Unblack-boxing the role of firms in sustainability transitions

A qualitative study of firm's agency in the emerging offshore wind industry in Norway

Ingvild Budal Jacobsen

Master's thesis

Master of Society, Science, and Technology in Europe (ESST)

TIK Centre for Technology, Innovation, and Culture

UNIVERSITY OF OSLO

15.11.2021

Specialization: Innovation and Global Challenges (TIK 4021)

Unblack-boxing the role of firms in sustainability transitions

Supervisor: Jakoba Sraml Gonzalez

http://www.duo.uio.no/

Word count: 27 612

Abstract

As the urgency of climate change and the demand for more energy increases, so does the need for changing Norway's incumbent energy system. We are witnessing a change from the dependence of the two dominant regimes of hydropower and oil and gas, and towards several new, renewable industries. Among these industries, is the offshore wind industry, which resembles a opportunity of diversifying the incumbent oil and gas industry and similarly, the Norwegian economy, and this process entails a transition of socio-technical regime.

Traditionally, the focus in the literature on sustainability transitions has focused on systemic change of socio-technical regimes. However, this notion tends to underemphasize the role of microprocesses as is apparent in management- and organizational studies. Therefore, this study has applied concepts from theories of institutional entrepreneurship to explore the role of firms during sustainability transitions.

Based on in-depth interviews with firms that are aiming to develop and operate offshore wind parks in Norway, this thesis provides new understandings of how a specific type of industry actor partakes in building a new industry. I investigate the conditions for developing an offshore wind industry, what barriers and drivers the firms face in this process, and how they strategically respond to increase the legitimacy of the emerging industry. The empirical findings extend on what this takeoff stage implies for the firms in terms of increasing legitimacy and reducing uncertainties in their efforts for partaking in industry building of the offshore wind industry.

This thesis contributes with empirical insights on the development of the offshore wind industry in Norway as I reveal how the industry has matured past the incubation stage and has entered the stage which I refer to as the industry takeoff. The findings illustrate that at this stage in the development of the OWP industry, the firms have attained more power and legitimacy which is expressed through the new alliances, the emergence of mobilized networks (i.e., clusters, trade unions, interest organizations), in the firms' efforts of cultivating and maintaining relationship with decision markers, as well as the progress in the technological development.

Acknowledgements

This thesis marks the end of an engaging year and a half at the TIK-center. I want to start by thanking all the wonderful professors and researchers. It has been incredibly refreshing to be present in your lectures. Your commitment and devotion to your research is contagious, thank you for inspiring us to cultivate our interests and for providing us with the tools to do so.

To my supervisor, Jakoba Sraml Gonzalex, thank you for your support, valuable insights, and reflections. I appreciate your confidence in me. You truly are an example to follow.

To all my informants, thank you for taking the time out of your busy schedules to participate in my thesis.

To my fellow students at TIK, even though the COVID-19 pandemic made certain things difficult with online teaching and societal lockdowns, you have not only made this year and a half bearable, but memorable. I am grateful for having had the opportunity to get to know every one of you and I will fondly cherish the memories of our great adventures during our time as TIK-students. I look forward to many more shared adventures in the future.

And finally, to my family, and Burim, thank you for your endless support and constant reassurance.

Ingvild Budal Jacobsen, Oslo, November 2021

List of abbreviations

BWP – Bottom-fixed offshore wind power

EEA – European Economic Area

EU – European Union

FWP – Floating offshore wind power

IE – Institutional entrepreneurship

MLP – Multi-level perspective

NOK – Norwegian kroner

R&D – Research and development

SCOT – Social construction of technology

O&G – Oil and gas

OWP – Offshore wind power

List of figures

List of tables

Appendix

TABLE OF CONTENTS

1. INTRODUCTION

1.1 THE RESEARCH AREA AND RESEARCH TOPIC

In order to address grand sustainability challenges such as climate change, degradation of ecosystems, lack of clean water, poverty or inequality, the 17 sustainable development goals and the Paris climate agreement were developed as global initiatives to emphasize the urgency of these challenges (Markard, Geels, & Raven, 2020). Relatedly, it is thought that these challenges can only be met through conducting deep-structural changes in areas such as energy, transport, agri-food, and other systems, which are often referred to as 'socio-technical transitions' (Köhler et al., 2019). This notion of fundamental changes in socio-technical systems has traditionally been the focus in the literature on sustainability transitions and the process of such changes typically unfolds over three phases: start-up (emergence of alternative niche technologies), acceleration (large-scale diffusion of niches and demise of established technologies), and stabilization (new, stable socio-technical configuration) (Andersen & Gulbrandsen, 2020, p. 1; Geels, 2011; Köhler et al., 2019; Markard et al., 2020). Previous research in the transitions literature has hitherto mainly focused on the start-up phase. However, if we are to reach the 1.5 degrees target and mitigate the disastrous effects of climate change, scholars argue that ongoing sustainability transitions must enter a new phase where emerging technologies accelerate and contribute to broader system transformations (Markard, 2018; Markard et al., 2020). Additionally, within this stage of transitions, researchers have emphasized the importance of deep decarbonization, which entails either a phase-out or a deliberate decline of carbon-intensive industries (Geels, Sovacool, Schwanen, & Sorrell, 2017; Markard et al., 2020; Rosenbloom & Rinscheid, 2020). Deep decarbonization requires transformations of socio-technical systems, which have often developed over many decades, ultimately making them resistant to change. Moreover, incumbents, or established firms, in the energy sector, are often considered to be passive or to resist sustainability transitions because of their vested interest in the current energy system (Geels, 2014; Mäkitie, 2020). Accordingly, this reflects the grand challenge that Norway is currently facing as the incumbent oil and gas industry (O&G) eventually must be phased-out and replaced by renewable energy. Thus, as part of Norway's national strategy for research and development of new energy technology, offshore wind has been identified as a prioritized area recommended for increased investment in research, development, and demonstration. Relatedly, the offshore wind industry represents an opportunity for Norway to *diversify* the incumbent O&G industry, which ultimately can ease

the transition towards sustainability as this would reduce conflict and competition and instead focus on how could contribute to development and diffusion of renewable technology.

So, this thesis sets out to contribute with empirical insights to the literature on sustainability transitions by exploring the case of the offshore wind industry in Norway. Similar to the need of focusing more on the acceleration of emerging technologies, transitions scholars have criticized the literature on socio-technical changes for focusing too much on systemic change, and not enough on the micro-processes that contributes to the formation of new industries, as is apparent in management- and organizational studies (Köhler et al., 2019). Consequently, there is a need for a more balanced approach that also appreciates how innovation at a firm level works to understand the underlying motivations and actions of firms. Firms and other industry actors play critical roles in sustainability transitions as they develop new products, services, business models, contribute to market creation for novel technologies, and work toward the formation of new industries (Köhler et al., 2019). However, how firms work with- and take external factors such as policy, legal frameworks, unions, regulatory constraints, and reactions from civil society into account when engaging in- and entering nascent industries is greatly black-boxed in the field of transition studies. Therefore, this thesis sets out to contribute with empirical insights to the literature on sustainability transitions by investigating how firms contribute to the industry building of the offshore wind industry in the *takeoff stage*.

Moreover, I argue that the offshore wind industry in Norway have passed the initial incubation stage and entered what I refer to as the industry takeoff stage. The incubation stage relates to the period before the first product commercialization, during which technological investments may shape industry knowledge bases, and ends with early signs of commercial viability at the point of industry sales takeoff (Eggers & Moeen, 2021; Moeen & Agarwal, 2017). The industry takeoff stage resembles what scholars refer to as the acceleration stage. The conceptualization is inspired by Klepper's (1996) "growth stage" in the life cycle theory combined with what Eggers and Moeen (2021) describe as the stage of "industry sales takeoff" in nascent industries. So, it is in this period of industry takeoff that the thesis will explore how the firms engage in industry building, which in this thesis describes the many institutional aspects that firms engage in, such as the development of regulatory frameworks, technological standards, and business models. This conceptualization of "*industry building*" is inspired by Garud and Karnøe's (2003) understanding of "path creation", which refer to all the activities that firms actively take part in when shaping the institutional context in an emerging industry. Consequently, this thesis sets out to extend on previous work related both to the offshore wind

industry in Norway and sustainability transitions by exploring the role of agency in firms in their efforts and behaviors related to industry building.

Norway's energy strategy entails carbon neutrality by 2050 and, in this strategy, offshore wind power has been identified as one out of four prioritized areas with a potential for future value creation, industrial development, and job opportunities (Meld. St. 36, 2021). As mentioned, a socio-technical transition is expected to be quite arduous in a country like Norway, considering that the carbon-intensive oil and gas (O&G) industry holds more than 150 000 jobs and represented approximately 42% of Norway's total export in 2020 (SSB, 2021). As of now, the industry is therefore essential to the Norwegian economy, which makes a transition towards other industries problematic as socio-technical transitions rarely take place without resistance from incumbent firms, civil society, and social movements (Geels, 2014; Geels & Penna, 2015; Köhler et al., 2019; Normann & Tellmann, 2021). Moreover, to add to this challenge, incumbent firms often have closer relations with policymakers and are therefore better positioned to influence policy, partly due to the economic and political importance of these firms to both state and political actors (Geels, 2014; Normann, 2017a, p. 42). Thus, close ties between state and business actors in the energy sector are often considered problematic as they can act as a barrier to the acceleration of new technologies and industries (Andersen & Gulbrandsen, 2020; Köhler et al., 2019; Markard, 2018; Markard et al., 2020; Rosenbloom & Rinscheid, 2020).

Nevertheless, in the coming years, it is reasonable to assume that there will be significant changes in global climate policies, increasing power demand, and responses from the civil society and unions, all of which will likely affect the development of the offshore wind industry in Norway. Even though partaking in industry building is complicated in a context affected by regime resistance, firms play critical roles in sustainability transitions as they help develop new products, services, and business models, contribute to market creation for novel technologies, and work toward the formation of new industries (Farla, Markard, Raven, & Coenen, 2012; Köhler et al., 2019). Correspondingly, working and applying concepts and frameworks used in management- and organizational theories to understand how firms engage in industry building towards, can contribute to a better understanding of the industry takeoff stage which will become even more important in the years ahead, and it is this underlying assumption that motivates this thesis' research question:

RQ: *How do firms work with drivers and barriers related to industry building in the takeoff stage?*

1.2 AIMS AND OBJECTIVES OF THIS STUDY

Firstly, concerning the theoretical relevance, the thesis tries to connect transitions studies and management- and organizational studies with the aim of opening for new perspectives in the field of innovation studies. Secondly, the thesis extends on previous research within the field of transitions studies that explores the offshore wind industry in Norway, like for instance research that have investigated the role of policy, diversification, and redeployment of existing resources form O&G to OWP (Hansen & Steen, 2015; Mäkitie, Andersen, Hanson, Normann, & Thune, 2018; Mäkitie, Normann, Thune, & Gonzalez, 2019; Normann, 2015; van der Loos, Normann, Hanson, & Hekkert, 2021). Thirdly, the objective is to investigate how an emerging industry matures past the initial incubation stage.

1.3 STRUCTURE OF THESIS

Chapter 1 has outlined the research topic, the existing research gap, the research question, the thesis' goal, and relevance, followed by reflections regarding ethical remarks. In addition, a presentation of this thesis' delimitation took place.

Chapter 2 details the research background and the chosen case. It draws on the characteristics of Norway's energy system and presents the conditions for the development of the offshore wind industry.

Chapter 3 presents the theoretical framework for this study, starting with introducing transition studies followed by management- and organizational studies.

Chapter 4 presents this thesis' methodology and research approach.

Chapter 5 presents the empirical findings resulted from the data analysis.

Chapter 6 discusses the main findings from this thesis considering the theoretical framework, followed by implications for practice and a discussion of this thesis' limitations and future research suggestions.

Finally, references and appendix are presented.

2 THE RESEARCH BACKGROUND AND CASE

Offshore wind was first mentioned 15 years ago in a white paper to the Storting in 2006 (Meld. St. 34, 2007). Throughout these 15 years, there has only been constructed one offshore wind turbine on the Norwegian shelf. In other words, the Norwegian offshore wind industry has evolved at a slow pace. However, the development of the emerging industry is beginning to pick up speed. As of now, the government has made available three concessions for offshore wind projects on the Norwegian shelf: first, there is Equinor's project Hywind Tampen, which will be Norway's first floating offshore wind park and the world's largest floating offshore wind park with the production starting in 2022. Second, the area of Utsira Nord is currently open for licensing applications to build floating offshore wind. Utsira Nord is located 12 nautical miles outside of Haugesund in Rogaland and a report illustrates a particularly positive economic effect of OWP development in this area, especially in regard to local employment, as it is estimated to employ between 6500 to 8000 people (Hernes, Erraira, & Winje, 2020). Third, the area of Sørlige Nordsjø II is also currently open for applying for a licensing to build bottom-fixed offshore wind. This area is located approximately 150 nautical miles south-east of the Norwegian part of the North Sea, towards the border with Denmark's economic zone. Because of its close connection to the European continent, it has been suggested there should be developed a hybrid solution for Sørlige Nordsjø II, which implies that the wind park is connected to two or more countries. This way, it has been argued that the cables can be used for exchange during low production which will provide better profitability (Øvrebø & Øystese, 2021). With these two areas, Norwegian firms can gain valuable knowledge in building both floating offshore wind power and bottom-fixed offshore wind power.

However, as there are only two areas available to apply for a license to build offshore wind, firms are currently teaming up in various forms of cooperation to get access to the Norwegian offshore wind market, typically through either a joint venture or consortium. While some of the firms that are applying for license have little to no experience within offshore wind, others have already taken market shares in OWP either in Norway or internationally. Correspondingly, the firms that are already engaged in OWP share a common feature in that they have all diversified from the O&G industry. Several studies have already illustrated how existing resources have played an important role in the diversification process towards the offshore wind industry (Hansen & Steen, 2015; Mäkitie, 2020; Mäkitie et al., 2018). Therefore, in this chapter, I will start by presenting some of the background and preconditions for establishing an offshore wind industry in Norway by primarily reviewing existing literature and

secondary data sources. In Chapter 4 the thesis will put forward more detailed description of the data collection process. Thereafter, I will put forward a review of today's situation for the industry in Norway. In the end, I have constructed two tables that are intended as a supplement for understanding both the preconditions for the industry as well as the factors that have so far influenced the development of the industry from 2005 until today.

2.1 A BRIEF INTRODUCTION TO NORWAY'S ENERGY SYSTEM

The Norwegian economy and energy system have traditionally been dominated by two existing socio-technical regimes, namely hydropower and oil and gas (Hansen & Steen, 2015). Moreover, the Norwegian State has a 67 per cent ownership in Equinor administered by the Ministry of Petroleum and Energy and a 100 per cent ownership in Statkraft administered by the Ministry of Trade, Industry and Fisheries (Normann, 2017a, p. 49). Historically, both regimes have proven to be crucial to the Norwegian economic welfare state and the industrial development. Hitherto, hydropower supplies almost all electricity needed for domestic consumption, while O&G is considered Norway's most profitable export commodity with over 40% of Norway's total export (Hansen & Steen, 2015). It is evident that the modest development of OWP in Norway can be seen in relation to these existing regimes' competitiveness, as they have essentially been uncontested by other energy sources and technologies, ultimately making them highly specialized and resistant to change because of industrial path dependency. Nonetheless, from this point forward we are facing a global climate crisis that calls upon a severe reduction in greenhouse gases, thousands of new green jobs, an electrification of society including all relevant sectors that need a green transition (e.g. transport, hydrogen, batteries, the process industry etc.) where the latter requires an estimated need of 82 TWh by 2050 (Prosess21, 2021). By the same reasons, the long uninterrupted domination of the two industries is likely to have run out its course, as the emergence of OWP and several other industries such as carbon capture and storage (CCS), hydrogen and marine minerals are excepted to serve as new, profitable industries in Norway in the years to come (Meld. St. 36, 2021). Consequently, many O&G firms are reorienting their strategies and resources towards OWP (Mäkitie et al., 2018). Therefore, I will start by making a brief account of the O&G industry before doing the same with the offshore wind industry to illuminate why this transition from one industry to the other takes place.

The Norwegian O&G industry was established during the latter part of the 1960s and has developed through an interplay of international oil firms, Norwegian suppliers, large R&D institutes and universities, and supportive policies, all arranged by the Norwegian Petroleum

Directorate, Ministry of Oil and Energy and Statoil (now Equinor) (Engen, 2009; Mäkitie et al., 2018). It is the largest industry in Norway with the service and supplier industry following in a close second. Together, their engagement in petroleum activities in the difficult weather conditions in the North Sea has made them competitive in both the Norwegian and international offshore oil and gas markets. As a result, Norway's industrial and economic structure is considered to be the result of a continuous policy support towards the oil and gas industry, which on the one hand have resulted in a situation of path-dependency that have been attributed as one of the reasons behind the success of this highly specialized and competitive industry, while on the other hand, have caused a decreased value to new industries, such as the offshore wind industry (Castellacci, 2008)[1].

The emerging industry of offshore wind power in Norway represents an opportunity for diversifying the Norwegian economy from the O&G industry, with promising prospects for market growth. In 2017, Sintef estimated that Norwegian offshore wind (both floating and bottom-fixed) has an export potential of NOK 50 billion and 50 000 jobs by 2030, and double that by 2050 (Mazzucato, Kattel, Algers, & Mikheeva, 2021). Today, the Norwegian offshore wind industry consists of firms that supply a wide range of products and services for offshore wind, but they do this mostly abroad. Some of these firms operate only in offshore wind, although many are engaged in both O&G and other maritime industries (Afewerki et al., 2019). The number of firms that have ambitions for offshore wind has grown significantly in recent years, yet at the same time many of these firms have a small share of their activities in OWP (Afewerki et al., 2019). In the coming years, the offshore wind industry is estimated to provide several business opportunities in various sectors, such as the supplier industry, the maritime industry, and the service industry. This is associated with the high degree of relatedness between the oil and gas industry combined with the supplier industry in regards to the offshore wind industry (van der Loos et al., 2021). These overlaps can be identified in several structural overlaps in the forms of actor, network, technological, and institutional overlaps (Mäkitie et al., 2018). As a result, Norway already encompasses several competencies that will prove to be valuable in the emerging offshore wind market. For instance, regarding industrial relations, firms engaging in floating offshore wind encompass a wide range of responsibilities from park development, construction and installation, operation, vessel suppliers, cable producers, geological surveyors, consultants, maintenance, to financing and law (van der Loos et al., 2021, p. 8). As the technology behind floating-offshore wind is still considered to be somewhat

[1] Path dependency describes systematic favoritism of some types of activities, solutions or ideas, while limiting or excluding others (Arthur, 1994).

immature, it is believed that because of the Norwegian firm's existing competencies and experiences, Norway can have a 'first-mover advantage' in developing this technology. Similarly, with the right investments, floating offshore wind has been estimated to generate a value of NOK 117 billion in addition to a job-creating effect of almost 130,000 man-years over a period of 30 years (Winje, Hernes, Lind, Grimsby, & Jakobsen, 2020). Additionally, in relation to cultural traditions and competencies, Norway has a major maritime, service, and supplier industry with far-reaching experiences with operating in rough climate conditions in the North Sea that can be relatively easily transferred to the offshore wind industry. In addition to the monetary values the OWP industry represents for Norway, this illustrates the socio-economic importance in terms of job opportunities. Moreover, regarding social perception, there has been conducted surveys that illustrates that most Norwegians prefer offshore wind compared to onshore wind (Gregersen & Tvinnereim, 2019; Hafsaas & Øystese, 2020).

Put together, these factors illustrate the prosperous conditions for firms in the O&G industry to engage in offshore wind. In general, firms are more likely to diversify towards related markets where they can apply their existing resources, knowledges, technologies and production capabilities (Mäkitie, 2020). This coincides with findings that the perceived transition in the energy sector combined with the opportunity to use existing firm resources have been important motivations for established firms in O&G to engage in entrepreneurship in floating offshore wind power technologies (Mäkitie, 2020). Similarly, it has also been found that established firms play important role in the development of renewable energy technology (Lechevalier, Nishimura, & Storz, 2014). In the transition from O&G to OWP, this became evident following the merger of Statoil and Hydro in 2007, as the company made a strategic decision to include renewable energy as a part of their operation. This resulted in the demonstration project for the Hywind turbine, "Hywind Demo", which attracted attention both from the media and industry, as the involvement of a large incumbent like Statoil created optimism and expectations for further growth in OWP (Mäkitie et al., 2019, p. 274).

Hitherto, incumbent O&G firms' participation in OWP has been important for the legitimacy of offshore wind in Norway and have also resulted in several sub-contracts in the international OWP market for Norwegian suppliers (Mäkitie et al., 2018). Historically, it has been illustrated that when influential oil and gas firms such as Statoil entered OWP, supplier firms that had previously been closely linked to the activities and investments of these large O&G firms, felt encouraged to diversify as well, which illustrates the important role incumbent firms can have on industry transformations (Hansen & Steen, 2015). Similarly, previous research that have examined the transition from O&G to offshore wind in Norway have focused

on the relatedness between the two industries, whether that being the influence that the one industry displays on the other, resource redeployment and diversification, or the similar and desirable sectoral and political contexts (Mäkitie, 2020; Mäkitie et al., 2018; Mäkitie et al., 2019; Normann, 2015; van der Loos et al., 2021). Unfortunately, the potential that the offshore wind industry exhibits will continue to be just that if the Norwegian government's inertia continues which only serves to exacerbate Norway's carbon lock-in and industrial path dependency (Mazzucato et al., 2021).

2.2 OFFSHORE WIND REAPPEARS ON THE AGENDA

As indicated, the slow development of offshore wind in Norway can to some extent be attributed by the industrial path dependency posed by the existing industries of hydropower and oil and gas. With both industries, the demand for energy (both fossil and renewable) was additionally saturated for many years, which caused the price for electricity to be very low. Similarly, there is a general principle in Norwegian politics that technologies should be cost-efficient, which caused offshore wind to be a deprecated alternative for many years. To my understanding, the access to this cheap, renewable energy therefore affected a lack of political will to explore new possibilities that offshore wind could put forward. Furthermore, this coincides with Norway's historical preference for cost-effectiveness in policies (Normann, 2017a; Normann, 2017b). However, growing concerns regarding climate change combined with energy deficiency because of the anticipated electrification of societies have put pressure on policymakers to conduct more extreme measures to support renewable industries and phase-out carbon-intensive industries, which caused offshore wind to reappear on the agenda. In June 2020, the Norwegian government announced plans for opening two areas (Utsira Nord and Sørlige Nordsjø II) for offshore wind power. Consequently, in a sense, we are witnessing a *reopening* of the window of opportunity for offshore wind in Norway for the second time.

The concept of a window of opportunity derives from the multi-level perspective which will be further elaborated on in the next chapter. In short, it is used to describe the period of when ideal conditions for a new industry takes place. Moreover, these ideal conditions occur when external events put pressures on the existing socio-technical regimes at the same time as new technologies and innovations emerge. Below, I have tried to illustrate these events in Table 1 and 2. The first time the window of opportunity opened was in 2012 and lasted until 2015 (Normann, 2017a), and the second time I would argue started in 2020 and remains open until this day and this time, as the government has finally stated that their intention behind the investments in offshore wind is partake in building up a new supplier industry in Norway.

Finally, a window of opportunity will remain open for a limited amount of time, so this time around it is crucial to take advantage of the possibility for creating a new energy adventure.

Subsequently, to take advantage of the current situation within the offshore wind industry, the Zero Emission Resource Organization have put forward five steps that must be implemented in Norway to succeed this time (Seminar, 19.10.2021). First, the Ministry of Petroleum and Energy must consider whether the allocation process can be more efficient as ten years will be too long, second, there must be developed an offshore hybrid solution for the power grid that will secure profit for the development of Sørlige Nordsjø II, third, it is necessary to ensure that the support scheme for floating offshore wind actually leads to construction, fourth, proposals must be made as soon as possible for new areas that can be opened and also set specific GW targets for offshore wind, and fifth, set strict requirements for environmental-, climate- and material requirements as sustainability can prove to be a competitive advantage for Norway (Holm, 2020). Below, I have created two tables that represents both the timeline of the offshore wind industry and corresponding external events that have taken place from 2005 until today that illustrates what caused the initial window of opportunity to open and then close, as well as what has caused the second window of opportunity to reopen. Naturally, this overview is by no means be complete, but it provides an indication on the exogenous events that have possibly affected the development of offshore wind in Norway. The two timetables were created following the preliminary data collection which will be further explained in Chapter 4.

Table 1. The development of the offshore wind industry in Norway

Timeline for offshore wind in Norway	
2005:	Norway began developing an offshore wind industry consisting of a few firms starting up activities in 2005. These firms shared an exploitation of existing competencies from offshore O&G industry and focused mostly on foundations for OWP. In 2005, the project development company Havsul also announced plans for a large bottom-fixed offshore wind park called Havsul in the Møre region.
2006:	Offshore wind was first mentioned in a report to the Storting on the Norwegian climate policy in 2006-2007. The report states that a national strategy for offshore electricity production will be established.
2007:	A more environmentally conscious Minister of Petroleum and Energy, Åslaug Haga, took office in late 2007. Haga set up an expert group named the Energy Council where she put forward a special report on the potential for offshore wind in Norway (Normann, 2015).

	Between 2007 and 2009, two offshore wind networks were formed (Arena NOW and Arena Mid-Norway).
2008:	The Energy Council put forward a report that illustrated how, if constructed, Norwegian offshore wind can account for 20% of the renewable energy in the EU by 2020.
2009:	The first offshore wind initiatives reached its peak in 2009 and 2010 which was set off by the decline in demand for oil and gas services following the financial crisis and oil price crash the year before (van der Loos et al., 2021). The research center for offshore wind led by SINTEF, FME NOWITECH, was established. Havsul received license to build an offshore wind park. However, due to the lack of political will to introduce any support regime for offshore wind, Vestavind sold out and Havsul was put off (Martiniussen, 2019). Statoil and Statkraft received license to build the biggest offshore wind farm in the UK, Doggerbank.
2010:	The Marine Energy Act came into force, and NVE prepared a proposal for areas of investigation for offshore wind.
2011:	Ola Borten Moe became Minister of Petroleum until 2013. He was not as concerned or interested in offshore wind compared to his predecessor as he expressed that offshore wind would be "too expensive".
2011-2014:	During the period 2011–2014, the engagement of the O&G industry in OWP stagnated (Mäkitie et al., 2019).
2012:	At the turn of the year 2012/2013, NVE prepared a strategic impact assessment for offshore wind. 15 areas were investigated with a view to possible conflicts and divided into 3 categories.
2014:	The oil crisis in 2014 caused "green flings", implying that firms from the O&G industry increased their activities in offshore wind (Mäkitie et al., 2019).
2015:	Since 2005, in 2015 the government had allocated NOK 750 million for research and development of offshore wind power, through the Research Council, Enova, and Innovation Norway. In 2015, Statkraft announced that they will not continue with offshore wind power.
2017:	From 2009 until 2017, the research center for offshore wind, FME NOWITECH, resulted in 40 innovations. Additionally in 2017, Statoil announced that for 8 years, the costs related to their demonstration project, Hywind Demo, has been reduced by 70%.

2018:	NVE was asked to assess whether there have been any changes that would affect the strategic impact assessment for offshore wind from 2012 and it was believed that there had been no changes of significance to the recommendations given at the time. If two areas were to be opened for renewable energy production at sea, NVE recommended the areas Utsira Nord and Sørlige Nordsjø II for opening.
2019:	In July 2019, the government proposed opening two areas for the construction of offshore wind: Sandskallen-Sørøya Nord, which is suitable for both floating and bottom-fixed OWP, and Utsira North, which is only suitable for floating. In addition, input was requested on the opening of a third area, Sørlige Nordsjø II. However, due to resistance from the fishing industry, Sandskallen-Sørøya Nord was called off. Enova pledged 2.3 billion NOK in support of Hywind Tampen, which will be the world's largest floating offshore wind farm. The support was primarily about contributing to technology development. The plan is that eleven turbines that will supply the Snorre and Gullfaks platforms with electricity. The project and physical construction are well underway, and production is expected to start in 2022.
2020:	In June 2020, The Marine Energy Regulations was adopted, making it possible to apply for concession for building offshore wind in two areas: Utsira Nord and Sørlige Nordsjø II. In total, a license can be granted for 4500 MW of wind power. In December 2020, it was announced that FME NorthWind would receive funding with a total of NOK 120 million over 8 years.
2021:	The Ministry of Petroleum and Energy presented the guide for area allocation, licensing process and applications for offshore wind power. The guide defines which allocation criteria are to determine who will be provided with the areas in Utsira Nord and Sørlige Nordsjø II. During the summer relevant stakeholders (including firms) were able to comment the guide by August 2021. The Ministry also requests proposals for alterations to the Marine Energy Act and the Marine Energy Act regulations. The Ministry has also announced that NVE will be commissioned to identify new areas for the development of wind power. The Ministry aims to designate new development areas by 2023. The Norwegian Offshore Wind Cluster signed a collaboration agreement with Wind'Occ, an industrial cluster for offshore wind development in Occitanie which will create collaboration opportunities for Norwegian and French offshore wind firms. The research project OffshoreGrid led by SINTEF received 82.7 million NOK to develop profitable solutions for offshore wind and connections to the power grid.

Table 2. Overview of exogenous events in parallel to the offshore wind industry

	Timeline of external factors from 2006-2021
2006:	Energy deficits in the Møre region in Norway caused by the development of new energy intensive industry in the region without additional investments in grid and new production capacity, resulted in the need for new electricity production to be an increasingly debated issue in in Parliament (Normann, 2015).
2007:	Increased public attention to climate change in Norway was fueled by the publication of the fourth assessment report by the IPCC and was amplified by the political opposition that suggested the government should introduce new plans for renewable energy production. In parallel, the appointment of Åslaug Haga as the new Minister of Petroleum and Energy caused an important change in the political stream (Normann, 2015, p. 186).
2008:	A series of events took place in 2008, such as the First Climate Agreement ("Klimaforliket"), the financial crisis, and oil price crash. In turn, these external events caused the opening of a window of opportunity for offshore wind as politicians and firms alike looked for alternative priority areas for the supplier industry.
2009:	There was a major drop in oil prices along with a decline in oil investments. Additionally, there were layoffs in the oil service sector where most employees in the oil industry work. This resulted in discussions regarding how Norway could transfer its competencies to new sectors (Normann, 2015). Unfortunately, the lack of political will to introduce any support regime for offshore wind combined with resistance from Norwegian Fishermen's Association caused the Havsul project to be put off.
2010:	Following the large fluctuations in the oil market in 2008 and 2009, the oil price was stabilized again.
2011:	In 2011, the Johan Sverdrup field was discovered in the Barents Sea. Simultaneously, the oil price rose significantly, resulting in an increasing "oil optimism" and a closed window of opportunity for offshore wind (Martiniussen, 2019). Additionally, Ola Borten Moe was announced as new Minister of Petroleum and Energy, and supported different policies than his predecessor which caused a less favorable political stream for offshore wind (Normann, 2015)
2012:	The Second Climate Agreement took place.
2014:	Another significant decline in oil prices in the summer of 2014.
2015:	The Paris Agreement was adopted by 191 Parties (190 countries including the EU) which serves as an international treaty on climate change. Increased opposition to oil extraction in the Lofoten and Vesterålen areas from environmental organizations, civil society, and the fishing industry.
2017:	Controversies and resistance towards onshore wind arose.

2019:	The resistance movement "Motvind" was established as a national body for the resistance primarily towards the onshore wind industry in Norway. The government changed their strategy regarding offshore wind as controversies concerning onshore wind reached their peak. Additionally, there were widespread resistance towards the construction of OWP at Sandskallen-Sørøya Nord from the fishing industry, which resulted in this project to be cancelled.
2020:	The European Commission presented the EU Offshore Renewable Energy Strategy which set a target for 60 GW OWP by 2030 and 300 GW by 2050. The EU taxonomy for sustainable activities came into force in July 2020. Tina Bru was announced as new Minister of Petroleum and Energy which yet again caused a more favorable political stream for offshore wind.
2021:	The IEA report and the sixth assessment report by IPCC was published, both emphasizing the urge of reducing carbon emissions and need for change. The 'Beyond Oil and Gas Alliance' was established. Åslaug Haga became head of the interest organization for wind power, Norwea. The Government announced plans to put an end to the exploration refund scheme and free income to petroleum and replace it with 'cash flow' starting in 2022. In October, the oil prices were at its highest in 3 years. Change in Parliament: Espen Barth Eide was announced as Minister of Climate and Environment, which has previously underlined the importance of creating an offshore wind industry in Norway.

3 THEORETICAL FRAMEWORK

This thesis is positioned within the field of innovation studies that focuses on sustainable transitions and attempt to supplement this field's deficiencies related to emerging renewable energy industries with concepts from management- and organizational studies. This is aligned with the identified research gap put forward in the previous chapter. Therefore, the following chapter presents the theoretical foundation for the analysis of the empirical data with the aim of building a bridge between the two strands of literature: transitions studies, and management- and organizational studies. Firstly, I will provide an overview of transitions studies. As this thesis is centered around the emerging offshore wind industry that symbolizes a possible transition from the incumbent oil and gas industry, it is fitting to make an account of prominent frameworks from transitions studies that deals with changes in socio-technical regimes. As this framework is the most notable framework in transitions studies, it has unsurprisingly received some criticisms that will subsequently be considered. Secondly, I elaborate on concepts deriving from management- and organizational studies that to some extent try to eliminate the previously mentioned criticisms by emphasizing the role of agency in firms presented through theories of institutional entrepreneurship. Thirdly, as this thesis seeks to understand how firms work with barriers and drivers while engaging in an emerging industry, I will elaborate on the characteristics of an emerging industry to illuminate the problems that firms might encounter along the way.

3.1 TRANSITION STUDIES

Sustainability transitions can be described as fundamental changes in socio-technical systems that aim to address grand challenges, like for instance climate change, in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs (Markard et al., 2020). Accordingly, this fundamental change in a socio-technical system is often referred to as a change of a socio-technical regime and furthermore involves changes not only in technology, but also in institutional (e.g. regulatory and cultural) structures and user practices (Markard, Raven, & Truffer, 2012, p. 956). The general assumption is that these socio-technical systems consist of actors, technology and institutions that interact and together fulfill a specific societal function (Geels, 2004). Therefore, transitions often focuses at the national or local level where situated innovations and interactions between so-called 'regime actors', namely, policymakers, firms, consumers, and civil society organizations can be empirically analyzed (Markard et al., 2020). Even though these

interactions between different regime actors are thought to be highly interrelated and interdependent, they may inherently have different interests and goals. Accordingly, transition studies aim to address grand societal challenges by conceptualizing and explaining how the necessary radical changes can occur to fulfill societal needs. This can be achieved by investigating how radical innovations emerge, how they struggle within incumbent interests, and eventually how they lead to a major shift in a socio-technical regime (Köhler et al., 2019; Markard et al., 2020).

Transition studies emerged at the intersection of innovation studies, evolutionary economics, science and technology studies, sociology, and history of technology (Boschma, Coenen, Frenken, & Truffer, 2017; Markard, 2018; Markard et al., 2012). The research is based on systems thinking and emphasizes the interrelatedness of social, technical, institutional, and political changes, and highlights the role of path-dependency and lock-in, as well as the inevitable conflicts that arise among actors (Markard, 2018, p. 628). As the unit of analysis in sustainability transitions is primarily situated at the 'meso'-level of socio-technical systems, naturally prompting transitions scholars to ask "big picture" questions, the field has inspired enthusiasm and creativity for optimizing the construction and stabilization of socio-technical transitions (Geels, 2004; Köhler et al., 2019).

Similarly, as the world is collectively facing what can be conceptualized as our utmost challenge thus far, namely, global warming, many of the existing socio-technical systems are unsustainable and must therefore undergo a transition towards sustainability if we are to meet the Sustainable Development Goals. This reflects the challenge currently facing Norway as the incumbent O&G industry is the country's highest polluting energy industry and will eventually have to be phased out in the decades to come. While many transition researchers explore how new innovations emerge and cause a shift in a socio-technical regime (Berkhout, Smith, & Stirlingh, 2004; Geels, 2004; Geels et al., 2017; Markard et al., 2012), it has been argued that a sole focus on innovation to accelerate green technologies underappreciate the degree to which existing carbon-intensive systems are locked in (Normann, 2017a; Unruh, 2000). For instance, carbon-lock displays factors such as the sunk-costs connected to the current system, established interests tied to longstanding development trajectories, as well as the accumulation of experience around established technologies and institutions (Rosenbloom & Rinscheid, 2020, p. 2). Therefore, scholars have argued that it might eventually become necessary to deliberately steer the decline of carbon intensive systems by phasing-out unsustainable technologies while at the same time strive to accelerate sustainability transitions (Geels et al., 2017; Markard et al., 2020; Rosenbloom & Rinscheid, 2020). Consequently, the notions of both deep

decarbonization and acceleration of transitions have been underlined as crucial in transitions studies simply because the rate of development is too slow as we need rapid and deep reductions in greenhouse gas emissions in order to avoid dangerous climate change (Geels et al., 2017; Markard et al., 2020). Still, however necessary, the process of the acceleration of sustainability transitions, industry decline and subsequently the phase-out of existing socio-technical regimes carry out several challenges.

For instance, when it comes to the transition of an existing, undesirable energy system, the different regime actors engaged in this system are likely to benefit from the stability that it exceeds. As a socio-technical transition requires a transformation of the interlinked mix of technologies, infrastructures, organizations (including firms), markets, regulations, as well as the user practices that together deliver societal functions, it is likely that regime actors such as firms that have vested economic and political interests in an existing energy system will be passive or even resist sustainability transitions (Köhler et al., 2019; Markard, 2018; Markard et al., 2020; Mäkitie et al., 2018). Correspondingly, the industry decline of unsustainable technologies such as O&G is an important challenge for the acceleration of new technologies, such as OWP, because it threatens existing business models and assets (Hess, 2014). A notable framework within transitions studies, namely the technological innovation system (TIS) approach, emphasizes the importance of securing *legitimization* for emerging technologies (Köhler et al., 2019). Accordingly, securing legitimization of new technologies can also be considered an important part of industry building. Resistance is also expected to come from unions and workers alike whose jobs are at stake, and there might be specific regions or social groups that are more affected by the industry decline and phase-out than others (Markard et al., 2020). As a result, political conflicts and struggles can be anticipated as part of the acceleration of the socio-technical transitions that Norway eventually must endure. A framework that can help understand the conditions for such a socio-technical transition to take place is one of the most prominent theoretical frameworks in transitions literature, namely the multi-level perspective.

3.2 THE MULTI-LEVEL PERSPECTIVE

The multi-level perspective (MLP) has been particularly dominant in the study of sustainability transitions with the aim of understanding how new technologies can emerge within existing technological fields (Geels & Schot, 2007). In the MLP, the socio-technical regime includes the dominant institutions, organizations (including firms), as well as cultural and political values that give structure to a domain such as the energy sector. The framework

view transitions as non-linear processes resulting from the interactions between three levels, namely the niche level, the socio-technical regime, and the landscape level which all function as analytical and heuristic concepts to understand system innovations (Geels, 2011). Here, the emerging technologies and industries are conceptualized as developing in niches that under certain circumstances might challenge or become part of the regime. Additionally, the interaction between niches and regimes are then influenced by exogenous developments conceptualized at the landscape level which usually takes place slowly (sometimes even decades). As a result, an acceleration of a socio-technical transition involves an increasing momentum of niches, a weakening of existing systems, and a strengthening of exogenous pressures which when aligned can create a window of opportunity (Geels et al., 2017). Such a transition goes further than merely adopting new technologies, as it includes investments in new infrastructures, establishment of new markets, development of new social preferences, and adjustment of user practices (Geels et al., 2017) A common understanding in the MLP is that regimes provide stability, naturally causing them to act as a barrier for the development of new technologies. This can be seen in relation to how existing socio-technical systems are maintained, defended, and incrementally improved by incumbent actors, whose actions are guided by the socio-technical regime, e.g., the semi-coherent set of rules and institutions (Geels, 2011). This further illustrates how existing regimes can provide extensive barriers for low-carbon transitions because of their path dependencies as well as the issues that might arise when trying to change a regime towards sustainability.

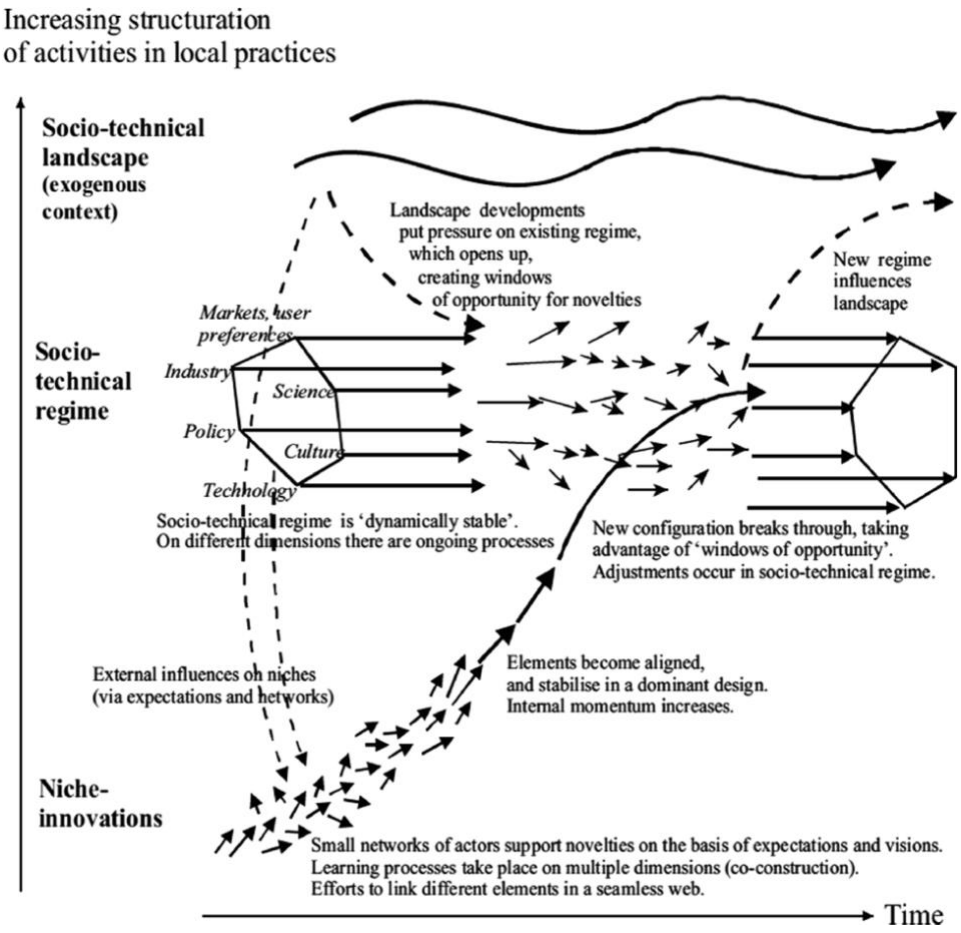


Figure 1. The multi-level perspective (Geels & Schot, 2007).

Returning to the case of this thesis, I am interested in looking at how the three levels interact and affect the development of offshore wind as a new socio-technical regime in Norway. As presented in Chapter 2, the first window of opportunity for offshore wind closed due to a series of external events, such as increased activity in the O&G industry as a result of recovering price of oil as well as new petroleum discoveries among other things, combined with insufficient political engagement and immature technology (Normann, 2015). However, as discussed, the window of opportunity for offshore wind has recently reopened and it is therefore crucial to take advantage of it. At this point in time, the technologies in OWP are thought to be developed sufficiently, and landscape pressures are becoming more forceful (as seen in both Table 1 and Table 2). As a regime actor, firms are currently in an advantageous position to take advantage of the window of opportunity as "only actors can exercise power" (Normann, 2017a, p. 22). Nevertheless, as the MLP is primarily focused on the regime level and largely emphasizes structural elements, the framework has been criticized for being too descriptive and therefore compromises the role of agency in regime actors such as firms (Smith, Stirling, & Berkhout, 2005).

3.3 CRITICISMS OF THE MULTI-LEVEL PERSPECTIVE

Despite its massive impact on understanding and analyzing sustainability transitions, the multi-level perspective has received some criticism throughout the years, particularly on three general points. The first criticism deals with the operationalization and specification of regimes. As mentioned, the concept varies greatly in its interpretations and understandings, making it unclear how it should be applied empirically as it could be defined at one of several empirical levels (Berkhout et al., 2004). This ambiguity instigates problems of drawing boundaries and defining the topic of analysis which have led scholars to call for more operationalization, specification, and delineation of the MLP, and particularly of the regime concept (Geels, 2011; Genus & Coles, 2008). The second criticism deals with an excessive focus on the role of niches as the driving force of regime change (Geels, 2011). It has been argued that MLP-approaches "tend unduly to emphasize processes of regime change which begin within niches and work up, at the expense of those which directly address the various dimensions of the socio-technical regime or those which operate 'downwards' from general features of the socio-technical landscape." (Berkhout et al., 2004, p. 62). As a result, the MLP is criticized for a bias towards bottom-up change models (Geels, 2011). The third criticism points to the relative neglect of agency in the MLP. Critics have argued that the MLP is overly descriptive and functionalistic, thus leaving room for greater analysis of agency (Smith et al., 2005). More specifically, Genus and Coles (2008) argue that the MLP should incorporate constructivists approaches such as the social construction of technology (SCOT) and constructive technology assessment as a way of reducing this deficiency. Nevertheless, despite its shortcomings, the usefulness of the MLP has been illustrated with several historical case studies of transitions and is a well-suited framework for addressing the special characteristics of the transitions research (Geels, 2011).

3.4 MANAGEMENT- AND ORGANIZATIONAL STUDIES

While transition scholars have only recently started looking into the role of businesses and industries in sustainability transitions, scholars in management- and organizational studies have a long history of studying innovation, disruptive change, and industry emergence (Köhler et al., 2019). Additionally, management- and organizational scholars have for a long time studied societal challenges, including climate change, inequity, and illiteracy, and argue that firms play an important role in society and in addressing these significant issues (Bansal & Song, 2017). Traditionally, the transition scholars' interests in businesses and industries have primarily focused on how firms and organizations contribute to (or slow down) transitions, as

well as how changes in the organizational and business dimensions affect transformation more broadly (Hockerts & Wüstenhagen, 2010; Köhler et al., 2019; Rosenbloom & Rinscheid, 2020). However, in later publications, scholars have underlined the need for including the role of firms in transitions that also appreciates how they work to understand the motivations and actions of firms or entrepreneurs (Köhler et al., 2019). Therefore, it has been proposed that research conducted at the intersection between the two fields have potential for opening new perspectives. As mentioned, transitions scholars often take a holistic and systemic perspective, which is much less common in management research (Bansal & Song, 2017). Moreover, as a means of paying more attention to the role of agency in transitions, scholars proposed to incorporate constructivist approaches such as SCOT to the multi-level perspective. Fittingly, this was partly conducted by researchers Garud and Karnøe (2003) who seek to understand the role of human agency in shaping new technologies and similarly new industries which I will now look further into.

3.5 INDUSTRY BUILDING THROUGH INSTITUTIONAL ENTREPRENEURSHIP

So far, this thesis has presented how a socio-technical transition takes place through the lens of the multi-level perspective. Even though the MLP asserts that these systems consist of actors, technologies, and institutions that together interact and fulfill specific societal functions, the framework tends to underplay the role of agency in a sustainable transition (Berkhout et al., 2004; Geels, 2004; Markard et al., 2012). Therefore, as opposed to the systemic approach to understanding how a transition takes place, this thesis investigates how the firms' actions contributes to sustainability transitions by exploring what I refer to as *industry building*. Industry building describes the all the activities related to setting the context and shaping the regulatory framework in an emerging industry. Moreover, it derives from theories on institutional entrepreneurship as it recognizes that the process of industry building throughout an industry's lifecycle is inherently a social process, like what Garud and Karnøe (2003) label as path creation. In the next subsection I will elaborate on what exactly the firms' industry building activities constitutes, but first I want to start by providing a backdrop for institutional entrepreneurship as this is essentially what has motivated this thesis.

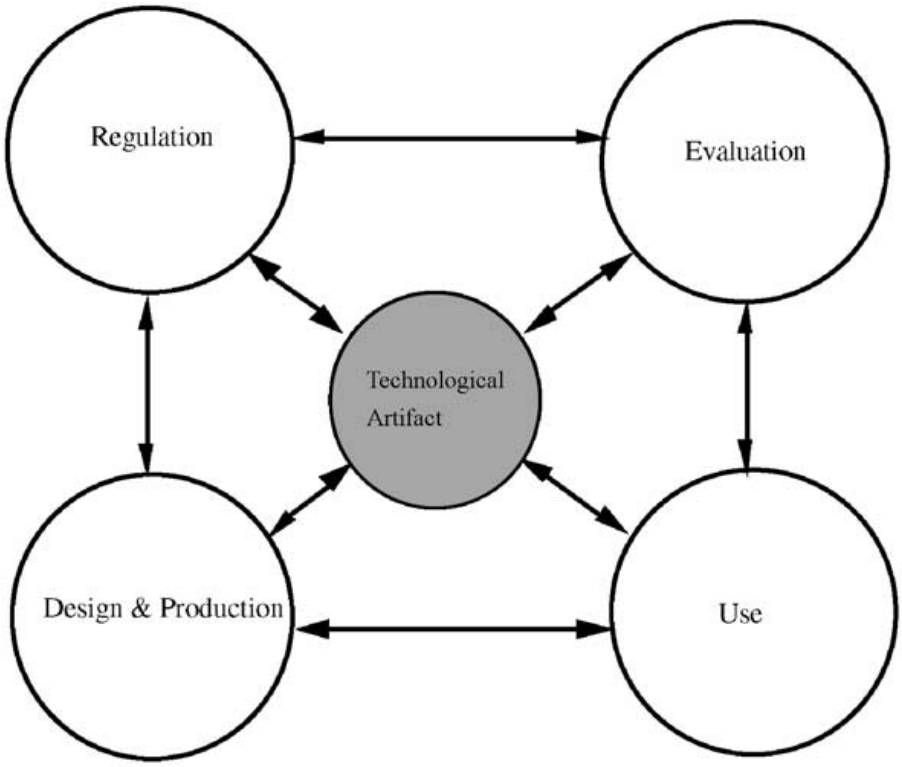
First of all, entrepreneurship involves the discovery, creation, and exploitation of opportunities (Venkataraman, 1997). Schumpeter (1942) argues that entrepreneurship works as the engine of economic growth as it "introduces new technologies and the subsequent potential for obsolescence that serves to discipline firms in their struggle to survive the perennial gales of creative destruction" (Garud, Hardy, & Maguire, 2007, p. 960; Schumpeter, 1942). As a

result, the disruptions generated by creative destruction can be exploited by individuals that have been alert enough to exploit the opportunities that arise, and these individuals reflect the entrepreneurs (Garud et al., 2007). However, instead of employing the traditional understanding of entrepreneurship as something that attributes success and failure of these types of initiatives to an individual, like Garud and Karnøe (2003), this thesis adopts a socialized view of actors which conceptualizes entrepreneurship as a larger process that builds upon the efforts of many.

The notion of entrepreneurship as a social process has its basis in the constructivists approach of the social construction of technology (SCOT) offers descriptions of the micro-processes associated with technology emergence that in turn serves as a good supplement for understanding how firms contribute to the emergence of new technologies and industries (Bijker & Pinch, 1987). The main goal of the SCOT approach is to understand the form and function of new technologies and how they come to existence. To do this, SCOT focuses on two main points: first, that human agency is distributed across actors and second, that these actors are all embedded in the emerging technological path. Consequently, this gave rise to the concept of technology entrepreneurship (TE) that addresses the role of human agency in shaping new technologies, which in this thesis is additionally used for understanding the shaping of a new industry (Garud & Karnøe, 2003). Here, the accumulation of inputs from multiple actors is thought to eventually generate a momentum that in turn harness the inputs of distributed actors (Bijker & Pinch, 1987). As a technology gains momentum, an emerging path starts enabling and constraining the activities of the involved actors. Next, actors become embedded in paths that they try to shape in real time, and in turn, these paths begin shaping the actors over time (Garud & Karnøe, 2003, p. 278). Here, the term technological path is deliberately used instead of "regimes" (as favored in the MLP) to connote a sense of embedded agency that Garud and Karnøe (2003) suggest actors enjoy in their involvement with a technology. However, in this thesis, the notion of path creation is understood as "*industry building*" as this term conceptualizes all the activities that firms actively take part in when shaping the institutional context in an emerging industry. Garud and Karnøe (2003) refer to this type of entrepreneurial strategy as *bricolage* as it connotes resourcefulness and improvisation on the part of the involved actors and is characterized by co-shaping during industry building. Relatedly, in the pursuit of establishing an onshore wind industry, it was Denmark's bricolage strategy that succeeded, rather than the US' contrasting entrepreneurial approach which has been labeled as *breakthrough*. In the latter strategy, the designers and producers of onshore wind tried to "leap-frog" the Danes with high-tech designs to reap greater profits (Garud &

Karnøe, 2003). In the case of onshore wind in Denmark, it was the bricolage strategy that prevailed.

Another key aspect in the literature on IE draws on ideas from Giddens' structuration theory (Giddens, 1984). This is expressed in how actors change institutional arrangements while at the same time being constrained by them, as "actors become interwoven into emerging technological paths that they shape in real time" (Garud et al., 2007, p. 281; Giddens, 1984). Therefore, it is assumed that actors are configured by their institutional environment, which they also try to reshape, for instance, through influencing policy and regulatory decision-making processes as depicted in Figure 2 below (the technological artifact refer in this case to the OWP industry(Jolly, Spodniak, & Raven, 2016). Relatedly, actors may find themselves in an ongoing struggle to challenge institutional arrangements through their creative efforts. Consequently, entrepreneurial actors cannot do everything they please because they are constrained by a structure that consists of specific rules and resources. If they deviate too much from existing arrangements, they might trigger counter-reactions that can spoil their efforts, yet if they do not deviate enough, they might not be able to spur a collective and generate momentum for their initiative (Garud & Karnøe, 2003, p. 281; Garud, Kumaraswamy, & Karnøe, 2010). Therefore, entrepreneurship can be thought of as a process "of mindful deviation" (Garud et al., 2007; Garud & Karnøe, 2003).



Notes: The arrows represent embedding processes. The specific em bedding processes may diffe r by paths.

Figure 2. **Distributed agents involved in the emergence of a technological path (Garud & Karnøe, 2003).**

The notion of technology entrepreneurship has in later publications been coined 'institutional entrepreneurship' (IE) as it also reflects the activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or transform existing ones (Garud et al., 2007; Maguire, Hardy, & Lawrence, 2004, p. 657). Hence, IE involves a range of actors including firms, industry associations, and advocacy groups (Jolly et al., 2016). New institutions are thought to arise when organized actors with sufficient resources see an opportunity to realize interests that they value highly (DiMaggio, 1988). Accordingly, an institution is reflected in the 'rules, norms and beliefs that describe the reality for the organization, explaining what is and is not, what can be acted upon and what cannot' (Hoffman, 1999, p. 351). To summarize, the literature on institutional entrepreneurship emphasizes the importance of distributed agency and collective action, arguing that institutional change is accomplished through distributed and un-coordinated actions of dispersed actors with different resources, justification principles, possibly conflicting world views who collaborate, compete and contest with each other for supporting institutional change (Hargrave & Van De Ven, 2006; Jolly et al., 2016, p. 104). Therefore, institutional transformation occurs *because* of the efforts of many uncoordinated actors acting in both collaboration and contestation with each other as their change efforts accumulating over a period (Jolly et al., 2016).

Moreover, institutional entrepreneurs are thought break with existing institutionalized rules and practices associated with the dominant institutional logics and institutionalize the alternative rules, practices, or logics that they are advocating together (Boschma et al., 2017). As a result, a transformation of institutional arrangements occurs because of the efforts of many uncoordinated actors acting in collaboration and contestation with each other (Jolly et al., 2016, p. 104). So, to legitimize new industries or technologies, firms often work collectively and focus the strategic impact of their shared efforts, and it is these efforts that reflect industry building.

3.6 FIRMS ENGAGING IN INDUSTRY BUILDING IN THE TAKEOFF STAGE

So, as mentioned, this thesis investigates industry building as engaged by the firms which describes the all the activities related to setting the context and shaping the regulatory framework in an emerging industry. Thus, this thesis is not focusing on the incubation stage, but rather the point of industry takeoff which is characterized by the first product commercialization during which technological investments starts shaping industry knowledge

bases as depicted in Figure 3 below. Following the product commercialization, a period of rapid firm entry begins. During this period of industry takeoff, experimentation with alternative product designs opens for the possible emergence of a dominant design (Eggers & Moeen, 2021). Moreover, in this period firms start matching product features in relation to customer preferences and contribute to building social legitimacy, and essentially contribute to *industry building*. Before elaborating further on how firms engage in industry building, it is beneficial to start by briefly explaining what characterizes an industry in the nascent staged, and thereafter elaborate on what activities firms engage in to bring an industry past the incubation stage and into the takeoff stage.

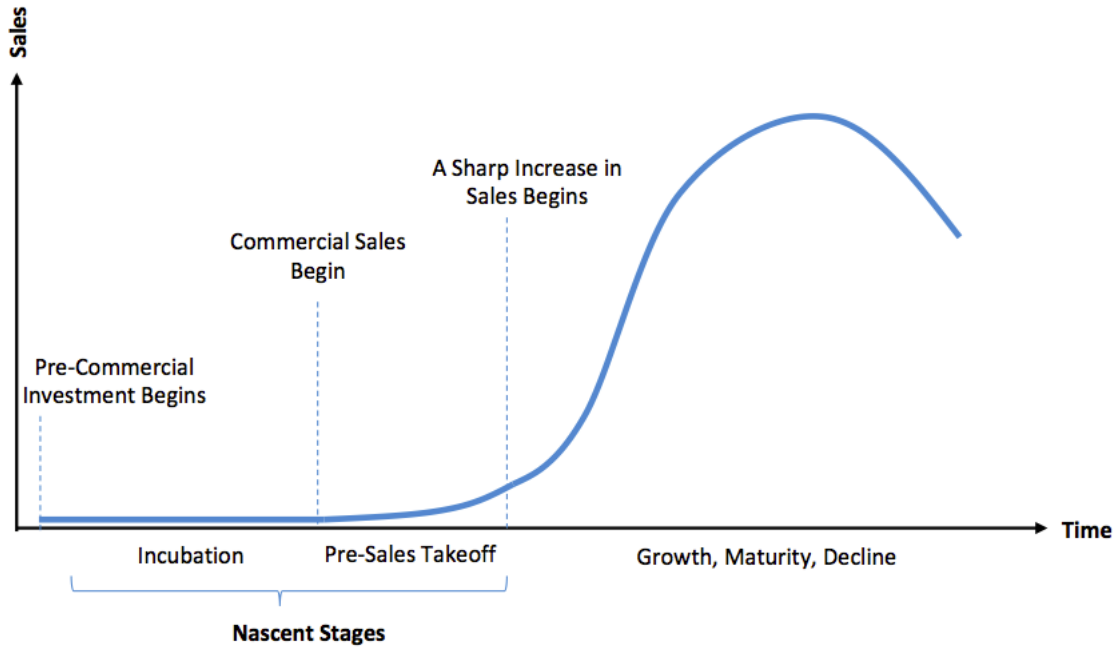


Figure 3. Nascent stages of industry lifecycle (Eggers & Moeen, 2021)

Nascent markets in emerging industries are characterized by undefined and fleeting industry structure, unclear or missing product definitions, and the lack of a dominant logic to guide actions. As a result, firms that enter a nascent market face a context characterized by extreme ambiguity and uncertainty (Benner & Tripsas, 2012). Here, the ambiguity and uncertainty are thought to be infused in everything related to the emerging industry, ranging from the viability and performance of the new technologies, the customers' needs, the competitive landscape, the meaning of the products to the conceptions of value (Zuzul & Tripsas, 2020, p. 396). So, naturally, these characteristics affect both the firms trying to partake in the creation of a new institution, as well as those who are already engaged in arrangements

that offer similar products, services, or resources. Evidently, the uncertainty and ambiguity cause firms to struggle when trying to establish their identity and similarly the institution in which they will engage in. Hence, Santos and Eisenhardt (2009) argue that to succeed as an institutional entrepreneur during an industry takeoff, firms need to establish their organizational boundaries as this will allow them to distinguish themselves from their environment, which will ultimately help them define their domain of action and their identity. With this basis, it will become easier for firms to legitimate their emerging set of activities. Nevertheless, it takes time to shape organizational boundaries and establish a new institution with new dominant logics, rules, and practices, which is why firms are thought to partake in shaping these over time (Santos & Eisenhardt, 2005).

Additionally, the uncertainties that firms experience in emerging markets are furthermore enhanced when they are entering an industry where the new product or technology disrupt the existing regime. This is especially true for industries where incumbent firms have attained dynamic capabilities over time that enables them to sense, shape, seize opportunities, and therefore maintain competitiveness by enhancing and reconfiguring their enterprise as they are benefiting from the stability that the existing regime exceeds (Teece, 2007). Accordingly, firms in nascent markets can sometimes be perceived as illegitimate by other actors operating in the traditional markets. In turn, this can result in challenges in attracting resources from investors, attracting customers, or even difficulties in gaining recognition from incumbents in nearby markets that may be disrupted (Casprini, Di Minin, & Paraboschi, 2019, p. 271; Fisher, Kotha, & Lahiri, 2015). Thus, when faced with complex issues, firms can mobilize change through entrepreneurial bricolage. Institutional constraints are thought to both force and enable firms to develop improvisation capabilities, which leads them to develop innovative solutions when seeking opportunities within the constrained institutional environment (Jolly et al., 2016, p. 104; Karnøe & Garud, 2012). This is related to the fact that in the nascent stages of an industry, firms are less likely to have an abundant number of resources available. Therefore, firms often use a *combination* of limited resources, improvise, and take pragmatic action to navigate through the complex institutional environment and thus, develop novel solutions (Jolly et al., 2016, p. 104).

Moreover, when engaging in industry building, firms work with novel technology-based market offerings that often lack legitimacy. So, to increase the legitimacy and mitigate the constraining effects of regulation, firms must respond strategically to regulatory constraints (Eggers & Moeen, 2021). Correspondingly, whereas some firms in emerging industries accept the regulatory framework as fixed, others seek to influence it to their advantage. Specifically,

some firms treat regulation as an exogenous and immovable factor, while other treat regulation as endogenous and possible to influence (Andersen, Frederiksen, Knudsen, & Krabbe, 2020, p. 2). The primary driver of whether a firm decides to influence a regulation has been attributed to its temporal orientation, which refers to the evolutionary stage of a market that the intended market application is oriented towards, and can be divided into a present orientation, future orientation, or a bridging orientation (Andersen et al., 2020). So, to summarize, industry building includes cultivating and maintaining relationships with decision makers, lobbying to secure resources and political support, providing information during regulatory hearings and using media to politically highlight individual concerns (Jolly et al., 2016, p. 103).

In addition to developing and affecting regulatory frameworks, industry building involves many institutional aspects such as the development technological standards and new business models. Moreover, to legitimize emerging industries or technologies, firms can mobilize collectively and focus the strategic impact of their shared efforts to focus on industry building, and later reorient their focus to competitive differentiation after the market has achieved legitimacy (Andersen et al., 2020, p. 12). A key aspect of institutional entrepreneurship in the emerging industries is exactly the capacity of actors to build new networks and alliances, legitimate new sets of practices and overcome difficulties associated with institutionalization (Jolly et al., 2016, p. 104). Correspondingly, it is not until after the market has achieved legitimacy that the firms reorient their focus to competitive differentiation (Andersen et al., 2020, p. 12). Relatedly, another institutional strategy involves bridging local and global partners, securing operations, and mobilizing solidarity for mobilizing change that will ultimately help in legitimizing institutional change (Barin, Aguilar, Leca, & Gond, 2015).

Furthermore, in addition to affecting firms negatively, during the nascent stages of an industry, ambiguity is also thought to play a significant role in market creation (Santos & Eisenhardt, 2009). It is even thought to facilitative entrepreneurial actions as it enables firms to experiment with alternative product configurations, functions, and technologies, with many competing alternatives that eventually converges to what is known as a dominant design (Benner & Tripsas, 2012, p. 277; Eggers & Moeen, 2021; Santos & Eisenhardt, 2009; Utterback & Suarez, 1993)[2]. The fluid social structure and multiple meanings of events in nascent markets make firms open to new interpretations as this can help reduce the ambiguity. Therefore, the ambiguity can act as a motivator for the entrepreneurs to reduce through social construction as

[2] A dominant design describes a standard set of technologies and interfaces as well as a shared understanding of what performance attributes are important (Benner & Tripsas, 2012).

it is in the nature of an established firm to scan for more information when faced with ambiguity (Santos & Eisenhardt, 2009, p. 665).

3.7 SUMMARY OF CHAPTER

In this chapter, I have presented what alignments is needed for a sustainable transition to take place and presented the notable multi-level perspective as a framework that illustrates how this process takes place. Moreover, I present the theory of institutional entrepreneurship which constitutes how agency plays a key role in creating new institutions and relate this to how firms affect their surroundings when trying to contribute with industry building during the industry takeoff stage. Therefore, in this thesis I combine these two strands of literature with the aim of complement to the existing knowledges regarding sustainability transitions, by emphasizing the role of firms in sustainability transitions.

4 METHODOLOGY

The following chapter details the methodological choices and the research process of the present study. First, a description of qualitative research and case study takes place. Second, a description of the process of data collection, including why and how interviews were conducted, followed by an explanation of how the empirical data have been analyzed. Last, a presentation of ethical considerations takes place, including the process of ensuring quality and rigor during this study.

4.1 QUALITATIVE RESEARCH AND CASE STUDY

The fundamental nature of qualitative research relates to the human experiences and human environment behind the phenomena that is being studied. In this study, the choice of conducting qualitative research was therefore motivated by the essential features it inherits, namely the appropriateness of methods and theories, the recognition and analysis of different perspectives and last, the variety of approaches and methods (Flick, 2009, p. 14). Specifically, the designing methods in qualitative research are open to the complexity of this study's subjects, namely the firms' experiences when entering an emerging industry. Accordingly, the object under study i.e., the firm, was the determining factor for choosing interviews as a method for data collection, and not the other way around. Similarly, individuals experience and understand the same events differently. Thus, by giving a voice to the individuals that represented the different firms through interviews, this brought forward the variety of perspectives and viewpoints that would otherwise be excluded when studying sustainability transitions (Hay, 2016, p. 7). Put simply, qualitative research tends to find out why something is happening, rather than mapping out that something is happing. Similarly, qualitative methods employ techniques of data gathering that focuses on human behavior and seek to understand the meaning and motivations underlying subjective experiences. As I sought to explore the meanings and motivation behind the firms' activities when entering an emerging industry, qualitative research was the favorable alternative as this would allow me to attain a complex and detailed understanding of the issue (Creswell, 2013).

Furthermore, this study also represents a case study of how firms influence sustainability transitions. A case study describes an approach that investigates a contemporary phenomenon in-depth within its real-life context (Yin, 2009). Moreover, the aim of a case study is both the precise description or reconstruction of a case, and to suggest theoretical relevance (Flick, 2009). Therefore, the case study approach is well-suited for studying a social phenomenon and groups of individual actors to establish a picture of a complex process by using a "case" (Yin,

2009, p. 4). Additionally, this study reflects an embedded single-case design as it contains more than one sub-unit as illustrated in Fig. 3 below. Furthermore, Yin (2009) argues that there are three main criteria for choosing case study research. The first criteria constitute that the research question is formulated as a 'how' or 'why' question. The second criteria constitutes that the researcher has little or no control over the behavior of the events and the third criteria constitutes that the focus of the study is contemporary, rather than historical. So, to summarize, this thesis is positioned within the field of innovation studies that investigates socio-technical transitions. Consequently, the present study is positioned within the context of sustainability transitions, exploring the case of the emerging offshore wind industry by examining firms as the embedded units of analysis. Moreover, the three criteria are fulfilled as the present thesis' research question is formulated as a "how" question about a contemporary set of events (sustainability transition) that I, as the researcher, have little to no control over (firms' agency).

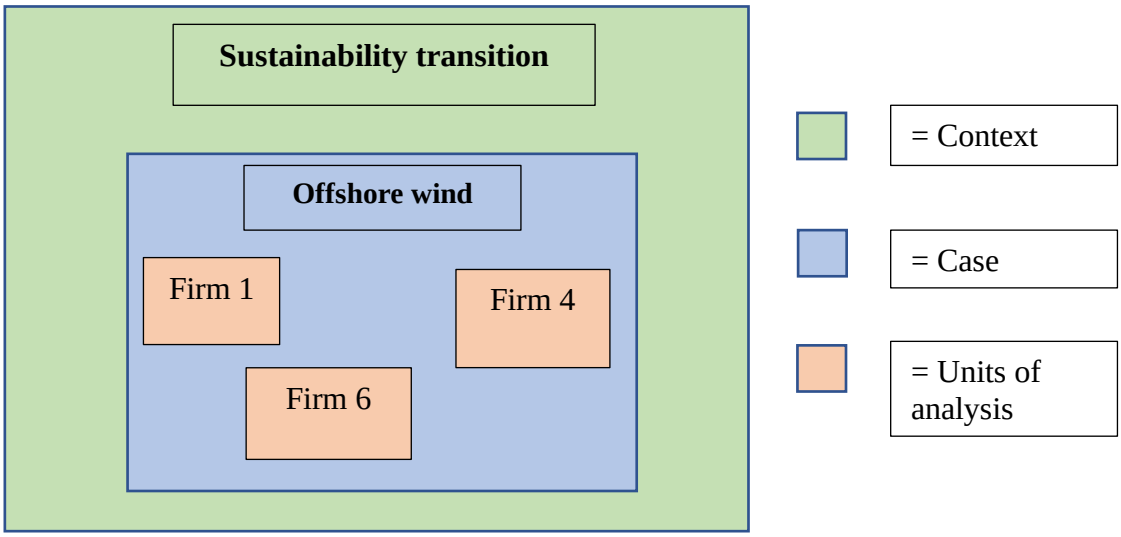


Figure 4. Illustration of the embedded single-case design (Yin, 2009)

4.1.1 SELECTING THE CASE AND PARTICIPANTS

This step of the research process developed quite naturally. During the first semester at the master's programme at the TIK-center, I was presented with the prosperous conditions for the offshore wind industry in Norway in a lecture focusing on the national innovation system approach. Following this lecture, I was curious to understand the complexities of why the industry had yet to undergo an industry take-off. As a result, I have chosen offshore wind as the unit of analysis in numerous essays ever since I became intrigued by the possibilities that this industry presents for Norway, though the approach and scope of research was located primarily at the system-level. Therefore, as I wanted to continue cultivating this interest, the only

selection criteria when searching for the appropriate case for this thesis was limiting the case to a Norwegian context. Consequently, when I was made aware of the existing research gap as put forward in Chapter 2, the decision to investigate the role of firms in sustainability transitions was made without hesitation.

Similarly, once I had decided on the case it was time to start the sampling for the case study. First, it should be recognized that one of the most crucial tasks of designing a qualitative case study is to identify the appropriate participants who can best inform the research questions (Stratford & Bradshaw, 2016). Moreover, sampling in qualitative research involves two actions that can sometimes pull in different directions (Miles, Huberman, & Saldaña, 2019). First, it is necessary to set boundaries which will help define the aspect of the case and that connects to the research question. For this thesis, this step involved deciding to focus the study on the firms that would develop and operate the offshore wind farms. Second, it is important to simultaneously create a conceptual frame that can help uncover, confirm or qualify basic processes or concepts that undergird the study (Miles et al., 2019, p. 27). For the present case, this involved focusing on the firm's agency and how this was expressed when the firms participate in industry building.

Furthermore, this thesis identified relevant participants through a method called purposive sampling which is common for qualitative samples. In addition to being purposive, the sampling method was theory driven, which is often the case for within-case sampling (Miles et al., 2019). Therefore, the choices of participants were driven by a conceptual question, rather than a concern for representativeness. Following the announcement when the government made available two areas for applying for licenses to build OWP in Norway, I was interested to follow the development of the offshore wind industry. Thus, early on, I decided to focus on the firms that expressed that they would apply for license to develop and operate the offshore wind farms at either Utsira Nord or Sørlige Nordjsø II, or both. From my secondary data search, I knew that research articles and previous theses have focused on the supplier industry in relation to the development of the offshore wind industry (Normann & Hanson, 2017; Røed, 2021), so I found it interesting to instead focus on the firms that are going to develop, build, and operate offshore wind parks. The methodological choice of limiting the case study to one type of firm was rooted in the aim to ensure validity as I wanted the participants to share the same qualities. Therefore, the procedure of selecting participants consisted of reaching out to Norwegian firms that are aiming at developing and operating offshore wind farms.

4.2 DATA COLLECTION

So, as I have previously explored the case of the offshore wind industry in Norway previously, the present study extended on some of the existing data collection, which mainly consisted of reports and research articles. Naturally, this made the process of starting the initial data collection for this thesis somewhat easier, although considering that the offshore wind industry is an emerging industry, the industry actors are coming to face with new developments continually, making it necessary to continually read new white- and grey papers as well as reports and research articles. Correspondingly, the data collection process consisted of a preliminary data collection, followed by the primary data collection.

4.2.1 PRELIMINARY INTERVIEWS AND OBSERVATIONS

Thorough preparation provides the researcher with better capacity to understand the perspectives of those you want to talk to (Stratford & Bradshaw, 2016). The offshore wind industry is a technically demanding industry to comprehend. While this thesis does not aim to understand the engineering practices for the different designs of floating- of bottom-fixed offshore wind, it still felt relevant to understand the basic terminologies and concept that might arise during the interviews. First, I spent months going through secondary data sources such as online news sites, official webpages, public documents, policy reports and previous research articles related to the OWP industry (Hay, 2016). These sources were helpful in creating an overview of the development of the offshore wind industry as well as the current situation, which thereafter was applied to detail the case, the relevant context, as well as enrich the description of some parts of the analysis. With this basis, I realized that there were some elements of the offshore wind industry that called for reinforcements, which led me to contact a lawyer that specialized in the legal challenges the industry faces as this would help me better understand what exactly these challenges mean for the firms. Additionally, I reached out to an offshore wind industry expert which served as a nicely addition to the secondary data search and that also enabled a clarification of various topics that I had come across during the preliminary data collection. Furthermore, I also approached some people that were experts on the EU taxonomy that either declined or that I was unable to get in contact with. In this case I tried to find alternative interviewees but failed. Fortunately, there were a lot of reports and articles related to the EU taxonomy which, combined with the seminar I attended with SINTEF, provided me with the necessary insights on the policy and its implications.

Additionally, by participating in a series of events hosted by the TIK-center, this served as a backdrop to navigate in the vastness of the transitions literature. In these seminars,

researchers presented their most recent findings on the transition of Norwegian industries, the importance of accelerating sustainability transitions, the implications, and necessities of green growth and last, valuable insights on developing an offshore wind industry without a home market. Moreover, I also attended the annual "Offshore wind conference" arranged by the Norwegian offshore wind cluster in person as part of the preliminary data collection to supplement the data material. Nevertheless, the observation enabled me to observe how the firms, policymakers, trade unions, and interest organizations, interacted under natural circumstances. As some of the informants were present, I made sure to not approach them as to ensure their anonymity. Table 4 provides a descriptive overview of the preliminary interview and attended seminars and conferences. In sum, it was during the preliminary data collection that the research question became more specialized. Similarly, the preliminary data collection motivated the interview guide for the firms as this part of the research process made me aware of the existing barriers related to the offshore wind industry. The research on the offshore wind industry enabled me to formulate interview questions that would expose how the firms responded to the barriers and drivers.

SEMINARS				
Name	Who	Date	Where	Length
Green and smart transition of Norwegian industries	Dr. Tukka Mäkitie	04.02.2021	Digital	1 hour
Green growth	Per Espen Stoknes	01.03.2021	Digital	1 hour
Accelerating transitions	Dr.Frank W. Geels	11.03.2021	Digital	1 hour
EU taxonomy as a tool for change	SINTEF […][3]	12.04.2021	Digital	1 hour 30 minutes
Developing an offshore wind industry without a home market […].	Dr. Håkon Endresen Normann	27.05.2021	Digital	1 hour
What does the government's Energy Report mean for your business?	Energy Valley	16.06.2021	Digital	1 hours 30 minutes

[3] Complete list of organizers: SINTEF, Energy Valley, Solar Energy Cluster, GCE Ocean Technology, GCE Node and Nysnø

The Offshore Wind Conference 2021	The Norwegian Offshore Wind Cluster	19.10.2021	Physical: Radisson Blue Hotel	6 hours
INTERVIEWS				
Informant 1	An expert on the offshore wind industry	11.08.2021	Digital	1 hour 4 minutes
Informant 2	An expert on the legal challenges of the offshore wind industry	13.08.2021	Digital	1 hour 2 minutes

Table 3. Descriptive overview of preliminary interviews and observations

4.2.2 SEMI-STRUCTURED INTERVIEWS

As this thesis sought out to understand the firms' contribution in helping the offshore wind industry to emerge and takeoff, it was important to understand their experiences in this process. This thesis therefore adopted one of the most widely used strategies for collecting qualitative data, namely, in-depth qualitative interviews (Hay, 2016). The main purpose of conducting interviews is to understand the meanings, ideas, opinions, and perspectives of the interviewees (Scott, 2013). Additionally, choosing to conduct interviews was further motivated by my hopes of acquiring insight into the firms' behaviors. However, in doing so, it is important to exercise caution as a researcher, as it is important to always assume that when interviewees describe their behaviors, their responses may be biased, as people in general tend to frame words that best suits our interests (Scott, 2013, p. 280). Nevertheless, interviews are valuable tools for obtaining insight to specific topic of interests, and can be conducted either through structured, semi-structured or unstructured forms. In the present case study, individual interviews have been conducted through a semi-structured interview form. This way of conducting interviews have attracted interest over the years and are widely used due to the expectation that the interviewees' viewpoints are more likely to be expressed in an openly designed interview situation than in a standardized interview or a questionnaire (Scott, 2013).

Although semi-structured interviews begin with a set of questions, it is important need to be attuned to the ongoing discussion and ask relevant follow-up questions that elaborate on more general knowledge. This way, semi-structured interviews can clarify how and why something occurs and provide data to support more rigorous testing of processes and expected outcomes related to the specific procedures of a program. For instance, I started each interview by asking both the informants and the firms a broad question that helped set the tone for the rest

of the interview. I asked them "what do you think are the biggest challenge that the offshore wind industry in Norway is facing today?". By doing this, the various answers I received from each informant and their respective academic discipline or firm that they represented, appeared truthful and illustrated a diversity of thoughts and experiences. Furthermore, it provided a good starting point for the rest of the interview, as I had established early on what the informants were the most concerned about regarding the OWP industry, and therefore, what their work consisted of. This guided me throughout the interview in knowing what topics to explore further, and what to disregard. Table 4 provides a descriptive overview of the semi-structured interviews.

FIRM	SIZE	POSITION	PLACE	DATE	LENGTH
Firm 1	Small	Chief Executive Officer	Digital	30.08.2021	53 minutes
Firm 2	Medium	Director for New Business	Digital	31.08.2021	1 hour
Firm 3	Small	Communications manager	Digital	16.09.2021	1 hour 15 minutes
Firm 4	Medium	Head of Offshore Wind	Digital	05.10.2021	40 minutes
Firm 5 – part 1	Medium	Head of Sustainability	Digital	12.10.2021	30 minutes
Firm 5 – part 2	Medium	Head of Sustainability	Digital	14.10.2021	18 minutes
Firm 6	Large	Corporate Strategy Manager	Digital	12.10.2021	1 hour

Table 4. Descriptive overview of the semi-structured interviews.

4.2.3 DESIGNING AND CONDUCTING THE INTERVIEWS

To prepare for the interviews, I designed an interview guide that included a list of subsections with questions that covered the topics that needed to be covered to answer the research question. The questions focused on content and dealt with issues and areas that I found to relevant to the research question. Specifically, the types of topics essentially included content related to background, knowledge, behaviors, opinions, and values (Hay,

2016). Thus, the interviews were conducted with predetermined, yet open-ended questions, which enables other subjects to emerge from the conversations. All interviews were conducted digitally, either through Zoom or Teams. Following the Covid-19 pandemic, most people have become relatively familiar with using digital tools for work-related obligations, so it was my impression that the informants were positive to engage in this digitalized interview setting. Before starting the interviews, all interviewees were sent information about the purpose of the thesis, their rights, and privacy as informants, as well as the contact information of my supervisor, the data protection services at the Univerisity of Oslo, myself, and the Norwegian Center for Research Data (NSD) (Hay, 2016). Additionally, I repeated the information verbally before starting each interview, followed by asking for permission to audio record the interview which all informants agreed to.

4.3 STRATEGY FOR PROCESSING AND ANALYZING THE DATA

Before processing the data to prepare it for interpretation and analysis, I transcribed all eight interviews by using the qualitative data analysis software, NVivo 12. The interviews were conducted in Norwegian over a period of three months (August – October 2021) and transcribed in verbatim continually in this period. Similarly, I used NVivo 12 for coding the data and all eight interviews were coded together. Simply put, coding describes the process of defining what the data are all about. Accordingly, to codify the data is to arrange things in a systematic order by making something part of a system or theme with the aim of identifying patterns or regularities in the behavior that is documented in the data (Saldaña, 2016). Moreover, a theme can be the outcome of coding, categorization or analytic reflection (Saldaña, 2016). This thesis used thematic analysis to categorize the data material into themes and related sub-themes which are developed into the thematic framework. The thematic analysis describes a method for identifying, analyzing, and reporting patterns (themes) within the data (Braun & Clarke, 2006). In other words, thematic analysis allows categories, or themes, to emerge from the data. Given this study's objective to investigate how institutional entrepreneurship is expressed within firms in a socio-technical transition, I found it fitting to apply a combination of both an inductive and deductive approach when coding and analyze the data. This enabled me to not only identify the emerging themes that were related to the chosen theoretical foundation, but also to look for emerging themes during the analysis. The streamline codes-to theory model depicted in Figure 3 below illustrates how I went from raw data to code (and subcodes), to category (and subcategories), to themes. As the present study constitutes an empirical case study, I did not

reach the ‘higher level’, or more abstract constructs, to see how the themes systematically interrelate towards the development of a theory (Saldaña, 2016, p. 15). In relation to the streamlined codes-to-theory model, I used a combination between coding book and in vivo coding. In practice, this means that I was informed by the theory and concepts, while maintaining open to what the emerging issues and challenges that are arising during the interviews.

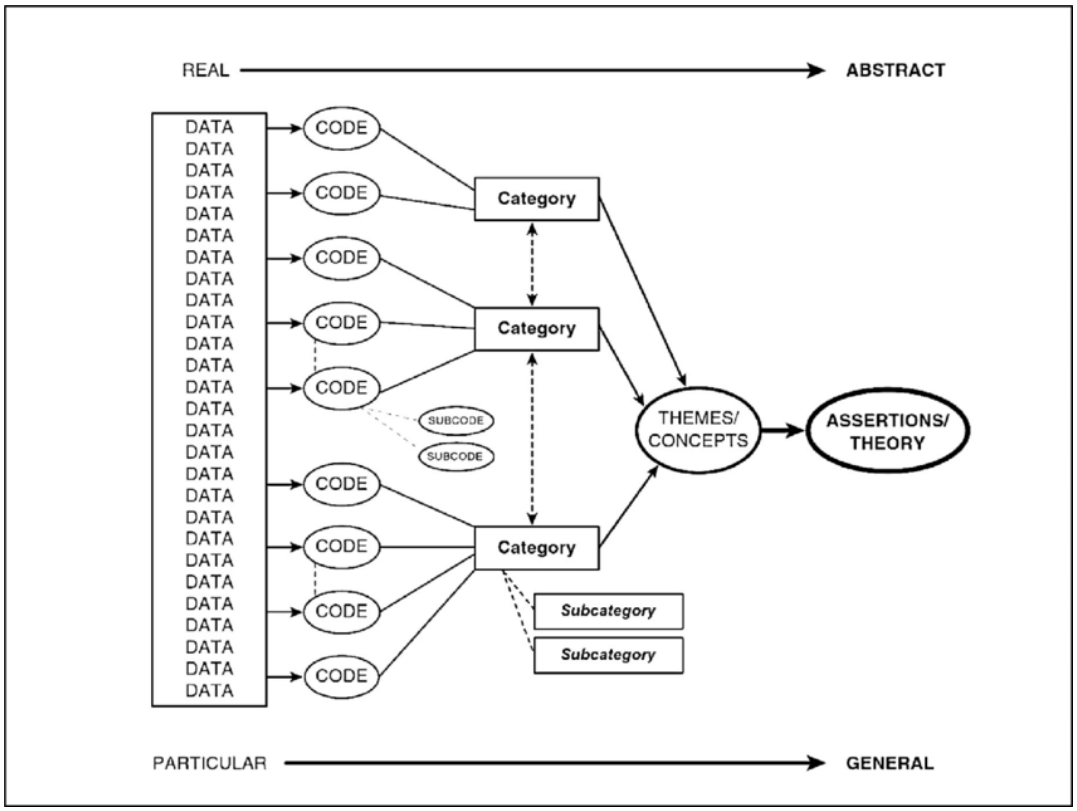


Figure 5. Streamlined codes-to-theory model for qualitative inquiry (Saldaña, 2016).

4.4 ENSURING QUALITY AND RIGOR

As qualitative research deals with interpretations and experiences, there are several aspects that are important for a researcher to reflect upon to ensure reliable and rigorous research. Validity refers to the degree to which a study examines what it set out to examine, and the degree to which the conclusions reflect the data material (Hay, 2016). Therefore, to ensure validity for this thesis, I thoroughly prepared for the primary data collection by reading secondary research, attending various seminars, and consulted experts by conducting semi-structured interviews as part of the preliminary data collection. Because of these measures, I am confident in the validity of the present study. Reliability refers to the degree to which the method of data collection provides consistent and reproducible results when used in similar

circumstances by different researchers or at a different time (Hay, 2016). Therefore, I have tried document the research procedure by explaining how I approached the data collection method. Moreover, I have presented the table of descriptive characteristics of the conducted interviews, provided a data structure model that illustrate the process of the data collection, and attached the interview guide as an appendix (see Appendix A).

4.5 ETHICAL CONSIDERATIONS

A principal rule of conducting scientific research, is that a researcher should always make sure that one embarks on a quest for new knowledge with critical and systematic verification. Additionally, as put forward by the Norwegian National Committees for Research Ethics, it is essential to keep in mind that all people who choose to participate in research shall be treated with respect, that researchers shall seek to ensure that their activities produce good consequences, that all research projects shall be designed and implemented fairly, and lastly, that researchers shall comply with recognized norms to behave responsibly, openly, and honestly towards both their colleagues and the public (NESH, 2016, p. 6). It has been my objective to ensure that this thesis succeeds in the search for new and better insights while fulfilling the guidelines for research ethics. To fulfill this, I have responded to the call for a more nuanced approach for understanding the role of industry actors in sustainability transition and in this process extended on previous research to be sure I addressed a topic that is considered underdeveloped in transitions studies. Moreover, the study's formal measures consisted of notifying the Norwegian Center for Research Data (NSD) before starting the data collection. Furthermore, all informants were informed about the details of the present study, along with their privacy rights. The informants were reminded that they could withdraw at any time from participation without further explanation.

4.6 LIMITATIONS AND WEAKNESSES

As this thesis is written on an intensive master's programme, I had limited time for planning and conducting the thesis, which is why I was not able to conduct a pilot study. The importance of conducting a pilot study has been underlined both to increase the study's reliability, but also to enhance the researcher's readiness to perform well in the interview situation. Additionally, the study would benefit from having a variety of firms within the offshore wind industry, as this would more likely provide a more precise representation of how firms participate in creating a new institution. Moreover, as the collected information is to be used in a research project, this can possibly influence the informants to provide information

they feel can advance their case. Relatedly, as the topic of interest deals is related to sustainability, it should be acknowledged that the informants might have responded socially desirable to some of the questions.

5 EMPIRICAL FINDINGS AND ANALYSIS

The following chapter details the empirical findings related to my research question. The empirical findings are mostly based on the primary data collection, namely the transcribed interviews with the different firms, though it also draws upon the interviews with the industry experts, as well as the secondary data sources. The empirical findings are presented through three sections. The first section draws on the analysis of what the firms experience as the barriers to the inherent potential of the offshore wind industry. The second section analyzes what the firms experience as the drivers to realizing the potential of the offshore wind industry for Norway, followed by the third and last section that analyzes the firms' role in evading the barriers and initiating the drivers for the offshore wind industry in Norway. Accordingly, the following two sections, barriers, and drivers, draw on the identified external events that are affecting the firms' engagement in OWP. The findings are presented in this order with the intention of contextualizing the situation of the offshore wind industry, and thereafter put forward how the firms are managing these features.

5.1 BARRIERS

Even though the window of opportunity for the offshore wind industry in Norway has reopened as illustrated in Chapter 2, the firms are still experiencing barriers that makes it difficult for the firms to contribute to an industry take-off. In this section, the thesis will extend on what these barriers indicate and how the firms relate to them.

5.1.1 UNCERTAINTIES

Uncertainties related to the emerging offshore wind industry have been a prevalent barrier to accelerating the industry take-off for quite some time now. Without contextualization, this barrier does neither appear especially informative, nor a particularly useful concept. In a way, it can be understood as an umbrella concept for all the barriers that the firms are experiencing when engaging in the OWP industry. So, to specify, during the interviews, the firms were asked how they dealt with the uncertainty of how much offshore wind the Norwegian government intended to produce within a given year, as most European countries that produces OWP have done themselves (for instance, the UK leads with plans for 30 GW by 2030, Germany will expand with 25 GW, the Netherlands 9 GW and Denmark has plans for 3.7 GW by 2030). In other words, the firms were asked about their thoughts and actions regarding the government's current lack of ambition for the industry. Interestingly, during the interviews, several of the firms elaborated on the concept of uncertainty and extended it to other

perceived barriers, such as the lack of a time plan, the volume of future projects, the speed the offshore grid, as well as the licensing process. As presented in the literature on industry building, reducing uncertainties and ambiguities in the takeoff stage is fundamental (Santos & Eisenhardt, 2009). This finding resulted in treating several of these emerging barriers as separate findings related to the elevated barrier of uncertainties, which this section of the analysis will put forward. Nevertheless, the firms did share some inputs as to how they dealt with the missing ambitions from the government.

> "*One way we deal with it is that we work in several arenas, in several countries and in several markets. We have experience of building and developing projects for onshore wind in Norway. So, the fact that it is uncertain- this simply implies that it is good to have more markets.*" (Firm 2).

So, like Firm 2 described, it is evident that the barrier of unclear stated ambitions from the government causes firms to ensure a distribution of risk. Consequently, even though these findings reveal that the government's lack of clearly stated ambitions for OWP does not appear as a distinct barrier for the firms to engage in offshore wind, this finding does in my opinion illustrate that the government's lack of ambition can result in the unfortunate event that there will only be a couple of Norwegian firms that are able to engage in markets internationally, as the remaining firms are not given the opportunity to gain valuable experiences in a domestic market. In turn, this could imply that Norway would lose the opportunities for job- and value creation to other countries as presented in Chapter 2. Conversely, Firm 4 extend on this barrier by including the risk of not being able to involve the supplier industry in the emerging industry.

> *"We are just going to go for it, in a way. We are going for it because we think it will come (OWP in Norway). We also believe that if it stops in Norway, we will be elsewhere, though we clearly see that it is difficult to get the supplier industry on board if you do not have better… That is, we live much better in that uncertainty than what they (suppler firms) do […]. So, it's a big challenge, as it is easier for us to make that decision because we can have long-term processes with these projects. We can work with these two projects that have opened in Norway, and then if nothing else comes up for a while we can continue working in other markets. We are very used to working this way."* (Firm 4).

As mentioned, the government's main motivation for investing in the offshore wind industry is securing a supplier industry. Therefore, as Firm 4 notes, it is important that the government provide predictability if Norway is to secure national content in the OWP industry. Moreover, Firm 1 added to the issue of missing clearly stated ambitions as only part of the problem. Like other firms in the sample, they state that merely presenting specific ambitions will have no value unless it comes with specific framework or measures. More specifically, in their responses to the regulatory hearing the firms call for a shorter time frame for the licensing process, new licenses with larger volume OWP parks in terms of megawatts as this will help scale-up the technologies and reduce costs, and last, that the Ministry of Oil and Petroleum decides to provide license to whoever is the most qualified developer, rather than the actors that can pay the most (Seminar 19.10.2021). Responding to regulatory hearings constitutes an institutional strategy as the firms essentially contribute to implementing desired policies and regulations in this way (Jolly et al., 2016). As mentioned, research on regulatory frameworks in emerging industries, has illustrated that firms either treat regulatory constraints as endogenous, meaning that they actively seek to influence regulation to increase alignment with their interest, or as exogenous, meaning that the regulation is perceived beyond their sphere of influence (Andersen et al., 2020, p. 1). Evidently, in this case the firms in my sample treated the uncertainty of unclear ambitions and new licenses for OWP as endogenous, implying that they tried to influence it to their advantage and reduce the discrepancy between regulatory constraints and their targeted market application (Andersen et al., 2020). Specifically, in their responses to the regulatory hearing, several of the firms mentioned that they suggested that there should be created a hybrid solution at Sørlige Nordsjø II, and that both areas should be split up into more areas, as this would enable more firms to build OWP.

5.1.2 THE EEA-AGREEMENT

So, to ensure that the offshore wind industry in Norway becomes socio-economically profitable, it has been estimated that the supplier industry must capture at least 11% of the emerging industry globally (Winje et al., 2020). Since 1994, Norway has interpreted that the EEA agreement has applied up to 12 nautical miles and that beyond 12 nautical miles, lies Norway's economic zone. However, recently there has been discussion on whether the EEA agreement applies beyond these 12 nautical miles or not, due to Norway's deficient regulatory framework at sea. As mentioned in Chapter 2, the regulation to the Marine Energy Act was adopted just recently, in 2020, meaning that in 10 years there was only the Marine Energy Act, which was very incomplete and caused a lot of uncertainty, according to Informant 2:

"In 10 years, we only had the Marine Energy Act. If you ask me […] this law was simply not enough. There were not enough rules, it was very uncertain; it was not clear enough. The law gave very few "certainties" in a way, it was difficult to know exactly how we should do it, who should get a license and how we should give that license." (Informant 2).

The regulation has provided some clarity, yet some of the uncertainties in the Marine Energy Act remains, which is why there has now been a discussion regarding whether the EEA agreement applies beyond 12 nautical miles. Concerning the two areas that are now made available for applying for licensing to build OWP, Utsira Nord is located between 11-15 nautical miles, while Sørlige Nordjsø II is located between 150-180 nautical miles. Thus, learning about the uncertainties regarding the EEA-agreement was perhaps the most surprising finding as it represents the barrier that can have the biggest impact for developing the offshore wind industry in Norway, specifically when it comes to securing national content at Sørlige Nordsjø II. In short, this can be a "game-changer" to quote Informant 2. So, if the offshore wind industry is to become an industry that benefits the Norwegian society, several tough measures must be taken, and they must be taken now. Clarity concerning the EEA agreement represents one such tough measure and the Ministry of Oil and Energy is apparently not in a rush to provide it:

"I have asked this exact question that you asked me to the Ministry of Petroleum and Energy. Does the EEA agreement apply or not? Silence in the room." (Informant 2).

According to Informant 2, as of now the law should be interpreted in such a way so that Norway must follow the EEA agreement also in the country's exclusive economic zone in the North Sea, to be 'in the clear'. This implies that Norway's development of offshore wind must be in line with the EU framework, and thus let go of the considerable freedom on the Norwegian shelf which Norway has grown accustomed to. For instance, this implies adhering to the EU's provisions concerning foreign cables, licenses, state aid and perhaps most importantly, public procurement. Consequently, this can be a game-changer because it can possibly have enormous consequences both for the government and the firms, as the EU rules will put a stop to securing national content through setting requirements for a certain proportion of Norwegian supplier or subcontracts when providing licenses for offshore wind which is an important measure if the

goal is to build up a competitive offshore wind industry. When asked how the firms deals with this uncertainty, Informant 2 shares some of their experiences:

> *"Every time I sit down and talk to the lawyers (in the firms), it's "let's not talk about it, move on". They know it's a hot potato, and I think they're just trying to do business as usual. Therefore, I think the Norwegian government is trying to apply rules that are not very contrary to the EEA, regardless of whether it applies or not, because they know that this can be a nightmare. So, therefore, I think the strategy is to be quiet. Be quiet, let's hope no one brings this up, and we'll work with the rules that won't spur conflict."* (Informant 2).

The firms are also aware of the challenges that might arise, but in their responses to the barrier they look to other countries for possible solutions to ensure national content:

> *"Yes, we see that there are several challenges, and this must be decided by the Ministry of Petroleum and Energy in the end, regarding what rules will apply. We are aware of the challenges with the EEA, and we see that it has been solved a little differently in other countries. Offshore wind projects in other EU countries have managed to get a surprisingly high proportion of local content, so what have they done? You can start to look at that a bit. So even though the EEA regulations prevent very strong, as well as clear formal requirements for Norwegian content, there are other solutions."* (Firm 4).

Evidently, as the third section in this chapter will pick up on, the firms apply creative measures to reduce uncertainty. Norway has adhered to the EEA agreement since 1994 and resemble what the IE literature refer to as institutional arrangements. Thus, the EEA agreement is a perfect example of how the firms are configured by their institutional environment, and illustrates how during the process of industry building, firms are engaged in ongoing struggles to challenge established institutional arrangements through their creative efforts (Jolly et al., 2016). According to Informant 2, the situation is highly unclear and will most likely remain unclear until a lawsuit is decided in court. If the government decides to disregard the EEA agreement, Norway can face issues with the World Trade Organization (WHO) for discriminating against foreign firms. Moreover, this uncertainty can make it even more difficult to engage supplier firms to diversify towards OWP. Therefore, as some firms have noted, using sustainability as a competitive advantage might be the solution for the Norwegian supplier firms

in the future due to the lack of a home market. Whether this will hold in court remains to be seen. This scenario adds to the already existing uncertainty of how much OWP Norway decides to produce, and when.

5.1.3 OFFSHORE GRID

To ensure profitability and reduce risk when building OWP at Sørlige Nordjsø II, there must be established a hybrid solution that connects the offshore grid to two or more countries. In the guide for the area allocation, licensing process and applications for offshore wind power put forward by the Ministry of Oil and Petroleum, it is proposed that offshore wind parks should be connected through radials (a single power cable), either to Norway, abroad or to petroleum installations. However, because Sørlige Nordsjø II is best suited for bottom-fixed wind power, the government announced that the offshore wind park in this area will not receive state aid as the technology is far more mature compared to floating offshore wind (Norum & Jørgensen, 2021). Therefore, the firms who are considering investing in the development of Sørlige Nordsjø II all seem to agree on the necessity of building a hybrid solution, as this is more likely to ensure profitability compared to radials. Moreover, the advantages of a hybrid solution are related to its versatility, as it is possible to send the electricity to wherever is the most profitable, in addition to the fact that the cables can be used for exchange during times of low production. Furthermore, according to estimates provided by Statnett, offshore wind on the Norwegian shelf can become profitable by 2030 if a hybrid solution is established (Viseth, 2021). Up until recently, there has been a lack of clarification concerning the frameworks and connection to the markets in the EU and the UK, and these uncertainties were a prevalent topic with all the firms.

> *"The grid is incredibly important because if you are to be able to build Sørlige Nordsjø II commercially without subsidies, you must have a hybrid connection, and this opens so many questions on the regulatory, as well as the political issues for that matter, regarding "who should own this and how do we distribute the income and costs in this system?". It is a challenging discussion. We have taken our position at it, we have worked a lot with what we think includes all actors, but then we see that, for example, actors like Statnett have taken a completely different position than we have. […]. It will be challenging to find a consensus and a system that everyone agrees on, and the Ministry of Petroleum and Energy will have to make some choices that will have big political impact, so there is a lot of politics related to this when you start discussing the different roles and responsibilities in building*

this system. So, this is, again, a very complex, very demanding, big issue which I think is definitely one of the main challenges for the offshore wind industry." (Firm 4).

According to Informant 2, the lack of clarification has been related to the Energy Act and the Marine Energy Act. The former posits that Statnett is the operator of cables up until 12 nautical miles, and there has not been given any clear guidelines as to whom should own and operate the cables past 12 nautical miles, an area covered by the Marine Energy Act. Relatedly, the licensing system related to the offshore grid has been incomplete and lacked a clear direction, which ultimately hinders a fast commissioning of the offshore grid. Yet again, the firms emphasize the timing aspect as crucial. Therefore, in addition to stressing the importance of creating a hybrid solution, it was also suggested that the firms could partake in developing the offshore grid, as this would 'speed-up' the process, before deciding who will be the owner of the grid. Some of the firms also suggested that the developers could be considered as owners of the offshore grid, as this would enable them to keep the so-called 'bottleneck revenues' from exports or to use the revenue to help finance either the grid or the offshore wind park.

"We believe that the offshore grid is important for profitability. […] We also believe that it should, for example, be allowed for developers to be able to develop the offshore grid along with the projects. The developers don't have to own it, because you have time enough to find the specific solutions as it takes a long time before this is even built, but the developers should have the opportunity to ensure that it gets built efficiently and in time, so that you don't get offshore wind parks that have no place to deliver their power." (Firm 2).

However, in the recent Hurdal declaration[4], Statnett was pointed to as the preferred owner and operator of all the international power connection (Holter, Melgård, & Riisnæs, 2021). Fortunately, Statnett has acknowledged that such a development takes time and are set to be finished before it has been settled which firms will be granted the license to build offshore wind; they even stated that they plan for completing one hybrid connection by 2030 (Viseth, 2021). Moreover, recently the research project "OceanGrid" led by a consortium with partnership consisting of Equinor and SINTEF was granted support of NOK 82.7 million through the Green Platform scheme (Andersen, 2021). This project will "develop new technology, knowledge and solutions that will enable profitable development of offshore wind on the Norwegian shelf,

[4] The Hurdal decleration refers to the newly elected Government's political platform as presented by the Labor Party and the Center Party

including how the power from offshore wind will be connected to the power grid" (Tande, 2021). The work will include both bottom-fixed and floating wind parks and can in the long run provide new green jobs and increased export revenues. As Europe is aiming to install 300 GW within 2050, there is a growing demand for a well-functioning offshore grid. Fittingly, Norway is thought to have a first-mover advantage of developing and building the offshore grid as a world leader in offshore technology (Tande, 2021). Furthermore, despite growing concerns regarding the increased tendency of "protectionism" towards electricity production in the civil society, the newly appointed government announced in the Hurdal declaration that even though they are not going to provide any new licensing for power cables abroad, this will not apply to the offshore wind industry (Holter et al., 2021). In sum, now that Statnett is most likely to be responsible for developing, owning, and operating the offshore grid, combined with the OffshoreGrid-research project, and finally, the government's go-ahead for international power cables, what remains to be seen is that the government will allow for a hybrid solution so that Statnett can start planning the development and the firms can earnestly proceed with developing OWP at Sørlige Nordsjø II.

5.2 DRIVERS

The identified drivers are helping the firms navigate in a somewhat fleeting industry structure and accelerate the transition towards renewable energy in Norway. Through the analysis I found that the firms were reacting positively to new developments such as the EU taxonomy and emphasized using sustainability as a competitive advantage in the European race to qualify for taking market shares, and that clusters and organizations acts as facilitators for the firms to legitimize new sets of practices.

5.2.1 THE EU TAXONOMY AND SUSTAINABILITY

The EU taxonomy is helping the firms shape the institutional environment for the offshore wind industry and additionally works as a driver for accelerating a sustainable transition in Norway. As mentioned, the EU taxonomy serves as a classification system as it establishes a list of environmentally sustainable economic activities based on six environmental objectives (EuropeanComission, 2020). Put simply, the taxonomy can be thought of as a tool for change, as projects that constitute a 'significant harm' on one of the six objectives will not be able to receive funding. For instance, at the webinar I attended with SINTEF (webinar, 12.04.2021), it was explained that SINTEF will no longer be able to get involved with future projects that are not aligned with one of the six criteria. Accordingly, it will become more

demanding to get R&D funding if the project does not comply with the taxonomy, which also includes funds from "virkemiddelapparatet". Therefore, the taxonomy will likely have a big impact for future projects in the O&G industry, as the criteria exclude all activities related to fossil energy as sustainable activities, including activities that support the production, transportation and storage of oil and gas (Viseth, 2020).

As known by now, many firms in the O&G industry have diversified to the OWP industry which is part of the reason why Norway might still be able to succeed internationally as firms draw on their existing competencies from the former industry. Relatedly, a challenge for the offshore wind industry was related to the fact that firms' willingness to invest in and diversify towards OWP depended on the oil market. As shown in Chapter 2, the oil price has fluctuated a lot over the last decades, which caused green flings where firms increased their activities within OWP during times of low oil prices (Mäkitie et al., 2019). In this period, some firms made clear strategic choices to enter OWP regardless of the volatile oil price, although most firms that were engaged in both markets had a hard time of passing up the lucrative contracts in the O&G industry (Mäkitie et al., 2019). However, due to external changes at both the regime and landscape level, important policies such as the EU taxonomy has recently been introduced, which ultimately can help push firms in the right direction towards sustainability. In turn, this notion resembles how actors change institutional arrangements while at the same time being constrained by them (Jolly et al., 2016). Therefore, like other policies such as the recent change in the oil refund scheme, the taxonomy is helpful for the firms in changing the institutional arrangement of the OWP industry, while simultaneously reducing the constraints posed by the O&G industry. As the EU taxonomy is put forward by the European Commission, Norway is forced to follow the regulation through the EEA-agreement. For that reason, I would argue that the taxonomy has succeeded in presenting climate policies that affects the O&G industry in a way that the government would have struggled with due to the close ties between policymakers, the industry, and civil society. The informant from Firm 5 shares how the taxonomy shapes their work in OWP:

> *"We have a sustainability manager who can answer this better than me, but we certainly have it very high on the radar in the offshore wind projects and include it as part of the equation when we work further with these projects, both from a commercial and from a technical perspective. So, it helps to shape what we work with, in terms of how we design this project, but also in how we look at this project commercially and commercial decisions."* (Firm 5).

If Norway is to accelerate the transition of the incumbent oil- and gas regime, there is a need for more R&D towards cleantech, and this policy facilitates just that. Moreover, the EU taxonomy can be thought of as an example of two types of policy mixes for sustainability transitions as presented in Kivimaa and Kern's (2016) analytical framework, namely the 'creation of new' and 'destruction of old'. First, it resembles what they call resource mobilization: because of the EU taxonomy, O&G firms will no longer be able to receive funding for research and development as all fossil activities will no longer be considered sustainable. This will also apply to the activities of building offshore wind parks to electrify oil production (Viseth, 2020). Consequently, this might influence the mobilization of human and financial capital towards OWP which in turn can lead to more R&D funding towards future projects. Second, the EU taxonomy resembles a significant change in regime rules as it excludes the O&G industry from receiving R&D support for future projects which can cause decreased value and worse interest rates for the incumbent industry. In sum, the taxonomy can help the firms *differentiate* from the O&G industry, as it puts sustainability on a pedestal, making its multifaceted implications inaccessible to O&G firms, but attainable to the firms engaged in OWP.

> *"The capital markets are a driver for sustainability now, especially on the climate side, but what is interesting about the EU taxonomy is that it warns us of an anticipated link to biodiversity. It's not enough that you merely have a project that helps cut emissions or replace emissions, nor can you have a negative impact on any of the six indicators, and biodiversity is one of them. So, we work very actively with it. We work to set goals that will ensure that we meet the requirements of the taxonomy and work to get a taxonomy analysis of our own company to identify which places we are in line with the taxonomy and if there are some areas we are not, then we need to identify how we can work to become in line with it. So, it has a very concrete impact on how we work."* (Firm 5).

Correspondingly, it was my impression that most of the firms in my sample were treating the EU taxonomy as exogenous, meaning that they did not try to influence it in any way (Andersen et al., 2020). Moreover, most of the firms treated it like it was desirable as it helped push their business model in becoming even more sustainable. However, it should be mentioned that a couple of the firms dismissed the taxonomy when I asked them about it, and interestingly these firms shared some characteristics in that they were typically small in size, or

part of a consortium backed by larger, more resourceful firms that are involved in activities that are not compatible with the taxonomy. Therefore, these firms dismissed the taxonomy as they argued that the firms in their partnership would know how to work with its impact in their anticipated OWP project. Nevertheless, in my opinion, the EU taxonomy can be thought of as a catalyst for securing national content in the emerging offshore wind industry in Norway. While Norway's first-mover advantage for floating offshore wind power is slowly fading away as more countries are concentrating on establishing a home market and building a supply chain for FWP, the EU taxonomy may represent a way of preventing this from happening as it sets requirements for something that Norwegian firms are already exceptional at. Moreover, the taxonomy can secure the developers of offshore wind in Norway a strategic and competitive advantage if they are to take the lead in floating offshore wind power by making sustainability a prerequisite for building OWP in Norway, which Firm 5 explains quite well:

> *"[…] We have also expressed that we want and believe that it can be an important difference factor for Norway to make sustainability a main criterion in the Norwegian development of the Norwegian offshore wind industry. The fact that Norway has very long knowledge and experience in the management of marine environments- for instance, we are one of the few countries in the world that has marine management plans that are updated every 12 years. We have extensive experience with interaction between different industries at sea, both oil and gas but also other industries such as fisheries and aquaculture for example, we have a very long tradition of shipping in Norway, and we have managed to do it in a way that in total has safeguarded environmental values in a good way […] Norway can build this the offshore wind industry by setting sustainability as a criterion in our competitions, and then we can qualify Norwegian companies to use it as a competitive advantage when we go out into the world and contribute to building the offshore wind industry, not only in Norway, but globally."* (Firm 5).

Moreover, the taxonomy does not only shape the institutional environment of the offshore wind industry, but it also shapes the *technology* of offshore wind power. Even though the firms have a 'green product', they will still need to take further measures such as deciding on what material for the foundation has the least carbon footprint during production or what types of anchoring system will have the least influence on biodiversity. Additionally, the firms must include sustainability as an assessment criterion when deciding on their supply strategy.

> *"All firms, including the developers, have a responsibility to document the total carbon footprint in our work. It's important for us to work with our suppliers and set requirements further down the value chain through, for example, a supplier strategy. This will also affect which suppliers one chooses. Price and competence are important, but I believe that the environment will count even more and become crucial. For example, if you choose a supplier, you must think about this in the concept choice of foundation; should one go for steel or concrete? What has the least emissions in production? We must think circular economy- what do you do with the concrete from the mills after the end of life, or the rotor blades? You must think about the whole value chain, i.e., both production and operation and removal. So, the financial institutions will make demands for us as developers, and we as developers must make demands again on the sustainability of the suppliers throughout the chain. Basically, we have a green product; we produce renewable energy, but as I said, in production, operation and removal, we have to think about sustainability and the total carbon emission."* (Firm 3).

A recent UNEP report points to the significance of changes in the financial system for sustainable development (Raes, 2020). Similarly, the role of finance capital in restricting or promoting change in a certain direction has been promoted as a topic for further research in the transitions literature (Köhler et al., 2019). In my experience, the implications of the EU taxonomy illustrate one such direction for change of the incumbent oil and gas industry in Norway, and by the look of it, the emerging offshore wind industry is benefiting from it.

5.2.2 MOBILIZED NETWORKS

Today, the situation of the OWP industry in Norway is characterized by a range of strategic actors and mobilized networks, consisting of various clusters, formal networks, trade unions, and interest organizations, that are facilitating interactions across the industry and are essentially influencing a policy change to the benefit of the offshore wind industry. As mentioned in Chapter 2, part of the reason why the initial window of opportunity opened, was attributed to ideal political conditions. Moreover, these conditions were explained by the more environmentally conscious Minster of Oil and Petroleum, Åslaug Haga's, commitment to explore the potential for OWP in Norway (Normann, 2017a). Likewise, when Normann (2017a)

discusses the reasons why the initial window of opportunity closed, a lack of organized networks and strategic actors was highlighted as one of the reasons. Today, there are clusters, formal networks, trade unions, interest organizations that work strategically for the benefit of the offshore wind industry. Fittingly, in 2021, Åslaug Haga became head of the interest organization for wind power, Norwea. Moreover, from the interview with Informant 1 they mentioned that the newly appointed Minister of Climate and Environment, Espen Barth Eide, has been quite vocal about the importance of building an offshore wind industry, and it is these types of strategic actors that will be necessary for OWP to gain legitimacy and undergo an industry takeoff. Moreover, in analyses that draw on institutional theory, it has been illustrated that social movements motivate the contestation of dominant institutional logics and the formulation of alternative logics (Fuenfschilling & Truffer, 2016; Köhler et al., 2019). So, now that these networks have been established, the firms are supported in their work for industry building and legitimization. Returning to Kivimaa and Kern's (2016) analytical framework, having an organized network resembles an important policy directed at the creation of new industries, which underlines the importance of receiving support or legitimization from powerful groups, and this importance is echoed by the firms. In the first quote, Firm 5 addresses the importance of having mobilized networks during the industry takeoff stage, and acknowledges that they find it important to share their knowledge, which again goes to show how the firms are emphasizing collaboration rather than competition in this stage of the development:

> *"It is very important that we have good clusters and networks. Additionally, in an industry that is in the development phase, it is important that we communicate well with each other to find out where the synergies and opportunities are to build this as an opportunity for the entire Norwegian industry. So, we are very eager to participate where we can, contribute with knowledge whenever we can, although we do experience that we also get a lot out of participation in the form of awareness about what is happening in other firms in different parts of the supply chain for example."* (Firm 5).

In the second quote, Firm 3 emphasizes the functions of clusters in the form of collaboration and coordination that goes beyond the firm's ability to affect regulatory processes:

"We need organizations that work on behalf of the entire industry. I initially talked about building a new Norwegian industry and a domestic market with a diversity of actors. To secure this, it is important to have a cluster that works strategically and coordinates the industry's input towards the authorities and regulatory processes so that offshore wind can become a large Norwegian export industry. Therefore, it is important to work together to unleash that potential. The clusters, or the Offshore Wind Cluster in this case, are an important actor in facilitating that. So, there are a few different features that clusters and networks can have, that the firms cannot do entirely on their own." (Firm 3).

To my understanding, the clusters and networks help legitimize the industry by engaging in broader institutional work, which is necessary for increasing political power (Normann, 2017a, p. 28). Generally, clusters and networks partake in shaping societal discourses and problem framing, lobby for specific policies and regulations, and develop new industry standards, and last, legitimate new technologies (Köhler et al., 2019, p. 11). This is made possible as these organizations facilitate interactions between a distributed set of actors, namely, firms, interest organizations, engineers, civil society, policymakers as well as academic institutions. During the interviews, I asked the firms in my sample how they experienced the influence of trade unions to the development of the OWP industry and based on their responses I gathered that all six firms were highly positive towards the trade unions and interest organizations, and that their interactions were both informative and instructive:

"We experience that there is a very close cooperation between - that is, that Norway benefits from the fact that there is a very close cooperation between industry actors and unions. The Norwegian model and tripartite cooperation give us such a tradition of talking together and building trust and discussing solutions together, which, in my experience, means that we will get far in Norway." (Firm 5).

So, it is evident that mobilized networks are important for the firms in the emerging offshore wind industry, and perhaps even more so because of the strong position that the O&G industry continues to hold in Norway. Even though none of the firms addressed the strong position of the O&G industry during the interviews, it is a prominent topic in the transitions literature that incumbent actors can obstruct major technological and institutional changes as they might feel that their economic positions and business models are being threatened (Köhler

et al., 2019; Rothaermel, 2001). For instance, Normann (2017a, p. 52) identified that incumbent regime actors in Norway obstructed new renewable energy technologies through what they referred to as a 'crowding out effect'. This was made possible by an "asymmetric distribution of power" which reinforced the existing institutions which therefore strengthened the O&G regime (Normann, 2017a). Nevertheless, I found that the window of opportunity for the offshore wind industry has reopened partly due to support from the organized networks and strategic actors that help push for policy change.

Moreover, the clusters and networks are reducing some of the uncertainties presented in the first section. Merely by participating at one of the conferences provided by the Norwegian Offshore Wind Cluster, I was able to observe first-hand how the discussions regarding the offshore grid, relationship to processes in the EU, and the pace of development of OWP helped clarifying the complexities that is apparent during the industry takeoff stage. Furthermore, in addition to providing valuable discussions and knowledge sharing, the clusters enable networking across the industry. For instance, from 5 emphasized that the clusters have helped them identify possible partners that they would not have known otherwise:

> *"It is often the case that you don't know exactly what solutions you need until you know who is out there and who has a solution in place, and maybe it's even a solution for another industry, but then by talking together and figure out "what is my problem and what is your problem" – you suddenly find that a solution they have can be adjusted and used to fix a problem that we need an answer to. So, it is simply a matter of having meeting places, we experience it as very important."* (Firm 5).

5.3 FIRM'S AGENCY

The previous two sections have presented the findings that illustrates what the firms experience as barriers and drivers to the offshore wind industry in Norway. In a way, these sections have illustrated the firms' agency in shaping their institutional context, as it has pointed to how various industry actors, such as the firms, clusters, interest organizations, and trade unions have provided information during regulatory hearings for implementing new legislations. Thus, this next section will detail how the firms are contributing to the process of industry building through establishing new alliances, expressing creativity, ensuring co-existence, and initiating R&D.

5.3.1 ESTABLISHING NEW ALLIANCES

As the firms enter new partnerships, they are in essence partaking in creating an institutional context for the offshore wind industry. A key aspect of institutional entrepreneurship in an emerging institutional context is the capacity of actors to build new networks and alliances, legitimate new sets of practices and overcome difficulties associated with institutionalization (Benner & Tripsas, 2012). As presented, the OWP industry draws on knowledge and experiences attained from the oil and gas industry, the supplier industry, the maritime industry, and the service industry. Additionally, firms with backgrounds and experience in hydropower, power generation and distribution, have started engaging in OWP and therefore bring competencies such as knowledge about power production, the power market, as well as the Norwegian power system, to the table. Moreover, existing research have found that firms in nascent markets that tend to avoid competition instead co-opt with powerful firms through alliances (Santos & Eisenhardt, 2009). As the firms entered cooperation, I find that this action gave them access to complementary resources through attracting financial investors and partnering with incumbents. Indeed, bridging global and local partnerships is considered an institutional strategy as it provides smaller firms an opportunity to secure operations in larger scale, and additionally make available more capital and resources (Jolly et al., 2016). During the interviews, the firms made sure to emphasize their combined strength in their newly formed alliances and referred to it as one of the characteristics of the offshore wind industry. Consequently, the firms are shaping the institutional context through establishing new alliances that build on a diverse set of knowledges and competences, which were a recurrent theme throughout the interviews:

> *"This (the partnership) represents a very complementary competence, both in shipping, maritime and offshore, but also in power, refining, and sales. This denotes the new industry called offshore wind."* (Firm 3).

Moreover, to my understanding, the notion of establishing new alliances does not only refer to the fact that firms entered cooperation through consortiums, but also that they are collaborating *across* the alliances with the aim of reducing the fleeting industry structure, ultimately establishing organizational boundaries for OWP. At first, this finding appeared counter intuitive due to the general nature of competition expected among profit-seeking firms, however, it became clear that each firm had a vested interest in promoting the OWP industry that counteracted their short-term interest of competing for market shares. From theories on institutional entrepreneurship, it has been shown that firms cooperate to legitimize new

industries, and that they reorient to competitive differentiation after the market has achieved legitimacy (Andersen et al., 2020). Nevertheless, I did not expect the firms to be so open and synergetic towards the other firms that they essentially are competing against for building OWP. For instance, some of the firms are developing their own technology which one would assume implies that they are interested in promoting. However, when asked whether they thought it would be important to settle on a dominant design, i.e., their own, they reported the opposite of what I anticipated, namely that they wanted to remain open-minded and continue exploring and testing a variety of technologies in conjunction with the other firms.

> *"There are a number of concepts and technologies that we should consider eventually, but I think it's good that the technology development is allowed to continue so that you do not lock yourself into a concept perhaps, it is a bit up to each individual what one wants to go for and what one believes in, but the technology development is happening fast. For example, in relation to turbines, we are talking about a 15 MW turbine soon that can produce even more, so the scale of the turbines has quite a lot to say, and the development there is relatively fast and it's important to get down costs. So no, there are constant developments and I think it must be allowed and supported for us to find the best solutions and optimize them eventually."* (Firm 3).

As mentioned, literature on IE assumes that an industry is created through an accumulation of inputs from multiple actors that eventually generate a momentum, which in turn harness the inputs of the distributed actors. So, as the OWP industry gains momentum, an emerging path starts enabling and restraining the activities of the involved firms. As a result, the firms in the industry become embedded in the institutional arrangement they shape, which successively shapes them over time. Therefore, to my understanding, it might be the case that the firms practice the precautionary principle in deciding on a specific technology, particularly for floating offshore wind, to ensure that the emerging path of the offshore wind industry fulfills its potential both in Norway and internationally. Like Firm 3 mentions in the quote above, the development of wind turbine technology is happening fast. Thus, it is important to not become locked-in on a technological path that constraints the firms to develop new technologies that can help reduce the costs even more. Consequently, another new alliance that has been established and that is of particular importance for the firms during the industry takeoff stage, is their alliances to policymakers, which the previous section on drivers elaborated on. In sum, the firms have achieved closer ties to policymakers and are therefore more able to influence the

development of the OWP industry to their advantage, which in turn increases the industry's legitimacy.

5.3.2 CREATIVITY

In the first section, I presented the barriers that the firms are currently facing during the industry takeoff stage for OWP. To reduce these barriers, the findings illustrate that the firms apply creative measures to partake in industry building. This was made particularly evident in relation to the uncertainties regarding the EEA agreement, specifically in relation to how the government might be able to secure national content among supplier firms:

> *"Concerning Norwegian content specifically it is possible to be a little creative. There are some who have already done it in some places such as in Scotland, where they have asked for a kind of binding supply-chain statement in the competition that does not provide any 'points', but the actors still have to commit to it even though you don't really get any 'points' if you have more Scottish content or not, but it shows what you think about the supply chain for example."* (Firm 4)

Thus, what is apparent when faced with ambiguity during the industry takeoff stage, is that Firm 4 scanned for more information and identified a possible solution in Scotland (Santos & Eisenhardt, 2009). During the initial stages of an industry, there are many uncertainties that has yet to be resolved. As firms in the nascent stages often have a resource scarcity, they utilize existing resources and creative improvisations when stumbling upon uncertainties, which was furthermore made evident by Firm 4. Moreover, even though Informant 2 initially advised the government to abide by the EEA agreement 'to be in the clear', interestingly they also suggested that the Ministry of Petroleum could "be smart about it" and try to be creative for ensuring a diversity of firms:

> *"I think you can think a little creatively and you can try to find ways to write requirements in a tender process to give an advantage to small businesses that do not violate WTO regulations, or the EEA or national regulations. It's the institution that is the planner of the licensing process that must think in a smart way."* (Informant 2).

Nevertheless, the EEA agreement is not something the firms can simply try to influence to their advantage. On the other hand, Jolly and colleagues (2016) argue that firms are engaged

in an ongoing struggle to challenge institutional arrangements through their creative efforts, which was evidently the case in relation to the EEA agreement as illustrated by Firm 4. Moreover, the findings also show that the firms are creative in that they to influence the guide for area allocation, the licensing process, and applications for offshore wind power, through regulatory hearing responses. As mentioned in the second section, the firms emphasized the importance of sustainability in securing national content. Similarly, Firm 5 suggested that another way of securing national content can be achieved by suggesting that the Ministry of Petroleum and Oil set requirements for health, safety, and environment in the guide:

> *"It's important to include the close ties we have with interest organizations in Norway, the experience we have with using labor that is confident in their working conditions, and confident that we put health and safety first, and that we will have proper working conditions- this is something that we believe is something that Norwegian firms can use to compete abroad and make it a competitive advantage. We intend to use it to illustrate that we want to build an industry in a proper way and contribute to both good and safe jobs in all countries where we are going to build projects."* (Firm 5).

Moreover, as there currently is a window of opportunity for OWP, it is important for the firms to take advantage of the situations as it has a limited time frame. According to the presumed timeline for the licensing process presented in the guide, the entire process from announcement of areas to having the project being installed, will take about 10 years. Therefore, in accordance with law firms, the firms in my sample have proposed to either cut down some of the steps of the licensing process or do *parallel processes* (Seminar 19.10.2021). Thus, I argue that this notion uncovers how the firms utilize institutional strategies for shaping regulatory framework. For instance, the allocation process is thought be significantly shortened down by 1) to run parallel processes, so that pre-qualification of the firms is run in parallel with area announcements and 2) allocate areas before other processes, such as hybrid solutions and role distributions, have been clarified. Firm 1 has also mentioned that they have proposed in their response to the regulatory hearing that there should be conducted a socio-economic analysis of Sørlige Nordsjø II now, even before the project has been designated to a developing firm:

> *"What we have proposed is to already start conducting a socio-economic analysis of the project. The Ministry of Finance has a very strict template for how it should be done, and*

our suggestion is in accordance with the EEA agreement as far as I have understood." (Firm 1).

Overall, the firms in my sample all shared the same concerns regarding the licensing process and emphasized that it must be accelerated so that Norway does not lose the prosperous opportunities for industrial development and job creation that the offshore wind industry represents. While it is important to accelerate the development by either conducting parallel process or cut down some of the steps, this cannot come at the expense of co-existence.

5.3.3 ENSURING CO-EXISTENCE

As the firms are beginning to prepare for building offshore wind on the Norwegian shelf, they shared some thoughts on the importance of ensuring co-existence, from even before the licenses are allocated, to gain acceptance and legitimacy from other industries as well as civil society:

> *"We focus on this a lot, we think it will be important, and a working group of the Ministry of Petroleum and Energy has also been established around that topic. It will be very important, and you must see that it benefits more people, instead of it being at the expense of other people's interests, which is very much what happened with onshore winds. You take from locals some values for which they don't get much in return for, really. […] So, it's to have a good dialogue and adapt their solutions based on those who have other interests in that area, which is important. And when you take away some values you should be able to compensate for it or try to find a solution that doesn't affect the values they have in the area as much."* (Firm 4).

So far, there have only been allocated three licenses for building offshore wind in Norway. Hywind Tampen marks not only the first offshore wind park, but also the first *floating* offshore wind park, and is expected to be finished constructed in 2022. As Hywind Tampen will become the first offshore wind park in Norway and its construction is well underway, naturally this project has been an object of inquiry for the firms in my sample. Following the licensing process of Hywind Tampen, the fishing industry was not pleased by the handling of the process, as they argued that their objections along the way were not considered. Additionally, as mentioned in Chapter 2, there has been a growing resistance towards onshore wind. Thus, what I gathered from the interviews with the firms in my sample are highly

concerned about securing *co-existence* in their projects. Following the controversies regarding Hywind Tampen and the fishing industry, the government constructed a cooperation forum for offshore wind that was highly desirable. Firm 5 extend on the importance of co-existence in relation to industries to also include the importance of creating an industry for the civil society as well as the species diversity:

> *"We are very concerned with it being essential for our industry to contribute to solving the climate crisis in a way that also benefits people and in a way that considers biodiversity. When it comes to people and coexistence with other industries, it's incredibly important for us to work with this right from the start. It is not something you can put into a project towards the end, you must work with it systematically over time. We are involved in several different projects and incentives in Norway to contribute with this. We are sitting in this newly appointed cooperation forum created by Tina Bru, with the aim of bringing industries together and share experiences and understand each other better and find out how we can cooperate, it's a very good initiative that we hope the next government continues."* (Firm 5).

Fittingly, co-existence was the main theme of the annual "Offshore Wind Conference" that I attended in October 2021. At the conference, actors, institutions, and other industries that are going to be affected by the offshore wind parks in some way, were invited to share their concerns and partake in a panel discussion. During the conference, it was clear that the cooperation forum had been well-received, not only by the representants from interest organizations, but also by the firms. As mentioned, securing legitimization is considered as a necessary step for emerging technologies (Köhler et al., 2019). Similarly, legitimization is an important part of the industry building, especially during the takeoff stage. To my understanding, the firms in my sample have learned their lesson that by focusing on co-existence, the firms are acknowledging that there are more actors than merely themselves that will partake in the creation of the OWP industry. Moreover, during the industry takeoff stage, it is of great importance that the firms reduce uncertainties when partaking in the industry building of OWP. Thus, facilitating for co-existence through dialogue in forums such as the cooperation forum represents one such starting point for laying the foundations for a new, inclusive offshore wind industry.

5.3.4 INITIATING AND ENGAGING IN R&D

Initiating research and development has been an important activity for the firms to partake in the industry building of the offshore wind industry, as it functions as a way of both reducing costs as well as uncertainties. For instance, the OffshoreGrid project will ensure new technology, knowledge, and solutions for enabling profitable development of offshore wind, as well as knowledge concerning how the power from offshore wind parks will be connected to the power grid. Moreover, by initiating and engaging in R&D, the firms are shaping the technology and testing different designs. For instance, Norway's first floating wind turbine, Hywind Demo, reduced costs by 70% in an 8 years' time. Hywind Demo, now named Unitech Zefyros, was developed by Equinor by using existing technologies and competences from the O&G industry and has become a widely design in Equinor's floating offshore wind parks and will similarly be used to build Norway's first floating offshore wind park, Hywind Tampen. Accordingly, this type of technological breakthrough has enabled firms to engage in floating offshore wind power, as Zefyros helped demonstrate the potential of using existing expertise from the O&G industry for developing OWP technologies, in addition to illustrate that there is great potential in reducing the costs for floating offshore wind power. Relatedly, cost reduction was an apparent theme with the firms:

> *"I think it is obviously important for the offshore wind industry to help reduce costs and this will be enabled by setting up several large volume projects so that you get experience in building and gain experience with what steps you can take to cut costs. We are very interested in helping to make it happen on floating offshore wind, where as you said where we have technology that we work with, but I think and that it may well be that there are several different technologies that will turn out to be good solutions, so we have not locked ourselves into just one solution, but we are absolutely committed to contributing to cost reductions for the industry."* (Firm 5).

However, as mentioned, some of the firms are not developing their own technologies but rather focus on building-upon the existing technologies such as the Zefyros technology. I asked all firms about how they had taken advantage of the knowledges deriving from the different research and demonstration centers, knowing that they had very different approaches to this. When asking the firms that do not develop their own technology about the value of the different research centers, it was made clear that these are fundamental for their engagement in OWP:

"Absolutely, the demonstration projects are very important for the whole industry. In other words, we do not develop our own technology or concept, but we are very concerned with technology development in the sense that we have some research projects we are involved in, for example to streamline and optimize processes and achieve profitable offshore wind development. A lot of exciting things have happened at the MET-center that have been important for the development of offshore wind, both with Hywind Demo which now became Zefyors, and this summer they set up a new mill called TetraSpar, so there is a lot going on in the research around these turbines that is important for the entire industry and testing of this, so it's very important" (Firm 3).

Supposedly, as some of the firms that are applying for building a license are not developing their own technology, this notion of leaning-upon the fact that the existing and future technologies, especially in relation to floating offshore wind power, rather resemble the US' "breakthrough" strategy of entrepreneurship (Garud & Karnøe, 2003). This understanding of Norwegian firms' engagement in developing renewable energy technologies coincides with Hanson, Kasa and Wicken's (2011) presumption. They argue that related to the development of renewable technologies in Norway, this strategy rather resemble the breakthrough strategy which is characterized by focusing on creating technological breakthroughs that will create new and more efficient production methods (Hanson et al., 2011). Nevertheless, as we have seen throughout the analysis, the firms engaged in the industry building of OWP in Norway, draw on several characteristics that constitutes the bricolage stragy.

5.4 SUMMARY OF CHAPTER

This chapter presented a detailed description of what the firms experience as barriers and drivers in their efforts to engage in the industry building of the offshore wind industry during the takeoff stage. Moreover, the different measures taken by the firms in this process to reduce apparent uncertainties were presented and analyzed. In the next chapter, the most essential factors that emerged from the analysis are discussed considering the theoretical framework and the proposed research question.

6 DISCUSSION

In the following chapter I discuss the empirical findings considering the theoretical framework presented in Chapter 2. I start by summarizing the main findings, and thereafter bring forward the research question to reflect on what new empirical insights this thesis has contributed to.

6.1 SUMMARY OF FINDINGS AND EMPIRICAL CONTRIBUTION

This thesis set out to extend on previous work related both to the offshore wind industry in Norway and sustainability transitions by exploring the role of agency in firms in their efforts of contributing to industry building. The thesis contributes with empirical insights on the development of the offshore wind industry in Norway as I reveal how the industry has matured past the incubation stage and has entered the stage which I refer to as the industry takeoff. Furthermore, the empirical findings extend on what this takeoff stage implies for the firms in relation to increasing legitimacy and reducing uncertainties in their efforts for partaking in industry building of the offshore wind industry. Specifically, my findings illustrate that at this stage in the development of the OWP industry, the firms have attained more power and legitimacy which is expressed through the new alliances, the emergence of mobilized networks (i.e., clusters, trade unions, interest organizations), in the firms' efforts of cultivating and maintaining relationship with decision markers, as well as the progress in the technological development. Moreover, the thesis extends on Normann's (2017a) findings which illustrate that in the initial stages of the offshore wind industry, there was a lack of mobilized networks which played a part in closing the initial window of opportunity. Hence, in this thesis, I have exposed how the firms have, together with well-organized network and strategic actors, brought the industry past the initial stage through industry building and into the industry takeoff stage. In the following section I will return to the research question and initiate a discussion based on how the empirical findings either concur or contradict the theoretical framework.

6.2 RQ: HOW DO FIRMS WORK WITH BARRIERS AND DRIVERS RELATED TO INDUSTRY BUILDING IN THE TAKEOFF STAGE?

The literature on institutional entrepreneurship conceptualizes how new organizational solutions, like a new industry, come into existence, and contributes to an understanding of how it can be well-established over time. Hence, this understanding resembles the processes of

socio-technical transitions but puts a greater emphasis on the unit of analysis' *agency* to affect change, which in this case reflects the firms' ability to intentionally reorient their actions to satisfy their needs and goals (Giddens, 1984). In this thesis, the firms' goals are reflected in the objective of contributing with industry building of OWP in the takeoff stage. These insights are valuable as they can contribute to an understanding of how firms partake in industry building through legitimizing renewable technologies and industries. As mentioned, deliberate decline of carbon-intensive industries carries some challenges, so instead of merely focusing on phasing-out incumbent regimes such as O&G, transition scholars express the necessity of accelerating renewable energy. Moreover, firms play critical roles in sustainability transitions in terms of the technologies and services they develop, as well as how they work toward the formation of new industries as they engage in industry building. In sum, firms partake in creating new industries, and by applying theories of institutional entrepreneurship, this can contribute to a deeper understanding of the role of firms in sustainability transitions.

In this thesis, I reveal that the offshore wind industry has entered the *industry takeoff stage*. As mentioned in the aims and objectives, the thesis sets out to 1) explore the role of agency in industry actors (firms) during sustainability transitions and 2) understand how an emerging industry matures into the second phase of sustainability transition, which I refer to as the industry takeoff stage. This stage is characterized by signs of commercial viability at the point where industry sales begin to takeoff (Eggers & Moeen, 2021; Moeen & Agarwal, 2017). So, based on the analysis there are several factors that illustrates how the OWP has matured and entered the takeoff stage. First, there has been mobilized networks and strategic actors in the OWP industry which help legitimize the activities and ultimately contribute to industry building. Second, there has been conducted considerable R&D, especially in terms of floating offshore wind power, which has helped reduced costs and increased legitimacy for the technology. Third, large strategic actors have entered OWP which can help influence and ultimately legitimize the network structure of OWP (Mäkitie et al., 2018). In sum, the analysis illustrates that like Garud and Karnøe (2003) suggests, the offshore wind industry has generated a momentum because of the inputs of distributed actors (i.e., firms, clusters, trade unions, policymakers, engineers), and that it is this development that has led the OWP into the industry takeoff stage. Now, in this takeoff stage, the OWP industry continues to gain momentum as the firms collectively partake in industry building while reducing uncertainties in the emerging industry. Similarly, it is in this this stage this thesis contributes with empirical insights.

From the literature on institutional entrepreneurship (Benner & Tripsas, 2012), we learn that in the emerging stages of an industry, the institutional context is characterized by extreme

ambiguity and uncertainty. This coincided with the empirical findings that illustrates how the firms in the emerging offshore wind industry are affected by barriers in the form of ambiguity and uncertainties reflected in the unclear ambitions and undefined regulatory frameworks (related to the EEA agreement and the offshore grid). Moreover, as the literature suggests (Eggers & Moeen, 2021; Santos & Eisenhardt, 2009), when faced with these barriers the firms set out to reduce the uncertainties. As we have seen through the analysis, for instance in the case of the offshore grid, the firms engaged in research projects to increase their knowledge and understanding of the offshore grid and develop new technology and solutions that can enable profitable development of OWP. Relatedly, as is apparent in the case of the OffshoreGrid project where several actors collectively engage in institutional work to reduce uncertainties, the theories of institutional entrepreneurship postulates that by working collectively to shape the organizational boundaries, the firms will be more likely to succeed with the legitimization of the emerging industry (Benner & Tripsas, 2012). Therefore, rather than withholding information that could have essentially been used as competitive leverage when applying for a license to build OWP, the firms collaborated through various forums and clusters, in effort to build legitimacy for the OWP industry. Through collaboration and cooperation, the firms will be more likely to reduce uncertainties and ambiguities that arise, so all things considered, it can be argued that collaboration is likely to be more strategic than being confidential and reserved.

Ever since the government made available Utsira Nord and Sørlige Nordsjø II for building OWP, there has been an increasing number of firms that have engaged in the emerging industry. In other words when the government in 2020 decided to finally proclaim that they wanted to build a new supplier industry for OWP in Norway, the developing and operating firms followed shortly after. So, the empirical findings in this thesis have exposed that the firms engage in industry building, which is perhaps best illustrated through the different institutional strategies that they have applied in this process. One such strategy has already been presented and refers to how the firms have mobilized collectively. This is reflected both in how they have entered cooperation, but also how they collectively try to influence policy change through addressing the same issues in the regulatory hearing. Moreover, some of the firms have applied institutional strategies of bridging global and local partners in their partnerships (Jolly et al., 2016), which provides them with the opportunity to secure operations in a larger scale, as well as it makes available capital and resources that are helpful during an industry takeoff.

Another fundamental part of industry building during the takeoff stage concerns how firms affect, and are affected by, regulatory framework. In this thesis I found that regulatory frameworks have functioned both as a barrier and as a driver to the firms during the takeoff

stage. Evidently, the EU taxonomy functioned as a driver for the firms engaged in the industry building of OWP. As presented in the findings related to the EU taxonomy, it was evident that most of the firms treated this regulatory framework as exogenous as they did not try to influence it in any way because the taxonomy's implications would benefit them. Even though Andersen and colleagues (2020) argue that this strategy of merely conforming to the regulation is the least strategic strategy a firm can apply, in this specific domestic context, I would argue otherwise. A key point in the IE literature emphasizes the importance of deviating from the institutional context which can be a particularly difficult process if the emerging industry disrupts existing regimes (Garud & Karnøe, 2003; Geels, 2014). As mentioned, because of Norway's incumbent O&G regime and the subsequently close ties between incumbent firms, policymakers, and interest organizations (Normann & Tellmann, 2021), these types of policies that directly affects carbon-intensive industries would be difficult to implement in Norway. Therefore, when faced with the implications of the EU taxonomy which I argue resemble both a policy mix aimed at the creation of new (OWP) and destruction of old (O&G (Kivimaa & Kern, 2016), the firms are being strategic in conforming to the taxonomy as this can help the firms both differentiate from the O&G industry and thus gain more legitimacy.

Another way the firms are partaking in industry building is reflected in their business models. Following controversies regarding onshore wind in Norway, there has been a growing resistance towards onshore wind and the technology, which ultimately have decreased the industry's legitimacy among the civil society. As the analysis draws upon, all firms in my sample emphasize the importance of incorporating co-existence into their business model and shared concerns regarding the necessity of having a continues dialogue with other industries as well as the civil society, throughout the entire process from planning the offshore wind parks to operating them. Similarly, the firms in my sample also emphasized the importance of incorporating sustainability as a differentiating factor in their business models, both to clearly deviate from previous institutional arrangements that some of the firms have been a part of as they have diversified from the O&G industry, but also in conjunction with the anticipated competition with other foreign firms. Relatedly, Firm 5 suggested that it would be a good idea to set strict requirements for sustainability and health, safety, and environment as a basis for deciding on whichever firm will be allowed to develop OWP at either Utsira Nord or Sørlige Nordsjø II, which resemble two qualities that Norwegian firms can outcompete foreign on. Conversely, another barrier illustrates how the firms in my sample venture into other international markets because of the uncertainties and ambiguities that government has expressed. This was an interesting finding as it illustrates how some of the Norwegian firms are

already competitive in that they can win tenders in other markets. However, this only applies to a small number of Norwegian firms. Therefore, if Norway is to succeed in developing a new industry, the firms request more licenses that will enable a domestic market where more firms are given the opportunity in gaining valuable experiences so that they have reference from real-world projects.

Another finding that coincides with the literature relates to how the firms have applied creative measures in reducing uncertainties in the takeoff stage. In this stage, Jolly and colleagues (2016) refer to this institutional strategy as engaging in *entrepreneurial bricolage*, which relates to Andersen and colleagues' (2020) findings that illustrates how firms in the takeoff stage can influence their regulatory environment *despite* resource scarcity. When the firms faced the complex issue of the EEA agreement, it was apparent that this type of institutional constraints both forced them and enabled them to apply improvisation capabilities. As Santos and Eisenhardt (2009) suggests, it is in the nature of a firm to scan for more information when faced with ambiguity, which was illustrated by Firm 4 as they found that other countries such as Scotland have managed through secure national content. Thus, the firms combined their limited resources with efforts of improvising and took pragmatic action to develop novel solutions for securing national content for the offshore wind industry.

Consequently, the findings regarding the firms' actions in the industry takeoff stage coincide with what Garud and Karnøe (2003) label as a bricolage strategy, as this strategy connotes resourcefulness and improvisation on the part of the involved actors and is characterized by co-shaping during industry building. As presented, the firms have valued collaboration and co-shaping during the takeoff stage of the offshore wind industry. However, similar to Hanson, Kasa and Wicken (2011) I would argue that the firms' actions during the takeoff stage resemble a *combination* of the bricolage and breakthrough strategies. Hanson, Kasa and Wicken (2011) assume that if the firms in Norway were to succeed in applying a bricolage strategy for offshore wind, they should start by building bottom-fixed wind power as this resemble a strategy characterized by more gradual changes in the technological development. Garud and Karnøe (2003, p. 282) argues that instead of pursuing a design intensive R&D approach, through a bricolage strategy, firms can deploy prototypes with simpler engineering heuristics to create a process of trial-and-error learning. So, as my sample indicates, not all firms that are applying for a license to build OWP at either Utsira Nord or Sørlige Nordjsø II have firsthand experiences from developing offshore wind parks. Similarly, not all firms are pursuing R&D, but rather depend on existing knowledges generated from demonstration projects. Conversely, the breakthrough strategy posits an exaggerated belief that

technological development will overcome more incremental advancements of existing technologies. In relation to floating offshore wind power, it is my understanding that firms have, to a greater extent, a belief that Norwegian firms are still able to achieve a first-mover advantage in FWP, because of their existing experiences from the O&G industry. Nevertheless, as the empirical findings indicate, the development of the offshore wind industry have transpired because of collaboration across a distributed set of actors, including the firms, clusters, policymakers, and civil society, reflecting the notion co-shaping which is a fundamental part of the bricolage strategy. Consequently, whether this combined strategy of both bricolage and breakthrough result in a new, Norwegian offshore wind industry, remains to be seen.

7 CONCLUDING REMARKS

From October 31 to November 13, world leaders gathered in Glasgow for the 26th United Nations Climate Change Conference to revisit and evaluate the measures taken in Paris 2015. Here, world leaders agreed to the necessity for meeting the 1.5 degrees target, which only underlines the importance of accelerating sustainability transitions towards a zero-emission carbon society. This thesis tried to pick up the threads from Köhler and colleagues' (2019) call for future research that connects management- and organizational studies with transitions studies. Moreover, this thesis set out to extend on previous work related both to the offshore wind industry in Norway and sustainability transitions by exploring the role of agency in firms in their efforts of contributing to industry building. Consequently, the thesis contributes with empirical insights on the development of the offshore wind industry in Norway as I reveal how the industry has matured past the incubation stage and has entered the stage which I refer to as the industry takeoff. Furthermore, the analysis and discussion extend on what this takeoff stage implies for the firms in relation barriers and drivers. Thus, this thesis has contributed to the transitions literature by applying concepts of institutional entrepreneurship to transitions related questions. Specifically, the empirical findings in this study exposes how firms, when faced with the barriers in the emerging industry apply institutional strategies such as influencing regulatory frameworks, develop new business models that help them differentiate from existing incumbent industries, mobilize collectively, and initiate research and development. As a result of the firms' institutional strategies, it is apparent that the offshore wind industry has gained legitimacy and has entered the next stage of stage of the transition.

However, it is important to address that this study focusing on a domestic context as it is limited to a single country, namely, Norway. This reduces the study's external validity. Additionally, the study focused on firms as the institutional entrepreneur and regarded their actions at the root of institutional change and industry building. However, the creation of an industry is a very complex process and involves a variety of different actors that I have not included in this study. Moreover, the study only focused on a specific stage during the industry lifecycle, namely the industry takeoff, and is therefore exclusively relevant to this stage. Thus, following firms over a period would have given more in-depth insight into how firms contribute to industry building.

7.1 IMPLICATIONS AND FURTHER RESEARCH

In terms of policy implications, the empirical findings add to the importance of clear ambitions from the government. It is evident that industry actors such as firms play an important

part in developing new technologies, mobilize resources, and creating industry relations to strategic actors through which cooperation helps influence and essentially change uncertainties that work as a barrier towards an industry takeoff. Therefore, if Norway is to secure a new national industry, it will be beneficial for the government to assist the firms in establishing legislations that support the activities of the firms during the takeoff stage. Specifically, the government should provide the firms with clearly stated ambitions for how much OWP should be produced within a given period. This ambition should include a concrete time frame, clarification of criteria for receiving subsidies, as well as new licenses with the possibility of installing larger volume OWP parks. Moreover, the Ministry of Oil and Petroleum should consider split up both Utsira Nord and Sørlige Nordsjø II into several areas as this would enable more firms to gain valuable experience so that they have reference from real-world projects, which in turn would increase chances of developing a new Norwegian industry. Additionally, the government should consider cut down some of the steps in the licensing process, or at least conduct parallel processes. However, this must not come at the expense of maintaining co-existence with other industries or civil society.

This thesis was motivated by an identified research gap within transitions studies that neglected the role of *agency* during socio-technical transitions. Therefore, I responded to the call for applying theories of institutional entrepreneurship into the field of sustainability transitions and chose to explore the case of the offshore wind industry in Norway. As mentioned, one of this study's limitations is due to its focus on a specific stage during an industry's lifecycle. Therefore, there is still need for further research that continues investigating the role of industry actors over a longer period than I was able to conduct in this study. Moreover, as mentioned in the introduction, there is a need for more research that focuses on the industry takeoff stage. Therefore, another notable framework in transitions literature framework that is relevant to use for explaining the success and failure of the development and diffusion of technologies, is the Technological Innovation System (TIS) framework. As of now, the technology of floating offshore wind lacks an analysis based on the TIS-framework. As mentioned in this thesis, Norwegian firms are particularly positioned to succeed in taking a first-mover advantage for this technology. Therefore, future research would benefit from conducting a TIS-analysis of floating offshore wind. Relatedly, scholars have urged more research directed towards breakthrough, diffusion, and tipping points and based on the findings in this thesis I believe this to be some of the more important things that transitions research on the offshore wind industry can contribute with. This is beginning to happen in the real world in some sectors, and the grand challenges like climate change require urgent acceleration in

transitions (Köhler et al., 2019, Geels, webinar, 2021). Focusing on diffusion can therefore be considered the necessary next step for the offshore wind industry in Norway.

8 REFERENCES

Afewerki, S., Aspelund, A., Bjørgum, Ø., Hanson, J., Karlsen, A., Kenzhegaliyeva, A., . . . Sæther, E. (2019). *Conditions for growth in the Norwegian offshore wind industry*. Retrieved from Oslo: http://hdl.handle.net/11250/2602644

Andersen, A. D., & Gulbrandsen, M. (2020). The innovation and industry dynamics of technology phase-out in sustainability transitions: Insights from diversifying petroleum technology suppliers in Norway. *Energy Research & Social Science, 64*, 101447. doi:https://doi.org/10.1016/j.erss.2020.101447

Andersen, I. (2021). Får støtte til å utvikle lønnsomme løsninger for havvind – og tilknytning til strømnettet. Retrieved from https://www.tu.no/artikler/far-stotte-til-a-utvikle-lonnsomme-losninger-for-havvind-og-tilknytning-til-stromnettet/513100?key=SioFFfvm

Andersen, K. V., Frederiksen, M. H., Knudsen, M. P., & Krabbe, A. D. (2020). The strategic responses of start-ups to regulatory constraints in the nascent drone market. *Research policy, 49*(10), 104055. doi:10.1016/j.respol.2020.104055

Arthur, W. B. (1994). *Increasing returns and path dependence in the economy*. Ann Arbor, Mich: University of Michigan Press.

Barin, L. C., Aguilar, N. D., Leca, B., & Gond, J.-P. (2015). Institutional Resilience in Extreme Operating Environments: The Role of Institutional Work. *Business & Society, 55*(7), 970-1016. doi:10.1177/0007650314567438

Benner, M. J., & Tripsas, M. (2012). The influence of prior industry affiliation on framing in nascent industries: the evolution of digital cameras. *Strat. Mgmt. J, 33*(3), 277-302. doi:10.1002/smj.950

Berkhout, F., Smith, A., & Stirlingh, A. (2004). Socio-technological regimes and transition contexts. In B. Elzen, F. Geels, & K. Green (Eds.), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy* (pp. 48–75). Cheltenham: Elgar, E.

Bijker, W., & Pinch, T. (1987). The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other. In (Vol. 14, pp. 17-50).

Boschma, R., Coenen, L., Frenken, K., & Truffer, B. (2017). Towards a theory of regional diversification: combining insights from Evolutionary Economic Geography and Transition Studies. *Regional studies, 51*(1), 31-45. doi:10.1080/00343404.2016.1258460

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3*(2), 77-101. doi:10.1191/1478088706qp063oa

Casprini, E., Di Minin, A., & Paraboschi, A. (2019). How do companies organize nascent markets? The BlaBlaCar case in the inter-city shared mobility market. *Technological forecasting & social change, 144*, 270-281. doi:10.1016/j.techfore.2018.01.012

Castellacci, F. (2008). Innovation and the competitiveness of industries: Comparing the mainstream and the evolutionary approaches. *Technological forecasting & social change, 75*(7), 984-1006. doi:10.1016/j.techfore.2007.09.002

Creswell, J. W. (2013). *Qualitative inquiry & research design : choosing among five approaches* (3rd ed. ed.). Los Angeles: Sage.

DiMaggio, P. (1988). Interest and agency in institutional theory. In L. G. Zucker (Ed.), *Research on Institutional Patterns: Environment and Culture*. Cambridge: Ballinger Publishing Co.

Eggers, J. P., & Moeen, M. (2021). Entry Strategy for Nascent Industries: Introduction to a Virtual Special Issue. *Strategic management journal, 42*(2), O1-O15. doi:10.1002/smj.2994

Engen, O. A. (2009). The development of the Norwegian petroleum innovation system : a historical overview. In (pp. s. 179-207). Oxford: Oxford University Press.

EuropeanComission. (2020). EU taxonomy for sustainable activities. Retrieved from https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

Farla, J., Markard, J., Raven, R., & Coenen, L. (2012). Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological forecasting & social change, 79*(6), 991-998. doi:10.1016/j.techfore.2012.02.001

Fisher, G., Kotha, S., & Lahiri, A. (2015). Changing with the Times: An Integrated View of Identity, Legitimacy, and New Venture Life Cycles. *Academy of Management Review, 41*(3), 383-409. doi:10.5465/amr.2013.0496

Flick, U. (2009). *An introduction to qualitative research* (4th ed. ed.). Los Angeles, Calif: SAGE.

Fuenfschilling, L., & Truffer, B. (2016). The interplay of institutions, actors and technologies in socio-technical systems — An analysis of transformations in the Australian urban water sector. *Technological forecasting & social change, 103*, 298-312. doi:10.1016/j.techfore.2015.11.023

Garud, R., Hardy, C., & Maguire, S. (2007). Institutional Entrepreneurship as Embedded Agency: An Introduction to the Special Issue. *Organization studies*, *28*(7), 957-969. doi:10.1177/0170840607078958

Garud, R., & Karnøe, P. (2003). Bricolage versus breakthrough: distributed and embedded agency in technology entrepreneurship. *Research policy*, *32*(2), 277-300. doi:10.1016/S0048-7333(02)00100-2

Garud, R., Kumaraswamy, A., & Karnøe, P. (2010). Path Dependence or Path Creation? *Journal of management studies*, *47*(4), 760-774. doi:10.1111/j.1467-6486.2009.00914.x

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research policy, 33*(6), 897-920. doi:10.1016/j.respol.2004.01.015

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental innovation and societal transitions*, *1*(1), 24-40. doi:10.1016/j.eist.2011.02.002

Geels, F. W. (2014). Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, culture & society*, *31*(5), 21-40. doi:10.1177/0263276414531627

Geels, F. W., & Penna, C. C. R. (2015). Societal problems and industry reorientation: Elaborating the Dialectic Issue LifeCycle (DILC) model and a case study of car safety in the USA (1900–1995). *Research policy*, *44*(1), 67-82. doi:10.1016/j.respol.2014.09.006

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research policy*, *36*(3), 399-417. doi:https://doi.org/10.1016/j.respol.2007.01.003

Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017). Sociotechnical transitions for deep decarbonization. *Science, 357*(6357), 1242-1244. doi:10.1126/science.aao3760

Genus, A., & Coles, A.-M. (2008). Rethinking the multi-level perspective of technological transitions. *Research policy, 37*(9), 1436-1445. doi:10.1016/j.respol.2008.05.006

Giddens, A. (1984). *The constitution of society : outline of the theory of structuration*. Cambridge: Polity Press.

Gregersen, T., & Tvinnereim, E. (2019). Hva mener folk om vindkraft på land og til havs? *Energi og klima*. Retrieved from https://energiogklima.no/nyhet/vindkraft-pa-land-og-til-havs-nordmenns-holdninger/

Hafsaas, S. L., & Øystese, O. (2020). Flere nordmenn negative til vindturbiner både til lands og til havs. *NRK*. Retrieved from https://www.nrk.no/vestland/flere-nordmenn-negative-til-vindturbiner-bade-til-lands-og-til-havs-1.15163575

Hansen, G. H., & Steen, M. (2015). Offshore oil and gas firms' involvement in offshore wind: Technological frames and undercurrents. *Environmental innovation and societal transitions, 17*, 1-14. doi:10.1016/j.eist.2015.05.001

Hanson, J., Kasa, S., & Wicken, O. (2011). *Energirikdommens Paradokser*.

Hargrave, T. J., & Van De Ven, A. H. (2006). A Collective Action Model of Institutional Innovation. *The Academy of Management review, 31*(4), 864-888. doi:10.5465/AMR.2006.22527458

Hay, I. M. (2016). *Qualitative research methods in human geography* (Fourth edition. ed.). Don Mills, Ontario: Oxford University Press.

Hernes, S., Erraira, J., & Winje, E. (2020). *Ringvirkningsanalyse for flytende havvind på Utsira*. Retrieved from Menon Economics: https://www.menon.no/wp-content/uploads/2020-115-Ringvirkningsanalyse_Industriutviklling.pdf

Hess, D. J. (2014). Sustainability transitions: A political coalition perspective. *Research policy, 43*(2), 278-283. doi:10.1016/j.respol.2013.10.008

Hoffman, A. (1999). Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry. *Academy of Management journal, 42*. doi:10.2307/257008

Holm, M. (2020). Norge trenger havvind nå. Retrieved from https://zero.no/norge-trenger-havvind-na/

Holter, M., Melgård, M., & Riisnæs, I. G. (2021). Den nye regjeringen sier nei til nye strømkabler til utlandet - men gjelder ikke for havvind. Retrieved from https://www.dn.no/energi/statnett/strom/utenlandskabler/den-nye-regjeringen-sier-nei-til-nye-stromkabler-til-utlandet-men-gjelder-ikke-for-havvind/2-1-1081748

Jolly, S., Spodniak, P., & Raven, R. P. J. M. (2016). Institutional entrepreneurship in transforming energy systems towards sustainability: Wind energy in Finland and India. *Energy Research & Social Science, 17*, 102-118. doi:10.1016/j.erss.2016.04.002

Karnøe, P., & Garud, R. (2012). Path Creation: Co-creation of Heterogeneous Resources in the Emergence of the Danish Wind Turbine Cluster. *European Planning Studies, 20*(5), 733-752. doi:10.1080/09654313.2012.667923

Kivimaa, P., & Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. *Research policy, 45*(1), 205-217. doi:10.1016/j.respol.2015.09.008

Klepper, S. (1996). Entry, Exit, Growth, and Innovation over the Product Life Cycle. *The American Economic Review, 86*(3), 562-583. Retrieved from http://www.jstor.org.ezproxy.uio.no/stable/2118212

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., . . . Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental innovation and societal transitions, 31*, 1-32. doi:10.1016/j.eist.2019.01.004

Lechevalier, S., Nishimura, J., & Storz, C. (2014). Diversity in patterns of industry evolution: How an intrapreneurial regime contributed to the emergence of the service robot industry: Res Policy. *Research policy, 43*(10). doi:10.1016/j.respol.2014.07.012

Maguire, S., Hardy, C., & Lawrence, T. B. (2004). Institutional entrepreneurship in emerging fields: HIV/AIDA treatment advocacy in Canada. *Academy of Management journal, 47*(5), 657-679. doi:10.2307/20159610

Markard, J. (2018). The next phase of the energy transition and its implications for research and policy. *Nature Energy, 3*(8), 628-633. doi:10.1038/s41560-018-0171-7

Markard, J., Geels, F. W., & Raven, R. (2020). Challenges in the acceleration of sustainability transitions. *Environ. Res. Lett, 15*(8), 81001. doi:10.1088/1748-9326/ab9468

Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research policy, 41*(6), 955-967. doi:10.1016/j.respol.2012.02.013

Martiniussen, E. (2019). Nordsjøen er det nye Silicon Valley for havvind. Ett land glimrer med sitt fravær. *Teknisk Ukeblad*. Retrieved from https://www.tu.no/artikler/nordsjoen-er-det-nye-silicon-valley-for-havvind-ett-land-glimrer-med-sitt-fravaer-br/468525?key=3sbJmoG7

Mazzucato, M., Kattel, R., Algers, J., & Mikheeva, O. (2021). *The Green Giant: New Industrial Strategy for Norway*. Retrieved from London: https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/thegreengiant_final_19_jan.pdf

Meld. St. 34. (2007). *Norsk klimapolitikk*. Oslo Retrieved from https://www.regjeringen.no/contentassets/c215be6cd2314c7b9b64755d629ae5ff/no/pdfs/stm200620070034000dddpdfs.pdf

Meld. St. 36. (2021). *Energi til arbeid – langsiktig verdiskaping fra norske energiressurser*. (Meld. St. 36). Oslo Retrieved from https://www.regjeringen.no/no/dokumenter/meld.-st.-36-20202021/id2860081/?ch=4

Miles, M. B., Huberman, M. A., & Saldaña, J. (2019). *Qualitative data analysis : a methods sourcebook* (Fourth edition. ed.). Los Angeles: SAGE.

Moeen, M., & Agarwal, R. (2017). Incubation of an industry: Heterogeneous knowledge bases and modes of value capture. *Strategic Management Journal, 38*(3), 566-587. doi:https://doi.org/10.1002/smj.2511

Mäkitie, T. (2020). Corporate entrepreneurship and sustainability transitions: resource redeployment of oil and gas industry firms in floating wind power. *Technology analysis & strategic management, 32*(4), 474-488. doi:10.1080/09537325.2019.1668553

Mäkitie, T., Andersen, A. D., Hanson, J., Normann, H. E., & Thune, T. M. (2018). Established sectors expediting clean technology industries? The Norwegian oil and gas sector's influence on offshore wind power. *Journal of cleaner production, 177*, 813-823. doi:10.1016/j.jclepro.2017.12.209

Mäkitie, T., Normann, H. E., Thune, T. M., & Gonzalez, J. S. (2019). The green flings: Norwegian oil and gas industry's engagement in offshore wind power. *Energy policy, 127*, 269-279. doi:10.1016/j.enpol.2018.12.015

NESH. (2016). *Forskningsetiske retningslinjer for samfunnsvitenskap, humaniora, juss og teologi*. Retrieved from Oslo https://www.forskningsetikk.no/retningslinjer/hum-sam/forskningsetiske-retningslinjer-for-samfunnsvitenskap-humaniora-juss-og-teologi/

Normann, H. (2017a). *Politics in energy system transformation. Conditions for the development of an offshore wind industry in Norway.* (PhD). Univeristy of Oslo, Oslo. Retrieved from https://www.researchgate.net/publication/318108288_Politics_in_energy_system_transformation_Conditions_for_the_development_of_an_offshore_wind_industry_in_Norway

Normann, H., & Hanson, J. (2017). The role of domestic markets in international technological innovation systems. *Industry and Innovation, 25*, 1-23. doi:10.1080/13662716.2017.1310651

Normann, H. E. (2015). The role of politics in sustainable transitions: The rise and decline of offshore wind in Norway. *Environmental innovation and societal transitions, 15*, 180-193. doi:10.1016/j.eist.2014.11.002

Normann, H. E. (2017b). Policy networks in energy transitions: The cases of carbon capture and storage and offshore wind in Norway. *Technological forecasting & social change, 118*, 80-93. doi:10.1016/j.techfore.2017.02.004

Normann, H. E., & Tellmann, S. M. (2021). Trade unions' interpretation of a just transition in a fossil fuel economy. *Environmental innovation and societal transitions, 40*, 421-434. doi:https://doi.org/10.1016/j.eist.2021.09.007

Norum, H., & Jørgensen, G. (2021). Slik blir regjeringens havvind-plan. Retrieved from https://www.nrk.no/norge/regjeringen-lanserer-plan-for-satsing-pa-havvind-1.15526985

Prosess21. (2021). *Hovedrapport*. Retrieved from Oslo: https://www.prosess21.no/contentassets/d4c74305ab764cf2b24f3f61f0514f5d/prosess21_rapport_hovedrapport_web-1.pdf

Raes, J. (2020). *Financing Circularity: Demystifying Finance for Circular Economies*. Retrieved from UNEP: https://www.unep.org/news-and-stories/press-release/new-unep-report-lights-way-financial-institutions-shift-more

Rosenbloom, D., & Rinscheid, A. (2020). Deliberate decline: An emerging frontier for the study and practice of decarbonization. *Wiley interdisciplinary reviews. Climate change, 11*(6), n/a. doi:10.1002/wcc.669

Rothaermel, F. T. (2001). Complementary assets, strategic alliances, and the incumbent's advantage: an empirical study of industry and firm effects in the biopharmaceutical industry. *Research policy, 30*(8), 1235-1251. doi:10.1016/S0048-7333(00)00142-6

Røed, T. (2021). *Havvind – Norges grønne livbøye. En kvalitativ studie av norske olje- og gassvirksomheter*. (Master thesis). University of Oslo., Retrieved from http://hdl.handle.net/10852/87508

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed. ed.). London: Sage.

Santos, F., & Eisenhardt, K. (2009). Constructing Markets and Shaping Boundaries: Entrepreneurial Power in Nascent Fields. *Academy of Management journal, 52*(4), 643-671. doi:10.5465/AMJ.2009.43669892

Santos, F. M., & Eisenhardt, K. M. (2005). Organizational Boundaries and Theories of Organization. *Organization science (Providence, R.I.), 16*(5), 491-508. doi:10.1287/orsc.1050.0152

Schumpeter, J. A. (1942). *Capitalism, socialism, and democracy* (2nd ed. ed.). New York: Harper.

Scott, G. (2013). *Doing qualitative research : designs, methods, and techniques*. Boston: Pearson Education.

Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research policy, 34*(10), 1491-1510. doi:10.1016/j.respol.2005.07.005

SSB. (2021). Utenrikshandel med varer. Retrieved from https://www.ssb.no/utenriksokonomi/utenrikshandel/statistikk/utenrikshandel-med-varer

Stratford, E., & Bradshaw, M. (2016). Qualitative Research Design and Rigour. In I. M. Hay (Ed.), *Qualitative research methods in human geography* (Fourth edition ed., pp. 117–129). Canada: Oxford University Press.

Tande, J. (2021). Havvind: Oppstart av nytt prosjekt for havnett i Nordsjøen. Retrieved from https://www.sintef.no/siste-nytt/2021/havvind-oppstart-av-nytt-prosjekt-for-havnett-i-nordsjoen/

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal, 28*(13), 1319-1350. doi:https://doi.org/10.1002/smj.640

Unruh, G. C. (2000). Understanding carbon lock-in. *Energy policy, 28*(12), 817-830. Retrieved from https://EconPapers.repec.org/RePEc:eee:enepol:v:28:y:2000:i:12:p:817-830

Utterback, J., & Suarez, F. (1993). Patterns of industrial evolution, dominant designs, and firms' survival. *Research on Technological Innovation, Management and Policy, 5*.

van der Loos, A., Normann, H. E., Hanson, J., & Hekkert, M. P. (2021). The co-evolution of innovation systems and context: Offshore wind in Norway and the Netherlands. *Renewable & sustainable energy reviews, 138*, 110513. doi:10.1016/j.rser.2020.110513

Venkataraman, S. (1997). The Distinctive Domain of Entrepreneurship Research. *Advances in Entrepreneurship, Firm Emergence and Growth, 3*.

Viseth, E. (2020). EUs nye klimaregler: Havvind til plattformer og karbonfangst offshore ikke godkjent som grønt. Retrieved from https://www.tu.no/artikler/eus-nye-klimaregler-havvind-til-plattformer-og-karbonfangst-offshore-ikke-godkjent-som-gront/503213?key=R5j78Ayd

Viseth, E. (2021). Statnett: Planlegger for hybridkabel for havvind innen 2030. Retrieved from https://www.tu.no/artikler/statnett-planlegger-for-hybridkabel-for-havvind-innen-2030/513835?key=3y4hCL1y

Winje, E., Hernes, S., Lind, L. H., Grimsby, G., & Jakobsen, E. W. (2020). *Virkemidler for å realisere flytende havvind på norsk sokkel*. Retrieved from Oslo: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.menon.no%2Fwp-content%2Fuploads%2F2020-116-Virkemidler-for-%25C3%25A5-realisere-flytende-havvind-p%25C3%25A5-norsk-sokkel.pdf&clen=2038623&chunk=true

Yin, R. K. (2009). *Case study research : design and methods* (4th ed. ed. Vol. vol. 5). Thousand Oaks, Calif: Sage.

Zuzul, T., & Tripsas, M. (2020). Start-up Inertia versus Flexibility: The Role of Founder Identity in a Nascent Industry. *Administrative science quarterly, 65*(2), 395-433. doi:10.1177/0001839219843486

Øvrebø, O., & Øystese, K. (2021). Statnett planlegger utenlandskabel for havvind. Retrieved from https://energiogklima.no/nyhet/statnett-planlegger-utenlandskabel-for-havvind/

Appendix A

Interview guide. Translated from Norwegian to English.

Preliminary questions

- Can you please start by introducing yourself? Your name, position and briefly what your work involves?
- Could you give a short description of the firm and say something about what distinguishes you from other actors within the offshore wind industry?
- What do you consider to be greatest challenge facing the offshore wind industry in the coming years?

Policy

- How does your firm deal with the uncertainties surrounding the amount of OWP that the government decides that Norway should produce within a given year?
- Which signals or specific political measures do you want to see from the government in the time ahead to best facilitate for a positive development of the OWP industry?
- As you may know, the EUs new taxonomy for sustainable activities recently came into effect. How does your firm work with the new criteria?
- How do you work with the uncertainties regarding the EEA regulations?
- How do you work with the uncertainties regarding the offshore grid?
- Are there other regulatory challenges you work on that are related to the construction of OWP (offshore grid/cables/supporting schemes)?

Civil society

- How do you experience the influence of unions in the development of OWP in Norway?
- How do you think past experiences from onshore wind power be applied to the development of OWP?
- How do your firm work with resistance from the population and other industries when you are in the works of building OWP?

Research and development

- What type of clusters or formal network is your firm a member of?
  - What has the participation in such networks and clusters meant for your firm?
- How have you utilized the foundation of knowledge presented by the test centers and demonstration projects within OWP?
- Are you involved with any technology development, or research and development (either through a R&D department or through participation in various research projects)?
  - How important do you consider this effort in the development of OWP industry in Norway in the coming years?

- Do you believe it is important to establish a so-called dominant design for OWP to lower the costs on the technology and speed up the development (if yes/no, why?)?

Concluding questions

- What are your ambitions within OWP?
- Is there anything you would like to add, something I should know or something you would want to question me about before we conclude?
- Can I contact you again if it there is a need for any follow up questions?