A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

ROYAL DUTCH SHELL PLC

BALANCING OIL WITH ENERGY TRANSITION

JOSÉ MARIA SALEMA CORDEIRO OOM

26283

PEDRO ILHÉU BALTAZAR SILVA

25830

A Project carried out on the Master in Finance Program, under the supervision of:

Professor Rosário André

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Abstract:

This Equity Research aims to value Royal Dutch Shell, a major Oil & Gas company, as of December 2020. The valuation integrates both the current and future prospects for the industry, incorporating expected energy transition features and how these will change Shell's value creation process. A Discounted Cash Flow valuation is performed, using Weighted Average Cost of Capital as the discount factor. These results, together with a multiples analysis, suggest that Shell is undervalued, which creates an investment opportunity.

Keywords:

Royal Dutch Shell; Oil & Gas; Energy Transition; DCF Valuation;

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ROYAL DUTCH SHELL PLC

COMPANY REPORT

OIL & GAS

3 JANUARY 2020

JOSÉ MARIA OOM; PEDRO SILVA

26283@novasbe.pt; 25830@novasbe.pt

Balancing Oil with Energy Transition

Shell's businesses adapting to climate change

- This coverage starts with a **BUY** recommendation. The target price is defined as **US$ 73.56**, compared to a current price of **US$ 59.09**, leading to a total shareholder return of **31.03%**.
- The Oil & Gas sector is expected to grow in the next years, meeting a rise in demand. Both demand and oil price are anticipated to grow, thus increasing Shell's Free Cash Flows, up to **US$ 28.64 billion in 2029**.
- Shell's Integrated Gas and New Energies' Revenues are expected to grow from **US$ 43.33** billion in 2019 to **US$ 86.68** billion in 2029, unveiling the increasing importance of this segment to Shell's future value.
- It is our belief that, according to IEA, oil production will peak around 2030, after which its reserves and production are expected to decrease. Shell's goal of being a Net Zero Carbon emissions company by 2070 leads to the conclusion that the Upstream and Downstream segments will shut down around that time frame.
- The DCF valuation accounts for the energy transition, assuming a perpetual value for Integrated Gas and New Energies' segment while valuing Upstream and Downstream only until 2070.

Company description

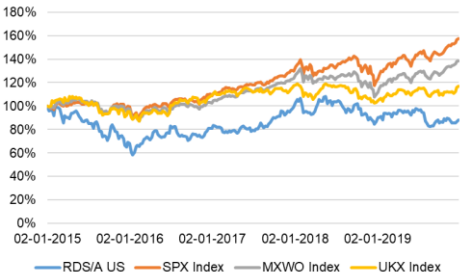
Royal Dutch Shell is one of the biggest Oil & Gas companies operating worldwide, with a market share of approximately 17%. It operates in the Upstream, Downstream and in the Integrated Gas and New Energies segments. Its shares are quoted in London, Amsterdam and New York

Recommendation:	**BUY**
Price Target FY21:	**73.56 US$**
Price (as of 27 Dec-2019)	**59.09 US$**

Bloomberg: RDS-A

52-week range (US$)	54.56-66.48
Market Cap (US$ Billion)	233
Outstanding Shares: A shares (million)	2104
Total Shareholder Return	31.03%

Source: Bloomberg, Analyst estimates



Source: Bloomberg

(Values in US$ billions)	2018	2019F	2020F
Revenues	338.37	353.57	366.25
EBITDA	53.3	47.9	52.8
EBITDA margin	13.7%	13.5%	14.4%
NOPLAT	21.8	17.0	19.5
Comprehensive Income (attributable to Shell)	24.9	17.6	18.2
EPS	6.28	4.44	4.57

Source: Company Data, Analyst estimates

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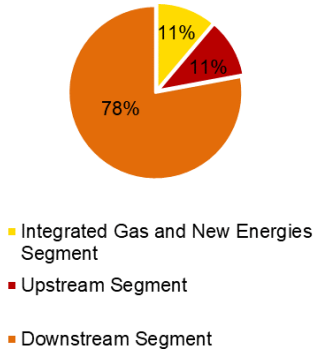
Company Description

Figure 1: Revenues per segment (including inter-segment) [source: Company Data]



Royal Dutch Shell PLC (Shell) was founded in 1907, through a merger between Shell Transport and Trading Company and Royal Dutch Petroleum Company. It has been growing hugely ever since, becoming one of the biggest companies worldwide, in terms of revenues, and one of the most valuable publicly traded energy companies. In 2018, it had revenues of **US$ 388.4 billion**, which generated an income of **US$ 23.9 billion**. Shell's market share in the Oil & Gas market, measured by revenues, has grown from 15.43% in 2015 to 16.72% in 2018.

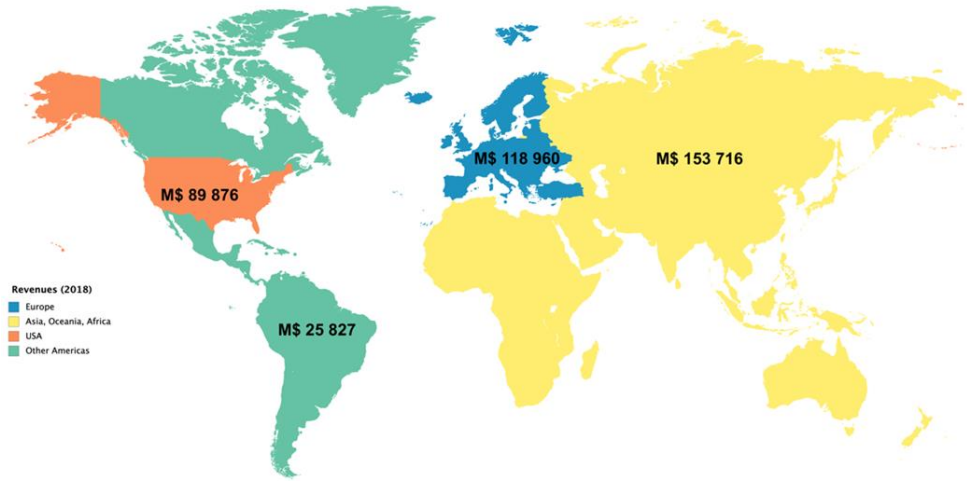


Figure 2:Shell's 2018 revenues by geography [Source: Company Data]

Shell's Headquarters are in the Netherlands and currently it operates in more than 70 countries worldwide. In 2018, Shell employed, on average, 82,000 employees.

Shell is involved in exploration, development, production, refining and marketing of oil and natural gas, alongside the manufacturing and marketing of chemicals. Its activities go from exploring crude oil and natural gas onshore and offshore, the development of oil fields, extraction and conversion of bitumen into synthetic crude oil, the process of cooling natural gas to produce liquified natural gas (LNG), transportation and trading of oil, gas and other energy-related products and uses refineries and chemical plants to transform oil and gas into a range of refined and petrochemical products. These products are mainly gasoline, diesel, heating oil,

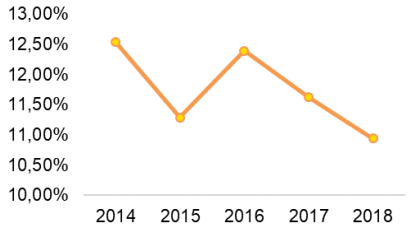
sulphur, aviation fuel, marine fuel and lubricants, which are marketed worldwide for domestic and industrial use[1].

Observing all Shell's activities, it is noticeable that it is vertically integrated, meaning that it is involved/controls several stages of its supply chain. In 2018, it produced an average of 3.7 million barrels of oil per day, sold 71 million tonnes of Liquified Natural Gas (LNG) and had interests in 21 refineries. It is structured in 3 different operating business units.

Upstream Segment

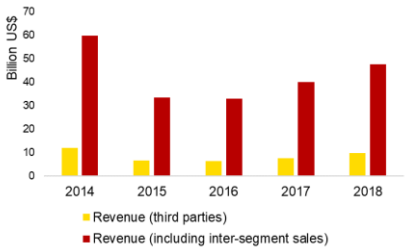
Is mainly responsible for managing exploration and extraction of crude oil and some stages of natural gas production. After the primary extraction process is concluded, it is also in charge of operating the necessary infrastructure to deliver the products to the market.

Figure 3: Upstream Revenues (% total revenues) [Source: Company Data]



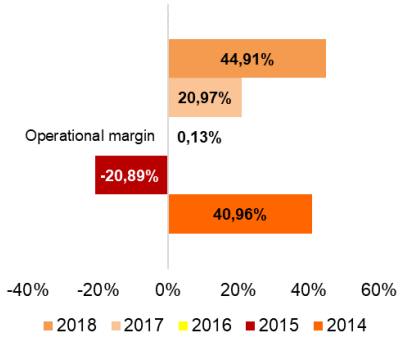
The Upstream segment is primarily focused on producing oil and gas to support the other segments. Its inter-segment revenues are, usually, more than 4 times higher than the revenues for third parties [Figure 4]. In 2018, consolidated revenues were just **US$ 9.892 million**, comparing with revenues including inter-segment sales of US$ 47.733 million[1]. It is worth notice that Upstream, judging by its revenues, seems to be decreasing Shell's value. However, the fact is that Downstream and Integrated Gas activities are highly dependent on the production levels achieved by this sector. This means that the high level of revenues estimated for the other sectors cannot be sustained without Upstream production.

Figure 4: Upstream third parties Revenues [Source: Company Data]



As the energy transition through carbon-free sources occurs, this segment will experience some production challenges. In fact, the Upstream segment revenues weight in Shell's total revenues is decreasing [Figure 3] in opposition to the increase verified in Integrated Gas and New energies segment [Figure 8]. These insights are very useful to support the assumptions used in the valuation model presented in the report.

Figure 5: Upstream Operating Margin [Source: Company Data]



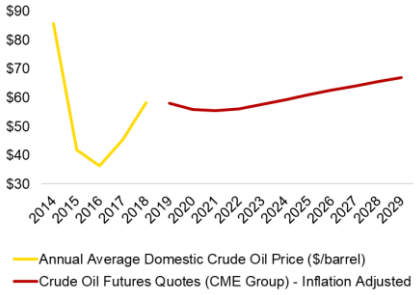
Another challenge of the Upstream business is its dependence on the oil price to be profitable. As one can observe [Figure 5], the Upstream segment suffered a lot and carried losses during the 2015 oil crisis, ending up with a negative operational margin of around -20%[1].

[1] Royal Dutch Shell plc. 2018. "Annual Report and Form 20-F for The Year Ended December 31, 2018". The Netherlands: Royal Dutch Shell plc.

Shell's Upstream segment is mainly focused on internal production

As Shell's Upstream segment is mainly focused on internal production, Shell's relevance in the worldwide Upstream market is not as large as in the Downstream. The Upstream sector is mainly dominated by the state-owned companies of the countries with larger oil reserves, which later export their productions. Some of these companies are **Saudi Aramco**, Saudi Arabia's national oil company, **Rosneft**, a Russian state-owned company, **Kuwait Petroleum Company**, **National Iranian Oil Company**, **China National Petroleum Company**, among others[2]. Summing up, it is possible to say that the sector is largely concentrated within the largest oil-production countries, being each one's production largely controlled by monopolistic companies. However, it is also possible to say that, in a global perspective, the sector is fragmented among all those different regions, each having its own company, and so not existing one or two companies which control the global production.

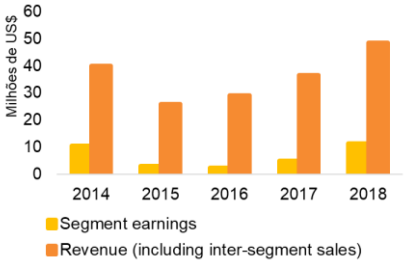
Figure 6: Crude Oil Price evolution [Source: CME Group]



Brent Crude Oil was traded, on average, at **US$ 71/b** in 2018, closing the year at **US$ 51/b** which was US$ 17/b higher than in 2017, and US$ 27/b higher than in 2016[1]. According to our model assumptions, based on inflation adjusted crude oil futures quotes, it is predicted that crude oil price continues to smoothly increase from US$ 51/b in the end of 2018 to **US$ 63.52/b** in 2024 and **US$ 76.12/b** in 2029 [Figure 6].

Overall, based on the last years data for world oil production, one can say that the Upstream market has been growing, alongside the whole Oil & Gas sector, having reached **99.84 million bbl/d** in 2018[3]. The prospects are that, although the climate change awareness is increasing, the oil production will still increase in the next years to **104.5 million bbl/d** in 2023[4], matching demand increased needs.

Figure 7: Integrated Gas & New Energies Revenues and Earnings



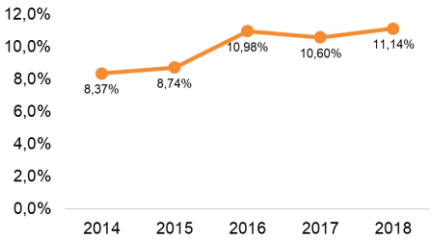
Integrated Gas & New Energies Segment

Responsible for managing the liquefied natural gas (LNG) activities and the conversion of natural gas into gas-to-liquids (GTL) fuels and other products, as well as the New Energies portfolio. It includes natural gas exploration and extraction, and the operation of Upstream and midstream infrastructure necessary to deliver gas to market. It markets and trades natural gas, LNG, electricity and carbon-emission rights. Moreover, it also markets and sells LNG as a fuel for heavy-duty vehicles and marine vessels.

[2] Ali, Umar. 2019. "Ranking the World's Top Ten Companies by Oil Production". *Offshore Technology | Oil and Gas News and Market Analysis*. https://www.offshore-technology.com/features/companies-by-oil-production/.
[3] BP plc. 2019. "Statistical Review ff World Energy"
[4] Organization of the Petroleum Exporting Countries (OPEC). 2018. "World Oil Outlook 2040."

As what gas concerns, its global demand is expected to have grown by near **5.3%** in 2018, which is clearly higher than the average annual growth rate of 2.2% between 2007 and 2017[3]. A combination of weather conditions, implementation of new policies such as the partial substitution of coal by gas-fired power generation in China, and global economic growth led to an increase in demand in most regions[1]. This increase in demand is expected to continue, and with a pace higher than in the oil market, meaning that it is our expectation that gas gains dimension within the Oil & Gas industry and, particularly, in Shell's overall profits.

Figure 8: Integrated Gas & New Energies Revenues (% total revenues) [Source: Company Data]



This increase in demand, together with the increase in production, is leading to an increased influence that Integrated Gas and new energies sector has inside Shell [Figure 8].

The natural gas price at the Henry Hub, an important international benchmark hub, averaged **US$ 3.1** per million British thermal units (MMBtu) in 2018, 3% higher than in 2017, and traded within a range of US$ 2.5-4.9/MMBtu. Due to a strong supply growth, 11% higher in 2017, and new gas pipeline capacity, there was some downward pressure on prices[1]. On the other hand, gas prices were supported by a range of factors, such as below-normal storage inventory levels, demand growth due to colder than normal weather in the second half of 2018 and the completion of LNG liquefaction projects[1].

In 2018, Shell's natural gas production increased by 9% in relation to 2017, from 324 million barrels of oil equivalent (boe) to **349 million boe**[1]. This increase is mainly explained by a stronger operational performance of Shell's assets across its several fields.

In New Energies, Shell is exploring emerging opportunities and investing where it is believed to exist sufficient commercial value available. These opportunities can go from new fuels for transport to new low-carbon power sources as wind and solar. As it is widely accepted worldwide and Shell recognizes it in its outlooks, the medium-to-long term prospects on the energy sector is of a transition from fossil traditional sources as crude oil, coal, etc. to new, more sustainable and renewable sources of energy production. As Shell does not have prospects of shutting down following this transition period, its Integrated Gas and New Energies segment is expected to slowly gain importance and weight in Shell's operating profits[1]. This is a predictable path due to the already larger importance that these new energies

are having in the company's CapEx in recent years[5]. All these predictable changes are further reflected in the analysis performed in this report.

Shell is investing in new ways of fueling transports. The most notable investments are the exploration of hydrogen fuel for electrics and the acquisition/partnerships with manufacturers and developers of high-powered fast charging points (like "IONITY", "New Motion" or "Greenlots"), already owning a vast network of charging points around Europe[6]. Additionally, Shell is also investing in biofuel, like fuel made from biomass waste.

With respect to power, Shell is also considering having a more relevant part in electricity business. To do so, the backbone is planned to be wind and solar energy. Shell is investing in solar energy producers, aiming to deliver energy directly to customers and even allow them to store the energy (through the acquisition of "Sonnen").

It is believed that to achieve the goal of reducing the CO2 emissions it is necessary to make investments, which Shell has been doing, since it is planning to invest up to US$ 2 billion in 2020. The main focus of this investment will be in power generation[7].

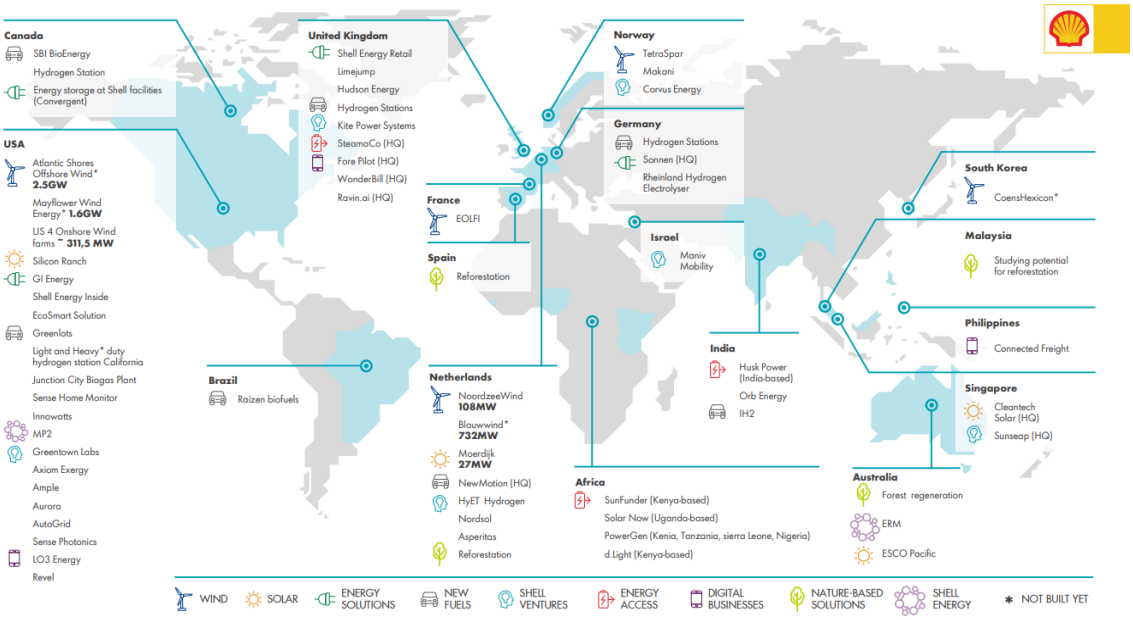


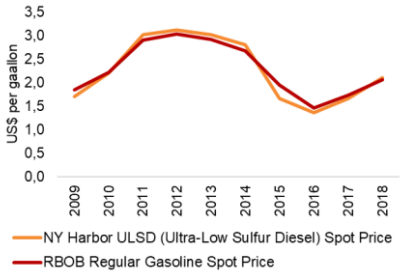
Figure 9: Shell's New Energies major projects Worldwide [Source: Shell Website]

[5] Vaughan, Adam. 2019. "Shell Says It Wants to Double Green Energy Investment". *The Guardian*. https://www.theguardian.com/business/2018/dec/26/shell-says-it-wants-to-double-green-energy-investment.
[6] "Station Locator". 2019. *Shell.Co.Uk*. https://www.shell.co.uk/motorist/station-locator.html#iframe=Lz9sb2NhbGU9ZW5fR0IjL0A0MS41Mzg2NSwtNi43MDA5NSw0eg.
[7] Royal Dutch Shell plc. 2019. "Shell Energy Transition Report."

Downstream Segment

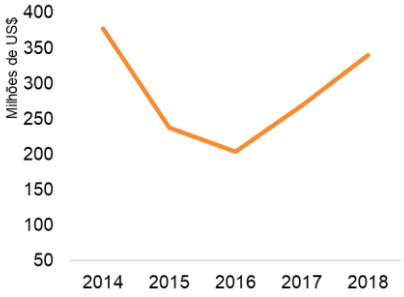
Composed by a number of different oil products and chemicals activities, Downstream is part of an integrated value chain, that trades and refines crude oil, and other feedstocks into a range of products which are moved and marketed around the world for domestic, industrial and transport use. The products sold include gasoline, diesel, heating oil, aviation fuel, marine fuel, biofuel, lubricants, bitumen and sulphur. In addition, petrochemicals for industrial use worldwide are also produced and sold.

Figure 10: Gasoline and Diesel Spot Prices [Source: US Energy Information Administration[8;9]]



In 2018, refined oil products, light distillates, middle distillates and fuel oil, grew **1.5%** worldwide. This positively compares with an annual average increase of 1.2% for the same products in the 2007-2017 period[3]. The NY Harbor Ultra-Low Sulphur Diesel (ULSD) Annual Average Spot Price, a relevant benchmark for the diesel-related products, was **US$ 2.10** per gallon in 2018, an increase comparing with the US$ 1.36 in 2016[8]. Another important benchmark in the Downstream segment is the Los Angeles RBOB Gasoline Annual Average Spot Price, which increased from US$ 1.46 per gallon in 2016 to **US$ 2.06** per gallon in 2018[9]. Following the valuation model assumptions, based on inflation adjusted futures quotes, it is predicted that the NY Harbor ULSD price increase to **US$ 2.63** per gallon in 2029 and the LA RBOB Gasoline price presents a more volatile behavior, reaching 2029 at **US$ 2.03** per gallon.

Figure 11: Downstream Revenue (including inter-segment sales) [Company Data]



The Downstream is, by a great amount, the largest segment within Shell. Its revenues amounted to **US$ 334 billion** in 2018, a reflection of the vertically integrated structure, in which the other segments have critical roles, ensuring the final products sold by this segment.

Due to all the technological changes happening in the oil market, the refining business has been facing some challenges in the past few years. Although the refining business deals with several different products and so each refinery is configured differently, serving different markets, there are some common issues[10]:

[8] "New York Harbor Ultra-Low Sulfur No 2 Diesel Spot Price (Dollars Per Gallon)". 2019. *Eia.Gov*. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=eer_epd2dxl0_pf4_y35ny_dpg&f=a.
[9] "Los Angeles Reformulated RBOB Regular Gasoline Spot Price (Dollars Per Gallon)". 2019. *Eia.Gov*. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=eer_epmrr_pf4_y05la_dpg&f=a.
[10] "Refining: High-Impact Challenges in Today'S Global Refining Market". 2019. *Hydrocarbonprocessing.Com*. https://www.hydrocarbonprocessing.com/magazine/2016/november-2016/columns/refining-high-impact-challenges-in-today-s-global-refining-market.

- As unconventional methods and broaden sources of oil increase, refineries must work with a greater amount of different materials, which represent more differentiated processes and an increased cost burden.
- The refining process has a significant environmental footprint and so it has been lately subject to several regulatory changes. One of those changes is the IMO 2020. This new regulatory package from the International Maritime Organization is considered one of the most impactful for the last decades. Since ships are now required to use fuels with a sulphur content below **0.5%** (previous limit was 3.5%), refineries will face the challenge of producing these new types of fuel. The key takeaways from this example is that refineries must continuously adapt to regulatory changes that can, sometimes, change a considerable part of the refinery process, requiring high levels of capital investment.

Shell has already publicly ensured that its refining products already meet all the regulatory changes, leading to a scenario where impacts are minimized[11].

Shareholder Structure

Royal Dutch Shell has two types of shares, A and B shares. A and B ordinary shares have identical voting rights but different access to dividends. While A shares have a Dutch source for tax purposes, B shares will receive dividends through the dividend access mechanism, which are from UK source for tax purposes and are not subject to withholding tax. It is listed in the Euronext Amsterdam (principal trading market for A shares), the London Stock Exchange (principal trading market for B shares) and in the New York Stock Exchange (through American Depositary Receipts, called ADS shares)[12].

Figure 12: A and B Shares [Source: Bloomberg]

Regarding its shareholders, Shell is held manly by institutional investors:

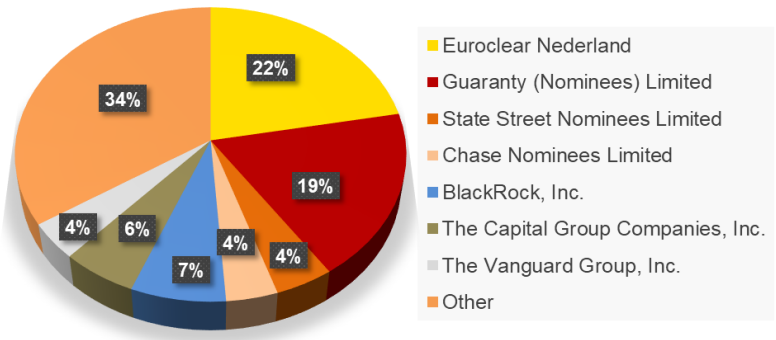


Figure 13: Shareholder Structure [Company Data]

[11] "IMO 2020". 2019. *Shell.Com*. https://www.shell.com/business-customers/marine/imo-2020.html.
[12] "Information on Shares". 2019. *Shell.Com*. https://www.shell.com/investors/retail-shareholder-information/information-on-shares.html.

It is worth noticing that there are no relevant governmental shareholders. In opposition to some of Shell's competitors, this can have positive influence in company's valuation, since it is not expected that political decisions overtake value creation opportunities.

Risks and weaknesses

Despite the increasing demand and consumption for oil and gas and the reward attributed to investors in this industry, there are some risks that should be considered.

A 67% drop in oil price led to a 46% fall in Shell's market value

Being the most noteworthy product in Shell's portfolio, the oil's price has huge influence in the company's revenues. Its price volatility generates another source of uncertainty for Shell, as it can be witnessed by the fall in oil prices in 2014. In June 2014, when the oil price traded around **US$ 105/b**[13], Shell's share price was around **US$ 82**[14]. Following the oil price drop to approximately **US$ 34/b**[13], in January 2016, Shell's share price hugely decreased to around **US$ 44**[14]. As it can be seen, **a 67% drop in oil price led to a 46% fall in Shell's market value**. Moreover, extraction involves time, high investments and cannot be shut down quickly, meaning that the extraction and the production can rapidly turn into non-profitable investments, due to high volatility in oil prices.

The valuation model forecast is associated to the oil and gas prices prediction. As mentioned before, the oil price volatility can hugely influence Shell's value. As further shown in the sensitivity analysis, small increases/decreases in the assumptions of oil and gas prices can lead to increases/decreases of almost US$ 17 per share.

The Political environment and relations between different countries can extremely affect Oil & Gas companies. Since the extraction depends on the available reserves/deposits, which are spread across the globe, and on the regulatory framework, **political instability** can often lead to production/extraction instability. The recent event, in September 14, 2019, with a drone attack against Saudi Aramco oil facilities is one example of how political conflicts can interfere in the oil market. In this case, this attack led to an **oil price increase of around US$ 7/b,**

[13] "Crude Oil WTI Futures Chart - Investing.Com". 2019. *Investing.Com*. https://www.investing.com/commodities/crude-oil-streaming-chart.
[14] (RDSA), Royal. 2019. "Royal Dutch Shell A Chart (RDSA) - Investing.Com". *Investing.Com*. https://www.investing.com/equities/royal-dutch-shell-a-plc-chart.

from US$ 54/b to US$ 61/b[13], hugely impacting the oil sector. This price changes occur when there is expectation of a real political conflict. However, many times the market overreacts to such events and later it returns to pre-conflict values.

Somewhat still connected with the political instability, there are also some risks associated with **global trade** and the **imposition of tariffs**, due to "trade wars". The most known recent example is the change in US trade policy since President Trump arrived in office. The United States have an history of supporting free trade, however this policy has changed in the past few years and can also influence negatively both oil price and oil demand, as tariffs normally reduce global trading.

Oil is a non-renewable resource (…) its increasing consumption and extraction cause the reserves to be depleted

Considering that oil is a non-renewable resource (natural replacement is far too slow comparing to the rate at which it is consumed), its increasing consumption and consequent extraction cause the **depletion of the reserves**, meaning that the company has to invest in new deposits, that eventually will disappear. Furthermore, when considering investing in new deposits, the amount of oil that can be extracted is estimated and substantial amounts of money are invested based on such risky assumptions.

Shell ranked 3rd in 2018 and 4th in 2017 on Sigwatch's list of most criticised corporations[15]

With all the social awareness regarding climate action, the Oil & Gas sector is one of the most negatively impacted in its reputation. One can consider a **reputational risk** around companies like Shell due to its polluting activities[15], which can lead to investors with environmental awareness to apply negative screening to its stock. Knowing that some of Shell shareholders are investment funds, which may suffer pressures to abandon polluting companies, this risk is more pertinent, given the possibility of a future block sale of Shell's shares, which normally lead to a decrease in value.

The Oil & Gas Sector

Energy is an indispensable product for most human activities, directly, as fuel, or indirectly, to deliver power, light or mobility. Oil has become a vital input in nearly all forms of production and processes carried out in different economic sectors. The prices of outputs in all economic sectors, including the strength and wealth of many nations, have depended heavily on the price of oil products. Since in economics the price of a product is primarily a function of demand and supply, the

[15] "Most Criticised Corporations In 2018". 2019. *Sigwatch.Com*. https://www.sigwatch.com/index.php?id=271&tx_ttnews%5BbackPid%5D=272&tx_ttnews%5Btt_news%5D=1688&cHash=fd635984148b252cda8afb8cb55778e7.

prices of oil and its derivatives have been changing according to changes in the world supply and demand.

In recent years, the Oil & Gas sector suffered a lot. In 2015, revenues from companies like BP, ExxonMobil and Shell decreased by around 40%, 34% and 37%, respectively, representing a **combined value of US$ 421 billion of lost revenue**. This fall in revenues was mainly due to low oil prices and the fall in demand. Moreover, this was followed by huge accumulations of oil barrels, since the sector was clearly suffering from oversupply.

With the recent constant increase in crude oil prices, consistently with the valuation model, the industry is more optimistic about its near future[16].

Comparables

(Billions)

	Exxon Mobil	Chevron	Shell	Total	BP
Revenues (ttm)	260.81	145.87	363.1	179.18	282.96
EBITDA (ttm)	34.33	33.69	49.61	31.79	35.17
Operational CF (ttm)	31.97	30.81	50.50	28.73	25.00
Dilluted EPS (ttm)	3.44	6.97	2.50	3.60	0.24
Debt/Equity	**26.75%**	**23.53%**	**46.18%**	**75.49%**	**53.98%**
Operating margin	5.24%	8.71%	7.60%	-0.18%	8.50%
Profit Margin	5.00%	7.42%	6.79%	6.58%	-1.10%

Figure 14: [Source: Bloomberg]

These **four** presented companies are Shell's main competitors, acting in the same type of projects and with similar structures. However, and since Oil & Gas is a sector with high political motivations, there are other three companies with a similar revenue dimension to Shell, which are mainly State-Owned companies: **Sinopec**, focused in the Downstream segment, is a Chinese firm with US$ 377 billion in revenues, **Saudi Aramco**, the Saudi Arabia's national oil company with revenues of US$ 355.9 billion, and **CNPC**, a Chinese firm focused on the Upstream segment with US$ 324 billion in revenues[17]. The main differences between Shell and these three last companies are that the latter are only focused on national production, are not subject to investor pressure, being subject to the business strategies of their governments, controlling their oil reserves and production[18].

Figure 14: Market share by company

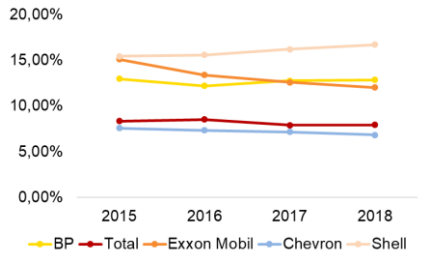
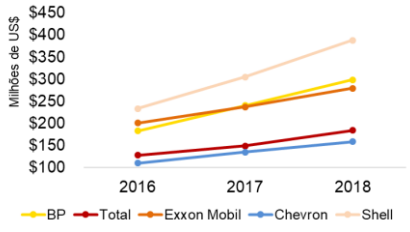


Figure 15: Revenues by company



[16] PWC. 2019. "Oil and Gas Trends 2018-19, Strategy Shaped by Volatility."
[17] "The Top 10 Oil & Gas Companies in The World: 2019". 2019. *Oil & Gas IQ*. https://www.oilandgasiq.com/strategy-management-and-information/articles/oil-and-gas-companies.
[18] Naimoli, Stephen, and Ladislaw, Sarah. 2019. "Oil and Gas Industry Engagement on Climate Change: Drivers, Actions, and Path Forward". Center for Strategic & International Studies: 11-12

As observable in Figure 17, the market shares have been relatively constant in the past few years, with Shell gaining market share from 2015 to 2018 while its comparables have lost a small percentage during the same period[19].

Market share	2015	2016	2017	2018
BP	12.98%	12.21%	12.76%	12.86%
Total	8.35%	8.53%	7.92%	7.93%
Exxon Mobil	15.11%	13.38%	12.60%	12.03%
Chevron	7.57%	7.35%	7.15%	6.84%
Shell	15.43%	15.58%	16.21%	16.72%

Figure 16: Market Share (by revenues) [Source: Market Line]

In terms of strategies to face the future and the move to new types of energy production, alongside with Shell, the comparable Oil & Gas companies are generally moving in the same direction. As of the first half of 2019, among others, Shell's comparables had invested in 30 projects and 12 companies. The definition of "projects" includes directly owned large-scale projects, while "companies" are those that have been acquired or started as joint ventures. This shows that the several companies are moving all in similar directions although with different intensities, resorting to M&A activity.

Inside the 30 projects, 14 were done by BP, 8 by Chevron, 6 by Total and 2 by Exxon Mobil. In terms of companies, Total invested in 8, BP in 4, while Exxon and Chevron have not done any investment in companies, as of this period. Using the same concepts, Shell has invested in 9 projects and in 6 companies, showing that the several companies are moving all in similar directions although with different intensities.

	BP	Chevron	ExxonMobil	Total	Shell
Projects	14	8	2	6	9
Companies	4	0	0	8	6

Figure 17: [Source: Center for Strategic & International Studies]

Project development is normally more common than company acquisition, but the numbers show that major oil companies have been showing a clear interest in purchasing companies outside their main competencies, mostly in the electric power sector[20].

Shell's previously described risks and weaknesses are also applied to its comparables. As mentioned, these risks are mostly global and systemic, derived

[19] Marketline. 2019. "Global Oil and Gas, September 2019."
[20] Naimoli, Stephen, and Ladislaw, Sarah. 2019. "Oil and Gas Industry Engagement on Climate Change: Drivers, Actions, and Path Forward". Center for Strategic & International Studies: 22-25

from non-business situations. As Shell, its comparables are vertically integrated, with a global approach, which mitigates some non-systemic risks, but they are all subject to the same oil price volatility, political instability, depletion of reserves and reputational risks. As explained, one solution to depletion of reserves and reputational risks is to find alternative business opportunities outside the traditional Oil & Gas sector, which is already being done. As of the oil price volatility and the political instability, these will be sector weaknesses as long as the sector operates.

Strategy and Outlook

More than US$ 15 billion of Upstream assets were already divested

The Oil and Gas sector is being urged to shift for more cleaner energy solutions, pushing companies to reduce the carbon emissions of its portfolio of products. Shell, as one of the biggest companies in the sector, aims to position itself in this transition. To do so, it has the goal of focusing its attention in its core business, investing in competitive projects and selling its non-core business[1]. In pursuit of this goal, Shell has already achieved its target for the divestment program, by divesting more than **US$ 30 billion of assets**, especially in the Upstream segment, with more than US$ 15 billion assets already divested[1].

Moreover, Shell has planned constant high levels of investment (around **US$ 30 billion a year**[1]) to achieve all these strategic goals. Nevertheless, it also has the intention of distribute its earnings to its shareholders (through dividends), thus maintaining focus on generating high levels of cash.

According to the most recent predictions from IEA, **it is expected that global oil demand grows steadily until 2030**, when it will reach a **plateau** during a few years and after starting its **decrease**[21]. In addition, DNV GL predicts a more intense decrease in oil demand, reaching its peak in the mid-2020's and starts decrease before 2030[22]. These two outlooks are aligned with the predictions applied in this report, that **oil demand increases in the near future but will ultimately start a final decrease due to the energy transition process**.

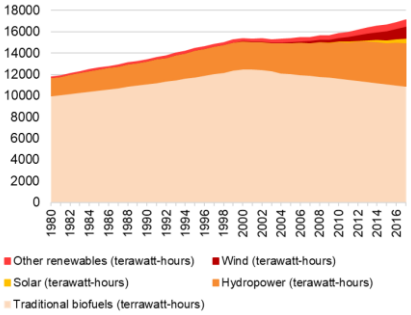
New Energies and its impact

The Energy sector is going through a period of transition. With the demand for cleaner sources of energy increasing, it is important to understand the position and investment of the main players in the industry in this matter.

[21] International Energy Agency. 2019. "World Energy Outlook 2019."
[22] DNV GL. 2019. "Energy Transition Outlook 2019, A Global and Regional Forecast To 2050".: 24

The demand for cleaner sources of energy has been growing in the past years, as well as its production. Since this trend is believed to continue, it is crucial to understand which sources of renewable and clean energy will grow the most. According to several sources, like Bloomberg NEF [Figure 20], in 2050, power will be 48% generated by wind and solar sources of energy, and **62%** if we consider all the renewables sources of energy[23].

Figure 18: Global Renewable Energy Consumption, World [Source: Vaclav]



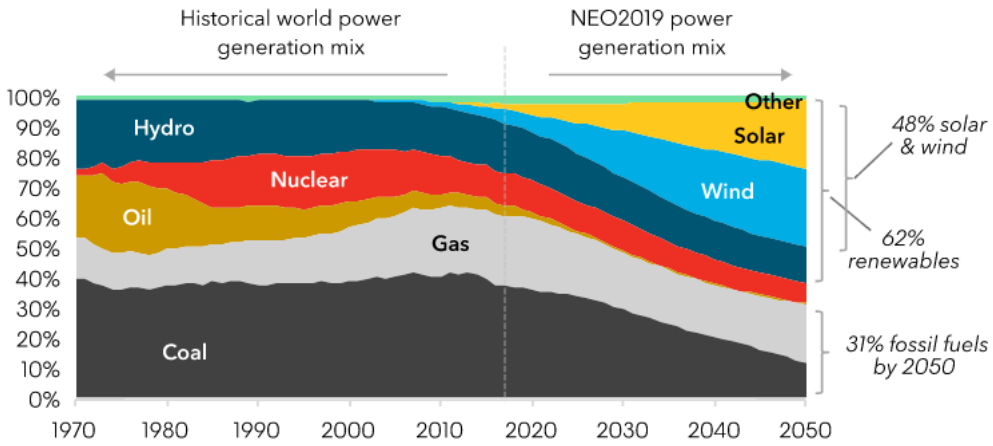


Figure 19: New Energy Outlook Power Generation Mix [Source BloombergNEF]

According to BloombergNEF, “Wind and solar make up almost 50% of world electricity in 2050 – “50 by 50” – and help put the power sector on track for 2 degrees to at least 2030.”. This means that companies which invest more and are able to switch its focus to cleaner energy sources (specially to wind and solar) will thrive and lead the transition.

Additionally, transportation will also suffer huge changes, as the number of electric vehicles rises sharply. According to the prediction of Wood Mackenzie, the number of electric vehicles sales will increase to nearly 40 million in 2040[24], which means that oil fueled vehicles will decrease, and so, Shell needs to be prepared to satisfy the demand for this new type of vehicles.

This transition has already been perceived by the major Oil & Gas companies, with the number of deals related to clean energies increasing since 2010. More recently, Shell has been gaining weight in the percentage of number of deals made, being the company with the cleanest energy deals in 2019 [Figure 21].

[23] Bloomberg. 2019. "New Energy Outlook 2019". BloombergNEF.
[24] "Electric Car Forecast To 2040". 2019. *Woodmac.Com*. https://www.woodmac.com/our-expertise/capabilities/electric-vehicles/2040-forecast/.

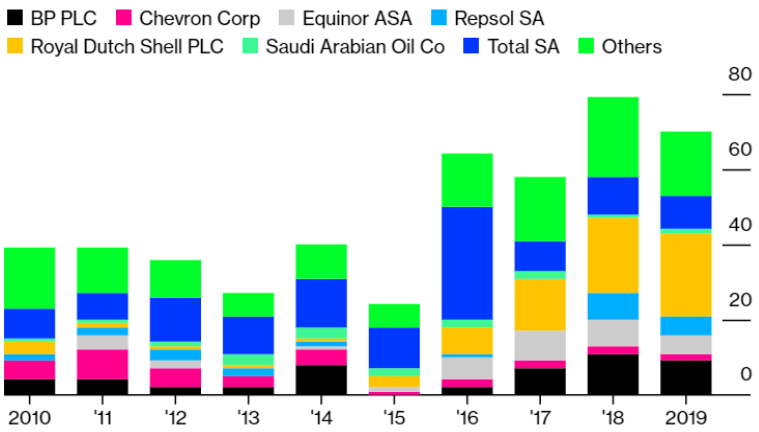


Figure 20: Number of Clean Energy Deals [Source: BloombergNEF]

Valuation

Methodology

In order to compute the equity value for Royal Dutch Shell PLC, it was conducted a **Discounted Cash Flow (DCF)** estimation.

When it comes to the decision on how to discount the company's future cash-flows, there are several options available, depending on assumptions made regarding Shell's future capital structure and what is the valuation's main purpose. As used in the valuation, the company aims to have a constant gearing, defined as net debt as a percentage of total capital, within a **range of 0-30%**. In 2018, the last year with historical data available, this gearing was of **20.3%**, and from 2019 until 2029 it was predicted that it will vary from a minimum of 21.24% in 2029 and a maximum of 25.13% in 2021, based on the assumption of a Debt-to-equity ratio of 30%[1]. Shell's debt-to-equity ratio was historically low[25] (around 10%/20%), increasing after the oil crisis that started in 2014. Given the historically low levels of debt and the declared intention to reduce the debt level, it is our believe that the 30% ratio is a credible indicator. Since Shell has a target for its capital structure, the best discount factor is, as mentioned before, the WACC.

The **forecasting period** ranges from 2019 to 2029, after which a terminal value was calculated, assuming the company will continue to conduct operations.

[25] "Royal Dutch Shell Debt to Equity Ratio 2006-2019 | RDS.B". 2019. *Macrotrends.Net*. https://www.macrotrends.net/stocks/charts/RDS.B/royal-dutch-shell/debt-equity-ratio.

To better forecast the operating result of Shell, it was decided that the best approach was to **forecast each segment's operating result separately**, considering that value drivers differ among them.

As a methodology to incorporate all the changes expected to occur in the sector and in Shell future FCF, it was found best to divide the valuation process in three stages:

- The first stage comprehends the estimation of all FCF until 2029. In this period, all the nowadays business conditions are ultimately conserved, expecting a growth of operations according to its value drivers (price and demand) in all business segments;
- The second stage includes the terminal value estimation for the Upstream and Downstream segments. In this case, according to our expectations and with Shell reports, and assuming the oil business will not have a perpetual lifetime, the future FCF are determined until the moment the segments shut down, in 2070 (year in which Shell expects its operations to be carbon neutral)[7];
- The third period incorporates the perpetual value of all future FCF for the Integrated Gas and New Energies segment, which is expected to grow and become Shell's main business segment.

Revenues Forecast

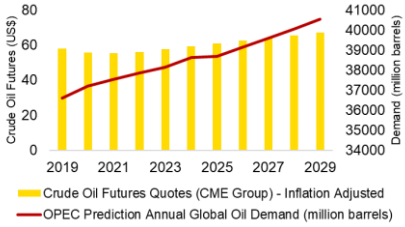
As already explained, Shell's activity is largely divided according to its three main operating segments, and so its revenues forecast is also divided by segment, according to what can be each one's main value drivers. In a general sense, this valuation found that the most appropriate assumption to predict each segment revenues is to regress a revenues model dependent on each segment's main products' prices and consumption. The regression method is seen as appropriate since it is visible the highly correlated relation between Shell's market value and the price and consumption of its main products. As already proved, every time the oil price changed, Shell's revenues value changed accordingly. It is also suitable to use the regression method since this process is only used to predict the cash-flows for the next 10 years, period when it is not expected to occur abrupt changes. These changes will occur from 2030 onwards, according to the sector outlook, and this is reflected in Shell's terminal value calculations. Note that Shell is a global oil company, highly subject to oil price variations, with activity spread along almost all continents, and so it deals with hundreds of different countries, with hundreds of different products and prices. This situation turned unreasonable

to predict specifically each market, product and price. Being so, and as on the contrary, using global and benchmark products and prices seemed the best viable assumption to predict revenues, since these are ultimately a very good proxy and driver for all the widespread Shell products.

Upstream Segment

To construct the Upstream segment regression, the dependent variable used was the past years Shell's Upstream revenues and, as independent variables, the **annual average crude oil price** ($/barrel) and the **annual world oil consumption** (millions of barrels). The regressed model is based on a 5-year annual frequency period, 2014 to 2019, with 5 observations. This resulted in an **adjusted R-square of 0.997**, with the annual average crude oil price variable having a **t-stat of 39.64** and a **p-value of 0.000635** and the annual world oil consumption variable having a **t-stat of 8.06** and a **p-value of 0.015032**. These values show that all variables are statistically significant, and that the model variations are almost exclusively explained by the independent variables, proving to be appropriate to predict future revenues. As future, and equivalent, independent variables were used **inflation adjusted Crude Oil Futures Quotes**[26] ($/barrel) and the **OPEC Prediction of Annual Global Demand**[4] (millions of barrels).

Figure 21: Predicted oil price and demand [Source: Analyst estimates]



Using the annual world oil consumption as a key driver, one is assuming a constant market share. This is a simplification but, as shown in Figure 17 present in the "Comparables" chapter, market shares have been relatively constant, only with minor changes, which leads to the assumption that Shell grows at the same pace as the market, **conserving its current market share, 16.72%**.

With this regression, it is expected that the **Upstream revenues increase from US$ 9,892 million in 2018 to US$ 13,224 million in 2029.**

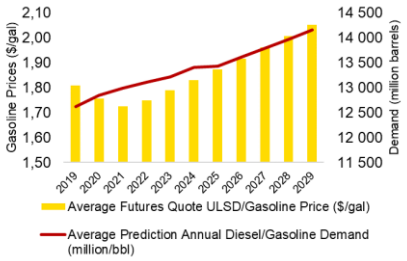
Downstream Segment

As in the Upstream Segment, the regression applied here used the past years Shell's Downstream revenues as dependent variable. For independent variables were used an **annual average between retail prices ($/gal) of both diesel and gasoline** as one variable and an **annual average between diesel and gasoline world consumption** (millions of barrels) as another. The regressed model is

[26] "Crude Oil Futures - CME Group". 2019. *Cmegroup.Com*. https://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude_quotes_globex.html.

based on a 5-year annual frequency period, 2014 to 2019, with 5 observations. This resulted in an **adjusted R-square of 0.980**, with the annual average between retail prices of diesel and gasoline variable having a **t-stat of 14.06** and a **p-value of 0.005020** and the annual average between diesel and gasoline world consumption variable having a **t-stat of 4.68** and a **p-value of 0.042831**. These values show that all variables are statistically significant, and that the model variations are almost exclusively explained by the independent variables, proving to be appropriate to predict future revenues. To apply the model, to have future predictions in line with the data used to construct the regression, in one case was used an **inflation adjusted average of futures quotes of ULSD** (ultra-low sulphur diesel)[27] **and gasoline** ($/gal)[28]. On the other variable, in result of a lack of relevant and useful available information, a linear regression for the next 10 years was done to predict the annual world diesel and gasoline demand (millions of barrels) and then applied these values to the main regression.

Figure 22: Predicted Gasoline price and demand [Source: Analyst estimates]

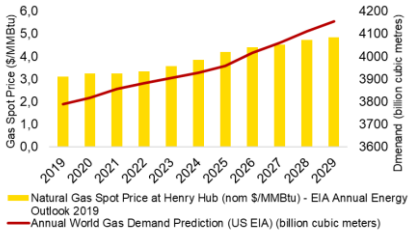


Applying the regression, it is expected that the **Downstream revenues increase from US$ 334,680 million in 2018 to US$ 455,563 million in 2029.**

Integrated Gas and New Energies Segment

Following the same reasoning applied in both Upstream and Downstream segments, to regress the model for future revenues in the Integrated Gas and New Energies segment we used the last 5 years Shell's revenues in this segment as dependent variable. As explanatory variables, both the **annual world gas demand** (billion cubic meters) and the **annual average Henry Hub natural gas spot price** ($/MMBtu) for the same period were used. The regressed model is based on a 5-year annual frequency period, 2014 to 2019, with 5 observations. This resulted in an **adjusted R-square of 0.946**, with the annual average Henry Hub natural gas spot price variable having a **t-stat of 6.31** and a **p-value of 0.024206** and the annual world gas demand variable having a **t-stat of 7.61** and a **p-value of 0.016854**. These values show that all variables are statistically significant, and that the model variations are almost exclusively explained by the independent variables, proving to be appropriate to predict future revenues. As forward-looking data to apply the model, it was used the EIA Outlooks on the

Figure 23: Predicted Gas spot price and demand [Source: Analyst estimates]



[27] "NY Harbor ULSD Futures Quotes - CME Group". 2019. *Cmegroup.Com*. https://www.cmegroup.com/trading/energy/refined-products/heating-oil.html.
[28] "RBOB Gasoline Futures Quotes - CME Group". 2019. *Cmegroup.Com*. https://www.cmegroup.com/trading/energy/refined-products/rbob-gasoline_quotes_globex.html.

natural gas spot price at Henry Hub[29] ($/MMBtu) and on the **annual world gas demand prediction**[30] (billion cubic meters).

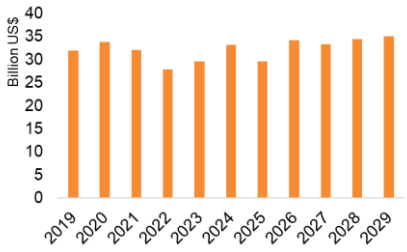
As the model is applied, it is expected that the **Integrated Gas and New Energies revenues increase from US$ 43,764 million in 2018 to US$ 86,667 million in 2029.**

Although it would be interesting to include the value of the projected investments in the revenues forecast process, their values and expected cash-flows are not publicly available and so impossible to incorporate in this valuation.

Capital Expenditures

The Oil & Gas industry is very capital intensive and requires constant investment in Shell's PP&E, since it plays a major role in the extraction, production and manufacturing process of the company. The capital expenditure of Shell is linked to its major production processes, essentially "Exploration and evaluation", "Production" and "Manufacturing, supply and distribution". The capital expenditure estimated will be dependent on the necessary infrastructure (PP&E) needed to carry out production. Having this into account, it was assumed that the **CapEx would be dependent on the demand for Oil & Gas** considered in forecasting revenues. To do so, the historical PP&E as percentage of historical total demand was computed (this way, it is possible to understand the historical CapEx needed to ensure the production to satisfy demand), for each of the production processes, from 2016 to 2018. Then, to forecast the PP&E, the predicted annual demand for Oil & Gas, for each year, was multiplied by the average of the historical percentage of Capex, calculated previously. This way, the CapEx estimation is dependent on the demand for its products, meaning that if the quantities demanded increase, Shell will need to invest more in CapEx to follow the increase in production.

Figure 24: Capital Expenditures [Source: Analyst estimates]

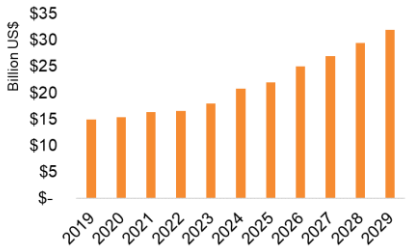


Following Shell's strategy to increase CapEx to around US$ 30 billion in 2020[1], it was estimated that in **2021 it would equal US$ 32.11 billion**. It is our believe that Shell will have to sustain high levels of CapEx every year to keep up and lead the energy transition.

[29] "Annual Energy Outlook 2019". 2019. *Eia.Gov*. https://www.eia.gov/outlooks/aeo/data/browser/#/?id=13-AEO2019&sourcekey=0.
[30] "International Energy Outlook 2019, World Natural Gas Consumption by Region". 2019. *Eia.Gov*. https://www.eia.gov/outlooks/aeo/data/browser/#/?id=6-IEO2019&sourcekey=0.

Dividends

Figure 25: Total Dividends [Source: Analyst estimates]



Regarding dividends, Shell, in the previous 5 years, has proved to take dividend payments seriously, by sustaining always the same level of dividends, despite the oil crisis that started in 2014 and the low (sometimes negative) comprehensive result. Shell announced that it will pay US$ 3.76 per ADR share (shares quoted in the NYSE), in 2019. To predict dividends, it was assumed that the payout ratio (Dividends/Comprehensive Result attributable to Royal Dutch Shell Plc shareholders) will be equal to 2019, **remaining at 84.7%**, forever. Being so, dividends per share are expected to grow as Total Comprehensive Income grows. As Shell's Comprehensive Income is expected to grow, the dividends paid to shareholders are supposed to increase.

Weighted Average Cost of Capital (WACC)

To determine the WACC, it is, by definition, indispensable to calculate the cost of equity and the cost of debt.

First, for the cost of equity, the best approach is to use the Capital Asset Pricing Model (CAPM), where we need inputs as the risk-free rate, the market risk premium and Shell's equity (levered) beta. The risk-free rate used is based on the NYU Stern database[31] for risk premiums by country. The 10-year US government bond yield, with a value of 1.81%, is used as the base value to which is added a country, or region, risk premium. In this case, since Shell is quoted in London, Amsterdam and New York, and its shareholders are mainly American and European institutional companies, it is added the regional risk premium for Europe + USA of 0.53%, to result in a final risk-free rate of **2.34%**. For the market risk premium, it was also used the NYU Stern database[31], in which is determined the equity risk premium for the Europe + USA region, weighted by GDP, leading to a market risk premium of **6.49%**. As for the equity (levered) beta, this was obtained by regressing the past 5 years monthly returns of Shell's stock against the market return, reaching a value of **0.8936, with a 95% confidence interval of [0,8809;0,9063]**. Knowing all these three inputs and using CAPM equation, the reached cost of equity is **8.13%**.

Figure 26: Cost of Equity and Cost of Debt [Source: Analyst estimates]

(1) Levered (Equity) Beta	0,89
(2) Risk-Free	2,34%
(3) MRP	6,49%
(2)+(1)*(3)=(4) Cost of Equity	**8,13%**
(5) Probability of Default (10 years)	1,19%
(2)+(5)=(6) Cost of Debt	**3,53%**

[31] NYU Stern School of Business. 2019. "Country Risk Premiums". Aswath Damodaran. Accessed December 28.

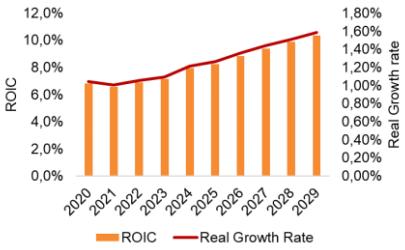
As for the cost of debt[32], it was calculated by adding the default spread to the risk-free rate. The default spread used is based on the credit rating of Shell and following the S&P500 probability of default matrix. Considering a 10-year probability of default for the AA Shell's credit rating, the default spread is **1.19%**. Since the risk-free rate is 2.34%, the determined cost of debt is **3.53%**.

Knowing both the cost of equity and cost of debt, after determining the market value of both equity and debt, using traditional and widely used methods, it was possible to determine the WACC, **6.74%**.

Growth Rate

As the assumption for the post-2029 constant terminal growth of Shell's Integrated Gas and New Energies, the growth rate assumed in the model is an essential input for the valuation. For that, it was used the theory stating that the growth rate can be determined as the product between the ROIC and the Reinvestment Rate (RR = 1 – Payout Ratio). With respect to ROIC, it is calculated through the NOPLAT divided by the sum of the Operating and non-operating invested capital. In relation to the RR, as described above, it depends on the assumption made to the payout ratio, which was assumed to be equal to 2019, being **84.7%**. In 2029, Shell's ROIC is **10.33%** and RR is **15.33%**, leading to a 2029 real growth rate of **1.58%** [Figure 28], which is stable throughout the forecasting period. Since the growth rate is stable throughout the final years of the projected FCF, the real growth rate plus the expected inflation were assumed to the perpetuity, with the nominal growth rate being equal to **3.89**%.

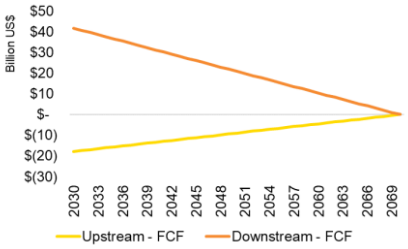
Figure 27: ROIC and Growth Rate [Source: analyst estimates]



Terminal Value

After having the FCF computed for the entire forecasting period, it is necessary to estimate what will happen after 2029, and what is its effect in the valuation of Shell. Given the fact that the oil is a scarce resource and that it cannot be estimated to exist forever, it was decided that the most reliable way is to predict the terminal value for the Upstream and Downstream segments separately from the Integrated Gas and New Energies segment. To do so, the most reliable way to segregate the FCF by segment from 2029 onwards is based on the weight each segment has on total operating result in 2029.

Figure 28: ROIC and Growth Rate [Source: analyst estimates]



[32] *Damodaran, Aswath. n.d. "Session 6: Estimating Cost of Debt, Debt Ratios and Cost Of Capital". Presentation.*

With regard to the Upstream and Downstream segments, and based on the IEA[21] and DNV GL[22] predictions, it was estimated that these two segments (which are dependent on oil) will start declining after 2029. As mentioned in Shell's Energy Transition Report[7], it is our believe that the goal of achieving "Net Zero Emissions" by 2070 is a reasonable assumption. This being said, **the Upstream and Downstream segments were predicted to decline starting in 2030, shutting down in 2070**. After estimating the FCF from both sectors, the discounted values were calculated, achieving a terminal value of **US$ 129.43 billion**.

With respect to the Integrated Gas & New Energies, it is estimated that it will continue to operate and growth, generating FCF forever, becoming Shell's main operation. Thus, the most reliable process to estimate its value is to apply the perpetuity formula, thereby using the growth rate previously calculated, of **3.89%**, achieving a terminal value of **US$ 84.29 billion**

Multiples

With the goal of comparing the predicted value of Shell with its closest peers, a multiples valuation was performed. As mentioned throughout the report, Shell's benchmark of the Oil & Gas industry includes **ExxonMobil**, **Chevron**, **BP** and **Total**. Being all public listed companies in the New York Stock Exchange (NYSE), those companies were considered as suitable comparables due to its vertically integrated structure.

To perform this valuation method, the multiples considered were i) **Enterprise Value/Forward EBITDA**, ii) **Forward Price/Earnings**, and (iii) **EV/Revenues**.

Figure 29: Upstream and Downstream FCF to 2070 [Source: Analyst

Comparables	EV/forward EBITDA	EV/Revenues	Forward P/E
BP	4,75x	0,66x	11,71x
Total	4,41x	0,99x	10,71x
Exxon Mobil	7,84x	1,34x	19,44x
Chevron	6,28x	1,74x	17,63x
Shell	5,16x	0,86x	11,23x
Median	**5,16x**	**0,99x**	**11,71x**

After gathering each ratio (ratios were retrieved from Bloomberg) for each one of the comparables and computing the median, each multiple achieved was applied to the corresponding metric, the EBITDA, Earnings of Shell and Revenues, respectively, as of December 2020. The EV/Forward EBITDA multiple valuation was estimated at around **US$ 272.39** billion, corresponding to a share price per share of **US$ 68.48**, validating the results achieved in the DCF valuation. With respect to the Forward P/E, the enterprise value was estimated to be around **US$ 212.65** billion, originating a share price of **US$ 53.46**. Finally, the EV/Revenues multiple was estimated at approximately **US$ 363.31** billion.

The graph below [Figure 31] contains the multiples valuation range, which includes the interval (from the 1st quartile to the 3rd quartile) that the three multiples can achieve. Looking to the multiples valuation, **one can conclude that Shell, in**

comparison to its peers, is being undervalued, which goes in accordance to the performed DCF valuation and the industry analysis.

Shell seems to be undervalued when compared to its peers

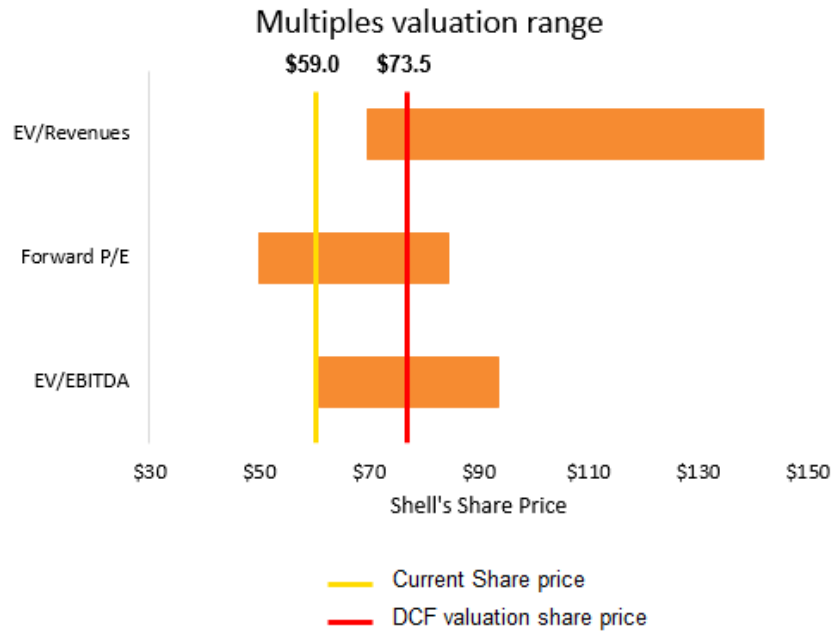


Figure 30: Multiples retrieved from Bloomberg

Analysing the multiples gathered for each comparable and for Shell, it can be witnessed that the market is penalizing Shell, BP and Total in comparison to Exxon and Chevron. First of all, it is important to notice that Chevron has higher profit margins than its competitors. This can be seen by investors as an indicator of higher efficiency and better management, leading to an increased confidence in Chevron's stock performance.

Moreover, and in our opinion the reason why the multiples are dispersed, the debt level varies significantly across companies. The fact that Shell, Total and BP have high levels of debt (46.18%, 75.49% and 53.98%, respectively), when compared to ExxonMobil and Chevron (26.75% and 23.53%, respectively) adds a risk factor to its value. In this sector, as oil price can change significantly and rapidly, sustaining high levels of debt can be very risk as, in a low oil price environment, these companies will suffer to comply with its financial obligations.

Despite the difference in share prices obtained through the different multiples, the results display evidence that Shell is undervalued. Additionally, Shell seems to be aware of the need to decrease debt level, since one of its major targets is a 0-30% gearing, which will progressively decrease investors' uncertainty about its performance. Also, this difference exposes some of the volatility that is associated

with Oil & Gas companies. To better understand this volatility, a sensitivity analysis was performed.

Sensitivity Analysis

As mentioned before, the DCF valuation performed is very sensible to some of the assumptions made. Adding to the fact that the Oil & Gas industry is volatile, it was decided that a sensitivity analysis could be useful in providing evidence of the sensitivity of the estimated Shell´s price per share to changes in WACC and in FCF terminal growth value [Figure 32]:

		WACC				
Growth Rate	**$ 73,56**	6,29%	6,36%	6,72%	**6,74%**	7,04%
	2,31%	71,23	70,26	65,94	65,77	62,48
	3,53%	78,40	77,07	71,34	71,12	66,95
	3,81%	81,05	79,56	73,22	72,98	68,45
	3,89%	81,89	80,34	73,81	**73,56**	68,91
	4,19%	85,74	83,92	76,42	76,14	70,95

Figure 31: Share Price (US$) sensitivity analysis to WACC and Growth rate [Source: Analyst estimates]

The changes in WACC tested are originated from changes in the considered markets for the MRP and the Risk-free rates. Besides the markets considered in the valuation, we tested the changes in WACC by changes in the weighted average MRP and Risk-free from (i) Asia, Europe and USA, (ii) UK, Netherlands and USA (iii) Netherlands and UK, and finally (iv) USA.

The changes in the growth rate applied in the sensitivity analysis refer to the different methods usually used in the valuation industry, meaning that it was tested a growth rate equal to (i) Weighted average of the inflation, used in the valuation, (ii) average growth rate for the entire forecasting period plus the inflation, (iii) average growth rate for the final 3 years (from 2027 to 2029) plus the inflation, and lastly (iv) the weighted average of real GDP growth plus the inflation.

As it can be observed, the considered changes in the assumptions lead to a range of Shell's share price between **US$ 62.48** and **US$ 85.74**.

		WACC				
Growth Rate	**31,0%**	6,29%	6,36%	6,72%	**6,74%**	7,04%
	2,31%	27,09%	25,45%	18,14%	17,85%	12,28%
	3,53%	39,21%	36,96%	27,27%	26,90%	19,84%
	3,81%	43,71%	41,18%	30,46%	30,06%	22,39%
	3,89%	45,12%	42,50%	31,45%	**31,03%**	23,17%
	4,19%	51,64%	48,56%	35,86%	35,39%	26,61%

Figure 32: Shareholder Return sensitivity analysis to WACC and Growth rate [Source: Analyst estimates]

Figure 33: Crude Oil Futures [Source: CME Group, Analyst estimates]

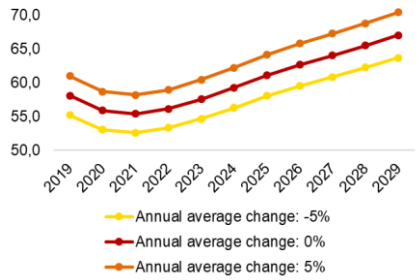


Figure 34: NY Harbour ULSD Futures [Source: CME Group, Analyst estimates]

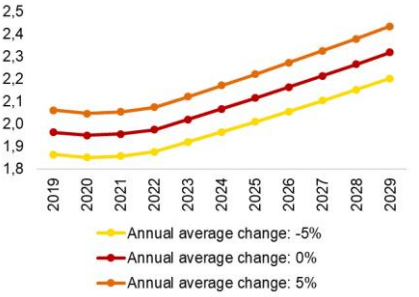
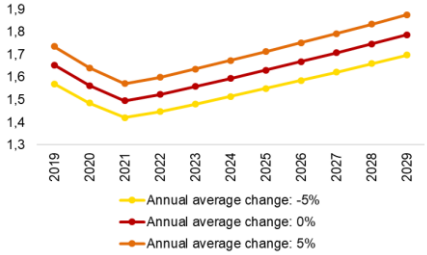


Figure 36: RBOB Gasoline Futures [Source: CME Group, Analyst estimates]



As it can be observed, even in worst cases, the share price would be higher than the actual one. This leads to the previously mentioned conclusion that Shell seems to be undervalued. As shown in Figure 33, even assuming the lower share price (**US$ 62.48**), a shareholder would have a return of **12.28%**, in opposition to a return of **51.64%** in the best scenario possible.

Moreover, since the industry and Shell are very sensitive to the oil price, it was decided to perform a sensitivity analysis to the assumption used. On the one side, it was decided to test the impact of different average annual changes in the crude oil futures (Upstream) and in the NY Harbour ULSD and RBOB Gasoline futures (Downstream). On the other side, it was tested the shock caused by changes in the annual average annual changes to the Natural Gas spot price used to predict the Integrated Gas and New Energies sector.

Annual average change in Oil prices (Crude Oil Futures, NY Harbor ULSD and RBOB Gasoline Futures)

Annual average Change in Natural Gas Spot Price	$ 73,56	-5,00%	-2,50%	0,00%	2,50%	5,00%
	-5,00%	57,15	63,56	70,74	79,06	89,23
	-2,50%	58,15	64,73	72,13	80,77	91,45
	0,00%	59,18	65,92	**73,56**	82,55	93,76
	2,50%	60,22	67,15	75,03	84,39	96,19
	5,00%	61,30	68,41	76,56	86,30	98,72

Figure 35: Share Price sensitivity to oil and gas prices [Source: Analyst estimates]

As expected, the share price highly varies from changes in the oil and gas prices, which can decline up to **US$ 57.15** if both prices present an average annual decrease of 5% and can increase up to **US$ 98.72** if both prices present an average annual increase of 5%.

Unlike to the sensitivity to financial assumptions, small decreases in oil and gas prices can destroy Shell's business value, as it happened in 2015.

Limitations to the Model

In the process of valuing Shell and predicting its revenues, costs and strategy, we faced several challenges.

It is important to mention, once again, that Shell operates in the Oil & Gas sector, which is very volatile and can see its conditions (like the oil price or regulatory/political conditions) changed in a very disruptive way, damaging Shell's value.

Moreover, due to limitations of information, it was not possible to forecast the free cash flow per segment. It is believed that it would be more accurate to forecast

each segment and all its captions (including the balance sheet), however it was not feasible to allocate some balance sheet elements by segment. Nevertheless, the consolidated operating result is a reflection of each segment's operating result, with its differentiated drivers and assumptions.

With respect to revenues estimation, when regressing the models, the number of historical observations used in the regression analysis are not ideal. However, in 2013 Shell started dividing the company's structure in different segments (the actual division) and so there is no additional available information on each segments' revenues.

Although the perfect scenario would be to have an estimation on the moment of total reserves depletion, this information is not available or predictable, since new oil fields are found every year. Knowing this, the alternative was to reduce the importance of, throughout the valuation, the oil dependent segments of Shell. This alternative is supported by Shell's intentions to be net zero emissions by 2070.

With regard to taxes, it is important to mention that Shell is a multinational company, subject to different jurisdictions. Moreover, its vertically integrated structure results in a complex tax structure, which does not allow the application of a single statutory tax rate. This way, the weighted average statutory tax rate was assumed and applied to the forecast period.

It was possible to observe Shell's major projects and upcoming investments but there is no public information on projected cash-flows, projected valuation or estimated revenues. Being so, it was not possible to use major projects alone as valuation drivers.

Appendix

Consolidated Balance Sheet Forecast

(US$ million)

Operating	2016	2017	2018	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F
Operating Cash	$ 7 008	$ 9 155	$ 11 651	$ 10 607	$ 10 988	$ 11 259	$ 11 720	$ 12 295	$ 13 068	$ 13 497	$ 14 300	$ 15 071	$ 15 884	$ 16 665
Trade and other receivables	$ 45 664	$ 44 565	$ 42 431	$ 38 435	$ 39 614	$ 40 390	$ 41 834	$ 43 667	$ 46 179	$ 47 456	$ 50 031	$ 52 464	$ 55 016	$ 57 435
Inventories	$ 21 775	$ 25 223	$ 21 117	$ 19 364	$ 19 954	$ 20 532	$ 21 625	$ 22 808	$ 24 203	$ 25 065	$ 26 638	$ 28 195	$ 29 806	$ 31 369
Current Operating Assets	**$ 74 447**	**$ 78 943**	**$ 75 199**	**$ 68 406**	**$ 70 556**	**$ 72 181**	**$ 75 180**	**$ 78 770**	**$ 83 450**	**$ 86 018**	**$ 90 969**	**$ 95 730**	**$ 100 705**	**$ 105 470**
Trade and other receivables	$ 9 553	$ 8 475	$ 7 826	$ 10 001	$ 10 988	$ 11 042	$ 10 597	$ 11 064	$ 12 356	$ 12 769	$ 13 375	$ 13 959	$ 14 781	$ 15 611
Property, plant and equipment	$ 236 098	$ 226 380	$ 223 175	$ 233 277	$ 237 816	$ 241 009	$ 244 041	$ 247 185	$ 251 930	$ 253 183	$ 258 318	$ 262 946	$ 267 760	$ 272 543
Intangible assets	$ 23 967	$ 24 180	$ 23 586	$ 20 018	$ 23 652	$ 27 304	$ 26 090	$ 26 349	$ 28 315	$ 29 999	$ 31 986	$ 33 142	$ 34 844	$ 36 727
Joint ventures and associates	$ 33 255	$ 27 927	$ 25 329	$ 28 099	$ 26 211	$ 27 297	$ 28 514	$ 29 024	$ 29 923	$ 30 016	$ 30 970	$ 31 875	$ 32 685	$ 33 531
Non-Current Operating Assets	**$ 302 873**	**$ 286 962**	**$ 279 916**	**$ 291 395**	**$ 298 667**	**$ 306 651**	**$ 309 242**	**$ 313 622**	**$ 322 525**	**$ 325 967**	**$ 334 649**	**$ 341 922**	**$ 350 070**	**$ 358 412**
Trade and other payables	$ (53 417)	$ (51 410)	$ (48 888)	$ (44 829)	$ (46 196)	$ (47 534)	$ (50 065)	$ (52 803)	$ (56 033)	$ (58 028)	$ (61 669)	$ (65 275)	$ (69 003)	$ (72 623)
Taxes Payable	$ (6 685)	$ (7 250)	$ (7 497)	$ (7 167)	$ (8 544)	$ (10 160)	$ (8 733)	$ (9 679)	$ (11 790)	$ (12 858)	$ (14 083)	$ (15 086)	$ (16 643)	$ (18 179)
Decommissioning and other provisions	$ (3 784)	$ (3 465)	$ (3 659)	$ (3 451)	$ (3 451)	$ (3 460)	$ (3 575)	$ (3 662)	$ (3 651)	$ (3 659)	$ (3 722)	$ (3 791)	$ (3 847)	$ (3 892)
Current Operating Liabilities	**$ (63 886)**	**$ (62 125)**	**$ (60 044)**	**$ (55 447)**	**$ (58 191)**	**$ (61 155)**	**$ (62 374)**	**$ (66 143)**	**$ (71 473)**	**$ (74 546)**	**$ (79 474)**	**$ (84 151)**	**$ (89 493)**	**$ (94 693)**
Trade and other payables	$ (6 925)	$ (3 447)	$ (2 735)	$ (5 080)	$ (5 654)	$ (5 743)	$ (4 964)	$ (5 328)	$ (6 142)	$ (6 319)	$ (6 553)	$ (6 752)	$ (7 194)	$ (7 618)
Decommissioning and other provisions	$ (29 618)	$ (24 966)	$ (21 533)	$ (22 790)	$ (23 238)	$ (23 522)	$ (23 667)	$ (23 850)	$ (24 286)	$ (24 380)	$ (24 740)	$ (25 088)	$ (25 460)	$ (25 839)
Non-Current Operating liabilities	**$ (36 543)**	**$ (28 413)**	**$ (24 268)**	**$ (27 870)**	**$ (28 892)**	**$ (29 265)**	**$ (28 631)**	**$ (29 178)**	**$ (30 428)**	**$ (30 699)**	**$ (31 294)**	**$ (31 840)**	**$ (32 654)**	**$ (33 457)**
NWC	$ 10 561	$ 16 818	$ 15 155	$ 12 958	$ 12 365	$ 11 027	$ 12 806	$ 12 627	$ 11 977	$ 11 472	$ 11 495	$ 11 578	$ 11 213	$ 10 777
Operating Invested Capital	**$ 276 891**	**$ 275 367**	**$ 270 803**	**$ 276 484**	**$ 282 140**	**$ 288 413**	**$ 293 417**	**$ 297 071**	**$ 304 074**	**$ 306 740**	**$ 314 850**	**$ 321 660**	**$ 328 629**	**$ 335 731**
Non-Operating														
Investments in securities	$ 5 952	$ 7 222	$ 3 074	$ 5 666	$ 1 024	$ 4 166	$ 1 824	$ 3 311	$ 3 950	$ 4 615	$ 6 284	$ 6 367	$ 7 712	$ 8 853
Retirement Benefits (Net)	$ (13 129)	$ (11 042)	$ (6 053)	$ (12 445)	$ (12 858)	$ (13 381)	$ (12 324)	$ (12 548)	$ (14 647)	$ (14 986)	$ (15 707)	$ (16 282)	$ (17 251)	$ (18 318)
Derivative financial Instruments (Net)	$ -	$ (11)	$ (816)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Tax (Net)	$ 20 466	$ 16 810	$ 13 803	$ 16 072	$ 16 949	$ 16 949	$ 16 619	$ 16 795	$ 17 853	$ 17 956	$ 18 314	$ 18 688	$ 19 230	$ 19 773
Non-Operating Invested Capital	**$ 13 289**	**$ 12 979**	**$ 10 008**	**$ 9 293**	**$ 5 115**	**$ 7 733**	**$ 6 119**	**$ 7 557**	**$ 7 156**	**$ 7 585**	**$ 8 891**	**$ 8 774**	**$ 9 692**	**$ 10 307**
Total Funds Invested	**$ 290 180**	**$ 288 346**	**$ 280 811**	**$ 285 777**	**$ 287 255**	**$ 296 146**	**$ 299 536**	**$ 304 628**	**$ 311 230**	**$ 314 325**	**$ 323 741**	**$ 330 434**	**$ 338 321**	**$ 346 039**
Financial														
Excess Cash	$ 12 122	$ 11 157	$ 15 090	$ 2 737	$ 10 279	$ 5 101	$ 8 755	$ 10 428	$ 12 146	$ 16 817	$ 16 861	$ 20 430	$ 23 472	$ 27 030
Total Debt	$ 92 476	$ 85 665	$ 76 824	$ 66 580	$ 68 662	$ 69 519	$ 71 144	$ 72 705	$ 74 625	$ 76 417	$ 78 601	$ 80 969	$ 83 491	$ 86 093
Net Financial Assets	**$ (80 354)**	**$ (74 508)**	**$ (61 734)**	**$ (63 843)**	**$ (58 383)**	**$ (64 417)**	**$ (62 389)**	**$ (62 278)**	**$ (62 479)**	**$ (59 600)**	**$ (61 739)**	**$ (60 539)**	**$ (60 019)**	**$ (59 062)**
Share Capital	$ 683	$ 696	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685	$ 685
Shares held in trust	$ (901)	$ (917)	$ (1 260)	$ (1 100)	$ (199)	$ (765)	$ (417)	$ (726)	$ (803)	$ (945)	$ (1 325)	$ (1 343)	$ (1 619)	$ (1 843)
Other Reserves	$ 11 298	$ 16 932	$ 16 615	$ 17 281	$ 17 963	$ 17 602	$ 18 859	$ 19 703	$ 20 799	$ 21 609	$ 22 858	$ 24 069	$ 25 396	$ 26 633
Retained Earnings	$ 175 566	$ 177 645	$ 182 606	$ 185 981	$ 189 447	$ 192 066	$ 196 334	$ 200 445	$ 205 307	$ 210 107	$ 215 890	$ 221 989	$ 228 658	$ 235 680
Non-Controlling Interest	$ 1 865	$ 3 456	$ 3 888	$ 2 330	$ 3 571	$ 4 094	$ 3 429	$ 3 877	$ 4 031	$ 4 346	$ 4 482	$ 4 714	$ 5 012	$ 5 233
Operating Deferred Tax (Net)	$ 21 315	$ 16 026	$ 16 543	$ 16 756	$ 17 406	$ 18 047	$ 18 256	$ 18 368	$ 18 731	$ 18 922	$ 19 412	$ 19 780	$ 20 171	$ 20 587
Total Equity	**$ 209 826**	**$ 213 838**	**$ 219 077**	**$ 221 933**	**$ 228 873**	**$ 231 728**	**$ 237 147**	**$ 242 351**	**$ 248 751**	**$ 254 725**	**$ 262 002**	**$ 269 895**	**$ 278 302**	**$ 286 976**

Consolidated Income Statement Forecast

(US$ million)

Operating	2016	2017	2018	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F
Total Revenues	$ 233 591	$ 305 179	$ 388 379	$ 353 569	$ 366 252	$ 375 301	$ 390 671	$ 409 839	$ 435 592	$ 449 888	$ 476 678	$ 502 368	$ 529 458	$ 555 515
Revenue Growth %	*-11,8%*	*30,6%*	*27,3%*	*-9,0%*	*3,6%*	*2,5%*	*4,1%*	*4,9%*	*6,3%*	*3,3%*	*6,0%*	*5,4%*	*5,4%*	*4,9%*
Purchases	$ (162 574)	$ (223 447)	$ (294 399)	$ (261 521)	$ (268 152)	$ (274 581)	$ (288 602)	$ (303 301)	$ (320 797)	$ (331 035)	$ (351 098)	$ (370 514)	$ (390 366)	$ (409 272)
Operating Expenses	$ (41 549)	$ (38 083)	$ (39 316)	$ (40 887)	$ (42 170)	$ (43 790)	$ (45 062)	$ (46 818)	$ (48 685)	$ (49 853)	$ (51 849)	$ (53 888)	$ (56 064)	$ (58 258)
EBITDA	**$ 27 360**	**$ 41 704**	**$ 53 324**	**$ 47 861**	**$ 52 788**	**$ 54 361**	**$ 54 326**	**$ 56 868**	**$ 62 893**	**$ 65 836**	**$ 70 558**	**$ 74 644**	**$ 79 553**	**$ 84 366**
Total Depreciation, depletion and amortisation	$ (24 993)	$ (26 223)	$ (22 135)	$ (25 430)	$ (25 672)	$ (25 268)	$ (26 049)	$ (26 194)	$ (26 512)	$ (26 724)	$ (27 100)	$ (27 498)	$ (27 938)	$ (28 344)
Operating Result (Weighted Scenario Adjusted)	**$ 2 367**	**$ 15 481**	**$ 31 189**	**$ 22 431**	**$ 27 115**	**$ 29 094**	**$ 28 277**	**$ 30 673**	**$ 36 381**	**$ 39 112**	**$ 43 458**	**$ 47 146**	**$ 51 614**	**$ 56 022**
Currency Translation Differences	$ 703	$ 5 156	$ (3 172)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Share of profit of joint ventures and associates	$ 3 545	$ 4 225	$ 4 106	$ 4 493	$ 4 134	$ 4 247	$ 4 375	$ 4 393	$ 4 467	$ 4 420	$ 4 499	$ 4 567	$ 4 619	$ 4 674
Taxable Income	**$ 6 615**	**$ 24 862**	**$ 32 123**	**$ 26 924**	**$ 31 249**	**$ 33 340**	**$ 32 652**	**$ 35 067**	**$ 40 849**	**$ 43 532**	**$ 47 956**	**$ 51 713**	**$ 56 234**	**$ 60 696**
Taxes	$ 7 347	$ (10 971)	$ (10 290)	$ (9 836)	$ (11 727)	$ (13 945)	$ (11 986)	$ (13 284)	$ (16 182)	$ (17 648)	$ (19 329)	$ (20 706)	$ (22 843)	$ (24 950)
NOPLAT	**$ 13 962**	**$ 13 891**	**$ 21 833**	**$ 17 087**	**$ 19 523**	**$ 19 396**	**$ 20 666**	**$ 21 783**	**$ 24 667**	**$ 25 884**	**$ 28 628**	**$ 31 007**	**$ 33 391**	**$ 35 746**
Non-Operating														
Interest and other income	$ 2 897	$ 2 466	$ 4 071	$ 4 145	$ 769	$ 3 154	$ 1 467	$ 2 555	$ 3 080	$ 3 542	$ 4 926	$ 4 946	$ 5 978	$ 6 876
Unrealised gains/(losses) on securities	$ (214)	$ 593	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash flow hedging gains/(losses)	$ (617)	$ (552)	$ 730	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net investment hedging losses	$ (2 024)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Share of other comprehensive (loss)/income of joint ventures and associates	$ (28)	$ 170	$ (10)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Retirement benefits remeasurements	$ (3 817)	$ 604	$ 3 588	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Deferred Cost of hedging	$ -	$ -	$ (209)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Equity instruments remeasurements	$ -	$ -	$ (153)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Share of other comprehensive income of joint ventures and associates	$ -	$ -	$ 193	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Non-Operating Income	**$ (3 803)**	**$ 3 281**	**$ 8 210**	**$ 4 145**	**$ 769**	**$ 3 154**	**$ 1 467**	**$ 2 555**	**$ 3 080**	**$ 3 542**	**$ 4 926**	**$ 4 946**	**$ 5 978**	**$ 6 876**
Non-operatingTaxes	$ 467	$ (331)	$ (2 268)	$ (1 477)	$ (216)	$ (1 094)	$ (502)	$ (969)	$ (1 050)	$ (1 196)	$ (1 719)	$ (1 728)	$ (2 096)	$ (2 375)
Non-Operating Result	**$ (3 336)**	**$ 2 950**	**$ 5 942**	**$ 2 668**	**$ 553**	**$ 2 060**	**$ 964**	**$ 1 592**	**$ 2 031**	**$ 2 346**	**$ 3 207**	**$ 3 218**	**$ 3 882**	**$ 4 501**
Financial														
Interest expense	$ (3 203)	$ (4 042)	$ (3 745)	$ (2 712)	$ (2 350)	$ (2 424)	$ (2 454)	$ (2 512)	$ (2 567)	$ (2 634)	$ (2 698)	$ (2 775)	$ (2 858)	$ (2 947)
Debt Instruments Remeasurements	$ -	$ -	$ (15)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tax shield	$ (535)	$ 1 317	$ 1 360	$ 985	$ 854	$ 880	$ 891	$ 912	$ 932	$ 957	$ 980	$ 1 008	$ 1 038	$ 1 070
Financial Result	**$ (3 738)**	**$ (2 725)**	**$ (2 400)**	**$ (1 727)**	**$ (1 497)**	**$ (1 544)**	**$ (1 563)**	**$ (1 600)**	**$ (1 635)**	**$ (1 676)**	**$ (1 718)**	**$ (1 767)**	**$ (1 820)**	**$ (1 877)**
Comprehensive Result	$ 6 888	$ 14 117	$ 25 375	$ 18 029	$ 18 579	$ 19 912	$ 20 067	$ 21 775	$ 25 063	$ 26 552	$ 30 117	$ 32 458	$ 35 452	$ 38 369
Income attributable to non controlling interest	$ 154	$ 578	$ 383	$ 365	$ 418	$ 474	$ 432	$ 465	$ 506	$ 525	$ 545	$ 579	$ 612	$ 641
Total Comprehensive Income attributable to Royal Dutch Shell plc shareholders	**$ 6 734**	**$ 13 539**	**$ 24 992**	**$ 17 664**	**$ 18 160**	**$ 19 438**	**$ 19 635**	**$ 21 310**	**$ 24 557**	**$ 26 027**	**$ 29 573**	**$ 31 880**	**$ 34 840**	**$ 37 728**

Consolidated Statement of Cash-Flows Forecast

(US$ million)

	2017	2018	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F
Net Operating Result	$ 13 891	$ 21 833	$ 17 087	$ 19 523	$ 19 396	$ 20 666	$ 21 783	$ 24 667	$ 25 884	$ 28 628	$ 31 007	$ 33 391	$ 35 746
Depreciation, depletion and amortisation	$ 26 223	$ 22 135	$ 25 430	$ 25 672	$ 25 268	$ 26 049	$ 26 194	$ 26 512	$ 26 724	$ 27 100	$ 27 498	$ 27 938	$ 28 344
Operating Cash-Flow	**$ 40 114**	**$ 43 968**	**$ 42 518**	**$ 45 195**	**$ 44 663**	**$ 46 715**	**$ 47 977**	**$ 51 179**	**$ 52 608**	**$ 55 728**	**$ 58 506**	**$ 61 329**	**$ 64 090**
Change in operating Cash	$ (2 148)	$ (2 496)	$ 1 044	$ (380)	$ (271)	$ (461)	$ (575)	$ (773)	$ (429)	$ (804)	$ (771)	$ (813)	$ (782)
Change in inventories	$ (3 448)	$ 4 106	$ 1 753	$ (591)	$ (578)	$ (1 093)	$ (1 182)	$ (1 395)	$ (862)	$ (1 573)	$ (1 557)	$ (1 610)	$ (1 563)
Change in Trade and other receivables	$ 1 099	$ 2 134	$ 3 996	$ (1 180)	$ (776)	$ (1 444)	$ (1 833)	$ (2 512)	$ (1 277)	$ (2 575)	$ (2 433)	$ (2 553)	$ (2 419)
Cyclical needs variation	$ (4 497)	$ 3 744	$ 6 794	$ (2 151)	$ (1 625)	$ (2 998)	$ (3 591)	$ (4 680)	$ (2 568)	$ (4 951)	$ (4 761)	$ (4 976)	$ (4 764)
Change in Trade and other payables	$ (2 007)	$ (2 522)	$ (4 059)	$ 1 367	$ 1 338	$ 2 531	$ 2 738	$ 3 230	$ 1 995	$ 3 641	$ 3 605	$ 3 728	$ 3 620
Change in Taxes Payable	$ 565	$ 247	$ (330)	$ 1 377	$ 1 616	$ (1 427)	$ 945	$ 2 111	$ 1 069	$ 1 224	$ 1 003	$ 1 557	$ 1 536
Decommissioning and other provisions	$ (319)	$ 194	$ (208)	$ (1)	$ 10	$ 115	$ 87	$ (11)	$ 9	$ 62	$ 69	$ 56	$ 45
Cyclical Resources Variation	$ (1 761)	$ (2 081)	$ (4 597)	$ 2 744	$ 2 964	$ 1 219	$ 3 770	$ 5 330	$ 3 073	$ 4 928	$ 4 678	$ 5 342	$ 5 200
Change in NWC	**$ (6 258)**	**$ 1 663**	**$ 2 197**	**$ 593**	**$ 1 338**	**$ (1 779)**	**$ 179**	**$ 650**	**$ 505**	**$ (23)**	**$ (83)**	**$ 366**	**$ 436**
CAPEX	$ (16 718)	$ (18 336)	$ (31 964)	$ (33 846)	$ (32 112)	$ (27 866)	$ (29 598)	$ (33 223)	$ (29 661)	$ (34 222)	$ (33 282)	$ (34 454)	$ (35 010)
Change in Trade and other receivables (Non-Current)	$ 1 078	$ 649	$ (2 175)	$ (986)	$ (54)	$ 444	$ (467)	$ (1 292)	$ (413)	$ (606)	$ (584)	$ (823)	$ (830)
Change in Trade and other payables (Non-Current)	$ (3 478)	$ (712)	$ 2 345	$ 575	$ 89	$ (779)	$ 364	$ 814	$ 177	$ 234	$ 198	$ 442	$ 424
Change in Decommissioning and other provisions (Non-Current)	$ (4 652)	$ (3 433)	$ 1 257	$ 447	$ 284	$ 145	$ 184	$ 436	$ 94	$ 361	$ 348	$ 372	$ 379
Change in Joint-Ventures	$ 5 328	$ 2 598	$ (2 770)	$ 1 888	$ (1 085)	$ (1 217)	$ (510)	$ (900)	$ (93)	$ (953)	$ (905)	$ (810)	$ (846)
FCF from operations	**$ 15 415**	**$ 26 397**	**$ 11 407**	**$ 13 866**	**$ 13 123**	**$ 15 662**	**$ 18 128**	**$ 17 665**	**$ 23 218**	**$ 20 518**	**$ 24 198**	**$ 26 422**	**$ 28 643**
After-Tax Non-Operating Result	$ 2 950	$ 5 942	$ 2 668	$ 553	$ 2 060	$ 964	$ 1 592	$ 2 031	$ 2 346	$ 3 207	$ 3 218	$ 3 882	$ 4 501
Change in Retirement Benefits	$ (2 087)	$ (4 989)	$ 6 392	$ 413	$ 524	$ (1 058)	$ 225	$ 2 098	$ 339	$ 721	$ 575	$ 969	$ 1 067
Change in Investement in Securities	$ (1 270)	$ 4 148	$ (2 592)	$ 4 642	$ (3 141)	$ 2 341	$ (1 486)	$ (640)	$ (665)	$ (1 668)	$ (84)	$ (1 345)	$ (1 141)
Change in Derivative Financial Instruments	$ 11	$ 805	$ (816)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Change in Deferred Tax (Net)	$ 3 656	$ 3 007	$ (2 269)	$ (877)	$ 0	$ 330	$ (176)	$ (1 058)	$ (103)	$ (359)	$ (374)	$ (542)	$ (542)
FCF from Non-Operating	**$ 3 260**	**$ 8 913**	**$ 3 383**	**$ 4 731**	**$ (558)**	**$ 2 578**	**$ 154**	**$ 2 432**	**$ 1 917**	**$ 1 901**	**$ 3 335**	**$ 2 964**	**$ 3 885**
Financial Result	$ (2 725)	$ (2 400)	$ (1 727)	$ (1 497)	$ (1 544)	$ (1 563)	$ (1 600)	$ (1 635)	$ (1 678)	$ (1 718)	$ (1 767)	$ (1 820)	$ (1 877)
Change in Excess Cash	$ (966)	$ 3 933	$ (12 353)	$ 7 542	$ (5 178)	$ 3 653	$ 1 673	$ 1 719	$ 4 671	$ 44	$ 3 569	$ 3 042	$ 3 559
Change in Total Debt	$ (6 811)	$ (8 841)	$ (10 244)	$ 2 082	$ 857	$ 1 626	$ 1 561	$ 1 920	$ 1 792	$ 2 183	$ 2 368	$ 2 522	$ 2 602
Net Transactions with Shareholders	$ (10 105)	$ (20 136)	$ (15 172)	$ (11 639)	$ (17 056)	$ (14 649)	$ (16 571)	$ (18 663)	$ (20 578)	$ (22 840)	$ (24 565)	$ (27 046)	$ (29 695)
FCF from financing	**$ (18 675)**	**$ (35 310)**	**$ (14 790)**	**$ (18 597)**	**$ (12 565)**	**$ (18 240)**	**$ (18 283)**	**$ (20 097)**	**$ (25 135)**	**$ (22 419)**	**$ (27 532)**	**$ (29 386)**	**$ (32 529)**

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A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

IS POLITICS DANGEROUS FOR BUSINESS?

PEDRO ILHÉU BALTAZAR SILVA

25830

A Project carried out on the Master in Finance Program, under the supervision of:

Professor Rosário André

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A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

Abstract:

As oil products are very relevant, political events can have impact on oil prices. Since political events are mostly unpredictable, projecting oil prices is a fallible process. It is important to understand how political events can affect oil prices, understanding how these prices reacted in the past. Political events influence the oil market, but political regimes also suffer from oil price changes. On Shell's value, an analysis is performed where one-time oil price variations are applied to the predicted Shell value. Other scenario, more systemic, is applied to Shell's value on how it can react to a low prices' crisis.

Keywords:

Royal Dutch Shell; Political Events; Share Price; Scenario Analysis

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Problem

As the Oil & Gas market is widely globalized, sometimes one country's problem can have worldwide effects. Due to its utility and importance, oil and its related products as gasoline, diesel and natural gas, have always been commodities with high political leverage, used as political instruments and reasons to start conflicts between regions and nations[1]. Apart from economic growth, one of the main drivers of oil prices, any relevant political event can also be considered an oil price driver. Nowadays, the price of any oil-related traded commodity immediately internalizes any change in the market, rapidly affecting every interested party. Lastly, the main problem still rests in the fact that most events influencing oil prices are irregular and so projecting oil prices is still a fallible and mostly unpredictable process[2].

Which countries most influence the oil market?

The impact of any political event on the market depends on how important the related country is to it. The most important countries in these circumstances are:

The largest oil producing countries[3]: *United States; Saudi Arabia; Russia; Canada; China; Iraq; Iran; United Arab Emirates; Brazil; Kuwait;* These countries cover around 70% of world production, leading any political disruption in the region to create a disturbance in the oil price.

The largest oil consuming countries[3]: *United States; China; India; Japan; Russia; Saudi Arabia; Brazil; South Korea; Canada; Germany;* It is possible to state that 9 of the largest oil consumer countries are within the 15 largest economies, measured by GDP[4]. Comprising 60% of world's total consumption, these top-10 countries have a vital importance to the global oil trade and demand, which ultimately leads the supply and the prices.

[1] "How can political events affect the oil price?". 2018. IG. https://www.ig.com/uk/news-and-trade-ideas/commodities-news/how-can-political-events-affect-the-oil-price--42098-180209
[2] "Oil: crude and petroleum products explained". 2019. EIA. https://www.eia.gov/energyexplained/oil-and-petroleum-products/prices-and-outlook.php
[3] "What countries are the top producers and consumers of oil?". 2019. EIA. https://www.eia.gov/tools/faqs/faq.php?id=709&t=6
[4] "Top 20 Economies in the World". 2019. Investing.com. https://www.investopedia.com/insights/worlds-top-economies/

Regions with high political influence or ongoing tension[5]: *Conflict between Ukraine and Russia; Instability in Venezuela; War in Yemen; Political Instability in Iraq;* Markets are constantly reacting to several political conflicts all over the planet. Among those, these mentioned conflicts are some examples of events in oil producing countries, which have led to disruptions in the oil production, affecting oil prices.

Current and Past events with influence

Departing from the idea that political events and outcomes cause disturbances in the oil market[6], it is important to analyze empirical evidence, events that have distorted, or are distorting, the world of oil. The following are some of the most impacting events of the last years[7]:

The United States Energy Policy: the enormous increase in Oil and Gas production in the United States since 2015 results mostly from the intensive use of hydro fracking. This increase triggered political changes in energy policy, mainly the lifting of the prohibition, in place since 1973, to export oil. This decision arrived at a time when refineries were reaching their historical high levels of shale oil processing capacity and oil storage in the United States. This decision turned the U.S. into a net exporter. The impact of this decision is not limited to the U.S., allowing European countries to reduce their dependence from Russian production. As a political event, the U.S. have now more geopolitical influence in the oil market, reducing the importance of OPEC countries in world exports and world prices. In this event, as it cannot be reduced to a single moment, it is more difficult to access the direct effect on oil prices. However, all the innovations in oil extraction and sources found in the U.S. are one of the main reasons to explain the oil price drop, since 2014, from an over US$ 100/b environment to an ever since environment of US$ 40/b – US$ 60/b[8].

[5] "Global Conflict Tracker". 2019. Council on Foreign Relations. https://www.cfr.org/interactive/global-conflict-tracker?category=usConflictStatus
[6] "What drives crude oil prices: Spot Prices". 2019. EIA. https://www.eia.gov/finance/markets/crudeoil/spot_prices.php
[7] "The Six Political Events That Have "Distorted" the World of Oil". 2016. Carnegie Endowment for International Peace. https://carnegieendowment.org/2016/08/17/six-political-events-that-have-distorted-world-of-oil-pub-64514
[8] European Central Bank. 2015. "Working Paper Series - Quantitative effects of shale oil revolution".

Middle East Crisis: According to the International Energy Agency, there are an average of 3.2 million barrels per day of oil production disruptions due to political instability in the Middle East, mostly in Iraq, Syria and Libya. In opposite, the political decision, by western countries, of lifting sanctions against Iran led to a duplication of Iranian exports to 2.1 million barrels a day in May 2016, disrupting the global oil supply. Although Iran and Saudi Arabia are both founding members of OPEC, their political relations are hostile for many years due to religious problems, leading to ongoing tensions in the region[9]. This crisis has already led to innumerous events, with different effects, and one of the most recent and relevant was the drone attack performed, in September 2019, against Saudi Arabia oil facilities. These facilities have a process capacity of 8.45 million crude oil barrels a day and when the event happened, Saudi Aramco suspended the production of 5.7 million barrels a day, which represents more than 5% of global oil production[10]. The oil price reacted, increasing US$ 54/b to US$ 61/b, a US$ 7/b increase[11]. This meant a 12.96% increase in crude oil price.

Russia's Expansionism and Sanctions: Russia annexed Crimea, a Ukrainian region, leading the European Union and the United States to impose economic sanctions, directly affecting Russian gas exports. These sanctions, together with the new U.S. energy paradigm in 2015, led to structural changes in oil and gas supply to Europe. In the day the Russian troops took over the Crimean parliament, on 27th February 2014, the crude oil price rapidly increased US$ 3/b, from US$ 102/b to US$ 105/b, representing a 2.94% one-time increase. However, on 11th March 2014, Crimean institutions declared the independence from Ukraine and requested full accession to Russia, leading to a decrease of crude oil price from US$ 101.5/b to US$ 97.5/b, a 3.94% decrease[11].

[9] "Why Saudi Arabia and Iran are bitter rivals". 2019. BBC. https://www.bbc.com/news/world-middle-east-42008809
[10] "Two Major Saudi Oil Installations Hit by Drone Strike, and U.S. Blames Iran". 2019. NY Times. https://www.nytimes.com/2019/09/14/world/middleeast/saudi-arabia-refineries-drone-attack.html
[11] "Crude Oil WTI Futures Chart - Investing.Com". 2019. Investing.com. https://www.investing.com/commodities/crude-oil-streaming-chart.

Oil Prices Transforming Global Geopolitics

Major political events have an impact on oil prices, but the oil prices can also have a strong effect on politics. Some countries, as **Venezuela** and **Nigeria**, heavily rely on the oil sector to sustain other economic activities and government's expenditures. The low oil price environment faced after 2015 led these countries to face heavy socio-economic downturns.

In **Venezuela**, since the fall in oil prices, political instability has been rising. The state-owned Venezuelan oil company has been suffering from a combination of long-standing business inefficiencies alongside low oil price, leading to an output decline due to non-profit production. All these circumstances led to a state with fewer resources and more social problems.

In **Nigeria**, the low oil price situation led to an ongoing recession, which created more difficulties in a country with already other political problems. In Nigeria, the oil infrastructures are subject to threats of attacks from militant groups, leading to losses in future investments[12].

Effect on Royal Dutch Shell's value

After describing and analyzing the effects of a political event on the oil price, it is important to understand how these changes can affect Shell's value. Departing from a base share price of **US$ 73.56**, retrieved from the equity research report valuation, it is important to understand how Shell's value can change when occurring one of the previously described events, a one-time oil price variation. If there was an increase of **12.96%**, verified in the Middle East crisis, an increase of **2.94%** or a decrease of **3.94%**, as observed in the Crimean Annexation, the effects on Shell share price would be as presented in Figure 1.

One-time change in oil prices			
$ 73,56	-3,94%	2,94%	12,96%
	$ 71,09	$ 77,14	$ 85,03

Figure 1: Share Price Sensitivity to one-time changes in oil prices (2020) [Source: Analyst Estimates]

The variations are applied in 2020 to the **Crude Oil Price Futures** and the **weighted average**

[12] "Oil Prices Transforming Global Geopolitics". 2017. Marsh. https://www.marsh.com/il/en/insights/research-briefings/oil-prices-transforming-global-geopolitics.html

inflation adjusted price of NY Harbor ULSD Futures and RBOB Gasoline Futures, both "oil prices", used as drivers to predict Shell's Upstream and Downstream revenues in the equity research model. This illustrates that Shell's share presents a maximum volatility of **US$ 11.47**, which is very relevant and corroborates the importance of these one-time political events to a share valuation. It is important to notice that this analysis assumes that these effects last and all future prices are derived following the one-time changes. However, if the market understands that it overreacted, it will correct itself to the price levels existent before the event.

It would also be interesting to estimate Shell's value variation in a scenario where oil prices would face a new crisis, similar to the 2014 crisis, which was partially originated from the U.S. change in energy policy, leading to a low-price environment in the oil market. If the oil price, instead of continuing the predicted increase in the next years, would face a new longstanding fall to **US$ 40/b**, by 2029, Shell's share price valuation would suffer a large change. Applying the yearly percentual change necessary to meet the US$ 40/b crude oil price by 2029 to both variables used in the first scenario presented above, as in Shell's equity research valuation, this highly negative scenario would lead to a share price of **US$ 56.65**. This value compares to the original US$ 73.56 valuation price, which indicates that another crisis, as the one in 2014, would be very harmful to Shell and oil companies in general.

Essentially, it is possible to understand that there is a visible relation between the moment when a political event occurs and a reaction of the oil price, concluding that not only business-related factors can deeply affect a company value. In Shell's case, its value is intrinsically connected to oil price variations and so one-time oil price variations or longstanding oil price crisis can hugely affect its share price, making it a relevant subject to deeply analyze and understand.