# MASTER'S THESIS

Course code: ORG 5009 Name: Filip Lestan & Elena Kubasova

## **The Effect of Strategic Development on the Competitive Status:** The Case of Equinor

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**SAMMENDRAG**

Hovedmålet med denne oppgaven har vært å vurdere kvalitativt hvilken effekt det grønne skiftet har hatt på konkurransesituasjonen for det globale energiselskapet Equinor.

Dagens situasjon i de globale energimarkedene, en overgang til fornybar energi og en global superkonkurranse er alle forhold som peker i retning av at Equinor står overfor en stadig sterkere konkurranse. Denne situasjonen er drevet av to krefter; eksterne markeder og interne prosesser og er klart dokumentert i forskning. Følgene av energi transisjonen for Equinors konkurransekraft er analysert ut fra fire perspektiver.

i) «The Herfindahl-Hirschman Index» (HHI) beskriver markedskonsentrasjonen innen olje og gass industrien. Data fra 30 olje og gass selskaper i perioden 2018-2020 indikerte at markedskonsentrasjonen var lav og konkurransen i markedet høy.

ii) «The Competitive and Profile Matrix» (CPM) analyserer ulike måter som selskaper har møtt det grønne skiftet på. (Multiple expansion, retrenchment og stability strategies). Equinor kom på dette området ut med en lavere score sammenliknet med sine konkurrenter. Selskaper med høyest omsetning, var de som gjorde det svakest i forhold til energiomstillingen.

iii) «Reserves-Life Index» (RLI) blir brukt til å vurdere de ulike selskapenes «retrenchment» stategier. RLI viser hvor mange år som gjenstår av et selskaps reservers før de blir brukt opp. Vår forskning viste at Equinor, basert på uttaket av reserver i 2020, vil trekke ned sine eksisterende fossile reserver raskere enn sine konkurrenter. Equinor har en RLI på 7 år, mens Saudi Aramco har en RLI på 56 år.

iv) Til sist ble Equinor's strategiske posisjon og konkurransestatus analysert ved hjelp av en kvantifisert SWOT analyse. Denne er basert på to variabler; interne nøkkel kompetanse og eksterne markeds muligheter. Vår analyse viser at Equinor er sterke i å trekke på sin interne organisasjon («Internal Factors Evaluation score» på 3,5). Dette står i motsats til selskapets score på hvordan å forholde seg til eksterne markedsmuligheter og trusler («External Factors Evaluation» på 2,8) som er lavere enn den gjennomsnittlige i industrien.

Vår hovedkonklusjon er at det grønne skiftet har hatt en marginalt negativ effekt på Equinor's konkurransedyktighet. Selskapet har hatt en negativ score på CPM, en positiv RLI og en nøytral SWOT og HHI. Fornybar elementet representerer kun to prosent av Equinors omsetning innenfor et marked som har en meget rask vekst. Equinor mangler dessuten tilgang til både vannkraft og biobrensel som basis for sin fornybare satsing.

**PREFACE AND ACKNOWLEDGEMENTS**

*"The Stone Age didn't end for lack of stone,*
*and the oil age, will end long before the world runs out of oil"*
*– Sheikh Ahmed Zaki Yamani*

This thesis has been written by Filip Lestan and Elena Kubasova as a graduate qualification work for a Master of Science degree in Global Management at the NORD University Business School in Bødø, Norway. The reason we chose this particular topic in the field of energy is due to the substantial pressures faced by Equinor to meet carbon neutrality by the year of 2050. The green energy transition pushes Equinor's oil and gas segment to conduct business more ethically, faithfully and responsibly towards the environment.

The competitiveness among energy companies, in particular among oil and gas entities is a very relevant narrative today due to the emergence of sustainable development concept, growing population linked with growing energy demand, as well as the diversification of global energy mix, which ultimately effects on competitiveness of global energy company – Equinor.

We would like to acknowledge our supervisor, Professor Emeritus Dr. Petter Nore from NORD University for his efforts in teaching our course in *Energy Management* and supervising us throughout the process of writing our graduate qualification work. Beyond that, we want to extend sincere gratitude to all faculty members and professors at NORD University Business School for creating a thorough knowledge-sharing environment throughout our studies.

Professor Emeritus Dr. Petter Nore has led the strategic course of our thesis. His academic and personal qualities have provided us with a solid ground to elaborate on our research.

17th May 2022
Bodø, NORWAY

Filip Leštan

Filip Lestan

Elena Kubasova

Elena Kubasova

**ABSTRACT**

The objective of this thesis was to quantitatively examine the extent to which the low carbon energy transition affects the competitive status of the global energy company Equinor.

According to the previous research, the age of hyper competitiveness and transition to alternative energy sources suggest that Equinor faces strong competitive pressures. These are posed by a combination of external market drivers and internal business processes. The effect of the energy transition on the competitive status of Equinor was analysed from four perspectives.

Firstly, competitiveness was analysed with the market concentration measure – the Herfindahl-Hirschman Index (HHI) consisting of a sample which represented 30 oil and gas companies. Our study shows that in the global oil and gas market from 2018 to 2020 market concentration was low and competitiveness high.

Secondly, Competitive Profile Matrix (CPM) examined three possible strategies (Multiple expansion, retrenchment and stability strategies) of how companies can tackle the energy transition. Comparing Equinor with its competitors, our study shows that Equinor's response in this response to the energy transition is slightly below average. Companies with the highest total revenues performed worse in tackling the energy transition.

Thirdly, an in-depth analysis of a retrenchment strategy was examined through the Reserves-Life Index (RLI). Our study shows that Equinor is one of the leading companies when it comes to retiring its oil and gas reserves. At the production pace as of in 2020, Equinor will extract its remaining proven oil and gas reserves within 7 years. This is in contrast to Saudi Aramco which has an RLI of 56 years.

Finally, assessment of Equinor's strategic position and competitive status was evaluated through a quantified SWOT analysis based on internal core competencies and external market opportunities. Our study shows that Equinor is strong in transforming its business internally with an Internal Factors Evaluation (IFE) score of 3.5. This contrast with how the company responds to the external market opportunities and threats. Its External Factors Evaluation (EFE) score of 2.8 is below the average of its competitors.

Our main conclusion is that the energy transition has had a marginally negative effect on Equinor's competitiveness. Equinor has had a slightly negative CPM, a positive RLI, and a neutral SWOT and HHI. Furthermore, the renewable segment of Equinor's portfolio represents only two percent of the company's total revenues. Equinor also lacks access to key renewable energy sources like hydropower and biofuels.

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# 1. INTRODUCTION

This chapter of the thesis introduces the background of the research topic and its relevance, while the chapter defines objectives and highlights examined phenomena.

## *1.1 Motivation and problem statement*

Energy is fundamental source of motion in our everyday life, and without it, the whole world would face an unprecedented crisis. The new global economy pushes the world energy system towards more sustainable practices due to heavy carbon burden that world energy system aggregated throughout the previous decades. However, the key players within the world energy system are the national oil companies (NOC – state-owned enterprises), and international oil companies (IOC –listed enterprises at the stock exchange). These contribute to the high-levels of carbon leakage due to fossil-based and fossil-driven practices which produce high amounts of greenhouse gas emissions (IEA, 2021a).

Besides creating high levels of greenhouse gas emissions, it is important to mention that NOCs and IOCs also supply billions of households, companies, and governments with energy required for our everyday life. As a result of unsustainable business practices that caused our planet's global crisis, the new global economy pushes the world energy system towards strategic development of green energy solutions adapting renewable energy resources. This process experts describe as energy- or green transition. Therefore, NOCs and IOCs are pushed by the global process to conduct its business, operations, and investment activities towards alternative solutions adapting green energy technologies that focus on renewable energy sources (IEA, 2021a).

For this reason, strategic development within the external environment of NOCs plays a crucial role and affects competitiveness of the energy organisations, especially those heavily dependent on fossil-fuels. The formerly well-known national oil company from Norway – Statoil, that has rebranded in 2018 to Equinor. Moreover, this step consisted of rebranding to a global energy company and shifting from the traditional national oil company. Equinor is not a standard NOC. It is more of a hybrid enterprise between the two categories of IOC and NOC. It is listed on the stock exchange and is owned 67% by the state. As a consequence of the rebranding decision, the company placed its competitive stake into new markets and industries (EQUINOR, 2018). In addition to that, the world's energy system started to face strict pressures to shift towards green, clean, and renewable energy alternatives.

Therefore, numerous macro-, meso-, and micro-environmental factors positively drives the global process of energy transition. While numerous factors drive shifts towards sustainable development, simultaneously they are representing potential risk for energy companies with unsustainable business models. In this case, the major fossil fuel enterprises, especially national oil companies need to undertake strategic decisions that will allow them to adapt in the new age within the world's energy system. Hence, Equinor as a recently rebranded national oil company will need to undertake novel strategic decisions that will allow the company to develop and sustain its competitiveness over the course of upcoming decades.

Thus, the problem statement of this thesis is as follows. **"Equinor being involved in the oil and gas segment is competitively confronted with a green energy transition."**

### *1.2 Research question*

In-depth analysis of the effect of strategic development – green energy transition on the competitive status of Equinor will be examined through the following research question:

"**To what extent does the green energy transition affect the competitiveness of Equinor?"**

### *1.3 Research gap*

Green transition as a global process and part of shift towards sustainable development concept pose certain risks to global energy companies. This concerns former national oil company Equinor which rebranded itself from traditional fossil fuel producer to global energy company. The shift towards sustainable development concept driven by energy transition poses threats as well as creates opportunities for the energy giant. Therefore, our research aims to highlight challenges of Equinor's competitive status in the age of turbulent times to shift towards green energy through strategic development.

In the highly competitive and globalised world, the previous research studies focused primarily on the broad effect of energy transition because numerous studies highlighted the effect of energy transition on the oil and gas sector as whole including upstream, midstream, and downstream sectors (Shojaeddini et al., 2019). Recently, Hartmann et al. (2021) explored how the world's largest oil and gas firms' strategies are responding to the energy transition. However, the in-depth evaluation of the oil and gas companies is still a missing link. For this reason, our thesis aims to narrow down and study in great detail the effect of energy transition on the competitiveness of a particular case company – Equinor and its respective sectors. Namely, this thesis aims to focus on depth of a particular case, rather than breadth – the whole oil and gas sector. For this reason, the key aspect that will be addressed in our research

represents the challenge of how the recently rebranded traditional fossil fuel producer can sustain, thrive, and compete in the newly emerging world energy system and global energy business. Unquestionably, there is an evident research gap of the effect between green energy transition and competitive status of the global energy company Equinor, because previous studies focused primarily on the breath – multiple oil and gas companies, rather than evaluating a single case with the four quantitative analysis incorporated in this study.

### *1.4 Aims and objectives*

The research conducted in this thesis intends to primarily fulfil existing research gaps and contribute to the lack of studies on particular cases of oil and gas companies whose competitiveness is threatened by the global process of green energy transition. By conducting case-study analysis on the competitive status of the former national oil company - Equinor based in Norway, which rebranded itself into a global energy company in 2018 (EQUINOR, 2018). The authors of this thesis aim to critically highlight and assess the significance of internal and external factors within the operational environment of the global energy company Equinor that have direct impact on the firm's competitiveness in the age of green energy transition.

Furthermore, the secondary objective of this thesis is to assess and examine the strategic position, in other words, the competitive status of the global energy company - Equinor based in Norway during the age of energy transition. In particular, the case study of Equinor attempts to understand and provide in-depth analysis of the organisation's competitive status with its global competitors, while the study critically highlights and assesses the significance of green energy transition within the operational environment of Equinor's respective segments.

Tertiary research objective is to qualitatively review existing literature, studies and reports in the periphery of strategic management disciplined under the section of theoretical framework and literature review in order to address the theoretical foundations of this thesis as well as to address evolution and emergence of green energy transition and its competitive implications on of markets and companies involved in the world's energy system.

### *1.5 Subject and object of the research*

One of the most significant ongoing phenomena in the global energy sector is the impact of energy transition *vis-à-vis* oil and gas companies. **Hence, this research study focuses on the – *competitiveness* – of the former national oil company that has rebranded towards a global energy company.** The key findings (section 4.2) lead to a SWOT analysis which is quantified and shows major results.

## 2. THEORETICAL FRAMEWORK & LITERATURE REVIEW

This chapter of the thesis systematically describes key theories, theoretical models and frameworks that intervene into the concept of strategic development, competitiveness and green energy transition. Furthermore, this chapter introduces theoretical concepts and provides theoretical foundations incorporated in the case study analysis, while reviewing existing literature on the still emerging green energy transition and strategic management concepts.

### *2.1 Theoretical Concepts of Competitiveness*

Disputably, one may argue that competitive advantage means to have the highest market share within the energy market, while one may argue that competitive advantage means to have the most customers within the energy industry, whereas, someone else may argue that competitive advantage means to have the highest quality of energy-related products and services.

While competitive advantage means to have sustained leverage inside a firm in relation to competition in the markets, industries or sectors (Porter, 2008a), the term competitiveness reflects on the ability to excel *vis-à-vis* rivals in the energy industry (OECD, 2021). In this study, the competitive advantage and competitiveness underlines Porter's ideology which is *"deliberately choosing a different set of activities to deliver a unique mix of value* (Porter, 2008a)*"*. *En bloc*, the same applies for the factors which exert influence on competitiveness. While one may argue that external forces of an organisation influence its competitiveness, one may argue that internal forces exert influence on competitiveness. *De facto*, there are a variety of perspectives on drivers and constraints of competitiveness, therefore, authors reviewed key theories of strategic management in order to eliminate bias perspectives.

#### *2.1.1 Resource-Based Theory (RBT)*

Resource-based theory (RBT) suggests that the degree of competitiveness of energy organisations is based on the internal aspects of a company. RBT explicitly concentrates on the degree of competitiveness from the internal point of view within an energy organisation. To clarify, RBT relies on the assumption that competitive advantage and competitiveness as such relies on the internal capabilities and resources of an energy organisation that seek to accrue its ability to compete (Omalaja & Eruola, 2011).

In the thesis authors concentrate on the processes of energy transition and transformation of the energy sector, which have a great impact on competitiveness from an internal point of view. Therefore, the sustainable competitive advantages should be examined. Resources in this case

can serve as a constraint as they are limited or as a benefit and tool of achieving goals related to sustainability (Barney, 1996).

Apart from tangible assets such as the quantity and quality of machinery, vehicles, buildings resource-based theory takes into account intangible ones such as skills, competence, expertise, information, image. The importance of these two types of assets and their impact on the competitiveness of the company can be described as equal. However not all resources related to tangible and intangible ones are equal and have the same value and contribution to the increasing competitiveness of a company (Barney, 1996). According to Barney and Hesterly (2010) resources should have the following characteristics: (1) comparatively higher value, (2) costly/expensive barriers to be imitated, (3) rarity, (4) organisational support.

Among these characteristics we argue that high value probably has the highest importance as it contributes to the relevance of the resources in the competition with similar companies. Moreover, the above-mentioned features are the source of competitive advantage and the more a company possesses the resources corresponding to these characteristics the more competitive in the market the company is. Apart from that, the above-mentioned factors give uniqueness to the company and serve as a basis for the creation of the original strategy which is specific for a particular company.

In the extended and enhanced perspective on the resource-based theory, the resources creating strategic and competitive advantages should be heterogeneous and relatively immobile (Smith et al., 1996). With this perspective, resource-based theory is grounded on the assumption that the distribution of resources is unequal even within the same industrial sector which leads to the fact that companies occupy a different position in the market (Kozlenkova et al., 2014).

The second assumption can be defined by the fact that the companies which exploit their internal resources sufficiently and efficiently though provided if these resources correspond to the VRIO-framework have competitive advantage over companies which do not do it when they face inevitable external market and industry changes (Grant, 1991). The detailed elaboration of VRIO-framework is listed in the section 3.2.5.

The third assumption implies that competitive advantage is challenging or more commonly impossible to be achieved based on one particular resource, therefore, there is always a set of resources to be analysed (Barney et al., 2011).

However, despite the fact that resource-based theory is based on the internal observation it is taxing to be used without evaluating specific external factors. That implies an analysis of resources possessed by a company in comparison with the ones of its competitors and the ones conventional for the industry which the company operates in. Such comparison gives a broader understanding of the value of a resource. Nevertheless, some difficulties can emerge in accessing resources. In this sense companies are suggested to use the Likert scale to identify the degree of impact of a particular asset as well as to conduct discussions (Mills et al., 2003). Another method represents the analyses of the entire chain of value creation which gives an opportunity to evaluate the significance of a resource on different stages of a firm's activity and interconnection with threshold resources (Knott, 2009).

To summarise, it can be concluded that resource-based theory (RBT) related to that VRIO-analytical method is an efficient approach of analysing the strengths and weaknesses of the company, soundness of a followed strategy and the company's position in the market in comparison with other competitors. For the oil and gas industry including Equinor in particular internal analyses will be utilised in monitoring of oil and gas reserves, financial resources, available technologies, know-how, or global presence because these are the key characteristics to sustain competitiveness and succeed in energy transition.

### *2.1.2 Industrial Organisation Theory (I/O)*

Industrial organisation theory suggests that competitiveness and its degree is based upon factors in external environment. Although, it is important to mention that I/O theory derives from economic philosophy rather than management philosophy. Therefore, I/O theory concentrates on the external environment as a periphery which affects competitiveness of energy organisations rather than the internal environment within energy organisations (Omalaja & Eruola, 2011).

The core idea of the I/O theory relies within the understanding of an industry which belongs to have a prevailing importance and great impact on the company's competitiveness and strategic development. Moreover, according to the I/O theory, the situation on the market determines the level of profitability of the company (Wirth & Bloch, 1995). For this reason, industrial-organisation theory is applicable for the topic of the thesis as the above-mentioned factors affect competitiveness of an Equinor and serve as a basis for identifying its competitive status in the market. Apart from that, energy transition can be an internal factor in case when a company is

willing to implement changes but it is mostly considered as an external factor which affects the companies and serves as a reason for the shifts in a company's activity.

The most commonly used tool of analysing the market conjecture is the method known as *"Porter's 5 forces*". The method evaluates five variables: the threat of new entrants in the market, as they are potential rivals complicating the competition. The risk of this variable is higher for attractive companies and profitable industries. Secondly, the power of buyers. This concept includes the correlation supply-demand, the quantity of customers and their desire to buy a company's product. Thirdly, the power of suppliers, which can affect the prices of a company's products. Fourthly, the quality threat of emergence of substitute goods or services which can make the product of a firm obsolescent and unattractive for customers. Lastly, the competitive rivalry, which affect the activity of a company, its expenses, profits as well as the chances to survive in the market (Porter, 2008b).

The bigger the scale of these variables, the more difficult it is to operate in a particular industry and the less attractive it is. However, operating in the market corresponding to such conditions in the long-term can result in a decreasing number of rivals and increased competitiveness.

The I/O theory further implies that in order for a company to thrive, it should concentrate on handling opportunities that market provides and overcoming risks existing in the industry (Waldman & Jensen, 2016). Consequently, a company should have a constant monitoring of the external environment and conduct a proper market research, whereas, the results can aid to adjust strategic course for its internal business processes.

As market represents the core subject of the I/O theory, market factors, trends and forces determine the limits within which a firm can act. However, such an approach has its own challenges. Evaluating external factors requires much more effort in comparison to evaluating internal factors. It often turns out to be rather expensive and it is impossible to collect full information about the industry (Day, 1981).

Additionally, market share is considered to be of great importance in the industrial-organisation theory. So, the research results show the interdependence of a company's market share and its profitability (Buzzell et al., 1975). In its turn, increased profitability means increased opportunities that results in higher competitiveness.

It is also important to mention that according to Wirth and Bloch (1995), industrial-organisation theory scanning of external factors should be constant and incessant throughout the entire

period of time the company is operating on the market. It comes from the fact that the market is an actively transforming system where every element contributes to creating a new market environment and changes. Moreover, authors argue that success of a company depends on its ability to wisely use the information about the market as well as adopt and correct its activity, strategies and operational decisions in concordance with opportunities and threats of the external environment.

In this case, I/O theory, and RBT are two contradictory theoretical foundations which rely on the opposed assumptions and focus on the contrary factors which drive and constrain competitiveness within the business environment of energy organisations.

To summarise, while I/O theory focuses on the external environment, the RBT focuses on the internal – operational environment of an energy organisation. Therefore, the authors of this thesis integrated both of the theories to give a thorough picture and understanding of the competitiveness in the business environment of energy organisations, namely oil and gas companies.

In other words, authors focused on the broad scope of factors that drive and constrain the competitiveness of energy organisation rather than depth analysing either internal or external drivers and constraints only. Henceforth, the process of strategic development carried out at the internal level of an energy organisation is defined as development of internal resources and capabilities in response towards external forces with primary and secondary impact on the degree of competitiveness within energy organisations.

### *2.1.3 Game Theory*

There is a theory that relies on the assumption that degree of competitiveness is to a certain extent dependent on the strategic decisions of direct competitors on a particular market is called game-theory (Fudenberg & Tirole, 1991). The game theory in fact plays a critical role in the competition context to understand how the degree of competitiveness is linked with strategic decisions of the competitors. To consolidate, game theory could be translated as a set of mathematical situations concerned with the observation of strategies that deal with competitive situations or scenarios. For instance, how a strategic decision of the direct competitor can affect the degree of competitive status of the rival in the energy industry (Maier & Zenovia, 2012).

Game theory implies interconnection of the players in the market. Therefore, every decision and action of a company has a direct impact on its competitors' decisions, operations and

position in the market (Stoft, 1999). That fact highlights the importance of conducting external analysis and constant monitoring of external factors and conjecture.

To sum up, resource-based theory (RBT) concentrates on the internal capabilities and resources, I/O theory concentrates on the external forces in the market, while game-theory concentrates on the causal relationship between strategic decision and its impact on the direct competitor. All three theories composite competitiveness in the business context but game-theory is not present in our analysis. Particularly because we do not measure causal relationship between strategic moves of Equinor's competitors and its impact on Equinor competitiveness.

The core idea of the next assumption is based on the understanding that companies choose one or the other strategy in accordance with current conjecture. As a result of that, strategies of companies operating within the same industry tend to be resemble and have similar features due to the fact that they analyse the same factors of the external environment and that they are the subject of influence of the same external realities.

### *2.1.4 Review of Pivotal Strategies*

The concept of pivotal strategies refers to the set of expansion, stability, and retrenchment strategic courses developed by authors. Each strategic course of the energy organisation consists of different strategies presented by David et al. (2013) with a variety of strategic options linked by Johnson et al. (2020) options.

Among multinational-, transnational-, and large capital- corporations which reflects on the selected case of our thesis, usually more than a single strategy is pursued to maintain competitiveness (Leavy, 2014). The more strategies organisations pursue, the broader the spectre and chances are to increase competitiveness. The entire amount of executed strategy highly depends on the firm's long-term vision. To consolidate and justify the process of strategy execution, organisations can deploy divergent strategic courses with differing generic strategies and particular options. The table below reviews a variety of corporate level strategies.

**Table 1. Systematic Review of Corporate Level Strategies** (Authors' own work).

The own work represents developed table, categorisation of strategic courses and certain strategic options. The data for strategies and definitions are outsourced from David et al. (2013).

| Strategic Course | Strategy | Strategic Option | Definition of Strategic Action |
|---|---|---|---|
| Expansion | Integration | Forwards | Acquiring ownership of distributors. |
| | | Backwards | Acquiring ownership of suppliers. |
| | | Horizontal | Acquiring ownership of competitors. |
| | | Vertical | Acquiring ownership forward/backward. |
| | Diversification | Related | Coherently enlarging portfolio[1]. |
| | | Unrelated | Incoherently enlarging portfolio. |
| | Concentration | Development | Advancement of portfolio or market. |
| | | Penetration | Empowering marketing activities for existing portfolio. |
| | | Cost focus | Targeting niche audiences. |
| | | Cost leadership | Attracting industry with lowest prices. |
| | | Differentiation | Fulfilling market gap. |
| | Cooperation | Merger | Fusion of companies to single entity. |
| | | Joint Venture | Risk-sharing in specific project. |
| | | Strategic Alliance | Independence & contribution in project. |
| | Internationalization | Export | Trading with market expansion. |
| | | Licensing | Granting permission to foreign entities. |
| | | FDI[2] | Investing on foreign markets. |
| | | Acquisition | Acquiring ownership on foreign market. |
| Stability | Pause | Restructure | Modifying operations and finances. |
| | No change | Temporary break | Controlling and review of status-quo. |
| | Profit | Increase in cash | Retain profitability by any means. |
| Retrenchment | Liquidation | Complete Sell-out | Purposefully selling all assets. |
| | Divestment | Partial Sell-out | Purposefully selling part of assets. |
| | Turnaround | Correction | Correcting actual strategic course. |
| | Bankruptcy | Market Exit | Undesirable selling of all assets. |

Thus, this section focuses on discussion of strategies used by Equinor in the past which are ultimately examined in the empirical section (Hartmann et al., 2021). Since Norway's global energy company have changed its core strategies in accordance with new realities and challenges posed by the global problem of increasing temperature, authors of this thesis decided to elaborate on each of the strategic course, namely expansion strategy, stability strategy and retrenchment strategy.

### Expansion Strategic Course

Expansion strategic course refers to strategies enhancing a company's development and enforcement of its competitive status in the market. Consistent part of the expansion course

[1] Portfolio = in this table, term *"portfolio"* refers to company's goods and services.
[2] FDI = Foreign Direct Investment either brown-field or green-field investments.

includes a significant variety of strategies. The choice of the one and its efficiency depends on the company's priorities and strategic plans (Johnson et al., 2020).

Evaluating the activity of Equinor, one can conclude that company pursued the following expansion strategies: diversification and concentration. However, there are different ways of implementing them which also depends on the company's aims and resources it possesses. Besides that, Equinor was involved in the internationalization strategy as well.

As a part of the expansion's strategic course Equinor also followed the internationalization strategy, namely acquisition. It means that the company acquired ownership over foreign companies. Acquisition strategy is a quite common strategy aimed for expansion of a company (Collan & Kinnunen, 2009). One of the undeniable benefits of such strategy in the internationalization context is that acquisition grants a chance to exploit new opportunities in the market and enlarge the scope of activity.

An example of acquisition strategy is the fact that in 2021 Equinor bought Wento. The Polish company which operates in the field of renewables. With the company, Equinor also acquired solar project pipeline (EQUINOR, 2021). The acquisition has given Equinor an opportunity to have a share in the Polish market and corresponded to the company's ambition to become a net-zero company by 2050.

In the same year the company also acquired 45% of British Norike. The business area of the company includes battery storage. Such a deal can be described as beneficial for acquiring expertise and additionally strengthening its position in the times of energy transition (EnergyConnects, 2021). Analysing the acquisition strategy conducted by Equinor, it can be concluded that the company has shifted its focus to exploiting opportunities of increasing its competitiveness in the era of energy transition.

The previous research highlights that internationalization is a very relevant strategy of the company's expansion strategic course (Coudounaris & Arvidsson, 2021). But in this thesis authors chose to analyse in detail diversification and concentration strategies of Equinor as the key pathways to sustain company's competitiveness in the long-term (Porter, 2008a).

Diversification of Equinor can be hereby described as unrelated. It means that the actual portfolio of a company is enlarging in an unrelated manner by shifting from conventional oil and gas producer to global energy company. In other words, the company is extending its activity by entering new markets or starting the production of new types of products which

earlier were not typical for it. The primary trigger of the unrelated diversification is caused largely by rebranding of the company from the traditional fossil fuel producer to a global energy company by adding new products and services to its portfolio that were not typical for Equinor before. For instance, the subsidiary Equinor ventures invests and supports innovative companies, Equinor group shares data to foster research and development beyond the field of energy, while digitalization initiatives of Equinor aims to become a smart digital company (EQUINOR, 2022a).

Equinor has changed its positioning and, respectively, its brand name. The company shifted the focus from being an oil and gas company to the company corresponding to modern realities and suggesting new energy solutions (EQUINOR, 2018). Consequently, the company had to change its strategy to the one which will represent its new values. As a result of which, a new priority of Equinor had become the development of alternative energy resources. Wherein, the company did not refuse continuing oil and gas production fully. Renewables had become an additional type of company's activity, though it is important to mention that its significance tends to grow annually.

The substantive drawback of pursuing unrelated diversification is associated with high-risks (Chatterjee & Wernerfelt, 1991). The reason for it is that such diversification requires much more financial resources and efforts than the related one, apart from that it requires structural changes, creating jobs, and investing in new equipment.

The activity in which Equinor was traditionally involved includes exploration, development and production (EDP) of oil and gas, refining and processing, marketing and selling of fossil fuels, logistics of produced products. Whereas installation of wind and solar power plants, the technologies for carbon capture and storage and investments in blue and green hydrogen have become a new direction of development in the company (EQUINOR, 2022b).

**Stability Strategic Course**

Among stability strategies Equinor follows the strategy known as pause which implies restructuring of the company, including modification of the company's activity and finances. As it was said before, Equinor is making serious and large-scale changes within the company which affected its brand name, strategies and field of activity by conducting commitments to reach carbon neutrality, taking actions by developing carbon neutral plans as well as deploying low carbon solutions among its fossil fuel facilities with the aid of carbon capture, utilization and storage (CCUS) (EQUINOR, 2022b).

However, financial issues have also become a subject of restructuring. This has become an inevitable result of the adoption to the new realities in energy industry. Any restructuring is a difficult and costly process and using such strategy requires a justified reason. In the 21st century one of the major reasons for it has become the processes of energy system transformation. Thus, currently restructuring can be called as a necessary strategy for staying competitive.

Equinor forecasts, the extraction of fossil fuels will gradually become increasingly expensive due to greenhouse-gas emission costs as well as the impact of taxation designed to decrease the level of emissions (EQUINOR, 2022b).

**Retrenchment Strategic Course**

As for retrenchment strategic course, the strategy followed by the company is called divestment with partial sell-out strategic option. Following this strategy, a company is selling out part of its assets including retirement of technologies and retirement of total proved undeveloped reserves which reflect on the exploration activities of the company.

For large companies the strategy of divestment often means competitive restructuring (Mariotti & Piscitello, 1999). However, it can also be associated with the unjustified expectations from the asset. Nevertheless, it is always connected with increasing efficiency of a company's activity and consequently increasing its competitive status (Barney & Hesterly, 2010).

In February 2021 Equinor sold its assets in the Bakken field located in the United States. The transaction was made with the oil and gas exploration company Grayson Mill Energy. The CEO of Equinor, Anders Opedal explained such decision as a step to optimized portfolio. The company is planning to use the earnings from this deal which are equal to $ 900 million for investing to more competitive and prioritized assets (EQUINOR, 2022b).

Moreover, 2021 was notable for another big deal. Equinor has sold its interests in offshore exploration located also in the territory of the United States, in the Gulf of Mexico. The counterparty in this deal had become the subsidiary of LLOG Bluewater Holdings, LLOG Exploration. The reason for selling the assets was also considered to be the desire of the company to reallocate its portfolio and focus on better opportunities for maximizing profit and accelerating the processes of the company's development (EQUINOR, 2022b).

Apart from that, in the same year Equinor decided to undertake another divestment. Company sold its ownership interest in the largest wind power plant Dogger Bank Wind Farm C, the project located in the United Kingdom (EQUINOR, 2022b). The decision of divestment was

made in spite of the fact that the project was characterized by great success and had high returns on equity. The divestment was made in accordance with the agreement with the major Italian oil and gas company Eni as part of the optimization of the Equinor's portfolio not for entrenchment but for future expansion.

### *2.2 Literature Review*

#### *2.2.1 Energy transition in the global oil and gas market*

Recently the topic related to transformation of the energy sector is becoming increasingly relevant and ubiquitous. The oil and gas production industry is at peak (Zeppini & Van Den Bergh, 2020) and the world is facing new realities and challenges, so the transition to renewables is inevitable but the question is how fast this transition can be implemented and what consequences it will have for countries and most importantly for current oil and gas companies.

As a result of the evolving energy transition, we can observe the explosive growth of attention to renewables and its production. In addition, the amount of consumed energy produced from renewable energy sources is also growing in the world. The growth can be described as gradual and steady. The figure below illustrates energy consumption from renewable sources excluding hydro, including biofuels (BP, 2022b).

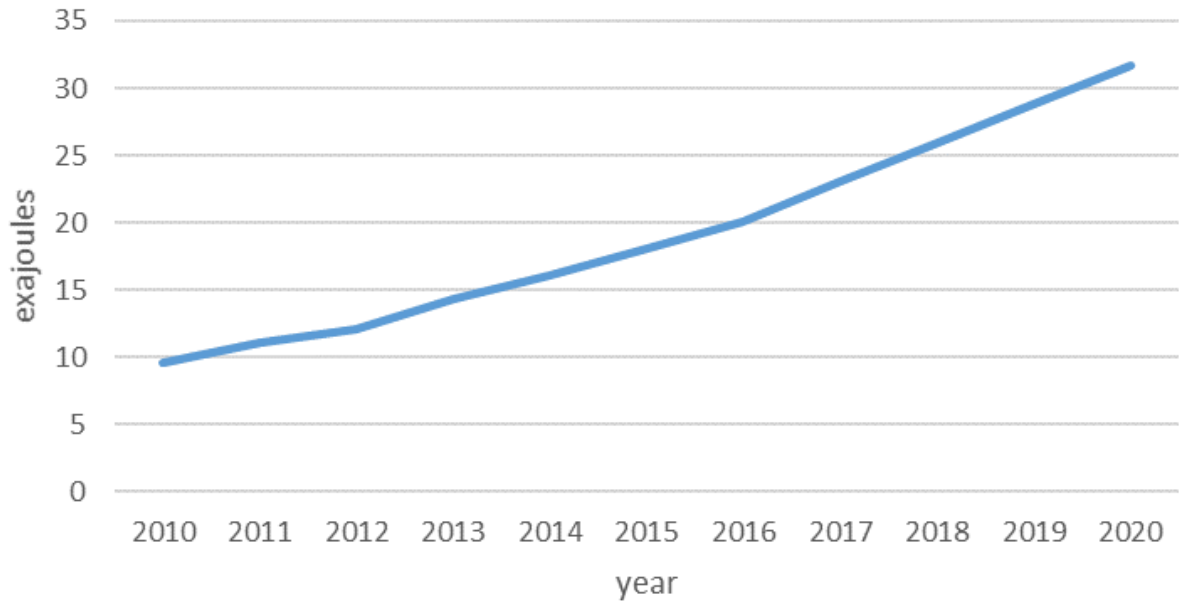


**Figure 1. Energy Consumption[3] from Renewables** (Authors' own work). Data: BP (2022b)

[3] Energy Consumption in exajoules (EJ) units, excl. hydro, incl. biofuels.
1 unit of EJ = 278 TWh- Terawatt Hours. Source: BP (2021).

However, further development of renewables is impossible without financial and legal support. Thus, the state apparatus is the core entity stimulating the transition to alternative energy sources and giving them momentum for their development. The governments of some countries which are showing interest in the energy transition and have the appropriate resources to implement it, not only invest in renewables, but also make them attractive for investment for shareholders as well as provide a more favourable tax regime (Gielen et al., 2021).

Moreover, the role of the state may include establishing cooperation with neighbouring countries. Such cooperation allows reducing the risks of lack of energy resources to meet the needs caused by the occurrence of unfavourable natural and climatic conditions caused, for example, by seasonal factors (Xiangchengzhen & Yilmaz, 2020).

**The role of the Norwegian state and financial risk for Equinor**

Apart from that, a country willing to develop alternative energy can choose a suitable way of production according to the natural features. So, the lack of sunlight makes the installation of solar panels in northern Europe, including Norway, more challenging than in countries with excessive amount of sunlight. The sun also rises in Norway, although, there is small but still growing solar industry in Norway (Åm, 2015). However, wind turbines are not only predominant in the region, but even provide excess electricity production (Ramsebner et al., 2021)

Some authors define carbon pricing as the most efficient way of implementing the energy transition and to combat the problem of global warming (van den Bergh & Botzen, 2020). In addition to the obvious economic benefits, this method allows to attract investment in a new industry and has a positive effect on the development of innovations.

In the report of the Norwegian Ministry of Finance, which examines the progress and success of the country in achieving the goals set for 2025, it is said that in the difficult economic situation caused by the coronavirus pandemic and the global crisis, more attention should be paid not only to the tasks of resolving climate change problems but also the ones of increasing the economic efficiency of this process. The Norwegian state also sees a solution to the problem of toxic emissions into the atmosphere in the establishment of high taxes on emissions, which makes activities that have a negative impact on nature unprofitable, the development of appropriate technologies and support for R&D in the field of renewable energy sources (NOU, 2021). As a result of governmental ambitions to strictly decarbonize and to become carbon

neutral, Equinor's competitiveness faces pressures to retain its competitive status in the age of energy transition.

Scandinavian countries, including Norway, were pioneers in introducing carbon pricing (Green, 2021). Norway was the first country that introduced taxes on mineral oil, and second in the introduction of CO2 emissions taxes (UNFCCC, 2018). The country succeeded in this field and they are planning to considerably increase carbon taxes further (NMPE, 2021). Such intensions can turn out to be a burden for Equinor forcing the company to accelerate transition to renewables.

It should also be mentioned that the number of green bonds in the Scandinavian countries has increased in the last decade, especially in Sweden and Norway. *"Green"* bonds are designed to improve the environmental situation, as well as to promote sustainable development (Torvanger et al., 2021). As a matter of fact, green bonds are posed on the business and policy agendas across Sweden and Norway, whereas, Equinor's competitiveness is therefore challenged in their oil and gas segments.

Undoubtedly, energy transition causes major structural shifts in the economy, creating the conditions for the development of some industries and causing the demise of others. However, the implementation of the energy transition also implies possible risks for the economic system.

The restructuring of the energy system carries great challenges and, if not prevented, could lead to a financial crisis, threatening economic stability and competitiveness of business entities. In addition to that, the possible reasons for competitive crisis may be an increase in the unemployment rate, a change in the level of energy prices which will directly affect the change in prices for a wide range of products, as well as industries that will be in the phase of life-cycle decline stage due to the transformation of the energy system. That in fact will have a negative consequence for Equinor. The company will find it more difficult to repay loans and pay dividends, the value of their assets is also expected to decline, as well as changes in investor expectations, as well as consumer preferences, are associated with the energy transition process (Semieniuk et al., 2021). In the same way this trend affects the competitors of Equinor so their relative position will broadly speaking remain the same.

Other economic implications include equipment used in the oil and gas sector with a tendency to have a long depreciation life and is designed to be used in the long-term. That makes the transition unprofitable, especially for countries classified as developing, because economic growth and development are closely related to the increase in the level of emissions of toxic

substances into the atmosphere. (Fankhauser & Jotzo, 2018). However, it is worth noting that the long depreciation life currently is losing its relevance, which is associated with the development of technologies and efforts aimed at increasing the availability and possibility of using alternative energy.

Energy transition also implies financial risks for Equinor, as the company invests in development of eco-friendly solutions. However, it can affect considerably such factors as customer's behaviour, legislative system, global technological changes, the decisions of its competitors and the conjecture of the market in general. Nevertheless, internal transformation of Equinor's core competencies and threshold resources needs to be strategically managed to efficiently response to the market opportunities and threats which arise along evolution of energy transition.

**Norway's contradictory responses to the Paris Agreement and consequences for Equinor**

The Paris Agreement is the legislative factor in the context of the oil and gas industry that affects competitiveness of Equinor. Even if not legally binding, the agreement has a significant impact on oil-producing countries, participants of the oil and gas market and on the company in question in particular. The Paris Agreement was signed with the core aim of preventing the negative effects of global warming, combating climate change and promoting sustainable development. The Paris Agreement assumes the obligations of countries to reduce emissions of toxic substances into the atmosphere. For these purposes, it is envisaged to control and monitor the fulfilment of countries' obligations every five years, as well as to draw up and publish a long-term plan for achieving emission reduction targets (Savaresi, 2016).

To achieve such goals, namely the reduction of toxic emissions and decrease of global temperature rise, a similar pact was adopted – the European Green Deal. The pact was accepted by 28 European countries, including Norway (Chardayre, 2020; Cyndecka, 2020). It is noteworthy that the transformation of the entire energy system by 2050 includes the elimination of fossil fuels.

As far as Norwegian legislation in the field of oil production, the state law governing this area, the *"Petroleum Law"* states that the management of oil resources must be carried out in the interests of the Norwegian state and society. The Act 29 (Article 4.1) also describes the criterion of desirable and efficient production, which implies maximum production and minimum costs (NPD, 1996).

A high degree of state participation in the oil and gas sector implies significant influence of the government and orientation of the company towards the goals of the country. Thus, the Norwegian government coordinates the activity of companies in the energy sector. However, there is a paradox. As a country with ambitious air pollution reduction targets and one of the leaders in terms of following the basic principles of the Paris Agreement, Norway has significantly increased the number of licenses issued for exploration and production of fossil fuels over the past decade.

Thus, during the above-mentioned period, the country discovered and started exploration of about 2.8 billion barrels of oil. This trend, although serving as the basis for increasing the wealth of the country and, accordingly, strengthening its development. However, it contradicts still the country's goals to achieve zero emissions. In addition, it should be noted that, according to the Norwegian Ministry of Petroleum and Energy, the largest number of licenses - 26 - in 2021 were issued to Equinor, as Norway's largest and main oil producer. The Norwegian offshore exploration and development company Aker BP, an oil and gas operator that conducts business in Norway, primarily in the North Sea, DNO and another Norwegian oil and gas operator Vår Energi also received the largest share in offshore development (NMPE, 2022).

As the energy transition is a trend, it affects businesses in all industries and there is a substantive pressure on oil and gas companies, which now tend to change their long-term plans and strategies proclaiming the targets of decarbonization. For example, the bottom line of the BP's new strategy is that it is planning to become an international energy kind of company by 2030 which implies the shift from being an international oil company focused on producing resources to an integrated energy company focused on delivering solutions for customers, so the main purpose and ambition of BP is to become a net zero company (BP, 2022a). Royal Dutch Shell's new strategy proclaims acceleration of carbon reduction. Like its competitor, the company is aimed to become a provider of clean energy products and services (Shell, 2022). Another giant of the energy industry, Total, also demonstrates its willingness to follow net zero ambition. Taking all these facts into consideration I can make a conclusion that soon many or even all oil and gas companies will, to a varying degree, move away from fossil fuel extraction towards greener activity (TotalEnergies, 2018).

**From Statoil to Equinor**

As for Equinor, energy transition has already reflected on its activity. In March 2018, the company Statoil announced the decision to change the brand name. Earlier, the name of the

company pointed to a strong connection of the oil and gas manufacturer with the State and to the focus on fossil fuel production (*"Stat"* - State and *"Oil"* - Oil). However, in 2018 the company changed priorities. According to Eldar Setre, which was the President and CEO of the company that year, the new name can be deciphered as follows: *"Equi"* - Equality, Equillibium and *"Nor"* – as a sign of respect to its Norwegian origin (EQUINOR, 2018). Such a choice can be described as well-grounded and reasonable, as it has become a reflection of the values of the beginning of the 21st century, namely stability and ecological approach, both in work and in relationships between people, including business and the world in general.

Additionally, the changes occurred in Equinor strategic and competitive positioning. If earlier the company placed emphasis on the extraction of fossil fuels, now the focus is shifted to the development of alternative energy sources, which does not cancel the fact that the company continues to produce oil and gas. On its website, in its reports and presentations, the company tries to demonstrate its interest in the future of the planet and creating favourable conditions from practical and environmental points for the lives of people.

Such positioning and change of the course of activity is fully justified, because, as we discussed earlier, states are forced to encourage people to live a more environmentally friendly life, as well as create conditions for the development of alternative energy and executing energy transition through a tax system, investments and other state regulation methods. It follows from the fact that the company is forced to adapt to new market conditions to survive. The process of changing the company's activity is always a great challenge for any company, but in modern realities it may have an impact on its competitiveness and reputation.

In 2021, the company's strategy proclaims a high level of security, high value and reduction of carbon footprint. For the first time, the concerns of climate change and negative impact on the environment was reflected in the strategy published in the company's annual report from 2016. In a similar report from 2015, the company positioned high value, improving efficiency and attractive shareholders' income, as their main priorities in its activity. Both, in 2015 and the years earlier, Equinor led the strategy for creating value and long-term, effective growth (EQUINOR, 2022a).

Equinor's new strategy proclaims the development of alternative energy and reducing the impact of global warming includes: setting a target to reduce emissions by 20 percent by 2030, in 5 years the company plans to halve emissions, achieving a reduction of 40 percent by 2035, and by 2050 the company's strategy should lead to zero emissions, a significant increase in

renewable energy investment is also expected, apart from that, the company is planning to boost free cash flow and raise quarterly dividends to 18 percent per share (EQUINOR, 2022b).

GNG Protocol Corporate Accounting and Reporting Standard was designed to stimulate business entities to noticeably decrease the level of toxic emissions. The companies are obliged to report the scopes, except the third one. The first scope implies direct emissions, the ones from a company's operations. The second one includes indirect emissions consumed from third parties and the third one defines emissions produced from other inputs (Hertwich & Wood, 2018).

As for Equinor, the company strives to contribute to enhancing the global ecological situation by taking into account all three types of scopes, including also the third one (emissions from the use of products as well as equity share). Adhering to scope 3 objectives is the most important thing that Equinor has signed up to. According to the company's plan the 20% net carbon intensity reduction is expected by 2030, and by 2035 the reduction should equals to 40% (EQUINOR, 2022c).

It also should be mentioned that Equinor was a state-owned non-listed company until 2002 when it became a partly privatized listed company. However, this fact does not mean that the role of the Norwegian government in the company's activity has been weakened. The state owns 67% of the company's shares and exercises constant control (EQUINOR, 2022d). The Kingdom of Norway also helps the company to implement projects and finances them. Thus, in 2021, the state allocated about NOK 83 million to the Ocean Grid project, implemented in the North Sea and aimed at supporting the improvement and development of wind energy (ZacksEquityResearch, 2021). Thus, Equinor largely acts on behalf of the Norwegian government and to some extent represents the country's oil and gas industry. Company, in turn, allows the state to gain independence from fuel supplies and acquire greater importance and influence in the international arena.

### *2.2.2 Criticism and Controversies*

**Energy transition**

There is a certain criticism of energy transition and current strategic management concepts and models. Some experts argue that current state of technologies, resources and funds are not sufficient to achieve the ambition of net-zero emissions by 2050 (Galvin & Healy, 2020). It is impossible to forecast all risks in the long term, as at any time the most unfavourable scenario can be realized, which, quite likely, can lead to a violation of plans or even their revision.

Some experts also argue that renewable energy sources will not be a replacement for traditional fuel, but an additional segment of the energy mix, which will not affect the decline in oil and gas production and consumption. As a proof of this theory, the following fact is given: the amount of energy produced from alternative sources is certainly growing. However, oil and gas production is also growing. According to studies, the growth and development of alternative energy has a minimal impact on the growth and development of traditional energy (York & Bell, 2019). This allows us to conclude that the above segments of the energy balance are not directly dependent on each other and a change in one variable cannot serve as direct and clear evidence of trends in another variable.

The problem of climate change is important and declared as the main reason for the need for the transformation of the energy system. However, in reality is not the main motivation for implementation of changes. The true aim of the energy transition supporters may differ significantly from the declared one (Roberts et al., 2018). Clear benefits include eliminating dependence on oil and gas supplies, as states have unequal access to energy resources, strengthening energy security from the perspective of supplier and consumers, and creating jobs. Also, creation of a green energy industry may provide states with income in the long term.

The Kingdom of Norway is notable for its particular ambition and performance with regard to the implementation of the energy transition as the impact of global warming can result in negative consequences for the country. On the Svalbard archipelago, the northernmost point of Norway, global warming has already caused the melting of glaciers. The decrease in the number and volume of glaciers amounted to a shocking 169.5 km2, which is almost half of the figure of 1936 (Chernov & Muraviev, 2018). A report compiled by the Norwegian Ministry of Finance on climate risks for the country's economy says that rising ocean levels threaten the country with an increased risk of storms (NOU, 2018). This is expected to affect the fisheries, which are well developed in Norway and generate significant income.

Apart from that, one of the major reasons explaining active support of energy transition by Norwegian government and Norwegian energy companies lies in the fact despite the fact that Norway is a leader in terms of oil and gas reserves among other European countries, these reserves are expected to be enough only for a period of time equals to less than 10 years. This means that there is a high risk that Norway in general and Equinor in particular in a decade can lose its competitiveness and the status of a leading entity in the field of oil and gas production and export.

The above-mentioned factors make pursuing the principles of energy transition and shift to renewables not only desirable but necessary processes to remain competitive in the turbulent market.

**Criticism of the strategic management (SM) concepts**

To begin with the academic controversy, the status quo provides numerous definitions for strategy in the business context. According to authors of the book "*Exploring Strategy*", authors defined the strategy in the business context as the "*long-term direction of an organisation*" (Johnson et al., 2020, p. 5). On the other hand, Stephen Bungay argues that it is a great myth that strategy in business context is about long-term. This is a very controversial dispute among two definitions of strategy from the view point of time.

In fact, the particular reason why strategy is not about the long-term, Stephen Bungay argues that when long-held assumptions within a specific industry are being converted into different course or challenged than assumed then strategic changes need to be taken immediately. For instance, in the oil and gas sector, boards of directors and executive management of leading companies would normally would assume that if prices of oil and gas are steady and there is an increasing trend it would be very likely resulted in their desire to push ahead investment activities in order to develop and enlarge production sites. However, in the case of the coronavirus pandemic, assumptions are challenged, and it may push the prices for oil and gas low which will ultimately require quick actions that will accordingly adjust the strategic course of the organisation. For this reason, strategy in the business context of energy organisations should not be associated with time and whether it is about long-term or short-term, rather strategy should be closely interconnected with the core and key fundamentals of the business and how the business model of organisation works (Bungay, 2019).

Nevertheless, in the competition context within the global oil and gas industry, the basis of competition could stay unchanged for the course of several decades. It is because the oil and gas industry requires a considerably large volume of capital in order to enter the market and start with the most necessary activities such as exploration, development, and production of fossil fuels. For this reason, competition within the global oil and gas market consists of very well-known, and strongly established national oil companies (NOCs), as well as international oil companies (IOCs). Therefore, some may argue that leaders within the oil and gas industry can stick to their corporate strategy even during turbulent and uncertain times (Baddour, 1997).

However, the scope of forces that drive and constrain competitiveness in Porter's model have been argued by multiple scholars, strategists and academics (Isabelle et al., 2020). In fact, strategists play the most important role in the criticism listed here. Hereby, the definition of strategists refers to people from the industry in the top-management roles, executive suites and members of the boards that are responsible for the strategic course of the energy organisation. It is without a doubt that strategists face competition in everyday activities, whereas, they have to pragmatically respond to the different strategic decisions made by its rivals as the game-theory suggests.

The most criticism about Porter's model of forces that drives and constrains competitiveness of energy organisations arise from the narrowed scope and biased views in the standard business practice. In other words, the model does not include all of the necessary forces that drive and constrain competitiveness of energy organisations (Narayanan & Fahey, 2005). To be exact, according to Isabelle et al. (2020), authors argue that Porter's model lacks complexity of forces that drive and constrain competitiveness of energy organisations in the 21st century, while authors proposed an advanced model that includes additional forces to the original model of Porter which drive and constrain competitiveness.

The **first** advancement adds force - threat of digitalization - within a particular industry (Isabelle et al., 2020). In the world energy market, particularly in the oil and gas industry the threat of digitalization is closely linked with the concept of big data (BD). The concept of BD refers to the enormous masses of information that are being utilized by divergent information and communication technologies (ICTs) on separate computers or on cloud locations provided by technology operators. The amount of available and collected BD is growing exponentially. Therefore, the main characteristics of the BD are volume, velocity, variety, and most importantly complexity (Kapil et al., 2016). BD are beneficial for Equinor in strategic terms, because the concept positively encourage company to have a broad picture in order to develop strategies and overcome challenges created by energy transition (EQUINOR, 2022b).

For this reason, according to Mohammadpoor and Torabi (2020), their findings suggest that the process of adoption of the BD concept can empower oil and gas companies to stay up- to-date at any time since data is constantly evolving in all interactions between different operators on all levels of the industry. Namely, in the upstream which allude to and deal with exploration and production – E&P of oil and gas resources, midstream which allude to and deal with storage

and transport of oil and gas resources, as well as downstream which allude to and deal with marketing in this sense refining and distribution of oil and gas resources (Hartmann et al., 2021).

The integration of BD and its analytics can empower oil and gas companies to increase revenues and optimize costs due to the robust advantages that is associated with efficiently applicating data sets. The pragmatic use of big data by strategists in oil and gas companies can help the organisation to analyse micro-seismic and seismic data. The seismic data helps oil and gas majors to understand the time picture of subsurface structures in the reserve fields of fossil fuels where exploration and development takes place. Due to recent developments of big data in the oil and gas industry followed by the application of data sensors in the drilling, exploration, and production areas, oil and gas industry has become an extensive and massive data industry (Mohammadpoor & Torabi, 2020).

The **second** limitation of Porter's five forces model, which we have chosen to incorporate in the empirical section, refers to the degree of innovativeness, which ultimately affects the level of competitiveness (Larry et al., 2014). The level of innovativeness in specific energy-concentrated industries can be presented with incremental or radical innovations. According to Lestan and Kabiraj (2022), radical innovations with revolutionary degree of change in the oil and gas industry are primarily driven by renewable energy solutions, whereas, the incremental innovations with the gradual degree of change in the oil and gas industry are driven by efficiency, which resulted in development of more sustainable technologies in exploration and drilling activities of fossil fuels in the Arctic region.

The level of innovativeness is relatively easy to be monitored. One of the possible methods is to track the volume of registered patents within the energy-concentrated industries. It may be respectively or simultaneously monitored across the oil and gas industry, renewable energy industry or nuclear energy industry. The second possible method to track the level of competitiveness in the industry-wide context, or meso level in the economic system conception is to detect so-called IPI, which stands for intellectual property index (Jalles, 2010). However, the competitiveness in terms of retaining competitive status and gaining competitive advantage may attract energy organisations where the volume of registered patents, as well as IPI is evolving gently and the number remains low. In the analysis we have chosen the volume of registered patents.

The **third** pitfall in the Porter's five forces model faced criticism due to lack of regulatory dimension. In fact, the industrial exposure to regulatory interventions is greatly linked with the competitiveness in the energy-concentrated industries. For instance, the oil and gas industry in macro-economic level is regulated by the Organization of Petroleum Exporting Countries, abbreviated as OPEC (Alhajji & Huettner, 2000). In addition to that, regulatory interventions can take place on the political scene as well. In any case, either regulations or deregulations of the oil and gas industry result in the effect of competitiveness of a particular organisation. Regulation of oil and gas business entities may result in tightened business operations which consequently impact competitiveness. On the other hand, deregulation of oil and gas business entities may result in more beneficial and advantageous freedom in trade and business operations (Farah & Cima, 2013). With this in mind, deregulation and regulation of energy-concentrated industries drive and constrain competitiveness of organisations.

To summarize, in the data analysis authors incorporated three adjustments to Porter's Five Forces analysis as criticised above. The adjustments include threat of digitalization, threat of innovativeness, and de- regulations dimension, which are hereby classified as market dynamics factors that affect competitiveness of energy organisations.

## 3. EMPIRICAL RESEARCH & METHODOLOGY

This chapter describes, as a background of the empirical section, a description of methods and techniques that are being used in the data collection and data analysis phase. Thereafter, the quality of the research design is discussed in terms of validity and reliability of the presented results and findings.

### *3.1 Research Philosophy*

The research conducted in this thesis represents a deductive kind of study. Hence, the core research idea of this study is theoretically based on the following structural points. Firstly, deduction from examined results. Secondly, the nature of multiple analyses. Thirdly, observation of break-down character. The deduction means the broad analysis of the factors results in concrete conclusions concerning the competitive status of Equinor. The nature of multiple analysis approach refers to conduct multiple analyses in order to have thorough understanding of the issue. The break-down of the observation serves to classify findings into simpler concepts in order to increase understanding. Consequently, break-down of analyses and analytical observations are crucially essential to science as well as they are vital to rational and logical understandings (Cohen, 1989).

Moreover, in the age of energy transition as well as the age of hyper competitiveness where the market or industry is in an extremely competitive environment, energy companies are facing non-traditional competitors. It is due to new participation and evolving business models. These models exploit vertical and horizontal integration opportunities within and across energy value chains to create sustainable competitive advantage. For this reason, our research is very relevant in terms of timing, because of the actual challenges faced by the world energy system and its key stakeholders. With this in mind, peak for oil demand scenarios out to 2030 are now common place as new sources and alternative sources of energy demand destruction begin to have an impact on the global oil market which ultimately affects competitiveness of Equinor (BAIN, 2021).

Furthermore, demand for fossil fuels could peak by 2030 under a more aggressive transition to a greener future, as growth in the demand for natural gas fails to compensate for lower demand for oil and coal. Therefore, global energy demand growth continues to slow down. The reason is because sustainability and sustainable development concept considerations do not affect only the energy from fossil fuels but also the overall demand for energy (IEA, 2021a). In the same way, the research ideology of this thesis from the view point of time perspective is to address

the challenge that global energy companies face in the age of transition and hyper competitiveness towards alternative energy sources.

### *3.2 Research Strategy and Design*

Conducted research, data collection and analysis of data in this thesis rely on the classification as **case study** with empirical data. The particular reason for selecting a case study method for conducting our research was to preliminary include identification of new hypotheses within the periphery of strategic management, energy transition, and competitiveness of particular case – Equinor. (Bennett, 2004, p. 19).

Therefore, research philosophy based on deductive approach in addition to the case study method is particularly important in order to identify new hypotheses and comparatively examine the competitive situation of the particular case – Equinor. The deductive approach begins with a theory, development of hypotheses from the particular theory, and then collection and analysis of data to test those hypotheses. In our thesis, rather than developing hypotheses, the aim is to identify new hypotheses based on analysis of data. Although, the major concern and problem of appropriate case selection may be affected by bias selection, in this thesis selection of Equinor was selected due to official and recent rebranding of the company in 2018 and the effect of energy transition on the strategic development of the company which provides energy to more than 170 million people every day (EQUINOR, 2022a).

Although, many scholars argue that case studies are established on a single case (Johansson, 2007; Meyer, 2001), there is potential to include multiple methods within the case study approach (Bennett, 2004). In our thesis, we focus on a particular case - Equinor, where the analytical framework is backed up with comparison of Equinor with direct competitors of the company. This will quantitatively examine the extent to which energy transition affects Norway's global energy company.

A particular case is very often defined as a single phenomenon that is examined upon single measure. But according to Bennett (2004, p. 19), author argues that standard research practice shows that each case has several statistical and quantitative analyses. For this reason, our thesis is not biased with a single perspective or analysis. Rather, the authors have decided to conduct a multiple analysis with a comparative approach of Equinor's competitiveness.

**Advantages and disadvantages of a case study method**

The most important advantage of the case study approach is the development of historical events on the particular cases, whereas, the contingent and broad generalizations is a simple pattern to describe complex relationships (Noor, 2008). In our case, the energy transition and its relationship on the strategic development within internal business processes of Equinor and among its direct competitors can be easily narrowed to an understandable pattern.

On the other hand, the main disadvantage and limitation of the case study method that is argued among world-class scholars represent inability to exclude explanations, impossibility to perfect control of case comparison as well as lack of independence of selected cases (Corcoran et al., 2004). For this reason, authors of this thesis selected Equinor as a concrete case. The case was compared with companies (competitors) with higher revenues in the fiscal year 2020. This approach was undertaken with intention to test the hypothesis whether bigger the revenues of a Equinor's competitors are, the better it is for dealing with energy transition.

### *3.3 Empirical Research Methods*

In this sub-section, authors describe methods which were adopted to analyse data. In fact, selected methods represent different perspectives of strategic management theory. The internal environment of Equinor focuses on its internal resources and capabilities. Whereas, the observation of the external environment focuses on the market and industry trends, opportunities, and threats in the form of market growth, exploration of fossil fuel reserves and concentration among the oil and gas companies.

#### *3.2.1 Herfindahl-Hirschman Index (HHI)*

First of all, before understanding the effect of energy transition on the competitiveness among oil and gas companies, authors decided to conduct market concentration measure known as Herfindahl-Hirschman Index (HHI) which portrays market concentration, in other words competitiveness within a particular market (Matsumoto et al., 2012). The main advantage of the HHI concentration measure is its simplicity. All required input for the measurement and analysis represent companies' revenues within reasonably well-defined market structure (OECD, 2021). In our case, market structure reflects on the global oil and gas market with a sample representing 30 companies. By sampling 30 companies in the HHI, this increases the reliability and accuracy of competitiveness concentration in comparison with concentration ratio (CR) which usually incorporates, just a few companies with the highest revenues within the particular market structure (Pavic et al., 2016).

The HHI index is a numerical result on a scale from 0 to 10.000, whereas, there are three levels of market concentration. The low market concentration represents numerical value from 0 to 1.500, which means that there are many market participants which are involved in the perfect competition market structure from the view of economic conception perspective. Secondly, the moderate market concentration represents numerical value from 1.500 to 2.500, which means that there are several firms and market participants within a particular market which are involved in the oligopolistic market structure from the view of economic conception perspective. Lastly, the high market concentration represents numerical value from 2.500 to 10.000, which means that there are 1 or less than 3 market participants involved within a particular market segment. This is characterized as *"monopoly market structure"* from an economic conception perspective (Brezina et al., 2016, p. 68).

The particular objective of conducting HHI index analysis of competitiveness concentration was to find out the status quo of competitiveness within the global oil and gas market among international and national oil companies in order to understand the market structure in which Equinor's upstream, midstream and downstream oil and gas segments are involved to measure market structure. Therefore, the main objective was to understand the structural market outcome of the global oil and gas market, rather than to measure competition directly. Rather than tracking HHI over time, authors deducted competitiveness concentration in the global oil and gas market based on the arithmetic mean for fiscal year 2018, 2019, and 2020. To consolidate, the HHI index analysis of competitiveness concentration in this study reflects on the competitive interaction of firms within global oil and gas markets, rather than determining the competitive interactions (OECD, 2021).

### *3.2.2 Competitive Profile Matrix (CPM)*

Secondly, and most importantly, in order to understand the extent to which energy transition affects the strategic development of Equinor and its competitors, the authors decided to conduct a competitive profile matrix (CPM). This will examine the difference of Equinor's competitors' attitude towards energy transition.

The competitive profile matrix is an analytical framework consisting of variety of assessment factors and criterions based upon which selected cases may obtain different scores, which eventually provide in-depth picture of involvement, activity or success in the particular strategy, in our case success reflect on the activity, presence or involvement in energy transition (Shojaeddini et al., 2019).

In this thesis, authors decided to adopt competitive profile matrix (CPM) in order to define extent to which energy transition affect competitiveness of oil and gas companies, as well as to understand the extent to which companies are successful in the process of tackling energy transition by analysing expansion, stability and retrenchment strategic courses. The competitive profile matrix (CPM) includes a variety of strategic courses (expansion, stability, retrenchment) in order to comparatively observe divergence among Equinor and its competitors' strategies in response to energy transition.

The competitive profile matrix (CPM) incorporates 11 companies (including EQUINOR), whereas, all of Equinor's competitors selected in the CPM intentionally represent companies with higher revenues in the fiscal year 2020. The particular reason for observing Equinor's competitors with higher revenues was to examine whether economically superior companies in the context of Equinor, are more involved in response to energy transition by integrating more strategies than Equinor, and whether these companies are competitively prepared for the new era. Besides that, the authors wanted to test the hypothesis whether bigger the revenues of a companies are, the better it is for dealing with energy transition.

### *3.2.3 Reserves Life Index (RLI)*

There are a variety of strategic courses that oil and gas companies adopt in the process of tackling energy transition. However, in the strategic course of retrenchment and divestiture strategy authors decided to conduct reserves life index (RLI) analysis. The RLI is an appropriate approach to examine the estimated time (years) for how much longer observed companies can extract liquid and gaseous hydrocarbons including oil and gas (Wei et al., 2021).

### *3.2.4 GRAND Matrix*

The competitive profile analysis of Equinor's segments based on sectoral presence in relation to market growth and competitive position was examined with competitive implications using grand matrix presented by David et al. (2013). While one axis of the matrix represents market growth momentum in the form of registered patents within the global renewables and oil and gas market, the second axis represent company's competitive position in the market. Rather than focusing on the Equinor as a group, authors of this thesis decided to examine Equinor's segments including upstream in Norway, USA, and Internationally, mid- and downstream internationally, as well as renewables Internationally.

To justify the division of sectoral structure within the global oil and gas market and Equinor, there are three essential sectors which constitute the oil and gas market in which Equinor

operates. The first sector in the global oil and gas market is upstream, the second is midstream, and the third sector is downstream. In particular, Equinor's presence in the upstream sector consists of exploration, development and production (EDP) of natural gas and crude oil. Although, upstream and global oil supply is strictly controlled by Organization for Petroleum Exporting Countries, Norway is not the member state of the organisation, as a consequence of which we assume that Equinor is not affected by revenues from upstream operations in Norway, USA, while it is on the international scale. Therefore, our grand matrix analysis focus on the revenues earned from the particular upstream segment across different geographical locations.

The grand matrix analysis focuses on the patents registered within particular segments and revenues earned by Equinor from the respective segments. Therefore, assumption that global market is controlled by OPEC is irrelevant for our analysis.

The second sector in the global oil and gas market for Equinor is represented by midstream, where transportation and storage of produced deposits of oil and gas reserves takes place. When observing natural gas respectively, there is tremendous growing trend for consumption and production of natural gas reserves (IEA, 2022). Nevertheless, the transportation and storage of natural gas varies on the form, and predominantly is driven by liquified natural gas (LNG) in the last few decades. As the name of LNG suggest, once the natural gas is exploited, the transportation and storage of natural gas can be liquified into liquid form at the temperature 160 °C below zero, and then back regasified to the natural gas at the atmospheric temperature (EIA, 2021).

The global fleet of LNG vessels increased roughly by 80% in the last decade. As of today, there are approximately 650 vessels in operation carrying LNG (Sönnichsen, 2021). For the global oil and gas market, LNG represents resilience towards geopolitical conflicts as it can be transported via international sea waters and then pumped into the regional pipelines which gives Equinor substantive competitive advantage due to 150 tankers in the fleet. However, not all of them are developed to transport LNG (EQUINOR, 2022e).

Once the crude oil or natural gas is transported to the storing facilities, the third sector in the global oil and gas market represents downstream, where the main objective is to capitalize refined and petrochemically manufactured goods explicitly through marketing and trading. In fact, wholesale and retail in the downstream sector is commonly known for marketing, trading and distribution of hydrocarbon goods through petrol station. Equinor in 2012 sold more than

2000 petrol stations in Northern Europe which changed their name in 2016 to Circle K (Barents & Observers, 2018).

In spite of selling of all assets in the downstream segment, Equinor is nowadays involved in the downstream sector just by implementation of marketing campaigns and communication with the key stakeholders, therefore in grand matrix authors divided Equinor's sectoral presence to upstream in Norway, USA, and Internationally, while midstream and downstream sector were merged into a single sector. Equinor's presence in renewables was included to examine the competitive position of the company.

However, in this study the big challenge was to define the relative size of the upstream, and merged mid- and downstream category in the competitive position axis. Authors simply referred to the categories as treated by Equinor in its annual reports – upstream in Norway, upstream in the USA, upstream Internationally, Marketing, Midstream and Processing Internationally. Downstream in this study relies on the assumption that marketing and trading belongs to the downstream sector even without wholesale or retail of refined petrochemical goods. Therefore, mid- and downstream sectors were merged into a single segment of the company.

Moreover, competitive profile analysis of Equinor's segments based on sectoral presence in relation to the market growth and competitive position within the specific market was sub-divided among four quadrants, whereas, each quadrant (Q) represents respective competitive position. Q1 – Competitive disadvantage. Q2 – Competitive parity. Q3 – Temporary competitive advantage. Q4 – Sustained competitive advantage (David et al., 2013).

A way to define market growth of global oil and gas market, as well as global renewables market. This was based on how much intellectual property in the form of applications and registered patents were held by Equinor throughout the last years. For instance, the number of patents applications in the global oil and gas market in 2020 was about 18.000 (Dewan&Co, 2021), whereas in the GRM patents applications accounted for more than 72.000 registered patents where more than half was devoted to solar photovoltaics and thermal renewable energy (IRENA, 2022). However, in case of Equinor, out of the 100 total granted patents in the last 5 years, less than 10% were related to renewables and green energy. Results of the MSCI ESG Research shows that international oil companies (IOCs) are heavily involved in innovations and R&D when looking at registered patents and filled patents applications. But the ratio of green

energy patents to oil and gas patents is still below 25%, which means that approximately every fourth patent is related to green energy (MSCI, 2020).

### *3.2.5 VRIO Framework*

VRIO framework can be characterized as a model used in strategic planning and analysis. It is an indispensable part of resource-based theory, the core idea of which is understood as evaluation of internal factors of a company. According to the resource-based theory, the internal resources determine the competitive position in the market and a company's success. In our thesis, authors adopted the VRIO framework to analyse Equinor's internal threshold resources and capabilities needed for the daily operations (Barney & Hesterly, 2010).

In the VRIO framework the role of a particular resource in the value creation chain is of great importance. A company is considered to have sustained competitive advantage if its internal resources or capabilities are valuable (V), rare among competitors (R), expensive to be imitated (I) and utilized by the organisation (O). Consequently, the more resources and capabilities corresponding to these criteria a company possesses, the more chances it has to create and gain sustained competitive advantage (Cardeal & Antonio, 2012).

The results of VRIO analysis serve as a basis for identifying a company's internal resources and capabilities for developing strategic plans as well as taking strategic decisions. Apart from that the quality of resources and capabilities, the framework determines potential opportunities in the market as well as limitations in the industry.

### *3.2.6 Measurable SWOT (IFE/EFE)*

Rather than conducting SWOT analysis with qualitative approach discussing Equinor's internal strengths and weaknesses as well as external opportunities and threats within the particular markets, authors of this thesis decided to conduct **SWOT analysis with quantitative approach** focusing on measurability of Equinor's internal business transformation and response to market and industrial external forces in the age of energy transition.

In this case, internal strengths and weaknesses of Equinor were evaluated separately using Internal Factors Evaluation (IFE) method, while external opportunities and threats were evaluated separately using External Factors Evaluation (EFE) method.

To justify the assessment of Equinor's internal environment, assessment firstly classified strengths and weaknesses through VRIO analysis (Barney & Hesterly, 2010) based on core competences in the age of energy transition. In the second stage, the assessment of the internal

environment was measurably examined with the internal factors evaluation (IFE) approach, a quantitative evaluation method proposed by David et al. to examine the internal environment of a firm (David et al., 2013).

In this case, the assessment of Equinor's internal environment consisted of internal factors which represented strengths and weaknesses from the VRIO analysis. Each and every of 10 factors was equally assigned with 10% weight to equal 100% total weight within the internal environment of Equinor. Factors were evaluated with the benchmarking approach, namely with a Likert scale in order to rank every factor and increase validity and credibility of results. In fact, Likert scale is very often applied in surveys or questionnaires (Pescaroli et al., 2020). However, authors applied Likert scale to benchmark Equinor's transformation of core competencies compared to energy transition principles among direct competitors.

A factor which was either strength or weakness was ranked on the scale from 1 to 5. Whereas, a factor ranked with number 1 represented poor transformation of Equinor among competitors, a factor ranked with number 2 represented Equinor's transformation below average among competitors, a factor ranked with number 3 represented average or moderate transformation of Equinor among competitors, while factor ranked with number 4 represented Equinor's transformation above average among competitors, and lastly, a factor ranked with number 5 represented superior transformation of Equinor among competitors.

To justify the assessment of Equinor's external environment, assessment firstly analysed industrial and market opportunities/threats through Porter's Five Forces (Porter, 2008b) as well as market dynamics (MD) (OECD, 2021) analysis based on factors that shape competitiveness of renewables, oil and gas in the age of energy transition. In the second stage, the assessment of the external environment was measurably examined with the external factors evaluation (EFE) approach, a quantitative evaluation method proposed by David et al. (2013) to examine the external environment of a firm.

The assessment of Equinor's external environment situation consisted of external factors which represented threats and opportunities from the Porter's Five Forces and market dynamics analysis. Each of 10 external factors was equally assigned with 10% weight to equal 100% total weight within the external environment of Equinor. Factors were evaluated with the benchmarking approach, namely with a Likert scale in order to rank every factor and increase validity and credibility of results. Authors applied Likert scale to benchmark Equinor's response to external factors in relation to energy transition principles among direct competitors.

A factor which was either threat or opportunity was ranked on the scale from 1 to 5. Whereas, a factor ranked with number 1 represented poor response of Equinor among competitors, a factor ranked with number 2 represented Equinor's response below average among competitors, a factor ranked with number 3 represented average or moderate response of Equinor among competitors, while factor ranked with number 4 represented Equinor's response above average among competitors, and lastly, a factor ranked with number 5 represented superior response of Equinor among competitors.

To summarize, measurable SWOT analysis was established on the basis of Internal Factors Evaluation (IFE) and External Factors Evaluation (EFE). The IFE was assessed based on internal core competencies analysed in VRIO framework, while the EFE was assessed based on the external market opportunities and threats analysed with adjusted Porter's Five Forces including market dynamics factors.

### *3.4 Data Sources and Data Collection*

According to Granello and Wheaton (2004) it is an absolute necessity to collect data from the reliable sources, as well as to collect data timely when it comes to process of data collection in conducting research. Data collected only from secondary sources are sufficient enough to be used in the empirical analysis to address the research question to what extent energy transition affect the competitiveness of Equinor in the market.

Due to time limitations as well as funding restrictions, authors of this thesis were unable to collect data from the primary sources with the selected empirical research methods. Hence, data collected for the empirical analysis were gathered from the secondary data sources including academic journals, articles, books and most importantly official annual reports of the selected companies and focus groups in the empirical data analysis stage.

### *3.5 Data Analysis*

There are divergent patterns to analyse secondary data in the research process. Nonetheless, in this thesis, analysis of secondary data represents a key pillar of the empirical methods. Hereby, authors conducted statistical and quantitative data analysis to answer research question to what extent energy transition affect strategic development of Equinor.

In the first place, the current competitiveness in the global oil and gas market was analysed with the help of market concentration measure in order to understand status quo of competitiveness among oil and gas companies. The market concentration was analysed based on Herfindahl-Hirschman Index (HHI) in order to define status quo of competitiveness within the global oil

and gas market which is more reliable competitiveness market concentration measure that so-called four firm's ratio which include only four best economically performing companies in the market (OECD, 2021).

The competitiveness of oil and gas companies was analysed through the following HHI formula.

$$\text{HHI} = \text{CMS}_1^2 + \text{CMS}_2^2 + \text{CMS}_3^2 + \ \ldots + \text{CMS}_x^2$$

where,

HHI = Herfindahl-Hirschman Index.

CMS = Company's Market Share in % (Elaborated below).

$^2$ Power = Squared CMS.

$_{1, 2, 3, \ldots x}$ Subscript = Respective company in the market.

With the aim to increase internal reliability and accuracy of results in the HHI, the variable of company's market share (CMS) was based on the arithmetic mean for the fiscal years 2018, 2019 and 2020. Therefore, the formula below portrays the calculation of selected companies and their market share calculation in this thesis.

$$\text{CMS} = \frac{\sum \text{CR FY2018} + \text{CRFY 2019} + \text{CRFY2020}}{\sum \text{MR FY2018} + \text{MRFY 2019} + \text{MRFY2020}}$$

where,

CMS = Company's Market Share in %.

CRFY2018 = Company's Revenues at the end of Fiscal Year 2018.

CRFY2019 = Company's Revenues at the end of Fiscal Year 2019.

CRFY2020 = Company's Revenues at the end of Fiscal Year 2020.

MRFY2018 = Market's Revenues at the end of Fiscal Year 2018.

MRFY2019 = Market's Revenues at the end of Fiscal Year 2019.

MRFY2020 = Market's Revenues at the end of Fiscal Year 2020.

This study observed the competitiveness in the global oil and gas market applied on companies with the status of International Oil Company, National Oil Company, and Joint Venture, which operate in the upstream, midstream, and downstream sectors world-wide. However, note that the sample for measuring current competitiveness in the global oil and gas market is limited to 30 companies (See *Appendix 1.*).

**Secondly**, the competitive profile matrix (CPM) of pivotal strategies among oil and gas companies tackling energy transition was analysed through 10 assessment factors and 7 criterions portrayed in the table below. CPM examined expansion, retrenchment, and stability strategic courses of Equinor and its competitors tackling energy transition. In this case Equinor's competitiveness is to certain extent affected by the strategic moves of its competitors. However, in our thesis we explicitly observe the extent these pivotal strategies succeed in tackling the energy transition, while comparing Equinor with economically superior competitors in the age of energy transition.

**Table 2. Assessment Factors and Criterions in the Competitive Profile Matrix**

(Authors' own work)

| Strategic course | Strategy | Assessment Criterion | Assessment Factor | Assessment Weight | Assessment Evaluation |
|---|---|---|---|---|---|
| Expansion | Unrelated Diversification | 1.CAPEX<br>2.Cooperation | 1.Hydro<br>2.Solar<br>3.Wind<br>4.Biofuels<br>5.Green Hydrogen | 10 %<br>10 %<br>10 %<br>10 %<br>10 % | **0:** Not /Involved/ /Present/ /Active/ |
| Stability | Restructure | 3.Commitment<br>4.Plan<br>5.Action | 6.Net-Zero Ambitions<br>7.Net-Zero Strategies<br>8.CCUS | 10 %<br>10 %<br>10 % | **1:** /Involved/ /Present/ /Active/ |
| Retrenchment | Divestiture | 6.PPE<br>7.TPR | 9.Retired technologies<br>10.Retired reserves | 10 %<br>10 % | |
| | | | Total | 100 % | 0 - 10 |
| | | | **Total Weighted Score** | **0 – 100 %** | |

In-depth evaluation of 11 examined companies in the competitive profile matrix (CPM) is portrayed in the *Appendix 2.*

### *3.5.1 Expansion strategy through more renewables or unrelated diversification*

First of all, the expansion strategic course in the competitive profile matrix (CPM) of the oil and gas companies tackling energy transition was assessed based on the diversification strategy with the strategic option of unrelated diversification. Having said that, the expansion strategic course refers to the enlargement of the company's portfolio, ownership, operations and contribution in the green energy alternatives. In the context of this study, green energy alternatives represent expansion in the form of renewable energy sources including hydro, solar, wind, biofuels, and hydrogen produced solely from the renewable energy sources (green hydrogen).

The assessment evaluation of unrelated diversification of the oil and gas companies was based on two criterions.

The first criterion of unrelated diversification was based on the cooperation in the form of merger, joint venture or strategic alliance in the field of renewable energy. Whereas, the second criterion of unrelated diversification was based on capital expenditure (CAPEX) to renewable energy sources (including hydro, solar, wind, biofuels, green hydrogen). In case that both of the factors were equal, if a company was involved in either of them (-cooperation and -capex) in the field of renewable energy, then the assessment was evaluated as positive, meaning involved, present and active in the in the energy transition tackling. In case a company was not involved in either of the two factors, then the assessment was evaluated as negative, meaning not involved, not present and not active in the energy transition tackling process.

Altogether, the assessment factors of the expansion strategic course, and unrelated diversification strategy were based on cooperation, and capital expenditures into five fields – factors of renewable energy. The first assessment factor represented hydro projects, the second assessment factor represented solar projects, the third assessment factor represented wind projects, whereas, the fourth assessment factor represented biofuels, and last but not least, the fifth factor represented green hydrogen projects. The **second** strategic course – stability of the oil and gas companies in the global oil and gas market in relation to energy transition response was based on the re-structuralizing strategy of the status quo in the companies including internal policies, plans, actions and commitments. Having said that, re-structuralizing strategy refers to the strategic pause, where the organisation restructure, reclassifies, re-evaluate its operations by necessary actions and modifications in order to decrease the carbon footprint by declining greenhouse gas emission produced from the oil and gas activities.

### *3.5.2 Three strategies for restructuring*

In the context of this study, restructure was examined from three different assessment criterions.

The **first** assessment criterion of the stability strategic course represented commitments of the observed companies. The assessment factor in this case was Net-Zero ambitions of the companies. In case a company declared commitment toward net-zero emission operations, then the assessment was evaluated as involved, present or active in the assessment factor. To justify, net-zero ambitions of the oil and gas companies is to neutralise the carbon footprint produced by the companies (IEA, 2021b). Nevertheless, when a company commits itself to achieve carbon neutrality, it is only the slight piece of the cake. Therefore, authors of this study decided

to involve a second assessment criterion of the stability strategy – Net-Zero strategies, because one thing is to declare and commit towards carbon neutrality prospects, whereas, the most important thing is to have a clear strategy or plan how the company wants to achieve the carbon neutrality.

Thus, the **second** assessment criterion of the stability strategic course represented plan, in other words strategy, which stated clear strategic goals of the oil and gas organisations, and how the companies aims to achieve **carbon neutrality by the year of 2050**. Therefore, the assessment factor of the plan represented a net-zero strategy of the company. In case the company had specific strategic goals on the pathway towards carbon-neutrality, the evaluation was considered as involved, present and active whereas, in case the company did not have any specific goals it was evaluated as not involved, present or active. Although, there were companies with the goals to became climate neutral even earlier than the year of 2050 (IEA, 2021b), it did not change the classification of the assessment evaluation. Nonetheless, even if the commitment and plan was present, restructure strategy requires execution, and that is why the assessment also examined the existence of execution aspect – action.

Finally, the **third** and final assessment criterion of the stability strategic course of the restructure strategy represented action. In this context action was considered as a relevant aspect of the re-structuralizing process in the oil and gas companies and that is why assessment factor considered integration of the projects that are keen on the carbon capture, utilization and storage (CCUS). Therefore, the evaluation of the third re-structuralizing assessment factor was based on the company's presence in the CCUS projects and their integration into their business models. If a company had integrated CCUS, it was evaluated as involved, present and active in tackling the low carbon energy transition and vice versa.

### *3.5.3 Retrenchment – The technological or the reserve route*

In addition to expansion and stability strategic courses, the last strategic course of the oil and gas companies tackling the energy transition process was retrenchment based on the divestment strategy with a strategic option of retiring technologies and declining the involvement in the global oil and gas operations from the financial / economical point of view.

Having said that, the divestiture strategy of retrenchment strategic course of the oil and gas companies was observed based on the two assessment criterions, whereas, each of the assessment criterion was selected with the objective to increase reliability of the retrenchment strategic course in the response to energy transition.

The first assessment criterion of divestiture strategy represented **retirement of technologies**. To consolidate, the assessment criterion was based on decline in non-current fixed assets and was chosen particularly due to extensive pressures from the governments, shareholders and key or so-called primary stakeholders of the international oil companies (IOCs) and national oil companies (NOCs) to retire its existing technologies (IEA, 2021b). The retirement of technologies was assessed as follows.

$$\text{Retirement of Technologies} = \Delta\,\text{PPE}$$

where,

Δ = change between Fiscal Year 2019 and 2020.

PPE = Plant, Property, Equipment (Non-current and Fixed Assets).

Assessment evaluation: 1 = decline, 0 = increase.

Unit: $ United States Dollars (USD).

Thus, the assessment evaluation of decline in assets was based on change between fiscal year 2020 and 2019 in the balance sheet of the chosen companies, in the section of non-current assets – property, plant, equipment (PPE) to observe retirement in technological equipment of the companies. In case that company experienced decline in the non-current assets particularly in the PPE section, the assessment factor was evaluated positively, that means involved, present or active, whereas, in case there was increase in the non-current assets of PPE, the assessment factor was evaluated as negative, meaning not involved, present or active.

The second assessment criterion of the divestiture strategy represented **retirement of the total proved reserves (TPR)** of developed and undeveloped liquid and gaseous hydrocarbons indicated in the million barrels of oil equivalent (mmboe). The retirement of total proved reserves (TPR) was assessed as follows:

$$\text{Retirement of TPR} = \Delta\,\text{TPR}$$

where,

Δ = change between Fiscal Year 2019 and 2020.

TPR = Total Proved Reserves (Developed and Undeveloped).

Assessment evaluation: 1 = decline, 0 = increase.

Unit: Million Barrels of Oil Equivalent (mmboe).

The particular reason why the authors decided to assess total proved reserves, rather than developed or undeveloped respectively was due to key objective to increase reliability and validity of the divestment and retirement of hydrocarbons. The classification of the proved reserves is highest in the hierarchical scale of reserves. The proved reserves represent likelihood of more than 90% to be extracted in commercial projects, while proven reserves represent likelihood in between 50% up to 90% to be extracted in the potential commercial projects, whereas, the possible reserves represent likelihood of 10% up to 50% to be extracted, and that is why possible reserves are usually back bone of exploration projects rather than commercial activities (Europe, 2013).

Nevertheless, the total proved reserves – TPR can be developed or undeveloped. However, the assessment criterion evaluated total proved reserves including developed ones, and undeveloped ones. The particular reason for that was to find a constructive balance in the assessment, because the total developed reserves of the oil and gas companies represent the quantity of oil and gas that was commercially recovered through the already existing drilling wells, operational facilities and production fields throughout a particular year. It is a fact that production of oil and gas reserves highly depends on the market demand, because the storage and transportation from the offshore drills is a sophisticated process and may be easily affected by low demand caused by coronavirus pandemic, benchmarking price increase in trading etc. Whereas, the undeveloped proved reserves refer to the quantity of oil and gas reserves that can be commercially recovered through anticipating and new drilling wells, operational facilities and production fields in the future (Europe, 2013). The particular reason for assessing developed and undeveloped reserves was to evaluate the key message, if the oil and gas companies are involved in the process of tackling energy transition by divesting reserves of fossil-fuels and retiring hydrocarbons.

The evaluation was based on decline or increase of total proved reserves, both developed and undeveloped, whereas, in case the examined company experienced decline in the total proved reserves between fiscal year 2019 to 2020, it was considered as positive response to energy transition, meaning involved, present and active. On the other hand, if the company experienced an increase in the total proved reserves between fiscal year 2019 and 2020, it was evaluated as a negative response to the energy transition process, meaning not involved, present or active.

However, not every company examined in the competitive profile matrix (CPM) declared its PPE in $ USD dollars, or TPR in mmboe units within their annual reports. For that reason, authors had to convert PPE of specific companies accordingly with the exchange rate of RMB, and RUB to USD as of 19th of February 2022 (IMF, 2022)[4].

In regards to total proved reserves (TPR), some companies reported reserves of liquid and gaseous reserves in common unit – million barrels of oil equivalent (mmboe), while other companies declared liquid reserves - crude oil, in millions of metric tonnes (mmt), and gaseous reserves – natural gas, in billions of cubic feet/metres (bcf/bcm). With the aim to increase validity of the results, authors converted liquid and gaseous reserves to million barrels of oil equivalent (mmboe) in accordance with the British Petroleum's approximate conversion factors (BP, 2021). See formula below[5].

Thirdly, the Reserves Life Index (RLI) was analysed based on the fraction one divided by the production to reserves ratio. The production represented total volume of produced gaseous and liquid hydrocarbons in the fiscal year 2020, whereas, the volume of reserves represented total proved developed and total proved undeveloped reserves in the common unit – million barrels of oil equivalent (mmboe). The particular reason for including proved developed and undeveloped reserves together was to increase validity and accuracy of the presented results because developed reserves are closely linked to the market demand, while undeveloped reserves are close linked to the exploration activities of the oil and gas companies.

Therefore, this study incorporated both developed and undeveloped, while indicating only proved reserves that are subject to gaseous and liquid hydrocarbons which refer to the quantity of hydrocarbons that are calculated and can be extracted profitably from the discovered accumulation in reservoirs, while they are sub-classified in accordance with geological knowledge of seismic and micro-seismic data. In the pragmatic business context, it means that

[4] 1 $ USD = 0.16 RMB
1 $ USD = 0.013 RUB
where,
USD = United States Dollar
RMB = Chinese Yuan
RUB = Russian Ruble

[5] 1 billion cubic feet – bcf – (natural gas) = 0.167 mmboe.
1 billion cubic meters – bcm – (natural gas) = 5.883 mmboe.
1 million metric tonnes – mmt – (crude oil) = 7.330 mmboe.

In-depth quantification of production and total proved reserves in million barrels of oil equivalent (mmboe) at the end of fiscal year 2019 and 2020 as well as annual change of eleven examined companies is enclosed in the Appendix 3.

conservative investment banks will not loan money for production to the oil and gas firms in case reserves are not proved (Europe, 2013). Oil and gas companies declare reserves in their financial books, and they are very attractive type of asset for investors. For this reason, authors of this study analysed the estimated time (years) for how much longer selected oil and gas companies are able to extract hydrocarbons based on the Reserves Life Index (RLI)[6].

The RLI index examined the remaining amount of time for exploration of hydrocarbons, Equinor's competitiveness is primarily affected by the estimated amount of oil and gas resources, because no hydrocarbons will result in no sales, and eventually the competitive status of the company will change. Moreover, Equinor's resources can be secondarily affected by the energy commodities prices on the exchanges. However, in our thesis we explicitly observe divestment of hydrocarbons as a retrenchment strategic course in response to energy transition.

Fourthly, in the grand matrix, the competitive profile of Equinor's segments was analysed with regards to market growth and competitive position of respective segments. Authors of this research were keen on the following segments. Upstream in Norway, Upstream in the United States of America, Upstream Internationally, Mid- and Downstream, as well as Renewables. To consolidate, the market growth momentum was analysed based on the external market driving forces and key trends, whereas, the competitive position of Equinor was analysed based on the revenues from the respective segments.

Last but certainly by any means not least, the measurable SWOT analysis was developed based on the VRIO analysis (Barney & Hesterly, 2010) for the Internal Factors Evaluation (IFE) (David et al., 2013) and Porter's Five Forces (Porter, 2008b) and Market Dynamics Analysis (OECD, 2021) for the External Factors Evaluation (EFE) (David et al., 2013). To consolidate, the Internal Factors Evaluation (IFE) consisted of Equinor's internal resources and capabilities that explicitly comply with the key principles of green energy transition, whereas, a particular capability or resource was considered as strength or weakness depended on the VRIO analysis and comparison of Equinor to 10 competitors involved in the Competitive Profile Matrix (CPM). For this reason, strengths and weaknesses of Equinor were evaluated in regards to energy transition as follows.

[6] RLI = 1 / (Production to Reserves Ratio)
where,
RLI = Reserves Life Index.
Production = Produced gaseous and liquid hydrocarbons in the fiscal year 2020 (FY20).
Reserves = Total proved developed and undeveloped gaseous and liquid hydrocarbons in the FY20.

$$\text{IFE} = \sum \text{Factors}' \text{ Score}$$

where,

IFE = Internal Factors Evaluation.

Σ = Sum of.

Factors = Strengths and Weaknesses.

Score = Weight (10 %) × Ranking (Likert Scale 1 to 5).

Ranking = 1 – poor transformation, 2 – transformation below average, 3 – moderate/average transformation, 4 – transformation above average, 5 – superior transformation.

Contrary to the Internal Factors Evaluation (IFE), the External Factors Evaluation (EFE) consisted of Equinor's market and industrial opportunities and threats that explicitly comply with the key principles of green energy transition, whereas, Equinor's presence in global oil and gas market as well as global renewables market was considered in the analysis of threats and opportunities which depended on the Porter's Five Forces and Market Dynamics analysis and comparison of Equinor to 10 competitors involved in the Competitive Profile Matrix (CPM). For this reason, opportunities and threats of Equinor were evaluated in regards to energy transition as follows.

$$\text{EFE} = \sum \text{Factors}' \text{ Score}$$

where,

EFE = External Factors Evaluation.

Σ = Sum of.

Factors = Opportunities and Threats.

Score = Weight (10 %) × Ranking (Likert Scale 1 to 5).

Ranking = 1 – poor response, 2 – response below average, 3 – moderate/average response, 4 – response above average, 5 – superior response.

### *3.6 Quality of the Research Design*

The quality of this thesis has to be confronted and the issues of validity and reliability of presented results have to be addressed. For this reason, the following section concentrates on the validity and reliability of presented results.

### *3.6.1 Validity of Results*

According to Satyaprasad and Krishnaswami (2010), authors argue that every conducted research should be established on a valid interpretation of data. For this reason, authors of this thesis had to increase validity of the presented results by converting financial indicators as well as units in production and inventory to a common unit. To consolidate, financial indicators including revenues and non-current fixed assets including plant, property and equipment of certain companies observed in this study had to be converted to a common unit which represents $ USD – United States Dollar. This was significantly important when conducting Herfindahl-Hirschman Index (HHI) and Competitive Profile Matrix (CPM) which requires all samples to have data in the common unit.

Indeed, not every observed company disposed of its finance in the $ USD when publishing annual reports. Therefore, authors converted revenues and non-current fixed assets of these companies to a single exchange currency in order to increase validity of the presented results. The exchange rate conversion was used from the International Monetary Fund as of 19$^{th}$ of February 2022 (IMF, 2022).

Secondly, production performance and inventory storage of the total proved reserves (TPR) of liquid and gaseous hydrocarbons (oil and gas) were converted to a common unit of million barrels of oil equivalent (mmboe) in order to increase validity of presented results. Again, not every company disposed of its TPR in mmboe, but in alternative units such as billion cubic feet (bcf), billion cubic meters (bcm) or million metric tonnes (mmt). For this reason, authors of this thesis converted TPR of focus groups into common units using British Petroleum's approximate conversion rates (BP, 2021).

Thirdly, validity of the results presented in this thesis may deviate from the current market situation. It is due to the validity and accessibility of secondary data analysed from the year of 2020. Not every company observed in this thesis has published its annual report from the fiscal year of 2021, and therefore in regards to competitive profile matrix (CPM) as well as market concentration measure (HHI) authors had to increase reliability by having data from the same year which results in decrease of validity on today's market situation.

### *3.6.2 Reliability of Results*

In terms of reliability of data and results in this thesis, findings must be considered to some extent subjectively because data were collected from secondary data sources. To increase the reliability of the research results and findings, authors argue that conducted research in this

thesis relies on transparent and official data sources, hence, the internal reliability of the results found in this research is substantially accurate as the data from the sources are as close as possible to reality. On the other hand, the external reliability of the results is irrelevant as the object of the research points to a single case company rather than the entire global energy market, or oil and gas industry as a whole (Mohajan, 2017). Therefore, induction of results presented in this thesis and external reliability of the research are irrelevant for the entire market or industry because this thesis points onto a single case – Equinor.

## 4. RESULTS & FINDINGS

This chapter is divided into two parts. While the key findings (4.1) illustrate the most relevant outcomes from the analysis of Equinor's external environment, the detailed findings (4.2) provide a more in-depth comparative overview of results applied on Equinor.

### *4.1 Key Findings*

Figure 2. presents the competitiveness in the global oil and gas market based on Herfindahl-Hirschman Index (HHI) for the fiscal year 2018, 2019, and 2020 and the overall competitiveness based on the arithmetic mean of these 3 years. The actual competitiveness in the global oil and gas market is in low market concentration, which means that market participants are involved in the perfect competition market structure. The industrial structure measured by turnover (total revenues) is characterized by many firms that have more or less the same turnover. Hence, authors of this thesis argue that most big firms and their competitors should have an equal possibility to confront green energy transition. Although, the competitiveness of the global oil and gas market in this study is perceived explicitly from the macro-economic perspective without bearing in mind international and national market regulators such as Organization of Petroleum Exporting Countries, or national ministries of energy, environment, industries. For this reason, presented results must be considered subjectively without partiality.

HHI Index examined the global market concentration, in other words competitiveness concentration in the global oil and gas market, which affects Equinor's competitive position internationally. The average competitiveness in the global oil and gas market for the 3 years period from 2018 to 2020 was 780.10 points. It means that the global oil and gas market was in low concentration. The lower the market concentration index is, the higher a competitiveness is present in the market. Based upon HHI classification of market structure, the global oil and gas market is in the perfect competition market structure world-wide. According to the US Department of Justice, the HHI index below 1.500 suggest that the specific market segment is unconcentrated (USDJ, 2010). Therefore, any strategic actions related to mergers and acquisitions (M&A) among examined companies will not have an anti-competitive impact on the global oil and gas market. The market score of competitiveness among oil and gas companies is shown in the *Appendix 1.*

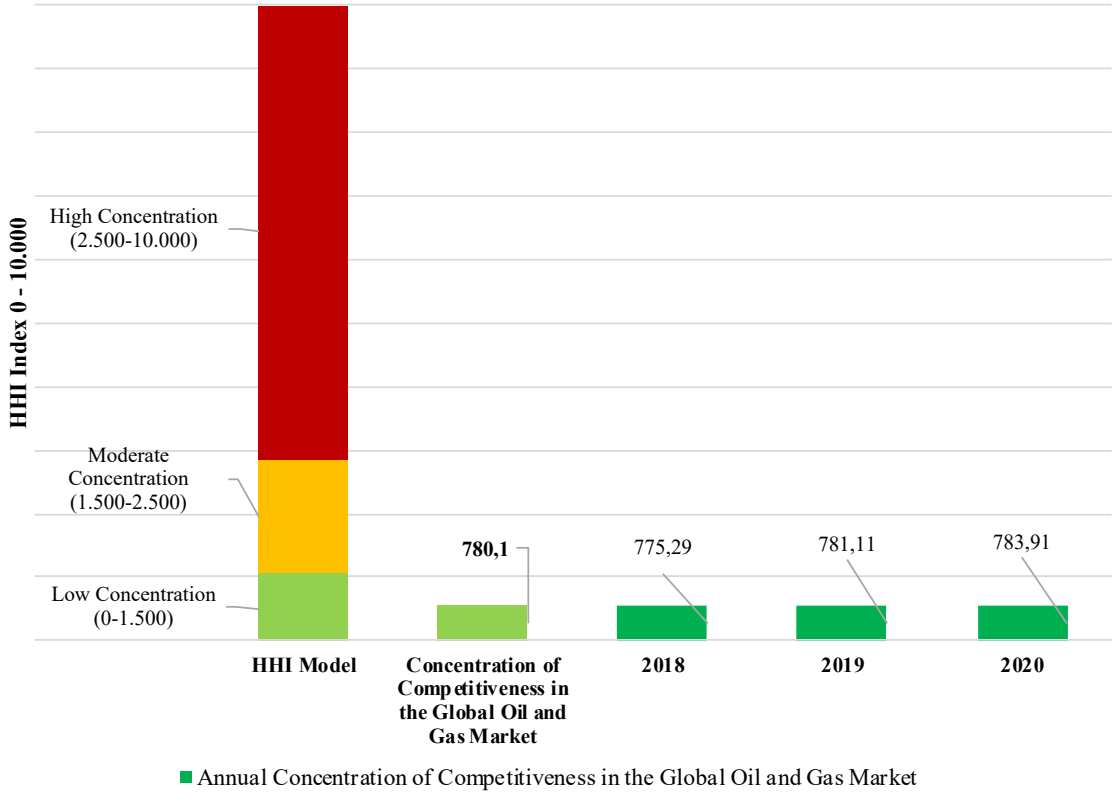


**Figure 2. Competitiveness in the Global Oil and Gas Market** (Authors' own work).

Figure 3. present the competitive profile matrix (CPM) of eleven observed companies in the process of tackling energy transition based on their total revenues. The competitive profile matrix of eleven observed companies highlights that companies with the highest total revenues from operational, investing, sales, and joint venture activities are less active and involved in tackling energy transition with response of divergent strategies. In fact, the green polynomial trendline shows that companies with revenues in the range between $ 140 USD billion to $ 210 USD billion are more likely to succeed in the energy transition and meet net-zero commitments by the year of 2050 compared with the larger and smaller companies. In-depth analysis of involvement, presence and activity of the eleven observed companies and their strategies is portrayed in the *Appendix 2*.

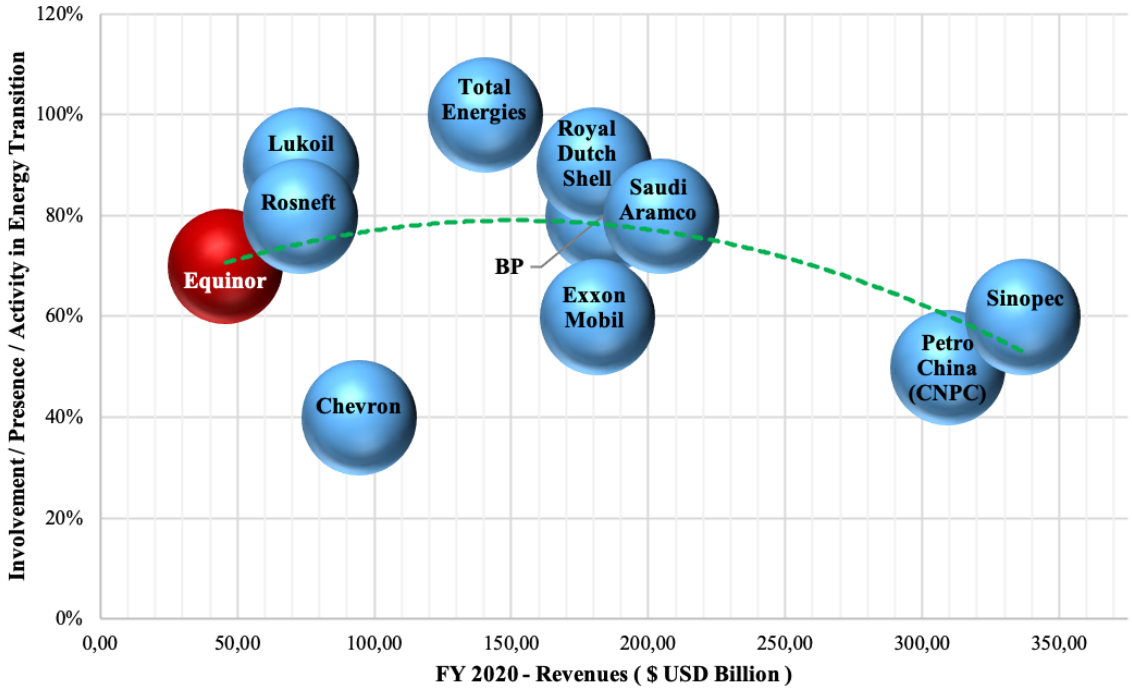


**Figure 3. Competitive Profile Matrix in the Age of Energy Transition** (Authors' own work).

Figure 4. presents reserves life index (RLI) of eleven observed companies. It is clear that Equinor besides Royal Dutch Shell and Sinopec are leading companies in terms of retiring liquid and gaseous fossil fuels. In fact, at the production pace that Equinor had in 2020 with its total proved reserves (developed and undeveloped) the Norwegian global energy company is capable to extract its remaining oil and gas reserves for 7 years, whereas, Saudi Aramco is capable of extracting its oil and gas reserves for the longest period of time – more than 56 years.

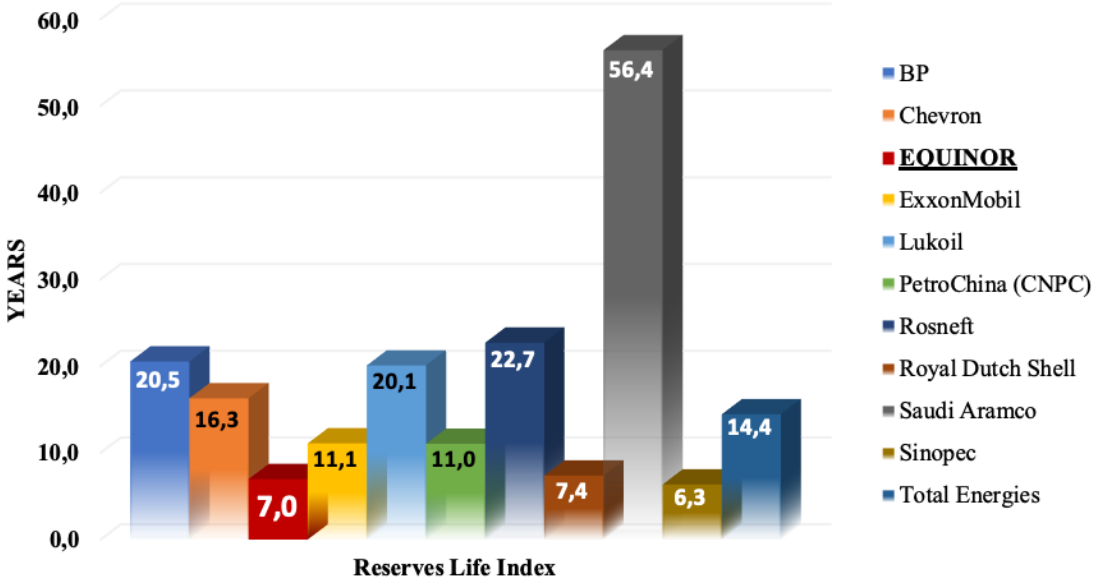


**Figure 4. Reserves Life Index of Examined Companies** (Authors' own work).

Figure 5. presents a grand matrix of Equinor's respective segments in the age of energy transition. The grand matrix below consists of two dimensions – the market growth and Equinor's competitive position. The matrix is divided among four quadrants and Equinor's division of segments is described in the empirical research methods (3.2.4). Indeed, the strongest competition position Equinor is in the mid- and downstream segment within the global oil and gas market due to the highest proportion of revenues coming from these segments in the fiscal year 2021. This can be subject to change in the future. In contrast, the weakest competitive position of Equinor remains in the segment of renewables due to the very low proportion of revenues coming from this segment. In fact, less than 2% of total revenues in the fiscal year 2021 came from the operations in renewable energy (EQUINOR, 2022b).

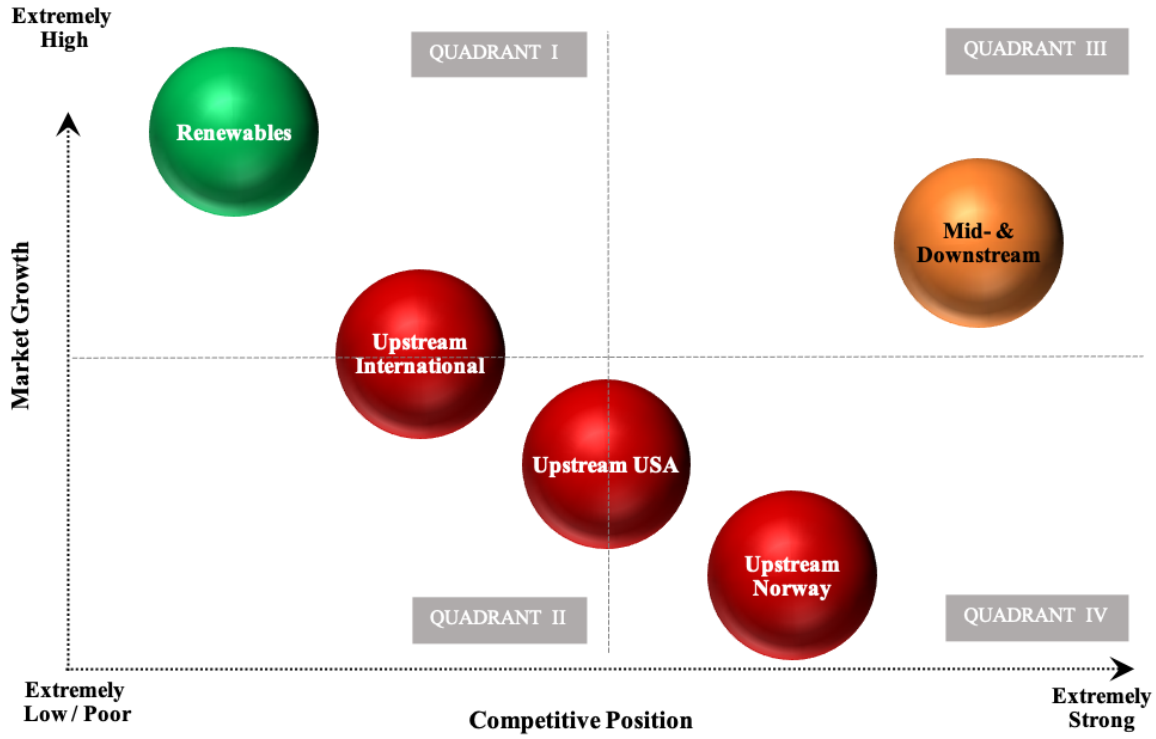


**Figure 5. Equinor's Competitive Profile** (Authors' own work).

Table 3. presents respective segments of Equinor from the grand matrix with competitive implications. The competitive disadvantage represents the segment of renewables due to poor competitive position and high market growth momentum. Contrary to competitive disadvantage, sustained competitive advantage represents the upstream segment in Norway which is to a large extent controlled when measured by percentage of total production held by Equinor. However, domestic energy and climate policies place the upstream oil and gas market in Norway to a slow-motion momentum in regards to market growth and patents registered domestically. Temporary competitive advantage represents global mid- and downstream operations which brought Equinor the highest proportion of total revenues in the fiscal year

2021, thanks to its shipping technologies and more than 150 vessels used to transport explored fossil fuels as well as strategically positioned terminal and refineries beyond Norwegian borders (EQUINOR, 2022e).

**Table 3. Competitive Implications on Equinor's Segments** (Authors' own work).

| SECTOR | Market Growth | Competitive Position | Competitive Implications |
|---|---|---|---|
| **Upstream Norway** | Extremely Low | Strong | (Q IV) Sustained competitive advantage |
| **Upstream USA** | Low | Moderate | (Q II) Competitive parity |
| **Upstream International** | Moderate | Poor | (Q II) Competitive parity |
| **Mid- & Downstream** | High | Extremely Strong | (Q III) Temporary competitive advantage |
| **Renewables** | Extremely High | Extremely Poor | (Q I) Competitive disadvantage |

### *4.2. Detailed Findings*

The section of detailed findings explicitly focuses on the case company – Equinor and its internal and external environment based on quantified SWOT. **The assessment of Equinor's internal environment was evaluated with a score of 3.5 and external environment with a score of 2.8 on a scale from 1 to 5.** The main elements of the quantified SWOT are shown in Table 4. and Table 5. The inputs in the Table 6. and Table 7. represent the main elements of quantified SWOT in Table 4. and Table 5. The evaluation is partly done based on data, partly done as subjective observations by the authors within the internal environment and Equinor's core competencies which comply with the key principles of energy transition analysed through the VRIO analysis (Barney & Hesterly, 2010), which eventually reflected on the competitive implications and classification of internal strengths and weaknesses. Therefore, internal strengths and weaknesses of Equinor were evaluated based on the Internal Factors Evaluation (IFE) method introduced by David et al. (2013).

Secondly, the external environment was analysed with the help of Porter's Five Forces analysis (Porter, 2008b) and market dynamics analysis (OECD, 2021) including key trends and drivers of the environments in which Equinor operates. Hereby, the operational environment was sub-classified to the global oil and gas market, and global renewables market. Eventually, the evaluation of both markets (renewables, oil and gas) implied Equinor's opportunities to be exploited and threats to be eliminated. For this reason, in-depth analysis of external opportunities and threats was evaluated based on the External Factors Evaluation method introduced by David et al. (2013).

Altogether, based on the classification of strengths and weaknesses from the VRIO analysis, and classification of threats and opportunities, the evaluation of these factors was necessary to

examine whether Equinor's internal business transformation towards energy transition is successful and to figure out how the company respond to the external threats and opportunities arising from the global oil and gas market as well as global renewables market.

**Table 4. presents Equinor's core competencies** – threshold resources and capabilities in the age of energy transition which are an absolute necessity for the company to run its everyday business operations. Based on the application of VRIO framework (value, rarity, inimitability, and organisational support), authors defined whether specific core competence represent strength or weakness for the company. Hereby, every single resource and competence is utilized by the organisation as observation analysed Equinor's core competencies. The classification of strengths and weaknesses was established on the comparative approach with the competitors incorporated in the Competitive Profile Matrix (CPM). Competitive implications of the respective core competencies consist of four levels and relate to the situation of Equinor versus its competitors. Firstly, competitive disadvantage (weakness against core principles of energy transition). Secondly, competitive parity (weakness complying with the energy transition principles). Thirdly, temporary competitive advantage (strength complying with the energy transition principles). Lastly, sustained competitive advantage (superior strength complying with the energy transition principles).

**Table 4. VRIO analysis of Equinor's threshold resources and capabilities** (Own work).

| **(R) = Resource (C) = Capability** | **Core competencies:** | **V** | **R** | **I** | **O** | **Competitive implications** | **Strength/ Weakness** |
|---|---|---|---|---|---|---|---|
| (R) Financial | **% Δ TPR**[7] | Yes | No | No | Yes | Competitive Parity | **Weakness** |
| (R) Physical | **Renewable technology** | Yes | No | No | Yes | Competitive Parity | **Weakness** |
| (R) Financial | **% Δ PPE**[8] | Yes | Yes | Yes | Yes | Sustainable competitive advantage | **Strength** |
| (R) Human | **Know-How, Expertise** | Yes | Yes | No | Yes | Temporary Competitive advantage | **Strength** |
| (R) Physical | **Shipping technology**[9] | No | No | No | Yes | Competitive Disadvantage | **Weakness** |
| (C) Human | **Governance** | No | No | No | Yes | Competitive Disadvantage | **Weakness** |
| (C) Innovation | **Low Carbon Solutions** | Yes | No | Yes | Yes | Competitive Parity | **Strength** |
| (C) Technological | **% Δ Production O&G** | No | No | Yes | Yes | Competitive Disadvantage | **Weakness** |
| (C) Innovation | **TADI**[10] | Yes | Yes | No | Yes | Temporary Competitive advantage | **Strength** |
| (C) Reputational | **Global presence** | Yes | Yes | Yes | Yes | Sustainable competitive advantage | **Strength** |

[7] TPR = Total Proved Reserves (Developed and Undeveloped).
[8] PPE = Plant, Property, Equipment (Non-current fixed assets).
[9] Shipping Technology = Vessels owned by company.
[10] TADI = Technological Advancement, Digitalization, and Innovation.

**Table 5.** presents Equinor's factors which drive the **operational environment** of the global energy company. For this reason, the global oil and gas market as well as the global renewables market were incorporated in the carried analysis since Equinor is involved in both of them. However, the factors that drive respective markets were observed from two divergent perspectives. Firstly, the industrial perspective of respective markets was analysed with the help of Porter's Five Forces, whereas the macro perspective of respective markets was analysed with the help of market dynamics (MD) factors and trends that directly impact competitiveness, rivalry and profitability of respective industries. For this reason, global oil and gas as well as global renewables market's dynamics were analysed with factors which pose either threat or opportunity to respective markets. Namely, market dynamics factors in this study represent complements of existing goods and services, degree of innovation, digitalization as well as de-/regulation of respective industries. Last but not least, a very relevant factor that drives and constrains competitiveness of respective markets is a foreign direct investments (FDIs) to the oil and gas or renewables industry by member states of the United Nations globally in 2020 (UNCTAD, 2021, p. 12).

**Table 5. Analysis of Equinor's Drivers in the Respective Markets** (Authors' own work).

| Methods | Factors | (GOGM) Global Oil and Gas Market | (GRM) Global Renewables Market | Competitive Implications |
|---|---|---|---|---|
| Porter's Five Forces | Industry Competition | High | High | Threat |
| | Threat of New Entry | Low | High | Threat |
| | Threat of Substitution | High | Low | Threat |
| | Power of Suppliers | Low | High | Opportunity |
| | Power of Buyers | Low | Low | Opportunity |
| Market Dynamics | Complements | High | Low | Threat |
| | Innovation | High | High | Opportunity |
| | Digitalization | High | High | Opportunity |
| | FDI | Low | High | Opportunity |
| | De- / Regulations | High | High | Threat |

**Table 6. presents the Internal Factors Evaluation (IFE) of Equinor's respective strengths and weaknesses analysed in the VRIO analysis.** Each and every of 10 factors was equally assigned with 10% weight to equal 100% total weight within the internal environment of Equinor. Factors were evaluated with the benchmarking approach, namely with a Likert scale in order to rank every factor and increase validity and credibility of results. In fact, Likert scale is very often applied in surveys or questionnaires (Pescaroli et al., 2020). However, authors of

this study applied the Likert scale to benchmark Equinor's core competencies in relation to energy transition principles among direct competitors of Equinor.

A factor which was either a strength or weakness was ranked on the scale from 1 to 5. Whereas, a factor ranked with number 1 represented poor internal transformation of Equinor among competitors, a factor ranked with number 2 represented Equinor's internal transformation below average among competitors, a factor ranked with number 3 represented average or moderate internal transformation of Equinor among competitors, while factor ranked with number 4 represented Equinor's internal transformation above average among competitors, and lastly, a factor ranked with number 5 represented superior internal transformation of Equinor among competitors.

**Table 6. Evaluation of Equinor's Strengths and Weaknesses** (Authors' own work).

| Internal Environment | (R) = Resource (C) = Capability | Factors | Weight | Ranking | Score |
|---|---|---|---|---|---|
| Strengths | R | % Δ PPE | 10 % | 4 | 0.4 |
| | R | Know-How, Expertise | 10 % | 4 | 0.4 |
| | C | Low Carbon Solutions | 10 % | 5 | 0.5 |
| | C | TADI | 10 % | 4 | 0.4 |
| | C | Global presence | 10 % | 4 | 0.4 |
| Weaknesses | R | % Δ TPR | 10 % | 4 | 0.4 |
| | R | Renewable technology | 10 % | 4 | 0.4 |
| | R | Shipping technology | 10 % | 1 | 0.1 |
| | C | Governance | 10 % | 3 | 0.3 |
| | C | % Δ Production O&G | 10 % | 2 | 0.2 |
| | | **Total** | **100 %** | | **3.5** |

**Table 7. presents the External Factors Evaluation (EFE) of Equinor's respective opportunities and threats within the global oil and gas market as well as global renewables market.** In this case, the assessment of Equinor's external environment consisted of external factors which represented threats and opportunities from the Porter's Five Forces and market dynamics analysis. Each of 10 external factors was equally assigned with 10% weight to equal 100% total weight within the external environment of Equinor. Factors were evaluated with the benchmarking approach, namely with a Likert scale in order to rank every factor and increase validity and credibility of results. Authors of this study applied the Likert scale to benchmark Equinor's response to external factors in relation to energy transition principles among direct competitors.

A factor which was either a threat or opportunity was ranked on the scale from 1 to 5. Whereas, a factor ranked with number 1 represented poor response of Equinor among competitors, a

factor ranked with number 2 represented Equinor's response below average among competitors, a factor ranked with number 3 represented average or moderate response of Equinor among competitors, while factor ranked with number 4 represented Equinor's response above average among competitors, and lastly, a factor ranked with number 5 represented superior response of Equinor among competitors.

**Table 7. Evaluation of Equinor's Opportunities and Threats** (Authors' own work).

| External Environment | Methods | External Forces / Factors | Weight | Ranking | Score |
|---|---|---|---|---|---|
| Opportunity | MD | FDIs | 10 % | 2 | 0.2 |
| | MD | Innovation | 10 % | 1 | 0.1 |
| | P5Fs | Power of Suppliers | 10 % | 3 | 0.3 |
| | P5Fs | Power of Buyers | 10 % | 3 | 0.3 |
| | MD | Digitalization | 10 % | 5 | 0.5 |
| Threat | P5Fs | Threat of Substitution | 10 % | 2 | 0.2 |
| | P5Fs | Industry Rivalry | 10 % | 2 | 0.2 |
| | MD | Complements | 10 % | 2 | 0.2 |
| | P5Fs | Threat of New Entry | 10 % | 4 | 0.4 |
| | MD | De- / Regulations | 10 % | 4 | 0.4 |
| | | **Total** | **100 %** | | **2.8** |

Figure 6. summarises the Internal Factors Evaluation (IFE) and External Factors Evaluation (EFE). **The assessment of Equinor's internal environment was evaluated with a score of 3.5 on a scale from 1 to 5.** This implies that internal resources and capabilities in the internal transformation to the energy transition are more than moderate, but still below the above average levels among competitors. In other words, internal resources and capabilities of Equinor comply with the key principles of energy transition. However, the internal transformation is still placed in a slow-motion internally in comparison to competitors. For this reason, Equinor's internal environment has a strategic position between competitive parity and slight temporary competitive advantage.

**On the other hand, the assessment of Equinor's external environment was evaluated with a score of 2.8 on a scale from 1 to 5**. It means that external opportunities and threats within the industry and market in the age of energy transition are less moderate, but still above the below average levels among competitors. In other words, Equinor's response to external opportunities and threats within both industries and markets are threatening the company's business model. Consequently, Equinor's external environment threatens its internal environment due to poor deployment of internal resources and capabilities to external threats and opportunities present within the market and industry.

Altogether, Equinor and its strategic position in the age of energy transition is stronger internally rather than prepared on external trends in relation to key principles of energy transition. While the company does not fully eliminate threats, and exploit industrial and market opportunities, company is stronger in transforming its business rather than responding to external market and industry trends.

The figure below portrays Equinor's strategic position based on IFE and EFE in the age of energy transition. Green linear trendline highlights safe strategic position. In this case, the strategic position above the trendline underlines that the company is stronger in internal transformation rather than adaptive to external trends. On the other hand, the strategic position below the trendline underlines that the company is stronger in external adoption to market and industry trends, whereas, fails to transform its business' internal core competences.

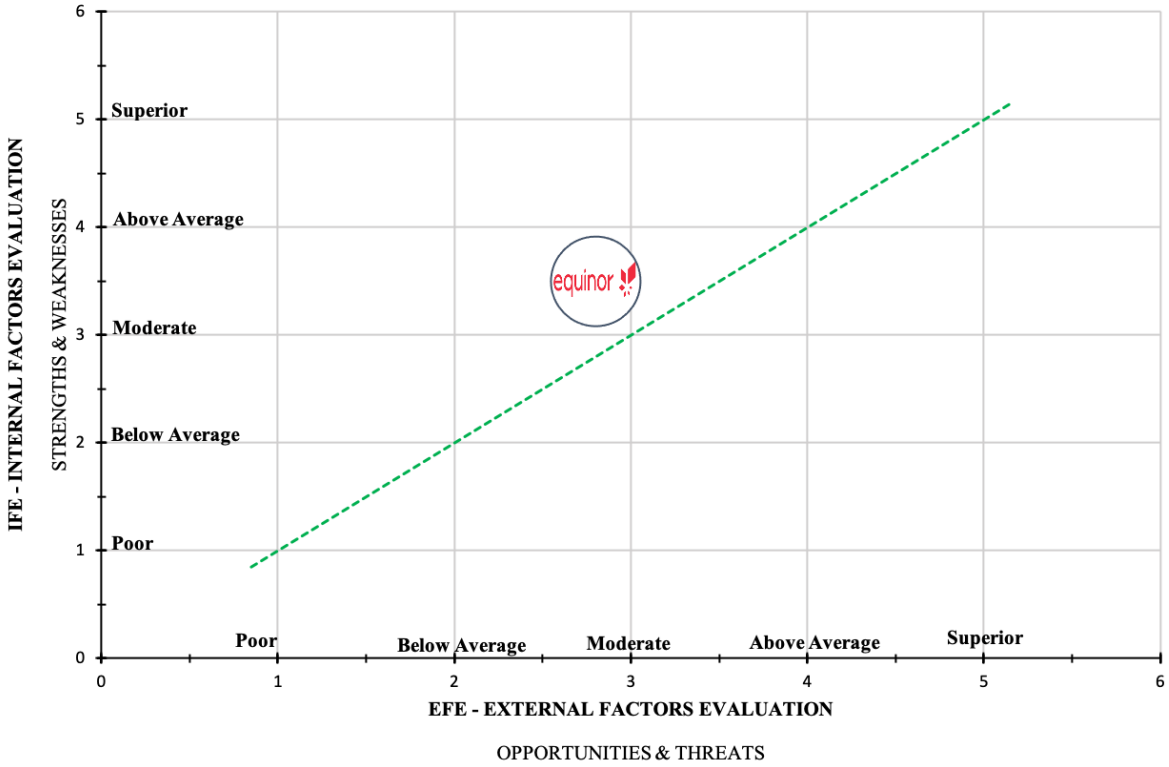


**Figure 6. Equinor's Internal and External Factors Evaluation** (Authors' own work).

## 5. DISCUSSION

The findings show that Equinor's presence in the global oil and gas market is in low concertation, which implies that the global oil and gas market including upstream, midstream and downstream sectors are posed in the perfect competition market structure. However, the implementation of strategic courses such as expansion, retrenchment and stability either domestically or internationally will differ due to variance in market concentration. While Equinor's strategies on the domestic market in Norway can be implemented by certain liberty due to the government's ownership of 67% of shares (EQUINOR, 2022d), the implementation of strategies in the United States or elsewhere can differ significantly due to divergent domestic market concentration in comparison with the global oil and gas market.

Although HHI analysis shows that global oil and gas market is placed in the perfect competition, it is of great importance to underline that our thesis perceives competitiveness in the global oil and gas market explicitly from the macro-economic perspective without bearing in mind international and national market regulators such as Organization of Petroleum Exporting Countries (OPEC), or national ministries of energy, environment, and industries. Hence, presented results must be considered subjectively without partiality.

The game theory suggests that companies within specific industry are affected by strategic decisions and moves of competitors. However, our findings from the HHI analysis advance the literature on the competitiveness under umbrella of the game theory concept. This is due to the competitiveness concentration within global oil and gas market. There is a low concentration in the market, as our HHI analysis found, therefore strategic decisions and moves of competitors do not have substantial effect on the competitiveness. Whereas, in the market or industry with moderate and high concentration, the strategic decisions and moves of competitors have high level effect on competitiveness.

However, the key question was to find out to what extent energy transition affects competitiveness of a selected case company – Equinor. The competitive profile matrix (CPM) reflects that energy transition affects Equinor's business to the extent of 30 %. Out of a maximum score of 100 % to indicate whether a company is likely to succeed (be competitive) in the energy transition. Equinor scores 70 % which is slightly below the global average of 73%. For this reason, we argue that Equinor while being roughly situated in the middle of the sample is not doing well for a company with the high expectations that Equinor has expressed. The

contrast is clear when compared with the leading company in the response to energy transition – Total Energies with a score of 100 %.

The missing link to excel in the process of tackling energy transition for Equinor represents absence in the hydro power plants, production of biofuels, and the increase in non-current fixed assets (plant, property and equipment of renewables, oil and gas technology). Certainly, one may argue that a company's increase in its plant, property or equipment can be positive for the global process of sustainable energy transition if the company increases its renewables technology. However, in this thesis, the assessment criterion was adopted based on the reference from Joshi (2021) who claims that Equinor's existence will never lead to sustainable energy transition. Our findings show that revenues from the renewables segment for Equinor in the year of 2021 represented less than 2 %, and even if this figure will increase in the future, it is still far a way to be considered as a sustainable company (EQUINOR, 2022b).

Under the expansion strategic course with unrelated diversification strategy (David et al., 2013), Equinor's success in response to energy transition is only 60 %. The company is substantially involved in the green hydrogen, solar and wind alternatives of renewable energy. This implies that under expansion in relation to energy transition Equinor is affected to the extent of 40 % which reflects on the company's absence in hydro power projects and production of biofuels.

In relation to the stability strategic course with restructure strategy, Equinor is 100 % successful in response to energy transition due to undertaken commitments, plans and actions to meet carbon neutrality by the year of 2050. The commitment to become a climate neutral company reflected on Equinor's concrete plan to become climate neutral by the year of 2050 by undertaking necessary step of utilizing carbon capture, utilization and storage technologies across its gas production facilities.

Furthermore, our findings imply that Equinor's global presence in 22 countries out of which 14 are in global oil and gas market, and 8 are in the global renewables market serves company with a substantial strength (EQUINOR, 2022b, p. 26). However, with the revenues from the renewables segment which are still below 2 % in relation to total revenues, Equinor fails from the long-term perspective to sustain and gain its competitiveness as a global energy company. As Equinor rebranded towards a global energy company from the formerly known national oil company in 2018, more efforts in the field of alternative energy sources were expected prior to conducting analysis in this thesis.

However, Equinor should be proud, namely about its retrenchment strategic course when it comes to the retirement of liquid and gaseous hydrocarbons under divestiture strategy. Based on the reserves life index (RLI) analysis of Equinor and intentionally selected competitors with higher revenues, Equinor is the second-best performing company in regards to the retirement of fossil-fuels. As of today, Equinor can extract its oil and gas reserves for no longer than 7 years.

However, in the divestment strategy of technology in the form of property, plant and equipment (PPE) as a part of the company's non-current fixed assets, Equinor failed to year-on-year decrease the record in the financial books from 2019 to 2020. For this reason, Equinor's retirement of technologies is hereby evaluated as negative and unsuccessful in the response to energy transition. This is despite the results from the retirement of technologies that are subject to the subjective perception due to consideration of all technologies including renewables besides oil and gas plant, property, and equipment. However, the status quo of the financial reporting does not provide classification of PPE based on the fossil-fuel and renewables which limits our findings.

To summarise, Equinor's competitive status and profile in relation to tackle energy transition adopts a variety of strategic courses including different strategies rather than playing *"all-in"* towards one strategic course. In fact, Equinor adopts multiple strategies to remain competitive, however, Equinor's market share within the global oil and gas market has decreased by 13% from the fiscal year 2018 to fiscal year 2020 which may be a positive signal that the company is truly reinventing its business model towards global energy companies. However, while global oil and gas markets faced disruptions during this time period due to the novel coronavirus pandemic, multiple companies were nevertheless capable of growing its market share. Therefore, any further investments and growth strategies in the global oil and gas market are required from the company to sustain its competitiveness.

The most significant aspect of our findings shows that Equinor's missing link the field of biofuels and hydropower projects places the company behind the anti-competitive curtain in this field. Particularly, out of the 11 selected cased in the competitive profile matrix (CPM), only 2 of Equinor's competitors are involved in the hydro power projects, while 8 of Equinor's competitors are involved in the field of biofuels, suddenly in both of them Equinor is absent.

### *5.1 Measurable SWOT (IFE/EFE)*

Crises posed by energy transition presents opportunity and chance to increase competitiveness of oil and gas companies. The particular reason for that is growing energy demand and total final consumptions (TFC) of all kinds of energy carriers (IEA, 2022). Because of that, the vast majority of oil and gas companies are involved in the global renewables market. However, they are involved in the highly divergent scale and scope as listed in the *Appendix 2.* Hence, our findings imply that Equinor's response to external threats and opportunities created by energy transition is still weaker than its internal business transformation as our assessment of internal and external forces evaluated. For this reason, the competitive status of Equinor is still weaker than some of the oil and gas competitors' response to the energy transition, especially within the segment of renewables where Equinor lacks projects with broader impact while exploiting current market opportunities within the global renewables market.

Internal Factors Evaluation (IFE) with the score of 3.5 compared with the External Factors Evaluation (EFE) with the score of 2.8 implies that Equinor's internal business transformation is faster than response to external opportunities and threats in the global renewables market and global oil and gas market. We argue that Equinor can overcome its competitors in the future because internal business transformation can be utilized to exploit market trends in the long-term. However, Equinor needs to remain keen on the sustainable development concept in order to succeed in the field of green energy in the long-run rather than quickly exploiting market opportunities in the short-term. The actual philosophy of the company to firstly transform and prepare its business for the new era can pay off substantially in the long-term competitiveness of Equinor.

Our measurable SWOT analysis that was quantified based on IFE and EFE advance prior literature on competitiveness in multiple ways. Firstly, the resource-based theory suggests that internal threshold resources and capabilities shape an organisation's competitiveness. We extend this position by quantifying Equinor's strengths and weaknesses through Likert scale, and argue that internal strengths and weaknesses shape an organisation's competitiveness based on the internal business adoption to market. Secondly, the industrial organisation theory (I/O) suggests that external drivers in the market and industry shape an organisation's competitiveness. We expand this theory by evaluating the Equinor's response to the market opportunities and threats through Likert scale. Moreover, for the EFE we advanced Porter's five forces analysis by innovativeness, digitalisation, complements, de- regulation and foreign direct investments as market dynamic drivers that shape competitiveness of Equinor.

## 6. CONCLUSION

This section of the thesis restates the research questions, objectives and key findings. Moreover, we will pay special attention to the acknowledgement of limitations that have occurred in the conducted research, and finally set up recommendation for further research and work to be done within the context of competitiveness, energy transition and global oil and gas companies.

The principal research question in this thesis was "**To what extent does the green energy transition affect the competitiveness of Equinor?"** where authors examined competitiveness of Equinor in the age of energy transition. The authors used a quantitative approach to answer this question. The extent was assessed based on evaluation of Equinor's internal business processes including resources and capabilities which are under transformation towards global energy companies. The evaluation of Equinor's presence in the global renewables and oil and gas market was evaluated based on the market dynamics and forces driving competitiveness of the company.

The primary objective of our research was achieved by conducting case study analysis with empirical data. This approach proposed a new hypotheses and questions to the internal and external factors that shape, and how competitive oil and gas companies are in the age of energy transition.

The secondary research objective of our research was achieved by analysing Equinor's segments including oil and gas upstream presence in Norway, USA, and Internationally. Nevertheless, besides analysing international presence of oil and gas midstream and downstream segments in addition to the international renewables segment of the company.

Thus, the thesis analysed Equinor's competitive status in the age of energy transition based on the internal business processes and external forces which drive competitiveness.

Not only empirical analysis but also theoretical framework in this thesis carry forward the prior literature and theoretical foundations of competitiveness. Based on our result, the game theory is relevant primarily for markets and industries with moderate and high concentration (low competition).

By conducting analyses on the market concentration (HHI), reserves life index (RLI) and competitive profile matrix (CPM) of Equinor and its competitors, this thesis and research design consists of several limitations.

### *6.1 Statement of Limitations*

**First** and foremost, results found and strategic assessment of Equinor's competitiveness in the age of energy transition was examined solely based on the data from the secondary sources including annual reports of the company and its competitors as well as reports and academic articles from the independent parties. Therefore, reliability and validity of the results may slightly differentiate from the reality as authors did not have access to the primary data sources.

The **second** limitation represent the sample size and current competitiveness within the global oil and gas market. The size of the global oil and gas market in this thesis refers to the sample portrayed in the *Appendix 1.* The sample represented cross-sectional analysis of 30 oil and gas companies with the status of International Oil Company (IOC), National Oil Company (NOC), as well as Joint Ventures (JV). That has largely reflected on the global competitiveness in the oil and gas market – concentration.

**Thirdly**, sample compared to Equinor in the competitive profile matrix (CPM) intentionally represent oil and gas firms with higher revenues during 2020 in order to critically highlight Equinor's competitive position in the age of energy transition and to examine whether economically superior companies in context of Equinor, are more involved in response to energy transition by integrating more strategies than Equinor, and whether these companies are hyper competitively prepared or simply better prepared for the new era. However, when comparing the competitive status of Equinor, authors could integrate companies with lower revenues in comparison with the Norwegian global energy company, where, the extent to which Equinor is successful would certainly differentiate from the extent presented in the results of this thesis.

**Last** but certainly but any means not least, the reliability of results presented in this thesis are limited to time. It is because authors analysed secondary data from annual reports of the examined companies from the fiscal year 2020 because not every company has published its annual report for the fiscal year 2021 yet. Therefore, with the aim to increase reliability, which are hereby time-limited to the year of past market performance (fiscal year 2020), authors strictly analysed companies within the market concentration measure (HHI), competitive profile matrix (CPM) as well as reserves life index (RLI) throughout the fiscal year 2020 which does not correspond to the actual performance of companies since this thesis was written in 2022.

### *6.2 Recommendations*

**Further research** on the specific strategic courses respectively rather than focusing on multiple of that with lesser assessment criterions and factors is needed in order to fully understand the extent and competitive implication of green energy transition on the specific segments of certain cases. As our study focus on depth – particular case (Equinor) in the evaluation and assessment of its internal business processes and responses to the external market drivers in the age of energy transition which drive competitiveness of the Norwegian global energy company, further research could also be conducted to determine the operational effectiveness of the particular strategies rather than focusing on the competitive status of the company.

Additional perspective and continued research efforts on the strategic development of green energy transition as well as the attitude of global energy companies, especially oil and gas business entities are needed. In order to make the green transition within the world energy system a sustainable solution for society, further research is required to foster development of competitiveness among all kinds of energy companies.

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## APPENDICES

(Authors' own work).

### Appendix 1. Summary of Companies Incorporated in the Study

| List of companies | Status | Country of origin | $ USD Billion Revenues 2020 | 2019 | 2018 | Market Share % Δ (2018 to 2020) | Company's Market Share CMS (%) 2020 | HHI Global Market 2018-2020 Average (Points Score 0 – 10.000) |
|---|---|---|---|---|---|---|---|---|
| ADNOC | NOC | United Arabic Emirates | 4,36 | 5,76 | 6,18 | 6% | 0,18% | 0,03 |
| BP | IOC | United Kingdom | 183,50 | 282,62 | 303,74 | -9% | 8,44% | 71,32 |
| Chevron | IOC | United States | 94,47 | 139,87 | 158,90 | -10% | 4,31% | 18,65 |
| CNOOC | NOC | China | 24,86 | 37,31 | 36,43 | 3% | 1,09% | 1,18 |
| ConocoPhillips | IOC | United States | 19,26 | 36,67 | 38,73 | -25% | 1,02% | 1,06 |
| Enbridge | IOC | Canada | 30,49 | 39,05 | 36,17 | 27% | 1,18% | 1,42 |
| ENI | IOC | Italy | 49,71 | 78,97 | 85,68 | -13% | 2,34% | 5,51 |
| **Equinor** | **NOC** | **Norway** | **45,82** | **64,36** | **79,59** | **-13%** | **2,08%** | **4,36** |
| ExxonMobil | IOC | United States | 181,50 | 264,94 | 290,21 | -6% | 8,10% | 65,70 |
| Gazprom | NOC | Russia | 52,80 | 61,86 | 67,33 | 18% | 2,04% | 4,20 |
| Indian Oil Corp | NOC | India | 7,42 | 7,92 | 7,92 | 41% | 0,26% | 0,07 |
| Kuwait Oil Company | NOC | Kuwait | 10,89 | 13,06 | 10,40 | 58% | 0,39% | 0,16 |
| Lukoil | IOC | Russia | 73,31 | 101,94 | 104,47 | 6% | 3,10% | 9,61 |
| Marathon Petrol | IOC | United States | 69,80 | 111,15 | 86,09 | 22% | 2,96% | 8,89 |
| MOL Hungarian | IOC | Hungary | 4,78 | 6,48 | 6,83 | 5% | 0,20% | 0,04 |
| Neste | IOC | Finland | 13,28 | 17,90 | 16,86 | 19% | 0,54% | 0,29 |
| Novatek | JV | Russia | 9,25 | 11,22 | 10,81 | 29% | 0,35% | 0,13 |
| OMV | NOC | Austria | 18,70 | 26,51 | 25,91 | 9% | 0,79% | 0,62 |
| Petrobras | NOC | Brazil | 53,68 | 76,59 | 84,64 | -5% | 2,37% | 5,61 |
| PetroChina (CNPC) | NOC | China | 309,41 | 402,69 | 379,99 | 23% | 12,21% | 150,17 |
| Petron Corporation | IOC | Philippines | 5,43 | 9,77 | 10,59 | -23% | 0,28% | 0,08 |
| Qatar Petroleum | NOC | Qatar | 29,76 | 30,94 | 33,78 | 33% | 1,07% | 1,17 |
| Repsol | IOC | Spain | 37,24 | 55,38 | 56,16 | 0% | 1,64% | 2,69 |
| Rosneft | NOC | Russia | 73,16 | 110,37 | 104,99 | 5% | 3,19% | 10,16 |
| Royal Dutch Shell | IOC | United Kingdom | 180,54 | 344,88 | 388,38 | -30% | 9,84% | 98,81 |
| Saudi Aramco | NOC | Saudi Arabia | 204,83 | 294,85 | 318,50 | -3% | 9,01% | 81,29 |
| Sinopec | NOC | China | 336,96 | 474,59 | 461,13 | 10% | 14,12% | 199,61 |
| Tatneft | IOC | Russia | 9,37 | 12,12 | 11,84 | 19% | 0,37% | 0,14 |
| Total Energies | IOC | France | 140,69 | 200,32 | 209,36 | 1% | 6,08% | 36,95 |
| Transneft | NOC | Russia | 12,51 | 13,83 | 12,74 | 48% | 0,44% | 0,20 |
| | | **MARKET TOTAL** | **2.287,78** | **3.333,90** | **3.444,35** | **-34%** | **100,00%** | **780,10** |

(Authors' own work).

## Appendix 2. Competitive Profile Matrix of Oil and Gas Companies Tackling Energy Transition

| Strategy | Assessment Factor | Weight | BP | Chevron | Exxon Mobil | Lukoil | PetroChina (CNPC) | Rosneft | Shell | Saudi Aramco | Sinopec | Total Energies | Equinor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expansion | Hydro | 10% | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | **0** |
| | Solar | 10% | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | **1** |
| | Wind | 10% | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | **1** |
| | Biofuel | 10% | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | **0** |
| | Hydrogen | 10% | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | **1** |
| Retrenchment | Retired Technologies[A] | 10% | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | **0** |
| | Retired Reserves[B] | 10% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **1** |
| Stability | Net Zero Ambitions | 10% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **1** |
| | Net Zero Strategy | 10% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **1** |
| | CCUS | 10% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **1** |
| | Total Score | | 8 | 4 | 6 | 9 | 5 | 8 | 9 | 8 | 6 | 10 | **7** |
| | **Total W. Score** | | **80%** | **40%** | **60%** | **90%** | **50%** | **80%** | **90%** | **80%** | **60%** | **100%** | **70%** |
| | **Total W. Score Average** | | **73%** | | | | | | | | | | |

[A:] Retired Technologies: Year-on-Year (FY 2019 – 2020) Δ in non-current assets – Plant, Property, Equipment[11] (PPE) in $ USD billion.
[B:] Retired Reserves (TPR): Year-on-Year (FY 2019 – 2020) Δ in total proved reserves – TPR – (developed and undeveloped) in mmboe[C].

[C:] mmboe: Million Barrels of Oil Equivalent including liquid (crude oil) and gaseous (natural gas) hydrocarbons.

Crude Oil = Million metric tonnes (MMT) = 7.330 mmboe. Converted in case of Rosneft. Source:(BP, 2021)
Natural Gas = Billion Cubic Feet (BCF) = 0.167 mmboe. Converted in case of Sinopec, PetroChina, Lukoil. Source: (BP, 2021)
= Billion Cubic Meters (BCM) = 5.883 mmboe. Converted in case of Rosneft. Source: (BP, 2021).

[11] Equipment includes renewables, oil and gas technology.

(Authors' own work).

## Appendix 3. Assessment of Reserves / Production / Assets / Reserves Life Index

| Company | TPR[A] 2020 | TPR[A] 2019 | Unit[B] | Δ % TPR | PPE[C] 2020 | PPE[C] 2019 | Currency[i] | Δ % PPE | Production[D] 2020 | Production[D] 2019 | Unit[B] | Δ % Production | P/R Ratio[E] | RLI[F] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BP | 17982 | 19341 | mmboe | -7% | 114,8 | 132,6 | $ USD | -13% | 876 | 949 | mmboe | -8% | 5% | 20,5 |
| Chevron | 11100 | 11433 | mmboe | -3% | 345,2 | 326,7 | $ USD | 6% | 682 | 681 | mmboe | 0,2% | 6% | 16,3 |
| **Equinor** | **5260** | **6004** | **mmboe** | **-12%** | **2,1** | **1,9** | **$ USD** | **10%** | **756** | **757** | **mmboe** | **-0,2%** | **14%** | **7,0** |
| ExxonMobil | 15211 | 22445 | mmboe | -32% | 227,5 | 253,0 | $ USD | -10% | 1373 | 1443 | mmboe | -5% | 9% | 11,1 |
| Lukoil | 15385 | 15769 | mmboe | -2% | 55,4 | 52,3 | $ USD | 6% | 767 | 675 | mmboe | 14% | 5% | 20,1 |
| PetroChina (CNPC) | 17946 | 19959 | mmboe | -10% | 130,2 | 133,0 | $ USD | -2% | 1625,5 | 1560,8 | mmboe | 4% | 9% | 11,0 |
| Rosneft | 42981 | 46779 | mmboe | -8% | 135,2 | 113,1 | $ USD | 19% | 1894 | 1728 | mmboe | 10% | 4% | 22,7 |
| Royal Dutch Shell | 9124 | 11096 | mmboe | -18% | 210,8 | 238,3 | $ USD | -12% | 1239 | 1338 | mmboe | -7% | 14% | 7,4 |
| Saudi Aramco | 255155 | 258563 | mmboe | -1% | 322,5 | 261,8 | $ USD | 23% | 4523 | 4808 | mmboe | -6% | 2% | 56,4 |
| Sinopec | 2910 | 2948 | mmboe | -1% | 94,2 | 100,1 | $ USD | -6% | 459 | 459 | mmboe | 0,02% | 16% | 6,3 |
| Total Energies | 12328 | 12681 | mmboe | -3% | 108,3 | 116,4 | $ USD | -7% | 855 | 896 | mmboe | -5% | 7% | 14,4 |
| **AVERAGE** | **36853** | **38820** | **mmboe** | **-9%** | **158782** | **157242** | **$ USD** | **1%** | **1368** | **1390** | **mmboe** | **-0,28%** | **8,26%** | **17,6** |
| **TOTAL (SUM)** | **405382** | **427018** | **mmboe** | **-98%** | **1746602** | **1729658** | **$ USD** | **14%** | **15048** | **15293** | **mmboe** | **-3%** | **91%** | **193,2** |

[A]: TPR: Total Proved Reserves (developed and undeveloped including crude oil and natural gas).

[B]: mmboe: Million Barrels of Oil Equivalent including liquid (crude oil) and gaseous (natural gas) hydrocarbons.
Crude Oil = Million metric tonnes (MMT) = 7.330 mmboe. Converted in case of Rosneft. Source: (BP, 2021).
Natural Gas = Billion Cubic Feet (BCF) = 0.167 mmboe. Converted in case of Sinopec, PetroChina, and Lukoil. Source: (BP, 2021).
= Billion Cubic Meters (BCM) = 5.883 mmboe. Converted in case of Rosneft. Source: (BP, 2021).

[C]: PPE: Plant, Property, Equipment – part of the non-current and fixed assets of the company indicated in the billion $ USD currency.

[D]: Production: Production is illustrated in annual time-frame (365 days). Moreover, production underlines hydrocarbons of all forms (liquid and gaseous). Daily production of million barrels of oil equivalent (mmboed) was multiplied x by 365 days to illustrate annual production. (mmboed) was multiplied x in case of every company except Sinopec, PetroChina (CNPC), and Royal Dutch Shell.

[E]: P/R Ratio: Production to Reserves Ratio calculated for the FY 2020 respectively.

[F]: RLI: Reserves Life Index. Calculated based on Production to Reserves Ratio for the FY 2020. Results are shown in number of years.

[i] $ United States Dollar (USD):
- Sinopec, PetroChina (CNPC): PPE converted to USD from RMB, with exchange rate (1 USD = 0.16 RMB) as of 19th of February 2022. (IMF, 2022).
- Lukoil, Rosneft: PPE converted to USD from RUB, with exchange rate (1 USD = 0.013 RUB) as of 19th of February 2022. (IMF, 2022).