FROM BLACK GOLD TO GREEN?

THE MOTIVES OF THE BIGGEST OIL AND GAS COMPANIES TO INVEST IN RENEWABLE ENERGY SOURCES

by

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Author's declaration

I, the undersigned Anastasia Zabusova hereby declare that I am the sole author of this thesis. To the best of my knowledge this thesis contains no material previously published by any other person except where proper acknowledgement has been made. This thesis contains no material which has been accepted as part of the requirements of any other academic degree or non-degree program, in English or in any other language. This is a true copy of the thesis, including final revisions.

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Abstract

Do fossil fuels companies invest serious money into the clean energy? There appears to be an agreement that the climate change is a global issue and that the future of energy mix might look quite different from what it is now. What would be the roles for the leading oil and gas companies in that transition? This research is examining the public statements and annual reports of the 33 biggest oil and gas companies to understand the underlying motives behind the decision to invest into the renewable power. The suggested explanations of the fear of stranded assets and policy pressure do not explain the whole sample. The study found that there is no uniform explanation to the diverse business strategies towards the renewable energy. However it revealed several trends within the groups of companies. One important finding is that most of the companies in this research consider policy pressure and public opinion an important factor in shaping their business strategies.

Keywords: *renewable energy; stranded assets; investment; oil and gas companies; business strategies*

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List of Abbreviations

CSR – Corporate Social Responsibility

GHG – greenhouse gas

IEA – International Energy Agency

IOC(s) – International Oil Company(ies)

MMBOEPD - Million of Barrels of Oil Equivalent Per Day

NOC(s) – National Oil Company(ies)

OPEC -Organization of Petroleum Exporting Countries

RE – Renewable Energy

SOE(s) – State-Owned Enterprise(s)

Introduction

"The energy world is evolving… There are new areas over the next 20 years beyond oil and gas that we think can be profitable"[1]

Patrick Pouyanne, CEO of Total

There appears to be an agreement that the climate change is a global issue and that the future of energy mix might look quite different from what it is now. However there is no obvious consensus on how to get to that future: what are the policies and technologies needed for the transition to low-carbon? And what would be the roles for the leading oil and gas companies in that transition? Shortly after the Paris Agreement, ten biggest oil companies launched Oil and Gas Initiative, a joint one billion USD fund to invest in low carbon technologies in their aim to support 2C scenario. Even though this particular investment is relatively negligible in relation to their exploration and production investments or annual budgets, this is a serious political statement by the industry towards seriously accepting the renewables into the energy mix in the coming years.

Renewables have been in the sightline for a long time since the ideas of peak oil and peak coal started to create concerns around the future of energy. The renewable energy is not a new idea. The Scientific American in the late 19th-early 20th century published numerous articles on the solar energy and up-to-date technologies of the time, with scientists hoping to soon phase out fossil fuels (Jones and Jones 2012). While the world in 2015 convened in Paris with similar hopes, renewables still accounted for less than 14% of the total primary energy supply, from which only 1,3% stands for non-hydro and non-solid biofuels and waste used to produce electricity (IEA 2016). However,

[1] (Stothard 2016)

renewable energy is on the rise. 2015 was record year for renewables[2]. For the first time ever additions of power sector capacity from renewables were higher than from fossils and nuclear combined (REN21 Secretariat 2017). In some markets solar and wind already do not require subsidies and strive to become even more cost-effective. The International Energy Agency, one of the most respected global energy think tanks, found that for the last 27 years renewables grew at the average annual rate of 2,2%, a bit higher than primary energy supply (IEA 2016). IEA reports that by 2015 in OECD countries 23% of the electricity, the largest share in the modern history, was produced from renewable sources (IEA 2016). Such growth is supported by the constant development of ever more efficient renewable energy technologies and falling installation and maintenance costs. Alternative energy is gaining its market momentum and some fossil fuels companies may turn to the diversification of their energy portfolios.

At the same time, global talks on the climate change, peaked at the Paris COP21, have raised long-awaiting concerns by the oil exporting countries (Wittmann, 2013). The Agreement showed the importance of reducing CO2 emissions worldwide in a coordinated manner. The biggest share of CO2 emissions come from the energy sector fueled by fossils. A serious reduction in greenhouse emissions is not possible without increasing the share of renewable energy in the global energy mix (Lee and Zhong 2014). New energy technologies along with energy efficiency measures are considered to be the cure to reduce greenhouse gas emissions (International Energy Agency 2014).

[2] The term renewable energy in this work is defined as the "energy that is derived from natural processes (e.g. sunlight and wind) that are replenished at a higher rate than they are consumed", following the definition suggested by the International Energy Agency. Throughout the thesis renewable energy is used interchangeably with the term 'clean energy'. The natural gas and nuclear energy do not fall into this definition.

Two of the key market failures, when it comes to climate change, concern the environmental impact of greenhouse gas emissions and little inherit incentives for the private sector to reduce them, alongside with the underinvestment in research and development of the renewable energy technologies (Newell 2010). The renewables sector is still reliant on the governmental expenditures and policy support. But so are oil and gas, which are being subsidized in many countries across the globe. Inspired by the commitments made at the COP21 in Paris in 2015, nation-states have created a whole new picture for the renewables. If states fulfill their Paris pledges, there will be more policy incentives to invest in renewable energy technology and the demand for oil, desirably by the under 2C degree scenario, should not increase. And even though the US declared in May that it's leaving the agreement, there are a lot of private and non-state movements supporting the fulfillment of Paris Agreement. Let alone the U.S. oil giants, ExxonMobil and ConocoPhilips, supporting the stay-in (Nussbaum and Carroll 2017). But why would oil and gas companies support the Agreement?

On the one hand, with the large scale of energy infrastructure and demand, the investments into renewable energy businesses actually promise profits. On the other, some energy majors acknowledge the renewables as a threat to their core business in the future, especially if the electric car market will grow exponentially. However, the trend is set up. A recent report by the Financial Times analyst says that seven biggest oil and gas groups have already cumulatively invested in renewables almost 15 billion U.S. dollars (Clark 2017). There is an opportunity for the oil and gas giants to reap profits from renewable businesses at the time of the low oil prices and immense public support of the clean energy. At the same time, the transition to low carbon economy and the potential of the renewables would be difficult to realize without an interest of private

players. The energy markets are dominated by the oil and gas companies, which stand behind the great portion of GHG emissions and have great investment potential.

Needless to say, if oil and gas companies started to diversify their fuel mix towards including more and more renewables, the below 2C degrees scenario of the Paris Agreement would be closer to the reality. So the interest of the oil and gas giants is crucial for the renewables' sector and the climate change mitigation. In order to create appropriate policy frameworks, policy-makers need to understand the underlying motivations of the oil and gas giants that are increasingly turning their eye to the renewable sector. So here are the puzzling questions. What does motivate oil and gas companies to invest in renewables now? Is it an expected profitability or public pressure? Are existing policy incentives shaping company's decisions towards renewables? Do companies aim to diversify and invest in new technologies now to avoid future stranded assets?

The aim of the master's thesis is to explore what motivates the biggest oil and gas companies to invest in the renewable energy.

Chapter One – Literature Review

Turning to the scholars and professionals in top consultancies and well-respected independent think tanks (the so-called "grey literature"), one may find different possible reasons for the biggest oil and gas companies to be interested in renewables. As the topic is relatively new, and the renewables and oil markets are changing at the fast pace, the role of the "grey literature" in this review is high. It is the think tanks, specializing on energy analytics and energy investments such as Bloomberg and International Energy Agency, and top business consultancies and newspapers with an exposure to the energy markets and with professional business audience such as McKensey, Accenture, or PWC. The review of the recent professional and academic literature would provide

the more comprehensive overview of the contemporary conceptual models and the current trends in oil companies' investment in the renewable energy.

On motivations

Often framed as a social or political issue, sustainable development is an issue that many transnational corporations have to pay attention to due to the high visibility of the companies (Escobar and Vredenburg 2011). Kolk and Levy (2001) have been looking at the way climate change talks transform the strategies of oil and gas companies. They observed shifts in the corporate approach to climate change in the oil and gas industry since the late 1990s (Kolk and Levy 2001). The Kyoto Protocol, the most advanced international treaty tacking climate change at the times, was found to have an impact on the industry, driving such multinationals as BP and Shell to publicly recognize the climate change as a problem. Both companies took precautionary approach towards the problem and started with investments into the renewables. However, early investments by the oil and gas companies into the renewables were not bringing enough returns and had a little overlap with the core oil business, so finally both companies divested.

In the management literature one can find diverse opinions on the corporate strategies involving the triple bottom line – social, environmental and financial performance (Elkington 1998)– oriented at the full cost accounting in all three dimensions. Reinhardt suggested, for example, in his handbook for environmentally responsible managers that climate talks can provide oil companies with a new economic opportunity by working on innovation and efficiency ahead of new policies and regulation (Reinhardt 2000). It would also arguable allow oil and gas companies to develop new "green markets". He argues that environmental decisions depend on the position within the industry and strategy a company has chosen. Reinhardt suggests that differentiating a product "along the environmental lines" is not significantly different from the usual

product differentiation. Moreover, it is not desirable to shift far away from the basic management principles in order to reach environmental goals (Reinhardt 2000). Escobar and Vredenburg analyzed four oil and gas multinationals "subject to sustainable development pressures" and found that the sustainable development is less driven by the political or social pressure, but more by other stakeholders' involvement (Escobar and Vredenburg 2011). Indeed some studies show that even with the environmental objectives in mind, the oil companies are still likely to be path-dependent and choose not to decrease its oil and gas investments while investing in renewable business (Nilsen 2017).

Interestingly how the policymakers in the Middle East are reasoning the large low-carbon projects. In this oil rich region, with a great potential, especially for solar energy, and some other forms of the renewable energy generation, the concepts of low carbon transitions are quite new. The pioneer initiative "Masdar City" launched in 2006 by the United Arab Emirates – a country reliant on the exports of oil through its state-owned company – was one of the biggest policy examples supporting the renewables (Reiche 2010). The drivers for such transition in the country with low domestic energy prices were the prospect of the long-term economic diversification of the capital city Abu Dhabi. The government sees the likely transition from carbon-based to sustainable economy of the 21st century and by starting early it is going to be among the technology innovators. The other reasons included the worries of the finiteness of the fossils and climate change, the need to meet the rising global energy demands with the alternative energy and the possible benefits of the "cleantech revolution" (Reiche 2010).

On innovation in renewable energy technologies

For the reasons of enhancing energy and environmental security, many scholars voiced the urgency of energy technology innovation (Barrett 2015; Goldthau 2017; Newell

2010). Pernick and Wilder suggested that among the drivers of so called "cleantech revolution", including climate change and consumer behavior, costs are the most significant force (Landry 2007). In fact, innovation in renewable energy technology has been traditionally linked in the literature with the oil prices (Ley, Stucki, and Woerter 2013). If the prices were high, the more investment would go to costly renewables' R&D (Cheon and Urpelainen 2012). The lower the oil prices, the less sensical were the investments into the more expensive renewables. However, one of the studies on the sensitivity of the alternative energy stock prices and oil prices showed that the former are more sensitive to the technology stock prices, than to the oil shocks (Henriques and Sadorsky 2008). Still the positive relationship between the oil prices and alternative energy innovation persists in many academic works and is observed in the broader business literature (Nyquist 2015). And even though linked or not to the oil prices, the growth in renewable technology is bound by perceived profitability (Sadorsky 2012). In the last years even with low oil prices, there are still opportunities for structural shifts in the energy markets. This happens for several reasons.

On trends in renewable energy

First of all, renewables do not directly compete with oil. Renewable energy is mostly used to produce electricity, while oil is used more in transportation and very little for power generation. McKinsey, therefore suggests, that the price of electricity, which is of importance for the renewables, "is not entirely a function of the price of oil" (Nyquist 2015). However, it is linked in many markets to the price of natural gas. McKinsey then argues that this should not be a concern as energy investments are long term, and changes in gas prices should not affect the volumes of investments in other energy sources (Nyquist 2015). Moreover, gas and renewables, such as solar and wind, could be complimentary, as the wind and solar are intermittent.

Above all, the true economic cost of fossil fuels is probably higher than the market price – the environmental and health damage along with hurdles for economic development placed by subsidies for fossils (Klevnäs, Stern, and Frejova 2015) are not usually reflected in the oil prices. And this is what increasingly worries policy-makers and environmentalists all over the globe.

Secondly, global energy mix changes. The market for electricity is transforming around the world. Renewables, natural gas and nuclear are increasing their presence in the global energy mix (ExxonMobil 2017b). Paired with raising concerns of the climate change, the rising demand for energy motivates governmental policies to support the shift towards lowering CO2 emissions. There is a need to find the most cost-effective low-carbon energy solutions, recognized by many states as well as by oil and gas majors (ExxonMobil 2017b; International Energy Agency 2016). It is also the changing consumers' behavior, increasingly favoring "cleaner" energy options. All these trends are increasing the demand for alternative energy sources.

Moreover, the science of the renewable energy technologies is improving: energy storage becomes cheaper and better (Nyquist 2015). The looming more efficient and portable energy storage could compete with oil and gas fueled power in many markets. The pace and support of electric vehicles are rising from year to year and could be a potential threat to oil and gas businesses, which are providing energy for the transportation sector (Germeraad, Khan, and Ravindranath 2017).

Thirdly, the renewable sector is booming and prices for solar and wind energy power are dropping steadily. While renewables are "effectively free" (Goldthau 2017), the current prices on renewable power depend on the technologies. And with a bigger interest in the R&D of renewables and policy support in many developed countries, the

prices on such technologies fall fast. International Renewable Energy Agency reported that in 2013-2014 the renewable power generation technologies improved their cost-competitiveness and "reached its historic levels" (International Energy Agency 2014). For example, prices on solar PV modules dropped almost two-fold since 2009 (IRENA 2015). The best project with solar power generation are already cost-competitive with natural gas (Klevnäs, Stern, and Frejova 2015). Erik Solheim, executive director of UN Environment, noted that decreasing costs of 'cleantech' will allow investors to "get more for less"(Frankfurt School-UNEP Centre/BNEF 2016). There is more capital financing renewable energy in both developing and developed countries (Sadorsky 2012). It's not only the governmental money but also corporate and private investors are increasingly interested in renewable business.

Fourthly, there is another economic underpinning to it: high or low, oil prices are volatile, renewables are much more stable in this respect. With falling costs on renewable power installation and low volatility, investments into renewable electricity generation make sense even at the low oil prices. Cutting the investments in pricy new oil exploration projects at the times of the low oil prices could as well help with avoiding stranded assets (Klevnäs, Stern, and Frejova 2015). 2015 has been a record year for renewables: investments reached their historic level, the amount of added power capacity showed steady growth, and all this with low oil and gas prices in the background (Frankfurt School-UNEP Centre/BNEF 2016).

Finally, some experts say, the transition to low-carbon will drive fossil fuel prices down in the long term. Projected on current trends, the future improvements of energy efficiency and cleaner energy solutions are likely to impact fossil fuel prices, like they already do with coal and gas (Klevnäs, Stern, and Frejova 2015). Even though most projections do not phase out fossils out of the energy mix (in fact the world will

continue to rely on them for decades from now (ExxonMobil 2017b)), the oil prices in the low-carbon transition world could be significantly lower than desired by the oil comanies (Klevnäs, Stern, and Frejova 2015). The International Energy Agency, for example, projects in its flagship scenario publication that oil prices under 2C Scenario are almost twice as low as in the business as usual scenario by 2040 (International Energy Agency 2016).

Nethertheless, there are different views of governments and fossil fuel companies on the future of energy. While renewables will increase their share in total primary energy consumption to almost 15% by 2050, Csomós (2014) found that most of the 'supermajors' do not see themselves changing their business model by drastically reorienting at renewables. 'Supermajors' still see the future in oil and gas for the next decades as primary energy source to feed the growing demand. The transition to low-carbon depends on the strategies towards renewables that transnational oil and gas companies are applying now and on what they plan for the future (Csomos 2014). Renewables still remain a rather small part of investment portfolio of the oil and gas companies, as many companies continue to invest in exploration and production activities (Germeraad, Khan, and Ravindranath 2017). At the same time, some companies, such as Norwegian Statoil are already saying that the advances in renewable energy technologies the "reshaping the energy industry" (Clark 2017). So how do the biggest oil companies choose between "black energy path"[3] and "green energy path"? What could explain the variation in their attitudes towards the renewables?

Chapter Two – Analytical Framework

Wustenhagen and Menichetti offer to look the investment decisions as a function of a risk, return and policy. So then an investment decision is to be made, an investor is

[3] Term used by (Nilsen 2017)

calculating all the perceived risks and possible projected returns. Policies in turn contribute to the risk-return weighing by stimulating desired outcomes by the policy-makers. This rather rational framework seems to be appropriate in explaining the premises in which the investment decisions are made by oil and gas groups in particular. At the same time, authors suggest that for an oil business the decision to support the alternative energy is connected to more far-reaching consequences than to any other investor as it might affect it position in the energy markets relatively to its competitors and possibly significantly transform its future energy portfolio. Moreover, one could reasonably add that such decision could affect the company's relations with its consumers, and its public image. Therefore a shift to renewables could be motivated by many reasons, both financial and non-financial. The non-financial factors could include amongst all the response to the institutional environment, pre-existing beliefs about RE, knowledge of the operational and technological field for the RE, and the perceptions of risks (Masini and Menichetti 2012).

Having analyzed the literature on the oil and gas companies as well as on renewable investments, I would summarize the most frequently mentioned reasons, that have a potential to explain the variation across oil and gas companies in their decision whether to invest in the renewable energy. These variables could be helpful to understand in the framework of risk, return and policy.

Diversification

One of the primary motives for oil and gas companies to turn to the renewable energy is to avoid risks by diversifying its energy portfolio (Fuss et al. 2012). This is connected with risk-aversion, as if a large oil and gas group has a range of energy assets and technologies at hand, it is better prepared for a radical restructuring in case the future

market conditions are changing. Portfolio evaluation in this case is crucial. Some oil companies may opt for preparation to the switch to low-carbon technologies, say experts from one of the top four consultancies – *pwc* (Biscardini, Morrison, and Branson 2017). Oil and gas companies might face the political and market pressure "to de-risk their existing energy portfolios and diversify", as the transition to the green, low-carbon future is looming (Germeraad, Khan, and Ravindranath 2017). However, the pace and the scale of it could still be uncertain.

So here from I would derive my initial hypothesis:

H1: The more an oil and gas company acknowledges the importance of renewables for the energy market's future, the more likely it is (to plan) to diversify its portfolio.

Such diversification can take many forms as most common are the R&D initiatives in renewable energy technologies, installation of renewable energy capacities, and investment into separate renewable energy businesses.

The importance of the investment in to the renewable energy for a company can then depend on the myriads of different reasons.

Policy pressure

Two of the key market failures, when it comes to climate change, concern the environmental impact of greenhouse gas emissions and little incentives for the private sector to reduce them, and the underinvestment in research and development of the renewables (Newell 2010). Inspired by the commitments made at the COP21 in Paris in 2015, there is a whole new picture for the renewables. After the Paris pledges by the world leaders, global energy groups are incentivized to develop environmentally-friendlier strategies, which would work financially long term (Stothard 2016). The

recent report in The Financial Times outlines that the political efforts to curb climate change will contribute to the fastest energy transition in history (Clark 2017). Over a 140 countries, especially after the Paris COP21 have developed policies targeted to support the renewables (REN21 Secretariat 2017). If states fulfill their Paris pledges, there will be more policy incentives to invest in renewable energy technology. However, there are diverse opinions on it. The investment communities, for example, highlight that the private capital looks for the opportunities regardless the policies in place (Wuestenhgen, Teppo 2006). This might be the case because companies do weigh policy risks against other types of business-related risks when making an investment decision. And if there is not enough policy pressure, the company might opt for the most profitable strategy and leave If a company has enough policy incentives to shift some of its activities towards renewable technologies, it is likely to follow the policy pressure to keep its business operations viable.

So one might assume that:

H2: Policy measures, targeting the shift to the low-carbon economy, are in the positive relationship with oil and gas company's investment into the RE.

Profitability

For a long time the case for sustainability was driven by the public image rather than profit (Watson 2016). However, as discussed above, the case for sustainability and renewables in particular is changing. The renewable economics becomes more valuable as costs are dropping. Perceived profitability of the renewable energy could be an important factor for oil and gas company's decision to invest in the RE. With the large scale of energy infrastructure and demand, the investments into renewable energy businesses can promise big profits. The early-investors in the renewables among oil and

gas companies, such as BP and Shell, arguably have not developed a mature financial model to better address the sustainable development and renewables in particular (Escobar and Vredenburg 2011). However, the RE technologies changed and time passed since their first moves. Moreover, at the time of the depressed oil prices, which fluctuate around $45 dollar per barrel for the last two-three years, it might not have much sense to continue the investment in exploration and production of oil fields. And with an ever dropping price of the RE assets, it could be a good time to diversify, says one of the City analytics (Macalister 2016). So if a company expects the returns from such investments, it would obviously be interested in the RE businesses or R&D.

H3: The more profitable the RE technology appears to a company, the more likely it would invest.

Public opinion

Consumer behavior and preferences play an important role in shaping the energy landscape. In the developed world consumers increasingly demand energy products with less carbon footprint (Sadorsky 2012). There are numerous studies showing that consumers, when given a choice, tend to prefer the electricity from the renewable energy resources. One study in the US showed that consumers in four states are willing to spend 0.31$ per month for the environmentally friendlier electricity (Murakami et al. 2015). Another study found that consumers prefer solar and wind energy to hydro or oil and gas (Ma et al. 2015). Consumers become more aware of the climate change and energy-use related concerns. It is then logical to assume that oil and gas companies are interested in responding to consumers' interests and in showing their commitment to the 'green energy'. The corporate citizenship becomes an important part of the public image of the large (at least privately owned) oil and gas companies. Minimizing company's

carbon footprint and increasing its energy efficiency are among the expectations the environmentally conscious public has from its energy producers. Deloitte experts found that energy industry is already spending a fortune on presenting its green image and commitment to environmental responsibility (Motyka, Clinton 2016). Investing in the image also requires actual investments into the renewables and adoption of cleaner technologies. However, the commitment could be exaggerated compared to the actual investments made to "shake off critics" (Macalister 2016). Is the phenomenon of investing into the RE a case for the corporate social responsibility and public image? Bruce Watson, a writer for The Guardian, who monitors the trends in energy, argues that the "corporate case for sustainability" (Watson 2016) targeted the public perceptions rather than profits.

Therefore, one could test the following:

H4: if a company recognizes the public opinion as an important factor, it would be more likely to invest in the renewable energy.

Stranded Assets

Under the political pressure of the Paris Agreement, the carbon-constrained future is likely to affect oil and gas companies as the hydrocarbons use could be limited. Accenture's report predicts that the lower demand under the 2C degree policy scenario would affect the exploration initiatives by the oil and gas companies (Debarre, Fulop, and Lajoie 2016). Moreover, some of the oil and gas companies' assets could be written off in the future. Such assets are usually called stranded. The University of Oxford defines them as 'assets that have suffered from unanticipated or premature writedowns, devaluations, or conversion to liabilities' (Smith School 2015). Among the major risk factors are climate change, new policies and regulations, falling renewable energy

technology costs, or evolving consumer behavior (ACCA 2016). Uncertainty of the pace of the transition to low carbon economies is worrisome to the traditional oil and gas businesses. A number of big asset-managers have started to divest in fossil fuel activities or demand more disclosure on risks from the oil and gas companies (Baron and Fischer 2015). However, the level of danger is disputed along with the amount of the hydrocarbon reserves that are likely to be stranded or left undeveloped (Butler 2015). The trend is nevertheless set. Just about the time of the submission of this thesis France announced its plan to switch to electric cars, planning to ban all the sales of diesel and petrol cars by 2040. Similar policy initiatives are now voiced in Germany and some Scandinavian countries. Norway already planned banning the petrol car by 2025. So the recurring theme of stranded assets could possibly explain the behaviors of the oil and gas companies.

Therefore,

H5: If the company expresses worries about the stranded assets caused by the future clean technology disruptions, it is more likely to invest into the renewable energy.

Technology and Innovation

The Paris Agreement as well as global energy market shifts to energy mix diversification and enhanced efficiency motivated some of the companies to commit to innovation in renewables and energy storage as never before. The report by the Wood McKinsey predicts that oil companies are risking to be blanked out in the next decades if they don't invest enough in the clean technologies and the renewable energy (Clark 2017). But are traditional business models of the oil and gas companies compatible with renewables? The French Total, self-reportedly, is undergoing a "radical reshaping" and it wants to invest around a fifth of its assets into low carbon business by 2035 (Stothard

2016). The problems that oil and gas companies can face trying to integrate renewable energy technologies to their supply chain could avert some companies, that are not prone to innovation, from diversifying to the renewables (Pinkse and van den Buuse 2012). Kolk and van den Buuse (2012) looked in their paper at the attempts of the Royal Dutch Shell, BP, and Total to develop solar business. They argue that even being "early movers" in the renewables market, they failed to build a successful business model. The reasons for that may lie in the nature of the technological competence of the oil and gas companies. With solar being outside of the expertise of the integrated oil and gas firms, these three firms were doomed to be unsuccessful. As Pinkse and van den Buuse put it, the renewable energy technology is "fundamentally different from the fossil fuel-based technologies" (Pinkse and van den Buuse 2012). So one might assume that,

H6: if an oil and gas company is more prone to innovation, the more likely it will invest in the renewable energy technologies.

Ownership Type

Finally, all these assumptions might be different for state-owned and privately-owned companies. The ownership type could serve a control variable in explaining the results. The fundamental differences between NOCs and publicly traded companies are described below.

Around 90% of the proven oil and gas reserves are in the control of the national oil companies since 1991 (Hartley and Medlock 2008). The info graphics above from the IEA, shows the dominance of NOCs when it comes to the oil reserves only. At the same time, IOCs with less access to new oil and gas reserves, compared to dominant NOCs, and NOCs as competitors in investments have more incentives to diversify (Csomos 2014). Alternative energy in the light of improving clean technology and increasing

profitability of renewables could be such path. So could ownership type possibly explain the variation in investment strategies of oil and gas companies?

Given the multiple definition of NOCs, many agree that the common feature of the state-owned oil company is that there is big share that belongs to state agencies. The nature of the national oil companies remains unclear. On the one hand, they have a leverage of the state economic and political support, on the other NOC are oriented on profit and need to stay competitive with IOCs. Hartley and Medlock (2008) argue as well that IOCs and NOCs differ in their production and investment behavior. Authors also find that NOC's strategies are generally more short-term oriented. Even though many NOCs are usually seen as less efficient in comparison to IOCs (Eller, Hartley, and Medlock 2011), they do apply similar strategies as profit-oriented IOCs to remain competitive energy suppliers (Csomos 2014). The overall issue with NOCs is the diverse forms that companies take. Several factors can explain their diverse performances: state objectives and capabilities; management models; available technology; state structure (Victor, Hults, and Thurber 2011). So along with economic objectives, NOCs pursue political ones. In the context of the renewable energy attitudes of the oil and gas companies, this phenomenon could potentially explain the strategies of state-owned enterprises: if the government favors the diversification of energy mix towards the renewables, then respective NOCs would be likely to invest in the renewables.

Moreover, some authors discuss the effects of stranded assets. The national oil companies have larger reserves than international oil companies. Also they are usually tied in their decisions to the national governments. Therefore NOCs are exposed to a greater risk of stranding (Stevens 2016).

Therefore, one might assume that the ownership type could potentially explain the variation of the investment strategies in the renewables.

H7: If the government ratified Paris Agreement, it is more likely that the state-owned oil and gas company of the respective state will favor the investments in renewables.

Chapter Three – Methodological Comments

There are different approaches to research the motivations of the oil and gas companies to invest in renewables. One of them is to investigate the perceived motives through the publicly announced intentions by the companies. The advantage of such qualitative approach is that the self-reported data is a primary source at hand. For the publicly traded companies annual reports are the declaration of intentions and a way to report results for the past time period to their shareholders (Yuthas, Rogers, and Dillard 2002). The annual and widely spread sustainability reports are usually aimed at the broader public – shareholders as well as consumers, non-governmental and governmental watchdogs. The annual report could be viewed as a formal public document created under the special corporate reporting requirements, existing in the country or/and across the industry worldwide (Stanton and Stanton 2002), with the hard legal requirements in the first case and soft requirements established in the industry in the second case. Annual reports, as a rule, are comprehensive narratives and tend to represent the core strategies and values along the worrying trends for the company in its financial and non-financial statements. Together with public statements of the top managers such self-reported information gives a better overview of the company's strategy, than the information the external sources could bring. The obvious drawbacks lie in the nature of the self-reported data. In every annual report or statement of the company there is a hidden agenda and only a part of the truth, as companies strive to create certain visibility (Stanton and Stanton 2002). The companies could be biased towards

presenting them in the better light and not disclosing much of the real strategies and actions. As some studies put it, the annual reports could serve as "means for both legitimate and distorted communication" (Yuthas, Rogers, and Dillard 2002). This is an important limitation of this research.

However, as this thesis is looking for trends in oil and gas companies' approach towards renewables, the primary sources and explanations, provided in the annual reports would serve a good basis to understand the self-declared motives behind the interest in the renewable energy. Even though some information, especially in the case of state-owned companies, might be distorted, it shows the overall trend in the company's strategy. Moreover, one might check the actual scale of declared plans or measures already taken by the companies in respect to the RE by the amount of the investment. And thus, the annual reports are a helpful tool for this research.

Data

This research is intended to be exploratory in its nature. To test what are the most recurrent motives to invest into the renewables I have reviewed the most recent annual reports of each of the 33 companies and whenever possible the most recent sustainability reports, to ensure that the most comprehensive publicly shared data was included. As a supplement I have reviewed the relevant news and reports from respected newspapers, news agencies, and think tanks.

Limitations

As mentioned above, there is not enough information available to check the real numbers behind the companies' pledges. Therefore the method used relies on the qualitative data and arbitrary judgments of the author over the values of dependent and independent variables. To ensure the transparency of the process of assigning values to

the variables, I provide a detailed description of criteria below. Moreover, the energy field, as it is, is traditionally criticized for scarce or/and unreliable data (Florini 2011), and even the biggest think tanks, such as the International Energy Agency, have to rely on the information provided by the companies, with little reality checks. The problem with information disclosure persists especially in relation to 'carbon asset' risks. The recent public letter by many prominent asset managers and investors to the Chair of the Securities and Exchange Commission of the United States was voiced once again the issue of "Inadequate Carbon Asset Risk Disclosure by Oil and Gas Companies" (Ceres 2015). As investors are worried about their shares in the oil and gas companies, the latter rarely discuss the business risks connected to the global transition to the low-carbon future. Moreover, they are more incentivized not to acknowledge the 'carbon asset' risks and to overemphasize their commitments to the sustainable practices in order not to lose its investors. Therefore, the presented results of this research represent the public position of the companies reviewed and could only map the trends in the oil businesses. Further in-depth case studies are necessary.

Mapping Out the Dependent Variable

The main question behind the dependent variable is how significant is the commitment to the renewable energy sources made by the company. In other words, how significant is the (existing or announced) investment to the renewable energy by the biggest oil and gas companies. In the absence of publicly available data on the exact amount of investment in the renewable energies, or a percent of the annual capital expenditure on the renewable energy, it is difficult to estimate the real commitments. However, one can estimate if the intentions expressed in the annual reports or official websites, and compare where possible with numeric data on the installed or planned renewable power

capacity, to give a more precise estimation of how important for their business it the renewable energy.

To review the annual reports and assign values (high, medium, low perceived importance of the renewables), I have used the following criteria:

High – a company mentions the renewable energy in the letter to shareholders; already invests or plans to invest in the R&D of the renewable technologies; there is a special section in the annual or sustainability reports (website) on the renewable energy; mentions the importance of the Paris Agreement. If two or more of these criteria are met, I assume that the company attaches high value to the development of the renewable energy.

Medium – a company mentions the renewable energy several times in the text of the annual report (for example, as a potential risk to the core business or as an important trend on the global energy market); has insignificant installed renewable energy capacity for internal use only; has no mentions in the most recent report, but has recently made an announcement or a deal to invest in the renewables; has a big section on climate change and/or the importance of Paris Agreement.

Low – has no mentions of the renewable energy in the text of the annual or sustainability reports; recognizes the growth of the renewable power potential in the future and/or problems with GHG, but does not see it a risk to its core business; explicitly mentions that the company did not invest in the renewable energy; divested from the renewable business.

Mapping Out the Independent Variables

The similar logic was applied to recognize the importance of the following factors to the company's business strategy.

Political pressure

Low – mentions compliance with existing regulations, but does not go into detail; does not mention policy pressure or policy-related risks explicitly.

Medium – recognizes the changing policy framework towards low-carbon transition as an important risk; mentions the importance of the compliance with existing policies, regulating RE or the transition to low-carbon.

High – a company explicitly mentions the relevance of state policies and regulations on reducing GHG emissions and/or energy transition; follows the government plans to increase energy efficiency and the use of clean energy; participates in the dialogue with the state on development of national regulatory framework to reduce carbon footprint; recognizes the changing policy framework towards low-carbon transition as an important risk. The fully state-owned companies are assumed to be under the high policy pressure at all times.

Public Opinion

Challenging, as it is, was the measurement of the commitments to good governance practices by the oil and gas companies, or, in other words, the way public opinion is influencing the company's strategy. I assigned the companies into three different groups based on their expressed commitment to the sustainability principles, people-oriented business model, and the role of the corporate social responsibility.

Low – no explicit policy towards the sustainable development; no mentions of energy efficiency and carbon capture initiatives; no sustainability report and/or no explicit chapter in the annual report on CSR.

Medium – a company expresses commitment to the environmentally-conscious policies; mentions adherence to the Paris pledges; is aware of the urgency of issues of climate

change; is working towards enhancing the environmental and ecological safety; has projects under the Clean Development Mechanism; has a specific chapter on the CSR and/or sustainability; is working towards energy efficiency targets and

High – a company expresses strong adherence to the Paris Agreement and/or sustainable development practices; is worried about the environmental safety and takes measures to curb carbon footprint; has a clear orientation towards energy efficiency and promotes sustainable practices within the company's operations; acknowledges the public concern over the GHG emissions; participates in the Carbon Disclosure Project; makes public statements in the support of the Paris Agreement; publishes sustainability and/ or CSR reports.

Stranded Assets

Low – a company does not mention risks connected to 'carbon assets'; explicit statements by the CEO of non-recognition of the risks of 'stranded assets'; little commentary on how climate change should be tackled.

Medium – A company expresses worries about the climate-friendly policies and/or rapid development of renewables; cut investments into the expensive exploration projects; enhances asset efficiency.

High – there is a special section in the annual report connected to carbon asset risks; public statements by the Company's representatives expressing concern over the possibly 'stranded assets'; a company made divestments from some of its fossil assets.

Technology and Innovation

There are many ways to discover the company's adherence to innovative culture and reliance on technological development. In this research, I again rely on the information

provided by the company, as a self-assessment of the company's technological capabilities.

Low – a company does not mention innovation and technology often; does not list innovation among its core strategic goals.

Medium – a company mentions its continuous monitoring of trends in technology development, lists innovation among its core strategic goals; has a track record of innovative solutions.

High – a company mentions the importance of innovation and R&D as one of the main focuses on its website or in the annual report; keeps up with state-of-art technologies; innovation is a part of the core strategy; mentions a large budget on the R&D.

Chapter Five – Sample. 33 biggest oil and gas companies

For the purposes of this research I have focused on the biggest oil and gas companies across the world, based on their production figures and generated annual revenue. First of all, the bigger and more profitable is the company, the more likely it has an opportunity for grand investments, especially at the times of low oil prices and tight budgets on capital expenditure. Secondly, it is the biggest producers of energy that are in the spotlight of the climate change talks and environmental concerns as top emitters. The landscape of the biggest oil and gas firms is not subject to quick changes, and the biggest players are the same for decades with little to no newcomers. This is the case due to the nature of the oil business and the scale of the operations of the oil and gas 'giants'. To select the sample I have used two most authoritative sources that produce annual rankings of the top oil and gas companies worldwide, based on revenue and production figures. Initially I included companies listed in the most recent ranking by Forbes – *The 25 Biggest Oil and Gas Companies in the World*, produced by Robert Rapier, one of the top energy analysts (Rapier 2016). Ranking includes publicly listed oil and gas companies from the S&P Global Market Intelligence database with the highest scores in the most recently reported production numbers and enterprise value. The other professional information provider for the commodities and energy markets – Platts – is also using the information from the S&P lists and ranks companies based on the financial performance in the previous year. The only problem with these lists is that they do not include national oil and gas producers, whose estimated production figures are among the top in the world. To fill in the gaps in the list with the NOCs, I have turned to the Petroleum Intelligence Weekly, an independent global energy news and data provider, known for its unbiased analysis, for their integrated data or both national and international oil companies. The most recent list available is the ranking of 2016 – *Top 50 Rankings of the World's Oil Companies* (Petroleum Intelligence Weekly 2016),

which is based on six operational criteria, which are undisclosed. It is also the only widely accepted ranking that compares national oil companies with publicly traded ones. Two lists largely overlap, so the final sample is based on the PIW list of both national and publicly traded oil companies, with minor differences:

- Petrochina is not included in the PIW Top 50; even though it is one of the biggest oil producers in the world. This might be due to the fact that CNPC (which is included in both lists) is the controlling shareholder of Petrochina. However, my final sample will include Petrochina, as according to the information on its official website CNPC "has not directly interfered with the Company's decision-making, production or operation, nor has it prejudiced against the lawful interests of the Company and other shareholders". And Petrochina is independent from CNPC in all aspects "including personnel deployment, assets, finance, organisation and business operations". This is enough to assume that Petrochina is independent in its decision-making regarding the renewables (Petrochina 2016).
- INOC – the national oil company of Iraq – was excluded from the sample as a clear outlier. The company currently has major problems within its structure and legal system of Iraq and is de facto non-functional.
- BG, a British Oil Company was recently purchased by the Royal Dutch Shell and is therefore excluded from the sample.
- Libya NOC was excluded from the list due to the unstable political and economic situation in the country, where the lack of interest in renewables could be possibly explained by the reasons, which are not included in the scope of this research.

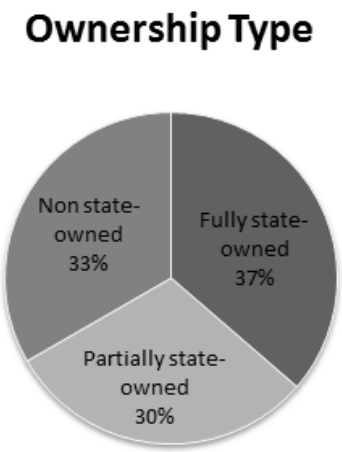
- Finally, Nigerian oil company – NNPC, Uzbekneftegas, EGPC, and National Iranian Oil Company were excluded from the final sample due to the lack of publicly available data.
- The final sample includes 33 biggest oil and gas companies according to the data for 2016. The bottom 11 companies were excluded as their assets and rankings are significantly smaller, and the research aims to test only the top companies in the industry.

The crosschecking with these three lists with rankings should minimize the selection bias and create a comprehensive picture of the largest oil and gas businesses. The final list mainly appears to include mainly the integrated oil and gas companies and the ones operating primarily in the upstream (oil exploration and production). It leaves behind all other smaller energy producers, and the some oil and gas services and marketing companies. Potentially if the mid and downstream energy firms were regarded in the list one would see more comprehensive picture of the energy industry's relations with the renewables. Also service companies are easier to adapt to the changes. According to Robert Rapier, energy analyst, some downstream energy companies in the US, for example, invest money in biofuel technologies as they face policy pressure to include biofuels in their fuel mix[4]. However, this is out of the scope of this research due to a different nature of the mid and downstream oil and gas businesses.

[4] Based on the author's interview with Robert Rapier

Chapter Six – Results

The reviewed 33 biggest oil and gas companies of 2016 have a diverse ownership structure. 22 companies are at least partially owned by the state, and 11 are non-state-owned enterprises. 37% of the reviewed companies are entirely owned by the state. Out of 33 oil and gas companies 11 companies consider the role of the renewable energy as important to their business for various reasons. Most of these 12 companies have a special business unit that is responsible for 'new energy', which is managing renewable power assets and/or conducts the research and development in the field. 10 companies consider the role of the renewables as moderate or medium. Many of them either have already invested insignificantly in the renewables or currently discuss the introduction of the renewable energy business into their portfolio. Some of them generate the renewable power for the internal use.



State ownership does not seem to significantly influence the attitudes towards the renewable energy. Among twelve fully state-owned companies, Saudi Aramco, Petronas, Pemex, CNPC, PDVSA, Sonatrach, KPC, Adnoc, CNOOC, Qatar Petroleum, Kazmunaigas, and Pertamina differences are high and on the first sight there is no trend visible. Besides Pemex, Kazmunaigas and PDVSA, all of the fully-state owned companies highly value innovation and technological progress. However, variation here could be possibly explained by the poor financial condition of these three companies, which are pouring the resources into trying to keep the core businesses afloat. Notably, all three of them are in the Latin America or Central Asia, where the innovations are usually financed worse than in the rich Middle East, Europe or the US. From the fully state-owned companies, Saudi Arabia, the UAE, and Qatar scored the most, having

announced grand plans on investing in the renewables. The announced plans mainly concern the solar power generation, perhaps with the Middle East companies taking the advantage of the natural conditions and trying to diversify from the 'carbon assets'. At the same time, Kuwait did not announce in its latest annual report (2015) the change towards the renewables, but seems to follow the fellow Middle Eastern colleagues by investing into the solar power plant. "The Government run Kuwait Institute for Scientific Research (KISR) has signed a contract in the year 2015 with Spain's TSK to establish the country's first solar thermal energy plant; it will have a planned production capacity of 50 MW". (RenewableEnergy.com 2016)

While there is no visible correlation in the state-ownership and announced plans for the renewables, there are several interesting sub-trends. Interestingly, the differences become apparent on regional scale. In the south Asia Indonesian national oil company Petromina is among the leaders in the renewable power generation with the focus on wind, solar and microhydro, and already generating record 1,13 GW of the renewable power. The company, notably, expresses little concern over the possibly 'stranded assets'. It's also among the pioneers in the renewable energy sphere, with a plan to increase the share of the renewables in the country's energy mix by 25% by 2025. The same ambitious plans with hydropower are expressed by the Indian partially state-owned company – ONGC. As a medium-term investor in hydro, the company recognizes the serious role of the renewable power generation and aims to increase solar and wind power capacities. While the US, Canada and Russia-based companies are more skeptical towards investing in the renewable energy, regardless the ***ownership type***. Among all Chinese national oil companies, CNOOC, Sinopec, CNPC and Petrochina there is a lack of consistency between the claims in the reports and actual

activities. While the renewable energy is rarely mentions, the companies have had interest in wind, geothermal, and solar power generation.

There is an interesting difference within the so-called 'supermajors', the non-state-owned, publicly listed companies: ExxonMobil, Total SA, Chevron, Eni, the Royal Dutch Shell, and British Petroleum. All, except for the US majors – ExxonMobil and Chevron, are a part of the Oil and Gas Climate Initiative and are stemming from the countries that ratified the Paris Agreement. With the US exiting the Agreement earlier, the two US super majors expressed their adherence to the Agreement regardless the US government position. The Exxon's position on the renewable investment is quite strict, and best expressed by the vice-president of corporate strategic planning at Exxon: *"People sometimes say we should be in renewable energy. It's like asking why GM isn't in the aircraft business*," (Crooks and Stacey 2016). It does also persuade its shareholders on the absence of the risk of 'stranded assets': "Based on this analysis, we are confident that none of our hydrocarbon reserves are now or will become "stranded" (ExxonMobil 2017a). Nevertheless, the company is investing in advanced biofuels research, the closet possible substitute to the traditional petroleum. At Chevron, one of the earliest investors in the renewable energy, the enthusiasm towards the renewables is also moderate. "We expect the need for oil and natural gas to continue to grow over the next 20-plus years as the developing world reaches for a better quality of life" (Chevron 2017). Its view of the oil future is as bright as among many oil and gas companies, regardless their investments into the renewables: "We share the view of many industry analysts that oil and natural gas will remain a major portion of energy supply for the foreseeable future" (Chevron 2017). The statements on the ***stranded assets*** and plans for the renewables' expansion are more modest. BP is coming right after Total in its renewables' expansion plan. "We expect oil demand to continue to grow throughout the

next 20 years, driven by increasing transport demand, particularly in fast-growing Asian economies" (British Petroleum 2017). BP, which has previously dropped the solar business, is now the biggest renewable power generator with its vast installed wind power capacity, but at the same time it mentions: "We don't expect our oil and gas portfolio to be 'stranded' in the future" (British Petroleum, n.d.). Saudi Aramco, which plans to invest 1,7% of its annual capital expenditure or $5 billion on the renewable business, also highlights: "however, we believe that the transition will be gradual, and the role of oil and gas in the global energy mix will remain significant for decades to come" (Saudi Aramco 2017). However, the ambitious Saudi Arabian plans are also connected to another trend. The new prince Mohammed bin Salman is planning to partially privatize (Raval 2017) the now 100%-state-owned oil giant. The reasons behind many of the oil and gas companies' denial of the possibly ***"stranded assets"*** could lie in the fear of divestment. So the fear of the ***stranded assets*** does not seem to drive the decisions.

Could then the ***policy pressure*** on the non-state-owned companies explain the commitments to invest the RE? Most of the super majors also acknowledge the high levels of ***policy pressure***. This might be the case with the French Total SA. The French government announced ambitious plans to ban petroleum-fueled vehicles in the next decade. From all super majors Total SA seems to be the most committed to the renewable energy transition. Total has announced massive investment into the different types of the RE with the main focus on solar and biomass, is "the only directly substitutable renewable alternative to fossil resources for the provision of liquid fuel for transport" (Total SA 2017).

Total, for example, acknowledges the rise of electricity as the primary energy type for the 21st century. Following the trends, Total sets the goal to become a leader in

electricity trading. It aims to develop its capacities in solar, biofuels, and most importantly in energy storage (Total SA 2016). Worries about the future of the company push Total to strategic shifts to diversify and be more "climate-friendly": "Total (…) will remain so [leading energy player] in the future" (Total SA 2016). "A lot of fossil fuels are not going to be burned, that is clear", "Today is not like yesterday", "We will have to adapt." – these are the words of the Total's Chief Executive (Walt 2015). So for the company it is a mix of both: policy pressure and stranded assets, which are closely interconnected. Chevron, one of the world's largest private producers of geothermal electricity, is investing in biofuel research and development. Perhaps, the reason behind are the blending mandates in the US and Europe , meaning that the fuels have to contain a certain percentage of ethanol. Shell "In December 2015, 195 nations adopted the Paris Agreement and we welcomed the efforts made by governments to reach this global climate agreement" (The Royal Dutch Shell 2011). The Company mentions the importance the *importance of government policies* for energy transition and low-carbon future, but is also moderate on the risks of the '***stranded assets'***.

In the national oil companies, as expected, the governments mostly dictate the strategy. The state-owned Saudi Aramco, the biggest to date Oil Company in the world, has been changing its game with renewables in the last several years. The Kingdom of Saudi Arabia announced its Vision 2030, a strategic document, which also envision the incorporation of 9,5 GW of electric power generated by the renewables only (Blazquez, Hunt, and Manzano 2017). Gazprom is concerned with relative prices of natural gas, impacted by the rise of renewables (Gazprom 2015). However, it does not consider renewables a direct competitor. "Alexei Miller, the head of Russian gas giant Gazprom, said on Thursday that renewable sources of energy did not pose a threat for Russian gas in Europe as they are too expensive," or "Natural gas is the energy source that will fill

the gaps left by renewable technologies" (Gazprom 2017). Even though the ***policy pressure*** is important for the Russian companies, there is no fear of ***stranded assets***, and all the measures lie in the fields of energy efficiency and innovation of oil and gas technologies.

The reasons for the moderate investments into the renewable energy could be outside of the set analytical framework for this research. The stranded assets can't explain the current attitudes now. "This is because we produce and replace our proved reserves over a 15-year time frame on average - which gives us the flexibility to shift our investment strategy".(British Petroleum, n.d.)

Public opinion seems to have some relationship with the company's decision to invest into the renewables. ***Public opinion*** and corporate citizenship are very important to almost all the companies reviewed in this research, with several outliers – Canadian Natural Resources, Petroleum Development Oman, Rosneft, Kuwait Petroleum, Petrochina, Surgutneftegas (non-state-owned, but shareholders are undisclosed), and Gazprom. Almost all of these companies are also ***state-owned***. There commitments to the renewable energy are limited or non-declared. However, it is difficult to drive conclusions, as from the companies with the high score in public opinion some do not have interest in the RE.

Finally, ***innovation*** does not seem to explain company's commitment to the renewable energy. Most of the companies score high, admitting their adherence to technological progress. ***Innovation*** is a core strategies for most of the companies regardless the commitment to the RE. This could be possibly explained by the worrying trends in oil prices, which have stagnated below the profitability rate for many companies, pushing companies to innovate for better energy- and cost-efficiency.

Conclusions

The Paris Agreement was a historical moment for the oil and gas industry. The global climate talks and the commitment to the low-carbon future put the companies at risk. At the same time the renewable energy technologies become more affordable and more efficient. The prices of the renewable power are already competitive in many markets. With an increased policy support for the promotion of the renewable energy, oil and gas companies have adapt their business strategies to keep afloat in the low-carbon future. This research aimed to look at the possible explanations for the motives behind some of the biggest oil and gas companies' decision to diversify their energy portfolio by including the renewable energy assets. The possible drivers to such diversification are widely discussed in the academic and so-called grey literature: the policy pressure from the host country; the raised expectations from the shareholders and broader public; general innovative and technology-driven culture of the enterprise or the fear of the 'stranded assets'. The ownership type was also taken into the consideration as the strategy of the company largely depends on it. In the absence of the comprehensive and publicly available data on the companies' financial commitments to the renewable energy and companies' risk calculations, this research reviewed the most recent annual reports, issued by the companies as well as the official websites and respected newspapers. From the reviewed 33 biggest oil and gas companies almost a half has announced or continued its investment into the research and development of the renewable energy or invested into the installation of the renewable power capacities. While most of the companies acknowledge the Paris Agreement importance or the need for sustainability, the company-specific business strategies towards the renewable energy were more important. No significant pattern was found to explain the variation in the companies' strategies. However, the low oil prices have forced many oil and gas companies to innovate and increase their commitments to sustainable operational

practices and energy efficiency. This study provides an overview of the different strategies of the oil and gas companies to tackle the climate change as well as the possible company-specific explanations behind the motives to invest into the renewable energy. One important finding is that most of the companies in this research consider policy pressure and public opinion an important factor in shaping their business strategies. The further study in necessary for the policy-makers to understand the most effective policy mechanisms to enable the transition to the low-carbon future.

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