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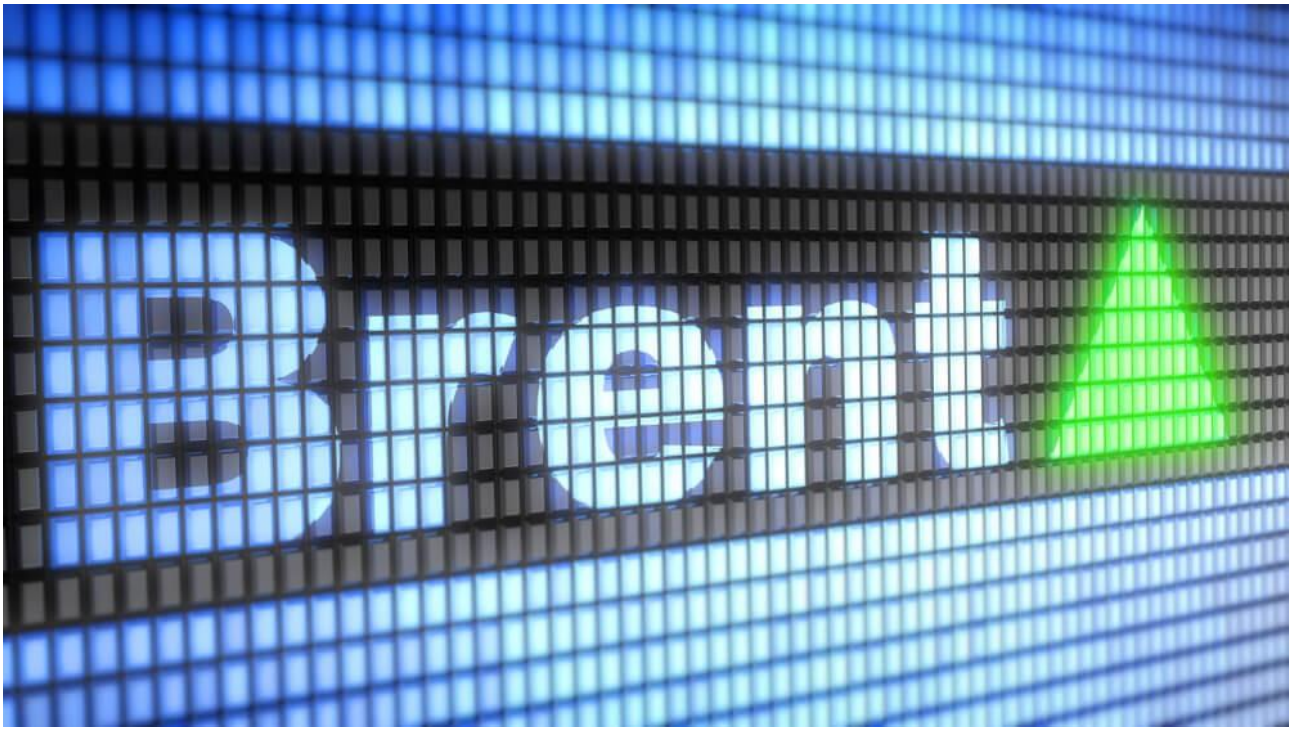


# Oil is back

## A STRATEGIC ANALYSIS AND VALUATION OF AKER BP ASA

MASTER THESIS FINANCE AND INVESTMENTS 2019

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# Abstract

This thesis contains a strategic analysis and valuation of Aker BP ASA ("**Aker BP**") as of 19 March 2019. Aker BP is listed on Oslo Stock Exchange under the ticker AKERBP and traded at a price of NOK 304 on 19 March 2019. The goal of this thesis is to estimate Aker BP's enterprise value and the value of Aker BP's equity as a going concern. Both fundamental- and relative valuation methods are utilized and all estimates in this thesis are based on publicly available information. Our problem statement is:

***"What is the appropriate share price of Aker BP ASA as of 19 March 2019?"***

This valuation of Aker BP starts with a thorough strategic analysis of Aker BP's external environment. The analysis shows that the Norwegian oil & gas industry is exposed to several risks with the capacity to significantly impact future growth and value creation. Following the macro-environmental analysis, a thorough analysis of global oil and gas markets is performed with the goal of predicting future market prices. Our oil- and gas price predictions are definitely in the upper range of analyst estimates, but this is regarded as appropriate given our bullish view on global growth. The strategic analysis ends with a competitive analysis of the Norwegian oil & gas industry and an analysis of some resources/capabilities that are deemed as absolutely crucial for Aker BP's success. Our analysis shows that there are several factors that make the Norwegian oil & gas industry attractive for established companies and that Aker BP possess resources with the potential to provide a competitive advantage.

The second step in our valuation of Aker BP is to conduct a detailed analysis of historic financial statements in order to forecast Aker BP's future performance. Aker BP has undertaken several mergers and acquisitions in recent years, thereby limiting the relevance of historic financial statements. Our future performance estimates therefore rely heavily on our industry outlook and guidance provided by Aker BP. Following our forecast of future performance, Aker BP's cost of equity and weighted average cost of capital is estimated to equal 9.2% and 8.2%, respectively.

Based on our forecasted cash flows and weighted average cost of capital estimate, the fundamental enterprise value of Aker BP is equal to USD 19,497 million. With net financial liabilities of USD 2,018 million, Aker BP's total market value of equity is equal to USD 17,479 million or NOK 425 per share. Our relative valuation based on comparable companies provided us with an estimated enterprise value of USD 16,412 million and a value per share of NOK 350. Following the initial value estimates, a sensitivity analysis was performed. The sensitivity analysis showed that Aker BP's value per share is highly sensitive to the assumptions taken. Given a price per share of NOK 304 as per 19 March 2019 and our final value estimate of NOK 425 per share, we have a buy recommendation for Aker BP ASA.

# 1 Introduction

In this thesis, the economic factors affecting the Norwegian petroleum company Aker BP ASA (“**Aker BP**”) will be analyzed with the goal of estimating Aker BP’s enterprise value and the value of Aker BP’s equity as a going concern. Aker BP is listed on Oslo Stock Exchange and our value estimates will thus provide guidance regarding whether or not Aker BP’s stock price is correct given current economic conditions.

Our thesis is comprehensive and includes substantial amounts of information and analyses. Background information and introductions to theoretical models are provided when appropriate, however, it is assumed that a potential reader is familiar with basic economic theories and concepts.

In this chapter our motivation, problem statement, limitations and thesis structure will be presented.

## 1.1 Motivation

Our motivation to write a thesis about Aker BP comes mainly as a result of the impact the petroleum industry has had on Norway in the last 50 years. Norway’s extracted and un-extracted petroleum reserves have contributed to making Norway one of the richest countries in the world and Aker BP is one of the largest petroleum companies operating in Norway. An analysis of the economic factors affecting Aker BP allows us to gain a deeper insight into a growing company which has undergone large changes in recent years. It also provides us with an opportunity to acquire significant knowledge and expertise regarding Norway’s most influential industry.

In addition, we are intrigued by the relevance and position of the global petroleum industry. By analyzing Aker BP, we get the opportunity to increase our familiarity with a highly controversial global industry that will undoubtedly change in the coming years. Regulations and pressure from governments and environmental organizations are likely to increase, and the industry’s legitimacy will continue to be a hot topic. We are certain that the knowledge gained from writing this thesis will benefit us greatly as we start the next chapters of our lives.

## 1.2 Problem statement

The goal of this thesis is to estimate Aker BP’s enterprise value and the value of Aker BP’s equity as a going concern. The estimated values are independent estimates and may significantly deviate from Aker BP’s market value based on their current stock price. This thesis is based on independent analyses conducted using public information available as of 19 March 2019. Our problem statement thus becomes:

***“What is the appropriate share price of Aker BP ASA as per 19 March 2019?”***

## 1.3 Limitations

This thesis is subject to several limitations which could impact our estimates of Aker BP's enterprise- and equity value significantly.

Our analyses and value estimates will solely be based on public information available as of 19 March 2019. Given the nature of such analyses and value estimates, Aker BP certainly possess private information that could potentially impact our conclusions. In addition, our analyses and value estimates can potentially be impacted by the relatively short analysis period and our cutoff date. Three years of historical data is significantly shorter than common practice but is deemed as the most appropriate solution given the changes Aker BP has gone through in recent years. Also, information made public after 19 March 2019 can potentially alter our view of Aker BP's future performance, even though such information is not included or accounted for in this thesis.

We have chosen to utilize two main valuation methods. If other methods were utilized, our value estimates would most likely be different. Our estimates are thus dependent on the chosen methods. In our relative valuation, we are limited by the fact that we will not rearrange and adjust the financial statements of comparable companies ourselves. These adjusted financial statements are based on Bloomberg's adjustments and could potentially have been different if we had made the adjustments ourselves. Bloomberg's adjusted financial statements were utilized because they fit our purpose and because we deemed it to be outside the scope of this thesis. Our cost of equity is highly dependent on the comparable companies and our subjective adjustments. Different comparable companies and adjustments would likely have provided different results.

Our value estimates are highly dependent on our projections regarding future oil and gas prices. Future oil and gas prices are contingent on estimates of global supply and demand growth, which are highly uncertain. These estimates are primarily developed using sources from developed countries, written in English. Estimates of supply and demand growth based on other sources could result in entirely different price estimates. In addition, our thesis is limited by the fact that we choose to use Bloomberg analyst estimates regarding future gas prices. A full analysis in line with the one performed for oil markets would likely have provided different gas price estimates.

## 1.4 Structure

This thesis takes a highly practical approach to valuation. In our opinion, the approach many in academia take when valuing companies is way too generalized and not appropriately tailored to the company and industry in question. We are of the opinion that future performance cannot be forecasted solely based on margins and historic extrapolation. Superior value estimates require an analyst to acquire an intimate knowledge of a company's value drivers, industry and risks. We have therefore chosen to spend a significant amount of time and energy familiarizing ourselves with the Norwegian petroleum industry, as well as international oil and gas markets. In addition, we have acquired an intimate knowledge of Aker BP's operations and ambitions. The knowledge we have gained will hopefully allow us to forecast Aker BP's future production and performance as accurately as possible. We believe that our thesis takes an approach that is as close to the one taken by real world financial analysts as possible, while still complying with financial theory and academic guidelines. It is our ambition that a potential reader will learn a great deal about Aker BP and the petroleum industry. We also hope that a potential reader will appreciate the practical approach that we have taken. It should be noted that throughout our thesis the terms "petroleum" and "oil & gas" will be used interchangeably. The "Norwegian petroleum industry" is thus the same as the "Norwegian oil & gas industry".

Our thesis consists of 8 chapters. Chapter 2 contains a general introduction to Aker BP and international oil and gas markets. In Chapter 3, we present the relevant valuation methods that will be utilized when estimating Aker BP's enterprise value and the value of Aker BP's equity as a going concern. Chapter 4 contains a thorough strategic analysis of factors with a potential impact on Aker BP's future performance. The strategic analysis also includes an in-depth analysis of international oil and gas markets. In Chapter 5, we analyze historical financial statements, forecast future performance, estimate a cost of capital and perform a fundamental valuation of Aker BP where we estimate enterprise- and equity value. Chapter 6 contains a relative valuation of Aker BP where we estimate enterprise- and equity value using multiples derived from comparable companies. Following our initial value estimates, we perform a sensitivity analysis in chapter 7. The sensitivity analysis critically assesses our assumptions and revise our expectations to provide ranges for our value estimates. Chapter 8 summarizes and concludes our thesis.

# 2 Aker BP and the Oil & Gas Industry

## 2.1 Introduction

This chapter will start with a preliminary introduction to the commodity known as "oil". Chapter 2 will then continue with a preliminary introduction to Aker BP ASA, focusing on the history of the company and their assets. The third part of the chapter presents the global and domestic oil & gas industry to gain an initial understanding of the main value drivers and risk factors affecting Aker BP. A more in-depth market and company analysis will be conducted in chapters 4 and 5.

## 2.2 Oil

Oil is often regarded as a general uniform commodity with one global price. However, the commodity known as "oil" is more accurately described as crude oil. Crude oil is unrefined oil, usually extracted from the ground through drilling and pumping (Wikipedia, n.d.A). There are many different types of crude oil, and as a result, many different crude oil prices. The prices of the different crude oil types are heavily correlated as global oil markets are highly integrated, but there is a difference and relative changes do occur. To avoid having to keep track of a wide range of different crude oil prices, three basket prices are broadly used. Each of these different baskets contain several different types of crude oil. The three different baskets are: West Texas Intermediate ("**WTI**"), Brent crude ("**Brent**") and OPEC reference basket (Oilprice.com, 2009). It should be noted that there are several other baskets which are used in addition to those mentioned, however, one must make the cutoff somewhere and these reference baskets are the most popular.

WTI is considered to be among the highest quality crude oils available (Oilprice.com, 2009). The two main parameters on which crude oil quality is measured are "sourness" and "heaviness". Sourness refers to the sulfur content of the crude oil, while heaviness refers to the density of the crude oil. Sweeter (less sulfur) and lighter crude oils are generally considered premium to sour and heavy crude oils. The reason being that sweeter and lighter crude oils are easier and cheaper to use when producing gasoline and diesel fuel (U.S Energy Information Administration, 2012). WTI is a sweet and light crude oil produced in the US. It is the underlying commodity for crude oil futures traded on the New York Mercantile Exchange (Wikipedia, n.d.B).

Brent is a basket of several sweet and light crude oils extracted from the North Sea. It is sourer and heavier than WTI, but the difference is relatively small. The low density and sourness make it prime for producing gasoline and diesel. Brent is the main commodity underlying crude oil futures traded in Europe

(Wikipedia, n.d.X). The crude oils that Aker BP produce are part of the Brent reference basket. The Brent price will therefore be the forecasted crude oil price underlying Aker BP's income projections.

OPEC reference basket is the weighted average price of different crude oil types produced by members of the Organization of Petroleum Exporting Countries ("**OPEC**") (ref. section 2.4.1). The crude oils included in the basket are heavier and sourer than both WTI and Brent. As a result, the price of the OPEC reference basket is usually lower than both WTI and Brent (Oilprice.com, 2009).

In this thesis, the term "**oil**" will be used when referencing crude oils. In general, no distinction will be made between the different crude oils, however, the names of the individual crude oil reference baskets will be used when appropriate. Unless otherwise stated, the term "**gas**" refers to natural gas.

## 2.3 Aker BP AS

Aker BP is an independent exploration and production ("**E&P**") company focusing on development, exploration and production of oil and gas on the Norwegian Continental Shelf ("**NCS**") (Aker BP, 2018A). Currently, Aker BP operate exclusively on the NCS, i.e. they do not have operations outside Norway. In 2018, they had ten producing oil and gas fields, producing a total of 56.8 million barrels of oil equivalents ("**boe**")[1]. The production generated a total revenue of USD 3.75 billion. Going forward, Aker BP expects to increase production output through safer operations, increased value creation and expansion of producing assets. (Aker BP, 2018B)

### 2.3.1 History

Aker BP in its current form was established in 2016 after a merger between British Petroleum Norway (BP Norway) and Det Norske Oljeselskap ASA (Aker BP, 2016A). Aker ASA and British Petroleum are major shareholders in the company with 40% and 30% of the shares, respectively (Aker BP, 2019A).

It all started in 2009 when Aker Exploration, a company focusing on E&P on the NCS, merged with the Norwegian part of DNO ASA. This merger was essentially a carve-out and acquisition of DNO's Norwegian operations, after which DNO mainly focused their activities on the Middle East and Africa. The newly merged company was named Det Norske Oljeselskap ASA, with Aker ASA as its main shareholder. In June 2016, Det Norske Oljeselskap ASA and British Petroleum reached an agreement to merge Det Norske Oljeselskap ASA with BP Norway, the Norwegian branch of British Petroleum, creating Aker BP ASA (Aker BP, 2019A).

[1] Barrels of oil equivalents (boe) is a measuring unit that aggregates oil and gas production. Gas production, which is normally measured in terms of cubic feet or meters, is converted into barrels of oil using a standard conversion formula.

2.3.2 Assets

Aker BP currently has ten main oil and gas producing assets located in six different areas on the NCS. In 2018, these assets produced an average of 155.7 thousand barrels of oil equivalents per day ("**mboepd**"). The production is split roughly 80/20 between oil and gas, respectively. All assets, except for those in the Skarv Area, are located on the NCS south of Bergen (Aker BP, 2018B). An overview of the different assets' location can be seen in Figure 1.

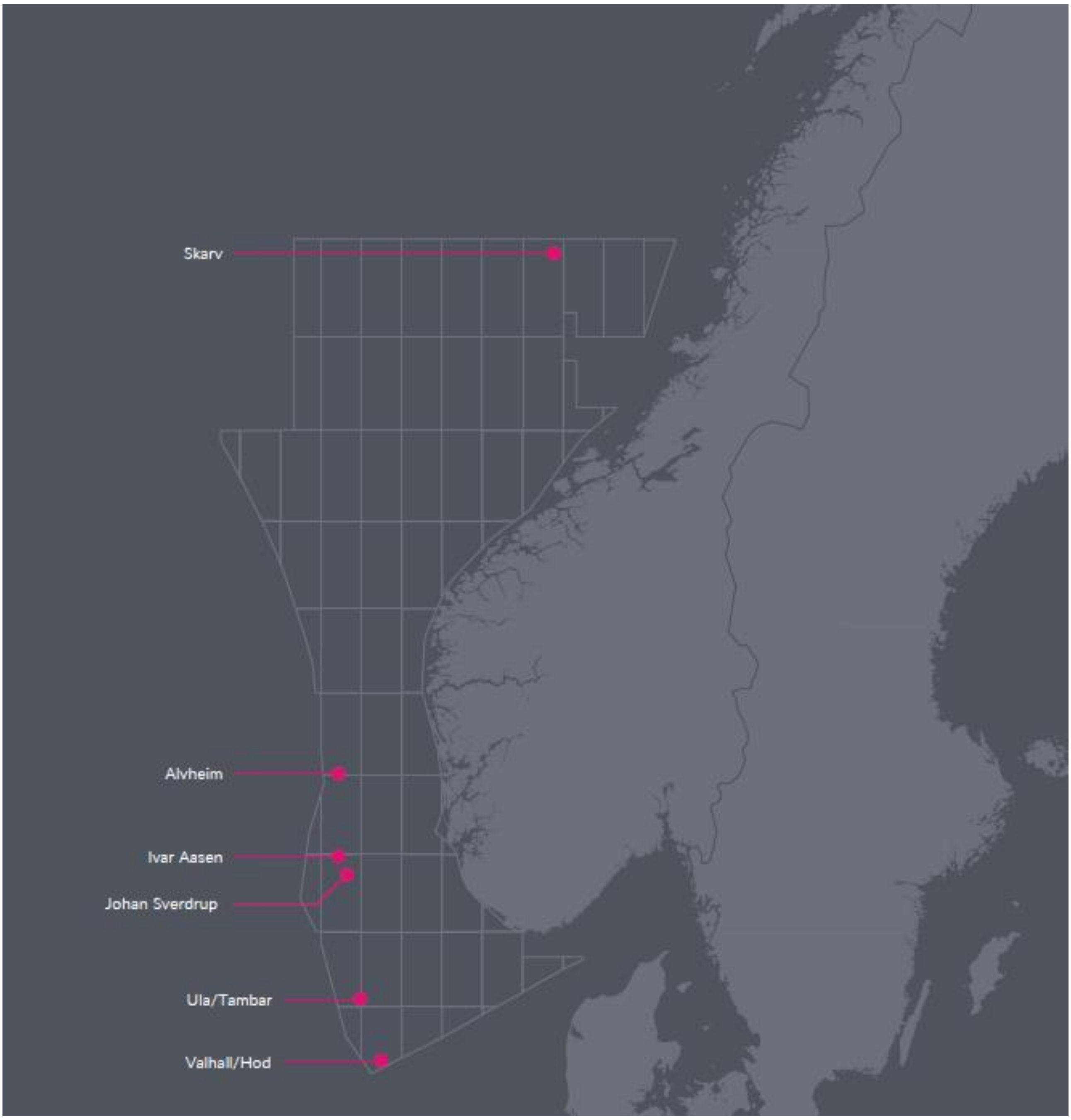


*Figure 1 - Aker BP asset overview (Aker BP, 2018A)*

#### *2.3.2.1 The Valhall and Hod Area*

Valhall and Hod were discovered in 1974 and 1975, respectively. These fields are the oldest currently producing fields in Aker BP's portfolio. In early 2017, Aker BP announced that the total boes produced at these fields had passed one billion since production started in 1982. Aker BP estimates that end-of-2018 remaining reserves is approximately 242 million boe ("**mmboe**"), corresponding to roughly 20% of the initial total boes in the fields. The last un-extracted sections of the fields are still being developed and are expected to be operational by the end of 2019. Aker BP expects high levels of activity going forward, and that Valhall and Hod will continue to be among the largest producing fields in their portfolio (Aker BP, 2018A).

#### *2.3.2.2 The Ula Area*

The Ula area consist of the fields Ula, Tambar, Tambar East and Oda. The Ula field was discovered in 1976, Tambar in 1982, Tambar east in 2007 and Oda in 2011. In early 2017, Tambar was re-developed to extract an additional 27 mmboe. Oda is currently under development and the first boes are expected in 2019. Activity in the Ula area has been high in 2018 and further modifications and upgrades are expected in the future. Aker BP expects that the Ula area will be important going forward and will investigate the possibility of extending the area's life-time until 2040 and beyond (Aker BP, 2019C).

#### *2.3.2.3 Johan Sverdrup Area*

Johan Sverdrup was first discovered in 2010 and is expected to contain between 1,900 and 3,000 mmboe (Tu, 2014). It is among the five largest off-shore fields in the world and will be operated by a consortium of five partners (Equinor, Lundin Petroleum, TOTAL, Petoro and Aker BP) (Offshore-Mag, 2018A). Aker BP intends to develop its part of the Johan Sverdrup project in two phases. Phase 1 is close to completion and the first boe is expected in Q4 2019. Phase 2 is under development and is expected to be completed by Q4 2022. Fully operational, Johan Sverdrup is estimated to contribute 40% of the total Norwegian oil and gas production. (Aker BP, n.d.B)

#### *2.3.2.4 Ivar Aasen Area*

Ivar Aasen was first discovered in 2008 and opened for production in 2017. In its first years of operation, activity has been very high and as a result of the modern equipment the field can operate close to maximum efficiency. The field is operated by a consortium of seven partners (Aker BP, Equinor, Spirit Energy, Wintershall, Neptune Energy, Lundin, Petroleum and OKEA), with Aker BP as the main operator and an ownership share of 35% (Aker BP, n.d.C).

#### *2.3.2.5 The Greater Alvheim Area*

Alvheim was first discovered in 1998 and opened for production in 2008. The Greater Alvheim Area consist of the fields Alvheim, Bøyla, Vilja, Volund and Skogul. The production from the five fields in The Greater Alvheim Area constitutes approximately half of Aker BP's production. Aker BP expects to further develop the area as the fields contain large un-extracted reserves. Alvheim has been producing beyond expectations and Aker BP suspect that it can be a good hub for future discoveries (Aker BP, 2018B).

#### *2.3.2.6 The Skarv Area*

The Skarv Area was first discovered in 1998 and opened for production in 2012. The area consists of two main fields; Ærfugl and Skarv. Ærfugl is mainly a gas field containing one of the world's largest offshore gas processing plants. Certain parts of the Skarv area is still under development and estimated production start is late 2023. The Skarv area is the production area located the furthest north and is the only current production area located in the Norwegian Sea (Aker BP, 2019C).

Figure 2 shows the historical development and relative production of Aker BP's different production areas. Each area's relative share is expected to change as Johan Sverdrup and other development projects become operational.

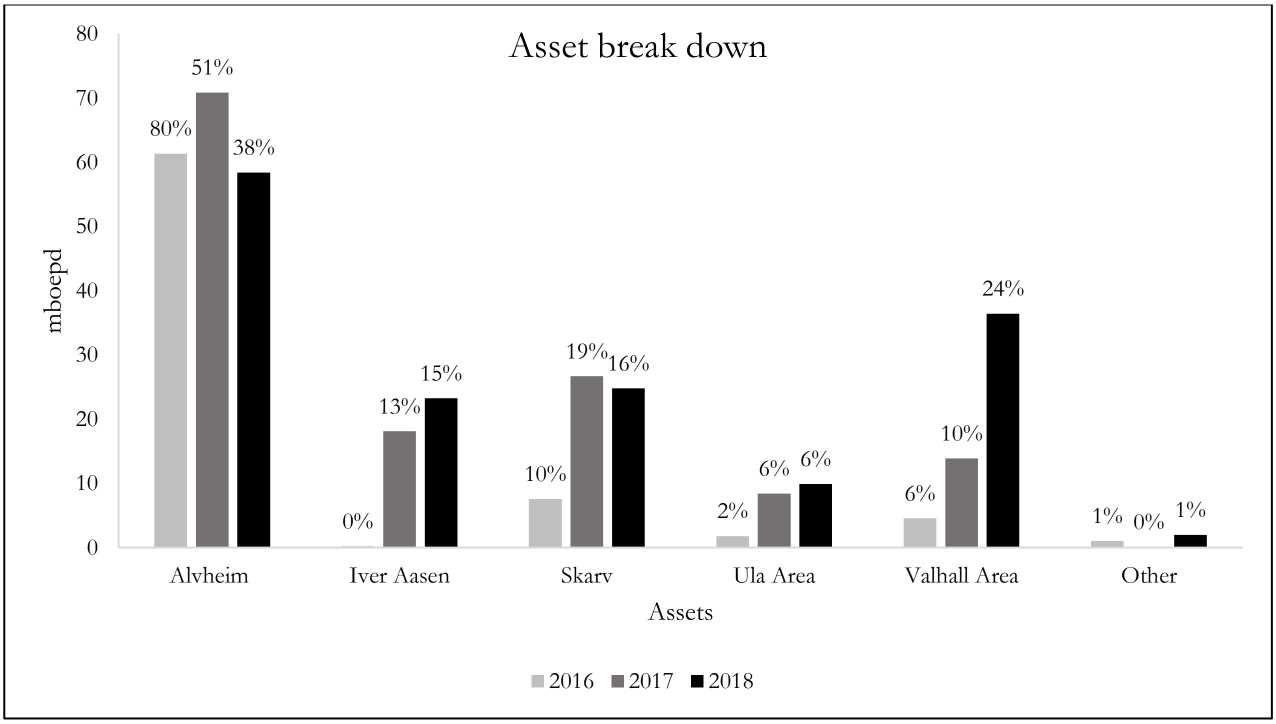


*Figure 2 - Asset break down (production and percentage of total production) (Aker BP, 2018A)*

## 2.4 Market Introduction

The oil & gas industry is one of the largest industries in the world. The following sections will give a brief introduction to global and domestic oil and gas markets. A more comprehensive analysis of these markets, and the factors affecting them, will be conducted in chapter 4.

### 2.4.1 Global Market

The oil & gas industry is among the largest and most important industries in the world. In 2017, total consumption of oil and gas totaled approximately 99 and 59 mmboe per day ("**mmboepd**"), respectively. Assuming an average Brent price of USD 54 per barrel, total market size equaled approximately USD 3.1 trillion in 2017 (not incl. secondary trading). Consumption of oil and gas is expected to grow as the world's energy demand continues to rise. In 2017, the total oil and gas consumption rose by 1.8% and 3.0% respectively, as primary energy consumption rose by 2.2%. Somewhat similar growth rates are expected going forward (BP, 2018).[2]

The oil & gas industry can be divided into three major sectors; upstream, midstream and downstream (Wikipedia, n.d.C). Upstream consists of, among others, seismic, drilling, extraction and reclamation, commonly referred to as E&P. Midstream consists of companies involved with transportation, storage and wholesale marketing. Downstream mainly consists of refining and selling of processed oil and gas products (gasoline, diesel, paraffin etc.). The three sectors are highly interconnected, and some large companies operate across the whole specter (Investopedia, n.d.A).

A few countries dominate a major part of the oil & gas industry. Some of these countries are organized into cartels and have significant pricing power. The most notable and well-known cartel operating within oil production is OPEC. OPEC consists of 14 countries, of which the most notable are Saudi Arabia, Iraq, Iran and United Arab Emirates. Approximately 43% of the world's total production of oil comes from OPEC (Wikipedia, n.d.D). By adding countries closely connected to OPEC such as Russia, Kazakhstan and Mexico, commonly referred to as OPEC +, the group controls approximately 62% of the world's oil supply (Rigzone, 2018B). The countries in OPEC also produce natural gas, however, they do not possess the same pricing power in gas markets as they do in oil markets. The world's largest producers of natural gas are the United States of America and Russia, producing approximately 20% and 17% of total production, respectively (BP, 2018).

[2] 2017 aggregate numbers are reported as 2018 market reports have not yet been released

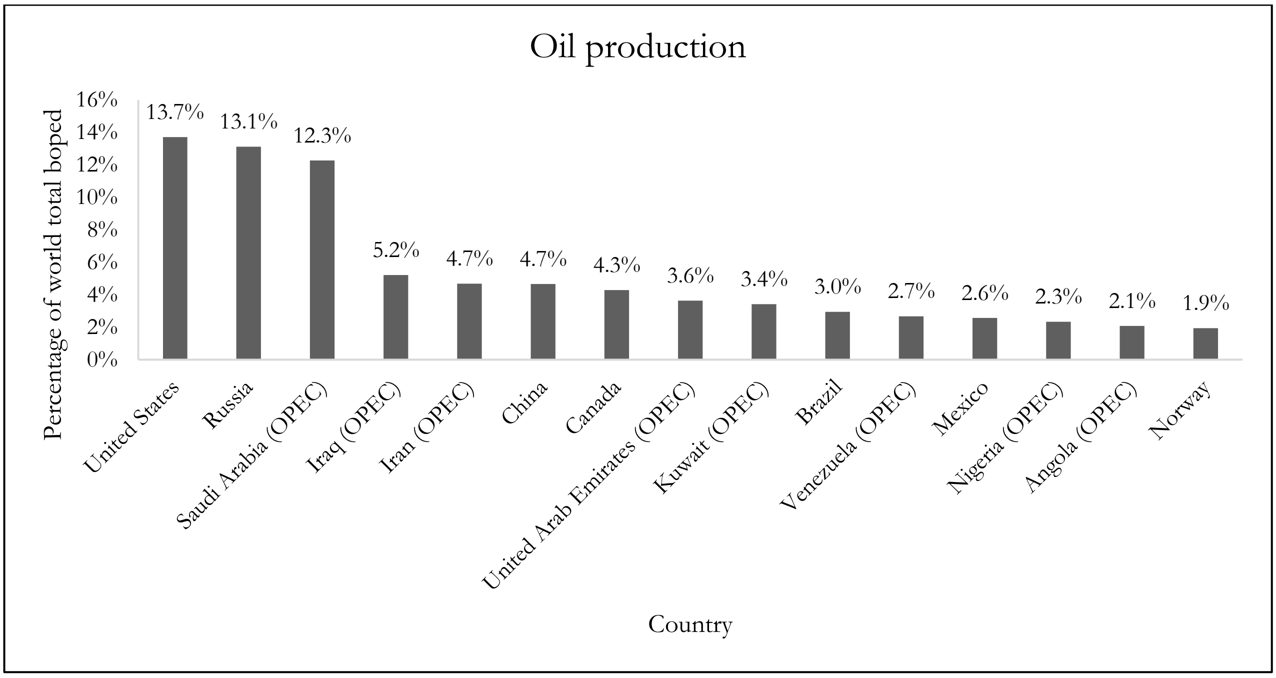


*Figure 3 - Oil production by country (Wikipedia, n.d.D)*

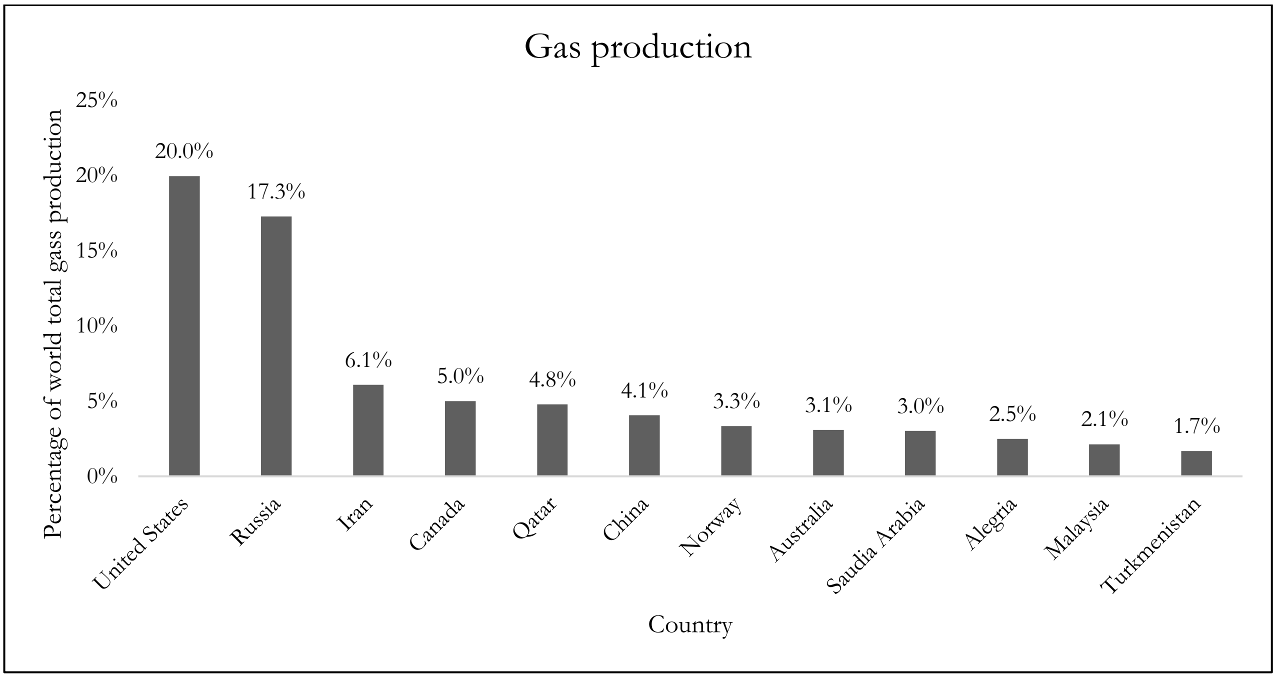


*Figure 4 - Gas production by country (BP, 2018)*

### 2.4.2 Domestic Market

Ever since the Norwegian oil & gas industry took off in the beginning of the 1970's, it has been an essential part of the Norwegian economy. Norway is the 15th largest producer of oil and the 7th largest producer of gas in the world (Wikipedia, n.d.D) (BP, 2018). Since the discovery of oil and gas on the NCS, the Norwegian government has created policies to secure profitable and sustainable extraction of the valuable natural resources. The principle which has guided all policies and major developments is that the value created by extracting oil and gas should, to the extent possible, benefit the Norwegian people as a whole (Norwegian Petroleum, n.d.A). It is estimated that the oil & gas industry has contributed NOK 14,000 billion to the Norwegian GDP (NOK indexed to 2018 levels) (Norwegian Petroleum, n.d.B). In addition, the income from extraction of oil and gas on the NCS has provided Norway with the largest sovereign wealth fund in the world. The Norwegian oil fund's market value as of March 2019 is approximately NOK 8.8 trillion (Norges Bank Investment Management, n.d.). The importance of the Norwegian oil & gas industry is illustrated in Figure 5.

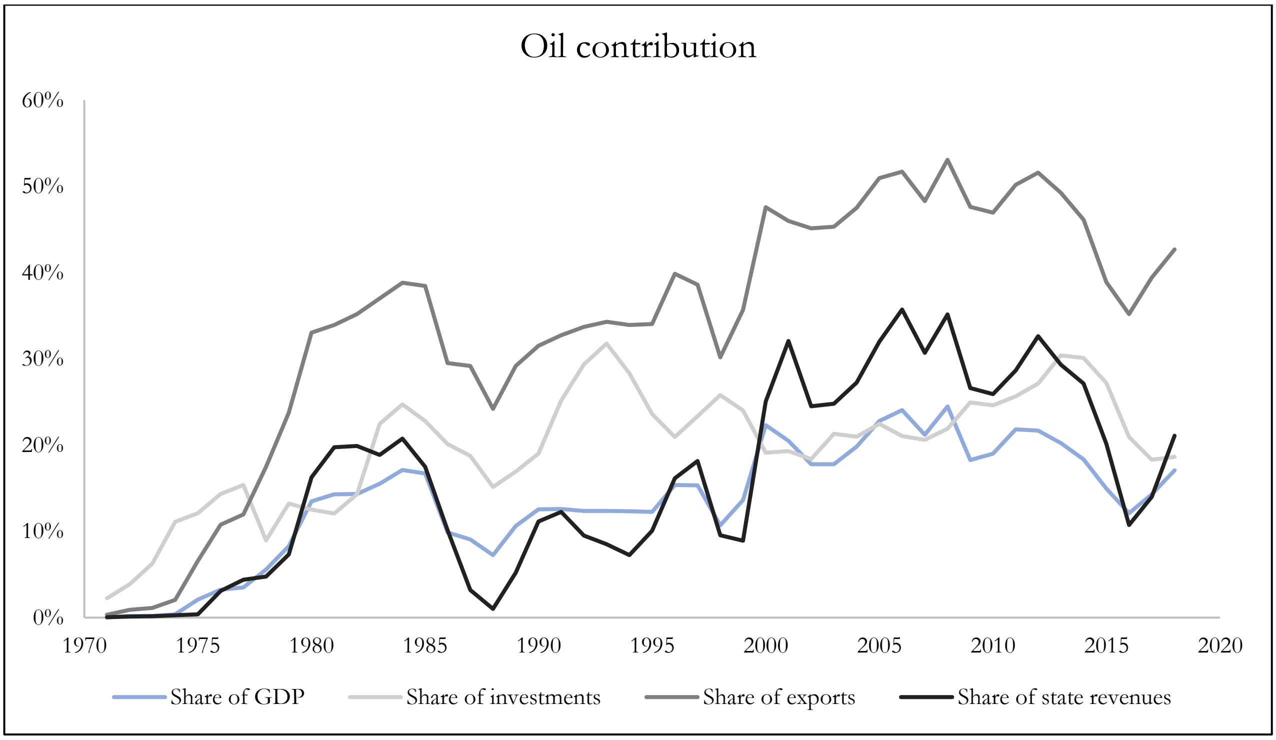


*Figure 5 - Contribution to Norwegian economy (Norwegian Petroleum, n.d.B)*

Extraction of oil and gas on the NCS is based on a concession system where a petroleum company or a consortium of petroleum companies apply for permission to extract oil and gas from an area. If the application is successful, the company or consortium receives exclusive rights to operate in that area. The concessions are often time limited, usually 10 years, during which time the company or consortium has the opportunity to conduct initial exploration. If the exploration is successful, the company or consortium can demand that the time limit is extended, usually for a period of 30 years (Norwegian Petroleum, n.d.C). There are currently 39 companies operating on a total of 83 active fields (Norwegian Petroleum, n.d.F). Operations are dominated by a few large operators such as Equinor, Aker BP, ConocoPhillips, Vår Energi and Shell (Norwegian Petroleum, n.d.M).

| Companies | No. concessions | No. fields |
|---|---|---|
| Equinor Energy AS | 290 | 59 |
| Aker BP ASA | 136 | 20 |
| ConocoPhillips Skandinavia AS | 46 | 9 |
| Vår Energi AS | 105 | 5 |
| Repsol Norge AS | 25 | 4 |
| Wintershall Norge AS | 48 | 4 |
| A/S Norske Shell | 31 | 3 |
| Faroe Petroleum Norge AS | 44 | 2 |
| Lundin Norway AS | 67 | 2 |
| Neptune Energy Norge AS | 68 | 2 |
| Spirit Energy Norway AS | 65 | 2 |
| Total E&P Norge AS | 64 | 2 |
| DEA Norge AS | 50 | 1 |
| OKEA AS | 16 | 1 |

*Table 1 - NCS Operators (Norwegian Petroleum, n.d.M)*

# 3 Valuation methods

The following chapter will provide a general introduction to financial theories and methods that are often used when valuing companies. As mentioned in the introduction, this thesis assume that a potential reader is familiar with basic economic theories and concepts. This chapter can therefore be regarded as a summary providing reference points to be used in future chapters. Chapter 3 ends with a conclusion and justification for the methods that will be utilized when valuing Aker BP.

The two main valuation methods that will be used to value Aker BP are fundamental valuation and relative valuation. These two methods will be used as complements to each other, as verifying a value estimate with different methods make a valuation more prudent and robust (Penman, 2013). These methods can in theory be used to value any asset, however, a focus is naturally placed on companies.

A fundamental valuation method values a company based on its fundamentals and is therefore highly dependent on accurate estimates of expected returns, growth rates, investments and the cost of capital (Damodaran, 2012). To estimate these variables as accurately as possible, a fundamental valuation usually begins with a strategic analysis of both internal and external forces. The insights gained from the strategic analysis is then used to predict how the aforementioned variables will develop in the future.

A relative valuation method values a company based on observable market parameters which is then adjusted and applied to the company in question. The underlying idea is that companies with similar characteristics should have similar values (Koller, Goedhart, & Wessels, 2015). A strategic analysis is often performed to determine which companies are similar to the one being valued.

## 3.1 Fundamental valuation

The theoretical value of a company is equal to the discounted value of the cash flows that the company generates (Damodaran, 2012). To determine the theoretical value as accurately as possible, future cash flows and the cost of capital needs to be estimated based on relevant information. As mentioned, a strategic analysis of external and internal factors is usually conducted in order to predict future cash flows. The following sections will present three different fundamental valuation methods used to estimate the value of a company.

### 3.1.1 Dividend Discount Model

A company's equity can in theory be valued by summing the discounted value of the company's future dividends. This approach is known as the Dividend Discount Model ("**DDM**"). By expressing the cost of capital at time $t$ as $k_{e,t}$ , the DDM can be expressed as follows (Koller, Goedhart, & Wessels, 2015).

$$Equity\ value = \sum\nolimits_{t=1}^{T} \frac{Dividend_t}{\left(1 + k_{e,t}\right)^t} \tag{1}$$

The cost of capital in the dividend discount model is the cost of equity (further described in section 3.2.2). According to Damodaran (2012), future dividends must be estimated based on the expected profitability of a company and the need to keep cash reserves. A special variation of the standard DDM is Gordon's growth model. Gordon proved that by assuming a constant dividend growth rate and cost of equity forever, a company's equity value can be expressed as in equation 2 (Penman, 2013).

$$Equity\ value = \frac{Dividend_0(1+g)}{k_e - g} \tag{2}$$

Since Gordon's growth model assumes constant dividend growth and cost of equity, it is often best suited for determining a terminal value. Terminal values are often used to avoid forecasting dividends (cash flows) too far into the future. A common approach is to forecast dividends for five to ten years before assuming a constant dividend growth rate and cost of capital. Equity value then becomes a combination of a forecast- and a terminal value, i.e. a combination of equation 1 and 2 with $T \in (5{,}10)$ (Damodaran, 2012).

The DDM has several shortcomings which limits its use in practice. Damodaran (2012) argues that the DDM provides an unreliable value estimate if a company pays relatively small or large dividends in comparison to its free cash flow (further explained in the next section), thereby affecting the company's cash reserves. By affecting the cash available for investment, dividends strongly affect a company's potential growth rates. The result is an underestimated value of companies with increasing cash reserves (low dividend ratios) and an overestimated value of companies with decreasing cash reserves. Because of limitations affecting the DDM, and the simple fact that not all companies pay dividends, other fundamental valuation methods are usually preferred. Two such methods are the discounted cash flow to equity method and the discounted cash flow to firm method.

### 3.1.2 Free cash flow to equity method

The free cash flow to equity method calculates the value of a company's equity as the discounted value of its future free cash flows to equity ("**FCFE**"). This is similar to equation 1 presented in the DDM section, however, dividend is substituted with FCFE. FCFE can be defined as the amount of generated cash available for distribution to shareholders in the form of dividends or share buybacks. FCFE, as opposed to dividends, is not dependent on whether or not a company actually pays out the available cash (Penman, 2013). FCFE can be calculated as shown in the following equation.

$$FCFE = Net\ earnings \\ + Depreciations\ \&\ Amortizations - Capital\ expenditures \\ -\Delta Working\ capital + \Delta Interest\ bearing\ debt \tag{3}$$

As with the DDM, the FCFE method is dependent on forecasted cash flows, growth rates and cost of equity (Koller, Goedhart, & Wessels, 2015). If a company pays 100% of its FCFE to shareholders, the two methods will yield the exact same result. The advantage of the FCFE method compared to the DDM, is that the FCFE method is unaffected if a company chooses to increase cash reserves by paying less dividend. The robustness of the FCFE method is therefore substantially higher and the accuracy of the value estimate increases relative to the DDM estimate (Damodaran, 2012). With the FCFE method, the two-stage approach described under the DDM is often used. Equity value thus becomes the sum of a forecasting period and a terminal value. Gordon's growth model is still utilized, however, dividend is substituted with FCFE and the relevant growth rate is the FCFE growth rate.

A weakness of the FCFE method is, as with the DDM, the dependency on accurate forecasting of cash flows, growth rates and cost of equity. These are all variables that can be very hard to estimate accurately.

### 3.1.3 Free cash flow to firm

The free cash flow to firm method calculates the value of a company as the discounted value of the free cash flow available to all claimants ("**FCFF**") (mainly shareholders and creditors). This is similar to the previously presented methods, however, dividend or FCFE is substituted with FCFF. FCFF can be defined as the amount of generated cash available for distribution to all claimants. Distributions are usually in the form of interest payments, debt repayments, dividends or share buybacks. FCFF can be calculated as shown in the following equation.

$$FCFF = NOPAT + Depreciations\ \&\ Amortizations \\ -Capital\ expenditures - \Delta Working\ capital \tag{4}$$

Net operating profit after tax ("**NOPAT**") is calculated as $EBIT(1 - tax\ rate)$, where tax rate is the tax rate on operating profits. FCFF is often referred to as unlevered cash flow since it is prior to debt payments. This means that FCFF does not include tax benefits from interest payments. Instead, the tax benefit from interest payments is accounted for in the cost of capital. The cost of capital used to discount future FCFF's is the weighted average cost of capital ("**WACC**"). WACC will be further discussed in section 3.2.1. The difference between FCFF and FCFE is caused by debt related payments such as interest payments, new debt issues, principal repayments and preferred dividends (Damodaran, 2012). As a result, FCFE is usually slightly more complex to forecast. This is primarily caused by changes in outstanding debt, the tax deductibility of debt and changes in interest rates. Even though changes in outstanding debt can be forecasted to a certain degree by looking at a company's future need for outside capital, it is difficult to predict what type of debt a company will potentially issue. If a company has (or issues) floating rate notes, or other types of debt dependent on yield curves, future interest rates need to be estimated in order to perform accurate valuations (Penman, 2013). The FCFF method will therefore in many cases be preferred to the FCFE method due to less complicated forecasts (Damodaran, 2012). As with the previously described methods, a two-stage approach is often used to estimate the value of a company with the FCFF method. The same equations are utilized, but with FCFF instead of dividend or FCFE.

A weakness of all the fundamental valuation methods is the dependency on accurate forecasting of cash flows, growth rates and cost of capital. These are all variables that can be very hard to estimate accurately. In the next section different approaches to estimating cost of capital will be presented.

## 3.2 Cost of capital

An integral part of a Discounted Cash Flow/Fundamental valuation is the cost of capital. The cost of capital must be compared to the expected return in order to determine whether a company is correctly priced. If a company is correctly priced, the cost of capital and the expected return will be equal (Damodaran, 2012) (Koller, Goedhart, & Wessels, 2015). When determining the enterprise value ("**EV**") of a company, the cost of capital is set equal to the WACC (defined in section 3.2.1). To determine the WACC of Aker BP several different methods can be utilized. The methods presented below assume that investors are risk averse, i.e. investors require a higher expected return to take on more risk. We will define the return at time (t) as the increase in the value of invested capital divided by the value of invested capital at time (t-n) where n is number of periods.

### 3.2.1 Weighted average cost of capital

WACC is defined as the weighted average of the cost of debt and the required return of shareholders, using debt- and equity ratios as weights (Koller, Goedhart, & Wessels, 2015). In general, debt- and equity ratios can be calculated by either using book values or market values. To evaluate the historical profitability of a company, it is normal to use book values of debt and equity (Petersen, Plenborg, & Kinserdal, 2017). When determining the forward-looking cost of capital, debt- and equity ratios based on market values is the norm (Damodaran, 2012). Debt ratios will be calculated using net financial liabilities (ref. section 5.1.1). When determining the EV of a company using DCF methods, future cash flows are valued, and weights based on market values are therefore the most appropriate. If interest payments are deductible, the cost of debt is multiplied with (1 – tax rate) (Koller, Goedhart, & Wessels, 2015).

### 3.2.2 Cost of Equity

There are different theoretical models available for calculating the cost of equity. The most common and well-known is the capital asset pricing model ("**CAPM**"). In addition, models such as the intertemporal capital asset pricing model ("**ICAPM**") have received much attention (Investopedia, n.d.B). CAPM is a one-factor model while ICAPM is a multi-factor model. The two models are based on the idea that an asset's expected return can be determined by a linear relationship between the asset's expected return and the factor(s) (Investopedia, n.d.C). CAPM and ICAPM will be presented below.

### 3.2.3 Capital asset pricing model

CAPM is the original and basic model for determining the expected rate of return. It was developed by Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1965) in the early to mid-1960s (Wikipedia, n.d.E). CAPM assumes that the expected return of any asset is linearly related to the expected return of the market portfolio. The market portfolio is a portfolio of all risky assets in the economy. CAPM is based on the following three assumptions: 1) there is a risk-free asset available to investors, 2) investors are not subject to any portfolio constraints and will invest so that their portfolio is mean-variance efficient and 3) investors have homogenous beliefs about the risk-free asset and the efficient frontier of risky assets (Cuthbertson & Nitzsche, 2004).

If these assumptions hold, CAPM states that all investors will own the same relative portfolio of risky assets and that the expected return of a risky asset is only affected by the expected return of the market portfolio and the covariance between the two expected returns. CAPM can then be used to determine the expected return of all assets, not just stocks (Cuthbertson & Nitzsche, 2004). The expected return of asset $i$ then becomes:

$$E(r_i) = r_f + \beta_i\big(E(r_m) + r_f\big), \forall i \tag{5}$$

Where $E(r_i)$ is the expected return of risky asset $i$, $r_f$ is the risk-free rate, $\beta_i$ is the beta of asset $i$ and $E(r_m)$ is the expected return of the market portfolio. The straight line that results from plotting equation 5 with expected return on the Y-axis and beta on the X-axis is called the security market line ("**SML**"). If CAPM holds, all risky assets' expected return is located on the SML (Cuthbertson & Nitzsche, 2004).

A significant problem with the CAPM is that the value of the market portfolio is unobservable. When calculating the expected return of an asset, one must therefore use a proxy for the market portfolio. Typically, a broad-based market index such as the S&P 500 or the MSCI World index is chosen. Choice of market proxy can often be difficult and can depend on the investor's portfolio. For example, if all Aker BP investors only own stocks listed on the Oslo Stock Exchange, the relevant proxy could be the Oslo Stock Exchange All Share Index. However, it is generally assumed that investors are globally diversified, and a larger broader index is therefore usually chosen as the appropriate proxy (Wikipedia, n.d.E).

#### *3.2.3.1 Beta*

An asset's beta measures the sensitivity of the expected return of the asset to the expected return of the market portfolio (Cuthbertson & Nitzsche, 2004). Beta is defined as follows:

$$\beta_i = \frac{Cov(E(r_i), E(r_m))}{Var(E(r_m))}, \forall i \tag{6}$$

$Cov(E(r_i), E(r_m))$ is the covariance between the expected return of asset $i$ and the expected return of the market portfolio and $Var(E(r_m))$ is the variance of the market portfolio's expected return. There are two main approaches to estimating an asset's beta. The simplest approach is to regress the historic returns of the asset against the historic returns of the market portfolio over a period of time. An asset's estimated beta is then equal to the slope of the best fitting line of the regression (Wikipedia, n.d.F)

$$r_{it} = r_{ft} + \beta_i(r_{mt} + r_{ft}) + \varepsilon_{it}, \forall i \tag{7}$$

In equation 7, $r_{it}$ is the return of asset $i$ in period $t$, $r_{ft}$ is the risk-free rate in period $t$, $r_{mt}$ is the return of the market portfolio in period $t$ and $\varepsilon_{it}$ is the regression residual. This is a historical approach as the beta estimate is based on past asset prices. A significant problem when utilizing a historical approach is that an asset's characteristics can change, and the historical estimate will therefore not necessarily be applicable in the future. In addition, beta estimates calculated from historical regressions tend to have high standard deviations and are therefore unreliable indicators of sensitivity to market risk (Cuthbertson & Nitzsche, 2004) (Wikipedia, n.d.F).

The second approach is to calculate the betas of comparable assets and use the average as the relevant asset's beta. Betas of comparable assets are often calculated by using the historical approach described above. The average beta of comparable assets tends to have a much lower standard deviation because of the larger sample size and is therefore a better estimate. When the asset is the stock of a company, the calculated beta is the equity beta. The equity beta is affected by a company's leverage ratio. In order to have comparable betas, one must therefore un-lever the betas of the comparable companies using equation 8. The un-levered beta is the beta a company would have if it was financed 100% with equity. To estimate a company's beta using comparable companies, one must then average the un-levered betas of the comparable companies and re-lever the average un-levered beta (using the inverse of the same equation), based on the leverage ratio of the relevant company. One possible disadvantage of using the betas of comparable assets is that there might not be any comparable assets trading regularly in the market. The problem is especially significant with unlisted illiquid assets such as alternatives and smaller companies (Koller, Goedhart, & Wessels, 2015)

$$\beta_{unlevered} = \frac{\beta_{levered}}{\left(1 + \frac{Net\ financial\ liabilities}{equity} * (1 - tax\ rate)\right)} \tag{8}$$

### *3.2.3.2 Risk-free rate*

In most models calculating an asset's expected return, a risk-free rate is needed. Per definition, a risk-free rate is the rate of return on an investment where the return is known with certainty beforehand (Damodaran, 2012). Usually the yield to maturity ("**YTM**") of short-term US government bonds is seen as the closest proxy to the true risk-free rate. The reason being that the short-term default risk of the US government is seen as negligible. Damodaran (2012) argues that the bond chosen as a proxy for the risk-free rate in asset pricing models should have the same maturity as the asset itself. There are still some risks present if, for example, the YTM of a US 3-month T-bill is chosen as the risk-free rate when valuing an asset with a much longer maturity. Koller et al. (2017) argues for the use of the YTM of long-term government bonds as the risk-free rate proxy when valuing long-term assets. In addition, they argue that the bond chosen should be denominated in the same currency as the asset's cash flow.

### *3.2.3.3 Market risk premium*

A crucial part of the CAPM, and other asset pricing models where the expected return of the market portfolio is a factor, is the market risk premium. The market risk premium is defined as the expected return of the market portfolio minus the risk-free rate of return (Investopedia, n.d.D). There are two main approaches to estimating the market risk premium. The first approach is a backward-looking approach where one takes the historical real return of the market portfolio (in practice the chosen proxy for the market portfolio) and adds the expected inflation rate. This estimate is then used as the expected return of the market portfolio going forward (Koller, Goedhart, & Wessels, 2015). A potentially significant problem of using historical estimates is survivorship bias. Equity markets, especially in the US, performed exceptionally well during the last century. The historical estimate might therefore be significantly higher than the expected return going forward (Koller, Goedhart, & Wessels, 2015).

The second approach uses fundamental factors in the market to calculate an implicit market risk premium. The implied market risk premium is highly sensitive to the assumptions made about the relevant factors. However, using realistic factor inputs, the approach can provide a good estimate of the forward-looking market risk premium. A significant advantage, relative to the historical approach, is that it uses current market prices and expectations (Koller, Goedhart, & Wessels, 2015). The approach is based on the following value driver equation (very similar to the Gordon growth model presented in section 3.1.1) where $r_e$ is the cost of equity, $g$ is earnings growth and $ROE$ is the return on equity.

$$Equity\ value = \frac{Earnings\left(1 - \frac{g}{ROE}\right)}{r_e - g} \tag{9}$$

Rearranging the equation gives a cost of equity of:

$$r_e = \frac{Earnings\left(1 - \frac{g}{ROE}\right)}{Equity\ value} + g \tag{10}$$

The inverse of earnings divided by equity value is equal to the Price/Earnings ratio (ref. section 3.3.2.1) and equation 10 can therefore be written as:

$$r_e = \left(\frac{1}{P/E}\right)\left(1 - \frac{g}{ROE}\right) + g \tag{11}$$

Subtracting the risk-free rate from the cost of equity results in an implicit market risk premium. As mentioned, the model is very sensitive to the assumptions made about the factors. The Price/Earnings ratio of the market proxy is an observable factor, while the $g$ and $ROE$ must be estimated. Koller et al. (2017) argues for using the long-run average return of the market proxy and GDP growth-rate as estimates of $ROE$ and $g$, respectively. An alternative approach could be to use the consensus analyst estimate of future market proxy $ROE$ and $g$ as inputs.

### 3.2.4 Intertemporal capital asset pricing model

The ICAPM, developed by Robert C. Merton in 1973, is an alternative approach to estimating the expected return of assets. The models presented below are stated in terms of excess returns, as opposed to the CAPM which was stated using the absolute return of the asset. It is essentially the same, however, we choose to keep the models as they were originally presented by their inventors. ICAPM is a multifactor asset pricing model which recognizes the fact that investment opportunities change over time. One of the factors is usually the excess return of the market, same as in the traditional CAPM. The other factors are referred to as state-variables. These state-variables are variables describing the state of the economy and thus the investment opportunities. The theory states that since consumers prefer a steady consumption during their lifetime, assets which provide a high return in "bad" states of the world are more valuable. Since they are more valuable, they have a higher price and a lower expected return. The sensitivity of an asset's value to these different states of the world are modeled by the state-variables in the ICAPM and the appropriate expected excess return is determined (Merton, 1973). A general version of the ICAPM can be expressed as:

$$E(R_i) = \gamma_M \beta_{iM} + \sum (\gamma_{i,K}) \beta_{i,K}\ , \forall i, \tag{12}$$

$E(R_i)$ is the expected excess return of asset $i$, $\gamma_M$ is the risk premium associated with the excess market return, $\beta_{iM}$ is the beta of asset $i$ with regards to the market, $\gamma_{i,K}$ is the risk premium associated with factor $K$ and $\beta_{i,K}$ is the beta of asset $i$ with regards to factor $K$.

There are several versions of the ICAPM which are popular. The inventors of these models usually pick different variables they believe are relevant risk factors or proxy for relevant risk factors. One model which has received a lot of attention is the Fama-French 3-factor model. The three factors used by Fama and French are: 1) the excess return of the market portfolio, 2) the return of a portfolio consisting of a long position in small stocks and a short position in large stocks and 3) the return of a portfolio consisting of a long position in stocks with a high book-to-market equity ratio and a short position in stocks with a low book-to-market equity ratio (Fama & French, 1996). The idea is that these portfolios are proxies for the state-variables that are priced by investors. According to Fama & French (1996) the expected excess return of asset $i$ can be stated as:

$$E(R_i) = \beta_{im} E(R_m) + \beta_{i,SMB} E(SMB) + \beta_{i,HML} E(HML), \forall i \tag{13}$$

Where $\beta_{iK}$, $K \in (m, SMB, HML)$ is the factor betas, $E(R_m)$ is the expected excess return of the market portfolio, $E(SMB)$ is the expected return of the small minus big portfolio and $E(HML)$ is the expected return of the high minus low portfolio. The factor betas can be estimated similar to how the market beta is estimated in CAPM. The regression to estimate betas based on past returns thus becomes:

$$R_{i,t} = \alpha_i + \beta_{i,m} R_{m,t} + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + \varepsilon_{it}, \forall i \quad (14)$$

Where $\alpha_i$is the intercept - the part of asset $i$'s return which cannot be explained by the factors. $R_{i,t}$ is the excess return of asset $i$ in period $t$ and $R_{m,t}$, $SMB_t$ and $HML_t$ are the realized returns of the factor portfolios in period $t$. The historical approach to estimating factor betas suffer from the same caveats as explained under the CAPM section. Few observations can cause the standard deviations of the beta estimates to be too large. In addition, the factor betas can be estimated based on comparable companies, as described in the CAPM section. However, increasing the number of factors could possibly reduce the number of comparable companies. Each comparable company would in theory have to be comparable on both size and book-to-market equity ratio throughout the estimation period.

#### 3.2.5 Cost of debt

The second component of the WACC calculation is the after-tax cost of debt. There are several approaches to estimating the cost of debt. The preferred approach depends on factors such as a company's credit quality, capital structure and whether or not a company is rated by one of the major credit rating agencies. The major credit rating agencies are Standard & Poor's, Moody's and Fitch. Credit rating agencies rate companies and debt based on the perceived probability of default. The range of possible ratings is large, however, an important divide exists between debt rated as investment grade and debt rates as non-investment grade (junk). Investment grade debt is considered to have a low probability of default, while non-investment grade debt is considered to have a relatively high probability of default. The division between the two categories is important as many investors are barred from investing in debt with a rating below investment grade. (Wikipedia, n.d.U).

In theory, the pre-tax cost of debt can be calculated using CAPM or other asset pricing models. In practice, it can often be problematic to utilize these asset pricing models as frictions and inefficiencies in debt capital markets violate essential assumptions underlying these models. For example, CAPM assumes that all assets are liquid and can be traded freely - an assumption which clearly does not hold. Because of these significant violations of underlying assumptions other methods are used in practice.

To estimate a company's cost of debt, Koller et al. (2017) and Damodaran (2012) recommends using outstanding debt and its YTM. In efficient markets, the cost of debt should be equal to the expected return on debt and approximately equal to the calculated YTM as long as the probability of default is low.

A significant problem of using the above-mentioned method is that many companies do not have publicly traded bonds, or their bonds are relatively illiquid. In that case, Koller et al. (2017) recommends looking at a company's rating or constructing a synthetic rating based on credit ratios. A cost of debt can then be estimated based on the yield of a portfolio of bonds with the same (synthetic) rating. Damodaran (2012) recommends taking the relevant risk-free rate and adding the credit spread associated with a given rating.

When a company has a several tranches/layers of interest-bearing debt, it has by definition multiple costs of debt. This can significantly increase the difficulty of estimating WACC. Subordinated debt is often not traded, and the presence of special provisions significantly increase the difficulty of finding comparable bonds to estimate YTM. A solution for hybrid securities, securities containing elements of both equity and debt, is to split the securities into different parts and value each part based on comparable traded securities (Koller, Goedhart, & Wessels, 2015). A common assumption made in order to simplify the calculation, is to assume that all interest-bearing debt is equal and then estimate a credit rating, and thus a cost of debt, for the company as a whole.

After calculating a cost of debt based on the methods described above, one must adjust for the tax deductibility of interest payments. Most interest payments are deductible for a company and the after-tax cost of debt is therefore the relevant input when calculating WACC.

The inputs needed to calculate a cost of capital have now been presented. Aker BP's cost of capital will be calculated in section 5.4.

## 3.3 Relative valuation

The second, and highly utilized, approach to valuation is relative valuation. As mentioned earlier, relative valuation is based on observable market parameters which is then adjusted and applied to the company in question. The underlying idea is that companies with similar characteristics should have similar valuations (Koller, Goedhart, & Wessels, 2015). Relative valuation is usually applied by using multiples, i.e. a company's value is estimated by multiplying a parameter by a number gathered from comparable companies. This approach is often favored in "real life" as it provides a quick and easy way to value companies based on observable market prices. In order for a relative valuation to give a good value estimate, several assumptions must hold. Relative valuations implicitly assume the market as a whole is efficient, but individual assets might be mispriced. In addition, relative valuations assume comparable assets are in fact similar or equal on key characteristics (Damodaran, 2012). Theoretically, there are an infinite number of possible multiples as any variable or parameter related to a company can be utilized as a relative measure of value. However, the most common non-sector specific multiples can roughly be divided into two categories; earnings/revenue multiples and book value multiples. Earnings/revenue multiples estimate a company's value based on revenue or a measure of earnings such as earnings per share ("**EPS**"), earnings before interest, taxes, depreciation and amortization ("**EBITDA**"), earnings before interest and taxes ("**EBIT**") and NOPAT. Book value multiples value a company based on a multiple of accounting value. Accounting value is heavily influenced by accounting principles and historic cost, consequently it is often not an accurate measure of market value. Book value multiples assume there is a fixed relation between accounting- and market value, and that a company's market value can be estimated by multiplying an accounting value with a multiple derived from comparable companies (Damodaran, 2012).

In the following, the most common multiples, as well as some specific to the oil & gas industry, will be presented.

### 3.3.1 Enterprise value multiples

EV multiples estimate companies' enterprise value based on common parameters such as revenue, EBITDA, EBIT and NOPAT. The approach is often preferred in practice, relative to equity multiples, as it is independent of capital structure (Penman, 2013). Subtracting net financial liabilities from EV gives an estimate of equity value. Net financial liabilities are the net of assets and liabilities classified as financial, see section 5.1.1 for a further explanation.

#### *3.3.1.1 EV/Revenue*

EV/Revenue estimates EV as a multiple of the revenue a company generates. The ratio is often used to estimate the value of companies with negative earnings since these companies cannot be valued using multiples such as EV/EBITDA or EV/EBIT. EV/Revenue is therefore an important multiple when estimating the value of start-ups (start-ups are often unprofitable) and distressed companies. Revenue based multiples should mainly be used to compare companies in the same industry as the choice of industry tends to heavily influence revenue and revenue growth.

$$\frac{EV}{Revenue} = \frac{Market\ value\ of\ equity + Net\ financial\ liabilities}{Revenue} \tag{15}$$

#### *3.3.1.2 EV/EBITDA*

EV/EBITDA is probably the most favored and heavily used EV multiple as it can be used to compare companies with different capital structures and depreciation schedules (Damodaran, 2012). However, as with EV/Revenue, the multiple works best when comparing companies within the same industry as both growth and EBITDA-margin can be very industry dependent. EV/EBITDA can be especially important when valuing M&A targets as it estimates enterprise value based on earnings from operations before depreciation and amortization – often one of the main considerations when evaluating a possible M&A deal.

$$\frac{EV}{EBITDA} = \frac{Market\ value\ of\ equity + Net\ financial\ liabilities}{Earnings\ before\ interest, tax, depreciation\ and\ amortization} \tag{16}$$

#### *3.3.1.3 EV/EBIT*

EV/EBIT is closely related to EV/EBITDA. Some prefer EV/EBIT over EV/EBITDA because it accounts for depreciation and amortization. Both depreciation and amortization are real costs relating to the wear and tear of a company's assets. These assets will eventually have to be replaced and therefore have a significant impact on a company's operations. For example, the legendary investor Warren Buffet prefers EBIT over EBITDA as a measure of operating profit. Warren Buffet famously said; "Does management think the tooth fairy pays for CAPEX?" (ValueWalk, 2016). Legendary investors aside, there are drawbacks to both multiples and the choice between them usually depends largely on personal preference.

$$\frac{EV}{EBIT} = \frac{Market\ value\ of\ equity + Net\ financial\ liabilities}{Earnings\ before\ interest\ and\ tax} \tag{17}$$

#### *3.3.1.4 EV/NOPAT*

EV/NOPAT is almost equivalent to EV/EBIT, except for the fact that it accounts for operating tax. Operating tax can have a significant impact on value when different tax regimes apply (Koller, Goedhart, & Wessels, 2015). Countries like the United Arab Emirates, Estonia and Bahrain have 0% corporate tax rates, while countries like Norway, the US and Germany have corporate tax rates above 20% (Wikipedia, n.d.G). The different corporate tax rates obviously have an impact on the value of companies conducting business in these different countries.

$$\frac{EV}{NOPAT} = \frac{Market\ value\ of\ equity + Net\ financial\ liabilities}{Net\ operating\ profit\ after\ tax} \tag{18}$$

### 3.3.2 Equity based value multiples

Equity based multiples value a company's equity based on common parameters such as EPS, market- to book value of equity ratio and net asset value ("**NAV**"). Equity multiples are simple as they do not require the valuer to calculate net financial liabilities. However, they are sensitive to differences in capital structure, which often reduce the number of comparable companies significantly (Koller, Goedhart, & Wessels, 2015).

#### *3.3.2.1 P/E*

Price/Earnings ratio is likely the most famous and most reported of the different valuation multiples. It is highly intuitive as it compares the value of equity to the earnings available to equity investors (Damodaran, 2012). P/E is widely used as a quick check of a company's share price relative to competitors as it does not require calculation of net financial liabilities. However, for more extensive valuations of companies with different capital structures it comes up short relative to EV multiples.

$$\frac{P}{E} = \frac{Price\ per\ share}{Earnings\ per\ share} \tag{19}$$

#### *3.3.2.2 P/B*

Price/Book ratio compares the market value of equity to the book value of equity. Market value of equity is based on future earnings, while book value of equity is the difference between book value of assets and book value of liabilities (Damodaran, 2012). Book value of equity is heavily dependent on accounting policy and is usually based on historic cost. P/B's popularity comes from its intuitive definition and ease of use. All companies have assets, liabilities and equity, and P/B can therefore be used in situations where P/E is not applicable, for example, when a company has negative earnings. However, P/B is critically dependent on similar accounting practices across comparable companies. Accounting frameworks providing different options for handling accounts and transactions can make valuations based on seemingly comparable companies biased (Damodaran, 2012).

$$\frac{P}{B} = \frac{Market\ value\ of\ equity}{Book\ value\ of\ equity} \tag{20}$$

#### *3.3.2.3 P/NAV*

Price/NAV is closely related to P/B. The main difference is that P/NAV use market value of net assets as the denominator instead of book value of equity. P/NAV is most often used in asset heavy industries where the assets' market value are easily observable (Petersen, Plenborg, & Kinserdal, 2017). It compares market value of equity to net asset value, which is calculated as market value of assets minus market value of liabilities. In theory, market value of equity and net asset value should be equal, but even asset heavy companies have off-balance sheet items and assets which are difficult to value precisely. Estimating net asset value requires that each asset and liability is valued individually. P/NAV is often utilized in industries with similar characteristics as the oil & gas industry. A significant part of oil & gas companies' assets consist of un-extracted reserves for which extraction cost is known with reasonable certainty. Given market prices for oil and gas, reserve values are relatively easy to estimate. Similar valuations can be made for companies in other industries heavily dependent on commodity prices.

$$\frac{P}{NAV} = \frac{Market\ value\ of\ equity}{Net\ asset\ value} \tag{21}$$

### 3.3.3 Oil & Gas industry specific multiples

In addition to the common multiples described above, several industry specific valuation multiples can be utilized to estimate the value of companies in a specific industry. According to Damodaran (2012), the numerator in industry specific multiples is usually EV and the denominator is usually units sold or owned of a revenue generating asset, such as a commodity or a subscriber. However, the denominator can in theory be anything related to an industry. In the following, a few multiples related to the oil & gas industry will be presented.

#### *3.3.3.1 EV/BOEPD*

EV/BOEPD relates EV to barrels of oil equivalents produced per day. It can be used to value oil and gas producers based on comparable companies. A significant weakness is that it does not account for available reserves. EV/BOEPD implicitly assume that all producers possess the same amount of un-extracted reserves. One could limit the comparison to producers with similar un-extracted reserves, but this will most likely severely limit the number of comparable companies (Valuation Academy, n.d.).

$$\frac{EV}{BOEPD} = \frac{Enterprise\ value}{Barrels\ of\ oil\ equivalents\ per\ day} \tag{22}$$

#### *3.3.3.2 EV/2P*

EV/2P relates EV to proven and probable reserves. It can be especially useful when valuing companies with little or no current production. Proven reserves are reserves with an estimated 90% chance of extraction, while probable reserves have an estimated 50% chance of extraction. EV/2P is a forward-looking measure as reserves will generate value in the future. A weakness of EV/2P is that different areas and companies have different extraction costs. When utilizing EV/2P one must therefore be careful regarding the choice of comparable companies and the number of comparable companies may be limited (Investopedia, n.d.E).

$$\frac{EV}{2P} = \frac{Enterprise\ value}{90\% * Proven\ reserves + 50\% * Probable\ reserves} \tag{23}$$

#### 3.3.3.3 *EV/EBITDAX*

EV/EBITDAX relates EV to earnings before interest, tax, depreciation, amortization and exploration expenses. Exploration expenses can vary significantly year to year and between companies. EV/EBITDAX is therefore used to value companies based on the more stable part of operations (Investopedia, n.d.E). EBITDAX also adjusts for the fact that exploration expenses can often be treated differently within and between accounting frameworks. Different accounting principles regarding capitalization of unsuccessful exploration can bias the earnings of different producers (Investopedia, n.d.F).

$$\frac{EV}{EBITDAX} = \frac{Enterprise\ value}{EBITDA\ and\ exploration\ expenses} \tag{24}$$

### 3.3.4 Best practice relative valuation

While relative valuations are highly utilized in practice, they are also extremely easy to manipulate and misuse. As previously mentioned, relative valuations are usually based on a multitude of implicit assumptions and considerations. If these assumptions and considerations are violated, relative valuations can easily lead to biased and incorrect conclusions. In the following, a few best practice principles regarding relative valuation will be presented.

#### 3.3.4.1 *Consistent definition of multiples*

Most multiples can be defined in several different ways. It is important to make sure all variables and parameters are defined equally for all companies in a sample. For example, EBITDA in the EV/EBITDA multiple can be the estimated forward EBITDA, the EBITDA from the latest annual report or the trailing 12-month EBITDA. The chosen version of an earnings measure can have a significant impact on a valuation. Koller et al. (2017) recommends always using forward looking measures as the spread between companies tend to be smaller. In addition, forward looking measures usually does not include one-time charges and unforeseen expenses, making the valuation less biased.

#### 3.3.4.2 *Choose the right multiple*

Valuing different companies requires different multiples. One must evaluate which multiples are most suited for the valuation at hand. For example, when valuing companies in newly established industries, earnings multiples might not be the most suitable as many companies in these industries does not have positive earnings. The choice of multiple can severely affect the valuation and must not be taken lightly (Koller, Goedhart, & Wessels, 2015).

#### *3.3.4.3 Choosing comparable companies*

A relative valuation is critically dependent on the choice of comparable companies. In theory, a comparable company is a company with similar cash flows, growth and risk characteristics, meaning it does not have to be a company from the same industry (Damodaran, 2012). However, in practice, companies from the same industry are usually chosen as they are assumed to be comparable on these measures. Koller et al. (2017) stress the importance of choosing the right peer group. They recommend finding 8-15 comparable companies and basing the valuation on the average multiple of these peers. A significant problem arises in industries where there are very few comparable companies. A solution may be to dissect the drivers of each multiple and explicitly adjust for them or choose companies outside the industry which are comparable on these drivers (Damodaran, 2012). Another issue often arises regarding the calculation of an average multiple; the presence of outliers may significantly skew or bias the estimate. Possible solutions are to take the median or remove the top and bottom 25% of peers.

## 3.4 Conclusion

The relevant theories, methods and models have now been presented. In chapters 5 and 6, some of these theories, methods and models will be utilized to determine Aker BP's EV and market value of equity. Aker BP's cost of equity will be estimated using CAPM as well as the Fama-French 3-factor model based on Aker BP's returns and the returns of comparable companies. The market risk premium will not be estimated in this thesis, estimates from other market sources will be utilized instead. Cost of debt will be estimated using Aker BP's credit rating and the relevant credit spread. The fundamental valuation will be based on the FCFF and FCFE methods described above, as these are regarded as superior to the DDM. An estimate of Aker BP's EV and market value of equity determined using multiples, will be based on all multiples present above, except for EV/EBITDAX and P/NAV. Thoughts regarding, and adjustments made to, the theories, methods and models will be presented when relevant.

# 4 Strategic analysis

The following strategic analysis will be used as the foundation for forecasting future oil and gas prices, market outlook and Aker BP's performance. Analysis and forecasting of oil and gas prices are performed separate to the macro-environmental analysis due to their large impact on Aker BP and their relation to multiple macro-environmental factors.

## 4.1 External analysis frameworks

The strategic analysis starts by analyzing external factors affecting Aker BP. External factors are usually divided into macro-environmental factors and industry-specific factors. Macro-environmental factors will be analyzed using the PEST framework, while industry-specific factors will be analyzed using Porter's five forces framework. Following a thorough analysis of external factors, Aker BP's key resources' (internal factors) ability to create competitive advantage will be analyzed using the VRIO framework.

### 4.1.1 Presentation of PEST

The PEST framework is a highly utilized framework when analyzing the macro-environmental factors that impact a company or industry (Wikipedia, n.d.V). PEST consists of four factors, providing an easy and intuitive way of organizing the macro-environmental forces and information that should be considered when analyzing an industry. The factors are: political-, economic-, social and environmental- and technological factors.

**Political factors** consider the potential impact political pressure and governmental intervention can have on the industry, and thereby the company's profitability. Political factors are often considered to be among the most important macro-environmental factors as political cooperation and legitimacy can potentially make or break an industry. Examples of political factors include political stability or instability in domestic and overseas markets, new foreign trade policies, labor laws, tax policy and environmental laws (Wikipedia, n.d.V).

**Economic factors** are macro-economic factors that directly impact how businesses and industries operate and how profitable they are. Examples of macro-economic factors are interest rates, economic growth, inflation and exchange rates. Several economic factors can to some extent be hedged short-term, but for example an economic downturn can be hard to predict, and hedge against, and can therefore hurt the profitability of otherwise healthy companies. It is vitally important that companies and industries recognize the importance of macro-economic factors and evaluate how they can optimally position themselves to reduce the potential negative impacts of changes in these factors (Professional Academy, n.d.).

**Social and environmental factors** involve factors such as people's attitudes and beliefs, demographic trends, environmental impact, pollution targets and resource scarcity. These factors are important as they directly affect a company's customers and ability to operate. For large global markets like oil and gas; customer sentiment, demographic trends and a wide range of environmental factors have a huge impact on supply and demand. A thorough insight into factors affecting supply and demand is vital to forecast future performance.

**Technological factors** can have large effects on a company's or industry's operations. Advances in technology can change the structure and competitiveness of an industry in a very short time span. A thorough understanding of technological developments is key for determining what companies and industries will thrive in the future.

### 4.1.2 Presentation of Porters Five Forces

Porters Five Forces is used to analyze the competitiveness and potential profitability of an industry, and companies within an industry (Wikipedia, n.d.H). The framework presents five forces that are vital in determining the attractiveness of an industry to companies currently operating in the industry and potential new entrants. The five forces are: threat of new entrants, threat of substitutes, customer bargaining power, supplier bargaining power and competitive rivalry (Porter, 1979).

Industries with high levels of profitability tend to attract new companies. This likely increases competition, which leads to decreased profit margins (Wikipedia, n.d.H). Industries with high profit margins and low barriers to entry thus have a **threat of new entrants.** This is the first force in Porter's framework. If companies currently operating in an industry are not able to make it difficult for new competitors to enter, profit margins are likely to be reduced as competition increase. There are multiple factors that can affect or create barriers to entry, thus increasing attractiveness for incumbents. Factors such as the existence of patents, economies of scale, product differentiation and customer loyalty are important in helping incumbents maintain a competitive advantage. The most attractive industries are those where entry barriers are high and exit barriers are low (Wikipedia, n.d.C).

The next force in Porter's framework is the **threat of substitutes.** Substitute products are products that use different solutions and/or technology to solve the same basic need. The difference between direct competitor and substitute can be somewhat unclear, but some examples of substitute products are trains instead of planes and cars, and wind- and solar power instead of coal and gas (Wikipedia, n.d.H). A possible definition of direct competitors are products that use the same technology but varies on some input, thus making the products marginally different. Substitutes can then be defined as products that are mostly interchangeable but are fundamentally different due to using different technology and/or production methods. The presence of substitutes tends to decrease profitability by putting a cap on prices. If prices get to high, customers choose to use the substitute instead. Two factors that decrease the threat of substitutes are; large levels of differentiation and high switching costs. Products that are highly differentiated have few substitutes because very few products can solve the same need. High switching costs make it more difficult for customers to switch between products and therefore reduce the threat of substitutes (Wikipedia, n.d.H).

The third force in Porter's framework is **customer bargaining power**. Customer bargaining power tends to be high if customers have many alternative suppliers and switching costs are low. Customers can then pressure a company into charging lower prices by threatening to purchase from a competitor instead. The force is thus somewhat connected to the threat of substitutes. Highly price sensitive customers also increase customer bargaining power as companies know that increasing prices will have a massive effect on sales. As with threat of substitutes, high levels of differentiation and switching costs are ways to potentially reduce customer bargaining power (Wikipedia, n.d.H).

The fourth force in Porter's framework relates to industry inputs and is therefore called **supplier bargaining power**. Supplier bargaining power tends to increase when there are few alternative sources of necessary inputs such as raw materials, labor, components and technical expertise. Pressure from suppliers can have a large effect on the competitive environment and profitability of an industry if increased costs cannot be transferred to customers in the form of higher prices (Wilkinson, 2013). Strong suppliers might pressure buyers by increasing prices, reducing availability or lowering quality. Supplier bargaining power can be reduced by measures such as downward integration and industry consolidation. Industry consolidation make a supplier more dependent on a few customers, thereby reducing the threat of selling to someone else.

The last force in Porter's framework is **competitive rivalry.** In order to succeed in an industry, it is crucial to have a good understanding of the competitive environment as it is often regarded as the main determinant of profitability. High levels of competition tend to reduce profit margins and overall profitability for all companies in an industry (Wikipedia, n.d.H). Competition tends to be high when product differentiation is low, and competitors are roughly the same size. This often leads to damaging price wars where prices are temporarily pushed below break-even to drive competitors out of the industry. In industries where the potential for competitive rivalry is high, it is vitally important to develop resources able to provide long-term competitive advantage (Wilkinson, 2013).

The frameworks that will be used to analyze Aker BP's external environment have now been presented. Focus will therefore shift to the framework that will be utilized when analyzing Aker BP's internal resources.

## 4.2 Internal resource analysis framework

Following an analysis of external factors and forecasting of oil and gas prices, a strategic analysis of internal resources will be conducted in order to determine Aker BP's current and/or potential competitive advantage. The VRIO framework will be utilized as it provides easy and intuitive criteria for evaluating whether a company's resources have the potential to provide competitive advantage.

### 4.2.1 VRIO

The VRIO framework was developed by J.B. Barney in his paper "Looking Inside for Competitive Advantage". In his paper, Barney present the idea that a resource has the potential to provide long-term competitive advantage if it is **V**aluable, **R**are, **I**mitable and if the **O**rganization is properly arranged to take full advantage of a resource (Strategic Management Insight, n.d.).

In the simplest sense, a resource is **valuable** if it increases revenue and/or decrease cost. Additionally, the cost of obtaining and/or using the resource must be lower than the benefits gained. Resources that increase revenue and/or decrease cost are considered to be value adding, whereas resources that cannot meet these criteria might lead to competitive disadvantages (Barney, 1995). Common value adding activities include; exploitation of opportunities, diversification, creation of defensive barriers and reduction of production cost. Over time, valuable resources might become less valuable and other previously non-valuable resources might become increasingly important (Strategic Management Insight, n.d.). It is thus important to be familiar with current market trends and developments in order to predict which resources will be valuable in the future (this ability can in itself be considered a valuable resource).

A resource is **rare** if only one or a few companies have it. If a resource is both rare and valuable, the resource is said to add a temporary competitive advantage. The ability of a temporary competitive advantage to become permanent depends on the last two criteria in the VRIO framework. A temporary competitive advantage can quickly become a competitive parity if a resource is acquirable by multiple companies (Strategic Management Insight, n.d.). If several companies acquire the same resource, neither of them will obtain a competitive advantage on the basis of that common resource. Even though such resources will not provide competitive advantages, they can still be preferable to acquire as they might be crucial for staying in the market.

A resource can provide sustained competitive advantage if it is **costly**, or ideally, **impossible for competitors to acquire or substitute**. There are mainly three reasons why a resource might be hard or impossible to imitate. Firstly, resources that were developed over many years or from direct historical events can be impossible to duplicate, or at least too costly to be desirable (Strategic Management Insight, n.d.). Secondly, some companies might have a competitive advantage due to resources with casual ambiguity, meaning the source of the competitive advantage is unclear. The last reason is based on social complexity. It can be hard or impossible for competitors to directly duplicate interpersonal relationships and internal culture (Strategic Management Insight, n.d.). If a company possess or is able to acquire valuable and rare resources that are also hard to imitate, they can potentially possess a sustainable competitive advantage.

The last criteria of the VRIO framework is whether a company is **organized** to utilize and capture the value from a resource. It does not matter that a resource is valuable, rare and hard to imitate if the company possessing it is not able to capture its benefits. Production methods, processes, internal policies and management must all be optimally organized to best realize the full potential of a resource. If all four VRIO criteria are met, a company will potentially possess a sustainable competitive advantage (Strategic Management Insight, n.d.).

This concludes the presentation of frameworks that will be utilized when performing a strategic analysis of Aker BP. These frameworks will be vital when organizing relevant information and forecasting future profitability.

## 4.3 Strategic analysis AKER BP

A strategic analysis of Aker BP, based on the presented frameworks, will now be performed. The strategic analysis of macro-, industry- and internal factors will serve as the basis for projecting future oil and gas prices, and Aker BP's performance. The analysis will start with macro-environmental factors followed by oil and gas prices, before moving on to the Norwegian petroleum industry and internal resources.

### 4.3.1 Macro-environmental analysis – PEST

The PEST framework will mainly be used as a tool for organizing relevant information. Especially environmental and political factors have a high degree of overlap. Most environmental factors and the political concerns regarding these factors will be presented together under Social and Environmental factors.

#### *4.3.1.1 Political*

Political factors, both international and domestic, have a huge impact on the oil & gas industry's ability to operate, as it is highly regulated and subject to extensive political oversight. Most countries in the world operate with a concession system, such as the Norwegian model briefly described in section 2.4.2. Petroleum companies operate in different political regimes and ideologies all over the world. Some prefer to only operate in areas with stable long-term political systems, while others simply go where oil and gas is located. Aker BP currently only operate on the NCS. As a result, the main political forces affecting Aker BP's ability to operate comes from the Norwegian government and political forces influencing the Norwegian government.

Norway is seen as a stable country with a business-friendly political system. This was one of the reasons why unexplored areas on the NCS were among the most sought-after areas in the world by large petroleum companies in the 1960s and 70s. (SNL, n.d.A). However, the different political parties in Norway have different views regarding future exploration, concessions, environmental restrictions, taxes and M&A. The political scene in Norway can roughly be divided into three different factions; the "**left**", "**center**" and "**right**" (see the glossary for an overview of which parties belong to each faction). A coalition of the right and two parties from the center currently make up the Norwegian government. The right is generally friendly towards the oil & gas industry, aiming to create significant value for the Norwegian people through exploration and extraction of oil and gas. The center faction is generally more negative towards the oil & gas industry. Most parties within the center faction wish to severely restrict exploration of new areas in the northern part of the NCS. One center party also wants to phase out the entire oil & gas industry within 15 years (MDG, n.d.). The left is perceived as less business friendly and generally seek to reduce Norway's dependence on the oil & gas industry (Putsj, n.d.).

Different areas of the NCS are divided into different classifications, and the concession system works differently for each class. The classifications are: mature areas, frontier areas and closed areas. A map showing the different areas can be seen in Figure 6 - NCS overview Figure 6 (Norwegian Petroleum, n.d.N).

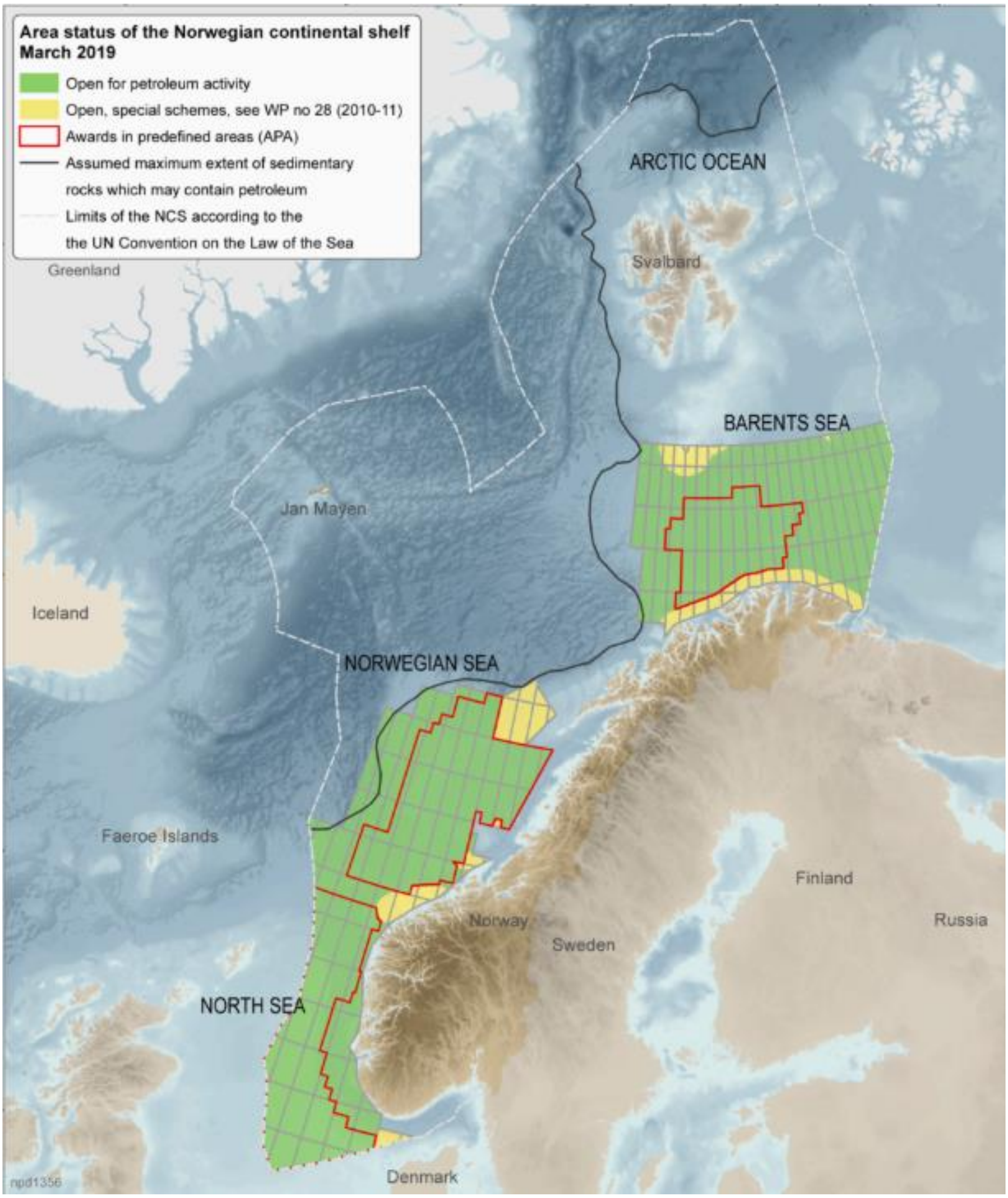


*Figure 6 - NCS overview (Norwegian Petroleum, n.d.N)*

Exploration of the NCS is based on a step-by-step process where new areas are opened for exploration after old areas have been carefully examined. In mature areas, focus is on exploiting the areas as much as possible while the appropriate infrastructure is still in place, i.e. the Norwegian government wants to extract as much oil and gas from these areas as possible. For these areas, new concessions are granted once a year in so called "awards in predefined areas" ("**APA**") rounds. APA concessions allow companies to start exploration in areas which are relatively well documented and safe. The APA process is open to petroleum companies who are pre-qualified, and concessions are granted based on a fair and transparent process (Norwegian Petroleum, n.d.J). The short-term political risk associated with these concessions can be deemed as minimal. Most parties in the Norwegian political system, except parties with an especially strong environmental focus, agree that mature areas should be exploited in full. However, the long-term risk is regarded as significant. In Norway, all major political parties have designated youth sub-parties and these youth-parties sometimes deviate from their parent-parties on major political issues, like petroleum policy. All but one of the major youth parties wish to phase out the petroleum industry and increase Norway's relative dependence on other industries. As members of these youth-parties grow older and start to occupy important positions within the Norwegian government/parliament, the oil & gas industry might face significant long-term headwinds.

Concessions in frontier areas are far more complicated and rarer than APA concessions. Frontier areas are areas on the NCS that have not been well documented, have a challenging geological profile and where necessary infrastructure is not currently in place. Concessions are granted in numbered rounds, usually every two years. The criteria regulating who can apply for these concessions is significantly stricter than APA criteria. Companies applying for concessions must be pre-qualified, have significant technical and geological experience from similar challenging areas and have the financial capabilities and resources to fully explore such areas (Norwegian Petroleum, n.d.J). The last frontier area concession round, round 24, started in August 2016. A total of 47 blocks (blocks are subsections of a field or area) were granted in June 2018 to a total of 11 petroleum companies, one of which was Aker BP. The awarded blocks from the 24th round are located in the Norwegian- and Barents Sea (Norwegian Government, 2018). There is considerable short-term political risk related to these numbered frontier area concession rounds. The 25th round was scheduled to start in 2018, with concession awards scheduled for end of 2019. However, the motion to start the 25th round was not approved in the Norwegian parliament. It was determined that the round will be delayed until a new long-term plan has been made for the sensitive areas on the NCS. Awards of concessions related to the 25th round will most likely not be granted until 2021 at the earliest (E24, 2018). Political risk regarding new concessions in frontier areas is regarded as significant both short- and long-term. The right is positive to exploration of new areas, however, they do not have a majority in the Norwegian parliament. Collaboration with center parties on petroleum policy in frontier areas have proven to be difficult. As with APA concessions, these headwinds will most likely grow stronger as time passes and a younger generation of politicians enter the scene.

The public debate regarding the unopened areas outside Lofoten, Vesterålen and Senja has been ongoing for years. The Norwegian Petroleum Directorate ("**NPD**") estimates that between five and ten percent of Norway's undiscovered oil and gas resources are located in these areas (Norwegian Petroleum Directorate, 2010). For a new area to be opened, a motion based on an environmental impact assessment and a thorough assessment of estimated resources must pass through the Norwegian Parliament. These assessments cannot be conducted without an initial clearance from the Norwegian Parliament. In 2018, the right failed to convince the two center parties participating in the Norwegian government to vote in favor of an initial environmental impact assessment of the areas surrounding Lofoten, Vesterålen and Senja (E24, 2018). Given the current political landscape it seems unlikely that the areas will be opened in the foreseeable future. However, the next parliament election in Norway will be held in 2021. A majority parliament consisting of only the right could potentially pass the required motion. The public debate mainly centers around potential impacts on the environment and fishery - one of Norway's other main industries. The left and center factions argue that the oil & gas industry will not be the leading industry in Norway in the future and that potentially harming the environment and fishing industry can have dire consequences for future generations. Decisions regarding opening of the areas outside Lofoten, Vesterålen and Senja provide significant political risk to the upside for Norwegian petroleum companies. At the moment, an opening of these areas is seen as so unlikely that not much time and effort is spent on projects related to these areas. However, if the areas are opened it could provide valuable new opportunities for several operators.

**Taxes**

Oil and gas producing countries choose different methods to capture value from its natural resources. Norway has chosen to charge a special tax on all profits made on the NCS. This special tax is known as the "**Petroleum tax**" and has been subject to political debate since oil and gas was first found on the NCS. Currently, the Petroleum tax rate is equal to 56% of net profit before tax deducted by an uplift to allow for a fair rate of return on investments. Adding the regular corporate tax rate of 22% results in a marginal tax rate of 78%. Net profit after tax from operations on the NCS is calculated as follows (Norwegian Petroleum, n.d.I):

| Petroleum companies taxation system: |
| --- |
| Operating income |
| - Operating expenses |
| - Linear depreciation of investments (6 year dep period) |
| - Exploration expenses, R&D and decommissioning |
| - Environmental taxes and area fees |
| - Net financial costs |
| **= Corporation tax base (22%)** |
| - Normal return special tax shield (5.4% over 4 years) |
| **= Special tax base (56%)** |
| - Tax |
| **= Net profit after tax** |

*Table 2 - Petroleum taxation system (Norwegian Petroleum, n.d.I)*

In recent years, the political discussion has mainly revolved around tax deductibility of exploration expenses. When both capitalized and non-capitalized exploration expenses are tax deductible at a rate of 78%, the Norwegian government in effect pays for most of the exploration on the NCS. Additionally, as a special incentive to invest, companies with negative net profit before tax can choose to receive tax losses carried forward as a payment instead of deducting it against future profits. The reason being that oil and gas fields are often not profitable for a period of 10 to 15 years and paying out tax losses carried forward significantly improves the liquidity of companies (Norwegian Petroleum, n.d.I). Some parties on the left and center argue that exploration costs should not be tax deductible at a rate of 78% and that the option to receive tax losses carried forward as a direct payment should be removed. They argue that the high deductibility incentivizes petroleum companies to undertake socially unprofitable investments because they do not bear a large portion of the associated costs (Aftenposten, 2017). Politicians in favor of the arrangement argue that a removal of the tax deductibility will significantly reduce investments on the NCS, and thereby hurt future tax income. Removal of the arrangement also creates an unbalanced tax system, breaking with a common principal that costs should be tax deductible to the same extent that profits are taxable. Historically, the right and the biggest party on the left, Arbeiderpartiet, have been in favor of the tax deductibility arrangement. In the last three Norwegian parliament elections, the right and Arbeiderpartiet received between 65% and 75% of the votes, and the deductibility arrangement has therefore not been in danger (SNL, n.d.B). However, in 2019, central figures within Arbeiderpartiet have criticized the deductibility arrangement and called for a vote regarding the party's official stance (Folkebladet, 2019). There is severe political downside risk both short- and long-term related to the deductibility arrangement. A change of Arbeiderpartiet's stance would create a parliament majority for removing the deductibility arrangement, potentially hurting profitability for petroleum companies operating on the NCS.

**Industry Consolidation**

Mergers and acquisitions have been an important source of growth in the oil & gas industry. Purchasing smaller companies is an easy way of obtaining concessions on promising fields and/or income from producing fields. For example, DNO ASA recently purchased Faroe Petroleum in a highly publicized hostile takeover worth more than GBP 500 million (BBC, 2019). The acquisition gives DNO ASA a significantly increased presence on the NCS.

A big consideration when consolidating businesses is regulatory approval. In Norway, mergers and acquisitions require approval from Norwegian Competition Authority. Historically, Norwegian Competition Authority and the Norwegian government have allowed consolidation of the Norwegian oil & gas industry without considerable regulatory scrutiny. Norwegian Competition Authority has stated that since the market for oil and gas is extremely large and international, consolidation in the Norwegian petroleum industry will most likely have no effect on the end consumer. Measures making Norwegian petroleum companies more competitive is positive as it will benefit the Norwegian economy overall (Norwegian Competition Authority, 2016). Most mergers and acquisitions are between a large and a small company. The process and approval could be different if large players like Equinor and Aker BP contemplated a merger, although some large mergers have been approved in the past. The short-term political risk related to Aker BP's ability to grow through mergers and acquisitions is seen as minimal. However, long-term risk is seen as more substantial. As previously mentioned, several parties' youth-parties wish to phase out the petroleum industry within 15 years. Blocking petroleum companies' ability to grow might be a tool to achieve the phase out of the oil & gas industry.

**Summary**

To summarize, Aker BP is exposed to a wide range of different political risks both short- and long term. The analysis was mostly focused on Norwegian politics as Aker BP currently operate exclusively on the NCS. International politics will be discussed to some extent under other factors and in the analysis of oil and gas markets. Many of the risks discussed are long-term. Such risks will not have a significant impact in a five- to ten-year forecasting period but can significantly impact long-term growth rates and projections for Aker BP and the Norwegian petroleum industry as a whole. These risks will become especially relevant in a sensitivity analysis where changes in long-term growth projections can have a significant impact.

#### *4.3.1.2 Economic factors*

The analysis of economic factors will focus mainly on foreign exchange rates and interest rate levels. As mentioned in the strategic analysis introduction, an in-depth analysis of oil and gas markets will be conducted separately.

Most petroleum companies are significantly exposed to foreign exchange risk. The international market for oil is denominated in USD, and as a result most petroleum companies receive a large part of their income in USD. Gas prices are denominated in different currencies depending on where the gas is sold (Timera Energy, 2011). A large part of the world's oil and gas production is conducted in areas where the local currency is not USD. Therefore, petroleum companies often have significant costs in other currencies. A significant part of short-term foreign exchange risk can be hedged using swaps, options and other derivatives, however, foreign exchange derivative prices do change when foreign exchange rates change, and full immunization is therefore impossible (Investopedia, n.d.H).

In 2018, USD strengthened significantly compared to other major currencies like the EUR, GBP and CNY. As mentioned, petroleum companies receive most of their income in USD and therefore benefits when the USD is strong compared to other currencies. The causes of the strengthening are many, but among the main ones were; the growth of the US economy compared to the rest of the world, rising USD interest rates and the USD's position as a "safe heaven" currency (QUARTZ, 2018C). US real GDP grew 2.9% in 2018, up from 2.2% in 2017 (U.S Bureau of Economic Analysis, 2019). Euro area real GDP grew by 1.9% in 2018, down from 2.5% in 2017 (Trading Economics, 2019A) (Reuters, 2018A). Chinese real GDP grew 6.6% in 2018, the lowest growth rate in 28 years and down from 6.8% in 2017 (Trading Economics, 2019B). The growth of the US economy increased, while the growth of other major economies decreased, most likely increasing the demand for USD and therefore contributing to USD appreciation. In 2018, the US federal reserve ("**FED**") raised interest rates by 0.25% four times (Trading Economics, n.d.E). When interest rates increase, a currency becomes more attractive as an investor earns higher returns by holding that currency. A more attractive currency leads to higher demand, resulting in a strengthening (Investopedia, 2018). Both the European Central Bank ("**ECB**") and the Chinese Central Bank has kept interest rates unchanged since 2016, thereby strengthening the relative position of USD (European Central Bank, n.d.) (Trading Economics, n.d.C). High levels of volatility, in part caused by political uncertainty, strongly affected markets in 2018. United Kingdom's BREXIT negotiations with the EU cause massive uncertainty regarding trade and future growth rates in Europe. Slower growth in China coupled with, and partly caused by, a trade war with the US, created uncertainty regarding future prospects in Asia. USD has historically proven to be a safe haven currency in times of uncertainty[3]. The uncertainty in 2018 most likely caused a flight to safety among investors, causing USD to appreciate.

Foreign exchange risk is deemed as significant in the long-term. The recent increase in the US GDP growth rate was partly caused by increased fiscal spending and a cut in corporate tax rates (QUARTZ, 2018A). These measures likely gave short-term boosts as opportunities for further increases in spending and decreases in tax rates are limited given the US' high fiscal deficit (US Government Spending, n.d.). It is therefore unlikely that the US will continue to increase its GDP growth rate in the short-term. There is still high uncertainty regarding growth in the Euro area going forward. The development is highly contingent on the outcome of BREXIT. A soft BREXIT with a good deal for both sides can spur investment and consumption, while a hard BREXIT can have the opposite effect. However, the ECB claims that underlying economic factors are still solid, providing some protection to the downside (European Central Bank, 2018). It is likely that the slowdown in the Chinese economy will continue as China's economy moves from developing to mature. However, the magnitude of their slowdown is dependent upon several factors. Two main factors are: the Chinese government's ability to stimulate growth and the trade war with the US. The Chinese government has historically had a tight grip on the economy and is likely prepared to increase spending if necessary to boost growth (Bloomberg, 2019A). The trade war with the US could potentially have a large impact if not resolved, however, a solution is deemed as probable in the near-term given current outlook. All in all, risk related to growth rates, for USD, is regarded as significant. In what direction growth rates will affect USD, depends on how US growth develops compared to other countries.

The FED has communicated that interest rate hikes will stop for the time being and it is uncertain whether USD interest rates will rise further during the current economic cycle. In addition, the quantitative tightening program initiated in October 2017 will most likely end in 2019 (New York Times, 2019). The ECB ended its quantitative easing program in December 2018 and economists believe rate hikes are possible at the end of 2019 (Reuters, 2019A). However, future hikes by the ECB is deemed as highly uncertain given the fragile economic situation in the Euro area. Future rate hikes by the ECB, without matching rate hikes from the FED, can put downward pressure on the USD. As growth in China is slowing, People's Bank of China may choose to cut interest rates. However, China has often been criticized for manipulating its currency and may be cautious about cutting rates (Reuters, 2019B). USD risk related to interest rates is deemed as mostly to the downside. Mounting political pressure and no real

[3] As a result of the financial crisis in 2008 USD appreciated significantly. US treasuries was seen as one of the only safe investments given its full backing by the US government.

signs of an overheating economy might keep the FED from hiking interest rates further. In addition, the ECB might be forced to hike in order to have reliable measures to initiate next time the euro area falls into a recession. However, there is a fine balance as premature rate hikes by the ECB might in itself cause a recession.

Going forward, the political turmoil in Europe and the US/China trade war are likely to de-escalate to a degree. Increased stability may cause some investors taking harbor in USD to reduce their USD exposure. This might cause selling pressure and depreciation of USD.

As Aker BP currently operate exclusively on the NCS, they are exposed to the USD/NOK exchange rate. The Norwegian economy is among the best performing economies in Europe and a strengthening of NOK relative to most other currencies is highly probable. In March 2019, the Norwegian central bank raised interest rates by 0.25% for the second time in six months (Norwegian Central Bank, n.d.). Further rate hikes are expected as growth and inflation continue to be strong. A depreciation of USD relative to NOK is therefore expected. Most of Aker BP's short-term NOK exposure is likely hedged, as wage costs, Aker BP's largest NOK cost, is relatively easy to predict. A strong NOK can however increase costs relative to income long-term as hedging is more difficult far into the future. Aker BP's USD/NOK risk exposure is therefore mostly neutral short-term and to the downside long-term.

A general depreciation of USD will likely have a mixed impact on petroleum companies. As explained, a weaker USD likely reduces income relative to costs. However, as will be explained later, oil prices are highly contingent on demand growth in emerging markets, which in turn is highly dependent on USD strength. A weak USD makes oil relatively cheap, thereby increasing demand. Increasing demand drives up the price of oil and in turn oil producers' income. The effect that has the largest impact on oil producers' income is likely dependent on each producer's ability to manage foreign exchange risk exposure.

**Interest rate risk**

In addition to its effect on foreign exchange risk, interest rates affect investment, growth and costs, among others. Low interest rates make debt financing and consumption relatively cheap and is therefore regarded as having a positive effect on investment and growth. Most of Aker BP's debt is USD denominated with USD LIBOR as the reference rate. USD LIBOR is highly affected by the FED as USD LIBOR represents the rate at which major banks can borrow (lend) USD from (to) each other. Some of Aker BP's interest rate risk is hedged using LIBOR swaps, but especially costs related to an outstanding revolving loan facility are hard to hedge given the nature of such loans. As mentioned, interest rates affect investment. High investments by petroleum producers will increase future supply, which negatively affect petroleum prices and therefore income. Separate from the exchange rate effect, interest rate changes thus have a mixed effect on petroleum producers. How each producer is affected depends largely on capital structure and their ability to hedge different risks.

As explained above, the FED is likely to keep interest rates constant, at least for the time being. Interest rate risk, except for the foreign exchange effect, is therefore regarded as somewhat muted in the short-term. It does however present a significant risk long-term given its significant impact on growth and costs.

**Summary**

To summarize, Aker BP is exposed to several economic risks both short- and long term. The analysis mostly focused on foreign exchange- and interest rates as these have a significant impact on several factors affecting Aker BP and the petroleum industry. Both foreign exchange- and interest rate developments will be considered when analyzing oil and gas prices, and when forecasting Aker BP's future performance. They will also be relevant in a sensitivity analysis as both factors can significantly impact long-term growth.

#### *4.3.1.3 Social and environmental factors*

There are an unlimited number of social and environmental factors having a potential impact on the oil & gas industry. Among the main ones are factors like population growth, generational differences, industrialization of developing countries, pollution regulations, resource scarcity and health & safety regulations. The analysis will start by analyzing social factors before transitioning to environmental factors.

**Social factors**

As of March 2019, the world population is 7.7 billion (Worldometers, n.d.). The world population has increased by 1.5 billion people since 2000 and the United Nations expect world population to further increase with over 2 billion people by 2050 (United Nations, 2017). Large increases in world population naturally leads to increases in energy consumption. Increased energy consumption leads to tailwinds for petroleum companies as the world has not yet found a viable replacement for non-renewable fossil fuels, and likely will not in the foreseeable future.

All over the world, the industrialization of developing countries has been happening at a rapid pace for the last two decades. At the forefront of this development stands the two largest countries in the world in terms of population, China and India. China's GDP has grown tenfold since the year 2000 (Trading Economics, n.d.B). China's GDP growth rate is as mentioned earlier expected to decline going forward, however, with expected growth rates remaining above 5%, China's economy is set to become the world's largest within ten years (Bloomberg, 2019B). Since the year 2000, China's oil consumption has more than doubled. China is currently the second largest consumer of oil and is expected to be among the key drivers of increased oil demand going forward (Wikipedia, n.d.K). A factor potentially having a negative impact on China's oil consumption growth is China's increasing focus on solar energy. As a large net importer of oil, China has invested large amounts into solar energy to reduce its growing dependence on oil. China is currently the world's largest producer of solar energy (Wikipedia, n.d.I). Further increases in the viability and efficiency of solar energy might reduce the expected long-term growth in China's oil consumption. A forecast of the growth in China's oil consumption will be made in the analysis of oil and gas prices.

India has increased its GDP fivefold since 2000 and GDP is expected to grow at a rate of above 7% going forward (Trading Economics, n.d.D) (Press Information Bureau Government of India, 2018). The population of India grows at an annual rate of approximately 1.2%. India is set to become the most populated country in the world within the next ten years (Wikipedia, n.d.J). The rapid increase in population, the increasing size of the middle class and continuing industrialization will severely increase India's energy consumption going forward. India is currently the third largest consumer of oil in the world and will soon be the world's biggest single driver of increased oil demand, overtaking China (Wikipedia, n.d.K) (CNBC, 2018A). It is estimated that India will be responsible for approximately 33% of global increase in oil demand. A forecast of the growth in India's oil consumption will be made in the analysis of oil and gas prices.

With similar changes as those described for China and India taking place in other developing countries, social factors in these countries are deemed to mostly provide tailwinds for the oil & gas industry, at least in the short- to medium-term. The massive industrial development and increasing size and purchasing power of the respective countries' middle class, will create a demand for energy that cannot be fulfilled by renewable sources alone.

Unfortunately for the oil & gas industry, the wind is not blowing in the same direction in more developed countries. Population growth in many European countries is close to 0% (Wikipedia, n.d.L). The middle class in many developed countries is shrinking and younger generations have different lifestyles and consumer habits than their parents. The generation known as millennials tend to live in cities and own fewer cars than previous generations (QUARTZ, 2018B). Fewer cars and more public transportation naturally results in lower oil consumption. This is reflected in data showing that oil consumption is decreasing in several European countries (Oilprice.com, 2019A).

From the previous paragraphs, one can concluded that social factors have different impacts depending on the type of country. All in all, social factors are deemed to benefit the oil & gas industry. The changes currently taking place in developing countries more than make up for decreasing demand and changing demographics in developed countries.

**Environmental factors**

Environmental factors present possibly the largest threat to the oil & gas industry. Oil and gas are non-renewable resources. The increased focus on pollution and sustainability has made the industry controversial and the center of heavy debate. To counter such concerns, several large petroleum companies like Equinor and BP also invest heavily in renewable energy projects (Equinor, 2019). At the moment, Aker BP has not undertaken large scale investments into renewable energy. The analysis of environmental factors has elements of overlap with the other factors, especially political factors.

Petroleum companies operating on the NCS are subject to a wide range of environmental restrictions. Paragraph §10-1 in the Norwegian petroleum law dictates that petroleum operations shall not damage or unnecessarily inconvenience shipping, fishing, air travel or other businesses (Norwegian Law Data, n.d.). The focus on not damaging the environment or other users of the sea naturally puts restrictions on operations. Petroleum companies are dependent on good dialogue and cooperation with other large Norwegian industries. Conflicts of interest often arise between the petroleum industry and the fishing industry. As previously mentioned, the fishing industry has protested loudly against opening areas outside Lofoten, Vesterålen and Senja for oil and gas exploration.

Domestic and international regulations regarding carbon emissions present a major risk in the years to come. In 2016, a major environmental agreement named the "Paris Agreement" was signed by 195 countries (European Commission, n.d.). The goal of the agreement is to reduce emissions and constrain global warming. The agreement has further increased pressure on the oil & gas industry. Major petroleum companies, like BP (Aker BP's second largest shareholder), have been forced by shareholders to explicitly explain how their strategy is consistent with the goals of the agreement (The Guardian, 2019). United States Environmental Protection Agency estimates that fossil fuels and industrial processes are responsible for 65% of the world's greenhouse gas emissions (United States Environmental Protection Agency, n.d.). The oil & gas industry will undoubtedly be affected if the goals of the Paris agreement are to be reached. A major setback to the Paris Agreement came in 2017 when US President Donald Trump announced that the US will withdraw from the agreement (Wikipedia, n.d.M). The US will not officially withdraw from the agreement until 2020. However, the withdrawal still has a major effect given that the US is the country with the second largest emissions of greenhouse gasses in the world (Wikipedia, n.d.N). The withdrawal was not praised publicly by major oil companies (for obvious publicity reasons), but it is still regarded as providing a tailwind for US oil and gas production.

In addition to the Paris Agreement, Norway and the EU have additional goals regarding reductions in greenhouse gas emissions. The Norwegian government has decided that Norway will try to reduce emissions by 40% compared to 1990 emission levels, before 2030. The petroleum industry, and other environmentally harmful industries, are subject to a quota system where they must pay an emission fee. This emission fee is used to fund efforts to combat emissions from these industries (Norwegian Government, 2019A). The level of these fees, as well as emission regulations, present a possible risk going forward. For 2019, the total fee level equals NOK 700 per ton of $CO_2$. The total feel level is significantly higher than in other large oil and gas producing nations (Norwegian Petroleum, n.d.K).

The Norwegian government's significant focus on safety and emissions has forced companies operating on the NCS to be among the cleanest petroleum producers in the world. In a report from 2018, Norwegian Oil & Gas presents numbers indicating that oil and gas extracted on the NCS emits the least $CO_2$ per boe in the world (Norwegian Oil & Gas, 2018). It should be noted that although the consensus among experts seem to be that Norwegian oil and gas is among the cleanest, Norwegian Oil & Gas is an advocacy group for the Norwegian petroleum industry. The numbers they present are possibly biased to some degree. Nevertheless, Norwegian petroleum companies have invested billions in research on how to optimally capture and store carbon emissions. A significant part of the $CO_2$ created is captured and pumped back into the reservoirs the oil and gas were extracted from. The largest facility in the world researching carbon capture and storage, Technology Center Mongstad, is located in Mongstad, Norway. Technology Center Mongstad is subsidized by the Norwegian government and highlights the Norwegian petroleum industry's efforts to be the cleanest in the world (Norwegian Petroleum, n.d.L). One can argue that if world oil and gas production were to be gradually phased out, oil and gas from the NCS should be among the last to disappear. Undoubtedly a positive for the Norwegian petroleum industry.

Oil and gas are non-renewable resources. Resource scarcity is therefore a potential problem for the oil & gas industry. The total remaining resources of oil and gas in the world is impossible to estimate. When discussing remaining resources only proven reserves are usually included. As explained in section 3.3.3.2, proven reserves are reserves that are known and have a reasonable probability of being extracted. In their statistical review from 2018, BP estimates that the total proven oil reserves were equal to approximately

1,697 billion barrels of oil equivalents (thousand mmboe) at the start of 2018. Proven reserves of natural gas were estimated to 1,138 billion barrels of oil equivalents (thousand mmboe) (BP, 2018). At the current level of consumption, the remaining proven reserves will support the world's oil and gas needs for approximately 50 and 53 years, respectively. A major problem with the estimates is that total proven reserves and consumption can change. For example, in 2007 the estimated proven reserves were equal to 1,427 billion barrels of oil equivalents (BP, 2018). Consumption is expected to increase in the short- to medium-term, but it is impossible to tell if renewable energy sources will dominate long-term. On the NCS, combined proven reserves of oil and gas equal approximately 19 billion barrels of oil equivalents (thousand mmboe) (BP, 2018). At current production levels, proven reserves will only last for approximately 13 years before they are empty. The Norwegian estimates are however somewhat biased downwards. Proven reserves do not count oil and gas situated in areas not yet opened for exploration. As explained in section 4.3.1.1, these areas are opened in numbered rounds historically taking place every two years (see section 4.3.1.1 for a further explanation of the Norwegian system). The NPD has a range estimate of the total level of oil and gas on the NCS. They estimate that the total level of oil and gas on the NCS is between approximately 40 and 67 billion barrels of oil equivalents. With a mean estimate of 52 billion barrels of oil equivalents, Norway can produce oil and gas for 36 more years, given 2018 production levels (Norwegian Petroleum Directorate, 2018) (Norwegian Petroleum, n.d.H). It should be noted that some of these oil and gas resources are located outside Lofoten, Vesterålen and Senja. As explained in section 4.3.1.1, these areas will likely never be opened. Excluding the mean estimate of the Lofoten, Vesterålen and Senja resources from the calculation, reduces the mean time remaining to approximately 35 years (Norwegian Petroleum Directorate, 2010).

Global resource scarcity is only regarded as a concern in the very long-term. Proven reserves will likely grow and can support the world's current energy expenditure for many years. For petroleum companies operating on the NCS resource scarcity present a significant risk. It is vitally important that new areas are opened for exploration. If new areas are not opened, companies like Aker BP must either expand their businesses to other countries or shut down operations. Political considerations discussed in this section and in section 4.3.1.1 will be vital in determining the future of these companies.

**Summary**

To summarize, Aker BP and the Norwegian petroleum industry is exposed to a wide range of social and environmental risks. Social factors will play an important role in future oil consumption growth and thus the oil and gas price forecasts. Environmental factors can severely impact Aker BP's ability to operate. Most environmental factors are likely negative for petroleum companies (with the exception of large undiscovered resources), therefore the environmental risk is mostly to the downside. In the most extreme scenario, Aker BP could be forced to shut down operations within one or two decades. Low growth scenarios will be further considered in a sensitivity analysis.

#### *4.3.1.4 Technological factors*

Technological factors are crucial in the oil & gas industry. In a concession-based system, petroleum companies are dependent upon being able to extract the maximum amount of oil and gas as safely as possible. Continuous efforts are made to increase efficiency and reduce pollution. Most petroleum companies invest heavily in research and development ("**R&D**") to always be at the forefront of technological innovation. Aker BP state in their annual reports from 2017 and 2018 that Aker BP's R&D efforts are highly focused on digitalization, gaining an increased understanding of subsurface and improvement of health and safety measures through the use of unmanned solutions (Aker BP, 2018A) (Aker BP, 2019C).

Digitalization of processes and informational processing have been important focus areas in recent years. Seismic research generates huge amounts of data, often referred to as "Big Data". Being able to efficiently sort and analyze these massive datasets is crucial in making informed decisions regarding where to explore. A big improvement in the way these datasets are analyzed have occurred through machine learning. Machine learning is a field within artificial intelligence that use algorithms and statistical models to analyze data without being given explicit instructions beforehand (Wikipedia, n.d.W). The emergence of machine learning has allowed petroleum companies to automatize a large part of their analysis work, significantly reducing the amount of people, time and cost associated with analysis (Rigzone, 2018A). The average success rate for exploration drilling on the NCS has hovered around 50% for the last 20 years (Norwegian Petroleum Directorate, 2018). With total exploration costs on the NCS equaling approximately NOK 25 billion in 2018, it is easy to see why improved analysis and success rates will have a beneficial impact on petroleum companies and society. As previously noted, the Norwegian government in effect pays for a large part of exploration costs and exploration related R&D through tax deductions. The tax deductions increase incentives for petroleum companies to invest heavily into exploration improvements.

Another key focus area for petroleum companies within the field of digitalization, is the use of artificial intelligence to undertake tasks previously performed by humans. Industry experts state that by using blockchain and artificial intelligence, petroleum companies can significantly increase safety and reduce costs (Offshore Technology, 2018). Blockchain has been a hot topic ever since the invention of Bitcoin in 2009. With blockchain 3.0 and "the internet of things" (essentially a system where regular objects are fitted with micro-computers and connected to the internet), the possibilities are endless. One immediate use of blockchain technology for petroleum companies is when they investigate a sequence of events, for example after a spill. Historically, it has been difficult to accurately deduct the sequence of events that led to an accident. With blockchain technology and the internet of things, everything can be monitored and archived in chronological order (Offshore Technology, 2018). In addition to the focus on software development, robotics has received major attention recently (Robotic Industries Association, 2017). Improvements in operating efficiency became a big focus following the severe decline in oil prices in 2014. A large part of inspections previously performed by humans are now conducted with drones, severely reducing both cost and time needed. Automated inspections can significantly reduce or eliminate downtime, resulting in improved efficiency and safety (Robotic Industries Association, 2017).

It is obvious that being at the forefront of the technological development will be crucial for petroleum companies' success going forward. Many companies, including Aker BP, are partnering with universities, research institutions and startups to secure the newest technology and the brightest minds (Aker BP, 2018A).

**Hydraulic fracturing**

A major development within the oil & gas industry in recent years has been the significant increase in the use of the extraction method known as hydraulic fracturing ("**fracking**"). In 1997, horizontal drilling and fracking was combined for the first time (The Atlantic, 2013). Horizontal drilling allows an oil well's path to deviate from its normal vertical trajectory. The method significantly increases the number of potential oil and gas fields that can be reached from a single drilling destination (APPEA, n.d.). Fracking is a method utilized to release oil and gas from shale rock. Oil and gas situated in shale rock is commonly known as "tight oil" and is notoriously hard to extract (Wikipedia, n.d.O). Fracking is performed by pumping a mixture of water, sand and chemicals into shale rock, thereby creating pressure. The pressure cracks the shale rock and releases the oil and/or gas situated within the rock formation (Wikipedia, n.d.P). Historically, extracting oil and gas using fracking had a much higher break-even price than offshore oil and gas or traditional onshore pumping. The break-even price is the defined as the lowest oil price where oil companies can produce profitably, i.e. the price at which oil production is financially viable. At the beginning of shale oil extraction, break-even price was estimated as high as USD 100 per barrel of WTI (Forbes, 2016). For that reason, large scale fracking operations were not financially viable. Following a large price drop during the financial crisis in 2008, a large increase in oil demand, without a corresponding supply increase, pushed oil prices significantly above USD 100 per barrel (Forbes, 2018B). As a result of high oil prices, investments into fracking operations became profitable. The US once again became a major producer of oil in the following years. The large increase in US supply made oil prices drop by more than 50% during a 6-month span in late 2014. Like with many other technology developments, fracking operators experienced significant economies of scale and learning curve benefits. Today, the break-even price for fracking operations is estimated to approximately USD 50 per barrel of WTI (Oilprice.com, 2019B).

**Summary**

To summarize, keeping pace with the technological development is a necessity for success in the petroleum industry. Fracking clearly illustrates how technological advances can have a large impact on oil and gas markets. Several of the largest operators on the NCS struggled severely following the 2014 drop in oil prices. New technologies further reducing break-even prices of shale oil extraction can push market prices downward and affect Norwegian offshore operators' profits. Aker BP and other offshore operators must continually improve their technology and break-even prices to keep up with development. Forecasting expenditures related to R&D and exploration will be a significant part of estimating Aker BP's future cash flow.

##### *4.3.1.5 Conclusion PEST*

The strategic analysis of Aker BP's macro environment has now been conducted. The extensive analysis clearly shows that Aker BP is exposed to a wide range of risks, each with a potential impact on future performance. An extensive macro-environmental analysis is key in forecasting future performance for companies in large global industries like the oil & gas industry. The results garnered will be used extensively in the rest of the thesis and references will be made to each section when applicable. Even though some factors and risks will not be mentioned directly, they will be part of an overall evaluation of future operating conditions. The strategic analysis continues with an analysis of oil and gas markets and forecasting of future prices.

### 4.3.2 In-depth oil and gas price analysis

This section will contain an in-depth analysis of future oil and gas prices. As Aker BP is an undiversified company selling only petroleum products, they are hugely dependent on oil and gas prices, and thus the driving forces behind them. There are an infinite number of factors impacting oil and gas prices. Several dissertations could likely be written about each of them. The following analysis will try to identify the main factors in order to predict future oil and gas prices.

#### 4.3.2.1 *Oil price*

The U.S. Energy Information Administration divide factors affecting oil prices into seven broad categories. The categories are: spot prices, supply non-OPEC, supply OPEC, balance, financial markets, demand non-OECD and demand OECD (U.S. Energy Information Administration, n.d.D). In the following, each category will be presented and analyzed. The analysis will be used to forecast Brent prices for the next five years as well as a long-term price assumed to be applicable thereafter. References will be made to the macro-environmental analysis from section 4.3.1 where relevant.

**Spot prices**

Although "Spot prices" is a strange name for a group of factors, it refers to factors that can affect the supply and demand for oil very quickly. Two such factors are: weather and geopolitical turmoil. The reason such factors can have a large short-term impact is the inelasticity of short-term oil supply and demand. Events creating large differences between supply and demand cannot easily be corrected (U.S. Energy Information Administration, n.d.D). For example, a large short-term increase in demand cannot easily be matched by a corresponding increase in supply. As a result, prices will have to change in order to maintain market equilibrium. Unanticipated changes in weather can potentially create such supply/demand shocks. Especially hurricanes hitting the Mexican gulf and the US east coast can create short-term volatility in oil markets. Several of the US's largest oil refineries are located in the Mexican gulf, creating the possibility for a major hurricane to significantly impact US supply of refined oil products (Wikipedia, n.d.Q). On 11 September 2018, the price of WTI increased 2.5% (Brent 2.2%) as hurricane Florence was making its way towards the US east coast (CNBC, 2018B). Scientists deem it as likely that global warming can increase the frequency and intensity of such hurricanes (Geophysical Fluid Dynamics Laboratory, 2019). An increase in hurricane frequency can potentially cause more short-term volatility in oil markets in the future. However, it should be noted that such weather effects in itself are not likely to have a significant long-term impact on oil prices as effects are usually seasonal and short-felt.

Geopolitical turmoil often has a large impact on oil prices. A significant part of the world's oil production comes from regions considered to be politically unstable. War and other major events in these regions have impacted supply and demand many times within the last 50 years. However, major events in the western world can also cause massive price volatility. During the financial crisis in 2008, the WTI price fell from a top of USD 162 in June 2008 down to USD 50 in January 2009 (Macrotrends, n.d.). More recently, the WTI price jumped 1.6% on 6 August 2018 following an announcement that the US would impose sanctions on imports from Iran following disagreements regarding Iran's nuclear program

(Business Insider, 2018). These are just some of many examples. Current and future US sanctions on OPEC countries will be discussed further in the "Supply OPEC" section.

The challenge with the factors included in "Spot prices" is that they are almost impossible to predict. When predicting future oil prices, one cannot account for such factors as they are not known in advance. Predicted future oil prices will therefore not take the "Spot price factors" into account. The effect of not taking such factors into account are most likely small as their effects are often only short-term.

**Supply Non-OPEC**

Non-OPEC production currently accounts for approximately 57% of world oil supply. However, as mentioned in section 2.4.1, subtracting production from countries in close cooperation with OPEC (OPEC +) reduces the share of true non-OPEC ("**TNO**") oil supply to approximately 38%. The following analysis will be based on TNO oil supply.

TNO oil producers do not coordinate output and tend to produce close to maximum capacity given current economic conditions. Without the ability to influence prices, individual TNO producers become price takers in a large global commodity market. TNO producers adjust long-term production capacity based on expectations regarding future market conditions (U.S. Energy Information Administration, n.d.D). As TNO producers are price takers and operate close to maximum capacity, factors influencing TNO supply tend to have a large impact on oil prices. In contrast, OPEC + tends to operate with more spare capacity, giving them the ability to adjust production in the short- to medium-term should one of its members' production be affected. As market participants know that TNO producers do not have the same ability, shocks or changed expectations regarding TNO supply tend to have a larger price effect (U.S. Energy Information Administration, n.d.D).

TNO oil production has increased drastically in the last ten years. Increases in TNO production was responsible for approximately 60% of the increase in total world production in the period 2010-2017 (U.S. Energy Information Administration, n.d.B). The major increase in TNO oil production was caused by an almost doubling of US production. Production of oil from other TNO producers slightly decreased. As explained in section 4.3.1.4, the increase in US production was caused by a significant increase in the use and efficiency of fracking. Currently, the US is the world's largest producer of oil and is responsible for more than 33% of total TNO production (Wikipedia, n.d.D). Changes in TNO supply going forward will depend heavily on the development in US production. US production increased by an average of 684 mboepd in the period 2010-2018. The fact that US production growth has a large impact on oil prices and is largely affected by oil prices, makes the analysis difficult. As described in section 4.3.1.4, fracking has a high break-even price compared to more traditional methods. The financial viability of fracking is therefore highly sensitive to future WTI prices. Following fracking's initial boom in 2011-2014, OPEC, led by Saudi Arabia, increased their production to capture market share and deter additional US investment (Reuters, 2014). Oil prices dropped drastically in the second half of 2014, and as a result US production growth paused for a couple of years.

| **US and TNO production: mboepd** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** |
|---|---|---|---|---|---|---|---|---|
| US | 5,477 | 5,654 | 6,501 | 7,467 | 8,759 | 9,430 | 8,830 | 9,351 |
| China | 4,078 | 4,052 | 4,074 | 4,163 | 4,208 | 4,278 | 3,983 | 3,821 |
| Canada | 2,741 | 2,901 | 3,137 | 3,325 | 3,613 | 3,677 | 3,679 | 4,160 |
| Brazil | 2,051 | 2,105 | 2,061 | 2,023 | 2,255 | 2,437 | 2,510 | 2,622 |
| Norway | 1,799 | 1,680 | 1,537 | 1,464 | 1,512 | 1,566 | 1,619 | 1,589 |
| Other TNO | 12,045 | 11,689 | 10,881 | 10,724 | 10,753 | 10,921 | 10,573 | 10,054 |
| Total TNO | 28,191 | 28,081 | 28,191 | 29,166 | 31,100 | 32,309 | 31,194 | 31,597 |

*Table 3 - US and TNO production (U.S. Energy Information Administration, n.d.B)*

Going forward, OPEC + could manipulate WTI prices below USD 50 (current rough estimate of fracking break-even price), but this is seen as highly unlikely. In December 2018, Saudi Arabia released its 2019 fiscal budget. The fiscal budget shows that Saudi Arabia plans to increase its fiscal spending to aid a stagnant economy (Reuters, 2018B). In order to fund the increased fiscal spending, Saudi Arabia is dependent on high oil prices. Analysts estimate that the WTI price would have to reach USD 90 per barrel for Saudi Arabia's budget to balance (assuming a fixed price spread between WTI and oil produced in Saudi Arabia) (Bloomberg, 2018B). The WTI price has not been above USD 90 since 2014. It is therefore highly unlikely that OPEC + will allow low oil prices going forward. With high WTI prices, oil production in the US is financially viable and production growth is expected to continue. A favorable WTI price for much of 2018 spurred a US production growth of approximately 1,600 mboepd, the highest growth number in the last ten years. In 2019, a US production growth of approximately 1,300 mboepd is estimated. Post 2019, production growth is expected to slow by about 200 mboepd per year, ending up at approximately 500 mboepd in 2023. The slowed growth is seen as reasonable given that 2017 and 2018 were exceptionally good years for the US economy and such conditions will likely not continue long-term. However, the growth is still high and is deemed as reasonable given Saudi Arabia's high (although somewhat unrealistic) fiscal break-even price.

These estimates seem to be within range of several other analysts' estimates, as well as U.S. Energy Information Administration's estimate for 2019 (U.S. Energy Information Administration, n.d.A). The estimates are somewhat higher than what U.S. Energy Information Administration and OPEC estimate post 2019 (OPEC, 2018). However, Saudi Arabia's need for high oil prices, further fracking break-even improvements, the US government's "America First" strategy, US withdrawal from the Paris agreement and improvements in trade negotiations between the US and China creates a bullish outlook for US producers. These tailwinds support a production growth estimate somewhat higher than that of U.S. Energy Information Administration and OPEC.

Excluding the US, the largest TNO producers are Canada, China, Brazil and Norway. In recent years, the production development from these countries have been mixed. Canadian oil production increased by 1,836 mboepd (67%) in the period 2010-2018 (Canadian National Energy Board, n.d.). Going forward, analysts, the Canadian government and the Canadian petroleum industry expect large production increases in 2019 and 2020 of approximately 500 mboepd per year (Canadian National Energy Board, n.d.) (Canada's Oil & Natural Gas Producers, 2018). This estimate is seen as reasonable given the high expected oil prices and Canada's rough estimate break-even Brent price of USD 50 (Reuters, 2017). Beyond 2020, consensus seems to be that growth will slow significantly. Canadian production growth is severely limited by pipeline capacity (Canada's Oil & Natural Gas Producers, 2018). Pipeline capacity is essential for exportation of oil. Without the ability to increase exports significantly, and with low or no domestic demand growth, yearly growth is expected to slow to approximately 100 mboepd post 2020.

Brazil's oil production grew by approximately 500 mboepd (25%) in the period 2010-2017. In 2018 and the first part of 2019, production was relatively stable (Trading Economics, n.d.A). Major investments have been made in Brazil and production is expected to increase drastically going forward. The recently elected Brazilian government is regarded as very business friendly and will likely impose regulatory measures aimed at growing the Brazilian economy. With major additional investments in new production capacity planed in the coming years, OPEC estimates that Brazil will grow its production by approximately 2,000 mboepd by 2027 (OPEC, 2017). This estimate seems to be in line with consensus. A significant part of the increase is expected to materialize as soon as in late 2019. OPEC estimates a total production increase of approximately 350 mboepd from Brazil in 2019. It is difficult to predict when the remaining increases will materialize. A linear increase is deemed as appropriate given Petrobas' (Brazil's previously state-owned petroleum company) plan of gradual investments in the period 2020-2025 (Bloomberg, 2019C). An average annual increase of approximately 200 mboepd per year is therefore expected post 2019.

Norwegian oil production declined steadily in the period 2000-2013, before plateauing in recent years. The total production decline of 53% has mostly been a result of a maturing/decline in the production at Norway's major fields, coupled with tight regulations regarding opening of new areas. In 2019, NPD expects the lowest production of oil since 1988 (Norwegian Petroleum, n.d.G). Post 2019, production is expected to increase significantly, as some new large fields have been discovered in mature areas and large-scale investments have been made. One of these new fields is the Johan Sverdrup field (described in section 2.3.2.3), where Aker BP is a part of the operating consortium. NPD expects production on the NCS to increase by approximately 325 mboepd in 2020, 125 mboepd in 2021 and by an average of about 75 mboepd for a few years thereafter (Norwegian Petroleum, n.d.G). Given the Norwegian regulator's extensive oversight and research regarding operations on the NCS, these estimates are seen as reasonable.

Chinese oil production was relatively stable in the period 2010-2018, declining by about 200 mboepd in total (U.S. Energy Information Administration, n.d.B). Going forward, no real change in Chinese production is expected.

In addition to the countries just described, there are a vast number of other small-scale producers. The production coming from these countries is often hard to estimate as petroleum production is usually not a significant part of their economy. OPEC estimates that the production from these countries will be close to unchanged over the coming years (OPEC, 2018). This seems like a reasonable estimate. Based on these projections, TNO oil production is expected to develop as illustrated in Table 4.

| **TNO supply mboepd change Y/Y** | **2019** | **2020** | **2021** | **2022** | **2023** |
|---|---|---|---|---|---|
| USA | 1,300 | 1,100 | 900 | 700 | 500 |
| Canada | 500 | 500 | 100 | 100 | 100 |
| Brazil | 350 | 200 | 200 | 200 | 200 |
| Norway | -75 | 325 | 125 | 75 | 75 |
| Sum | 2,075 | 2,125 | 1,325 | 1,075 | 875 |

*Table 4 - TNO year-on-year supply change*

### Non-OECD demand

"Non-OECD demand" is the demand for oil coming from countries who are not a member of the Organization for Economic Co-operation and Development ("**OECD**"). These countries are generally seen as having immature developing economies with potential for growth. It is estimated that most short-term increases, and virtually all medium- to long-term increases, in oil demand will come from these countries. The social development and potential in these countries was explained in section 4.3.1.3. As mentioned, China and India will be key drivers of growth from developing countries, and as a result, the whole world. Other non-OECD countries, especially in the Middle East and other parts of Asia, will also be important.

Demand growth is highly dependent on economic growth rates and can therefore be hard to estimate. As explained in section 4.3.1.3, GDP growth in China and India is expected to remain high, although it is slowing in China. OPEC (2018) estimates that non-OECD countries as a group will grow GDP at an average rate of 5% per year in the period 2019-2023. The projected growth numbers should create the foundation for a high growth in oil demand as these countries become increasingly developed.

Consensus regarding growth in Chinese demand seems to be that demand growth will be in the region of 400 mboepd for 2019 and 2020, before dropping to about 250-300 mboepd from 2021 to 2023 (OPEC, 2018) (IEA, n.d.B). This seems somewhat reasonable given China's declining GDP growth rate. A drop down to 250 might be excessive given the current positive outlook in trade negotiations with the US, and a growth of approximately 350 mboepd in 2021 and 300 mboepd in 2022 and 2023 is therefore chosen as estimates.

While estimates regarding Chinese demand growth are similar across different reports, estimates regarding India's demand growth is more warried. OPEC (2018) estimates that India's demand growth will be approximately 200 mboepd in 2019 and 2020, before increasing to approximately 300 mboepd in 2021 to 2023. This projection makes India's demand growth on par with China's within 5 years. On the other hand, International Energy Agency ("**IEA**") estimates a growth of approximately 250 mboepd in 2019, 150 mboepd in 2020 and then 150-200 mboepd in 2021 to 2023 (IEA, n.d.B). Given India's rapid economic expansion and projected population growth (described in section 4.3.1.3), OPEC's estimate is deemed as the most appropriate.

Regarding demand growth for the rest of the non-OECD countries, reports differ on the expected development in 2021-2023. In 2019 and 2020, consensus seems to be that non-OECD demand growth, excluding China and India, will equal approximately 500 mboepd and 800 mboepd, respectively. For 2021-2023, OPEC estimates that non-OECD demand growth, excluding China and India, will average 500-550 mboepd per year (OPEC, 2018). On the other hand, IEA estimates an average growth of approximately 750 mboepd per year (IEA, n.d.B). IEA's medium-term estimate is deemed as the most appropriate given the previously expressed positive outlook on global growth. A positive development in international trade will likely spur high growth in developing countries, and as a result, oil demand. Table 5 presents expected growth in non-OECD demand given the assumptions described above.

| Non-OECD demand growth<br>mboepd change Y/Y | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| China | 400 | 400 | 350 | 300 | 300 |
| India | 200 | 200 | 300 | 300 | 300 |
| Other | 500 | 800 | 750 | 800 | 700 |
| Sum non-OECD | 1,100 | 1,400 | 1,400 | 1,400 | 1,300 |

*Table 5 - Non-OECD year-on-year demand growth*

### OECD demand

While non-OECD demand paints a rather positive short- and medium-term picture for the oil & gas industry, the same cannot be said for OECD demand. OECD demand has been relatively stable for the last five years with only minor yearly increases (U.S. Energy Information Administration, n.d.D). Going forward, demand is expected to grow in 2019 and 2020, and then start to decline from 2021. OPEC (2018) expects a consumption increase of 200 mboepd in 2019 and 300 mboepd in 2020. The 2019 expected increase is comprised of a 200 mboepd US growth, 100 mboepd OECD Europe growth and a negative 100 mboepd OECD Asia Oceania growth. In 2020, the same growth numbers are expected, except for OECD Asia Oceania where demand is expected to be steady. In comparison, IEA expects the same OECD development in 2019, but no demand growth in 2020. The OPEC estimate seems like the most probable scenario. Demand flattening in the US is not probable given the positive trade outlook, expected short-term GDP growth rates and the continued increase in investment (FED, n.d.A). However, one alteration is made to the OPEC estimate; due to the high uncertainty regarding BREXIT, no consumption growth is expected for OECD Europe in 2020, which is in line with IEA's estimate. Post 2020, consumption is expected to decline. Consensus seems to be that the decline will be gradual with a 100, 200 and 300 mboepd decline in 2021, 2022 and 2023, respectively. The decline will most likely start a new era in OECD oil consumption. Consumption is expected to decline gradually for at least the next 20 years (OPEC, 2018). OECD oil consumption has previously declined because of recessions, but consumption was always expected to pick up again once the economy recovered. The shift towards a perpetual decline, even during economic expansions, represents a fundamental shift in world energy markets. Luckily for oil producers, non-OECD countries are expected to pick up the slack in the long-term and will continue to drive oil consumptions upwards. Table 6 summarizes the expected OECD consumption growth for 2019-2023.

| OECD demand mboepd change Y/Y | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| USA | 200 | 200 | 100 | 0 | -100 |
| OECD Europe | 100 | 0 | -100 | -100 | -100 |
| OECD Asia Oceania | -100 | 0 | -100 | -100 | -100 |
| Sum OECD | 200 | 200 | -100 | -200 | -300 |

*Table 6 - OECD year-on-year demand change*

In 2018, new regulations regarding sulfur oxide emissions was passed by the International Maritime Organization ("**IMO**") (Danish Maritime Authority, 2018). The new regulations, knowns as "**IMO 2020**", are very positive for the demand of sweet oils such as WTI and Brent. IMO 2020 regulates the allowed sulfur content of fuels used in shipping. Starting 1 January 2020, ships will not be allowed to utilize fuel with a sulfur content above 0.5%, down from 3.5%. Shipping fuel represents a substantial part of daily oil consumption and once IMO 2020 comes into effect there will likely be a significant shortage of compliant fuel in the short- and medium-term (IMO, n.d.). A major part of shipping fuel has historically been refined from sour (high sulfur) oils because of their relative cheapness compared to sweeter oils. The new regulations will shift the oils used when making shipping fuel significantly towards WTI and Brent. IMO 2020 is therefore expected to create upwards pressure on WTI and Brent prices in the short- and medium-term.

**Supply OPEC**

A major determinant of oil prices is the supply coming from OPEC + countries. These countries deliberately adjust their production to influence oil prices. As OPEC + explicitly manage supply, historic production growth will not be as important for projecting future production growth as it was for TNO countries producing close to maximum capacity. Historic production numbers for the largest OPEC + producers are presented in Table 7 but will not be explained further.

| Production largest OPEC + producers Mboepd | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Russia | 9,694 | 9,773 | 9,932 | 10,053 | 10,107 | 10,253 | 10,551 | 10,580 |
| Saudi Arabia | 8,900 | 9,458 | 9,832 | 9,693 | 9,735 | 10,168 | 10,461 | 10,134 |
| Iraq | 2,399 | 2,626 | 2,983 | 2,650 | 2,642 | 2,784 | 2,905 | 2,753 |
| Iran | 4,080 | 4,054 | 3,387 | 3,113 | 3,239 | 3,293 | 4,151 | 4,469 |
| UAE | 2,570 | 2,849 | 2,994 | 2,938 | 3,010 | 3,149 | 3,243 | 3,174 |
| Other OPEC + | 19,053 | 18,067 | 19,048 | 18,836 | 18,529 | 18,799 | 18,336 | 18,385 |

*Table 7 - Production largest OPEC+ producer (U.S. Energy Information Administration, n.d.B)*

OPEC + production increases or decreases are highly dependent on several factors such as; current TNO supply, expected future TNO supply, current and expected future demand, geopolitics and the economic landscape. Member countries regularly meet to discuss the current situation and the future direction of the organization. Following a significant decline in oil prices in Q4 2018, OPEC + announced in December 2018 that they would begin a new series of production cuts to stabilize markets. The initial cut is for a total of 1,200 mboepd and is intended to last for the first half of 2019. OPEC countries are responsible for 800 mboepd of the cut, while the remaining 400 mboepd are the responsibility of the non-OPEC affiliated countries (mainly Russia). The cut is shared between OPEC member countries pro-rata based on pre-cut production. Iran and Venezuela are exempt from the cut because of their current position as the target of US sanctions. Libya is also exempt because of their ongoing technical production problems and political situation (Oilprice.com, 2018). In March 2019, OPEC + communicated that they were continuing the cut until at least June 2019. Whether the cut will be continued in the second half 2019 is unclear, but it is seen as likely given Saudi Arabia's need for high oil prices and the downward pressure that reintroducing 1,200 mboepd can have on market prices. What OPEC + will do post 2019 is hard to determine, and sentiment can change in a matter of weeks. It is deemed as likely that OPEC + will continue to introduce necessary cuts to keep oil inventories from building (inventories build when supply exceeds demand) in the short-term. However, post 2020, OPEC + will likely start to reintroduce barrels into the market as the spread between estimated TNO supply growth and total demand growth tightens. Another reason for this view is that Russia will probably not be satisfied with halting its oil production growth for very long, standing on the side-lines watching as the US takes a larger and larger market share. In addition, Iran and Venezuela are currently under sanctions from the US. These sanctions will likely be lifted at some point, especially if a democrat is elected in the 2020 US presidential election. Removing these sanctions will allow Iran and Venezuela to drastically increase their production and exports, thereby increasing the number of barrels available in the market. This will likely put some downward pressure on oil prices from 2021. Given these assumptions, it is estimated that OPEC + production will develop as presented in Table 8.

**Balance**

"Balance" refers to the balance between demand and supply, and thereby inventory levels of oil. Inventories of oil can fluctuate for many reasons, but generally one can expect prices to increase if demand exceeds supply and inventories decrease. The balance at the start of 2019 was approximately zero (U.S. Energy Information Administration, n.d.D). Therefore, the numbers presented in Table 8 show the general direction that inventories of oil are expected to take in the coming years. The balance is also heavily influenced by expectations about future market prices relative to spot prices. If market participants with a long exposure to oil prices expect prices to rise, they might purchase oil now and store it for later use. Inventories of oil are highly seasonal as the demand for different oil products warry throughout the year. As a result, inventories are usually compared to previous year's inventories at the same time of the year (U.S. Energy Information Administration, n.d.D). Balance and inventories will not be discussed further as it follows directly from the previous analysis regarding demand and supply. Note that the supply and demand numbers presented in Table 8 and previous tables do not separate the different types of oil.

| Supply and demand growth<br>mboepd change Y/Y | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| OPEC+ supply | -1,200 | -500 | 1,000 | 500 | 0 |
| TNO supply | 2,075 | 2,125 | 1,325 | 1,075 | 875 |
| Demand | 1,300 | 1,600 | 1,300 | 1,200 | 1,000 |
| Difference supply and demand | -425 | 25 | 1,025 | 375 | -125 |

*Table 8 – Year-on-year supply and demand growth*

**Financial markets**

Different oils are the underlying commodities in a huge commodity derivatives market. A barrel of oil can also in itself act as an investment asset. Trading in oil related derivatives has doubled several times over in the last 20 years and now represents an important market for those directly exposed to oil prices (producers, manufacturers, transporters etc.) and investors (U.S. Energy Information Administration, n.d.D). Oil options, futures and forward contracts are often used by those directly exposed to oil prices to hedge price risk. They are also used by investors and other financial institutions to gain exposure to oil price risk, as well as service the needs of clients by taking the other side in hedging arrangements. The emergence of oil and oil derivatives as investment objects have attracted scrutiny as it can possibly create short-term price volatility. For example, if many investors believe that oil prices will rise in the future, they have an incentive to either buy oil today and store it or go long oil derivatives. This can increase demand for oil and thereby drive up prices short-term. The detailed workings of oil derivatives will not be analyzed further as the price effects are mainly short-term. Developments in supply and demand are still the main underlying drivers of oil prices and will therefore be the main determinant upon which future price estimates are based. It should nevertheless be mentioned that most large producers hedge part of their short-term exposure to price risk. Developments in derivatives markets will therefore have some impact on profits.

Changes in foreign exchange rates is a financial market risk that can have a potential impact on oil prices in the medium- and long-term. Several theories have been presented that argue for an inverse relationship between the strength of the USD and oil prices (U.S. Energy Information Administration, n.d.D). Two facts are presented as the main reasons for this inverse relationship; firstly, if the USD strengthens, oil become relatively more expensive in other countries. More expensive oil leads to lower demand and a downward pressure on prices. Secondly; if the USD weakens, producers make less profit as they often have costs in other currencies than USD. If profits weaken, producers might want to increase oil prices to counterbalance the negative effect.

As discussed in section 4.3.1.2, USD risk is seen as mostly to the downside. This will potentially create upwards pressure on oil prices.

**Conclusion**

Based on the analysis conducted above, the following Brent prices are predicted for 2019-2023. Note that these predictions are averages and that the price at a given time within each year can deviate significantly from the predictions.

| **Brent crude oil price: USD per barrel** | **2019** | **2020** | **2021** | **2022** | **2023** |
|---|---|---|---|---|---|
| Brent crude oil price | 70 | 80 | 70 | 65 | 70 |

*Table 9 - Brent crude oil price*

In 2019, an average Brent price of USD 70 per barrel is expected. There are several reasons why the Brent price is expected to rise after starting the year at USD 53 per barrel; 1) OPEC +'s production cut will cause draws on oil inventories, pushing prices upwards, 2) positive developments in trade talks between the US and China will create renewed confidence in global growth and thereby demand, 3) in anticipation of IMO 2020 Brent prices will rise as WTI and Brent become relatively more attractive and 4) a possible weakening of the USD can create further tailwinds for oil prices. Average 2019 Brent price up until 19 March was approximately USD 63, and the Brent price is expected to rise as the year continues on (YCHARTS, n.d.).

In 2020, an average Brent price of USD 80 is expected. This is a significant jump from the USD 70 expected average price of 2019. The reasons for the increased average price in 2020 are: 1) additional cuts from OPEC +, 2) with IMO 2020 coming into effect from 1 January 2020, demand for sweet and light oils will be high and 3) high growth in developing countries continue to create upwards pressure on prices.

After reaching a peak of USD 80 in 2020, Brent prices are expected to decline to USD 70 in 2021, USD 65 in 2022, before increasing slightly and reaching a long-term average of USD 70 from 2023. Prices will obviously not stay fixed post 2022 but given the uncertainty in supply and demand and volatility of oil markets, there is no real value in predicting any further. Therefore, a long-term average is chosen based on long-term predictions of supply and demand. Prices are expected to decline post 2020 as OPEC + starts to reintroduce barrels into the market. In addition, Iran and Venezuela's sanctions are expected to be lifted, increasing the number of barrels available for export from these countries. Negative demand growth in OECD countries, as well as a slowing growth in China, will add some downwards pressure. The long-term average estimate of USD 70 is seen as reasonable given the long-term growth prospects of non-OECD countries. In addition, OPEC countries' fiscal budgets will continue to be highly dependent on oil prices for many years. It is therefore unlikely that they will allow prices to drop below a level where they can avoid large fiscal deficits.

This concludes the analysis of oil prices. A somewhat less extensive analysis of future natural gas prices will now be conducted. The main reasons for the less extensive analysis are that most of Aker BP's income comes from oil and several of the factors already discussed under oil prices are also relevant for natural gas prices.

#### *4.3.2.2 Natural gas prices*

Natural gas prices are mainly determined by the same type of factors that determine oil prices. However, there are a few key differences which separate the structures of the two markets. First of all, the natural gas market is not nearly as globalized as the oil market. The lack of globalization is mainly a result of the difficulty and cost of transporting natural gas across the world. This has caused prices to differ significantly between continents and even between countries within each continent. The focus of this analysis will be the Northwest European market, which consists of the countries: Norway, Sweden, Denmark, United Kingdom, Germany, France, The Netherlands, Italy, Belgium and Austria (Energy Analyst, 2016). The natural gas markets of these countries have become so integrated that price deviations between the countries are small. Because of the decentralized nature of the global natural gas market, natural gas is traded at different hubs around the world. There are several gas hubs in the Northwest European market and the currency in which payment for natural gas is received is dependent upon where the hub is located. The largest natural gas hub in Europe is the National Balancing Point ("**NBP**") in the UK (Energy Analyst, 2016). As price deviations between natural gas hubs in Northwest Europe is small, NPB natural gas prices will be the target of the analysis. To simplify calculations and comparisons, natural gas prices will be presented in USD even though spot prices for natural gas at NBP is quoted in GBP.

This is not a significant simplification as USD denominated NBP natural gas futures are traded on the Chicago Mercantile Exchange in the US. In addition, Aker BP books revenue from European natural gas sales in USD, so using USD as the natural gas price currency greatly simplifies the analysis.

A second difference between oil markets and natural gas markets is the use and seasonal price swings of natural gas. Compared to oil, a significantly larger portion of natural gas is used for electricity generation and heating (U.S. Energy Information Administration, n.d.C). Electricity and heating needs are highly seasonal, making natural gas prices a lot more dependent on weather. An unexpectedly cold winter has historically caused natural gas prices to spike sharply as electricity and heating needs become higher than expected (Energy Analyst, 2016). The dependence on weather increases the volatility and difficulty of forecasting natural gas prices. Like with oil, unexpected weather effects will not be taken into consideration as these are nearly impossible to predict. As a side note, it should be mentioned that in the long-term, global warming and increased temperatures can possibly decrease demand for natural gas as a source of heating.

A third difference between oil markets and natural gas markets is the global supply and demand relationship. Natural gas prices in Northwest Europe often deviate from natural gas prices in other parts of the world and is mainly determined by local supply and demand in this area. Supply of natural gas to Northwest Europe comes mainly from countries within the northwestern part of Europe, Russia, Algeria and Qatar (European Commission, 2018). Natural gas from Qatar comes as liquefied natural gas ("**LNG**"), i.e. natural gas that has been cooled down to a liquid state and is then transported on ships. Liquefying natural gas is expensive, but costs are dropping, and LNG is expected to become a larger part of the natural gas supply. Reducing the cost of liquefying natural gas is also expected to increase the globalization of natural gas markets as liquefying natural gas significantly increases the transportability (Wikipedia, n.d.R). Increased globalization will most likely cause a tightening of natural gas price-spreads across the globe.

Most of the natural gas produced in Northwest Europe is consumed by the countries themselves. Out of the countries mentioned above, only Denmark and Norway are net exporters of natural gas (Energinet, 2017). The net exports of Denmark are miniscule compared to Norway, as Norway is responsible for delivering approximately 34% of the European Union's natural gas imports. Russia is the largest supplier of natural gas to the European market as they are responsible for delivering approximately 47% of the European Union's natural gas imports (European Commission, 2018). Going forward, the European Union is expected to attempt to diversify its supply of natural gas to decrease its dependence on Russia. Russian dominance of natural gas supply has caused frictions within the EU following Russia's annexation of Crimea in 2014 (Forbes, 2018A). The EU's significant dependence on Russian gas severely constrains the possible actions the EU can undertake to influence Russia in political matters. In addition, conflict in the Ukraine can potentially disrupt supply as several of the major pipelines connecting Russia and the rest of Europe goes through the Ukraine (European Commission, 2018). A conscious effort to reduce the dependence on Russia will likely have a very positive effect on Norwegian gas producers. Increased demand for Norwegian gas will provide upwards pressure on the price received for Aker BP's gas. As previously mentioned, LNG is becoming a larger part of natural gas supply in Europe. Following the fracking boom in 2014, the US has large reserves of natural gas available for export. The increase of European LNG imports is regarded as having little effect on the demand for Norwegian gas. It is likely that the imports from the US will mainly replace Russian supply, not Norwegian.

Total demand for natural gas in Europe slightly decreased in 2018 and is expected to continue to slightly decrease for the next five years (European Commission, 2018) (IEA, n.d.A). This will put some downwards pressure on natural gas prices. However, the decreasing demand will likely affect Russia the most, given the EU's conscious effort to reduce imports from Russia. In addition, a further substitution of coal for gas in electricity production by several of the poorer European countries could create unexpected tailwinds for Norwegian gas producers.

To estimate the price of natural gas at NBP going forward, estimates from analysts posted on the Bloomberg terminal will be utilized. This is a much simpler approach than the one taken for Brent prices, however, it is deemed as appropriate given the low share of Aker BP's revenue provided by the sale of natural gas. The future price estimates from natural gas analysts seems to be in the range of USD 6-7 per thousand square feet of natural gas ("**MCF**"). In addition, the estimates and natural gas forward contract prices seem to be rather steady, indicating that no large changes are expected year-on-year. Given our bullish outlook on demand for Norwegian natural gas and the high expected Brent price, a natural gas price of USD 7 per mcf is chosen from 2019 and onwards.

A thorough analysis of oil and gas prices have now been conducted. The predictions will be utilized when estimating Aker BP's revenue from oil and natural gas production going forward.

#### 4.3.3 Micro-Environmental analysis – Porters Five Forces

To conduct an analysis of Aker BP's competitive environment, Porters Five Forces framework will be utilized. The analysis will go through each force chronologically (as presented in section 4.1.2) to determine their potential impact on Aker BP.

#### *4.3.3.1 Threat of new entrants*

New competitors entering the Norwegian oil & gas industry can potentially have a large impact on existing producers as increased competition tends to result in lower profits. A significant barrier to entry in the Norwegian oil & gas industry is the concession system described in section 4.3.1.1. New entrants must bid for, and secure, new concessions in order to start exploration and production. Alternatively, they must purchase them from existing producers, likely at a premium. Existing producers have a significant advantage since they already own these long-term concessions. In addition, they are familiar with the processes and have built up a strong relationship with the Norwegian government, making it more likely that they will receive additional concessions in the future. Norwegian APA concession grants shall in theory be non-biased and every application shall be judged fairly according to predefined criteria (Norwegian Petroleum, n.d.C). However, NPD has a tendency to offer APA concessions to established producers with a strong track record in operating on the NCS. As described in section 4.3.1.1, concessions in numbered rounds are only given to pre-qualified companies with the necessary capabilities to operate in challenging areas. These special regulations further strengthen the barriers to entry as new producers will likely not even be able to apply for these types of concessions. The concession system is unlikely to be changed anytime soon and acts as a significant tailwind for Aker BP.

The capital intensity and the investment needed to explore fields and extract oil and gas are very high. This means that a potential new entrant must invest vast amounts of money and time in order to enter the industry. The investment needed to start production is especially large when oil and gas is located beneath the sea, as the technology and resources needed is significantly more expensive than in land-based production. In addition, the costs of running petroleum exploration and extraction operations are very high. A producer is vitally dependent on highly educated workers. As a result, wages in the Norwegian petroleum industry have been among the highest in the country (Karrierestart, 2018). Investments and costs represent a significant barrier to entry as new entrants will likely have to spend large sums of money before they see any valuable results.

Two factors increasing the threat of new entries are: product differentiation and customer loyalty. Oil and gas are commodities traded on huge international markets. As previously mentioned, there is some difference in petroleum products on a global scale, but within the Norwegian petroleum industry the products are largely the same. The possibility for producers on the NCS to differentiate themselves based on product quality is therefore minimal. Customer loyalty is generally not present in commodity markets. Midstream and downstream customers will usually purchase from the producer with the lowest price.

The combination of regulatory boundaries, high costs and capital intensity creates significant barriers to entry in the Norwegian oil & gas industry. Low barriers to entry caused by low product differentiation and customer loyalty are seen as having minimal effect when compared to the above factors. The threat of new entries is therefore regarded as low.

#### *4.3.3.2 Threat of substitutes*

Substitutes for oil and gas have the potential to put a cap on oil and gas prices, and can severely affect future demand.

One of the largest challenges facing the oil & gas industry is the increasing use and effectiveness of renewable energy sources. BP (2019) estimates that renewable energy sources will be responsible for providing approximately 66% of the increase in global power generation. This entails that renewable energy sources will provide more power than non-renewables by 2040. The large increase in power from renewables is expected to come predominantly from solar and wind (BP, 2019). Battery technology is an important determinant in the development of renewable resources. A significant advantage of energy coming from non-renewables is that it can be easily stored in the form of oil, gas and other fossil fuels. The cost of making batteries is falling continuously and is expected to decrease by more than 50% before 2030 (Bloomberg, 2018A). Threat of substitution from renewable energy sources is greatest in the long-term. In the short- and medium-term, non-renewables will continue to dominate as the necessary technology and infrastructure to completely phase out fossil fuels is not yet in place. The long-term threat of substitutes for the Norwegian oil & gas industry is deemed as substantial. As discussed in section 4.3.1.1, Norwegian youth politicians are generally quite negative towards non-renewable energy sources. It is therefore likely that regulations heavily in favor on renewable energy sources will be imposed at some point in the future. Increased emission fees (discussed in section 4.3.1.3) can potentially raise costs and make renewable energy sources relatively more attractive. Thus, possibly increasing the rate of substitution.

Another substitute for oil and gas is nuclear power. Nuclear power currently generates approximately 11% of the world's electricity (World Nuclear Association, n.d.). BP (2019) estimates that nuclear power will significantly decrease in OECD countries and grow in non-OECD countries. The decrease in OECD nuclear power generation takes place as old nuclear power plants become obsolete and no new investments are undertaken to replace them. Nuclear power generation is in a similar situation as fossil fuels, both facing significant scrutiny from politicians and environmentalists. A large part of non-OECD growth is expected to come from China who currently operates 46 nuclear power plants and have 11 more under construction (Wikipedia, n.d.S). The impact on Chinese oil and gas demand is not regarded as significant. Increases in Chinese nuclear electricity generation will likely impact coal demand, not oil and gas. Coal is currently the largest electricity source in China, providing approximately 65% of the country's electricity supply (Wikipedia, n.d.T).

Given the arguments provided above, threat of substitutes is judged as low in the short- to medium-term and high in the long-term. Radical unforeseen technological advancements will have to take place for renewables to pose a significant threat to oil and gas consumption within the next five to ten years.

#### *4.3.3.3 Customer bargaining power*

Customer bargaining power tends to decrease profitability as customers can demand reductions in price or an increase in service from producers. As explained in section 4.1.2, customer bargaining power tends to be high when there are many suppliers, many substitutes, few customers and low switching costs. To analyze the bargaining power of customers, customers are split into mid- and downstream segments according to the definitions given in section 2.4.1. It should be noted that companies in the midstream segment can be regarded as both customers and suppliers. Some midstream operators purchase petroleum from producers, some are hired by the producers themselves and some are hired by customers in the downstream segment. The midstream segment's bargaining power will be analyzed here, as it is seen as the most appropriate.

Customer bargaining power in the midstream segment is regarded as low. Transportation and storage are usually undertaken by either ships or pipelines. The availability of oil tankers has been at all-time highs in recent years. This has resulted in record low utilization rates and falling prices (Bimco, 2018). The pipeline system on the NCS does not represent a threat to Aker BP. Most pipelines are under governmental control to reduce the risk of monopolization. If one company or petroleum producer controlled the entire pipeline system, it could impose significant costs on other petroleum companies by restricting access to pipelines. To avoid this, the Norwegian government controls the pipeline system and charges low prices for producers to use it. The Norwegian government wants to ensure that no additional costs are imposed on producers and that oil and gas is readily available for those who need it (Norwegian Petroleum, n.d.D).

The downstream segment comprises refineries and end users. Brent and natural gas are commodities and the possibility for product differentiation is low. In addition, the cost to customers of switching between different producers is relatively low, meaning that customers will tend to opt for the cheapest alternative. According to Porter (1979), these factors increase the bargaining power of customers (Porter, 1979). However, the size of the global oil market and the large number of buyers severely limits the influence ordinary customers have on producers. As demonstrated in section 4.3.2.1, market prices are mainly determined by supply and demand. Most individual buyers are not large enough to have a meaningful impact on the supply and demand balance. If one customer is dissatisfied, producers like Aker BP can just sell their products to someone else in a large global market. It should be mentioned that some institutional customers are potentially large enough to impact market prices. Even though large net importers of oil and gas, like the EU, does not attempt to severely impact prices today, it does not mean that they will refrain from doing so in the future. The fact that some buyers can potentially act like a cartel provides some risk for petroleum producers.

For the reasons mentioned above, customer bargaining power is regarded as moderate. Markets are currently in favor of producers, but the possibility that some large institutional customers can affect prices, should they wish to do so, creates some degree of risk.

#### *4.3.3.4 Supplier bargaining power*

Supplier bargaining power tends to increase if a company or industry has few alternatives and switching costs are high. As explained in section 4.1.2, supplier bargaining power can negatively affect profitability if the increased costs cannot be transferred to customers. This is the case in the oil & gas industry as most individual producers, like Aker BP, are not large enough to materially impact the supply and demand balance.

Most suppliers to the oil & gas industry are technologically advanced and highly specialized. Mistakes and accidents caused by suppliers can potentially be very costly for producers. As a result of the large potential for error and the costs associated with these errors, producers are incentivized to choose the absolute best suppliers almost regardless of price. This creates the potential for a high degree of supplier bargaining power as the costs of switching to a less sophisticated supplier can be very high.

A factor potentially reducing the power of suppliers is the cyclicality of the oil & gas industry. Producers' willingness to invest and purchase services from suppliers is highly dependent on current and future petroleum prices. If producers' willingness to invest is highly correlated with oil and gas prices, then so are the revenues of suppliers. Therefore, the potential bargaining power of suppliers can be regarded as highly variable. When oil and gas prices are high, and the demand for suppliers' products are high, suppliers can negotiate and push their prices upwards. Following the severe drop in oil prices in 2014, prices charged by suppliers dropped drastically. Suppliers' prices have not recovered in line with oil and gas prices, and are significantly below what they were pre 2014.

Another factor potentially reducing the power of suppliers is the relative size differences between producers and suppliers. Producers tend to be many times larger than their suppliers, and companies operating in specialized parts of the world, like Equinor and Aker BP, have been known to leverage their relative size in negotiations with suppliers. Equinor and Aker BP represents a huge part of production on the NCS (Norwegian Petroleum, n.d.H). As a result, suppliers providing products and services for production in Norway are highly dependent on these two companies.

Because of the factors discussed above, the bargaining power of suppliers is regarded as moderate. The cost of mistakes, and the somewhat high Brent price predicted in section 4.3.2.1 possibly spurring investments, are seen as positives for suppliers. The relative size of suppliers and producers, cyclicality of investments and the low recovery of supplier prices post 2014 are seen as negatives.

#### *4.3.3.5 Competitive rivalry*

According to basic economic theory, high levels of rivalry within an industry will decrease profitability as companies are often forced to cut prices and compete for resources. There are many factors which can impact the competition within an industry. Two of these factors are: number of competitors and the relative size of these competitors. In 2018, a total of 39 petroleum companies were active in exploration and extraction on the NCS. This is significantly lower than in 2013-2014. The reduction is a result of industry consolidation and some companies experiencing financial distress following the large drop in oil prices in 2014 (Norwegian Petroleum, n.d.E). Even though 39 companies are active, production is dominated by Equinor. Equinor is responsible for approximately 69% of total oil and gas production on the NCS. By adding the relative shares of Aker BP, Shell and ConocoPhillips, approximately 90% of total production is accounted for (Norwegian Petroleum, n.d.H). According to Porter (1979), industry rivalry tends to be high when companies are relatively equal in size and the potential for growth is limited. By looking at total production shares, one might conclude that production on the NCS is in effect a monopoly and therefore relatively low. However, such a conclusion fails to account for the fact that a significant part of Equinor's production comes from old fields acquired many years ago when competition was relatively low. A better measure of current competition is the distribution of new concessions. In the most recent APA concession rounds, Aker BP received almost as many concessions as Equinor (Norwegian Government, 2019B). The relatively equal distribution of new concessions, coupled with the limited potential for growth that a concession system provides, contributes to a higher degree of industry rivalry.

A third factor having an impact on the level of rivalry within an industry is the possibility for product differentiation. Because both Brent and natural gas are commodities, there is limited scope for product differentiation between Norwegian petroleum producers. As explained in section 2.2, there are differences between oils produced in different parts of the world. One positive for Norwegian petroleum producers is the previously discussed IMO 2020 regulations. IMO 2020 will reduce substitutability between oils and increase the demand for Brent. A high international demand for Brent can mitigate some of the potential negative effects of low differentiation opportunities between individual Norwegian producers. If all Norwegian producers can easily sell their output, the need to compete for customers with other domestic producers is reduced. Prices would then mainly be capped by substitutability between oils, not by the competition between Brent producers.

A fourth factor potentially increasing the rivalry within an industry is the capital intensity and exit costs. As previously mentioned, the oil & gas industry, especially offshore, is very capital intensive and requires large amounts of highly educated human capital. Exit costs are high, therefore, once the equipment is in place, prices will have to fall substantially before discontinuing operations is rational. The need for the most talented and experienced workers can create significant competition and strain on profitability as wages gets pushed upwards to attract qualified employees. Examples of the competition in attracting employees can be observed at Norwegian universities' career fairs every year. Petroleum companies are often heavily represented and spends large amounts of money to convince talented students that they are the best place to work.

As a result of the factors described above, the competitive rivalry is regarded as high. Even though increased demand for Brent might mitigate some competition, the effects stemming from industry structure, limited potential for growth and high capital intensity will likely dominate.

#### *4.3.3.6 Summary Porters five forces*

Looking at the forces discussed above, the Norwegian oil & gas industry can be described as relatively attractive. Some factors facilitate possibilities for outperformance and value creation, while others provide challenges that the industry will struggle to overcome. Going forward, there should be opportunities for Aker BP to prosper by carefully managing and reacting to changes influencing the dynamics of the industry. The industry analysis will be highly relevant when forecasting Aker BP's future performance. Considerations regarding the different forces will be especially important when predicting long-term growth rates.

### 4.3.4 Internal resource analysis

An analysis of Aker BP's internal resources will now be conducted. The analysis will be focused on a few key resources considered to be vital for the future profitability and competitive advantage of Aker BP. These key resources will be analyzed using the VRIO framework presented in section 4.2.1.

#### *4.3.4.1 Producing assets and concession portfolio*

The first resource that is seen as absolutely vital to Aker BP's success is their current portfolio of producing fields and concessions. Aker BP currently has ten main oil and gas producing assets. An introduction to these assets was given in section 2.3.2 and they will therefore not be presented further. The current concession portfolio (incl. those currently operated) consists of 136 concessions located in the North-, Norwegian- and Barents Sea. What these concessions entail was described in section 2.4.2 and 4.3.1.1, and will therefore not be explained further. The production assets and concession portfolio will now be evaluated according to the VRIO criteria.

**Value**

Resources will by definition be valuable if they increase income and/or reduce costs. The production assets of Aker BP are definitely valuable. In 2018, these production assets generated a total revenue of approximately USD 3.5 billion and an after-tax net profit of approximately USD 476 million (Aker BP, 2019C). Current production assets are only a part of Aker BP's vast concession portfolio. Their concession portfolio is likely the most valuable resource Aker BP possess. As previously explained, these concessions are required to operate on the NCS and are therefore the foundation on which all current and future operations are based.

**Rare**

Resources are rare if one or only a few companies have them. Oil and gas producing fields and concessions are rare for several reasons. Firstly, the industry is heavily regulated by the Norwegian government. Regulators only allow qualified companies to operate on the NCS. Given that four companies are responsible for approximately 90% of total production, it is clear that large-scale oil and gas producing fields are rare. Concessions given in numbered rounds are regarded as especially rare given the extensive regulatory approval process needed to acquire these concessions. APA concessions are not as rare given the somewhat less extensive approval process. Secondly, concessions (and production fields) are rare because there is by definition a very limited number of them. The NCS is limited in size and some parts will likely never be opened for exploration. In addition, the number of concessions given each year is very limited and may decrease further given the political risks previously described. Competitors can therefore not easily acquire new concessions. Concessions will most likely have to be bought from someone who already owns them.

**Imitability**

Resources tend to be more desirable if they are costly or impossible for competitors to acquire. Producing assets and concessions are costly but not impossible to acquire for those who don't have them. As previously explained, the petroleum industry is very capital intensive. Production equipment is very expensive, and concessions will likely have to be bought from established operators at high prices. The resources are hard to copy because they are mainly based on historic one-time events such as concessions grants and successful exploration and extraction. Aker BP's production assets and concessions can therefore be regarded as providing the potential for sustained competitive advantage.

**Organization**

In order for resources to provide long-term competitive advantage, a company must be organized to optimally take advantage of them. Aker BP is leading within production efficiency and project development. Production efficiency at Aker BP's fields are among the best in the Norwegian petroleum industry. This provides stability, control and reduces costly downtime. All of Aker BP's platforms operate with an intense focus on safety and control, ensuring that as much oil and gas as possible can be extracted as safely as possible (Aker BP, 2019C). Best in class project development and management contributes to Aker BP realizing as much value as possible from their library of concessions, both producing and non-producing.

**Conclusion**

Based on the criteria discussed above, one can conclude that Aker BP's portfolio of producing fields and concessions will be key value drivers in the future. These resources have the potential to create long-term competitive advantage and will contribute to Aker BP's continued growth and success.

#### *4.3.4.2 Culture focused on continuous improvement*

A key to Aker BP's future growth and industry position is their ability to improve and change. Aker BP has managed to build a culture that fosters critical thinking and a desire to always improve. Through management and leadership training, managers are taught how to work together with their team to create the safest and most profitable business environment possible. Data is always collected and analyzed to figure out how they can learn from previous mistakes and improve in the future (Aker BP, 2019C).

**Value**

The ability to change and adapt can be highly valuable for companies and has therefore been the subject of countless research reports. In recent years, Aker BP has shown the ability to improve in key areas such as safety, pollution and operating costs. Much of these improvements can be attributed to a culture that is relentless in its focus on continuous development. Improvements in these areas, and thereby the culture from which they originate, are highly valuable as they can potentially create large costs for Aker BP if mismanaged. For example, the serious injury frequency per million exposure hours (a common safety measure in the oil & gas industry) was reduced by approximately 43% in 2018 and is now in line with Aker BP's biggest competitors. Pollution per boe and the break-even price of new ventures is also continuously decreasing. Improvements such as these are some of the reasons why Aker BP expects record profitability and shareholder distributions going forward (Aker BP, 2019B)

**Rare**

A culture based on adaptability and change is not rare as all companies have it. At least, they all claim to have it. In reality, very few companies are able to continuously improve and adapt to changing market conditions. This is exemplified by legendary company downfalls such as Eastman Kodak and General Motors (Yahoo Finance, 2015). However, among Norwegian petroleum companies, the ability to change and adapt seems to be surprisingly prevalent. Most Norwegian producers were able to significantly reduce costs following the 2014 collapse in oil prices. At the same time, Norwegian petroleum companies continued to invest in new technology, allowing them to become even more efficient once prices returned to higher levels. Several operators also invested large amounts into renewables and have become leading in these areas as well. One can therefore conclude that a culture focused on change and improvement is not particularly rare amongst Aker BP and their competitors. The ability to change and adapt is rather a necessity and not possessing it might be a competitive disadvantage.

**Imitability**

Culture and internal processes are often regarded as hard to imitate because they cannot easily be observed from outside the organization. In addition, it is often hard to discern why or how a culture has developed the way it has. Even though a culture focused on change and continuous improvement might not be rare within the Norwegian petroleum industry, it can still be hard to imitate for companies wanting to enter the industry. The Norwegian petroleum industry is quite tight knit and dominated by a few large companies. Recycling of personnel between the different operators might have contributed to a type of industry culture, instead of a company specific one. The valuable culture is thus based on the history of the Norwegian petroleum industry and cannot easily be duplicated. For example, several of Aker BP's executives, including the CEO, have previously held positions at Equinor (then Statoil) (Aker BP, 2019C). Acquiring the type of culture needed to be successful will most likely require a newcomer to hire many key employees from existing operators. This can be very costly and will reduce the potential profitability of a new venture.

**Organization**

To take advantage of a culture that always wants to improve, processes must be in place so that new initiatives can be implemented effectively. Companies must also be able to analyze and learn from previous mistakes to make sure that things are done better in the future. Aker BP seems to be very focused on providing the necessary structure and processes to learn optimally. They have developed their own training program called "Aker BP Academy" where all employees get courses and training tailor-made to their needs. As mentioned, managers undergo intense training to make sure their team can perform optimally. The Aker BP Academy "curriculum" is always under review and focus is on figuring out how things can be done better. For example, in 2019, Aker BP changed the focus of their periodical performance reviews from performance goals to a more development focused system where future, rather than past, performance is the focus. Another example of the improvement focus is the analysis and review that took place after an accident on the Tambar Platform in 2018. The incident was carefully reviewed, and measures were taken on other platforms to reduce the risk of similar accidents happening in the future. (Aker BP, 2019D)

**Conclusion**

Even though a culture focused on continuous improvement and change might not provide a basis for competitive advantage, it is crucial to effectively compete against other producers on the NCS. Aker BP seems to possess a valuable industry culture and are appropriately organized to take advantage of that culture. Their culture allows them to exploit future opportunities and create value for their shareholders through adaption, effectiveness and innovation.

#### *4.3.4.3 Technological Innovation*

The ability to digitalize a wide range of processes has been, and will be, an important resource in the oil & gas industry. Aker BP has been at the forefront of technological innovations in the industry, providing them with a strong industry position. Going forward, Aker BP must continue to be leading innovators. A part of future value creation will surely be contingent on their ability to innovate, reduce costs and increase efficiency. Aker BP and the petroleum industry's technological focus was covered in section 4.3.1.4 and will therefore not be presented in much detail.

**Value**

Technological innovations have the potential to both increase revenue and decrease costs. The huge potential value creation is why billions of dollars are spent by petroleum companies each year on R&D. Being at the forefront of the technological development will be absolutely crucial if/when political pressures regarding climate and emissions increase. Companies unable to comply with new regulations might be forced out of the industry. Aker BP's current digitalization efforts and ability to stay at the forefront of the technological development is therefore highly valuable.

**Rare**

Being at the forefront of technological innovations is very costly and requires the best human capital available. Aker BP spends tens of millions of USD each year on R&D. Strategic partnerships have been initiated with universities and suppliers to create the best possible atmosphere for innovation and integration (Aker BP, 2019C). Few companies have the resources and capabilities to conduct such R&D efforts themselves. There are significant economies of scale in R&D, which might be another reason why the Norwegian petroleum industry has stayed relatively concentrated. Aker BP's current digitalization efforts and ability to stay at the forefront of technological development are regarded as rare because very few companies currently have the necessary resources and capabilities to conduct the necessary R&D operations.

**Imitability**

A significant problem with technological innovations is that there is often a large second mover advantage. It is usually much cheaper to copy or alter someone else's innovations than to conduct all the research yourself. Patent and copyright laws are established to make sure that an innovator extracts the value from his/her innovations. However, research shows that a majority of patented products and processes are copied within three years (Grant, 2016). As a result, current technology is unlikely to provide long-term competitive advantage. For example, Aker BP recently moved the main Ivar Aasen area control room onshore (Aker BP, 2019C). This is the first control room of its kind in Norway and exemplifies Aker BP's innovation abilities, but several competitors might now do the same to cut costs and increase safety. Therefore, the most valuable resource is not current technology, it is the ability to continuously innovate and create new solutions. The only way to create long-term competitive advantage is to always be the leading innovator. Aker BP has shown an ability to lead the technological development, but given the importance of key personnel in innovation, Aker BP's position as an industry leader is fragile and unlikely to create a reliable competitive advantage. Human capital is generally a less reliable source of long-term competitive advantage as key personnel can be head hunted by competitors. In addition, there is no guarantee that the employees currently in charge of innovation will have the appropriate capabilities to develop groundbreaking technology in the future. Aker BP's current digitalization efforts and ability to stay at the forefront of technological development are regarded as imitable/transferable and likely only provide a short-term competitive advantage.

**Organization**

In order to benefit from innovations, a company must be organized to implement changes effectively. In addition, a proper evaluation process must be in place to ensure that only projects and initiatives with positive net present values are conducted. Technological innovations are fine and dandy, but only projects that create value should be initiated. Unprofitable projects, no matter how groundbreaking they are, destroy value for shareholders. Aker BP seems to be able to implement new technology in a safe and effective manner. As mentioned, strategic partnerships have been established with universities and suppliers to effectively capture value from outside the organization. A continued focus on providing the best atmosphere and backing for improvement and innovation will be absolutely crucial if a seemingly short-term competitive advantage is to persist for a long time.

**Summary**

Aker BP's current digitalization efforts and ability to stay at the forefront of technological development will be crucial for value creation in the years to come. The resources are both valuable and rare, but due to the potential imitability/transferability they will likely not provide a long-term competitive advantage. History is filled with examples of innovative companies losing their position as industry leader.

#### *4.3.4.4 Summary internal resource analysis*

From the analysis above, it can be concluded that Aker BP have several resources on which the company can continue to build a foundation for value creation. They possess many resources in addition to those analyzed, but the presented resources are deemed as some of the most crucial for success. Aker BP's portfolio of production assets and concessions can possibly provide a foundation for long-term competitive advantage. These assets will feature extensively in the next chapter, where future production is forecasted. Culture and innovation will likely not be featured as extensively given their more qualitative nature. However, they will be contributing factors when determining future growth and cost levels.

# 5 Fundamental Valuation

In this chapter a fundamental valuation of Aker BP will be conducted. The strategic analysis from chapter 4 will be the foundation upon which Aker BP's historical and future performance is analyzed and forecasted. Chapter 5 starts with an analysis of historical financial statements to get an overview of current and previous performance. The historical- and strategic analysis will then be utilized to forecast future financial statements. After future financial statements have been forecasted, Aker BP's cost of capital, EV and market value of equity value can be determined using the methods described in chapter 3.

## 5.1 Adjustment and Analysis of Financial Statements

Financial statement analysis consists of analyzing historical- and forecasting future financial statements. Historical financial statements are usually adjusted for unique items and items that are not part of continuous operations, in order to give a more true and fair view of a company's historic- and future profitability. After adjusting for such items, financial statements are usually rearranged to get a more accurate picture of operations and invested capital (Petersen, Plenborg, & Kinserdal, 2017).

### 5.1.1 Adjustments Financial Statements

The future profitability of a company should be forecasted based on adjusted financial statements, as these best represent the core activities of a company. Adjusting financial statements is often referred to as "normalization". "Abnormal" actives are usually not reoccurring and thus not an indication of future profit potential. These abnormal activities should be adjusted for prior to forecasting. "Normal" activities are expected to continue and will naturally not be adjusted for. It should be noted that it is not always straight forward to determine which activities are reoccurring and thus which items should be adjusted.

The primary reason for rearranging financial statements is to separate operating- and financial activities. Income statements are not changed significantly (except for adjustments) as they already separate operating- and financial items. The only major changes are usually the calculation of NOPAT (described in section 3.1.3) based on an estimate of the operating tax-rate and a reclassification of operating lease expenses (Petersen, Plenborg, & Kinserdal, 2017).

In contrast to the income statement, the balance sheet is significantly rearranged to separate operating- and financial activities. Assets and liabilities are classified as either operating or financial. Operating assets minus operating liabilities equals invested capital (Petersen, Plenborg, & Kinserdal, 2017). Invested capital is an important measure for analysts. It represents the amount a company has invested in its operating activities, i.e. the amount of capital which requires a return (Petersen, Plenborg, & Kinserdal, 2017).

Financial assets and liabilities are also netted against each other in a similar way. Net financial liabilities and equity are thus how the net operating assets are financed.

A majority of the accounting items in a balance sheet are quite easily classified as either operational or financial, however, there are still items requiring careful consideration. Such items will be discussed further when relevant during the analysis of Aker BP's historical financial statements.

## 5.2 Analysis of historical income statements

Since Det Norske Oljeselskap ASA merged with the Norwegian branch of British Petroleum (BP Norway) in 2016, this analysis will only look at historical data from 2016 and onwards (Aker BP, 2019A). Balance sheet data will however be presented from 2014 to highlight some of the changes in capital structure that occurred because of the merger. Operations prior to the merger strongly deviate from current operations and older financial statements (other than balance sheets) are thus not particularly relevant. Income statements will be analyzed first, followed by balance sheets and cash flow statements. Unless otherwise stated, all deductions and conclusions presented below are based on Aker BP's annual reports.

### 5.2.1 Income

From 2016 to 2018, both revenues and net income after tax increased significantly. In 2016, revenues amounted to roughly USD 1.36 billion, whereas in 2018, revenues had more than doubled compared to 2016 and equaled USD 3.75 billion. Net income after tax also increased from USD 35 million in 2016 to USD 476 million in 2018. Aker BP looks to be growing at a rapid pace, but the reported income statements must be adjusted to provide a better picture of operations.

Income statements as presented by Aker BP are provided in the appendix. Some key performance measures from reported income statements are presented together with analytical income statements in Table 10. The analytical income statements start with operating revenues before performing the relevant adjustments needed to provide an accurate picture of profitability. Some of the adjustments deserves special attention and will be discussed further below.

| USDm | 2016 | 2017 | 2018 |
|---|---|---|---|
| **Operating revenues** | **1,364** | **2,563** | **3,750** |
| - Total operating expenses | 977 | 1,556 | 1,775 |
| **EBIT** | **387** | **1,007** | **1,975** |
| + Other Op Exp Adjustments | 118 | 59 | 45 |
| + Operating Lease Adjustments | 140 | 177 | 250 |
| **EBIT, Adjusted** | **645** | **1,243** | **2,271** |
| + Depreciation and Amortization | 509 | 727 | 752 |
| **EBITDA, Adjusted** | **1,154** | **1,970** | **3,023** |
| + Exploration Expense | 147 | 226 | 296 |
| **EBITDAX, Adjusted** | 1,007 | 1,744 | 2,727 |
| | | | |
| **EBIT** | **387** | **1,007** | **1,975** |
| + Derivatives | 46 | 7 | 25 |
| + Asset Write-Down | -17 | 21 | 20 |
| + Impairment of Goodwill | 80 | 29 | 0 |
| + Impairment of Intangibles | 8 | 2 | 1 |
| + Operating Lease Adjustments | 140 | 177 | 250 |
| **EBIT, Adjusted** | **645** | **1,243** | **2,271** |
| | | | |
| **Pretax Income** | **290** | **811** | **1,805** |
| + Derivatives | 46 | 7 | 25 |
| + Asset Write-Down | -17 | 21 | 20 |
| + Impairment of Goodwill | 80 | 29 | 0 |
| + Impairment of Intangibles | 8 | 2 | 1 |
| **Pretax Income, Adjusted** | **408** | **870** | **1,850** |

*Table 10 - Adjusted historical income statement*

Reported EBIT is first adjusted for other operating expenses. These adjustments, which are denoted "**Other Op Exp Adjustments**" in Table 10, covers all operating expenses which are not considered general reoccurring production expenses, R&D expenses, depreciation and amortization expenses or provisions for future liabilities. The different items included in Other Op Exp Adjustments can be seen under the EBIT section of Table 10. Asset Write-Down and Impairment of Intangibles (other than goodwill) does not require any special attention in this case, as they are both relatively small and constant. The Derivatives item included in Other Op Exp Adjustments are related to derivatives used to hedge price-, interest rate- and currency risk. Oil price risk is hedged using Brent put options, while interest rate- and currency risks are hedged using swaps (Aker BP, 2019C). Note that not all price-, interest- and currency risks are hedged, as parts of future risk exposure are impossible to predict. These derivatives are marked to market (as required by IFRS) and therefore impact Aker BP's income statement. Fluctuations in derivative values are hard to predict and not something Aker BP can control. It is therefore common to adjust for changes in derivative values to provide an unbiased picture of earnings. Note that commodity derivatives are presented under "other income", while interest and currency derivatives are presented as financial items (Aker BP, 2019C).

Impairment of goodwill deserves some special attention as it decreases substantially from 2016 to 2018. A large part of Aker BP's reported goodwill is described by Aker BP as "Technical Goodwill". Technical goodwill is created by Aker BP to offset deferred taxes. Some concessions owned by Aker BP are valued by discounting after tax cash flows, as required by the *Petroleum Taxation Act Section 10* (Aker BP, 2018A). Most of these concessions were bought from other producers and Aker BP is not entitled to tax reductions for amounts paid over the seller's tax values. To handle this in terms of auditing, a provision is made for deferred taxes, which is equal to the difference between the acquisition cost and tax value multiplied by the applicable tax rate. Technical goodwill is tested for impairment in Q4 every year. The majority of recent Impairment of Goodwill charges were related to downward adjustments of future expected oil prices occurring in 2016 and 2017 (Aker BP, 2018A). In 2018, Alvehim, Valhall/Hod, Skarv/Ærfugl and Ula/Tambar were tested, and no Impairment of Goodwill charge was needed (Aker BP, 2018B). Technical goodwill is dependent on several assumptions and is thus sensitive to market developments. The difficulty of accurately predicting market variables and Aker BP's low impact on these variables, justify adjusting for Impairments of Goodwill to give a better picture of earnings (Aker BP, 2018A).

The last adjustment made to income statements relates to operating leases. Operating leases are originally booked as operating expenses. This treatment of operating leases ignores the fact that operating leases are essentially 100% debt financing. Payments related to operating leases should therefore be regarded as financial expenses (Koller, Goedhart, & Wessels, 2015). By classifying operating lease expenses as financial expenses, adjusted EBIT becomes higher than reported EBIT. Operating leases will be forecasted together with other financial expenses in the forecast section. Reclassifying operating leases has no effect on net income after tax, but it provides a more true and fair view of a company's capital structure. Most of Aker BP's operating lease expenses come from rig lease payments and other concession related lease payments. The rest is related to office premises and payments received on subleases. To create a true and fair view of Aker BP's capital structure, operating leases will be capitalized in the balance sheet section (section 5.2.2).

### 5.2.2 Balance

As for income statements, balance sheets need to be adjusted and/or rearranged to provide an accurate representation of operations. Balance sheets as presented by Aker BP can be found in the appendix. A compressed rearranged balance sheet is presented in Table 11. The presented balance sheet is divided into

1) total assets and 2) total liabilities and equity. Total assets (liabilities) comprise tangible- and non-tangible assets (liabilities) as well as current- and non-current assets (liabilities). The different balance sheet items are then classified as either operating or financial according to Koller et al. (2013)'s principals, although with some adjustments. A few comments regarding what each item comprise, their development and classification will be provided.

| USDm | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Tangible non-current assets | 2,549 | 2,979 | 4,442 | 5,582 | 5,746 |
| Other non-current assets | 2,140 | 1,722 | 3,635 | 3,904 | 4,341 |
| Other current assets | 399 | 397 | 1,063 | 2,300 | 645 |
| Cash and cash equivalents | 296 | 91 | 115 | 233 | 45 |
| Capitalized operating lease | 90 | 471 | 420 | 531 | 750 |
| **Total assets** | 5,474 | 5,660 | 9,675 | 12,550 | 11,527 |
| | | | | | |
| Total equity | 652 | 339 | 2,449 | 2,989 | 2,990 |
| Interest-bearing non-current debt | 2,290 | 2,622 | 2,541 | 1,893 | 2,018 |
| Interest-bearing current debt | 0 | 0 | 0 | 1,496 | 0 |
| Other liabilities | 2,442 | 2,227 | 4,265 | 5,641 | 5,769 |
| Operating liability | 90 | 471 | 420 | 531 | 750 |
| **Total liabilities and equity** | 5,474 | 5,660 | 9,675 | 12,550 | 11,527 |
| | | | | | |
| Net operating assets | 2,930 | 2,945 | 4,930 | 6,335 | 4,960 |
| Net financial liabilities | 2,278 | 2,606 | 2,480 | 1,850 | 1,970 |

*Table 11 - Adjusted historical balance sheet*

#### *5.2.2.1 Assets*

Tangible non-current assets consist solely of property, plant and equipment. These assets are measured at historical cost adjusted for relevant depreciations. In the last four years, tangible non-current assets have more than doubled. The largest increase came in 2016 as a direct consequence of the merger between Det Norske Oljeselskap ASA and BP Norway, while the 2017 increase was mainly a result of Aker BP's acquisition of Hess Norge AS.

Other non-current assets have also increased substantially in the last four years. A large part of the increase came because of the merger in 2016. The remaining increase has mainly been a result of concession acquisitions, and capitalized exploration expenditures related to Johan Sverdrup and Valhall. Both tangible and other non-current assets are a direct result of operations and are therefore classified as operating. However, a small portion of other non-current assets (approximately USD 48 million in 2018), listed as financial assets in Aker BP's reported balance sheets, are not counted as operating.

Other current assets consist of accounts receivable, other short-term receivables, inventories and tax receivables. Inventories, accounts receivable and other short-term receivables have fluctuated somewhat, mainly due to changing oil prices. Tax receivables has fluctuated substantially and spiked in 2017. The spike was caused by a tripling of tax receivables resulting from the acquisition of Hess Norge AS. All items included in other current assets are considered a direct result of operations and are therefore classified as operating assets.

Cash and cash equivalents have generally been low but have fluctuated as a result of mergers and acquisitions. Aker BP does not seem to carry cash in excess of what is needed for on-going operations and no adjustments will be made. Cash and cash equivalents are therefore classified as operating assets.

Operating leases are capitalized and brought onto Aker BP's balance sheet as a separate item. The result is an increase in assets and an offsetting increase in liabilities. Post 2018, new IFRS 16 guidelines will require companies to capitalize operating leases and report them on their balance sheet. This has not been done historically and balance sheets must therefore be adjusted "manually" to provide a true and fair view of a company's capital structure. Operating leases are capitalized according to Moody's methods. Moody's adjust balance sheets to reflect that leased assets are essentially purchased with debt. Moody's suggests that assets and liabilities are increased by an amount equal to the greater of 1) the present value of minimum lease commitments and 2) a company's annual lease payments multiplied by a sector specific multiple. The appropriate multiple for the oil & gas industry is 3 (Moody's, 2018). The multiple approach is used for both historical and forecasted balance sheets. It would be nearly impossible to forecast future minimum lease commitments and the multiple approach is therefore seen as the most prudent approach in the forecast section. To preserve consistency, the multiple approach is also used in the historical analysis. Aker BP's historical assets and liabilities in a given year are thus increased by 3x operating lease expenses.

#### *5.2.2.2 Liabilities*

Historically, interest-bearing non-current debt has comprised a few different loans. In 2018, interest-bearing non-current debt consisted of 1) DETNOR02, a floating rate bond with USD 223 million outstanding, 2) USD 886 million in fixed rate senior notes and 3) a USD 907 million draw on a reserve-based lending facility ("**RBL**") with a maximum capacity of USD 4 billion. In the last four years, total interest-bearing debt (both current and non-current) have been relatively stable, except for a spike in 2017. The spike was caused by a short-term loan of USD 1,496 million related to the acquisition of Hess Norge AS. The short-term loan was repaid as planned in Q4 2018 (Aker BP, 2019C). Interest-bearing current debt has equaled zero throughout the entire period, except for 2017. All interest-bearing debt is classified as financial liabilities.

Capitalized operating leases create a liability on Aker BP's balance sheets. This liability can be regarded as interest-bearing debt and is exactly equal to the capitalized operating lease asset discussed in the previous section.

Other liabilities comprise current and non-current other liabilities. Non-current other liabilities consist mainly of long-term abandonment provisions and deferred taxes. Historically, deferred taxes (sum of deferred tax assets and deferred tax liabilities) have been relatively stable but increased significantly in 2018 as deferred tax assets decreased because of lower abandonment provisions. Pre 2016, long-term abandonment provisions were relatively low but increased significantly following the merger between Det Norske Oljeselskap ASA and BP Norway. Provisions are recognized on the balance sheet when Aker BP incurs legal or self-imposed commitment, i.e. they occur when it is likely that financial settlements will take place and settlement amounts can be reliably estimated. Current other liabilities mostly comprise taxes payable (sum of tax receivable and tax payable) and other current liabilities (Aker BP's own term). Taxes payable has fluctuated significantly due to mergers and acquisitions. Other current liabilities consist of several smaller items, the largest being "share of other current liabilities in licenses". These are liabilities related to licenses where Aker BP has an equity share but is not the main operator. Other current liabilities have been relatively stable in recent years. All items included in other liabilities are classified as operating. Aker BP's book-value of equity will not be discussed, as it is basically just a residual resulting from assets and liabilities.

### 5.2.3 Cash Flow

The reported cash flow statement is split into operating-, investment- and financing cash flows in order to provide a better picture of the various parts of the overall net cash flow. In recent years, a positive development in cash earnings has contributed to a significant increase in cash flow from operations. Cash flow from operations is defined as cash earnings minus the year-on-year change in working capital. Working capital is calculated as the difference between other current assets, interest-bearing current debt and the current part of other liabilities (discussed in the precious section). As a result of mergers and acquisitions, working capital have fluctuated significantly, causing the growth in cash flow from operations to be volatile.

Cash flow from investments has been negative, primarily caused by acquisitions and investments in production assets. It was especially high in 2017 because of the acquisition of Hess Norge. Since 2016, cash flow from financing has fluctuated significantly. In 2017, the positive cash flows from new long-term debt severely outweighed repayments of old long-term debt and dividends, while in 2018, large dividend payments and repayments of debt were the main causes of a negative financing cash flow. No significant adjustments are made to cash flow statements, as non-cash charges are automatically adjusted for by Aker BP (Aker BP, 2019C).

Aker BP's historical financial statements have now been analyzed, adjusted and rearranged to give a better picture of operations. The analysis was useful in understanding which items are subject to large changes and which items will likely stay relatively constant going forward. The different historical financial statements will be referenced when relevant in the forecasting section below.

| USDm | 2016 | 2017 | 2018 |
|---|---|---|---|
| Cash earnings | 1,074 | 2,885 | 2,149 |
| Change in working capital | 178 | 729 | -1,650 |
| Cash flow from investments | -705 | -3,059 | -2,147 |
| Cash flow from financing | -163 | 1,018 | -1,838 |
| Net cash flow | 383 | 1,573 | -3,486 |

*Table 12 - Adjusted historical cash flow statement*

## 5.3 Analysis forecast

The previous section analyzed Aker BP's profitability prior to 2019. Historical income statements, balance sheets and cash flow statements were presented, adjusted and rearranged. Future financial statements will now be forecasted until 2025. Since previous performance is not necessarily an indication of future performance, the objective of the previous section was to establish an understanding of Aker BP at a more detailed level, as well as an understanding of what needs to be forecasted. The strategic analysis and the oil and gas price forecasts from chapter 4 will be crucial in this section. Note that the forecasts will be presented in the same order as the historical analysis. It should also be noted that even though production outlook, estimated income and costs are presented first, these will be impacted by end of year balance sheet numbers from the previous year, which is presented later. Each year's financial statements are connected and should be read in context with each other. In the forecast section, all balance sheet items will be classified as operating or financial as they were in the historical analysis.

### 5.3.1 Production outlook, estimated income and costs

Aker BP's production is expected to increase in 2019. Estimates provided by Aker BP indicate that 2019 production will be in the range of 155 – 160,000 boepd (Aker BP, 2019B). However, due to higher production expectations (than Aker BP's) at the largest fields, such as Alvheim, 2019 production estimates are increased to 160 – 162,000 boepd. This is supported by the fact that Alvheim has consistently beaten expectations since it was first acquired in 2014 (Aker BP, 2019C). In 2018, production at Alvheim slightly decreased, however, based on Aker BP's estimate and the historical outperformance, 2019 production is expected to return to pre-2018 levels. Alvheim's historic production levels and outperformance, and thus the basis for our expectations, can be seen in Figure 7.

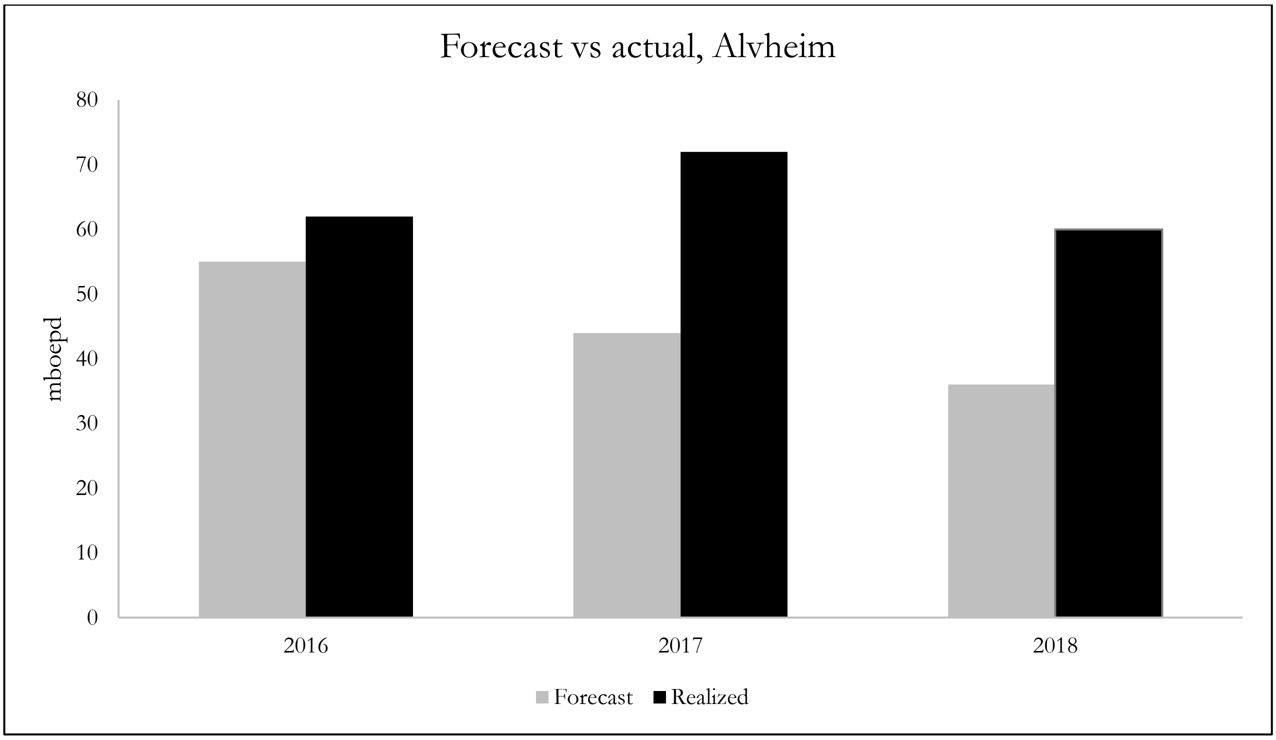


*Figure 7 - Forecast vs actual production at Alvheim*

As was mentioned in the introduction to Aker BP's assets, production at the Johan Sverdrup field is expected to start by November 2019. This will result in a significant production increase in 2020, compared to 2019. Current 2020 production estimates suggest a ~32% year-on-year increase, mostly caused by Johan Sverdrup. Total production capacity at Johan Sverdrup is estimated to equal approximately 440,000 boepd when phase 1 of the development is complete (Equinor, 2017). Aker BP's ownership share of the field amounts to 11.57%. Assuming a production efficiency of 92-97%, which is reasonable given the new technology in place on the field, Johan Sverdrup should increase Aker BP's production by 47 – 50,000 boepd. The efficiency numbers are also supported by Aker BP's own projections, outlined in the 2018 annual report (Aker BP, 2019C). With Johan Sverdrup and the already producing fields, total production should amount to 209 – 214,000 boepd in 2020. It addition, Aker BP has outlined plans to increase output at a few other fields such as Valhall and Skarv in the coming years. Production growth is also expected at the Alvheim area due to high infill drilling activity and extensive further development (Aker BP, 2019C). Total production can be estimated fairly accurately up until 2023. Assuming a constant production at Johan Sverdrup phase 1 and an average production growth of 5% per year for the other production fields, total production is expected to equal 240 – 245,000 boepd by the start of 2023. The average 5% growth per year estimate is seen as reasonable given Aker BP's projections and historic production growth (Aker BP, 2019B). In 2023, Johan Sverdrup phase 2 is expected to be completed, increasing production at Johan Sverdrup by 50% (Aker BP, 2019C). Production from other producing fields is expected to stabilize post 2022, before declining slightly in 2025. In the period 2023-2025, total production from Johan Sverdrup and the other producing fields is expected to equal 260-270,000 boepd. The decreased production from other producing fields in 2025 is a result of declining reserves, as several of these fields have been producing for a long time.

NOAKA is a large new field that can significantly increase production if the initial estimates regarding the field's potential are correct. It is located north of Alvheim and will potentially be developed by Aker BP and Equinor together. Early estimates indicate that the field could provide a total production of up to 155-160,000 mboepd, of which Aker BP would receive a large part (Offshore-Mag, 2018B). The development of NOAKA has been included in Figure 8, but not in the actual production estimates, as planning is far from finalized and the timing of first oil is highly uncertain. Production estimates for 2023-2025 are highly dependent on NOAKA. If successful, NOAKA is expected to contribute with a production growth of roughly 10-20% per year in 2023-2025. In 2025, Aker BP might see a dip in total production if NOAKA does not develop as projected in Figure 8. Since planning at NOAKA is far from finalized, developments can impact both required investments and the timing of first oil. As explained in the strategic analysis, the Norwegian government refunds approximately 78% of investments through short-term tax deductions. It is therefore unlikely that Aker BP's current cash flow outlook will be drastically worsened because of NOAKA developments. As mentioned, NOAKA is not currently included in future production estimates, so it may provide some upside potential to the current cash flow outlook. Finally, as can be seen from Figure 8, Aker BP's own growth estimates are relatively ambitious, and the development of NOAKA is key if Aker BP is to deliver on their targets.

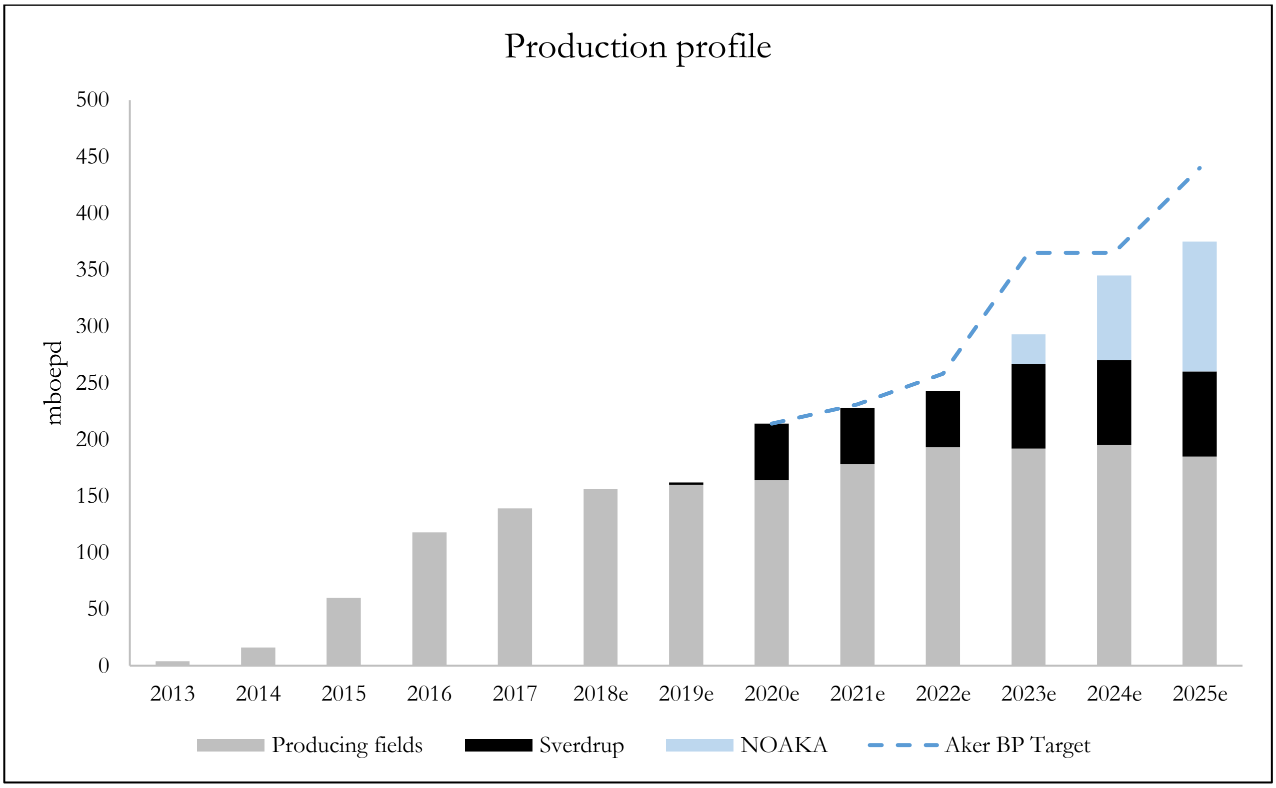


*Figure 8 - Aker BP production outlook (Aker BP, 2019)*

To estimate operating revenues, the relative production split between oil and gas needs to be determined from 2019 and onwards. There is a large variation in the relative split at the different production fields and the relative split may change depending on future developments. In 2018, the relative split between oil and gas was roughly 80/20 in favor of oil and will be assumed constant going forward. As presented in the gas price analysis, an NBP gas price of USD 7 per mcf is assumed going forward. In order to estimate operating revenues, gas prices are converted into USD per boe and combined with the Brent price estimates. A weighted average of Brent and gas prices will thus be used to forecast operating revenues. One boe equals 5,800 cubic feet of gas, which translates into 5.8 mcf. Assuming a gas price of USD 7 per mcf from 2019 and beyond, this translates into USD 40.6 per boe coming from gas. Since the Brent price fluctuates throughout the forecast period, a weighted average realized petroleum price will be used, calculated assuming an 80/20 split between oil and gas.

| | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Production mboepd | 156 | 162 | 214 | 228 | 243 | 267 | 270 | 260 |
| | | | | | | | | |
| Brent price | 72 | 70 | 80 | 70 | 65 | 70 | 70 | 70 |
| Gas price mcf/day | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Gas price USD/boe | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| Weighted average price | 66 | 64 | 72 | 64 | 60 | 64 | 64 | 64 |
| | | | | | | | | |
| Operating costs | -21 | -24 | -17 | -15 | -14 | -13 | -12 | -12 |
| EBITDAX per boe | 45 | 40 | 55 | 49 | 46 | 51 | 52 | 52 |
| | | | | | | | | |
| Operating revenue | 3,750 | 3,791 | 5,633 | 5,336 | 5,332 | 6,249 | 6,319 | 6,085 |
| EBITDAX | 2,702 | 2,349 | 4,274 | 4,055 | 4,055 | 4,943 | 5,097 | 4,908 |
| Exploration expense | 296 | 400 | 350 | 300 | 300 | 300 | 300 | 300 |
| EBITDA | 2,998 | 2,749 | 4,624 | 4,355 | 4,355 | 5,243 | 5,397 | 5,208 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| EBIT | 2,226 | 1,791 | 3,576 | 3,281 | 3,261 | 4,131 | 4,321 | 4,236 |
| Net financial expenses | 171 | 120 | 140 | 120 | 110 | 110 | 110 | 110 |
| Operating lease expenses | 250 | 260 | 343 | 365 | 389 | 428 | 433 | 417 |
| Profit before taxes | 1,805 | 1,412 | 3,093 | 2,796 | 2,761 | 3,593 | 3,778 | 3,710 |
| Taxes | 1,329 | 1,016 | 2,227 | 2,013 | 1,988 | 2,587 | 2,720 | 2,671 |
| Net profit | 476 | 395 | 866 | 783 | 773 | 1,006 | 1,058 | 1,039 |
| | | | | | | | | |
| Dividends | 450 | 750 | 850 | 950 | 1050 | 1150 | 1250 | 1350 |

*Table 13 - Forecasted income statement*

Aker BP's EBITDAX is best forecasted on an individual boe basis. EBITDAX per boe can be determined by subtracting the operating cost per boe from the realized petroleum price. Note that operating cost per boe includes operating lease expenses. Since EBITDAX should be determined before operating lease expenses (operating leases are capitalized), they are added back, thus decreasing the operating cost per boe slightly. Costs related to operating leases will be included in net financial expenses, meaning the forecasted net profit will not be affected.

When Johan Sverdrup becomes fully operational in late 2019, a significant decrease in average operating cost per boe is expected. However, Aker BP indicates that average 2019 operating cost per boe is expected to increase roughly 10-13% compared to 2018 (2018 was an historic low) (Aker BP, 2019B). In 2018, the operating cost per boe amounted to roughly USD 23. From 2019 to 2020, projections indicate a 27-30% decrease in operating cost per boe, thus significantly increasing the EBITDAX margin. From 2021 to 2025, a constant yearly decrease in operating cost per boe of 6% is expected. The decreasing operating cost per boe is mainly driven by Johan Sverdrup's new technology and resulting lower break-even price (Aker BP, 2019C). As Johan Sverdrup phase 2 is completed and production from Johan Sverdrup becomes an even larger part of total production, it is reasonable to assume a further decrease in operating cost per boe.

In 2018, exploration expenses amounted to USD 298 million. It should be noted that exploration expenses are difficult to forecast. Considering that the development of Johan Sverdrup phase 2 continues along with the finalization of phase 1, it seems reasonable to assume a USD 100 million increase in 2019. In 2020, exploration expenses are expected to be USD 50 million lower than in 2019, as phase 1 is finished. Post 2020, it is assumed that exploration expenses at Johan Sverdrup phase 2 will decrease somewhat as the initial exploration is finished, exploration expenses are therefore assumed constant at USD 300 million from 2021 and onwards.

Depreciation is estimated based on the tangible non-current assets of the previous year. Investments on the NCS is depreciated based on a six-year linear schedule (Norwegian Petroleum, n.d.I). Depreciations for a given year is thus equal to the previous year's tangible non-current assets multiplied by 16.667%. This leads to a relative depreciation which is a couple of percent higher than pre 2019, however, the exact depreciation expense is difficult to estimate as an external analyst and 16.667% is seen as the most prudent estimate. Aker BP's EBIT forecast follows directly and can be seen in the Table 13.

Net financial expenses, except for operating lease expenses, are forecasted based on interest-bearing debt, which will be forecasted below along with other balance sheet items. Interest-bearing debt will thus be taken as given in this section. In 2018, net financial expenses equaled USD 421 million, comprising USD 26 million in interest income, USD 142 million in other financial income, USD 120 million in interest expenses, USD 218 million in other financial expenses and USD 250 million in operating leases. Going forward, interest income, other financial income and expenses will be assumed equal to zero. Interest income has historically been relatively small, so the effect should not be significant. Other financial income (expenses) is to a large extent gains (losses) on derivatives, currency gains (losses), reclassifications and changes in fair value. These items fluctuate based on market variables and are impossible to forecast accurately. It is thus reasonable to assume that they will, on average, be approximately zero. Operating lease expenses are forecasted based on boes produced, as operating lease expenses are primarily driven by production. Operating lease expenses in a given year will be set equal to USD 1.6 multiplied by total boes produced. The USD 1.6 multiple is chosen based on 2018 production and operating lease expenses. In 2019, Aker BP's interest expenses are expected to remain constant. This might seem strange considering interest-bearing debt is higher in 2019 than in 2018. However, the reported 2018 interest-bearing debt does not incorporate the short-term debt that was repaid in Q4 2018. In 2020, interest expenses are expected to increase somewhat as Aker BP will likely need to increase interest-bearing debt by drawing on their RBL. As explained below, Aker BP will use their RBL to refinance existing bonds as they fall due. The RBL has a significantly lower interest rate than the maturing bonds. Interest expenses are therefore expected to decrease in 2021 and 2022, as these bonds mature. Post 2021, interest expenses are assumed constant as Aker BP is not projected do draw any more on their RBL. Note that interest expenses might fluctuate as the RBL interest payments are based on LIBOR. Operating lease expenses are expected to increase in line with production. Net financial expenses (sum of interest expenses and operating lease expenses) can be seen in Table 13.

As explained in section 4.3.1.1, companies operating on the NCS pay a special petroleum tax equal to 56%. Aker BP's marginal tax rate is thus 78%. Because of the uplift incorporated to allow for a fair return on investments, the effective tax rate becomes somewhat lower. How much lower is impossible to forecast as an external analyst, as the uplift is based on the company's individual assets and their tax values. Based on historical tax payments, it is assumed that the uplift makes the effective tax rate 6% lower than the marginal tax rate. An effective tax rate of 72% will thus be assumed going forward. Aker BP's tax charge and net profit after tax follows directly. Both can be seen in Table 13.

### 5.3.2 Dividends and balance sheets

In early 2018, Aker BP increased dividend projections past previous expectations and presented increased growth targets. Aker BP currently pays and projects an industry leading dividend yield. It should be noted that Aker BP's 2025 production target (440,000 boepd), which is roughly three times today's output, combined with the impressive dividend yield, is likely considered very attractive amongst investors and could put some upwards pressure on Aker BP's share price. The projected dividend payments entail that Aker BP intends to distribute approximately 38% of their current market capitalization in cash to shareholders over the next five years, while at the same time tripling production output. The CEO of Aker BP stated that they intend to increase dividends by USD 100 million per year (Aker BP, 2019B). This gives the following estimates for dividend yields (shown in Figure 9) based on Aker BP's share price as of 19 March 2019. The 2019 dividend yield is also compared to industry peers (based on share prices as of 19 March 2019).

The projected dividend might be regarded as unrealistic by some analysts, considering the large projected mismatch between free cash flow and dividend in 2019. High investments at both Johan Sverdrup and Valhall will significantly impact 2019 cash flow, however, Aker BP will likely increase leverage to keep dividend promises. This is arguably a good move from an investor's perspective, considering Aker BP currently has relatively low leverage on their balance sheet. As mentioned in section 5.2, they have only utilized a small portion of their RBL and have a favorable post-tax funding cost of only approximately 2-3%.

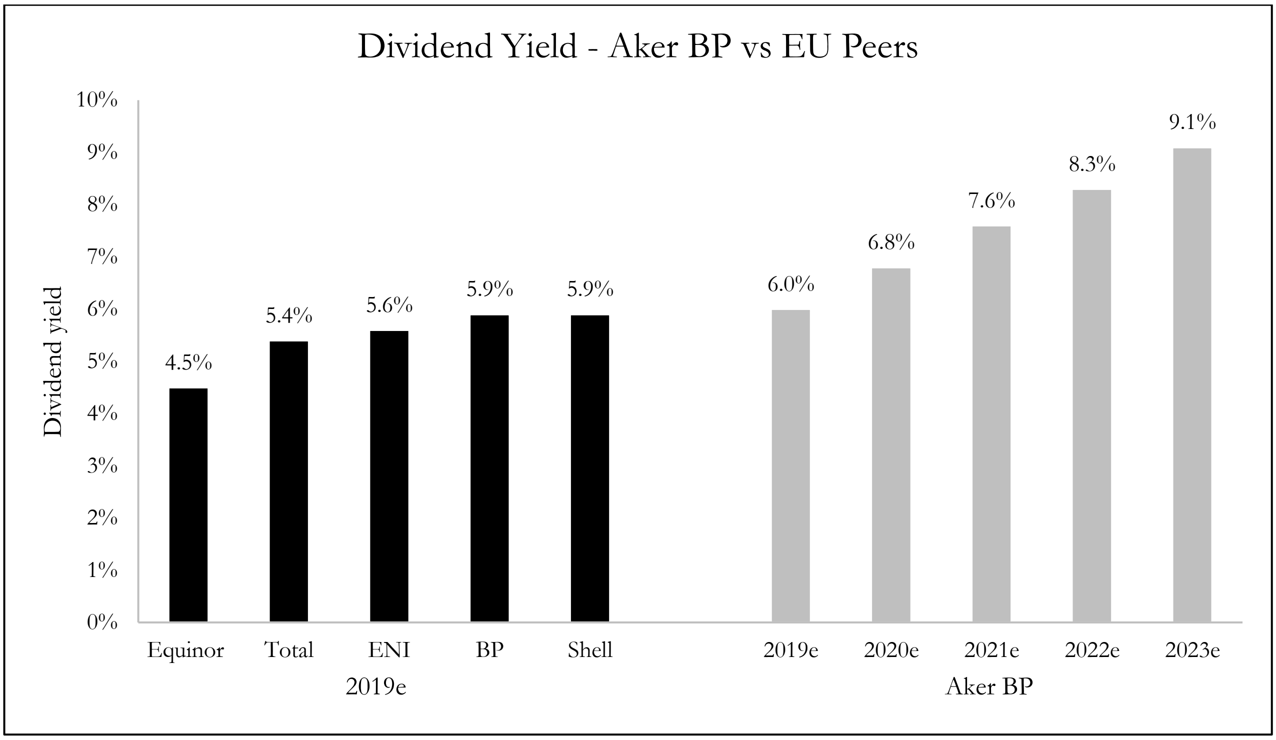


*Figure 9 - Dividend yields*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Tangible non-current assets | 5,746 | 6,288 | 6,440 | 6,567 | 6,673 | 6,460 | 5,834 | 5,312 |
| Other non-current assets | 4,293 | 4,293 | 4,293 | 4,293 | 4,293 | 4,293 | 4,293 | 4,293 |
| Other current assets | 693 | 692 | 708 | 722 | 734 | 711 | 642 | 584 |
| Cash and cash equivalents | 45 | 130 | 94 | 100 | 118 | 186 | 621 | 832 |
| Capitalized operating leases | 750 | 779 | 1,029 | 1,096 | 1,168 | 1,284 | 1,298 | 1,250 |
| **Total assets** | 11,527 | 12,182 | 12,565 | 12,779 | 12,986 | 12,934 | 12,687 | 12,270 |
| | | | | | | | | |
| Total equity | 2,990 | 2,635 | 2,651 | 2,484 | 2,207 | 2,064 | 1,871 | 1,560 |
| Interest-bearing non-current debt | 2,018 | 3,000 | 3,100 | 3,400 | 3,800 | 3,800 | 3,800 | 3,800 |
| Interest-bearing current debt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other liability | 5,769 | 5,768 | 5,784 | 5,798 | 5,810 | 5,787 | 5,718 | 5,660 |
| Operating liability | 750 | 779 | 1,029 | 1,096 | 1,168 | 1,284 | 1,298 | 1,250 |
| **Total liabilities** | 11,527 | 12,182 | 12,565 | 12,779 | 12,986 | 12,934 | 12,687 | 12,270 |
| | | | | | | | | |
| Net operating assets | 5,008 | 5,635 | 5,751 | 5,884 | 6,007 | 5,864 | 5,671 | 5,360 |
| Net financial liabilities | 2,018 | 3,000 | 3,100 | 3,400 | 3,800 | 3,800 | 3,800 | 3,800 |

*Table 14 - Forecasted balance sheet*

Interest-bearing non-current debt totaled USD 2,018 million in 2018, comprising a USD 908 million draw on the RBL and USD 1,110 million in outstanding bonds. The exact development in interest-bearing non-current debt is hard to determine, but Aker BP will likely have to increase the draw on their RBL. This is because cash flows from operations and investments are projected to be low as a result of high investments at Johan Sverdrup and Valhall. Also, Aker BP's promised dividend payments will cause further pressure on cash reserves, in effect forcing Aker BP to perform a dividend recap using their RBL. In 2019, a large increase in interest-bearing non-current debt of almost USD 1,000 million is expected based on estimates. Post 2019, it is expected that interest-bearing non-current debt will be increased if necessary to fund investments and dividends. Interest-bearing current debt is assumed to equal zero throughout the period. This is somewhat inconsistent as the maturing bonds are technically current debt when their time to maturity is less than one year, however, it is assumed that the maturing debt will be refinanced using the RBL. The simplification will thus not influence cash flows.

Given the projected production numbers, analysis suggests that Aker BP's dividend policy is achievable for Brent prices substantially below current forecasts. Aker BP has a low market-based leverage ratio, and if needed they can significantly increase debt to keep promised dividend payments. A possible solution could be to refinance parts of the RBL using a new long-term bond. The 2023 dividend yield of 9.1% thus seems robust and is also strengthened by possible production upside. Aker BP also has substantial balance sheet capacity to perform further acquisitions. Such acquisitions will obviously not be incorporated into forecasts, but if undertaken, they will have a significant impact on future production, capital structure and cash flow.

Changes in tangible non-current assets can be forecasted as a direct result of depreciation forecasts and cash flow from investments. As explained above, depreciations are forecasted as a percentage of the previous year's tangible non-current assets. Cash flow from investments are forecasted and explained in the cash flow section below (section 5.3.3) and will therefore be taken as given here. Tangible non-current assets are calculated as the previous year's tangible non-current assets plus cash flow from investments minus depreciations. A negative cash flow from investments indicates an increase in assets. Projected tangible non-current assets follows directly from other forecasted items and can be seen in Table 14.

Other non-current assets consist of roughly 50% goodwill and 50% other intangible assets (mostly concessions resulting from acquisitions). As will be explained below, no new acquisitions of concessions are projected going forward. Concessions granted to Aker BP from the Norwegian government are off-balance sheet assets and will thus not influence other non-current assets or cash flows.

Historically, other current assets have mostly comprised accounts receivable from sale of petroleum and other short-term receivables. As mentioned in section 5.2.2, other current assets spiked in 2017 caused by tax receivables from the acquisition of Hess Norge. This was a one-time effect and will be ignored in the forecasts. A margin relative to tangible non-current assets is deemed as the most appropriate way of forecasting other current assets. Even though accounts receivables related to sale of petroleum is closely linked to oil and gas prices, the majority of other current assets comes from other short-term receivables, which are not as closely linked to sales. Other current assets are thus determined as 11% of tangible non-current assets. The ratio is based on the historic ratio between the two items and is assumed constant going forward. Note that other current assets are small relative to other balance sheet items and will likely have a low impact on cash flow in any case.

Cash and cash equivalents are calculated as the previous year's cash plus net cash flow. Net cash flow is forecasted in the cash flow section below and will thus be taken as given here. Forecasted cash and cash equivalents can be seen in Table 14.

Changes in total equity are determined by forecasted net profits and Aker BP´s official dividend projections. Total equity is equal to the previous year's total equity plus net profit minus dividend. Given the current estimates of Aker BP´s future profits and dividend expectations, total equity will decrease as the expected dividends are larger than the expected net profits.

As in the historical analysis, capitalized operating lease assets and liabilities are assumed to be three times the operating lease costs. Operating lease costs can be found under net financials in the income statement section (section 5.3.1).

Other liabilities are forecasted as a residual based on total assets, interest- bearing debt and total equity. The reason being that the relative changes in the items included in other liabilities are difficult to forecast. As in the historic analysis, all items included in other liabilities will be classified as operating.

### 5.3.3 Cash flow

Cash earnings is forecasted based on profits before tax, taxes paid and depreciations. It should be noted that taxes on profits during a year are usually different from the taxes paid in that specific year. The difference is hard to forecast as an external analyst. It is assumed that taxes accrued equals taxes paid, as the difference will likely balance itself out considering accrued taxes need to be paid at some point. Associated income, loss/gain on sale of assets and other non-cash items will also affect cash earnings. At this point in time, Aker BP has no publicly stated plans to sell assets so these items will be assumed equal to zero (Aker BP, 2019C). Cash earnings follow directly from other forecasted items.

Working capital is often closely linked to production volume or operating revenue, and it would therefore be natural to assume increases in working capital going forward. However, as Aker BP's other current assets is assumed to remain relatively constant, and historically current liabilities have remained mostly unchanged/unaffected by sales, there is no reason to believe that large changes in working capital will occur going forward. Expected changes in working capital is thus set equal to zero from 2019 to 2025.

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Cash earnings | 2,150 | 1,353 | 1,914 | 1,856 | 1,868 | 2,118 | 2,135 | 2,011 |
| Change in working capital | 1,649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cash flow from investments | -2,147 | -1,500 | -1,200 | -1,200 | -1,200 | -900 | -450 | -450 |
| Cash flow from investments (lease) | -219 | -29 | -250 | -67 | -72 | -115 | -14 | 48 |
| Cash flow from financing | -1,838 | 232 | -750 | -650 | -650 | -1,150 | -1,250 | -1,350 |
| Cash flow from financing (lease) | 219 | 29 | 250 | 67 | 72 | 115 | 14 | -48 |
| **Net cash flow** | **-186** | **85** | **-36** | **6** | **18** | **68** | **435** | **211** |

*Table 15 - Forecasted cash flow statement*

Cash flow from investing activities is determined as the sum of acquisitions and divestments, disbursements on investments in fixed assets, disbursements on investments in capitalized explorations and disbursements on investments in concessions. This cash flow analysis ignores potential investments in NOAKA, as these investments are too far into the future to forecast accurately. As explained in section 5.3.1, investments in NOAKA will likely not impact net cash flow significantly in the long run, given the depreciation schedule and tax deductibility of such capitalized exploration investments.

No acquisitions of companies and divestments of business units are included in forecasts given the one-off nature and unpredictability of such activities. Aker BP purchased concessions from external operators twice in 2018. This caused the disbursements on investments in concessions to be higher than expected going forward. Purchase and sale of concessions are not reoccurring activities and therefore difficult to forecast, consequently this item will be assumed to equal zero going forward. There is a significant amount of uncertainty in this estimate given the large cash inflows or outflows related to such investments. Aker BP has not explicitly stated anything regarding acquisitions of concessions going forward.

Aker BP states that the majority of investments related to Johan Sverdrup are complete and expects total investments to decrease going forward (Aker BP, 2019C). A 10% decrease in disbursements on investments in fixed assets is assumed from 2018 to 2019. A 25% decrease in disbursements on investments in fixed assets is assumed as phase 1 of Johan Sverdrup is completed. After the completion of Johan Sverdrup phase 2, cash flow from investments are expected to drop by 25% per year from 2022 to 2024. Investments are then expected to stabilize at a level of USD 450 million per year. Once again, it is reiterated that this excludes possible investments related to NOAKA. Cash flow from investments can be seen in Table 15.

Cash flow from financing is determined as the change in interest-bearing debt minus dividends paid. From 2018 to 2019, an increase in interest-bearing debt of roughly USD 1,000 is expected. The large increase in interest-bearing debt cause a positive cash flow from financing. Post 2019, cash flows from financing are expected to be negative as a result of Aker BP's large projected dividend payments. As explained above, Aker BP is expected to draw on their RBL if needed. Cash flow from financing follows from other forecasted items and can be seen in Table 15.

The net cash flow follows as the sum of cash earnings, change in working capital, cash flow from investments and cash flow from financing.

The forecasting of Aker BP's future performance has now been conducted. The presented case is obviously quite bullish. Alternative scenarios based on different assumptions and developments will be presented in chapter 7. Both FCFF and FCFE have been forecasted until 2026. A cost of capital will now be estimated, before future cash flows are discounted and the fundamental valuation of Aker BP is completed.

## 5.4 Cost of Capital

This section will utilize the methods described in section 3.2 to derive a cost of equity, cost of debt and WACC. After the relevant cost of capitals have been determined, the fundamental valuation using the FCFF and FCFE models will be performed in section 5.4.4. This section will be rather brief, considering the theory behind these models has already been presented.

### 5.4.1 Cost of equity

Two separate methods will be used to determine Aker BP's cost of equity. The first method will be the classic CAPM, while the second method will be the Fama-French 3-factor model. Two versions of the Fama-French 3-factor model will be utilized; one based on Aker BP's own historical returns and one based on the historical returns of comparable companies. The following sections will also discuss the choice of market risk premium ("**MRP**"), risk-free rate, SMB premium, HML premium and comparable companies.

#### *5.4.1.1 Capital asset pricing model*

The CAPM-beta will be estimated based on daily returns from the last two years. Betas can also be estimated based on weekly, monthly and yearly returns. Each approach has its pros and cons, however, using daily returns from the last two years is deemed as the most appropriate considering the comparable companies' and Aker BP's recent structural changes. Beta estimates are thus based on data from March 2017 to March 2019. Daily returns are also chosen, instead of weekly or monthly, to provide enough observations to make the estimates statistically relevant.

The S&P 500 index is chosen as the market proxy. As described in section 3.2.3.1, several other proxies can be utilized, but the S&P 500 index is chosen based on its size, liquidity and global significance. Aker

BP's estimated raw beta equals 0.67 and is statistically significant with a t-statistic of 5.938. Note that the beta estimate is sensitive to the chosen time horizon. Increasing the time horizon to 15 years, increases the beta estimate to 0.83. Shortening the time horizon to the last six months, increases the beta estimate to 0.90.

The public consensus seems to be that the MRP will increase slightly going into 2019, compared to previous estimates. KPMG and Duff & Phelps recommend an MRP of 5.5% by the end of December 2018 (KPMG, 2018) (Duff & Phelps, 2019). The MRP increase is likely caused by high market volatility and increased risk aversion amongst investors. Several factors have contributed to the recent increase in market volatility and risk aversion. The Tax Cuts and Jobs Act, enacted at the end of 2017, significantly reduced US corporate tax payments. After tax corporate earnings were therefore likely to surpass previous expectations. This created hope amongst investors that US companies would increase dividend payouts and share buybacks, causing stock prices to rise (Duff & Phelps, 2019). The increased corporate earnings also contributed to increased inflation, which resulted in fears of additional interest rate hikes. These fears can also be seen from several spikes in the volatility index (VIX) in 2018 (Yahoo Finance, n.d.). In spite of a decrease in early 2018, the S&P 500 index reached record high levels by September 2018. The good times changed during the last quarter of 2018, when U.S. stocks suffered large losses, causing increased volatility and a significant widening of credit spreads. Several market indices ended the year with negative returns, providing the worst performance since 2008 (Duff & Phelps, 2019). One can argue that these negative returns have "reminded" investors that negative returns are possible, thus increasing risk aversion. An MRP of 5.5% seems reasonable and is chosen as the relevant MRP for estimating a cost of equity. This is somewhat lower than the ~10% average 90-year historic return of the S&P 500 index (Investopedia, n.d.G). However, as mentioned in section 3.2.3.3, historic returns are likely impacted by survivorship bias.

The yield to maturity on 30-year US government bonds will be used as a proxy for the risk-free rate. 30-year US government bonds are chosen because of the reasons presented in section 3.2.3.2. Currently, the YTM on 30-year US government bonds equals approximately 2.94%, which will be used as the risk-free rate in the cost of equity calculations below (U.S. Department of the Treasury, n.d.).

The presented values result in a CAPM cost of equity for Aker BP of 6.61%. Aker BP's CAPM cost of equity will now be compared to cost of equities based on the Fama-French 3-factor model using both Aker BP's historical returns and the historical returns of comparable companies.

#### 5.4.1.2 Fama-French 3-factor model

Factor betas, and thus a cost of equity, will first be estimated using Aker BP's own returns. Later, factor betas will be estimated using the returns of comparable companies.

French provides daily factor data up until February 2019 on his website (French, n.d.). The time horizon used to estimate factor betas will be from January 2017 to January 2019. Since the Fama-French 3-factor model uses excess returns, the returns of Aker BP need to be adjusted with risk-free rates. French provides daily risk-risk free rate estimates, which Fama and French use in their research. These estimates will be used to adjust daily returns. For the last two years, daily risk-free rates have been in the range 0-0.01%. The impact on returns are thus minimal. Estimated factor beats can be seen in Table 16.

The MRP used in the standard CAPM will also be used in the Fama-French model. Several approaches can be taken when constructing the SMB and HML portfolios and when estimating the relevant risk premiums. SMB and HML portfolio returns provided by French will be utilized here. Risk premiums will be based on the historic average return of French's portfolios. Historic average return is highly dependent on the estimation period. Since a longer estimation period includes more than one economic cycle, estimates of SMB and HML risk premiums will be based on a 20-year estimation period. Using a 20-year estimation period provides an HML risk premium of 3.91%. It should be noted that using a shorter estimation period indicate a negative HML risk premium. Negative risk premiums are not in line with the theory on which the model is based and supports the use of a longer estimation period (Fama & French, 1996). The historic average return of the SMB portfolio is not as affected by the length of the estimation period. The historic average return is equal to 2.47%, which will be used as the SMB risk premium. The Fama-French 3-factor model cost of equity based on Aker BP's returns equal 9.3%.

| Fama-French betas | MKT-rf | SMB | HML |
|---|---|---|---|
| Aker BP ASA | 0.74 | 0.06 | 0.56 |

*Table 16 - Fama-French beta values*

#### 5.4.1.3 Fama-French 3-factor model comparable companies

The 3-factor model is able to explain the historic returns of comparable companies better than the CAPM for all relevant companies. A CAPM cost of equity based on comparable companies will therefore not be presented. Comparable companies' factor betas will be estimated by regressing the comparable companies' returns with the market- and factor portfolio returns. Beta estimates will then be un-levered using equation 25. Industry factor betas will be estimated by averaging the un-levered betas of the comparable companies, significant outliers will however be removed from the sample if deemed appropriate. These industry factor betas will then be re-levered to fit Aker BP's capital structure.

Eight companies have been chosen as comparable companies. The companies are listed in Table 17 and have been chosen because they have similar operational activities as Aker BP. Other companies could have been chosen, but the chosen companies are seen as the most comparable given Aker BP's current structure. All the comparable companies are undiversified E&P companies. Most of them conduct a large part of their operations offshore. Some of the largest petroleum companies in the world such as Equinor, ExxonMobil and Shell were not chosen because they operate all over the world and are involved in a vast range of different activities.

Each comparable companies' raw- and un-levered factor betas can be seen in Table 17. The net financial liabilities and equity values used to un-lever raw betas are based on market values gathered from the Bloomberg terminal. As mentioned in section 3.2.1, market values are the most relevant when calculating a forward-looking cost of capital. The relevant tax rate is the effective tax rate from 2018 annual reports. The effective tax rate equals the income tax expense divided by the pre-tax income. Note that the effective tax rates vary among the comparable companies depending on where they operate and where they are incorporated. Factor betas are un-levered using equation 25 (almost the same as the one presented in section 3.2.3.1.).

$$\beta_{K,unlevered} = \frac{\beta_{K,levered}}{\left(1 + \frac{Net\ financial\ liabilities}{equity} * (1 - tax\ rate)\right)} \tag{25}$$

The variations in un-levered factor betas are quite large. This creates uncertainty regarding industry beta estimates. The un-levered market betas are in the range of 0.06-1.16. Nostrum Oil & Gas' estimated un-levered market beta equals 0.06 and is excluded from the average estimated un-levered market beta, as it differs greatly from the other beta estimates.

Aker BP's re-levered market beta equals 0.63. The industry SMB beta excludes Rockhopper Exploration as their un-levered SMB beta is significantly lower than the other companies'. Rockhopper Exploration is the smallest company in the sample in terms of boepds produced and may not be as comparable to Aker BP as the rest. Aker BP's re-levered SMB beta equals 0.27. Aker BP's re-levered HML beta is calculated excluding Nostrum Oil & Gas and Serica Energy, and equals 0.54. It should be noted that the adjustments made to the averages are subjective. Different analysts may adjust according to different criteria.

| Fama-French betas | MKT-rf Raw | MKT-rf Un-levered | SMB Raw | SMB Un-levered | HML Raw | HML Un-levered |
|---|---|---|---|---|---|---|
| Lundin Petroleum AB | 0.73 | 0.70 | 0.33 | 0.31 | 0.52 | 0.50 |
| Premier Oil PLC | 1.14 | 0.49 | 0.86 | 0.36 | 1.53 | 0.65 |
| EnQuest PLC | 1.10 | 0.14 | 0.74 | 0.09 | 1.39 | 0.18 |
| Cairn Energy PLC | 0.76 | 0.67 | 0.39 | 0.34 | 0.97 | 0.86 |
| Hurricane Energy PLC | 0.62 | 0.58 | 0.78 | 0.72 | 0.46 | 0.42 |
| Rockhopper Exploration PLC | 0.84 | 1.16 | -0.21 | -0.29 | 0.36 | 0.49 |
| Nostrum Oil & Gas PLC | 0.45 | 0.06 | 0.55 | 0.08 | 0.14 | 0.02 |
| Serica Energy PLC | 0.44 | 0.52 | -0.09 | -0.11 | -0.12 | -0.14 |
| **Aker BP Re-levered** | | **0.63** | | **0.27** | | **0.54** |

*Table 17 - Fama-French comparable companies beta values*

The estimated factor betas based on comparable companies paired with the market, SMB and HML risk premiums, provide a cost of equity equal to 9.2% for Aker BP. This is similar to the Fama-French 3-factor model estimate based on Aker BP's returns. The fact that two different approaches provide very similar results, contribute to the belief that the estimates are reasonable.

### 5.4.2 Cost of debt

As mentioned in section 5.2.2.2, Aker BP has multiple types of debt. The main bank facility is the RBL, carrying an interest of LIBOR plus 2-3% yearly. DETNOR02 carries an interest of 3-month NIBOR + 6.50%, with coupons paid quarterly. It should be noted that this NIBOR exposure is swapped for LIBOR + 6.81%. Aker BP also has two notes with coupons payable semi-annually. The two notes are: a USD 400 million 6% senior note due in 2022 and a USD 500 million 5.875% senior note due in 2025. Each interest-bearing debt facility could be evaluated and rated individually but this is regarded as unnecessary, as all of Aker BP's interest-bearing debt have the same seniority. In section 3.2.5, it was argued that in efficient markets the cost of debt should equal the expected return on debt and be approximately equal to the YTM. This does however only hold if the probability of default is low. Aker BP's debt is rated by both S&P and Moody's, holding a BB+ long-term corporate credit rating from S&P and a Ba1 corporate family rating from Moody's. It has been stated that these ratings have a stable outlook (Aker BP, n.d.A). Given this information, a pre-tax cost of debt can be derived by adding the implied credit spread to the risk-free rate. This estimated cost of debt will be slightly biased upwards, as Aker BP is not investment grade rated, and there is a modest probability of default. Moody's data suggest a 365-bps implied credit spread for companies with a rating of Ba1. The implied credit spread is based on corporate bonds with a 15-year horizon (Moody's, 2019). Adding the risk-free rate to the implied credit spread, provides a cost of debt equal to 6.59%. It should be noted that the 15-year implied credit spread is the longest maturity available. One can argue that the implied credit spread should be higher given the "infinite" maturity of a company. The impact on the valuation from these different limitations is however minimal. Aker BP has a low market-based leverage ratio and interest payments are fully deductible. The method used above is therefore seen as prudent even though it was argued in section 3.2.5 that credit spreads should mainly be used for investment grade rated companies.

#### 5.4.3 Weighted average cost of capital

The Fama-French cost of equity will be the cost of equity used in the WACC calculation, as the Fama-French 3-factor model consistently explained past returns better than the standard CAPM for Aker BP and all comparable companies. Recall that the Fama-French cost of equity based on historical Aker BP returns equaled 9.3% and the cost of equity based on comparable companies equaled 9.2%. The cost of equity used to estimate WACC and discount FCFEs is 9.2%. The tax rate used to calculate after tax cost of debt is the assumed effective tax rate of 72% (same as in the forecast section). Aker BP's market value of equity is set equal to their market cap on the day following the release of the 2018 annual report, while the net financial liabilities used in the WACC calculation is from the 2018 annual report. It is thus assumed that net financial liabilities have not changed in the first three months of 2019. Aker BP's estimated WACC follows directly from this information and equals 8.2%. The WACC of 8.19% and cost of equity of 9.2% will now be utilized to discount Aker BP's FCFF and FCFE.

#### 5.4.4 Discounting

Aker BP's future cash flows can now be discounted with the applicable cost of capital. An estimate of enterprise value and market value of equity derived using the free cash flow to firm method will be presented first, followed by an estimate of the market value of equity using the free cash flow to equity method. Terminal values will be determined in two fundamentally different ways. The first is by using Gordon's growth model, described in section 3.1.1. Gordon's growth model will be applied using the calculated cost of capital and an eternal free cash flow growth rate of 2%. The eternal growth rate of 2% is chosen based on Aker BP's future production outlook and the expected USD inflation. As have been mentioned several times, growth in production post 2025 is highly uncertain given the current political situation regarding concessions. Developments at NOAKA are also highly uncertain and will not be accounted for. The FED's inflation target of 2% is therefore seen as a reasonable estimate (FED, n.d.B). No growth in production and constant margins are thus implicitly assumed. One could argue that using a model assuming eternal cash flows is inconsistent with the resource scarcity described in section 4.3.1.3. However, assuming a 2% growth until 2050 and no cash flows thereafter, provides a terminal value relatively close to the one provided by Gordon's growth model. Using Gordon's growth model is therefore seen as prudent.

The second approach to calculating a terminal value, will be a multiples approach. A terminal value will be calculated based on forecasted EBITDA and the EV/EBITDA multiple. This is similar to the approach taken by buyout funds in LBO transactions. The future EV/EBITDA multiple is assumed equal to the current EV/EBITDA multiple based on comparable companies, calculated in the next chapter (taken as given in this chapter). Assuming a constant EV/EBITDA multiple is seen as reasonable given that the current oil price is relatively close to the long-term forecasted oil price.

#### 5.4.4.1 *Free cash flow to firm method*

Future FCFFs, terminal values, enterprise values and share price estimates can be seen in Table 18. It is no surprise that the majority of the enterprise value comes from the terminal value. This is relatively common in these types of valuations given the relative length of the two periods. There is a significant difference in the terminal values calculated using the two approaches. The un-adjusted multiples approach provides a terminal value approximately USD 9 billion higher than the one calculated using Gordon's growth model. Table 18 provides estimates using both an un-adjusted and adjusted (excl. Serica Energy) EV/EBITDA multiple. Share price is calculated assuming that the total number of outstanding shares equal 360,113,509 (Aker BP, 2019C).

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| NOPAT | 623 | 502 | 1,001 | 919 | 913 | 1,157 | 1,210 | 1,186 |
| CAPEX | -2,366 | -1,529 | -1,450 | -1,267 | -1,272 | -1,015 | -464 | -402 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| **FCFF** | **-971** | **-70** | **599** | **725** | **735** | **1,253** | **1,822** | **1,756** |
| Gordon Terminal | | 28,936 | | | | | | |
| EV Gordon | | 19,963 | | | | | | |
| **Share Price Gordon NOK** | | **436** | | | | | | |
| Multiple Terminal un-adjusted | | 37,439 | | | | | | |
| EV Multiple un-adjusted | | 24,493 | | | | | | |
| **Share Price Multiple un-adjusted NOK** | | **546** | | | | | | |
| **Share Price Multiple adjusted NOK** | | **445** | | | | | | |

*Table 18 - FCFF share price estimates*

#### 5.4.4.2 *Free cash flow to equity method*

Future FCFEs, terminal values, market value of equity and share price estimates can be seen in Table 19. Like in the FCFF method above, Aker BP's market value of equity calculated using the FCFE method is highly dependent on the terminal value. Since the P/E multiple is highly dependent on the future capital structure of comparable companies, which is outside the scope of this thesis, the EV/EBITDA multiple is used in the multiples approach in this section as well. For the same reasons as above, the market value of equity is significantly larger when determining the terminal value using un-adjusted multiples. Table

19 provides estimates using both an un-adjusted and adjusted (excl. Serica Energy) EV/EBITDA multiple.

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Net Profit | 476 | 395 | 866 | 783 | 773 | 1,006 | 1,058 | 1,039 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| Cash flow from investments | -2,147 | -1,500 | -1,200 | -1,200 | -1,200 | -900 | -450 | -450 |
| Change in working capital | -1,649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cash flow from financing | -1,838 | 232 | -750 | -650 | -650 | -1,150 | -1,250 | -1,350 |
| Dividends | 450 | 750 | 850 | 950 | 1,050 | 1,150 | 1,250 | 1,350 |
| **FCFE** | **-3,936** | **835** | **814** | **956** | **1,068** | **1,218** | **1,685** | **1,561** |
| Gordon Terminal | | 22,113 | | | | | | |
| Market Cap Gordon | | 16,490 | | | | | | |
| **Share Price Gordon NOK** | | **401** | | | | | | |
| Multiple Terminal un-adjusted | | 33,639 | | | | | | |
| Market Cap Multiple un-adjusted | | 22,190 | | | | | | |
| **Share Price Multiple un-adjusted NOK** | | **540** | | | | | | |
| **Share Price Multiple adjusted NOK** | | **445** | | | | | | |

*Table 19 - FCFE share price estimates*

This concludes chapter 5. A relative valuation of Aker BP using the same comparable companies will be conducted in the next chapter. The final share price estimate and investment recommendation will be presented in chapter 8, following the relative valuation and a sensitivity analysis.

# 6 Relative valuation

In this chapter a relative valuation of Aker BP will be conducted. Aker BP's enterprise value and market value of equity will be estimated based on a selection of the multiples presented in chapter 3. The chosen multiples will likely provide different value estimates. A final estimate of enterprise value and market value of equity will be chosen based on a subjective weighting of the different estimates. The subjective weighting will depend on the perceived accurateness of the relevant parameters and on how common the multiples are among real world financial analysts.[4]

The relative valuation will be based on the same comparable companies used to estimate Aker BP's cost of equity. Reasons why these companies are appropriate comparisons were given in section 5.4.1.3 and will thus not be discussed further. The relative valuation will be based on adjusted financial statements provided by Bloomberg. Using Bloomberg's adjusted financial statements is not an optimal approach, however, it is seen as a reasonable compromise given the limited scope of this thesis.

## 6.1 Enterprise Value

To estimate Aker BP's enterprise value, most enterprise value multiples presented in chapter 3 will be utilized. EV/EBITDAX will be excluded as only two of the comparable companies explicitly report exploration expenses. Aker BP's market value of equity, and thereby appropriate stock price, is estimated by deducting net financial liabilities from the estimated enterprise value. Current net financial liabilities were calculated in chapter 5 and equals USD 2,018 million.

| EV multiples | EV/Revenue | EV/EBITDA | EV/EBIT | EV/NOPAT | EV/BOEPD | EV/2P |
|---|---|---|---|---|---|---|
| Lundin Petroleum AB | 4.41 | 6.20 | 8.24 | 46.29 | 167.87 | 15.50 |
| Premier Oil PLC | 2.15 | 3.37 | 5.65 | 8.25 | 41.20 | 15.47 |
| EnQuest PLC | 2.29 | 3.99 | 9.77 | 11.55 | 53.23 | 12.16 |
| Cairn Energy PLC | 3.20 | na | na | na | 83.68 | 23.36 |
| Hurricane Energy PLC | na | na | na | na | na | 32.50 |
| Rockhopper Exploration PLC | 7.81 | na | na | na | na | na |
| Nostrum Oil & Gas PLC | 3.22 | 13.77 | na | na | 39.77 | 3.07 |
| Serica Energy PLC | 8.06 | 22.01 | 41.20 | 10.78 | na | 5.42 |
| Weighted average | 3.32 | 7.19 | 11.13 | 22.01 | 85.28 | 13.92 |
| **Aker BP EV USDm** | **12,316** | **19,608** | **21,994** | **11,476** | **13,278** | **12,764** |
| **Share Price NOK** | **299** | **477** | **535** | **279** | **323** | **310** |

*Table 20 - Enterprise value multiples (Bloomberg, 2019B)*

Negative multiples have been removed from Table 20, as negative multiples have no logical economic interpretation. The comparable companies' average multiple is calculated as a weighted average based on

[4] Some parameters are easier to calculate than others. Multiples based on parameters that are uniformly defined and relatively certain will be given a higher weighting.

relative production. This is seen as reasonable, considering that Aker BP produce more boepds than all the comparable companies. The largest producers, such as Lundin Petroleum and Premier Oil, are therefore the most comparable and are given the most weight. The spread in share price estimates provided by EV multiples is quite large. All EV multiples, except for EV/EBITDA and EV/EBIT, indicate that Aker BP's share price should be close to NOK 300. EV/EBITDA and EV/EBIT indicate a significantly higher share price for Aker BP. However, these estimates are severely affected by the high multiple of Serica Energy. Excluding Serica Energy from the calculation provides EV/EBITDA and EV/EBIT share price estimates of NOK 377 and NOK 368, respectively. Given the different estimates provided above, a final share price estimate based on enterprise value multiples of NOK 350 is seen as reasonable. Estimates provided by EV/EBITDA and EV/EBIT (excl. Serica Energy) are assigned the highest subjective weighting, given their popularity among "real life" analysts.

## 6.2 Equity value

Aker BP's market value of equity, and thereby stock price, will also be estimated using the equity-based multiples presented in chapter 3. P/NAV will however not be utilized given the scope of this thesis. The Net Asset Value of each comparable company is not observable from Bloomberg, as it requires estimating the market value of each individual asset.

| Equity multiples | P/E | P/B |
|---|---|---|
| Lundin Petroleum AB | 52.47 | na |
| Premier Oil PLC | 6.90 | 0.96 |
| EnQuest PLC | 2.01 | 0.36 |
| Cairn Energy PLC | na | 0.98 |
| Hurricane Energy PLC | na | 2.06 |
| Rockhopper Exploration PLC | na | 0.33 |
| Nostrum Oil & Gas PLC | na | 0.45 |
| Serica Energy PLC | 6.04 | 2.52 |
| Weighted average | 20.96 | 1.00 |
| **Aker BP market cap USDm** | **9,984** | **12,806** |
| **Share Price NOK** | **243** | **311** |

*Table 21 - Equity multiples*

As with EV multiples, negative equity multiples are removed from the calculations and averages are weighted based on relative production. Equity multiples suggest a share price close to, or below, NOK 300. It should be mentioned that equity multiples are especially sensitive to differences in capital structure and tax rates (ref. section 3.3.2). Keeping this in mind, a final share price estimate based on equity multiples of NOK 275 is seen as reasonable.

A relative valuation of Aker BP has now been conducted. The results will be compared to the results from the fundamental valuation and sensitivity analysis, in chapter 8.

# 7 Sensitivity analysis

In this chapter, a sensitivity analysis of Aker BP's fundamental valuation will be performed. The analysis will present three different cases where key assumptions affecting Aker BP's enterprise value and market value of equity are varied to provide probable ranges for the value estimates. The cases will be based on many of the risk factors presented in chapter 4. Not all risks previously presented will be mentioned, however, they are all part of a general assessment regarding future developments. Compressed financial statements can be seen at the end of each sub-section.

## 7.1 Bull case

The first case presented will be a case where it is assumed that value determining variables will develop in favor of Aker BP. Oil and gas prices will however remain unchanged as these are somewhat bullish to begin with. The possibility of higher oil and gas prices provide further upside to the following projections. As mentioned in section 5.3.1, projections regarding NOAKA are highly uncertain. Positive indications from the exploration of NOAKA can significantly increase future investment needs and production outlook. In this alternative bull case, it is assumed that investments related to NOAKA will materialize from 2021. CAPEX is therefore increased by USD 300 million per year from 2021 compared to the base case. USD 300 mill is seen as a reasonable estimate of additional yearly investment needs given Aker BP's projections and historic project costs. In line with Aker BP's projections, production is increased because of NOAKA from 2023. Expected production is increased by 25, 75 and 115 mboepd in 2023, 2024 and 2025, respectively (Aker BP, 2019B).

Aker BP will not generate sufficient cash flows to fund the USD 300 million increase in yearly CAPEX, without issuing new debt. In addition, they will not have enough undrawn debt capacity on their RBL to fund the required CAPEX. It is therefore assumed that Aker BP will issue new long-term bonds to refinance a part of the RBL. They should have no problems issuing affordable debt given their (assumed) low market-based leverage ratio. By issuing a USD 1,500 million bond and refinancing the RBL, they should have the necessary cash to fund future CAPEX outlays.

As described in section 4.3.1.1, there is significant uncertainty regarding future concession grants. Although the 25$^{th}$ frontier area concession round has been delayed for at least a couple of years (ref. section 4.3.1.1), a dominant majority for the right in future Norwegian elections can significantly increase the rate at which the unexplored areas of the NCS are developed. This can provide high production growth rates for Aker BP for at least the next 20 years. NOAKA is projected to provide a yearly production growth of 10-20%. It is not unreasonable to assume that such growth rates can be seen for at least 10 years post 2025 (given the assumptions outlined above). The high production growth can also be supported by Aker BP's valuable resources and the relatively high barriers to entry in the Norwegian petroleum industry. One could argue that such a development on the NCS will push Brent prices downward, however, the long-term Brent price of USD 70 is held constant as it is impossible to project oil prices that far into the future. A three-step model is implemented in this bull case to estimate Aker BP's enterprise value and market value of equity. Up until 2026, FCFF and FCFE will develop as presented in Table 23 and Table 24. Then a FCFF and FCFE growth of 10% per year is assumed for the next 10 years, after which a 2% growth is assumed until 2050. Production is assumed to end post 2050 as a result of the resource scarcity described in section 4.3.1.3. A terminal value calculated using Gordon's growth model in 2035 is not seen as prudent, given its implicit assumption of production until infinity. The three-step model gives the following enterprise value and market value of equity for Aker BP.

| Compressed financial statements | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Production mboepd | 156 | 162 | 214 | 228 | 243 | 293 | 345 | 375 |
| | | | | | | | | |
| Brent price | 72 | 70 | 80 | 70 | 65 | 70 | 70 | 70 |
| Gas price mcf/day | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Gas price USD/boe | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| Weighted average price | 66 | 64 | 72 | 64 | 60 | 64 | 64 | 64 |
| | | | | | | | | |
| EBITDAX | 2,702 | 2,349 | 4,274 | 4,055 | 4,055 | 4,943 | 5,097 | 4,908 |
| EBITDA | 2,998 | 2,749 | 4,624 | 4,355 | 4,355 | 5,725 | 6,813 | 7,380 |
| EBIT | 2,226 | 1,791 | 3,576 | 3,281 | 3,211 | 4,521 | 5,610 | 6,252 |
| Net profit | 476 | 395 | 866 | 774 | 751 | 1,095 | 1,377 | 1,543 |
| | | | | | | | | |
| Dividends | 450 | 750 | 850 | 950 | 1050 | 1150 | 1250 | 1350 |
| | | | | | | | | |
| **Total assets** | 11,527 | 12,182 | 12,565 | 13,903 | 13,715 | 13,901 | 14,228 | 14,523 |
| | | | | | | | | |
| Net operating assets | 5,008 | 5,635 | 5,751 | 6,976 | 6,677 | 6,622 | 6,749 | 6,942 |
| Net financial liabilities | 2,018 | 3,000 | 3,100 | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 |

*Table 22 - Bull case compressed financial statements*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| NOPAT | 623 | 502 | 1,001 | 919 | 899 | 1,266 | 1,571 | 1,751 |
| CAPEX | -2,366 | -1,529 | -1,450 | -1,567 | -1,572 | -1,440 | -1,000 | -894 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,144 | 1,204 | 1,203 | 1,128 |
| **FCFF** | **-971** | **-70** | **599** | **425** | **471** | **1,029** | **1,774** | **1,984** |
| Terminal value | | 32,682 | | | | | | |
| **Share Price NOK** | | **697** | | | | | | |

*Table 23 - Bull case FCFF and share price estimate*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Net profit | 476 | 395 | 866 | 774 | 751 | 1,095 | 1,377 | 1,543 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,144 | 1,204 | 1,203 | 1,128 |
| Cash flow from investments | -2,147 | -1,500 | -1,200 | -1,500 | -1,500 | -1,200 | -750 | -750 |
| Change in working capital | -1,649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cash flow from financing | -1,838 | 232 | -750 | 450 | -1,050 | -1,150 | -1,250 | -1,350 |
| Dividends | 450 | 750 | 850 | 950 | 1,050 | 1,150 | 1,250 | 1,350 |
| **FCFE** | **-3,936** | **835** | **814** | **1,748** | **395** | **1,099** | **1,830** | **1,921** |
| Terminal value | | 27,611 | | | | | | |
| **Share Price NOK** | | **671** | | | | | | |

*Table 24 - Bull case FCFE and share price estimate*

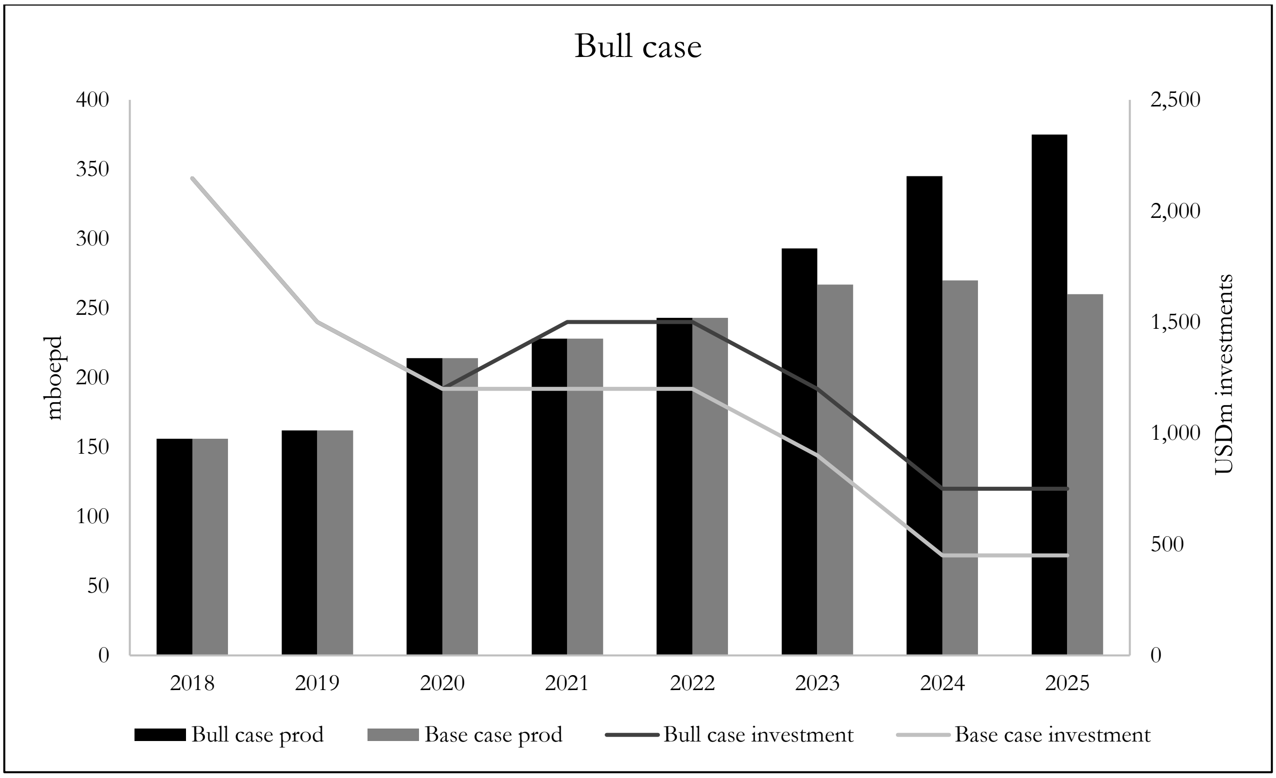


*Figure 10 - Bull case difference*

## 7.2 Bear case

The second case presented will be a "bear" case where it is assumed that some value determining variables will develop in disfavor of Aker BP. As described in section 4.3.2.1, future oil prices are highly dependent on OPEC +'s decisions. The current production cuts, resulting from the dive in oil prices in late 2018, have only been guaranteed to last for the first half of 2019. If OPEC + chooses to re-introduce 1,200 mboepd to the market, they will likely create severe downwards pressure on market prices. Consequently, it is not unreasonable to assume that oil prices will approach the levels seen prior to the 2018 cut. A small increase is nevertheless expected in 2020, following the introduction of IMO 2020. Post 2020, Brent prices are once again expected to decrease for the same reasons as outlined in section 4.3.2.1. In this case, a long-term Brent price of USD 60 is chosen. This is based on analyst estimates from the Bloomberg terminal. A long-term Brent price of USD 60 is more in line with consensus than the USD 70 long-term price presented in the base case. Future expected Brent prices can be seen in Table 25. In this case, it is also assumed that interest rates will increase. Macro data from early 2019, indicate a strong US economy. It is therefore possible that the FED will hike interest rates further. An increase in interest rates of 1% is assumed in this case. This will put interest rates closer to the approximate neutral interest rate of 3.5% (Dallas FED, 2018). Higher interest rates will likely lead to a stronger USD. Both higher interest rates and the stronger USD can put downwards pressure on oil prices. Higher interest rates will also likely increase Aker BP's interest cost given the RBL's floating interest rate. One can argue that a stronger USD will increase Aker BP's margins. This effect is not incorporated into projections, as is it highly uncertain to what degree the income and cost relationship is affected.

In this bear case, NOAKA is not included and forecasted production in the period 2019-2025 is therefore equal to the base case. Post 2025, production is expected to decline. It is assumed that concession grants will be significantly reduced. As presented in section 4.3.1.1, this is not an unreasonable assumption given certain political developments. Consequently, Aker BP will not be able to replace old production fields as they mature and start to decline. The lower Brent prices and cash flow will likely force Aker BP to cut dividend projections. It is assumed that Aker BP will reduce future dividend payments by USD 300 million, compared to the base case. This will bring future dividends closer to projections presented before the recent increase (Aker BP, 2019B). By decreasing dividends, Aker BP will not be forced to issue new debt. Interest-bearing debt is thus equal to the base case. One could argue that Aker BP would refinance parts of the RBL to keep dividend projections. However, lower oil prices and a worsened outlook will likely cause a lower share price. This will increase the market-based leverage ratio. New debt financing might then not be as easy/cheap to issue. In this case, terminal values are estimated using Gordon's growth model with 0% growth in cash flows from 2026. Given an expected inflation of 2%, the real growth in FCFF and FCFE is approximately -2%, which is congruent with a decrease in production. These assumptions provide the following estimates for enterprise value and market value of equity.

| Compressed financial statements | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Production mboepd | 156 | 162 | 214 | 228 | 243 | 267 | 270 | 260 |
| | | | | | | | | |
| Brent price | 72 | 55 | 65 | 55 | 55 | 60 | 60 | 60 |
| Gas price mcf/day | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Gas price USD/boe | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| Weighted average price | 66 | 52 | 60 | 52 | 52 | 56 | 56 | 56 |
| | | | | | | | | |
| EBITDAX | 2,702 | 1,639 | 3,337 | 3,056 | 3,346 | 4,164 | 4,309 | 4,149 |
| EBITDA | 2,998 | 2,039 | 3,687 | 3,356 | 3,646 | 4,464 | 4,609 | 4,449 |
| EBIT | 2,226 | 1,082 | 2,639 | 2,283 | 2,551 | 3,351 | 3,532 | 3,477 |
| Net profit | 476 | 191 | 598 | 498 | 569 | 782 | 831 | 820 |
| | | | | | | | | |
| Dividends | 450 | 450 | 550 | 650 | 750 | 850 | 950 | 1050 |
| | | | | | | | | |
| **Total assets** | 11,527 | 12,278 | 12,692 | 12,921 | 13,224 | 13,248 | 13,075 | 12,740 |
| | | | | | | | | |
| Net operating assets | 5,008 | 5,731 | 5,879 | 6,027 | 6,246 | 6,178 | 6,059 | 5,830 |
| Net financial liabilities | 2,018 | 3,000 | 3,100 | 3,400 | 3,800 | 3,800 | 3,800 | 3,800 |

*Table 25 - Bear case compressed financial statements*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| NOPAT | 623 | 303 | 739 | 639 | 714 | 938 | 989 | 974 |
| CAPEX | -2,366 | -1,529 | -1,450 | -1,267 | -1,272 | -1,015 | -464 | -402 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| **FCFF** | **-971** | **-268** | **337** | **445** | **537** | **1,035** | **1,601** | **1,544** |
| Gordon Terminal | | 18,847 | | | | | | |
| EV Gordon | | 13,409 | | | | | | |
| **Share Price NOK** | | **277** | | | | | | |

*Table 26 - Bear case FCFF and share price estimate*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Net profit | 476 | 191 | 598 | 498 | 569 | 782 | 831 | 820 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| Cash flow from investments | -2,147 | -1,500 | -1,200 | -1,200 | -1,200 | -900 | -450 | -450 |
| Change in working capital | -1,649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cash flow from financing | -1,838 | 532 | -450 | -350 | -350 | -850 | -950 | -1,050 |
| Dividends | 450 | 450 | 550 | 650 | 750 | 850 | 950 | 1,050 |
| **FCFE** | **-3,936** | **631** | **546** | **671** | **863** | **994** | **1,458** | **1,343** |
| Gordon Terminal | | 14,595 | | | | | | |
| Market Cap Gordon | | 11,602 | | | | | | |
| **Share Price NOK** | | **282** | | | | | | |

*Table 27 - Bear case FCFE and share price estimate*

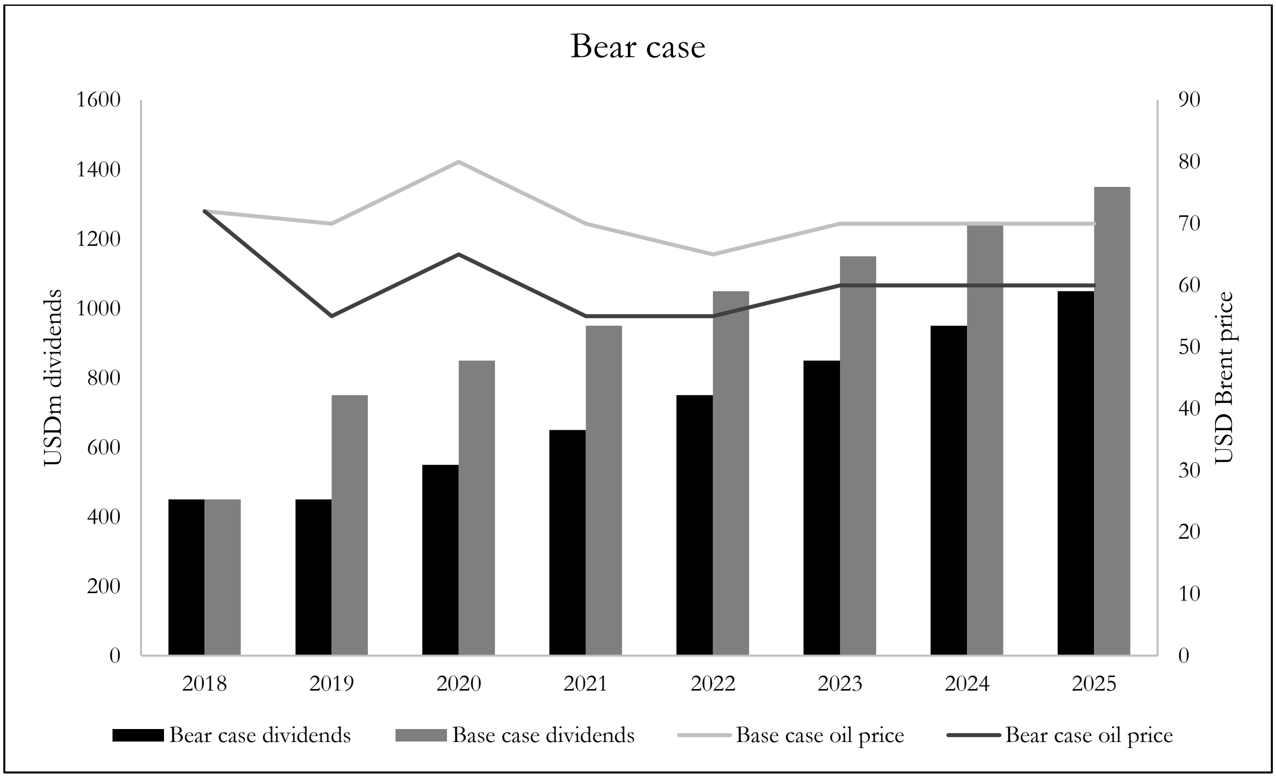


*Figure 11 - Bear case difference*

## 7.3 Disaster case

The third case presented will be a "disaster" case where oil markets and future outlook take a significant turn for the worse. Some of the developments in this case will be similar or equal to those in the bear case. If the reasoning behind developments are the same as in the section above, they will not be presented here. As described in section 4.3.2.1, OPEC significantly increased production in 2014 to capture market share and deter additional US investments into fracking. If OPEC realize that they will not be able to fund current expenditures, and oil prices does not reach a satisfactory level, they could once again increase output and make up the budget differences by additional volume. If OPEC + re-introduce the 1,200 mboepd cut from 2018 and add additional barrels on top, oil prices could reach levels seen in the second half of 2014. For 2019, an average Brent price of USD 45 is assumed (in line with 2014 prices). Prices post 2019, are expected to develop in the same pattern as before. The long-term Brent price is set equal to USD 45. This is not unlikely at all. Better than expected developments in renewables could cause significant downwards pressure on oil prices. If renewables fill a larger part of the world's increased energy demand, undiversified petroleum producers will face significant challenges. Interest rates are assumed to develop as in the bear case. Future expected Brent prices can be seen in Table 28.

As in the bear case, NOAKA is not included and expected production is thus equal to the base case. In this case, future concessions grants are assumed to be very rare or non-existent. Aker BP will then have to "survive" on their current concession portfolio. Lower oil prices will likely force Aker BP to cut dividends even further. A projected dividend cut of USD 450 million per year is assumed. Aker BP will then not be forced to issue new debt. The reasons why they choose to cut dividends are the same as in the base case. In this case, terminal values are estimated using Gordon's growth model with -2% growth in cash flows. Given an expected inflation of 2%, the real growth in FCFF and FCFE is approximately -4%, which is congruent with a significant decrease in production. These assumptions provide the following estimates for enterprise value and market value of equity.

| Compressed financial statements | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Production mboepd | 156 | 162 | 214 | 228 | 243 | 267 | 270 | 260 |
| | | | | | | | | |
| Brent price | 72 | 45 | 55 | 45 | 45 | 45 | 45 | 45 |
| Gas price mcf/day | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Gas price USD/boe | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| Weighted average price | 66 | 44 | 52 | 44 | 44 | 44 | 44 | 44 |
| | | | | | | | | |
| EBITDAX | 2,702 | 1,166 | 2,712 | 2,390 | 2,636 | 2,994 | 3,126 | 3,010 |
| EBITDA | 2,998 | 1,566 | 3,062 | 2,690 | 2,936 | 3,294 | 3,426 | 3,310 |
| EBIT | 2,226 | 609 | 2,014 | 1,617 | 1,842 | 2,182 | 2,350 | 2,338 |
| Net profit | 476 | 59 | 423 | 311 | 370 | 455 | 500 | 502 |
| | | | | | | | | |
| Dividends | 450 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
| | | | | | | | | |
| **Total assets** | 11,527 | 12,295 | 12,685 | 12,877 | 13,131 | 12,978 | 12,624 | 12,120 |
| | | | | | | | | |
| Net operating assets | 5,008 | 5,749 | 5,872 | 5,983 | 6,153 | 5,908 | 5,608 | 5,210 |
| Net financial liabilities | 2,018 | 3,000 | 3,100 | 3,400 | 3,800 | 3,800 | 3,800 | 3,800 |

*Table 28 - Disaster case compressed financial statements*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| NOPAT | 623 | 170 | 564 | 453 | 516 | 611 | 658 | 655 |
| CAPEX | -2,366 | -1,529 | -1,450 | -1,267 | -1,272 | -1,015 | -464 | -402 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| **FCFF** | **-971** | **-401** | **162** | **259** | **338** | **708** | **1,270** | **1,225** |
| Gordon Terminal | | 11,780 | | | | | | |
| EV Gordon | | 8,469 | | | | | | |
| **Share Price NOK** | | **157** | | | | | | |

*Table 29 - Disaster case FCFF share price estimate*

| USDm | 2018 | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E |
|---|---|---|---|---|---|---|---|---|
| Net profit | 476 | 59 | 423 | 311 | 370 | 455 | 500 | 502 |
| Depreciation | 772 | 958 | 1,048 | 1,073 | 1,094 | 1,112 | 1,077 | 972 |
| Cash flow from investments | -2,147 | -1,500 | -1,200 | -1,200 | -1,200 | -900 | -450 | -450 |
| Change in working capital | -1,649 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cash flow from financing | -1,838 | 682 | -300 | -200 | -200 | -700 | -800 | -900 |
| Dividends | 450 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
| **FCFE** | **-3,936** | **498** | **371** | **485** | **665** | **667** | **1,127** | **1,024** |
| Gordon Terminal | | 8,959 | | | | | | |
| Market cap Gordon | | 7,685 | | | | | | |
| **Share Price NOK** | | **187** | | | | | | |

*Table 30 - Disaster case FCFE and share price estimate*

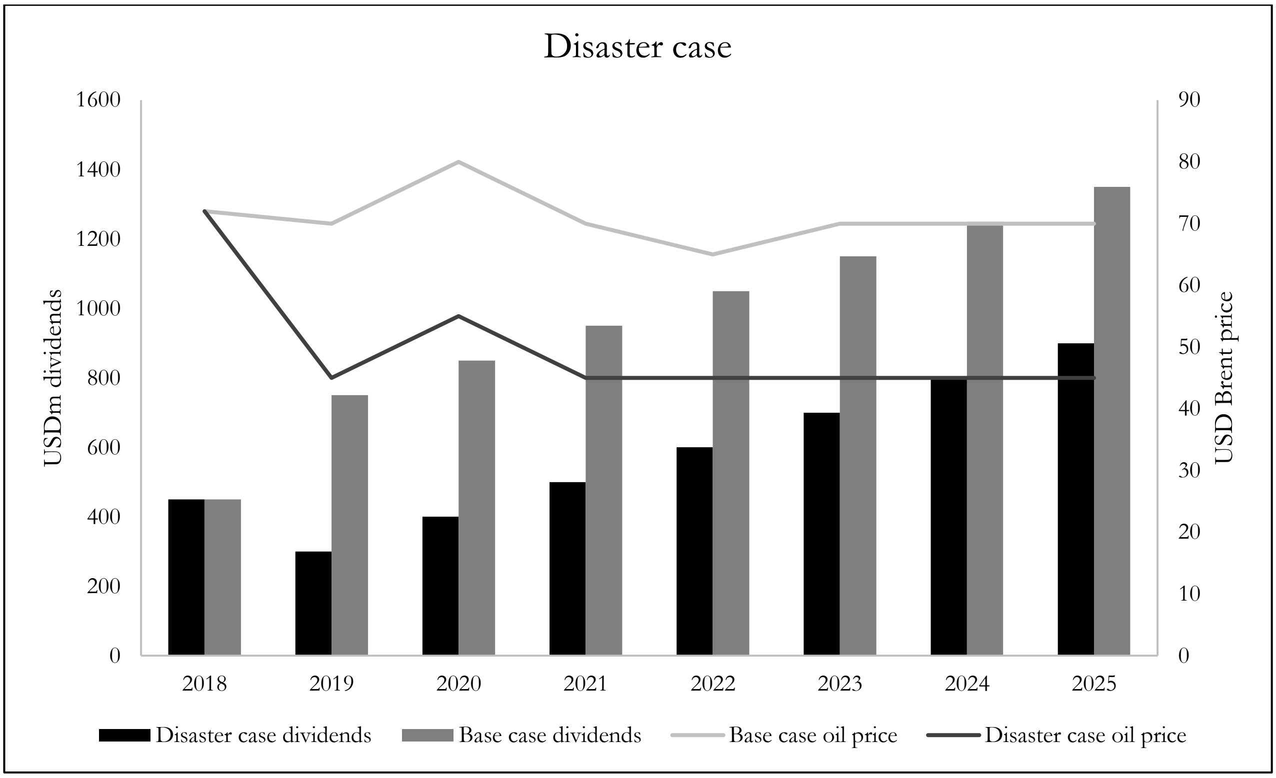


*Figure 12 - Disaster case difference*

# 8 Conclusion

The primary goal of this thesis was to estimate Aker BP's appropriate enterprise value, market value of equity and share price. These values have been estimated in several different ways, and a final share price estimate and buy/hold/sell recommendation will now be provided. The strategic analysis conducted in chapter 4 showed that the oil & gas industry face significant risks in the short-, medium- and long-term. Future developments regarding demand for, and supply of, oil and gas can significantly impact the financial viability of the industry. However, the strategic analysis also showed that Aker BP has a significant potential for value creation. Positive developments in key market variables will enable Aker BP to create value for shareholders for many years to come.

Aker BP's share price 19 March 2019 was NOK 304. The fundamental valuation conducted in chapter 5 provided estimates between NOK 401 and NOK 546. This is a wide range, however, the very high estimates resulted from using the average un-adjusted EV/EBITDA multiple to calculate a terminal value. As explained in chapter 6, the average un-adjusted EV/EBITDA multiple is severely affected by Serica Energy. Excluding Serica Energy from the average EV/EBITDA multiple provides share price estimates of NOK 445. Using Gordon's growth model to calculate terminal values result in share price estimates of NOK 401 and 436. Taking everything into consideration, a share price estimate, based on the fundamental valuation, of NOK 425 is seen as reasonable. This suggests that Aker BP is almost 50% undervalued. However, one must remember that the sensitivity analysis conducted in chapter 7 indicated that the share price estimate is highly uncertain. The "bull" case provided share price estimates of NOK 671-697, while the "disaster" case provided share price estimates of NOK 157-187. Given the very "bearish" outlook presented in the "disaster" case, the fundamental valuation undoubtedly indicates that there is significant upside potential to Aker BP's current share price. To conclude, the fundamental valuation indicates that Aker BP is a screaming "buy".[5]

The relative valuation provided share price estimates of NOK 350 and 275, i.e. one estimate indicate that Aker BP's stock is undervalued, while the other indicate that it is overvalued. Given the caveats affecting equity multiples (ref. section 3.3.2), the EV multiple based estimate of NOK 350 is seen as the most appropriate. The relative valuation thus indicates that Aker BP's stock should receive a "buy" recommendation, although not as screaming as the one provided by the fundamental valuation.

[5] A stock receives a "buy" or "sell" recommendation if it is more than 10% over or undervalued, respectively. Within a range of plus/minus 10%, it receives a "hold" recommendation.

Aker BP's enterprise value, market value of equity and share price has now been estimated. Based on the assumptions presented throughout the thesis, the analysis indicate that Aker BP's stock is undervalued and should therefore be bought. In our opinion, the difference between the current share price and the share price provided by the fundamental valuation, is primarily caused by the market's lower Brent price projections. We think that the market project future prices which are too bearish given current economic conditions. The lower consensus regarding future Brent prices is likely why the relative valuation provides estimates which are lower than the ones provided by the fundamental valuation. It is difficult to estimate when and if prices will adjust, however, we believe that increasing Brent prices in 2019 and 2020 will create upwards pressure on Aker BP's share price.

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# Appendix

## Glossary:

| | |
|---|---|
| **Aker BP:** | Aker BP ASA |
| **APA:** | Awards in predefined areas |
| **Brent:** | Brent crude |
| **CAPM:** | Capital asset pricing model |
| **Center:** | Kristelig Folkeparti, Miljøparti de Grønne, Senterpartiet, Venstre |
| **DDM:** | Dividend Discount Model |
| **E&P:** | Exploration and production |
| **EBIT:** | Earnings before interest and taxes |
| **EBITDA:** | Earnings before interest and taxes, depreciation and amortization |
| **ECB:** | European Central Bank |
| **EPS:** | Earnings per share |
| **EV:** | Enterprise value |
| **FCFE:** | Free cash flows to equity |
| **FCFF:** | Free cash flow available to all claimants (firm) |
| **FED:** | US federal reserve |
| **Fracking:** | Hydraulic fracturing |
| **ICAPM:** | Intertemporal capital asset pricing model |
| **IEA:** | International Energy Agency |
| **IMO:** | International Maritime Organization |
| **Left:** | Arbeiderpartiet, Sosialistisk Venstreparti, Rødt |
| **LNG:** | Liquefied natural gas |
| **Mboepd:** | Thousand barrels of oil equivalents per day |
| **MCF:** | Thousand square feet of natural gas |
| **Mmboe:** | Million barrels of oil equivalents |
| **Mmboepd:** | Million barrels of oil equivalents per day |
| **MRP:** | Market risk premium |
| **NAV:** | Net asset value |
| **NBP:** | National Balancing Point |
| **NCS:** | Norwegian Continental Shelf |
| **NOPAT:** | Net operating profit after tax |
| **NPD:** | Norwegian Petroleum Directorate |
| **OECD:** | Organization for Economic Co-operation and Development |
| **OPEC:** | Organization of Petroleum Exporting Countries |
| **R&D:** | Research and development |
| **RBL:** | Reserve-based lending facility |
| **Right:** | Fremskrittspartiet, Høyre |
| **SML:** | Security market line |
| **TNO:** | True non-OPEC |
| **WACC:** | Weighted average cost of capital |
| **WTI:** | West Texas Intermediate |
| **YTM:** | Yield to maturity |

Financial statements as presented by Aker BP:

Table A1: Balance sheet part 1 (assets)

| ASSETS<br>USD 000 | 2018 | 2017 | 2016 | 2015 | 2014 |
|---|---|---|---|---|---|
| Intangible assets | | | | | |
| Goodwill | 1,860,126 | 1,860,126 | 1,846,971 | 767,571 | 1,186,704 |
| Capitalized exploration expenditures | 427,439 | 365,417 | 395,260 | 289,980 | 291,619 |
| Other intangible assets | 2,005,885 | 1,617,039 | 1,332,813 | 648,030 | 648,788 |
| | | | | | |
| **Tangible fixed assets** | | | | | |
| Property, plant and equipment | 5,746,275 | 5,582,493 | 4,441,796 | 2,979,434 | 2 549271 |
| | | | | | |
| Financial assets | | | | | |
| Long-term receivables | 37,597 | 40,453 | 47,171 | 3,782 | 8,799 |
| Long-term derivatives | 0 | 12,564 | 0 | 0 | 0 |
| Other non-current assets | 10,388 | 8,398 | 12,894 | 12,628 | 3,598 |
| | | | | | |
| Total non-current assets | 10,087,710 | 9,486,491 | 8,076,905 | 4,701,425 | 4,688,778 |
| | | | | | |
| Inventories | | | | | |
| Inventories | 93,179 | 75,704 | 69,434 | 31,533 | 25,008 |
| | | | | | |
| Receivables | | | | | |
| Accounts receivable | 162,798 | 99,752 | 170,000 | 85,546 | 186,461 |
| Tax receivables | 11,082 | 1,586,006 | 400,638 | 126,391 | 0 |
| Other short-term receivables | 360,194 | 535,518 | 422,932 | 108,097 | 187,881 |
| Short-term derivatives | 17,253 | 2,585 | 0 | 45,217 | - |
| | | | | | |
| Cash and cash equivalents | | | | | |
| Cash and cash equivalents | 44,944 | 232,504 | 115,286 | 90,599 | 296,244 |
| | | | | | |
| Total current assets | 689,450 | 2,532,069 | 1,178,290 | 487,384 | 695,594 |
| | | | | | |
| **TOTAL ASSETS** | 10,777,160 | 12,018,560 | 9,255,196 | 5,188,809 | 5,384,372 |

Table A2: Balance sheet part 2 (equity and liabilities)

| EQUITY AND LIABILITIES<br>USD 000 | 2018 | 2017 | 2016 | 2015 | 2014 |
|---|---|---|---|---|---|
| Equity | | | | | |
| Share capital | 57,056 | 57,056 | 54,349 | 37,530 | 37,530 |
| Share premium | 3,637,297 | 3,637,297 | 3,150,567 | 1,029,617 | 1,029,617 |
| Other equity | -704,432 | -705,756 | -755,709 | -728,121 | -415,485 |
| Total equity | 2,989,920 | 2,988,596 | 2,449,207 | 339,026 | 651,662 |
| **Non-current liabilities** | | | | | |
| Deferred taxes | 1,800,199 | 1,307,148 | 1,045,542 | 1,356,114 | 1,286,357 |
| Long-term abandonment provision | 2,447,558 | 2,775,622 | 2,080,940 | 412,805 | 483,323 |
| Provisions for other liabilities | 107,519 | 152,418 | 218,562 | 1,638 | 14,065 |
| Long-term bonds | 1,110,488 | 622,039 | 510,337 | 503,440 | 253,141 |
| Long-term derivatives | 26,275 | 13,705 | 35,659 | 62,012 | 5,646 |
| Other interest-bearing debt | 907,954 | 1,270,556 | 2,030,209 | 2,118,935 | 2,037,299 |
| **Current liabilities** | | | | | |
| Trade creditors | 105,567 | 32,847 | 88,156 | 51,078 | 152,258 |
| Accrued public charges and indirect taxes | 25,061 | 27,949 | 39,048 | 9,060 | 6,758 |
| Tax payable | 551,942 | 351,156 | 92,661 | 0 | 189,098 |
| Short-term derivatives | 8,783 | 7,691 | 5,049 | 13,506 | 25,224 |
| Short-term abandonment provision | 105,035 | 268,262 | 75,981 | 10,520 | 5,728 |
| Short-term interest-bearing debt | 0 | 1,496,374 | 0 | 0 | 0 |
| Other current liabilities | 590,860 | 704,197 | 583,844 | 310,675 | 273,813 |
| Total liabilities | 7,787,241 | 9,029,964 | 6,805,988 | 4 849783 | 4,732,710 |
| TOTAL EQUITY AND LIABILITIES | 10,777,160 | 12,018,560 | 9,255,196 | 5,188,809 | 5,384,372 |

Table A3: Income statement

| INCOME STATEMENT<br>USD 000 | 2018 | 2017 | 2016 |
|---|---|---|---|
| Petroleum revenues | 3,711,472 | 2,575,654 | 1,260,803 |
| Other operating income | 38,600 | -12,721 | 103,326 |
| Total income | 3,750,072 | 2,562,933 | 1,364,129 |
| Production costs | 689,102 | 523,379 | 226,818 |
| Exploration expenses | 295,908 | 225,702 | 147,453 |
| Depreciation | 752,437 | 726,670 | 509,027 |
| Impairments | 20,172 | 52,349 | 71,375 |
| Other operating expenses | 17,037 | 27,606 | 21,993 |
| Total operating expenses | 1,774,658 | 1,555,705 | 976,665 |
| Operating profit | 1,975,414 | 1,007,228 | 387,464 |
| Interest income | 25,976 | 7,716 | 5,795 |
| Other financial income | 141,823 | 75,507 | 42,871 |
| Interest expenses | 120,033 | 103,627 | 82,161 |
| Other financial expenses | 218,272 | 175,696 | 63,515 |
| Net financial items | -170,505 | -196,100 | -97,011 |
| Profit before taxes | 1,804,909 | 811,128 | 290,453 |
| Taxes (+)/tax income (-) | 1,328,486 | 536,340 | 255,482 |
| Net profit | 476,423 | 274,787 | 34,971 |

Table A4: Cash flow statement

| CASH FLOW STATEMENT USD000 | 2,018 | 2,017 | 2016 |
|---|---|---|---|
| **CASHFLOWFROMOPERATINGACTIVITIES** | | | |
| Profit before taxes | 1,804,909 | 811,128 | 290,453 |
| Taxes paid | -606,082 | -101,115 | -1,419 |
| Taxes refunded | 1,513,394 | 404,704 | 212,944 |
| Depreciation | 752,437 | 726,670 | 509,027 |
| Net impairment losses | 20,172 | 52,349 | 71,375 |
| Accretion expenses | 128,737 | 129,619 | 47,977 |
| Interest expenses | 200,524 | 156,704 | 160,808 |
| Interest paid | -195,659 | -145,940 | -161,634 |
| Changes in derivatives | 11,558 | -34,461 | 10,408 |
| Amortized loan costs | 29,722 | 36,900 | 17,915 |
| Amortization of fair value of contracts | 56,775 | 11,728 | -115,616 |
| Expensed capitalized dry wells | 65,852 | 75,401 | 51,669 |
| Changes in inventories, accounts payable and receivables | -7,800 | -7,583 | -317,488 |
| Changes in other current balance sheet items | 25,031 | 39,387 | 119,234 |
| **NETCASHFLOWFROMOPERATINGACTIVITIES** | **3,799,570** | **2,155,491** | **895,653** |
| **CASHFLOWFROMINVESTMENTACTIVITIES** | | | |
| Payment for removal and decommissioning of oil fields | -242,545 | -85,733 | -12,237 |
| Disbursements on investments in fixed assets | -1,312,697 | -977,462 | -935,755 |
| Acquisitions of companies (net of cash acquired) | 0 | -2,055,033 | 423,990 |
| Cash received from sale of licenses | 0 | 170,959 | 0 |
| Disbursements on investments in capitalized exploration | -128,795 | -111,724 | -181,492 |
| Disbursements on investments in licenses | -463,049 | 0 | 0 |
| **NET CASH FLOW USED IN INVESTMENT ACTIVITIES** | **-2,147,086** | **-3,058,994** | **-705,494** |
| **CASH FLOW FROM FINANCING ACTIVITIES** | | | |
| Net drawdown/repayment of long-term debt | -380,252 | -777,911 | 0 |
| Repayment of bond (DETNOR03) | 0 | -330,000 | 0 |
| Repayment of short-term debt | -1,500,000 | 0 | -612,825 |
| Net cash received from issuance of new shares | 0 | 489,436 | 0 |
| Net proceeds from issuance of debt | 492,423 | 1,886,885 | 512,013 |
| Paid dividend | -450,000 | -250,000 | -62,500 |
| **NET CASH FLOW FROM FINANCING ACTIVITIES** | **-1,837,829** | **1,018,410** | **-163,312** |
| **Net change in cash and cash equivalents** | -185,344 | 114,906 | 26,846 |
| Cash and cash equivalents at start of period | 232,504 | 115,286 | 90,599 |
| Effect of exchange rate fluctuation on cash held | -2,216 | 2,312 | -2,158 |
| **CASH AND CASH EQUIVALENTS AT END OF PERIOD** | **44,944** | **232,504** | **115,287** |
| **SPECIFICATION OF CASH EQUIVALENTS AT END OF PERIOD** | | | |
| Bank deposits and cash | 44,944 | 231,506 | 106,369 |
| Restricted bank deposits | 0 | 998 | 8,917 |
| **CASH AND CASH EQUIVALENTS AT END OF PERIOD** | **44,944** | **232,504** | **115,286** |