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Review

Innovation from the inside out: Contrasting fossil and renewable energy pathways at Statoil

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ABSTRACT

The social science literature on energy lacks much attention to private and semi-private energy companies and their efforts to reduce the impacts of the ongoing climate change. This paper explores one of the dominating energy companies in Europe, Statoil, and its strategic decisions that determine which type of energy technology multinational corporations choose to invest in or to acquire. The author develops the concept of two different paths to investigate the company's role within this context. The *black energy path* implies continued production of hydrocarbons and investment in more advanced technology to create economic output for Statoil. By contrast, diversifying into the *green energy path* has the potential to close the gap between the black and green path, step-by-step. The author discusses Statoil's decisions that have an environmental objective. He concludes that despite new initiatives having been taken to close the gap between Statoil's fossil and renewable energy paths within offshore wind and carbon capture and storage, as well as the new and upcoming gas projects in the company's portfolio, the company is highly path-dependent on the black carbon path and is prolonging its corporate strategy towards increased oil and gas investments.

1. Introduction

Within the European Union, one of the aims of the Europe 2020 growth strategy is for 27% of the total energy production to be provided from renewables by 2030. The strategy also aims simultaneously to reduce greenhouse emissions by 20%. The background is the overall recognition of climate change and specifically the role of energy production in large greenhouse emissions from conventional sources of energy such as coal, oil and gas. Lawrence et al. [1:622] have demonstrated the success of the strategy by showing that energy derived from wind, solar and natural gas increased from 87.9 GW in 2000 to 116 GW in 2014 [2]. At the same time, Europe witnessed a decrease in energy derived from nuclear power, coal and fuel oil. In 2015, renewable energy provided 28% of the EU's electricity [3:96]. The scientific community has reached an agreement that activities driven by human actors are the main factor in disturbances to the earth's ecosystems [4]. As the International Energy Agency (IEA) states, energy companies are at the heart of the climate change challenge IEA [28]. Accordingly, this paper examines one of the leading oil and gas companies in Europe and investigates whether and how emerging low-emission energy sources can challenge the established technological assets of multinational corporations (MNCs).

The literature lacks much attention towards private and semi-private energy companies and their effort to reduce ongoing climate change. However, it is acknowledged that considerable private investment is needed if public policy aims to enhance the share of renewable energy and prevent anthropogenic climate change are to be achieved Wüstenhagen and Menichetti [5]. While governments used to be the most important source of funding in the mid-2000s, private investments have since become the largest source of capital for renewable energy projects. This growth is the result of two factors: (1) technology improvements have led to increased reliability and declining costs of many renewable energy options, and (2) renewable energy policies have successfully created new market opportunities, which in turn have spurred private sector investment [5]. However, not much attention has been directed towards private companies and organizations in the field of energy research, and within this context the number of studies of organizations has been rather limited [6]. Hence, following the line of research on semi-private energy companies, I investigate one of the leading petroleum companies in Europe, Statoil. Statoil is a partly private and partly Norwegian state-owned company, and it is interesting to investigate how social pressure can challenge such MNCs' established technological assets, and whether emerging low-emissions energy sources built on new technology can provide alternatives to how oil companies organize their assets.

Statoil is the second largest gas company in the world and among

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the top 15 oil companies globally. Statoil, which was established in 1972, is 67% owned by the Norwegian state and has in 2017 approximately 21,600 employees.[1] It is represented in 36 countries and the headquarter is located in Norway. The company holds the majority (75%) of the licences for oil and gas production on the Norwegian continental shelf. Given the low oil prices and market decline in the global oil sector from 2013, it is of interest in a European perspective to examine Statoil's adaption to and strategies for renewable energy. As MNCs can bridge the gap between fossil fuels and renewable energy as a future energy supply, they are interesting as units of analyses in social science and energy research. This perspective has societal importance in a transition perspective in which rapid changes alter already established energy systems and company strategies have a significant impact on the practical side of climate change. However, Statoil has been subject to criticism because it continues and even increases the rate of its depletion of hydrocarbon resources in the Arctic, an area containing large resources of hydrocarbons. As the company continues to produce a massive share of Norway's greenhouse emissions, opponents claim that Statoil should downsize its oil and gas activities and introduce strategic efforts to develop renewable energy within the company. NGOs have argued that if Norway is to fulfil its commitment to the terms of the Paris Agreement of 2015, action must be taken to reduce CO_2 emissions, and Norway's energy companies have a specific responsibility in this respect.[2] To contextualize, Statoil's northernmost development, the liquefied natural gas (LNG) field in the county of Finnmark (north-east Norway), contributes 800 tons of CO_2 emissions per year. This isolated plant contributes more CO_2 emissions than a city of 700,000 inhabitants.

This paper address key questions about Statoil's role in renewable energy, since the company's efforts in support of the EU 2020 strategy have great relevance for future climate policy. Building on recent literature in the field of renewable energy and company performance on this topic, it is of importance to map to what extent and how strategies in semi-private energy companies is developed to reduce their negative impact on the environment. Energy companies' role in energy production and as agents of creating negative impact on energy production through increased emissions to air, underline the need of new knowledge on this topic. A few questions are addressed to answer this: To what extent is environmental issues a prioritized concern within the energy company? How does the external pressure from outside the company on environmental concerns influence on company strategies and actions? To what extent is a company able to shift its initial strategy towards a more environmentally friendly approach to energy production? And last, but not least, how is such a strategy balanced within the company as it is not only relying on significant different technologies compared to Statoil's conventional technology, but also has a lower profitability outlook? Thus, we focus on the company's decisions that have been taken with an environmental objective. The following research question is addressed: *To what extent can recently launched renewable strategies in Statoil facilitate a 'green' development and a new energy path for the company?*

The paper is organized as follows. I start with a theoretical examination of the terms path dependence and structural inertia, drawing on an interdisciplinary approach to the field of renewable energy strategies. In Section 3, I present my study methods, and then discuss the data in Section 4, the results section. In the discussion (Section 5), I assess how Statoil's strategies and its internal structure can generate assets to facilitate a shift from non-renewable to renewable energy. In the concluding section (Section 6), I summarize the main findings.

[1] Statoil.com.

[2] http://www.aftenbladet.no/aenergi/Kritisk-til-Statoils-gassutspill-34841b.html.

2. Path dependence and structural inertia

In this section, I discuss the concept of path dependence and structural inertia in order to gain a better understanding of Statoil's strategies in renewable energy. The question of organizational change is a recurring topic within the social sciences, especially resistance to change in larger and smaller organizations [7,8]. The phenomenon of hyperstability is used to describe how organizations are resistant to external change. The theory of path dependency, which was originally introduced within the academic field of economics [9], has recently received increased attention within different fields, including economic geography [10–12], energy studies [1], and organizational studies [13]. Independent of theoretical approach and academic field, the concept of path dependence is primarily founded on the argument that past events are important for current and future actions [13:385].

A large number of disciplines have been involved in the debate on path development within the social sciences. Framing all of these disciplines, the concept has provided insights into the importance of past events for current and future actions. This has contributed to a time-sensitive approach and understandings of change from a geographical, sectoral and organizational perspective. An evolutionary turn within the field of economic geography maintains that experienced competencies developed over time by entities in certain localities regulate present formations and will regulate paths in the future [14]. This suggests that history matters in terms of shaping places, firms, and economic and social scenery. In such thinking, the notion of path-dependent industrial development is of great interest to economic geographers. However, these insights can be translated into the field of organizational path dependence. Reflected in a situation of growth in the regional economy, this implies that local and regional firms increase their market position, generate more jobs and contribute to development through continuity. In such situations, if firms ignore the need for change, they may eventually, experience stagnation and drop in profitability because lack of renewal [15]. Firms might enter a situation in which their innovation potential is reduced or their innovations occur along a constrained technology pathway. The lock-in situation will result in exhaustion. Typically, external events or developments will be ignored or recognized too late, and firms become uncompetitive and might decline. This may even lead to stagnation in the industrial environment.

However, the evolutionary approach has added theoretical contributions that supplement the notions of path-dependent developments that focus on continuity and lock-in with alternative paths along which dynamics occurs. Changes may follow from different elements of reorganization of industries or external shocks [16]. Path renewal occurs when firms shift their focus to different activities. Often, path renewal is developed within an industry as the industry transforms and broadens its industrial structure into new or related areas of activities [17]. Further, path creation represents a wide-ranging transformation in a regional or national economy. For a region or nation, it includes the formation of new firms and new sectors. Alternatively, businesses have different products, apply new techniques or organize in dissimilar ways to previously in the region [18].

Hannan and Freeman [19] introduced a concept of structural inertia, which clearly has similarities to organizational path dependence. The concept implies that organizational arrangements are hyperstable despite environmental changes. Hannan and Freeman argue for a perspective in which the routinization of organizational activities is perceived as crucial in order to guarantee efficiency and survival in competitive environments. As argued by Sydow and Schreyögg [13:388], like path dependence, inertia is a double-edged-sword because it is considered a precondition of organizational efficiency and legitimacy, while at the same time it threatens organizations' survival when it conflicts with changing environments. From such a perspective, being far too reluctant to adapt to external change or dynamics could lead to exhaustion or petrified structures, as the

environment changes, in common with institutions. On the other hand, if a firm or an organization relies too much on signals and impulses from the external environment, it may risk losing sight of its goals. In a complex organization, commitment to a long-term goal requires a balance between reluctance to being affected by new impulses and at the same time introducing and integrating the 'right impulses'.

Research on commercial sectors and energy behaviour in business [20] has demonstrated a striking gap between private businesses in terms of their adaptation to renewable energy. Andrews-Speed [21] clarifies how, within an organizational perspective and institutional theory in the analysis of energy transitions, studies have drawn on organizational or sociological institutionalism. He argues that rational choice and historical institutionalism can provide additional insights into the low-carbon energy transition. Even within the above-mentioned studies, the focus on private or semi-private energy companies is rare. However, Darmani et al. [22] deal with the strategic decisions of MNCs. They explore how the influence of energy frameworks contributed Vattenfall, one of Europe's largest generators of electricity, making specific decisions in different energy markets. Darmani et al. found that even within the energy industry, with institutional richness, MNCs follow their core global strategy to such an extent that it may prevail over local institutional considerations. Their findings also illustrate the trend of local institutions playing a more dominant role within even large MNCs, which is relevant to the discussion in the present paper.

3. Methods

I used various methods to assess the strategies of renewable energy from the energy companies. First, I conducted three telephone interviews with staff in Statoil's support division New Energy Solutions (NES), to ensure the relevance of the collected data to the research question. I than conducted two interviews with the department of Research and Technology and Future Value Chains. The interviews were carried out with a semi-structured interview guide as a background, and each interview lasted between 30 and 45 min. The interviewees answered questions on specific efforts in renewable energy, how the internal set-up of organizational structure could facilitate renewable energy strategies, and in what way climate change is dependent upon energy companies' efforts to invest in new technology. In addition, documents and written material were reviewed and analysed, with the aim of supplementing the qualitative interviews. The documents were categorized according to three actor groups. The first group of documents related to the international bodies of renewable energy relevance such as institutions, and supranational bodies such as the EU and energy associations. The second group of documents related to national government in Norway and provided the context and institutional frames for the specific case, highlighting regulations and subsidies related to renewable energy. The third group of documents comprised company reports, which provided important information with which to contextualize Statoil's efforts. The actions undertaken by the company annually are summarized in its Sustainability Reports series. These documents provided additional information and were analysed to validate the information collected from the interviews.

4. Company decisions on renewable energy

In a Norwegian context, the dominating position of the petroleum industry has evolved since the early 1980s [23]. When the oil crises ended in the 1980, a new wave of investments in the petroleum sector began and continued until 2014, followed by a new crisis in the sector with decline raw material prices. During those years, Statoil acquired a solid footprint in the Norwegian industry environment, and in the 1990s it became the leading oil and gas company in Scandinavia and Northern Europe. Since the Norwegian Government established Statoil in 1972, the company has been a major contributor to economic development and growth in Norway. To control and assure that Norwegian oil and gas resources and knowledge were embedded within the Norwegian system, the company has been used as a tool for the Norwegian Government in industrial policy regarding building local content in the industry in Norway. Following Statoil's merger with its Norwegian competitor Hydro in 2007, Statoil became the single dominant company with a Norwegian ownership structure, while other companies operating on the Norwegian continental shelf were either smaller or had foreign ownership. Statoil's position has resulted in the provision of a large stock of new technologies and numerous innovations within Norwegian business.

The overall context of this paper is Statoil's ability to reduce its climate footprint from energy production, and the decisions the company has made to improve its climate responsibility. Statoil's overall corporate strategy highlights that its top priorities are to conduct safe and reliable operations with zero harm to people and the environment, and to add value through investments and financial management, with redistribution of capital to shareholders Statoil Annual Report [24:10]. Since 2013, the company has invested in nine new and upcoming projects in its efforts to prolong the extraction of oil and gas on the Norwegian continental shelf. Six of the projects, Oseberg West, Rutil, Johan Sverdrup, Aasta Hansteen, Polarled, and Gina Krogh are new projects 'in the pipeline' or have recently started, with Statoil is lead partner. The investments in these projects have been estimated to total EUR 22.7 billion Ministry of Petroleum and Energy, 2017. In addition, Statoil is junior partner in three other upcoming projects called Flyndre, Ivar Aasen, and Martin Linge, and the total investments in these projects is EUR 7 billion Ministry of Petroleum and Energy, 2017. Statoil carries most of the investments in the six projects for which it is the lead partner, and carries a minor part of the investments in the three upcoming projects, for which it is a junior partner. These investments are closely linked to the overall corporate strategy, in which prolonging the path within oil and gas is strongly underlined.

One of four main aims of Statoil's strategy are to provide energy for a low carbon future. The Fig. 1 shows the overall CO_2 emissions from Norwegian industries in 2015, distributed by sectors [25]. As is evident from the figure, the oil and gas industry is the largest contributor to CO_2 emissions in Norwegian industry as a whole.

Nevertheless, CO_2 emissions are not static, but evolve over time as new industries arise, decline or even shut down. However, as the debate on climate change has expanded, a number of critical voices have been raised towards Statoil, accusing the company of not being determined to adhere to renewable energy strategies, since it continues to contribute to the increase in total of CO_2 emissions from Norway. Between 1990 and 2015, the petroleum industry increases its CO_2 emissions by 83% (Fig. 2).

4.1. CO_2 emissions and carbon capture and storage − plans and realities

Statoil's sustainability report for 2014 states that one of the company's goals was to identify where 250,000 tons of potential CO_2 emissions could be saved.[3] According to the report, potential savings of 339,000 tons could be made. The NGO Greenpeace said in 2014 after Statoils general assembly:

> *This is off course very promising for the future. If Statoil can cut the emissions and reduce its extremely negative contribution to climate change, I will believe that it is possible to do a lot more in the future as well.* (Truls Gullowsen, Greenpeace)

However, aims and results differ in this context. Aims are not automatically translated into a reduction in emissions, since Statoil's own statistics demonstrate that there was a steady increase in CO_2

[3] http://www.statoil.com/no/InvestorCentre/AnnualReport/AnnualReport2014/Documents/DownloadCentreFiles/01_KeyDownloads/Sustainability_report_2014.pdf.

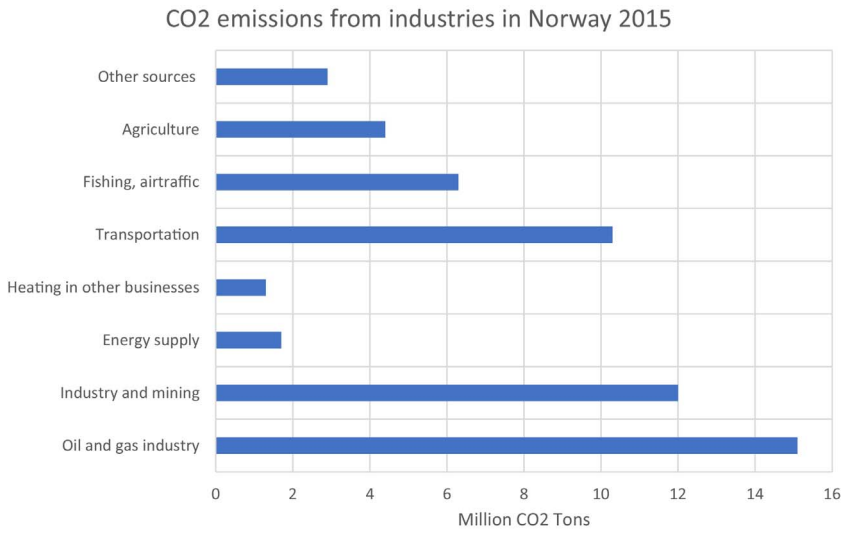

Fig. 1. Source SSB Statistikbanken https://www.ssb.no/klimagassn/.

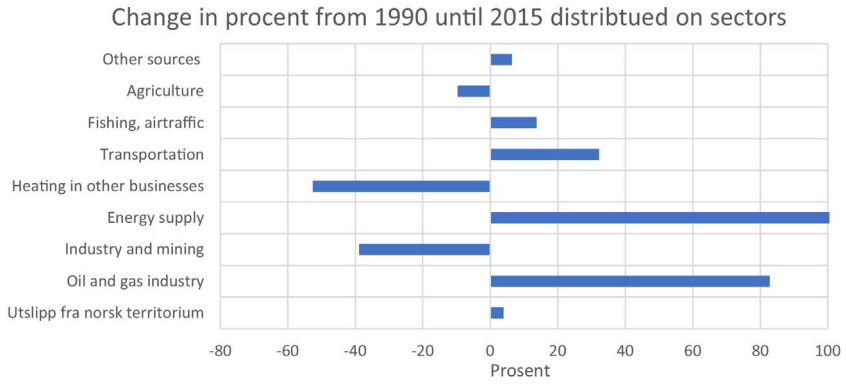

Fig. 2. Percental change in CO2 emissions in Norway-distributed on sectors. https://www.ssb.no/klimagassn/.

emissions from approximately 13.3 million tons in 1990 until almost 16 million tons in 2015 (Statoil [24]).[4] Seen in context, Statoil contributes to emissions equivalent to almost one-third of Norway's total emissions of greenhouse gases; in 2013, 53.9 million tons of CO_2 were emitted. To reduce the emissions in the years ahead, Statoil has embarked on some new strategies:

> *[…] both to increase energy efficiency and reduce the use of flaring, i.e. burning off excess gas. The aim is to halve flaring from 4 tons of gas per 1,000 tons of produced hydrocarbons in 2014 to a maximum of 2 tonnes of gas per 1,000 tons of produced hydrocarbons in 2020.* (Statoil [24])

It has been argued that Statoil fails to make adequate efforts to improve the situation [26]. This critique reflects the company's view on carbon capture and storage (CCS), as it argues that CCS will be the most central factor within the next 20 years if energy companies can contribute in a favourable way to achieve the EU 2020 strategy regarding reduced CO_2 emissions (interview data, Statoil). Within this context, Statoil is involved in the three largest CO_2 capture projects in the world: Storage in the Sleipner field in the North Sea, the elimination of CO_2 from the Snøhvit field in the Barents Sea, and the In Salah field in Algeria. Besides planned purification of CO_2 from Mongstad in full scale, a feasibility study is conducted to capture CO2 from Norwegian industry and to store it on the Norwegian continental shelf interview Statoil 2017. To realize the capture and storage of CO_2 requires long-term technological research from some of the leading research environments globally, and Statoil has a long-term perspective on developing such technology. However, the launching of Mongstad in the years 2006 and 2007 as a test centre for this technology, in which Statoil has a major stake, has led to a considerable amount of criticism from different sources. First, the launch did not reflect technological maturity in industry or research, and therefore the project encountered technological major difficulties. Second, the project became subject to major economic overruns. Finally, the political parties that had financed much of the research centre decided to shut it down in 2013. However, although the project was terminated, its research component of the project has been sustained. More importantly, in Statoil's corporate strategy and its decisions relating to CCS are reflected in its the efforts regarding the storage of carbon combine its strategy of being a leading provider of oil and gas in the future with a more environmentally friendly approach by working toward reduced its carbon emissions.

4.2. Economic incentives and funds

In 2016, Statoil launched a new venture fund by investing in ambitious growth companies within renewable energy. The fund was to invest USD 200 million over the course of four to seven years:

> *We have our own department within the area of new energy. It is called New Energy Solutions. This department reflects the company's strategy of step-by-step closing the gap between [its] non-renewable and renewable*

[4] Statistics on the company's CO_2 emissions are summarized in Statoil's Sustainability Reports sereis, which are published annually and trace the company's efforts relating to specific economic, health and environmental measures and indicators.

energy portfolio and Statoil wants to develop further its approach towards low carbon solutions (Henriette Undrum, manager, New Energy Solutions, Statoil)

As stated by Wüstenhagen and Menichetti [5], economic funding and investments often remain unrealized in sustainable renewable energy projects. In this contextual frame and within the frame of the corporate strategy, in 2016 Statoil sought to ease the transition from its black carbon path to its and green carbon path, and therefore created a venture fund in new renewable energy. The intention of the fund is to add valuable capital and to be ready to invest within three strategic areas: (1) the support of existing investments within renewables, (2) positioning Statoil towards new growth opportunities, and (3) challenging new technologies and business models. Within these broad areas, Statoil created areas within investment such as wind (onshore and offshore), solar energy, energy storage, transportation, energy efficiency, and smart grids (interview data Statoil). Since the fund emerged in 2016, it is too early to draw any conclusions from the initiative.

4.3. Statoil and offshore wind

Between 2006 until 2016, Statoil invested in six offshore wind projects. The dominating company within renewables in Norway, Statkraft, suffered a cut in state funding in 2015. The background was national politicians' desire to balance the national budget. Statkraft and its owners therefore decided to transfer all of the offshore wind projects and new investments in their portfolio to Statoil in 2017. The decision to move new assets in offshore wind from a state-owned company to Statoil, a semi-private company listed on the stock exchange, indicates a shift away from state control and state policies in renewable energy towards a market orientation of renewable energy in offshore wind. This is especially interesting because Statkraft's decision questioned the role of Statoil as a pure oil and gas producer within the Norwegian system, in which it has been a major industrial tool for the Norwegian state in industrial development. As S of January 2017, Statkraft employees within offshore wind are employed by Statoil, which means that Statoil has increased its human assets within the field of renewable energy in addition to prolonging its existing offshore wind projects.

As one of the leading offshore oil companies regarding knowledge of deep-sea installations and engineering, Statoil's has industrial relatedness to offshore wind technology. The company has six offshore wind projects within its portfolio: five projects in the North Sea and one in the Baltic Sea (Interview data). Statoil's total investment in offshore wind farms – offshore wind – is EUR 2 billion per january 2017 (interview data Statoil). This is equivalent to the market capitalization to the 15th largest company on the Oslo Stock Exchange (Oslo Børs). However, the most recent development was in 2016, when Statoil entered the German offshore wind market by buying 50% of the new offshore wind farm Arkona (Offshore Windfarm Arkona Becken Südost). Statoil and the energy company E.ON took the final investment decision and the project will result in a new capacity of 385 MW. This is the first time Statoil has developed offshore wind in places other than Great Britain. Interview data revealed that the company had plans for developing new offshore wind projects in Germany in the years to come. There is a strong potential for growth in offshore wind in the area around the Baltic States, Denmark, and Sweden. Together with E.ON, Statoil is one of seven big energy companies that competed for contracts to build and operate the offshore wind farm in Denmark, with a capacity of 600 MW (Interview data).

4.4. Modifying the company structure

When, in May 2015, Statoil announced the established New Energy Solutions − its separate business unit within the company structure − the head of the new department announced:

The restructuring of the global energy system to a low-carbon society is creating new business and growth opportunities in renewable energy and new energy solutions. Statoil has established a new business area for New Energy Solutions (NES) to promote further profitable growth in these areas. (Representative A, Research and Technology and Future Value Chains, Statoil)

The new unit implied a structural change, since the company change its internal reporting process. Previously, the section of renewable energy did not report directly to the CEO, but was defined as a project within the organization. The new way of organizing the structure within the company implies a more formal step-by-step approach towards an energy company and not only an oil company:

The establishment of the NES as a separate business unit that reports directly to the CEO is an expression of the aspirations of gradual supplementation of the oil and gas portfolio with profitable, renewable and other low-carbon solutions. A more detailed plan for this business will be developed as an integral part of our strategy. (Representative B, New Energy Solutions Statoil).

According to the interview data, the main mechanism that enabled the structural change with a new department in the company, was the mechanisms of responding to global energy needs and at the same time responding on external expectations and new global energy paths. The new strategy has been an answer to a general demand surrounding the company after COP21 by building a step-by-step solution that is more environmentally friendly compared to especially oil production. As one of the representatives from the department of New Energy Solutions states; "*For the first time in my carrier, everyone I talk to outside Statoil is positive towards the way we are headed now because of this reorganizing*". However, discussions within the company has been on how the company can overcome the problem of profitability within renewable energy and especially offshore wind. Another company representative within the same department argued; *"the solution must be cost effective and provide income that can complement other energy projects in the company in the long turn*". This statement was followed by another representative in the company; "*we need to find a profitable solution on renewable energy that is competitive on the global market*". Until recently, lack of profitability without subsidies have been a barrier to utilize renewable wind as a corporate beneficial activity within Statoils portfolio. In some European regions, this challenge is no longer the case as renewable wind is competitive without subsidies. Another reason for the restructuring of the company was the need to reduce CO_2 emissions. In this context, the internal company discussions expressed concerns about the fact that to reach the goal of limiting global warming to a maximum of 2 °C, human-generated CO_2 emissions would have to be reduced dramatically. Mirroring the internal processes in the company, we know that responsibility was discussed in the initial phase of the reorganizing process. How to respond to the Climate agreement was discussed in the company. The answer was simple and clear: Statoil supports the climate agreement from Paris. It was expressed within the company that Statoil had an ambition to be one of the leading companies in the oil and gas industry when it comes to meeting the climate challenge. This decision both reflected a general concern on what would be good for the climate and because key persons inside the company thought it would be a distinct competitive advantage. However, the solution to the problem is not an easy fix: The company representatives all together underlined that oil and gas, together with renewables, contribute to solve the future energy challenge at the global scale. If Statoil should cut all oil and gas activity, this would have been substituted by coal from Europe, and thus contributed to increased climate challenges.

In the next section, I apply the theoretical concept of path dependence and structural inertia to reflect upon company strategies within renewable energy in general, in the context of Statoil's estab-

lished portfolio of business relations.

5. A transition from fossil energy path towards a renewable energy path?

5.1. The role of gas—balancing the black and green carbon paths in Statoil?

The degree to which MNCs are influenced by local or regional institutions is an important issue, and, as Darmani et al. [22] demonstrate, MNCs strategies often prevail in local institutions. Concerns about local institutions may be perceived as external pressure from the MNCs' perspective. Statoil experienced major pressure from non-governmental institutions surrounding the company to shift from fossil fuels towards new technologies that facilitate low-carbon energy production. Analysts in the research organization Bloomberg New Energy Finance estimated that the annual global investment in renewable energy reached USD 330 billion in 2015 [27]. By comparison, according to OPEC (Organization of the Petroleum Exporting Countries), the annual investment in oil and gas reached 520 billion dollars [27]. While the petroleum industry is still a significantly larger industry, energy experts have forecast that renewable energy will grow faster in the future [28]. Statoil was founded on the basis of non-renewable energy and still has major stakes in this type of energy. To demonstrate the company bias, Statoil's company overview documents reveal that in xxxx, Statoil was involved in 225 oil and gas field, but only a modest six projects in offshore wind in international waters (interview data Statoil, 2017). In addition, as I have shown in Section 4 above, Statoil has nine new and upcoming oil and gas projects with a of a total value of EUR 29 billion. The weight of investments in oil and especially in gas, is striking, as they account for 80% of new investments. Statoil's most important market for gas are England, France and Germany, in addition to the flexible LNG supplies from the Snøhvit field in the Barents Sea, which are transported globally to customers in more than 15 countries. In Algeria, Statoil operates the In Sala gas field and In Amenas, besides holding the licence to operate Hassi Mounia. In addition, there are three shale gas development projects in the US.

Statoil's gas investments are significant higher than investments in new wind power. From an environmental perspective, this is an interesting observation because environmental research points to gas playing a significant role in balancing the future electricity market, since gas plants can replace coal plants and have lower environmental impacts both on land and in the air [29]. It has been suggested that newly built shale gas plants can be alternatives for old coal-fire power plants because gas can be burned with roughly half the amount of carbon dioxide and three-quarters less nitrogen oxide than coal-fired plants [30]. Gas is known as the cleanest fossil fuel [29: 443]. In addition, it can meet the changing market demand in consumption and the fluctuating production rates of renewable energy relatively easily. New investments in upcoming gas projects in Statoil demonstrate that Statoil had increased its efforts within this area. Of nine upcoming projects in the last seven years, seven have involved new investments in gas technology or new gas plants. This reflects Statoil's position as a big gas player in the global energy complex and the investments in new projects seems to manifest Statoil as a major gas actor within the energy environment. The company is the second largest gas supplier in Europe. Statoil expects to invest in three oil and gas developments on the Norwegian Continental Shelf in 2017: Johan Castberg in the Barents Sea, Snorre in the North Sea, and Njord Future in the Norwegian Sea.

Since the mid-2000's, Statoil has increased its investments in renewable assets, technology and resources, both in economic and technology terms. These investments reflect the fact that growth in renewable energy has traditionally been driven by the political climate and state regulations, but this is now changing, and now investments seem to be run increasingly forward of cost (interview data Statoil). In all markets, traditional forms of power generation, such as coal and nuclear power, are struggling to compete against wind and solar prices, even without subsidies (interview data Statoil).

5.2. Path-dependent company decisions

Based on the data presented in Section 4 above, Statoil's decisions in the context of becoming more environmentally friendly are reflected in one of the four main aims in the overall corporate strategy. The corporate strategy has four main pillars, of which the first three pillars focus on prolonging the company's strategic position within fossil fuels to provide increased income and value to the company's shareholders [31:10]. The new and upcoming projects and investments underline this strategy, as Statoil has invested heavily in nine new oil and gas projects since 2011. As Statoil is the main contributor of economic capital to the Norwegian state through capital from energy products, its path dependency on its existing market is heavily oriented towards a continuation in black hydrocarbon strategies. As discussed in Section 2 above, Manning and Sydow [8] examples can be translated into how Statoil has followed an established trajectory and become locked-in by applying traditional ways of understanding and determining the energy production. The tendency for lock-in is related to missed opportunities that have been recognized too late compared with other energy companies in Northern Europe [26]. Statoil's existing strategy on the Norwegian continental shelf, as the company taking the lead role in new and prospective areas in the 'Arctic frontier', the Barents Sea, underlines this argument. As one of the company's representatives argued:

> *There is one reason for the success of Statoil, its strategy, will, and effort to investigate new resources within oil and gas. This will be the strategy for the next fifty years as well.*

The concept of path dependence, as Sydow et al. [32] and others have analysed, highlights how in this context. since the beginning of 'the climate debates' from end of 1990s, Statoil has been reluctant to reduce its pace on black carbon utilization. My analysis reveals that Statoil is heavily dependent on its existing path. This implies a strong belief within the internal organization in existing products along a specific value chain, in a matter that is path dependent on a long-term strategy, institutional support, and national control. The concept of the black carbon path, in which fossil fuel is one of the company's prospective strategies, can frame these initiatives. In a 10–15 year perspective, this might be the only viable future strategy for the company. Statoil owns approximately 75% of the existing resources on the Norwegian continental shelf and has major stakes within the international waters as the second biggest gas company in the world. Its strategy towards Arctic frontiers and the Barents Sea is aggressive and it is seeking to evolve technology that could reduce the need for manpower in the Arctic, thereby facilitating remote management of oil and gas production in locations where climate and marine conditions are extremely demanding [11]. In 2016, during the 23rd round of concessions in Norway, Statoil's efforts as one of the most persistent companies in the Barents Sea was rewarded with an area with among the highest prospects towards the Russian border. The Norwegian Government also asked Statoil to facilitate the cooperation with the Russian partners Gazprom in this area of the Barents Sea. Consequently, there are crucial factors that probably will hinder a radical path renewal in the years to come, as the company has invested assets in the long term and investments in the black carbon path.

However, and in line with one of the four main pillars in the corporate strategy, decisions have been taken by Statoil to avoid becoming subject to structural inertia – a concept introduced by Hannan and Freeman [19]. A mentioned earlier in this paper, the company's performance on CCS is actually a major step towards environmental improvement if the initiative succeeds. Reduced CO_2 emissions are desired by all involved parties in the energy sphere at the global scale. However, the exact nature of the investment in CCS is far

from a renewable turn itself. As stated in by David [33], the nature of path dependency and lock-in cannot be 'de-locked' unless an external shock emerges that could move a technological path onto a new path. It might be reasonable to expect that the oil recession, with declining oil prices and major layoffs in the industry could be such an external shock for the company. However, the fact that the company still is determined in CCS actually points to its endurance within the fossil fuel sector and leaves few indications that it will reduce its efforts in the sector. The investment in CCS underlines Statoil's resilience within the non-renewable technological path. While the investments in CCS clearly point towards the 'black energy route' and continuation on established paths, a few initiatives are included in a strategy of become 'greener'. One of the possible paths to transform one of the leading engineering environments in the world from oil to renewable energy is the relatedness between the technology demanded in offshore wind and the traditional knowledge in offshore oil. This might be an arena in which knowledge relating to the black carbon path could provide insights and information for Statoil to use towards a new and renewable green path. Industry relatedness is perceived as strong, since offshore wind reflects several similar challenges when it comes to installation and transportation. Bridging the gap between these two strands may be seen as the most important factor in the early phase of Statoil's renewable strategy. However, as pointed out by Dawley [34], the promotion of and investment in offshore wind in other parts of Europe has required 'policy activism'; for example, state policy interventions played a crucial role in mediating the creation of new paths in North East England and Scotland.

As a distinct break from a successful path, the black energy route is unlikely to be followed by Statoil unless institutional pressure on the company becomes severe and threatens its economic viability. A more realistic approach might be to develop financial incentives. Economic incentives to invest more in renewable energy might facilitate such an evolvement, and the internal structural change is a promising approach. The organizational change in the direction of an separate renewable division in 2016, add to such an argument as the director of renewable energy reports to the CEO on this topic, and further, that as a consequence the CEO is required to report to the Statoil board on how the company delivers on CO_2 emissions and renewables from 2016 and in the future. Earlier, the organizational structure of the company did not reflect climate change in any apparent way. As formal structures change in a company with formation of new departments, it is likely that actual behaviour will follow the structural change. Nevertheless, if Statoil is expected to bridge the gap between the black and green carbon paths in a more comprehensive and long-term perspective, the government's institutional regulations will need to develop economic incentives in order for the company to abandon the traditional black carbon path. As I have suggested in this paper, such energy transitions will be hampered in energy companies due to the resource rent and the extremely high economic profits from the production and sales of petroleum products.

As stated above, the role of producing an economic surplus is the overall leading aim for all companies registered on a the stock market. This implies an all-encompassing aim of producing a positive economic output for the owners of the companies. A paradox within this context is the fact that the Norwegian state is the main owner of Statoil. In fact, the role of state ownership in Statoil has been debated for several decades [23]. Environmentalists' are biased towards the state applying its shareholder value to increase our understanding of climate change and their perspective has a greater emphasis on the environmental aspects in the governing of Statoil. By contrast, the engineering and economic interests within this debate underline how the company's main role is to produce positive economic input for the Norwegian state and provide energy for a global population that is demanding ever more energy. One of the interviews stated:

No matter what, as long as capital is valued as the primary asset, Statoil will survive as a strong oil company.

Nevertheless, due to public reputation and perceptions, questions of environmental concerns are high on the agenda in energy companies. If a company is sloppy or careless in the way it deals with environmental concerns in the planning phase of a field development, a number of sanctions will be raised by governments. Due to various claims and regulations relating to this topic, a regulated planning process guides the environmental concerns from investment decision to implementation. Consequently, the companies will be reluctant to implement any claims other than those regulated by law and environmental regulations, as there are vast numbers of stakeholders. The literature on varieties of capitalism draws a line between, on the one hand, companies that mainly serve their owners and in which shareholder value understood as economic output is the most important result, and, on the other hand, companies that serve their surroundings as stakeholders value companies [35]. However, this divide is less nuanced than the literature's divide between European companies and US companies, in which the European companies tend to trust stakeholders' arguments more highly than US companies [35]. As a European company, Statoil is a part of an institutional system in Norway, where strong institutional regulations affect its actions through Norwegian legislation and politics, and where a significant number of stakeholders are allowed to state their arguments on decisions through a rather comprehensive planning process. However, as one of Statoil's representatives stated, 'money talks' when it comes to financial questions in planning and the governance of oil and gas projects. Economic and financial concerns have traditionally overruled environmental concerns from a company perspective, and the resource rent contributes to path dependence and connects the company even more strongly to the black-energy route. However, the recent development observed, whereby non-renewable sources of energy are ousted by renewable energy, can create dynamics in the relationship of cost versus environmental concerns.

6. Conclusions

In this paper, I have explored one of the world's leading energy companies and company decisions with an environmental objective. This study has been driven in three main ways. First, it has been driven by the ongoing debate on climate change and the role of energy companies as polluting agencies, and the energy sector's role in this context. Second, recent research on renewable energy has underlined the need for private companies and private funding to enable an energy transition and to achieve the EU's Europe 2020 growth strategy. Substantial private investment is needed if public policy objectives to increase the share of renewable energy and prevent a dangerous anthropogenic climate change are to be achieved. Third, and finally, this study has been driven by Statoil's overall corporate strategy with four main pillars, of which three point towards prolonging the oil and gas path to ensure an increased position within the petroleum sector, whereas the fourth pillar concentrates on more environmentally friendly energy production.

Two different paths have been developed to investigate energy companies' environmental decisions in this context. The *black carbon path* implies a prolonged use of hydrocarbon resources and investments in more advanced technology to create economic output for companies based on oil and gas. By contrast, the *green energy path* represents a diversification into renewable energy and has the potential to contribute to specific efforts that step-by-step will close the gap between the black and green paths and achieve a more environmental friendly energy industry. The two paths have the potential to be combined to create an interplay between them and thus lead to the development of new and innovative solutions for the energy in the future. The investments in six new offshore wind projects can be understood from such a perspective, where competence from Statoil's main activity can

be utilized in new ways. Recent restructuring of the energy company, involving a new organizational structure and a new reporting regime within the company, has provided exciting 'building stones' for a step-by-step approach towards a renewed direction for the company. Together, all these decisions taken by Statoil point towards the fourth pillar in the overall corporate strategy. Statoil's investments in seven upcoming gas projects can also be analysed from a perspective of diversification with greater emphasis on environmental impacts. However, this paper demonstrates that despite a few changes within Statoil's corporate strategy and decisions since 2011, the company is highly path dependent on the petroleum energy path and will rely on the black energy path as the main competitive advantage in the years to come. In terms of path dependence, Statoil continues to be dominated by a fossil-fuel philosophy rather than disruptive change. Further, the concept of path dependence points to the existing energy paths in the company. Even though, the company invest in emerging low-emissions energy sources built on low carbon technology and follow a global increase in renewable energy. This emerging technology could have challenged the company within the black energy path, but Statoil invest in emerging technologies and embed technologies in-house to be able to encounter the potential competitive factor of clean-tech companies in supplying the global arena with energy.

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