated below
		Premium/ Discount	Average of historical data
	Quantity	Intake volume	Capacity x Operating days
Hydrocracker bottom	Price	Base price	Gasoline price
	Quantity	Intake volume	Capacity x Operating days
Others	Price	Base price	Market crude Dubai price as stated below
		Premium/ Discount	Average of historical data
	Quantity	Intake volume	Actual 2017

Note: Hydrocracker bottom is a supplemental feed exchange with PTTGC in order to maximize yields of higher value products. This feed exchange has high gasoline component.

Crude Dubai

After the coming of US shale oil that caused market price dropped significantly since 2015, the oil price situation recovered in 2018. Although the market price has been highly volatile between $60 per barrel and $90 per barrel during the year, an average crude oil price reached the highest point at $69.7 per barrel for the last four years. According to the forecast of oil demand and supply as well as the upcoming events, we assume that the price will rise steadily in 2019 and 2020 due to its trend which continues moving in the same way as it was in the year 2018, but the price will drop in 2021 because of an oversupply from conventional oil which was

invested since 2018; the high price year. In 2022, the market price will go down further as US shale oil is expected to maximize their capacity in this year. An excess supply will come from both conventional oil and shale oil. However, the world need to balance demand and supply eventually so that the price will not be lower than $70 per barrel which is the cost plus margin of US shale oil (Figure 7.3).

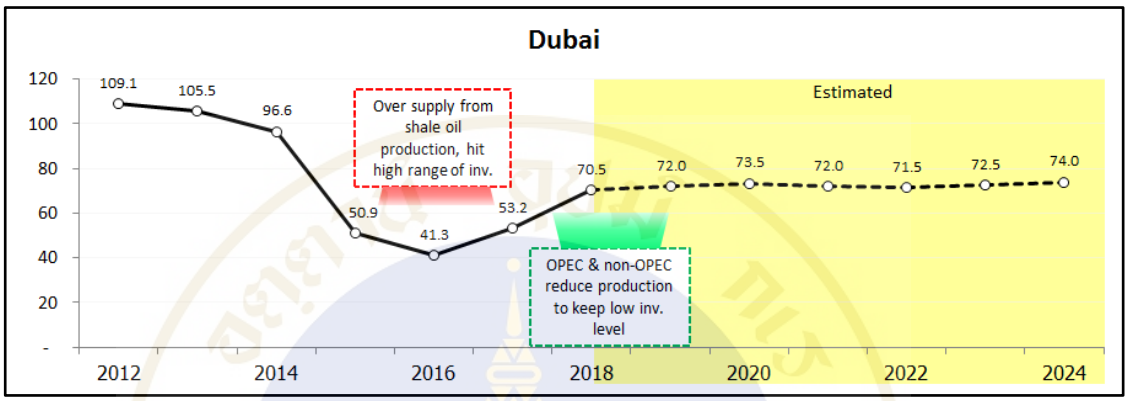


Figure 7.3: Historical and forecast of crude Dubai price

Source: Platt's and team forecast

Foreign exchange

Exchange rate forecast for the USDTHB is supposed to be 33 Baht per dollar, a bit depreciate from the year 2018, as U.S. dollar is likely to be appreciated due to an increase in Fed Fund Rate. In addition, the USDTHB is remained stable for long term as monetary reserve does not change materially in general.

For other assumptions can be found at Appendix 14 in order to get financial income statement.

Capital Expenditure

The company stated that its investment is typically about $20 million each year. Moreover, there is an announcement of adding refining capacity amounting to 10,000 barrels per day in order to meet 175,000 barrels per day, using $80 million and it will be commercial in December 2019.

Net operating working capital

Crude oil, including crude oil intransit, and petroleum products as well as material and supplies are considered as inventory of the company. We use the company's maximum oil storage capacity at 29 days for crude oil and 10 days for products which is from an average historical inventory outstanding. Main trade receivables are Chevron and PTT but other receivables mainly come from Thai government for LPG and fuel subsidy. Trade receivables are calculated based on an average collection period at 25 days, while other receivables are longer at 158 days due to the government's process takes time since receiving document until payment approval. Besides, trade payables are calculated using 30 days for payment period as stated on purchasing agreements and other receivables are calculated on an average historical data at 5% of cost of goods sold.

Terminal value

We apply Dividend Discount Model ("DDM") to estimate the terminal value since it takes into account the constant growth rate from 2024 onwards. The constant growth rate is 1.1% per year. Referring to Oil 2018; an analysis and forecasts report, issued by IEA, oil consumption of Thailand is believed to grow at an average annual rate of 1.3% for the next five years until 2023. 1.1% is the growth rate of the latest year; 2023, of IEA's forecasting. We maintain this rate as the long term growth rate for terminal phase because there is no peak sign of oil consumption in the future and oil demand growth rate is likely to slow down due to vehicle energy efficiency and more renewable energy penetration. Even though there are alternative energy to replace oil that used in private cars, the world still need oil for other transportation such as ship and airplane. The terminal value is THB 89,715 million.

Weighted average cost of capital

WACC is calculated by using CAPM model. 10-year government bond yield as of December 5, 2018, provided by ThaiBMA is used as the risk-free rate. Beta of the company is taken from our own regression analysis between stock price and set index since December 8, 2015. Market return is calculated by using an average arithmetic return of total index. As a result, the company's cost of equity is 10.8%. In part of cost of debt, effective interest rate of long-term borrowings is taken from 3-month LIBOR announced by Bank of Thailand ("BOT") as of September 2018. The

marginal tax rate is 20%. As a result, the company's after tax cost of debt is 1.88%. The proportion of equity and debt are the company's market capitalization and its liabilities as of September 30, 2018, respectively. Therefore, WACC of the company for DCF model is 9.8%.

7.1.2 Value of non-operating assets

The value of non-operating assets is approximately THB 43 million in cash and cash equivalent. Thus, the value of non-operating assets is THB 0.01 per share.

7.1.3 The result of discounted cash flow valuation

Finally, we obtain the estimated profit of the year 2019 of 2,311 million Baht (Table 7.1), financial cash flow statement (Appendix 9) and shareholders' equity of 45,031 million Baht (Appendix 10). We assume the company's number of shares outstanding to be constant at 4,336 million shares (Appendix 10); the same amount as shown in 2017 because there is no evidence of future movement from its business plan.

After obtaining all input from forecasted financial statements, we get total free cash flow from year 2018 to year 2023 which is included terminal value (Table 7.2). All future cash flows are estimated and discounted by using weighted average cost of capital to give their present values (PVs). The sum of all future cash flows, called enterprise value, is added 43 million Baht of non-operating asset then subtracted 9,259 million Baht of interest-bearing debt to get a number. Lastly, dividing that number by number of shares outstanding to receive a target price of THB 18.68 per common share which can be broken down into three components, including (1) the value of operating assets at THB 20.81 per share (2) the value of non-operating assets at THB 0.01 per share and (3) the value of debts at THB 2.14 per share.

Table 7.1: Statement of comprehensive Income including projection

Statement of Comprehensive Income (MB)	Actual (audited)			Estimated					
	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E
Sales	178,766	154,954	169,620	208,184	172,756	232,579	229,473	225,601	228,267
Liquefied Petroleum Gas and fuel subsidies	111	128	915	924	409	532	532	528	532
Total revenue	178,877	155,082	170,535	209,108	173,165	233,110	230,005	226,129	228,799
Cost of sales	(166,175)	(141,709)	(158,245)	(198,566)	(167,472)	(219,084)	(216,675)	(214,198)	(217,253)
Other expenses	(12)	(21)	(1)	(44)	-	-	-	-	-
Other income	143	34	31	53	-	-	-	-	-
EBITDA	**12,833**	**13,385**	**12,320**	**10,551**	**5,693**	**14,027**	**13,330**	**11,932**	**11,546**
Depreciation	(2,766)	(2,872)	(2,775)	(2,686)	(2,853)	(2,879)	(2,902)	(2,924)	(2,950)
Amortisation	(33)	(48)	(53)	(52)	(53)	(53)	(57)	(25)	(25)
EBIT	**10,033**	**10,465**	**9,492**	**7,813**	**2,786**	**11,094**	**10,371**	**8,983**	**8572**
Interest expenses	(9)	(94)	(92)	(92)	-	-	-	-	0
Interest income	90	30	16	81	103	195	285	366	444
Finance costs				-					
Gain on exchange rate	495	548	1,509	757	-	-	-	-	-
Profit before income tax (EBT)	10,610	10,949	10,925	8,559	2,889	11,289	10,656	9,349	9,016
Income tax	(2,382)	(2,261)	(2,029)	(1,747)	(578)	(2,258)	(2,131)	(1,870)	(1,803)
(Loss) Profit for the year	**8,227**	**8,688**	**8,895**	**6,812**	**2,311**	**9,032**	**8,525**	**7,479**	**7,213**

Source: Audited financial statements of SPRC and team calculation

Table 7.2: Free cash flow projection

	Estimated						
Statement of Cash Flows (MB)	**2018E**	**2019E**	**2020E**	**2021E**	**2022E**	**2023E**	**2024E**
Profit before income tax (EBT)	**8,559**	**2,889**	**11,289**	**10,656**	**9,349**	**9,016**	**6,246**
Adjustments:							
Finance income	(81)	(103)	(195)	(285)	(366)	(444)	(509)
Finance expense	92	-	-	-	-	-	-
Depreciation	2,686	2,853	2,879	2,902	2,924	2,950	2,976
Amortisation	52	53	53	57	25	25	25
Loss from disposal of fixed assets	40	-	-	-	-	-	-
Unrealised (Gain) Loss from foreign exchange rate	(242)	-	-	-	-	-	-
Loss on obsolete materials and supplies	5	-	-	-	-	-	-
Allowance (Reversal) of inventory to net realisable value	-	-	-	-	-	-	-
Retirement benefit expenses	25	-	-	-	-	-	-
Deferred income realised during the year	-	-	-	-	-	-	-
Change in operating assets and liabilities							
Change in working capital	2,050	2,219	(1,959)	233	172	(176)	426
Cash generated from operations	13,185	7,912	12,068	13,562	12,103	11,371	9,163
Interest received	80	103	195	285	366	444	509
Interest paid	(90)	-	-	-	-	-	-
Income tax paid	(2,589)	(578)	(2,258)	(2,131)	(1,870)	(1,803)	(1,249)
Net cash generated from operating activities	**10,587**	**7,437**	**10,005**	**11,717**	**10,600**	**10,011**	**8,423**
Cash flows from investing activities	-						
Purchases of equipment and intangible asset	(701)	(3,102)	(660)	(660)	(660)	(660)	(660)
Proceeds from disposal of equipment	1	-	-	-	-	-	-
Net cash used in investing activities	**(700)**	**(3,102)**	**(660)**	**(660)**	**(660)**	**(660)**	**(660)**
Free cash flow	**9,886**	**4,335**	**9,345**	**11,057**	**9,940**	**9,351**	**7,763**
Terminal value						**89,715**	
Total Free cash flow	**9,886**	**4,335**	**9,345**	**11,057**	**9,940**	**99,067**	**7,763**

Source: Unaudited financial statements of SPRC for 9 months of 2018 and team calculation

7.2 The second part of valuation: Conclusion

After we obtain the company's values taken from the DCF and relatives valuation (Pitaknitinun, 2018). We then find a range for each price as in valuation, no

single value is right, so we prefer to find possible range for them by using different method between DCF and relative valuation as described below.

7.2.1 Drivers of volatility in earnings: sensitivity analysis

For the target price derived from DCF valuation method (Phatisaran, 2018), we have performed a sensitivity analysis to determine how much each variable affects on the value of SPRC. Market spread, WACC, FX and growth are considered as key variables for the sensitivity analysis (Table 7.3).

Table 7.3: Sensitivity analysis

	Deviated from Base Case			Change in Stock Price (B/share)			
Cases	WACC	FX	Terminal Growth	Market Spread	WACC	FX	Terminal Growth
- 20%	7.8%	26.4	0.9%	3.94	24.43	10.5	18.39
- 10%	8.8%	29.7	1.0%	11.31	21.19	14.6	18.53
0%	9.8%	33.0	1.1%	18.68	18.68	18.7	18.68
10%	10.7%	36.3	1.2%	26.05	16.67	22.8	18.83
20%	11.7%	39.6	1.3%	33.43	15.02	26.9	18.99

Source: Team calculation

Market spread is considered to be the most significant factor of refinery business as the overall refinery performance is highly depended on it. It has direct impact on the company's bottom line. If any companies own high market spread, they tend to outperform the market and their competitors.

WACC must be one of the key factors for this valuation because, as stated above, the nature of refinery business normally requires huge amount of capital if new investment or major maintenance is on a plan. Although the company do not need external funding for the next turnaround and capacity expansion in 2019, what if it need since there is a possibility of inadequate cash on hand. This will affect a change in the company's leverage; a componence in WACC formula.

Foreign exchange could be another factor for SPRC because even though the company is located in Thailand, its financial statements apply the U.S. dollar as its functional currency and huge amount of gain/loss on exchange rate always show on the financial statements. Based on macroeconomic analysis, the increase in federal

funds rate will lead the U.S. dollar to appreciate. What if the expectation moves in reversed.

The constant growth for terminal value can be an important factor because this growth indicates the degree of the company's future performance which means, how much the company can earn in long term. Thus, what if the constant growth is higher or lower than our assumption.

7.2.2 The most significant factor: spider chart

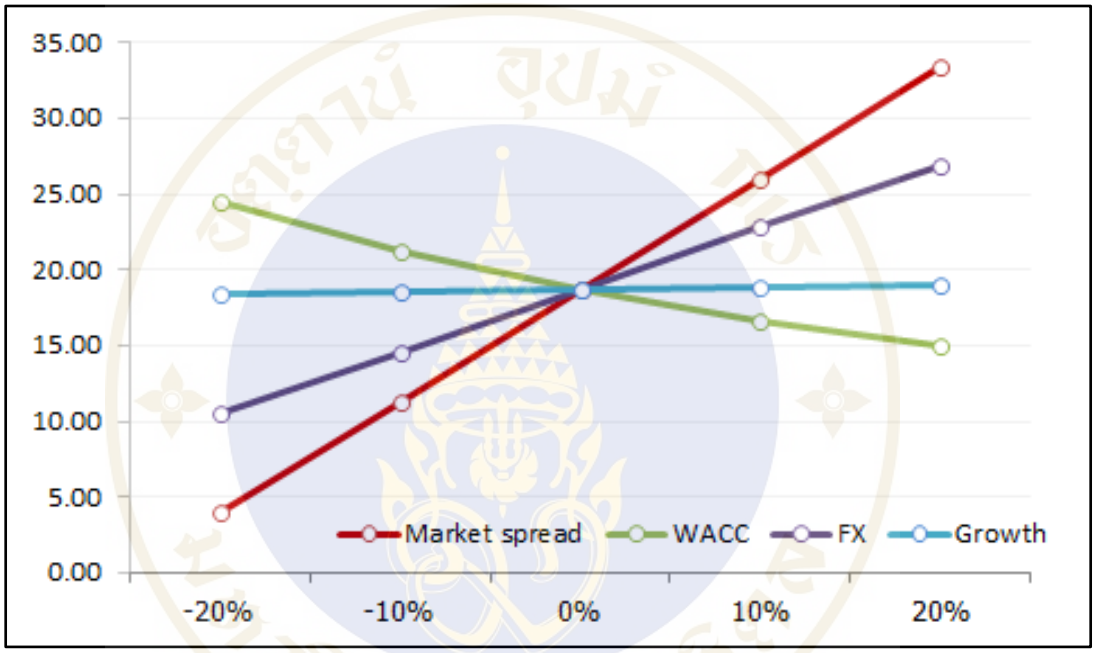


Figure 7.4: Spider chart

Source: Team calculation

From Spider Chart, we found that market spread generates the greatest impact among four factors on SPRC's share price (Figure 7.4). We therefore use the sensitivity analysis result of market spread as the target price's upper and lower bounds.

7.2.3 The boundary of each multiples

In case of three multiples derived from relative valuation; P/E, P/BV and EV/EBITDA, provides us three different target prices. We then create their boundary taken from a quartile above and below their medians. The ranges of potential prices are shown in the table 7.4.

Table 7.4: Target prices' boundary

Normalized	P/E	P/BV	EV/EBITDA
Lower	11.2	13.7	12.0
Base	13.6	13.9	12.9
Upper	16.7	15.9	17.7

Source: Team calculation

7.2.4 The most appropriated price: Football Field Chart

To make a better decision, we apply Football Field Chart to help us determine the most appropriated price from the overlap area rather than pick one price from one method straight away. We use Football Field Chart because the chart summarizes all four stock prices, resulting from DCF and relative valuation, and visually shows an average between the range of our four target prices. To see the overall picture is easier for us to make the decision. And finally we pick the average at THB 15.9 per share, as the most appropriated price of SPRC (Figure 7.5).

Figure 7.5: Football Field Chart

Source: Team calculation

The target price at THB 15.9, offering a 31% upside from its closing price of THB 12.1 on November 30, 2018, seems to be impossible. However, when looking at the company's historical prices (blue line), we found that the stock prices were higher than our target price, even touched THB 18.0. Therefore, the company's intrinsic value is possible at THB 15.9 (Figure 7.6).

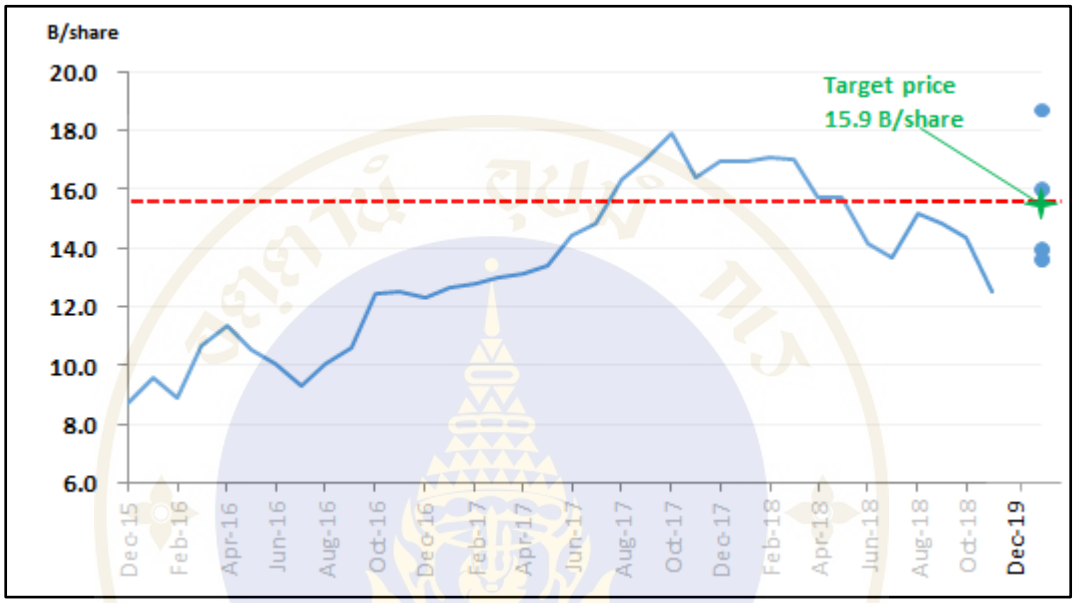


Figure 7.6: Historical prices vs target prices

Source: Team calculation

CHAPTER VIII

INVESTMENT RISK

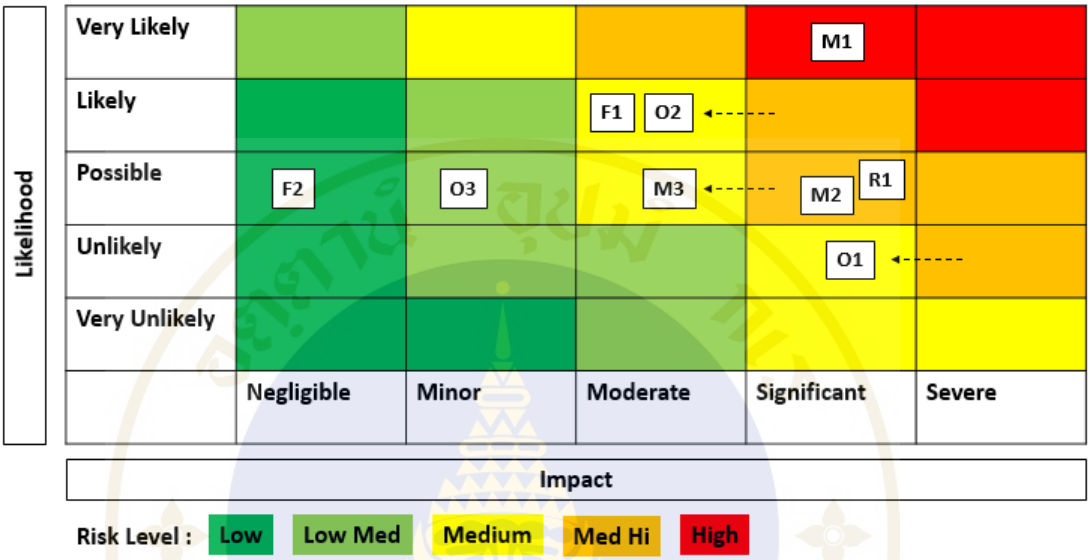


Figure 8.1: Risk matrix

Source: Team analysis

Table 8.1: Risk factors

Code	Risk factors	Mitigation plan
M1	Market spread fluctuation and not in line with the expectation. The price of raw material is highly influenced by the global oil price. Likewise, the prices of petroleum products are based on MOPS.	As a result of BLIP and other projects, the company shows strong GRM withstanding low GRM cycle but it can reduce a bit of exposure.
M2	The use of EV comes faster than expectation due to the country's readiness of infrastructure and supporting policies.	
M3	Refinery industry in Thailand has fierce competition with 7 refiners. The company may not compete with other big and powerful companies.	Almost 90% of revenue are sold through the Offtake Agreement with Chevron and PTT.

Table 8.1: Risk factors (Cont.)

Code	Risk factors	Mitigation plan
R1	Rules and regulations have been issued continuously to protect the world's environment. The company always comply with those environmentally-concerned rules as its operations are based on sustainable development.	N/A
O1	A significant hazard such as spills, fires, explosions and tragic accidents, will probably occur and causes business interruption as well as low performance.	SPRC has implemented three management systems to enhance its operation and to avoid potential business interruptions as well. Besides, to cover the loss, it has business interruption insurance.
O2	As a small player, it is difficult for the company to reach desirable feed with bargaining power.	Chevron is the company's major shareholder, so it is able to take various benefits through Chevron's system including global procurement services.
O3	Large capital is required in order to expand or upgrade the plant. It may be impossible for some companies, but not SPRC because the company has healthy financial performance with excess cash and nearly debt free.	N/A
F1	The effect of exchange rate fluctuation can be reduced as the company used U.S. dollar as its functional currency. So, natural hedge is in place.	N/A
F2	The fluctuation of interest rate will not affect the company much because of an effective financial management. Its current debt to equity is so low; only 0.4.	N/A

Source: Team analysis

Market spread fluctuation and GRM reduction (M1: Likely & Moderate)

A serious risk of refiners is the market spread fluctuation because neither refiners nor the government cannot control over prices. The company has to import crude oil as its feedstock and the price is strongly influenced by the global oil price. Likewise, prices of petroleum products are based on MOPS. Moreover, the performance of refinery highly depends on gross refining margin ("GRM"), which is the difference between the total value of petroleum products (output) and the price of crude oil (input). The more refiners can produce high-value products, the greater the GRM. The GRM is typically fluctuated by both domestic and global economy, which can be another risk for refiners. Therefore, demand and supply of both feedstock and outputs need to be concerned in order to get ready for GRM fluctuation.

Mitigation plan: The company is aware of this point. Not only BLIP the company has been implemented but also safety, reliability and full utilization that the company focuses on. Resulting in strong GRM that withstands low GRM cycle. Nevertheless, that can reduce a bit of risk exposure.

The Fast coming of EV (M2: Possible & Significant)

For Thailand, it seems to take more than 10 years to make infrastructure ready for EV passenger car. However, what if the three responsible ministries make it success faster than the plan. Thailand may have a million of EV driven on roads within 5 years. It is not too difficult for the nation to switch from gas car to EV car as long as the infrastructure can be completed and policy is written to support the use of EV due to the fact that car producer companies in Thailand have EV passenger cars ready to be sold domestically. They are waiting for the country's readiness.

Competition (M3: Possible & Moderate)

Nowadays, refinery industry in Thailand has fierce competition. As at 31 December 2017, there are 7 refineries in the country amounting to 1,235 KBD. 5 of them are the company's main rivals namely Thaioil, Esso, Bangchak, PTTGC and IRPC, totaling to 1,067 KBD. Moreover, PTT who used to be the company's shareholder holds significant interests in 3 of the main rivals. There is a risk that the company cannot compete with other powerful companies.

Mitigation plan: A significant portion of products are sold primarily through the Offtake Agreement with Chevron and PTT, accounting for almost 90% of total sales by revenue.

Strict rules and regulations (R1: Possible & Significant)

Burning fossil fuels (coal, natural gas and oil) release carbon dioxide into the atmosphere led to rise in average temperature of the earth. Carbon dioxide and other greenhouse gases are believed to be the primary sources of global warming which is one of the world's main concerns. Therefore, there are rules continuously issued to cut such the emissions such as maximum global sulphur cap recently announced by IMO. It is difficult for oil and gas producers to foresee and prepare as long as new rules have not been issued yet. The company always comply with those kinds of the environmentally-concerned rules as its operations are based on sustainable development which means, payment for following those rules to upgrade refinery or make it more efficient will be occurred any times in the future.

A significant interruption in the operations (O1: Unlikely & Significant)

No one can deny that operating the business in oil and gas industry is somewhat dangerous. Every operational process; refining, transporting and storing crude oil, other feedstocks as well as petroleum products, involves many major hazards, such as spills, fires, explosions and tragic accidents, that can interrupt the company's operation and lead to low performance.

Mitigation plan: SPRC aims to "Set the Standard" in operational excellence. The company has implemented some management systems to enhance its operation in a systematic way and to avoid potential business interruptions as well. Those management systems including Refining Management System, Environmental, Health and Safety Management System and Asset Management System aim to deliver exceptional safety, reliability, utilization and environmental performance. Moreover, the company has business interruption insurance to cover the loss after a disaster.

Accessing to feed with bargaining power (O2: Likely & Moderate)

With 13% of total capacity in Thailand the company is not a major player with negotiating power in the market. The risk of an ability to reach desirable feed with bargaining power must be concerned. The company will not probably purchase crude oil at competitive prices due to low level of purchase compared to other big players.

Mitigation plan: This risk can be minimized, thank to Chevron for being SPRC's major shareholder, the company is able to take benefits through Chevron's global procurement services, products sales network, advanced technological, operational, engineering and other technical support services, etc.

New investment (O3: Possible & Minor)

The company may need to expand its capacity to serve higher demand in the future, or make any configuration with its distillation tower so that the refinery will have a better operation. All of these need a lot of capital investment to expand or upgrade. This investment may be impossible if the company neither has an excess cash nor a good credit rating to borrow money from banks. Thank to the company's healthy financial performance, its current debt to equity is nearly debt free.

Exchange rate (F1: Likely & Moderate)

Even though the company is not a global company with branches located in many countries, it is still exposed to exchange rate risk because invoices are issued in Thai Baht which means, most of its cash inflows are in local currency. Whereas the company makes payments for feed in U.S. dollar. Therefore, the company's financial statements are affected by gain/loss on exchange rate and also translation gain/loss. However, the effect of exchange rate fluctuation can be reduced as the company used U.S. dollar as its functional currency. Besides, those particular invoices are calculated on U.S. dollar then translated into Thai Baht based on invoice date. Therefore, natural hedge is done to mitigate the risk.

Interest rate (F2: Possible & Negligible)

Interest rate may cause a huge burden to many companies which have high leverage. Nevertheless, the company always maintains an effective financial management. Its current debt to equity is so low; only 0.4, that the fluctuation of interest rate will not affect the company much.

REFERENCES

Bangchak Corporation Public Company Limited. (2017). Annual Report. Retrieved from http://www.bangchak.co.th

Electricity Generating Authority of Thailand and Team. (2016). Electric Infrastructure plan to serve electric vehicle in Thailand. Retrieved from http://www.eppo.go.th

Esso (Thailand) Public Company Limited. (2017). Annual Report. Retrieved from http://www.esso.co.th

International Monetary Fund. (2018). Foreword. In E. Editor (Ed). World Economic Outlook: Challenges to Steady Growth. (pp. xiii-xv). Retrieved from http://imf.org

International Monetary Fund. (2018). Executive Summary. In E. Editor (Ed). World Economic Outlook: Challenges to Steady Growth. (pp. xvi-xviii). Retrieved from http://imf.org

International Monetary Fund. (2018). Global Prospects and Policies. In E. Editor (Ed). World Economic Outlook: Challenges to Steady Growth. (pp. 1-68). Retrieved from http://imf.org

IRPC Public Company Limited. (2017). Annual Report. Retrieved from http://www.irpc.co.th

National Science and Technology Development Agency. (2017). Electric Vehicle. In E. Editor (Ed). Study Report: Electric Vehicle (pp. 33-36). Retrieved from https://www.nstda.or.th/

Peeraya Pitaknitinun. (2018). Relatives Valuation of Star Petroleum Refining Public Company Limited. Bangkok

S&P Global Platts. (2016). The IMO's 2020 Global Sulfur Cap. Retrieved from http://www.platts.com/shipping

S&P Global Platts. (2018). World Oil Market Outlook. Retrieved from http://www.platts.com

Star Petroleum Refining Public Company Limited. (2017). Annual Report. Retrieved from http://www.sprc.co.th

Star Petroleum Refining Public Company Limited. (2018). Financial Statement. Retrieved from http://www.sprc.co.th

Star Petroleum Refining Public Company Limited. (2018). MD&A. Retrieved from http://www.sprc.co.th

Star Petroleum Refining Public Company Limited. (2018). Opportunity Day. Retrieved from http://www.sprc.co.th

Thai Oil Public Company Limited. (2017). Annual Report. Retrieved from http://www.thaioilgroup.com

Thansettakij. (2018). SPRC new target to be retailer. Retrieved from http://www.thansettakij.com/content/282145

The Energy Policy and Planning Office. (2018). OIL. In E. Editor (Ed). Energy Statistics of Thailand 2018 (pp. 55-104). Retrieved from http://www.eppo.go.th

The Energy Policy and Planning Office. (2018). Petroleum Prices. In E. Editor (Ed). Energy Statistics of Thailand 2018 (pp. 233-253). Retrieved from http://www.eppo.go.th

The Energy Policy and Planning Office. (2018). Thailand's Energy Situation in 2017. In E. Editor (Ed). Energy Statistics of Thailand 2018 (pp. 13-54). Retrieved from http://www.eppo.go.th

The International Energy Agency (IEA). (2017). World Oil Supply and Demand 2002-2016. In E. Editor (Ed). Annual Statistical Supplement 2017 Edition (pp. 4). Retrieved from http://www.oilmarketreport.org

The International Energy Agency (IEA). (2018). Demand & Supply. In E. Editor (Ed). OIL Market Report Series 2018 (pp. 11-78). Retrieved from http://www.iea.org

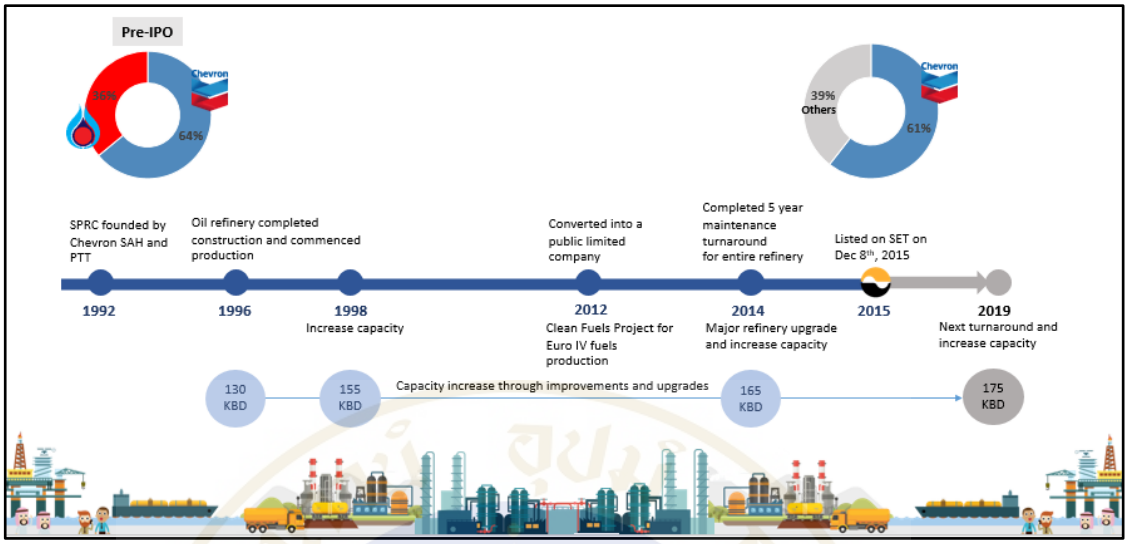
The International Energy Agency (IEA). (2018). Outlook to 2030. In E. Editor (Ed). Global EV Outlook 2018 (pp. 75-94). Retrieved from http://www.iea.org

The International Energy Agency (IEA). (2018). World Oil Supply and Demand. In E. Editor (Ed). Annual Statistical Supplement 2018 Edition (pp. 1). Retrieved from http://www.oilmarketreport.org

VALERO. (2018). Basics of Refining and Optimization. Retrieved from https://valero.gcs-web.com

APPENDICES

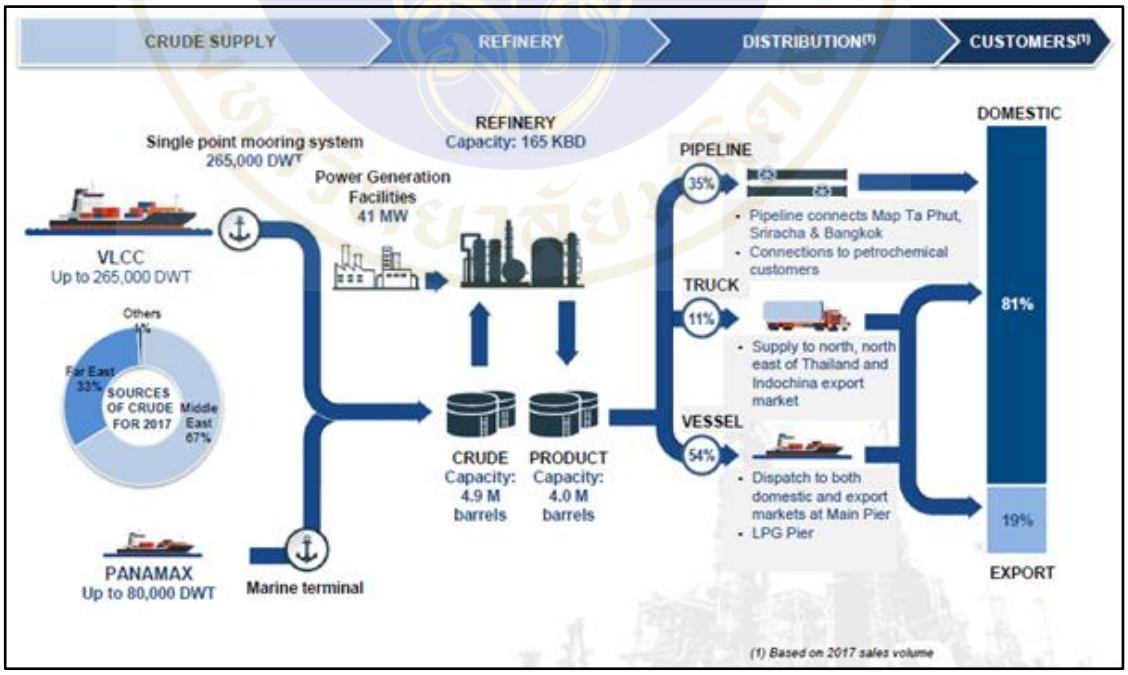
Appendix 1: A brief history



Source: SPRC website

Appendix 2: Business structure

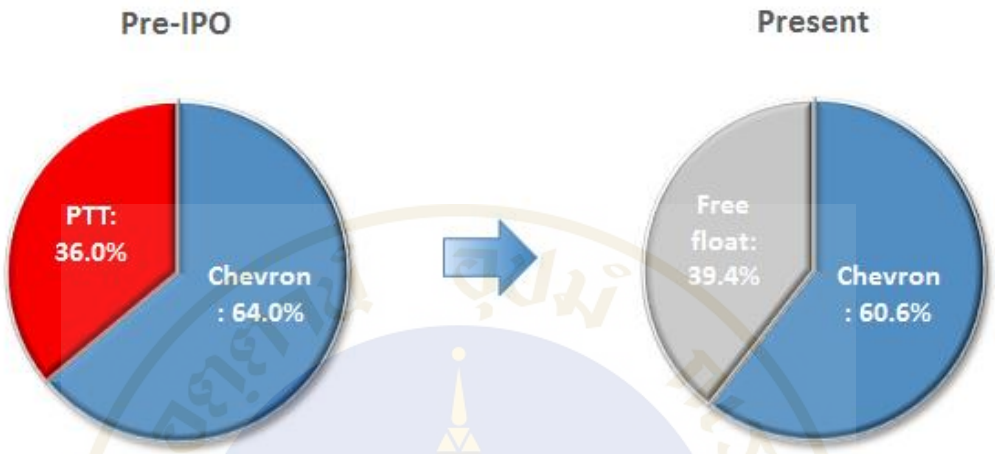
A big picture of refinery business process from purchasing crude oil to selling products to customer



Source: SPRC Opportunity Day 2017

Appendix 3: Shareholding Structure

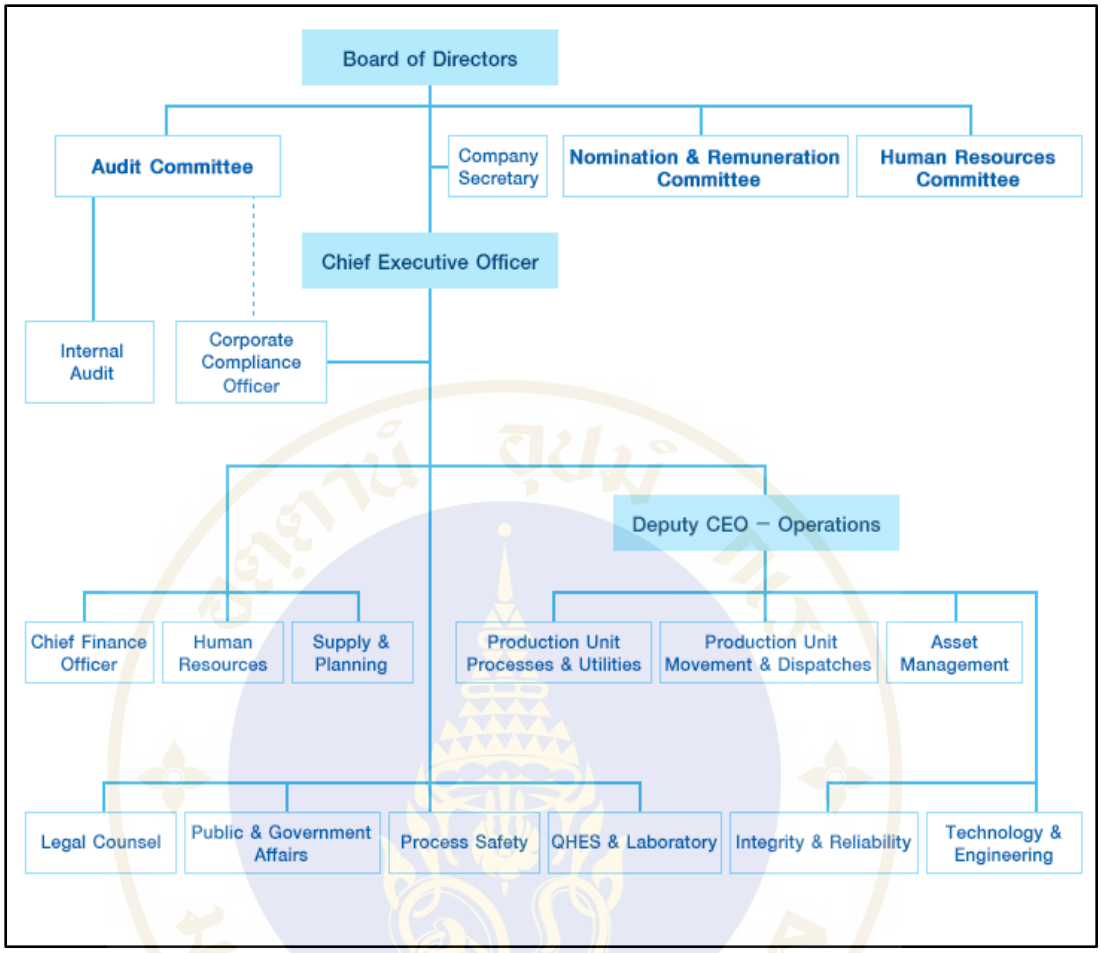
The shareholding structure had been changed after IPO on December 8, 2015. The updated shareholding structure is as shown below.



Rank	Major Shareholders	% Shares
1	Chevron South Asia Holding Pte Ltd	60.56
2	Thai NVDR Company Limited	8.14
3	South East Asia UK (Type C) Nominees Limited	2.54
4	State Street Europe Limited	2.36
5	The Bank of New York (Nominees) Limited	0.87
6	Other Shareholders	25.53

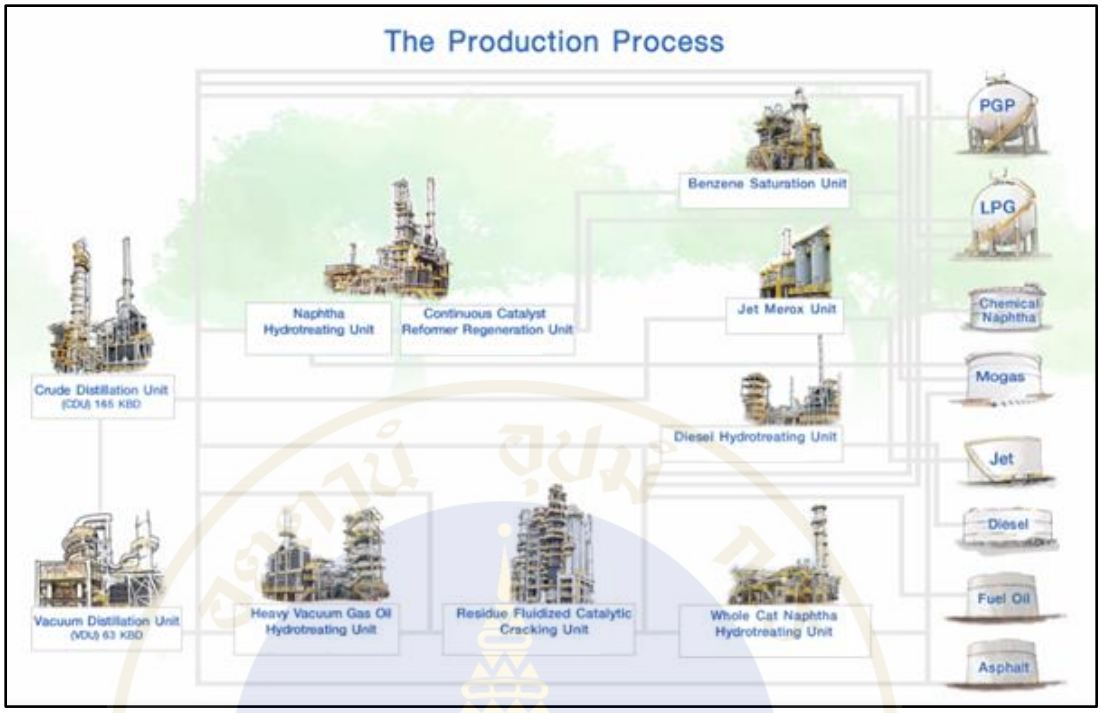
Source: SPRC website as of October 2018, SPRC Annual Report 2017

Appendix 4: Organization Chart



Source: SPRC website as of October 2018

Appendix 5: Production process of refinery



Source: SPRC website as of October 2018

- The CDU separates crude oil into fractions according to their boiling range; LPG, light naphtha, heavy naphtha, jet fuel, diesel and fuel oil.
- The VDU uses a vacuum to improve distillation of atmospheric residue from the CDU.
- The NHTU removes sulphur from heavy naphtha prior to feeding it to the CCR.
- The CCR converts low-octane naphtha into high-octane fuels for production of various grades of unleaded gasoline.
- The BSU removes benzene from gasoline.
- The JMU treats jet streams from the CDU in order to produce jet fuel.
- The DHTU treats streams from the CDU, VDU and the RFCCU to produce diesel.
- The HVGO HTU removes sulphur and improves feed quality.

- The RFCCU cracks petroleum hydrocarbons in order to convert heavy low value fractions of petroleum crude oils to more valuable and higher margin products.
- The WCN removes sulphur from gasoline.

Appendix 6: SWOT

Strength

- With Chevron as major shareholder, SPRC can access a global network of Chevron in many areas such as procurement services, products sales network, advanced technological, operational, engineering and other technical support services, etc.
- A complex cracking refinery provides the company a much higher margin by upgrading low-value fuel oil into higher value transportation fuels.
- SPRC has implemented BLIP that helps the company enhance its earning as well as withstands low GRM cycle.
- SPRC has one of the lowest cost structure as the company is able to generate power for internal use by using heat, leading to cost savings.

Weaknesses

- Oil and gas is commodity-based business that normally has highly volatile earnings. As can be seen, for example, in 2017, crude oil prices were volatile referring to Dubai crude price moving between $43.50/bbl and $64.36/bbl.

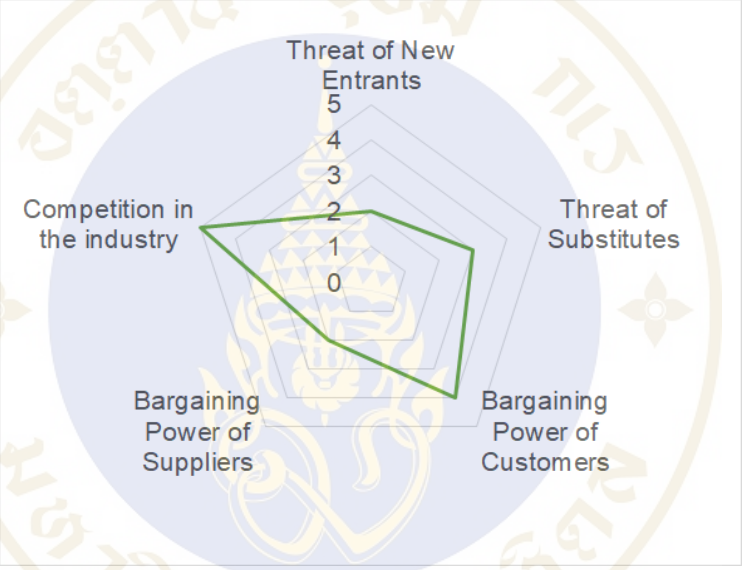
Opportunities

- New technology would be an opportunity for internal efficiency improvements.
- There are some possibilities to expand itis business into neighboring countries

Threats

- Change in rules and regulations tend to be tighter due to the environment protection purpose. This causes a huge investment in order to align with those rules.
- An increase of a trend to use vehicle energy efficiency instead of burning fossil fuels that produce carbon dioxide emissions and other greenhouse gasses.

Appendix 7: Five force analysis



Source: Team analysis

Low Threat of New Entrants

Refinery business requires not only large amount of investment but also specific knowledge and know-how to build a distillation tower as well as to run the business. Besides, there are some constraints about environment concern to follow; otherwise, penalties are imposed for breaking the rules. Thus, it is not easy that someone will enter into the business.

Medium Threat of Substitutes

There are many substitutes for oil and gas, including nuclear power, solar power, wind power and so on. Although these renewable energy are considered as

clean energy that produce negligible adverse climate effects, they are still unpopular due to less efficient and more expensive. Nevertheless, many countries are aware of global warming caused by burning of fossil fuels (coal, oil and gas). To slow down the effect, they work hard to promote alternative energy as well as to encourage less oil and gas consumption, for example, using EV car.

High Bargaining Power of Customers

Nearly 90% of total sales by revenue is sold under the Offtake Agreement with Chevron and PTT. This implies that the company has only two main customers which means, if the company lose these two customers, it will have to work hard to sell that 90% out; otherwise, it might get loss in that year. So, the bargaining power is in Chevron and PTT's hands.

Low Bargaining Power of Suppliers

Even though SPRC is a small refiner, its major shareholder is Chevron. Chevron is a global energy company where operates from upstream to downstream business even go further in chemical business. Therefore, the risk to access to desirable feedstock with bargaining power can be minimized as the company is allowed to use a global procurement services of Chevron.

High Competition in the Industry

The refining industry in Thailand is fiercely competitive. There are 7 refineries operating in the country with a combined capacity of 1,235 kbd. SPRC primary competes with other five refiners with a combined capacity of 1,097 kbd, which are Thai Oil, PTTGC, Bangchak, Esso and IRPC. In addition, PTT, which is Thailand's largest oil and gas company, holds materiality interests in three of that five competitors.

Appendix 8: Statement of comprehensive Income including projection

Statement of Comprehensive Income (MB)	Actual (audited)			Estimated					
	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E
Sales	178,766	154,954	169,620	208,184	172,756	232,579	229,473	225,601	228,267
Liquefied Petroleum Gas and fuel subsidies	111	128	915	924	409	532	532	528	532
Total revenue	178,877	155,082	170,535	209,108	173,165	233,110	230,005	226,129	228,799
Cost of sales	(166,175)	(141,709)	(158,245)	(198,566)	(167,472)	(219,084)	(216,675)	(214,198)	(217,253)
Other expenses	(12)	(21)	(1)	(44)	-	-	-	-	-
Other income	143	34	31	53	-	-	-	-	-
EBITDA	**12,833**	**13,385**	**12,320**	**10,551**	**5,693**	**14,027**	**13,330**	**11,932**	**11,546**
Depreciation	(2,766)	(2,872)	(2,775)	(2,686)	(2,853)	(2,879)	(2,902)	(2,924)	(2,950)
Amortisation	(33)	(48)	(53)	(52)	(53)	(53)	(57)	(25)	(25)
EBIT	**10,033**	**10,465**	**9,492**	**7,813**	**2,786**	**11,094**	**10,371**	**8,983**	**8572**
Interest expenses	(9)	(94)	(92)	(92)	-	-	-	-	0
Interest income	90	30	16	81	103	195	285	366	444
Finance costs				-					
Gain on exchange rate	495	548	1,509	757	-	-	-	-	-
Profit before income tax (EBT)	10,610	10,949	10,925	8,559	2,889	11,289	10,656	9,349	9,016
Income tax	(2,382)	(2,261)	(2,029)	(1,747)	(578)	(2,258)	(2,131)	(1,870)	(1,803)
(Loss) Profit for the year	**8,227**	**8,688**	**8,895**	**6,812**	**2,311**	**9,032**	**8,525**	**7,479**	**7,213**

Source: Audited financial statements of SPRC and team calculation

Appendix 9: Statement of cash flow including projection

Statement of Cash Flows (MB)	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E
Profit before income tax (EBT)	**10,610**	**10,949**	**10,925**	**8,559**	**2,889**	**11,289**	**10,656**	**9,349**	**9,016**
Adjustments:									
Finance income	(90)	(30)	(16)	(81)	(103)	(195)	(285)	(366)	(444)
Finance expense	9	94	92	92	-	-	-	-	-
Depreciation	2,766	2,872	2,775	2,686	2,853	2,879	2,902	2,924	2,950
Amortisation	33	48	53	52	53	53	57	25	25
Loss from disposal of fixed assets	12	20	1	40	-	-	-	-	-
Unrealised (Gain) Loss from foreign exchange rate	121	96	(524)	(242)	-	-	-	-	-
Loss on obsolete materials and supplies	17	24	32	5	-	-	-	-	-
Allowance (Reversal) of inventory to net realisable value	(2,477)	-	-	-	-	-	-	-	-
Retirement benefit expenses	19	42	31	25	-	-	-	-	-
Deferred income realised during the year	(12)	-	-	-	-	-	-	-	-
Change in operating assets and liabilities	-	-	-	-	-	-	-	-	-
Change in working capital	9,731	(4,569)	(545)	2,050	2,219	(1,959)	233	172	(176)
Cash generated from operations	20,739	9,545	12,823	13,185	7,912	12,068	13,562	12,103	11,371
Interest received	90	30	16	80	103	195	285	366	444
Interest paid	(5)	(88)	(98)	(90)	-	-	-	-	-
Income tax paid	(291)	(1,851)	(1,882)	(2,589)	(578)	(2,258)	(2,131)	(1,870)	(1,803)
Net cash generated from operating activities	**20,534**	**7,637**	**10,860**	**10,586**	**7,437**	**10,005**	**11,717**	**10,600**	**10,011**
Cash flows from investing activities				-					
Purchases of equipment and intangible asset	(468)	(538)	(503)	(701)	(3,102)	(660)	(660)	(660)	(660)
Proceeds from disposal of equipment	0	1	0	1	-	-	-	-	-
Net cash used in investing activities	**(468)**	**(537)**	**(503)**	**(700)**	**(3,102)**	**(660)**	**(660)**	**(660)**	**(660)**
Cash flows from financing activities				-					
Proceeds from short-term borrowings				8,673	-	-	-	-	-
Repayment of short-term borrowings				(8,636)	-	-	-	-	-
Proceeds from long-term borrowings	3,988	4,959	-	-	-	-	-	-	-
Repayment of long-term borrowings	-	(2,530)	(3,614)	(2,286)	-	-	-	-	-
Payment of capital reduction	(9,057)	(3,580)	-	-	-	-	-	-	-
Dividends paid to shareholders	(14,863)	(9,502)	(4,799)	(5,521)	(1,536)	(3,168)	(5,035)	(4,589)	(4,213)
Proceeds from issue and paid in common shares	1,775	-	-	-	-	-	-	-	-
shares under Employee Stock Ownership Plan	322	-	-	-	-	-	-	-	-
Net cash used in financing activities	**(17,836)**	**(10,654)**	**(8,413)**	**(7,771)**	**(1,536)**	**(3,168)**	**(5,035)**	**(4,589)**	**(4,213)**
Net increase (decrease) in cash and cash equivalents	**2,230**	**(3,554)**	**1,944**	**2,115**	**2,800**	**6,177**	**6,022**	**5,350**	**5,138**
Cash and cash equivalents at the beginning of year	2,286	3,949	233	2,171	4,137	6,937	13,114	19,136	24,486
Adjustment from foreign exchange translation	(568)	(162)	(6)	(149)	-	-	-	-	-
Cash and cash equivalents at the ending of year	**3,949**	**233**	**2,171**	**4,137**	**6,937**	**13,114**	**19,136**	**24,486**	**29,624**

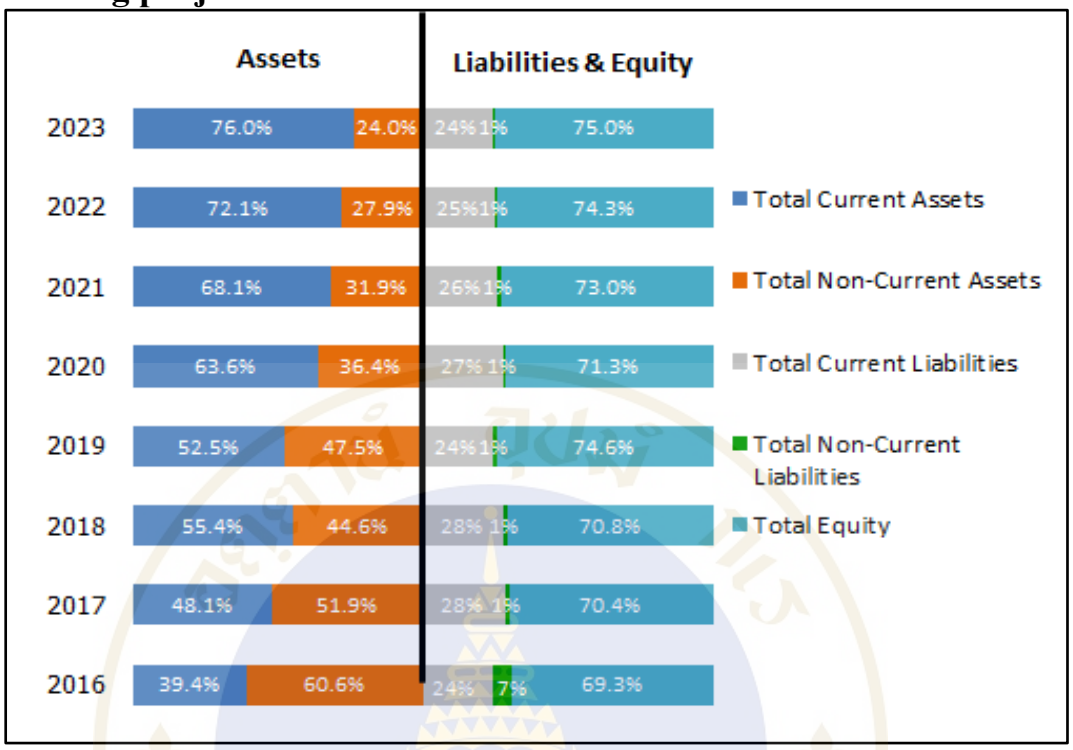
Source: Audited financial statements of SPRC and team calculation

Appendix 10: Statement of financial position including projection

Statement of Financial Position (MB)	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E
Assets									
Current assets									
Cash and cash equivalents	3,949	233	2,171	4,137	6,937	13,114	19,136	24,486	29,624
Trade receivables	8,660	11,391	11,907	11,859	9,548	12,957	12,745	12,499	12,663
Other receivables	-	255	346	240	205	246	246	245	246
Inventories, net	9,033	11,776	14,244	19,039	14,879	19,695	19,333	19,066	19,386
Other current assets	240	50	96	96	96	96	96	96	96
Total current assets	21,881	23,707	28,765	35,372	31,665	46,108	51,556	56,392	62,015
Non-current assets									
Property, plant and equipment, net	39,006	36,171	30,791	28,209	28,528	26,309	24,001	21,638	19,348
Intangible assets, net	78	190	173	142	93	44	58	136	116
Other non-current assets	157	121	68	68	68	68	68	68	68
Total non-current assets	39,240	36,481	31,032	28,420	28,690	26,422	24,127	21,842	19,532
Total assets	**61,122**	**60,188**	**59,797**	**63,792**	**60,355**	**72,530**	**75,683**	**78,234**	**81,547**
	61,122	60,188	59,797						
Liabilities and equity									
Current liabilities									
Short-term borrowings from financial institutions				-	-	-	-	-	-
Trade and other payables	7,086	8,232	10,025	13,349	11,328	15,084	14,790	14,608	14,883
Capital reduction payable	3,580	-	-	-	-	-	-	-	-
Current portion of long-term borrowings	1,329	3,840	2,354	-	-	-	-	-	-
Value added tax payable	146	155	198	-	-	-	-	-	-
Current income tax payable	632	1,065	1,236	565	289	1,129	1,066	935	902
Dividend payable	6,027	-	-	-	-	-	-	-	-
Other current liabilities	1,221	999	3,036	3,832	2,829	3,676	3,676	3,652	3,676
Total current liabilities	20,021	14,291	16,848	17,746	14,446	19,889	19,531	19,194	19,460
Non-current liabilities									
Long-term borrowings - financial institutions	2,659	2,580	-	-	-	-	-	-	-
Deferred tax liabilities	1,513	1,329	549	549	549	549	549	549	549
Employee benefit obligations	204	268	299	314	330	347	364	382	401
Other non-current liabilities	-	-	-	-	-	-	-	-	-
Total non-current liabilities	4,376	4,178	848	863	879	895	913	931	950
Total liabilities	**24,397**	**18,469**	**17,696**	**18,609**	**15,324**	**20,784**	**20,444**	**20,125**	**20,410**
	24,397	18,469	17,696						
Equity									
Share capital									
Authorised share capital Ordinary shares 4,335,902,125 shares at par value of Baht 6.92 each (2015: 4,774,343,003 shares at par value of Baht 6.92 each) (2014: 4,102,951,025 shares at paid-up at Baht 10.00 each)	33,038	30,004	30,004	30,004	30,004	30,004	30,004	30,004	30,004
Issued and paid-up share capital									
Ordinary shares 4,335,902,125 shares	6.92	6.92	6.92	7.31	7.31	7.31	7.31	7.31	7.31
paid-up at Baht 6.92 each	30,004	30,004	30,004	30,004	30,004	30,004	30,004	30,004	30,004
(2015: 4,335,902,125 shares at paid-up at Baht 6.92 each) (2014: 4,102,951,025 shares at paid-up at Baht 10.00 each)									
Premium on share capital	978	978	978	978	978	978	978	978	978
Retained earnings									
Appropriated - legal reserve	2,887	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Unappropriated	3,600	8,672	12,769	14,059	14,835	20,698	24,188	27,078	30,077
Other components of equity	(743)	(935)	(4,650)	(2,859)	(3,787)	(2,935)	(2,932)	(2,951)	(2,923)
Total equity	**36,725**	**41,719**	**42,101**	**45,182**	**45,031**	**51,746**	**55,240**	**58,109**	**61,137**
Total liabilities and equity	**61,122**	**60,188**	**59,797**	**63,791**	**60,355**	**72,530**	**75,683**	**78,235**	**81,547**

Source: Audited financial statements of SPRC and team calculation

Appendix 11: The proportion of balance sheet's components including projection



Source: Audited financial statements of SPRC and team calculation

Appendix 12: Common size analysis

Actual (audited)			Estimated					
2015	2016	2017	2018	2019	2020	2021	2022	2023
100%	100%	100%	100%	100%	100%	100%	100%	100%
0%	0%	1%	0%	0%	1%	0%	0%	0%
100%	100%	101%	100%	100%	101%	100%	100%	100%
93%	91%	93%	94%	92%	97%	97%	95%	97%
0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%
7%	**9%**	**7%**	**6%**	**8%**	**4%**	**3%**	**5%**	**3%**
2%	2%	2%	1%	1%	1%	1%	1%	2%
0%	0%	0%	0%	0%	0%	0%	0%	0%
6%	**7%**	**6%**	**5%**	**7%**	**2%**	**2%**	**4%**	**2%**
0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	1%	1%	-1%	1%	0%	0%	0%
6%	7%	6%	6%	6%	3%	2%	4%	2%
1%	1%	1%	1%	1%	1%	0%	1%	0%
5%	6%	5%	5%	4%	2%	1%	3%	1%

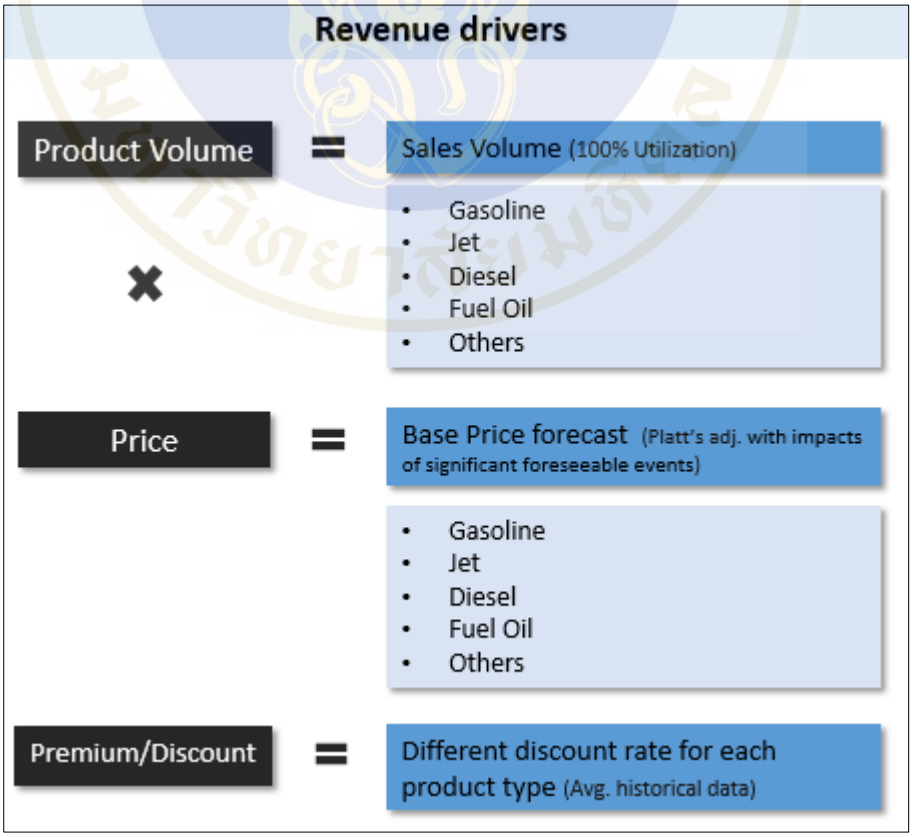
Source: Audited financial statements of SPRC and team calculation

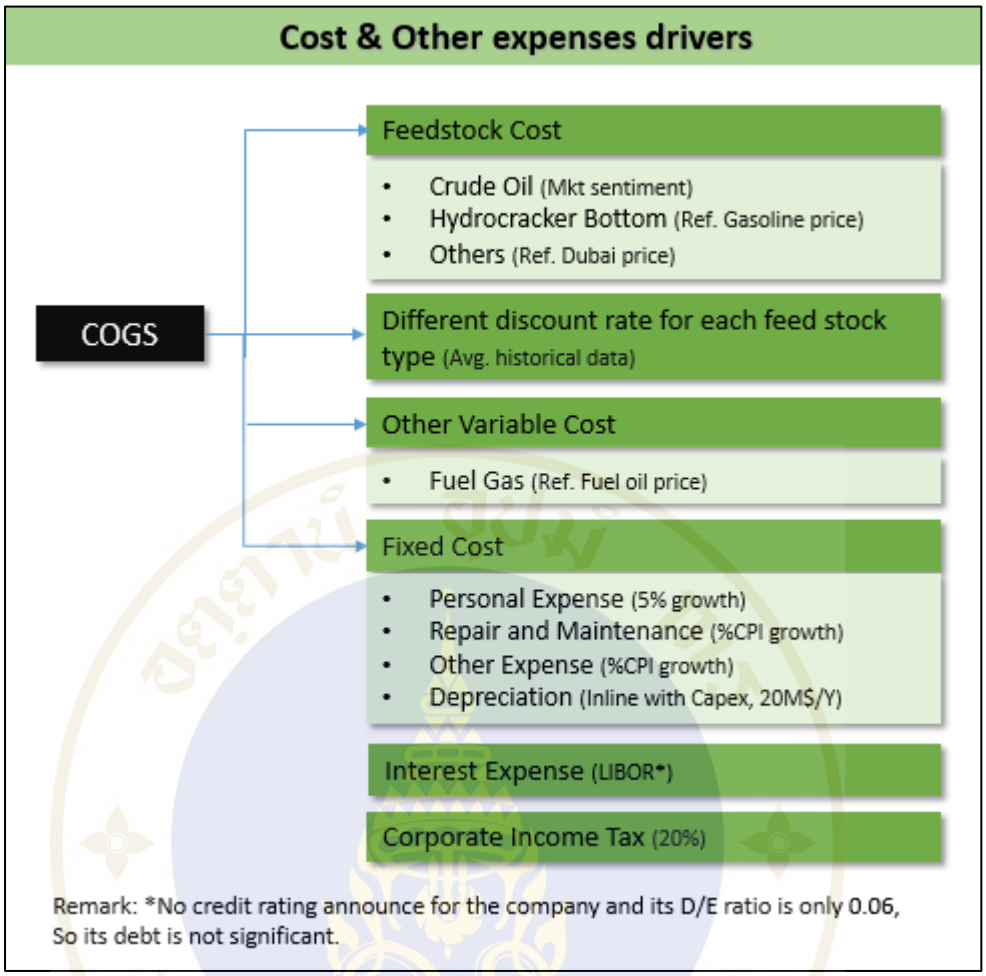
Appendix 13: Trend analysis

CMS 2016	Base year 2016	Estimated 2017	2018E	2019E	2020E	2021E	2022E	2023E
100%	100%	109%	134%	111%	150%	148%	146%	147%
0%	100%	713%	720%	318%	414%	414%	412%	414%
100%	100%	110%	135%	112%	150%	148%	146%	148%
91%	100%	112%	140%	118%	155%	153%	151%	153%
0%	100%	4%	209%	0%	0%	0%	0%	0%
0%	100%	92%	157%	0%	0%	0%	0%	0%
9%	**100%**	**92%**	**79%**	**43%**	**105%**	**100%**	**89%**	**86%**
2%	100%	97%	94%	99%	100%	101%	102%	103%
0%	100%	111%	109%	111%	111%	118%	52%	52%
7%	**100%**	**91%**	**75%**	**27%**	**106%**	**99%**	**86%**	**82%**
0%	100%	98%	97%	0%	0%	0%	0%	0%
0%	100%	54%	271%	345%	654%	957%	1227%	1488%
0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	100%	275%	138%	0%	0%	0%	0%	0%
7%	100%	100%	78%	26%	103%	97%	85%	82%
1%	100%	90%	77%	26%	100%	94%	83%	80%
6%	100%	102%	78%	27%	104%	98%	86%	83%

Source: Audited financial statements of SPRC and team calculation

Appendix 14: Assumptions for statement of income





Source: Team analysis

Appendix 15: Corporate governance

Since 2001, the Thai Institute of Directors Association (IOD) in collaboration with the Stock Exchange of Thailand (SET) has continuously assessed corporate governance practices of listed companies for a total of 15 annual periods. The overall survey results were published in the reports entitled "Corporate Governance Report of Thai Listed Companies (CGR)" and publicized to all listed companies and related parties in the capital market. The CGR studies have significantly contributed to the improvement of good corporate governance paradigm in Thailand.

The assessment criteria were developed by referring to the Organization for Economic Cooperation and Development (OECD) Principles of Corporate Governance and Thailand's Corporate Governance Code for Listed Companies. There are 241 criteria in the following five categories.

Year 2017	Item	Weight
Right of Shareholders	32	15%
Equitable Treatment of Shareholders	19	10%
Role of Stakeholders	29	20%
Disclosure and Transaparency	53	20%
Board Responsibilities	108	35%
Total	241	100%

Result Presentation

Score	Number of Logo	Description
90 - 100		Excellent
80 - 89		Very Good
70 - 79		Good
60 - 69		Satisfactory
50 - 59		Pass
Below 50	No logo given	N/A

According to Corporate Governance Report Of Thai Listed Companies 2017, SPRC received "Excellent" scoring

Source: Corporate Governance Report Of Thai Listed Companies 2017

SPRC received the certification of membership from Thailand's Private Sector Collective Action Coalition against Corruption ("CAC") which is an evidence of its commitment to a corruption free organization. Certificate date is on Friday, November 10, 2017. There are 332 members up to October 2018.

Source: CAC website

Appendix 16: List of refining acronym

- AGO – Atmospheric Gas Oil
- ATB – Atmospheric Tower Bottoms
- B–B – Butane–Butylene Fraction
- BBLS – Barrels
- BPD – Barrels Per Day
- BTX – Benzene, Toluene, Xylene
- CARB – California Air Resource Board
- CCR – Continuous Catalytic Regenerator
- DAO – De–Asphalted Oil
- DCS – Distributed Control Systems
- DHT – Diesel Hydrotreater
- DSU – Desulfurization Unit
- EPA – Environmental Protection Agency
- ESP – Electrostatic Precipitator
- FCC – Fluid Catalytic Cracker
- GDU – Gasoline Desulfurization Unit
- GHT – Gasoline Hydrotreater
- GOHT – Gas Oil Hydrotreater
- GPM – Gallon Per Minute
- HAGO – Heavy Atmospheric Gas Oil
- HCU – Hydrocracker Unit
- HDS – Hydrodesulfurization
- HDT – Hydrotreating
- HGO – Heavy Gas Oil
- HOC – Heavy Oil Cracker (FCC)
- H2 – Hydrogen
- H2S – Hydrogen Sulfide
- HF – Hydroflouric (acid)
- HVGO – Heavy Vacuum Gas Oil
- kV – Kilovolt
- kVA – Kilovolt Amp
- LCO – Light Cycle Oil
- LGO – Light Gas Oil
- LPG – Liquefied Petroleum Gas
- LSD – Low Sulfur Diesel
- LSR – Light Straight Run (Gasoline)
- MON – Motor Octane Number
- MTBE – Methyl Tertiary–Butyl Ether
- MW – Megawatt
- NGL – Natural Gas Liquids
- NO_x – Nitrogen Oxides
- P–P – Propane–Propylene
- PSI – Pounds per Square Inch
- RBOB – Reformulated Blendstock for Oxygen Blending
- RDS – Resid Desulfurization
- RFG – Reformulated Gasoline
- RON – Research Octane Number
- RVP – Reid Vapor Pressure
- SMR – Steam Methane Reformer (Hydrogen Plant)
- SO_x – Sulfur Oxides
- SRU – Sulfur Recovery Unit
- TAME – Tertiary Amyl Methyl Ether
- TAN – Total Acid Number
- ULSD – Ultra–low Sulfur Diesel
- VGO – Vacuum Gas Oil
- VOC – Volatile Organic Compound
- VPP – Voluntary Protection Program
- VTB – Vacuum Tower Bottoms
- WTI – West Texas Intermediate
- WWTP – Waste Water Treatment Plant