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Confronting Disruptive Innovations

- a case Study of Statoil's Business

Unit New Energy Solutions

MSc in Innovation and Entrepreneurship)

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<p>Increasing climate challenges has led to stronger governmental policies and regulations, as well as enhanced demand for sustainability. Technological developments in renewable energy solutions has led to improved profitability and applicability of these technologies, imposing a challenge for incumbent firms in the oil and gas industry. This thesis has been an explorative study of Statoil’s business unit New Energy Solutions (NES) in the context of the energy transition towards a low carbon future. The aim of this study has been threefold; (i) to uncover the rationale of the establishment of NES and the strategic option pursued by Statoil, (ii) to examine how new energy solutions can be designated as disruptive innovations, and (iii) how organizational elements in NES promotes or inhibits Statoil's ability to benefit from disruptive innovations. This thesis shows that new energy solutions can be designated as disruptive innovations for Statoil, and that when confronted by these Statoil pursued a strategy with ambidextrous characteristics. NES, as their acting response was found to constitute organizational elements that may promote a successful response to disruptive innovations. However, lack of autonomy in the unit was found to be the most prominent inhibitor for this success.</p>		
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Solutions

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“It is not the strongest of the species that survive, nor the most intelligent, but the one that is most responsive to change.”

Charles Darwin

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Abbreviations:

BD	Business Development
CCS	Carbon Capture and Storage
CEC	Corporate Executive Committee
CEO	Chief Executive Officer
COP21	Conference of Parties, number 21
EVP	Elected Vice President
GSB	Global Strategy and Business Development
NES	New Energy Solutions
TSB25-S	Taking Statoil Beyond 2025 - Sustainability
SI	Strategy and Innovation
VEN	Ventures
WIC	Wind and CCS

1 Introduction

Since the industrial revolution, dependence on carbon-based energy sources have been vital for the industrialized societies to achieve economic growth. However, the effects of a growing world population, industrialization in developing countries and increasing energy demand, combined with the detrimental effects of anthropogenic climate issues, requires the search for and deployment of sustainable solutions and a transition to less carbon-intensive energy sources. As a collective responsibility, this challenge has brought together countries and governments to set sustainability goals and deploy strategies to meet them. The actions taken by individual states and governments, along with an increased awareness on climate issues and sustainability amongst regular customers, has led to a shift in several industrial sectors. Among the sectors, witnessing the largest change is the energy sector in which increased focus on both supply security and environmental concerns has contributed to a transition from a fossil-based energy supply to the search for technologies to increase the renewable share of the energy mix.

In Norway, this increased focus on climate challenges and sustainability, have put a significant mark on the industrial activities conducted by both private and public industry players, illustrated through the creation of strict governing documents regarding quality, Health, Safety and Environment (HSE), and emissions. The Norwegian Government's proposal to the 2015 annual budget present an ambition to increase focus and investments in technologies for increased CO₂-handling and cost reductions, involving the identification and implementation of measures that may contribute to meet the proposed goal. Measures include research and development of full-scale facilities for viability demonstrations, transport, sequestration and alternative use of CO₂, as well as increased international cooperation to promote CO₂-handling (Stortinget, 2015). For the 21st annual Conference of Parties (COP21), held in Paris in 2015, the Norwegian Government had a great wish to appear as serious actors in the fight against climate change. Being one of Statoil's main shareholders, this clear ambition exerted by the Norwegian Government, combined with the company's own goals to reduce its carbon footprint, served as major contributors to the activities and actions taken by Statoil both before and after COP21.

In the preparations of the COP21 conference in Paris 2015, six CEO's of major oil and gas companies, Statoil, Shell, Eni, BP, Total and BG, came with a joint statement admitting to an increased climate responsibility. In the letter, they emphasize carbon pricing as a powerful and important remedy/incentive to drive ambition and energy of companies into develop low-carbon technologies, and they ask for the world politicians to gather around one joint carbon emission at the forthcoming climate summit (Kongsnes, 2015). The following quote from the letter states the ambition of the companies in question: *“Our companies are already taking a number of actions to help limit emissions, such as growing the share of gas in our production, making energy efficiency improvements in our operations and products, providing renewable energy, investing in carbon capture and storage, and exploring new low-carbon technologies and business models. These actions are a key part of our mission to provide the greatest number of people with access to sustainable and secure energy.”* (UNFCCC, 2015).

The effects of the changes seen in the regulatory space and in the market following the increased focus on sustainability, and the energy-transition moving towards increased usage of low-carbon solutions, is by many organizations considered as challenges for sustained competitiveness. Some will even consider the changes as disruptive for the business in which they take part, and the business model from which they prosper. At the same time, such changes may create business opportunities for new entrants, or enhance the competitiveness of others.

In Statoil's new “Climate Roadmap- creating a low carbon advantage”, the company claim that renewables will account for a significant share of power generation in the future and that renewables are set to represent up to 5-15% of the energy mix by 2040, compared to less than 2% today (Statoil, 2017). Considering this a business opportunity, Statoil has an ambition to grow profitably and potentially expand into other sources of renewable energy; *“We believe that energy must not only be secure and sustainable, but also competitive. We are working tirelessly to develop reliable new energy solutions that are both green and cost-efficient”* (Statoil, 2017). More specifically, the climate roadmap states that within 2030, new energy has the potential to constitute around 15-20% of Statoil's investments/annual capex. Accordingly, as a first approach to achieve this ambitious goal, Statoil established New Energy Solutions (NES) in 2015.

By taking major steps into the industry of new energy and other low-carbon solutions, Statoil seeks to both increase the company's contribution to the energy transition, but also to diversify the portfolio and strengthen the future role of the organization as an energy company. However, in the attempt of building a new business arm within new energy solutions, Statoil is confronted by technologies, competitors, market dynamics, policies and business models about which they have little prior experience or knowledge: "*There are many uncertainties in the transition to low carbon energy. Game-changing technologies are likely to emerge, climate policies will shift in unexpected ways and new entrants will disrupt the energy industry*" (Statoil, 2017). Therefore, Statoil will be confronted by activities and actions that may seem foreign to the organization, but that still will be necessary for it to take in order to prosper in this new landscape. With NES as the primary tool for Statoil in this regard, much of these activities and actions will be in the unit's control and responsibility.

During our initial contact and collaboration with Statoil we were quickly introduced to the newly established business unit NES and its mandate as Statoil's leading initiative in the landscape of new energy solutions. We were also drawn towards the ongoing focus in Statoil around the advent of disruptive innovations within this energy sector, and how these could threaten Statoil's business model. Hence, these intriguing insights led us into electing NES as the focus of our study, and additionally how the unit could serve as a response towards disruptive innovations within new energy solutions.

The objective of this thesis is to study the strategic response taken by Statoil when confronted by disruptive innovations within new energy solutions, why NES became the response and how it will enable Statoil's ability to benefit from the disruptive innovations. In order to understand Statoil's rationale for establishing NES as its response to disruptive innovations, the first part of the thesis aims to find answers in the processes taking place prior to its creation. This becomes valuable as the thesis' second objective seeks to understand what Statoil defines as disruptive innovations and to analyze whether this is in line with the theoretical definitions. Finally, the thesis aims to analyze organizational factors of NES in order to discuss NES's ability to provide Statoil with a successful response to disruptive innovations within the new

energy solutions landscape.

For this approach, the following research questions has been established:

1. *What was the rationale and strategic choice behind Statoil's decision to establish New Energy Solutions?*
2. *Addressing the energy transition for climate: How can new energy solutions be disruptive innovations for Statoil?*
3. *What aspects of New Energy Solutions enables or inhibits the unit to act as Statoil's response towards disruptive innovations in the energy sector?*

Chapter 2 provides a theoretical overview from which the theoretical framework will be developed. The first section of this chapter will provide a description of the theoretical framework of disruptive innovations, and uncover key characteristics of such innovations. Following this, a theoretical introduction will be given of different strategic options found in literature that incumbents can chose when confronted by disruptive innovations. In the third section, a theoretical review regarding how incumbent firms should respond to (and develop) disruptive innovations will be established. This section will focus on key organizational elements found through a literature review to be of crucial importance in an incumbent's attempt to accommodate a successful response to disruptive innovations. Chapter 3, provides an explication of the research design utilized and how the data was gathered. Chapter 4 constitutes an analysis and discussion of the research questions, starting to address research question one by discussing the rationale and the strategic choice behind Statoil's decision to establish NES. Following this, an analysis will be given of how renewables and other energy solutions can be defined as disruptive innovations for Statoil, including how the energy transition can contribute to the pace. The last section in the analysis chapter aims to answer research questions three, by studying organizational aspects of NES and discussing whether these are inhibiting or promoting of the unit to act as Statoil's response towards disruptive innovations. Chapters 5 presents the thesis' summary and practical implications. Chapter 6 presents the conclusions. The thesis' last chapters, 7 and 8, presents the thesis' limitations and future work, and post phase accordingly.

The research objective is not to provide a generalized view on the appropriate organizational response for incumbent's facing disruptive elements in their industry. However, it is in the

thesis' aim to uncover and explicate manifested organizational barriers met by the incumbent organization in our study, along with the strengths and weaknesses of its response. New energy solutions will adapt the definition presented by Statoil as a common designation of non-hydrocarbon energy sources that can be used to generate electricity, such as solar, wind and geothermal. The word *response* in this thesis includes the actions of sensing, incorporation and benefitting from disruptive innovations emerging in the energy sector.

2 Theory

This chapter presents theory utilized to construct a theoretical framework to be used in the discussion/analysis section of this thesis. The first part of this chapter explores theories of disruptive innovations and present key characteristics of this kind of innovation. The second part will present different strategic choices that incumbents can follow when confronted by disruptive innovations. Finally, the third and last part of the theoretical chapter will present theory concerning key organizational elements important to enable incumbents with a successful response to disruptive innovations.

2.1 The concept definition of disruptive innovation

To be able to understand the critical elements in a successful response to disruptive innovation, this chapter will present the theory of disruptive innovations. The term *disruption* in innovation theory is described by academics using different terms, definitions and descriptions. In the context of this thesis, a description of the conceptual framework of *disruptive technologies* and *disruptive innovations* will be given. Additionally, the theoretical strand accounting for *disruptive business models* will be explored. For the purpose of this thesis the definition of business models will adapt that proposed by Osterwalder and Pigneur (2010); *A business model describes the rationale of how an organization creates, delivers, and captures value* (Osterwalder et al., 2010). The first part of this subsection focus on the evolutionary background and description of the phenomenon disruption, with an emphasis on the theoretical framework developed by Clayton Christensen and his colleagues. The second part explores the various additions to the theory of disruptive innovations from other researchers' viewpoint. The third part explores the concept of disruptive business models.

2.1.1 Evolutionary background and description of disruptive innovation

The theory of disruptive innovation was popularized through the works by Clayton Christensen “*The Innovator’s Dilemma*” (Christensen, 2013), “*The Innovators’ Solution*” (Christensen and Raynor, 2013), and “*Seeing What’s Next*” (Christensen et al., 2004). In these works, the essence of disruptive innovations is described, in which the term disruption “... describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent business” (Clayton M. Christensen, 2015). The theory was based on several other studies on technological innovations. Figure 1 below illustrates the major theoretical works on disruptive innovation as presented by Yu and Hang (2010) from their literature review.

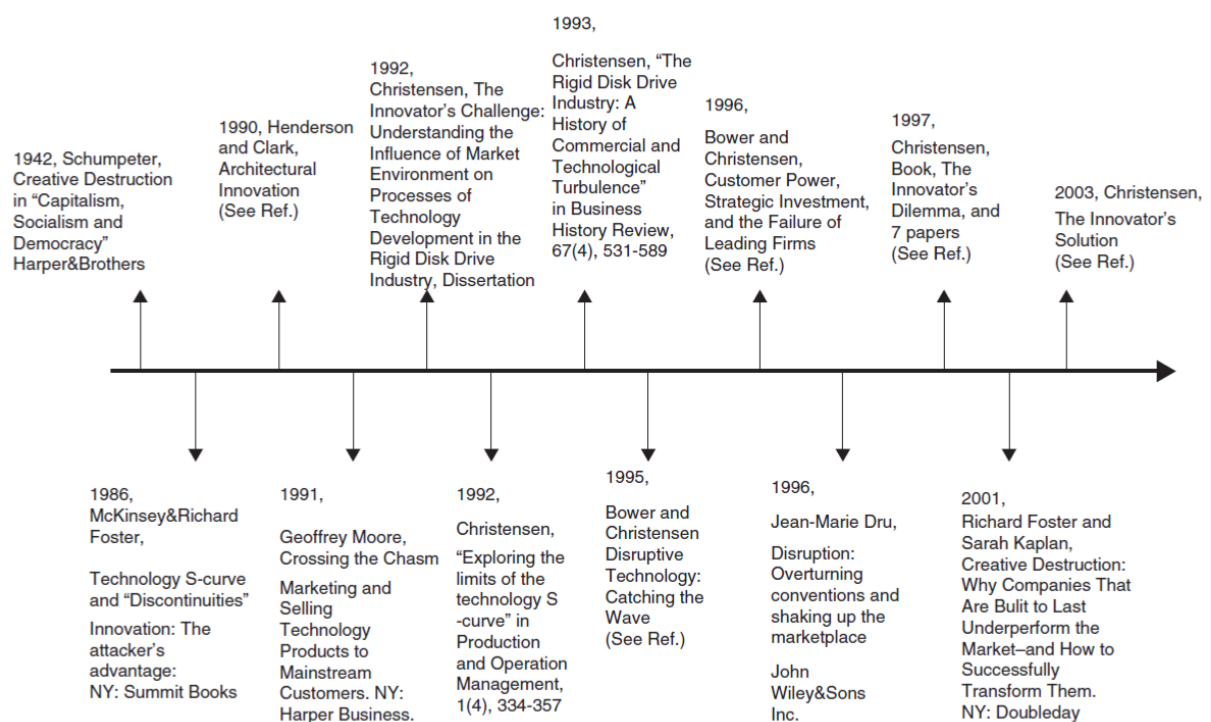


Figure 1: Timeline of evolution of Disruptive Innovation Theory. This figure was summarized based on the early literature of technology discontinuity as well as on the papers and books of Christensen (Yu and Hang, 2010)

In 1995, Bower and Christensen published the article "Disruptive Technology: Catching the wave", which addresses the failure of leading companies to stay on top of their industries when technologies or markets change. This is explained by introducing the concept of *disruptive technologies* which "...introduce a very different package of attributes from the one mainstream customers historically value, and they often perform far worse along one or two dimensions that are particularly important to those customers" (Bower and Christensen, 1995). In "The

Innovator's Dilemma", first published in 1997, Christensen claims that the decision processes and good management procedures that ensure a company's success, eventually also cause their failure. Such good management practices, as listening to customers, investing aggressively in new technologies that provide customers more and better products, and doing careful studies of the market trends to systematically allocate investment capital to innovations that promise the best returns, thus become only situationally appropriate. Christensen further claims that, in order to mitigate being disrupted, incumbents should not always listen to their main customers, they should invest in developing lower-performance products that promise *lower* margins, and aggressively pursue smaller, rather than substantial, markets. This process becomes the innovators' dilemma as incumbents must decide if they should allocate their resources to the traditional processes and technologies that they are familiar with or to invest in new technologies that could be potentially disruptive (Christensen, 2013).

To give an explanation to the innovators' dilemma, Christensen makes an important distinction between *sustaining* and *disruptive* technologies. Disruptive technologies are defined as technologies that bring to a market a very different value proposition than had previously been available. Sustaining technologies are technologies that tend to maintain a rate of improvement. According to Christensen (2013), some sustaining technologies can be discontinuous or radical in character, while others are of an incremental nature. Common for all sustaining technologies is that they improve the performance of established products, along the dimensions of performance that mainstream customers in major markets have historically valued (Christensen, 2013). Disruptive technologies are further characterized by being initially inferior and underperform the established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value, such as being cheaper, simpler, smaller, and, frequently more convenient to use (Bower and Christensen, 1995, Christensen, 2006, Christensen and Raynor, 2013).

Christensen introduces the important aspect of changing performance over time. His model, Figure 2 plots the trajectories of product performance provided by firms (solid lines) and demanded by customers (stippled lines) for different technologies and market segments, and illustrates that technology disruption occurs when the trajectories intersect (marked by a star in

Figure 2).

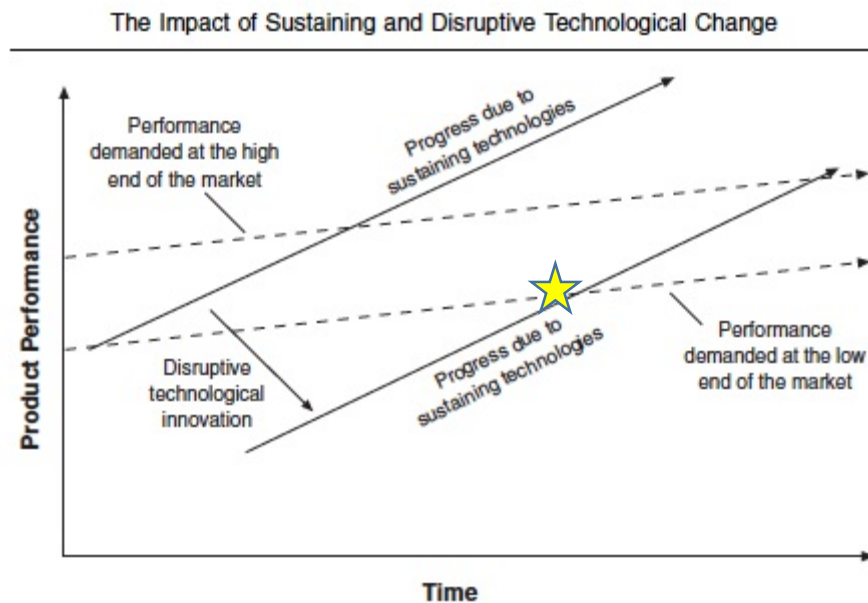


Figure 2: The impact of sustaining and disruptive technological change (Christensen, 2013)

Each product based on a certain disruptive technology will in its early development stage, only serve niche markets that value the inferior attributes. With time, sustaining technologies in both disruptive and established products, lead to enhanced performance in key attributes. According to Christensen (2013), the pace of technological progress outstrips customers' abilities to use it. Therefore, these performance improvements can raise the disruptive technology's performance on the focal mainstream attributes to a level sufficient to satisfy mainstream customers. At the same time, the performance offered by the established mainstream technology also improves, making the performance of the disruptive technology remain inferior. The market disruption occurs when the new product starts to take away sales from the mainstream product in the remaining market. This can happen due to two reasons; first, if the performance of the mainstream technology exceeds the demand of mainstream customers, this may result in 'performance overshoot' or 'performance oversupply' with overserved customers. This gives new technologies, which were only performance competitive in remote niche markets, the ability to mitigate into other customer markets. Additionally, this performance oversupply triggers a fundamental change in the basis of competition – the criteria by which customers choose one product or service over another- in the product's market. The second reason for the market disruption is the development of asymmetric incentives between existing healthy

business and potential disruptive business. This asymmetry is explained through the notion that the incentives for existing businesses to allocate resources towards serving customers in fringe markets (that often have lower performance criteria, and are more price-sensitive), is less attractive compared with the profits offered for products served to mainstream customers (Christensen, 2013, Christensen and Raynor, 2013, Yu and Hang, 2010).

Based on the characteristics of the various disruptive innovations, as depicted above, Christensen develops an explanation for the failure of incumbents to respond to disruptions in his so-called *failure framework*. He claims the rationale for the managers' conclusion not to invest in disruptive innovations has three bases; first, the disruptive products are, as previously mentioned simpler and cheaper, they generally promise lower margins, not greater profits. Second, disruptive technologies are typically first commercialized in emerging or insignificant markets. Third, leading firms' most profitable customers generally do not want, and often cannot use, products based on disruptive technologies. In combination, these issues make it difficult for managers and decision makers to predict how big the markets for the disruptive technology will become in the long term (Christensen, 2013, Christensen and Raynor, 2013).

In sum, the dynamics of disruptive technologies can be characterized by three aspects; *(i)* incumbent technologies that are displaced from the mainstream market by technologies that underperform them on the performance dimensions that are most important to mainstream consumers; *(ii)* mainstream consumers who shift their purchases to products based on the invading technology, even though those products offer inferior performance on key performance dimensions; *(iii)* and incumbent firms that do not react to disruptive technologies in a timely manner (Adner, 2002).

To resolve the innovators' dilemma Christensen and Raynor (2003) published the sequel, "The Innovator's Solution" in 2003. Here they seek to give incumbents guidelines to avoid being disrupted by developing disruptive technologies from their sustaining competitive paradigms (Christensen and Raynor, 2013, Hardman et al., 2013, Yu and Hang, 2010). In this book, the authors replaced the term disruptive *technologies* with disruptive *innovations*. This was a reaction to what they saw as a common misinterpretation of the term disruptive technology, in

which it had been equated with the words *radical*, *breakthrough*, *out-of-the-box*, or *different*, and a tendency of readers to "...twist the concept to fit into what we believe is an incorrect way of categorizing the circumstances" (Christensen and Raynor, 2013). Additionally, they widened the concept of disruptive innovations to include both services and business models in addition to technological products. Here they used the terms disruptive innovations, disruptive technologies, disruptive products, and disruptive business models. The term *product* was used when describing what a company makes or provides, but they emphasized that the term encompasses both product and service businesses. This extension of the conceptual meaning ensured that it could explain and account for disruptions in product innovations and business model innovations, in addition to technological innovations (Christensen and Raynor, 2013). Because, as he later confessed; "*I made a mistake when I labelled the phenomenon as a disruptive technology; the disruptive business model in which the technology is deployed paralyzes the incumbent leader*" (Christensen, 2006). In the further analysis and discussion, the term disruptive innovation will therefore be used, and it will encompass the theoretical understanding and characteristics of both disruptive technologies and disruptive innovations.

A further strengthening of the theoretical framework of disruptive innovations was the distinction made between *low-end disruptions* and *new-market disruptions*, and the relative nature of disruption. As such, low-end disruptions accounts for the dynamic and characteristics of the description of those disruptive technologies as originally introduced by Christensen (2013) in "The Innovator's Dilemma".

Low-end and new-market disruptions

As mentioned in the section above, a strengthening of the theoretical framework of disruptive innovations, was introduced in "The Innovators' Solution" through the distinction between *low-end disruptions* and *new-market disruptions* (see Figure 3). Low-end disruptions, introduce products or services that are cheaper and of lower quality than existing products but that offer no performance improvement. These are innovations that attract the least-profitable and most over-served customers at the low end of the original value network. Christensen and Raynor (2013) define a value network as the context within which a firm establishes a cost structure and operating processes and works with suppliers and channel partners to respond profitably to

the common needs of a class of customers. Within a value network, each firm's competitive strategy, and particularly its cost structure and its choices of markets and customers to serve, determines its perceptions of the economic value of an innovation (Christensen and Raynor, 2013, Yu and Hang, 2010). New-market disruptions, on the other hand, create a new value network. They compete with “non-consumption” in that these products are much more affordable to own and simpler to use that they “...enable a whole new population of people to begin owning and using the product” (Christensen and Raynor, 2013, Henderson, 2006).

The authors also stress the important aspect of the relative nature of disruptive innovations, by which is meant that an idea that is disruptive to one business may be sustaining to another. Another important aspect of disruptive innovation is that it is a process and not an event; "The forces are operating all of the time in every industry. In some industries it might take decades for the forces to work their way through an industry" (Christensen and Raynor, 2013, Christensen, 2006, Henderson, 2006).

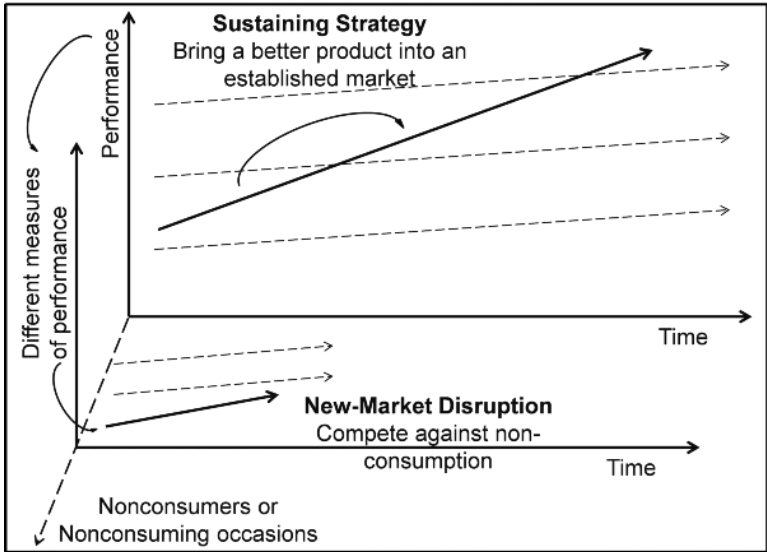


Figure 3: New-market disruption and low-end disruption (Christensen and Raynor, 2013)

2.1.2 The widening of the concept of disruptive innovations

As indicated in the beginning of this chapter, ever since the introduction of the theory, much research has been performed to further explore the validity of its original framework, and to

address limitations or aspects that are less understood. This section will present some of the major contributions to the theory, and the main limitations as designated by different researches.

Govindarajan and Kopalle (2006) contributed to the theory by providing a more general measure of disruptiveness by including the notion of high-end innovations. They define the high-end disruptions as disruptive innovations having inferior performance in traditional attributes, and a higher price. A further definition of these innovations is based on the technological radicalness of the innovation, in which the high-end disruptions are more technically radical than low-end innovations (Govindarajan and Kopalle, 2006). Adner (2002) called for a better understanding of the role of price and performance in driving disruptions, and on the demand-side factors that drive the emergence of competition. According to his mathematical model, the main driver for the phenomenon of disruption lies in the changes in the structure of consumer demand combined with technical progression (Adner, 2002, Adner and Zemsky, 2003). Henderson (2006) emphasizes changes in customer preferences as one of the key drivers of disruptive innovations. She exemplifies this with the case of chocolate confectionery and the energy bar, that when entered in 1986 as a nutritional supplement for athletes, has gained popularity and moved its way into the mass market. She highlights that even though it is too early to say if the energy bars represent a disruptive innovation, she concludes that the reason for the increased popularity received by the energy bars partly can be explained by changing customer preferences. In this lies changes in what the customers' value as the most important performance measures (Henderson, 2006).

Even with these and other contributions to the theory, Yu and Han (2009) called for more research on the definition of disruptive innovation, particularly to clarify some of the potential misunderstandings of the theory. The authors discuss three of these misunderstandings: first, the notion that disruption is a relative phenomenon. As Christensen (2006) describes, disruptive innovation must be seen in relation to another organization or business models as one innovation can be supportive for some organizations while disruptive for others. Second, that disruptive innovations not always replace the mainstream products "*...disruptive innovation does not always imply that entrants or emerging business will replace the incumbents or traditional business; it does not imply that disruptors are necessarily start-ups*" (Yu and Hang,

2010). Schmidt and Druehl (2008) discuss this misunderstanding and introduce the term *encroachment* as an alternative terminology to describe the event when a new product takes sales away from the old product. In this terminology, they distinguish between low-end and high-end encroachment, in which low-end encroachment is the scenario where the new product first displaces the old product in the low end of the market and then diffuses upward. The high-end encroachment describes the reverse progression, starting at the high end of the old-product market. Furthermore, the authors states that encroachment implies that the new product has impact on the old, but only to a certain extent and it does not define the extent of that impact. Hence, disruptive innovation ultimately could have a significant impact on an existing market but need not necessarily totally displace it (Schmidt and Druehl, 2008). This leads to the fact that incumbents with existing high-end technologies still can survive disruptions by focusing on satisfying its most demanding but least price sensitive customers (Yu and Hang, 2010). Third, disruptive innovation is not equal to destructive innovation. Meaning that technological innovations with prevalent execution in key dimensions with a moderately low-cost structure would directly invade the mainstream market and cause more serious destructive effects than a normal disruptive innovation focusing on low cost but with initially lower performance (Yu and Hang, 2010).

2.1.3 Disruptive business model innovations

As mentioned earlier, the emphasis in "The Innovator's Dilemma" was on technological disruptions, but as Christensen later came to realize, the problem for incumbent firms was not the technology itself, but rather an issue related to the business model. Markides (1997 and 1998) and Charitou and Markides (2003) first introduced the term *strategic innovations* to explain why some entrants successfully managed to attack and gain major parts of an established market from industry leaders. According to the author the common element in these success stories, was that the attackers "...broke the rules of the game in their industry". The entrant firms did not gain market share because they tried to play the game better than the competition but because they changed the rule of the game through strategic innovation; a fundamental reconceptualization of what the business is all about that, in turn, leads to a dramatically different way of playing the game in an existing business (Charitou and Markides, 2003, Markides, 1997, Markides, 1998). Later, the term was described as an innovation in one's business model that leads to a new way of playing the game. Here, a further distinction was made between strategic innovations, and *disruptive strategic innovations*, described as a way

of playing the game that is both different from and in conflict with the traditional way. As such, disruptive strategic innovations share common features with disruptive innovations; they emphasize different product or service attributes, compared with traditional approaches. They usually start out as low-margin businesses, and as such, do not attract incumbent's investment attention. Finally, as they mature, they grow to capture a large share of the established markets. To be adopted, the new set of success factors provided by these innovations, require established businesses to attain and develop a new combination of tailored activities as well as new supporting culture and processes (Charitou and Markides, 2003). In an attempt to avoid the confusion around the term *strategic innovation*, Markides (2006) re-termed strategic innovations to business-model innovation, which he described as the discovery of a fundamentally different business model in an existing business (Markides, 2006). Christensen and Raynor also highlights the importance of disruptive business models. According to the authors, disruptive business models can generate attractive profits at the discount prices required to win business at the low end of the market (Christensen and Raynor, 2013). Business model innovations is also an important topic in the book "Creating Climate Wealth: Unlocking the Impact Economy" by Jigar Shah (2013). According to the author, his novel approach to the business model of solar power was a key reason for the success of his company SunEdison (Shah, 2013).

Chesbrough (2010) discuss the often-observed mismatch seen in companies regarding the amount of investments and processes for exploring new ideas and technologies, compared to the low ability of these same businesses to innovate their business models through which these inputs will pass. According to him, the economic value of a technology remains latent until it is commercialized via business models, and that the return yielded from this commercialization may differ depending on the business model utilized. For a company to benefit from these return-differences, an essential competence is the ability to innovate the company's business model. As he points out, an innovation can successfully employ a business model already familiar to the firm, while in other cases a potential new technology, often with a disruptive character, may have no obvious business model. In these cases, the managers must expand their perspectives to find and develop a business model that enables them to capture value from that technology (Chesbrough, 2010). This is also an aspect highlighted by Hart and Christensen (2002), where they claim that the inability to change or innovate business models is one of the main reasons why incumbents loses the battle to disruptors. According to them, many disruptive

innovations starts in gaining a foothold in emerging markets, often contained in developing countries. For industry leaders, these markets do not promise profit margins high enough to be bet on, and is therefore ignored. Entrants with the ability to develop business models for low-income markets can therefore develop a healthy market without the need to fight off capable competitors. Instead, they compete against non-consumption – that is, they offer a product or service to people who would otherwise be left out entirely or poorly served by existing products. After getting a foothold in these emerging markets, disruptors will consequently seek to grow upmarket by successively attacking market tiers that represent the less attractive investment options for industry leaders (Hart and Christensen, 2002).

Chesbrough (2010) puts a focus on the opportunities represented by business model innovations and the consequent barriers that prevent organizations to participate in these activities. According to the author, an important aspect in innovating their business model is the action of experimentation. According to the author, it is the aspect of business model experimentation, which represents the most prominent barrier met by incumbent businesses. One prominent barrier is how managers often oppose to business model experimentations, as these "might threaten their ongoing value to the company" (Chesbrough, 2010). The author also highlights cognitive barriers, which resides in the notion that there exists a 'dominant logic' in the organization on how the firm creates and captures value. Following this 'logic', enable firms to operate and make sound decisions in frequently chaotic environments. However, following it too slavishly, firms may risk missing potentially valuable uses of technologies that does not quite fit in the current business model (Chesbrough, 2010). Gilbert (2005) also draws attention to literature findings of how the feeling of threat, created in the face of uncertain environments, may influence and limit the number of alternatives firm leaders are willing to consider and hence reduces the level of experimentation in the firm's response (Gilbert, 2005).

2.2 Strategic options when confronting disruptive innovations

The strategic focus of organizations will in this thesis concern the ways in which companies choose to respond to disruptive innovations. A strategic choice taken by the senior management team, and its consequent effects on organizational aspects, such as structure, culture, competence and values, is a highly nuanced picture. The aim of this subsection is to give a theoretical overview of the possible strategic options incumbent organizations can pursue when

facing disruptive innovations. For the purpose of this thesis the strategic options in focus will be the action of establishing an autonomous unit and that of ambidexterity.

2.2.1 Autonomous unit and ambidextrous organization

A review of literature on different strategic choices on how to best respond to disruptive innovations, uncovers a rather vague distinction between the concept of autonomous units and ambidextrous organizations with exploratory units. In Christensen's spirit, the notion of having a unit that both draws on the resources of the original business and at the same time maintain a unique cost structure and culture without the contamination of the mother business is in every aspect impossible. He claims that the processes and resources focused on activities to increase competitive advantages in mainstream markets cannot be expected to also encompass the nurturing of disruptive technologies. Because, as he puts it; "*... to focus resources on proposals that customers reject, that offer lower profit, that underperform existing technologies and can only be sold in insignificant markets – is akin to flapping one's arms with wings strapped to them in an attempt to fly*" (Christensen, 2013). Tushman and O'Reilly (1996, 2004), on the other hand, challenge this stance and argue that through close control and good leadership, the ambidextrous organization can both exploit the old and explore the new (O'Reilly and Tushman, 2004, Tushman and O'Reilly, 1996). Justified by the tendency of senior managers and existing customers to ignore disruptive innovations and their inferior performance, Yu and Hang (2009) choose to disregard the theoretical strand on ambidexterity (Yu and Hang, 2010). Despite this theoretical disagreement both concepts are considered relevant for the case study presented in this thesis, and will therefore be presented in the following sections.

Autonomous unit

In literature, there seem to be some confusion concerning the exact meaning and definition surrounding the words autonomous unit and spinout or spin-off. These concepts tend to be used interchangeably, complicating the understanding and separation of the terms (e.g. Christensen (2013), Tushman and O'Reilly (1996)). For this thesis, the concept of an autonomous unit adopts the definition as presented by Christensen and Raynor (2013). According to them, an autonomous unit does not necessarily mean geographical separation from the core business, nor a different ownership structure. It is rather related to the processes and values of a business unit.

Organizational processes are defined as the ways in which products are developed and made and the different methods by which procurement, market research, budgeting, employee development and compensation, and resource allocation are accomplished. Values are defined as the criteria by which managers and employees use to make prioritization decisions (Christensen, 2013). If granted with full autonomy, the unit has the freedom to create its own unique processes and cost structure. Hence, the authors claim that the only rational response to disruptive innovation is for companies to create a separate division that operates under the protection of senior leadership to explore and exploit a new disruptive model.

To benefit from disruptive technologies, Christensen and Raynor (2013) propose a theory to guide executives as they choose a management team and build an organisational structure that together will be capable of building a successful new growth business. Depending of the fit of the existing processes and its values managers can choose between four different tactics. Christensen and Raynor (2013) illustrate these tactics in a framework shown in Figure 4. If the fit is good (toward the lower end of the scale), the project manager can exploit the organization's existing processes and coordinate work that is done within the existing functional units. If not, new processes and new types of team interactions will be required. Every response (A-D) in the figure integrate the challenges with different types of fit with the mainstream organization's processes and values.

Region A and B are related to sustaining innovations and hence not discussed here. In contrast, region C denotes a disruptive technological change, representing a mismatch with the organization's existing processes or values. Region D represents projects whose end-products or services are similar to those in the mainstream market and that can leverage some of the main organization's logistics management processes. Nevertheless, these projects require a different business model with lower overhead cost structure, and different budgeting, management, and profit and loss profile. To ensure success in such situations (C and D), Christensen and Raynor (2013) argue that setting up an autonomous organization to develop and commercialize the venture will be essential to achieve success (Christensen and Raynor, 2013). The organizational elements and actions required to succeed with an autonomous approach will be further explored in section 2.3.1.1.

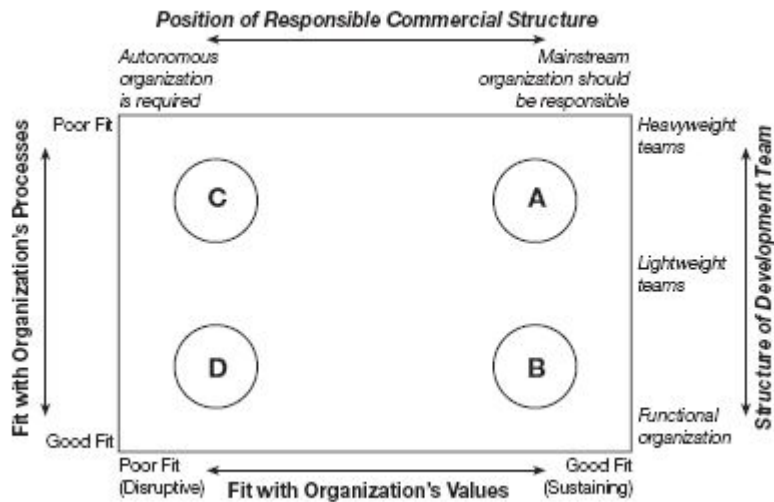


Figure 4: A Framework for finding the Right Organizational Structure and Home (Christensen and Raynor, 2013)

Ambidexterity

Ambidexterity, as introduced by O'Reilly and Tushman (2008), is the ability of a firm to simultaneously explore and exploit changes in their environment. Or as stated by Richter (2013); "Ambidexterity is described as a mental balancing act for managers between maintaining the current core business and developing radically new products and services for the future of the firm." (Richter, 2013a). O'Reilly et al. (2008) make a reference to the "The Innovator's Solution" where the authors confess that creating an autonomous unit may not be an adequate response to disruptive innovations. Instead, they propose ambidexterity as a possible solution (O'Reilly and Tushman, 2008). Henderson (2006) also finds that establishing a new unit within the old to take advantage of and benefit from new technological development is a strategic solution taken by several incumbents. This is however, rather difficult to achieve as such units have significant difficulty putting in place appropriate incentive structures and in successfully imitating the behaviours of successful entrants (Henderson, 2006).

In order to decide whether to pursue an ambidextrous strategy or not, O'Reilly and Tushman (2008) present a figure (Figure 5) in which 'operational leverage' and 'strategic importance' constitute the two variables. Strategic importance in this context is related to how the new opportunities can enhance the company's competitive advantage by capturing larger part of

existing or new markets.

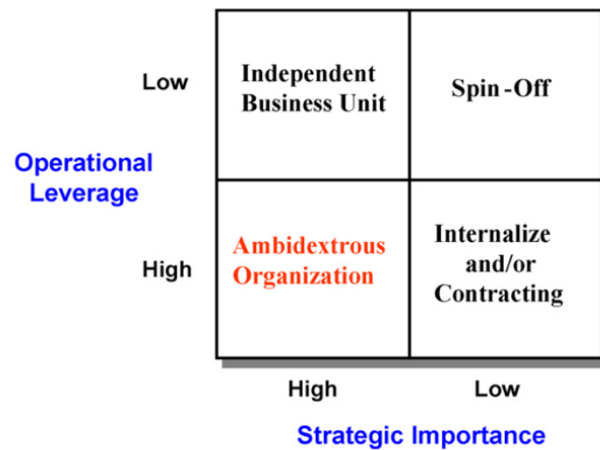


Figure 5: When should ambidexterity be considered (O'Reilly and Tushman, 2008)

According to Figure 5, if new opportunities are unimportant strategically and they cannot benefit from a firm's existing resources or capabilities, there is no rationale to pursue them and the recommendation is to spin them out. If a product has low strategic importance but offers operational leverage (e.g., the use of channels of distribution) it can be either internalized or contracted out. When a business is strategically important but cannot benefit from leveraging existing firm assets, the recommended action is to operate the new business as an independent business unit. Examples of this strategic decision are in cases of product substitution, when one technology or process replaces another. When a new opportunity is both strategically important and can benefit from the firm's existing assets and operational capabilities, an ambidextrous design is most appropriate. Operational capabilities are here defined as discrete business-level processes and associated activity systems fundamental to running the business which give it a contemporaneous advantage. In these situations, to spin the exploratory unit out is to sacrifice the future or endure the inefficiencies of not using available resources. It is also pointed to the advantages that larger companies have in being able to internalize the variation-selection-retention process of markets to create an internal selection environment that permits experimentation and exploration. Additionally, larger firms can run multiple experiments in which failure does not jeopardize the enterprise and may increase learning (O'Reilly and Tushman, 2008). The organizational elements and actions required to succeed with an ambidextrous approach will be further explored in section **Feil! Fant ikke referanseilden..**

2.2.2 The framing of disruptive innovations and its importance for the incumbent's strategic choice

In the process of making a strategic decision, Gilbert and Bower (2002) focus on how the managerial perception about the disruptive innovation and the dangers related therein, influences the result of the actions taken. According to the authors, the way managers perceive and frame a disruption, influences how they describe it to the rest of the organization, how they organize the response and how they allocate resources. They claim that if managers see the disruption as a threat they tend to overreact by committing too many resources too quickly. On the other hand, if they see the disruption as an opportunity, the managers are likely to commit insufficient resources to its development. Framing the disruptive innovation in singular terms – as either a strong threat or an independent opportunity – is emphasized by the authors as an important factor contributing to the failure seen among incumbents trying to respond to disruptive innovations. They further explain this tendency to fail by drawing on the effects framing has on the motivation to change. If the motivation is based on the feeling of threat, managers and teams may respond aggressively and rigidly (Gilbert and Bower, 2002). In this context, the perception of threat can be defined as *"a deep sense of vulnerability that is assumed to be negative, likely to result in loss, and largely out of one's control"* (Gilbert, 2005). Furthermore, Gilbert and Bower (2002) highlight three tendencies with an amplifying effect on each other that may occur in these situations; managers and teams will enhance focus on and defend the existing business model, they will commit resources in large lump sums, and they will tighten the existing organization's authority. In addition, spending too much too soon also creates lock-in penalties that are reinforced by the tension managers bring to the table. In practice, this means that when freeing resources to face the threat of disruptive innovations managers track events too closely and therefore impose old norms and metrics on the emerging business. When the motivation is opportunity-driven, there tend to be too little involvement and energy in making the appropriate change, and resources is allocated to scarcely (Gilbert and Bower, 2002).

These common pitfalls lead the authors to recommend business managers to have a dual presentation of the disruptive innovations: initially as a threat to create an expedite commitment and resource allocation. Later, when a new business model is to be established together with an

identification of the demand for the disruptive innovation, the framing should be opportunity driven to give the managers time and flexibility to set the proper strategy for the innovation. Additionally, the authors claim that this opportunity perception can best be achieved if the disruptive innovation is to be developed in an autonomous unit (Gilbert and Bower, 2002).

2.3 Responses to Disruptive Innovations

This subsection will explore what current literature emphasize as critical factors that determine organizational success or failure in an incumbent's response to disruptive innovations. The key organizational factors include; (i) organizational structure, (ii) organizational culture, and (iii) human resources and competencies.

The research on disruptive innovations may support the view that entrant firms have a better chance of success in disruptive innovation over incumbent firms because of their smaller sizes, shorter histories, and more constrained commitments to value networks and current technological paradigms (Macher and Richman, 2004, Walsh et al., 2002). However, history has provided examples of incumbent firms who despite organizational barriers have succeeded to identify and utilize potentially disruptive innovations before being disrupted by others (Ahuja and Morris Lampert, 2001, Bower and Christensen, 1995, Gilbert, 2005, Hill and Rothaermel, 2003, Macher and Richman, 2004, Paap and Katz, 2004). This has revealed some relevant questions to why most large incumbents failed and some survived. What in the end would decide or contribute to a firm's success in its response to disruptive innovation is an issue composed of a multitude of organizational elements. This subsection will present some of the key organizational elements found in literature to be prominent in deploying a successful response to disruptive innovations. This will later be used to analyse how the business unit NES acts as a response to the disruptive changes happening in the renewable energy sector.

It is important to emphasize, that organizational theory includes a multitude of interrelated elements, and separating these elements from one another is a challenging activity. Nevertheless, it is an instructive tool to gain increased understanding of the barriers and enablers involved in organizational responses to disruptive innovations, and even a greater understanding by which processes and actions these elements are interrelated.

2.3.1 Organizational structure

In this thesis the term organizational structure adapts the definition provided by G.R. Jones (2010); "*Organizational structure is the formal system of task and authority relationships that control how people coordinate their actions and use resources to achieve organizational goals*" (Jones, 2010). In the context of disruptive innovations, organizational structure and how this is designed or changed is decisive for the organizational response to the disruptive changes. As such, the theory regarding incumbent responses to disruptive innovation draws specific attention to certain aspects of organizational structure. These include different structural choices regarding autonomous unit, ambidextrous organizations, and involvement with external organizations such as external partnerships.

2.3.1.1 Autonomous unit

Autonomy is related to the processes and values of a business unit, and that the unit has the freedom to create new processes and to build a unique cost structure to be profitable in the market segment it will sell its earliest products. Processes in this context include both *formal*, explicitly defined or documented and consciously followed, and *informal*, habitual routines or ways of working that have evolved over time, and that in some instances constitute the culture of the organization. Values are defined as the standards by which employees make prioritization decisions – for instance, the way in which employees value an idea for a new product attractive or not (Christensen and Raynor, 2013).

According to Christensen's (2013) findings, the only successful incumbents were those whose managers set up an autonomous unit with the mandate of building a new and independent business around the disruptive innovation. These units were characterized by being free of the mainstream customers, and hence free to position themselves among customers who wanted the products of the disruptive innovation (Christensen, 2013). The rationale to establish such a unit, was the notion that when threatened by a disruptive innovation the mainstream organization would not be capable to allocate freely the critical financial and human resources needed to establish a strong position in the small, emerging market. As the cost-structure of the mainstream company is designed for products providing high margins, it becomes difficult to utilize the same cost-structure on disruptive innovations whose end products often promise lower margins (Christensen, 2013).

Gilbert et al., (2002) studied venture units in the newspaper industry facing online publishing

and found that those operating autonomously from the corporate unit were the most successful. In addition they found that the way resources were used had a huge impact on the performance of venture units; the separation seemed to help companies untangle the contradictory imperatives of threat and opportunity (Gilbert and Bower, 2002). According to Christensen and Raynor (2013), keeping such projects in-house is an essential first step, as trying to develop the disruptive innovation so that it can meet mainstream customers performance criteria is essential to prepare the organization on the advent of disruptive technologies taking over their market segments (Christensen and Raynor, 2013). However, after this initial step the disruption needs to be placed in an autonomous unit without obligations from the mother organization (Gilbert and Bower, 2002). According to them, direct reporting and other work-processes interrelated to the mother organization, as well as physical proximity, are factors with a negative effect on the business unit's autonomy and ability to create different work patterns and decision rules.

2.3.1.2 *Ambidexterity*

Ambidexterity is another structural approach to meet the challenges of disruptive innovations. This section will explore the concept of ambidexterity along with its function as a dynamic capability for organizations to both exploit current business and explore new business opportunities. Ambidexterity signifies an action to explore new ideas and innovations through the separation of the exploratory units from their traditional, exploitative ones, allowing for different processes, structures, and cultures. In this context, the significance of *exploration* is captured by terms such as search, variation, risk taking, experimentation, flexibility, discovery and innovation. Whereas *exploitation* is described using terms such as refinement, choice, production, efficiency, selection, implementation, and execution. Both exploration and exploitation are essential for the competitiveness and survival of organizations, but as they compete for scarce resources, organizations are forced to make explicit and implicit choices between the two. While the explicit choices are materialized through the calculated decisions about alternative investments and competitive strategies, the implicit choices are hidden in the many features of organizational forms and customs (March, 1991).

O'Reilly et al. (2008) view ambidexterity as an appropriate response to disruptive innovations provided the right working conditions and environment. In their research paper, they highlight how a firms' ambidexterity acts as a dynamic capability, that is defined as the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing

environments (O'Reilly and Tushman, 2008). The organizational capabilities are further embedded in existing organizational routines, structures and processes. These routines are again found in the way the organization operates, its structure, culture, and the mind-set of senior leadership. Dynamic capabilities include specific activities such as new product development, alliances, joint ventures, and other more general actions that foster coordination and organizational learning.

Existing capabilities reflect the firm's ability to compete in the current environment. In the context of ambidexterity, the challenge for senior leaders is to both nurture and refine these and to be prepared to reconfigure these assets as contexts shift. The configuration of competencies, systems, structure and culture to execute the strategy of exploitation is completely different from that of exploration. For this configuration, key success factors emphasize a longer time perspective, more autonomy, flexibility, and risk taking and less formal systems and control.

Drawing on the studies by O'Reilly and Tushman (2004), the ambidextrous organizations separate their exploratory units from their traditional, exploitative ones for allowing the new unit to develop their own processes, structures, and cultures. Nevertheless, the significant difference between the ambidextrous organization and the autonomy unit as explained by Christensen (2013) is the tight links across the senior executive level maintained between the explorative and exploitative units. According to O'Reilly and Tushman (2004) ambidextrous firms manage organizational separation through a tightly integrated senior team. Particularly two factors were found in one of the studied companies that successfully employed an ambidextrous strategy: the first aspect was how the CEO of this company emphasized the importance of a shared commitment to the chosen strategy at the senior executive level, and how this ensured a united front and consistent communication towards the rest of the organization. The second aspect was how the company changed the executive incentive program, in which unit-specific goals were replaced by a common bonus program tied to growth targets across all the business' industries (O'Reilly and Tushman, 2008).

A major challenge faced by managers in organizations following an ambidextrous strategy is the contradictory nature of the two businesses. On one side, senior managers must handle a mature business, with its emphasis on productivity, incremental improvements, and short-term focus, while on the other managing an entrepreneurial venture with the mandate to move

quickly, learn from failure, and to have a more long-term orientation (O'Reilly and Tushman, 2008). Charitou and Markides (2003) also highlighted these challenges through their study of possible strategic choices of firms confronting disruptive innovations. They found that the action of separating the venture unit was not enough to ensure success. It was essential that the new business unit had enough autonomy to decide its own operational procedures, investment policies, and culture (Charitou and Markides, 2003). These findings were substantiated by Crockett et al (2013) through their study of factors influencing the success or failure of corporate ventures. They found that decision autonomy influences the performance of new venture divisions, both directly and as a moderating variable. Greater decision autonomy was positively associated with strategic performance (Charitou and Markides, 2003, Crockett et al., 2013). Regarding the effect of organizational synergies on venture performance, Charitou and Markides (2003) found that greater synergetic linkage between the venture and the parent company, the more effective the company was at playing two games simultaneously (Charitou and Markides, 2003).

2.3.1.3 External partnerships

Some researchers have found external partnerships to be a beneficial response for incumbents in managing disruptive innovation. These researchers often relate this response to open innovation, defined as the process by which companies combine externally and internally developed technologies with the aim of developing new businesses (Chesbrough, 2000). This section aims to explore external partnerships as an organizational structure incumbents can pursue when confronted by disruptive innovations.

One strand of research view external partnerships as an important path to accumulate new know-how and create openness to innovation. It is argued that external partnerships are a good way to face complexity of the challenges and reduce risks for the individual company (Boscherini et al., 2012). Chesbrough (2003) argues that successful innovators manage to increase their return on R&D as they understand the importance of combining in-house R&D with external technologies and open-up their own technologies to externals. According to the author, large companies is shifting from its traditional inward R&D focus to a more outward-looking management (e.g. open innovation) that draws on technologies from networks of universities, start-ups, suppliers and competitors (Chesbrough, 2003a). Chesbrough (2003 b),

introduces the terms *inbound open innovation*, as the practice of leveraging the discoveries of others, and *outbound open innovation*, as the practice in which companies look for external organizations with business models that are better suited to commercialize a given technology (Chesbrough, 2003b).

In Chesbrough and Crowther's (2006) study of why companies utilize open innovation approaches, they found that some of the organizations saw open innovation efforts as a way to monitor potentially disruptive innovations that could threaten/affect their existing business. They further found that open innovation was used by companies for two different growth objectives; those within the current business and those associated with a potential new business (see Figure 6 for illustration). The second growth objective was perceived to require a longer time horizon before any results would be expected. Companies seeking for this practice confronted the issue of over-funding incremental business projects and under-funding potentially higher growth or longer-term options. When looking into the best-practice activities of the companies deploying this approach, the authors found that these companies started by defining a set of target areas that they anticipated would drive next generation growth. These activities were often related to a high-level exercise, and often tied to strategic planning. To manage the risk connected to these opportunities, the studied companies placed a series of small bets on early stage, unproven technology with an unclear commercial viability. Some companies went beyond investment and additionally acquired board involvement in early stage activities or provided them with access to internal resources for joint development. Others even established an own group to fund small investments in external ventures, hence acting as a venture capital firm. The objective of these investments was not primarily capital appreciation, but rather a means to assess the applicability of these ventures' technologies to the company (Chesbrough and Crowther, 2006)

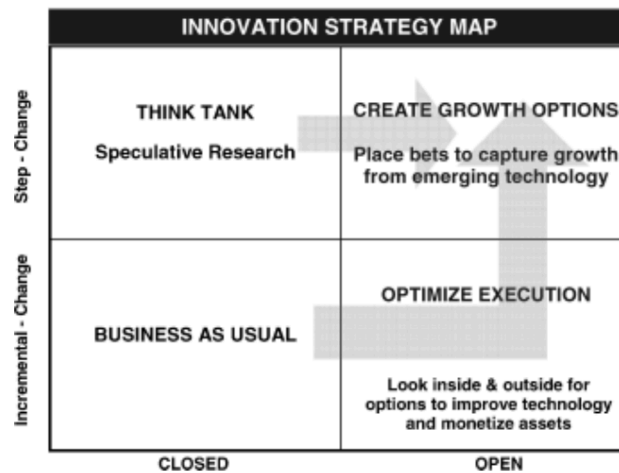


Figure 6: Innovation Strategy Map (Chesbrough and Crowther, 2006)

Chesbrough and Crowther (2006) identified two critical challenges to be overcome for companies to effectively adopt an open innovation approach; the not-invented-here (NIH) challenge, and the other related to sustaining internal commitment over sufficient time to realize benefits from adopting an open innovation approach. How the companies successfully overcame these challenges were related to building stronger organizational alignment and commitment to an open innovation approach. This was done through establishing a clear understanding in the organization of the growth-gap, and why internal efforts are insufficient to meet the growth objectives. The second challenge was addressed by ensuring senior management support and funding of the initiative, creating open innovation 'champions' with the task of managing the processes that incorporate the technologies in the business, and revised internal processes, metrics, and incentives to induce adoption (Chesbrough and Crowther, 2006).

2.3.2 Organizational culture

The literature identifies culture as another important element in an organization's ability to succeed with disruptive innovations. According to Gareth R. Jones (2013, p. 201), organizational culture can be defined as "...a set of shared values and norms that control organizational member's interaction with each other and with suppliers, customers, and other people outside the organization." (Jones, 2010). As culture possesses characteristics such as scarcity and imitability, it is viewed as an important source for sustained competitive advantage (Hayton, 2005, Tushman and O'Reilly, 1996). As seen in section 2.3.1, much

research has focused on the creation of separate units such as autonomous or ambidextrous organizations as a means to enable disruptive innovations. In that regard, the organizational culture in the separate unit and its ability to accommodate disruptive innovation may be affected by the interdependency and autonomy from the corporate venture. This section will explore factors that contribute to the creation of a favorable culture in the separate unit and how the culture of the corporate organization can affect the separate unit's culture.

According to Christensen and Raynor (2013), organization culture develops the moment employees adopt ways of working and criteria for making decisions by assumption and not by conscious decisions. It is when *processes* and *values* of the organization become inherently embedded in the ways the employees perform their work, that these processes and values constitute part of the organizational culture. When the problems faced by the organization starts to change, the established processes and values are no longer fit to meet these problems, and they consequently become inhibitors rather than enablers (Christensen and Raynor, 2013). In such situations, culture can be a valuable tool for the management as the culture enables members of the organization to act independently and consistently.

According to Christensen and Raynor (2013), every organizational change requires a change in resources, processes or values or a combination of these, and to enable and manage such changes require various tools and techniques. External changes often introduce incumbent organizations with the opportunity to create new growth businesses. However, these opportunities often bring the managers of the organization in a contradictory situation, since pursuing such opportunities often calls for alterations in the current processes and values, while a still healthy core business requires these same processes and values to be present (Christensen and Raynor, 2013). This contradiction, and the difficulty that large organizations face when trying to change cultural embedded processes and values, constitute some of the primary explanations given by Christensen and Raynor (2013) to why so many incumbents fail in their response to disruptive innovations. The authors consider the action of changing the values and culture of the mainstream organization to be very difficult, and it therefore constitute the primary reason why the authors state that establishing an autonomous unit to cope with the disruptive innovation is the only viable option. Whichever strategic approach chosen to pursue such opportunities, whether it is through an autonomous unit or an ambidextrous organization,

the importance of establishing the right cultural environment through processes and values is crucial to enable a proper response to disruptive innovations.

The ability to create a unique culture in a venture unit may be viewed as depending on the degree of interdependency to the corporate organization along with the autonomy provided to the unit. Crockett et al. (2013) have studied how the culture of the corporate organization influences the success of the venture. They found that those corporate organizations that were inclined to take risk, and that preferred change and innovations as a way to obtain and maintain a competitive advantage, were more positively oriented toward entrepreneurial endeavours. In the opposite case, conservative organizations would be risk averse, react to competitor's moves rather than lead them, and avoid innovative approaches to competition. Another important finding was how a shared entrepreneurial vision between the mainstream business and the venture unit could contribute to a consistent culture and identity in the business unit, and contribute to a better communication and coordination of activities across the organizational boundaries. They defined entrepreneurial vision as the ability of a venture management team to envision future direction of the venture unit. In addition, a shared vision was found to enable a common language and mutual understanding, which would facilitate the legitimacy and acceptance of the new venture by the mainstream business (Crockett et al., 2013).

Govindarajan and Kopalle (2006) suggests that small business units attempting to develop disruptive innovations are in need of a culture that value entrepreneurship, experimentation and risk-taking, flexibility and creativity (Govindarajan and Kopalle, 2006). These elements are characteristic for the adhocracy culture, which also includes the elements of tolerance and effectiveness. Effectiveness is here defined in terms of finding new markets and new directions for growth (Deshpandé et al., 1993). Elements in the adhocracy culture are illustrated in Figure 7 below, which depicts the main organizational culture types.

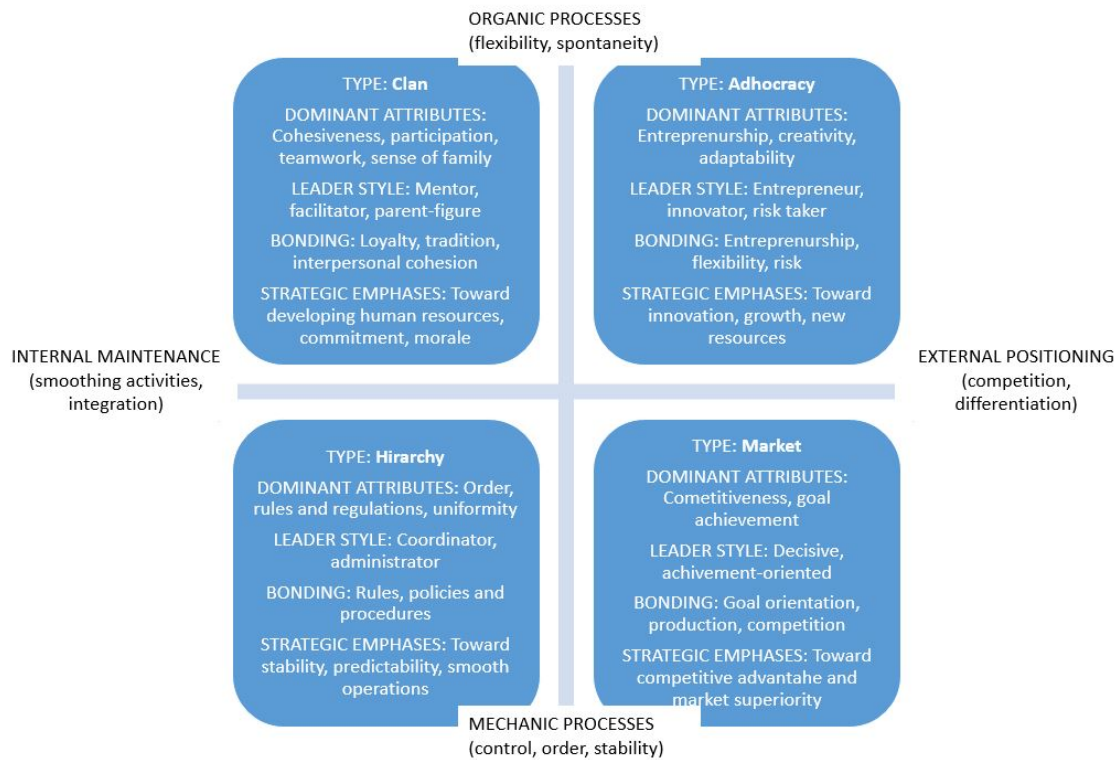


Figure 7: A model of Organizational culture types, based on (Deshpande et al., 1993)

As emphasized by the Deshpandé et al. (1993), these culture types represent extremes of a continuum, and are not mutually exclusive. Therefore, it is often found that firms have elements of several types of cultures, even between product groups or within the same strategic business unit. According to their findings, the firms having cultures of a responsive (market-oriented) or flexible (adhocracy) character, outperformed more consensual and internally oriented, bureaucratic (hierarchical) cultures.

Building an organizational culture with adhocracy characteristics is viewed as important for firms meeting changing demands and market dynamics. In their research paper, Sarros et al. (2008) focuses on the combined role of transformational leadership, organizational culture, and organizational innovation, and the linkages between these aspects as prominent mediators to facilitate organizational transformation. In this context, transformational leadership refers to *behaviours of leaders who motivate followers to perform and identify with organizational goals and interests and who have the capacity to motivate employees beyond expected levels of work performance* (Sarros et al., 2008). The authors conform to the school of thought that claims the leaders to be the architects of cultural change. They further

draw on several theoretical findings from strategic leadership that indicate that it is the top managers who influence organizational outcomes by establishing organizational culture, influencing organizational climate, and building the capacity for change and innovation.

Sarros et al. (2008) further focused on several factors coupled with transformational leadership and their effect on organizational culture. Through their analysis, the authors found that (i) vision, (ii) setting high performance expectations, and (iii) caring for fellow workers through individual support, were positively related to a climate for organizational innovation, and powerful forces in the culture-leadership relationship. The authors define vision as *"a set of beliefs about how people should act, and interact, to make manifest some idealized future state"*. The aspect of visionary leaders was found to be the factor most strongly associated with organizations that were reported to provide adequate resources, funding, personnel, and rewards to innovate, as well as time for workers to pursue their creative ideas.

This chapter has reviewed the nature and origin of organizational culture, and how it constitutes a significant reason for the prominent difficulties met by incumbents confronting changes related to disruptive innovations. In this regard, having the right cultural environment, preferably through an adhocracy culture, is an essential ingredient for a business unit to be able to respond and enable development of such innovations. Depending on the autonomy given to the unit and the interdependency with the corporate processes and values, the cultural influence exerted from the corporate environment may have significant effects on the unit's ability to build such a culture. In this regard, the role of a shared vision between unit and the corporate managers, as well as transformational leadership has been found to have positive effects on this ability.

2.3.3 Human resources and competences

Human resources is another aspect that may have important implications on an incumbents' ability to respond to disruptive innovations. This sub-section will explore three different levels of managers' mind-sets', skills and competencies and how it influences the success of an incumbents' response to disruptive innovation; (i) the supportiveness of the corporate managers, (ii) the skills and competence of managers, and (iii) the middle-managers evaluation of projects and ideas. The last part of this sub-section concerns how the team members in the venture unit influences the response and how internal and external hires can play a role.

Corporate managers

Crockett et al. (2013) look at how influences from the mother organization affects the venture unit's performance. Crockett et al. (2013) emphasize that in order for a corporate venture to succeed, it is not enough to assemble a team of excellent managers to the business unit unless the corporate environment is supportive of entrepreneurial activities, and if they also are under tight control from the parenting organization. The authors also put an emphasis on the role of the corporate management's commitment to and support of the corporate ventures. One of the most important roles of such corporate managers is to increase the unit's leveraging possibilities of core competencies contained in the corporate organization, and reduce the organizational politics that can hinder venture team success. This can be achieved by having the corporate manager personally involved with the unit, as well as by removing the intra-organizational boundaries (Crockett et al., 2013).

Managers – selection process for new growth business

Companies that want to stay on top of disruptive change must give their leaders and employees the possibility to develop the required mind-sets, skills, competences, and tools to *break through*, both personally and on behalf of the business (Christensen and Raynor, 2013). Starting with the manager sub-aspect, Christensen and Raynor (2013) claim that one of the most prominent reason why organizations fail to successfully build new-growth businesses is the choice of the managers to run it. The authors believe it irrelevant whether the manager is hired from internal or external candidates. Instead they emphasize the often improper criteria by which these managers are chosen. According to them, managers are picked based on erroneous personal attributes, such as "good communicator", "results oriented", "decisive", and "good people skills". Focus is laid upon those managers with an uninterrupted string of past success to predict the future success of the unit. One problem with predicting future success from past success is that managers can succeed for reasons not of their own making. In deciding who to run a new-growth business, the authors highlight that one should examine what problems potential candidates have wrestled with in the past. Furthermore, it is not as important that managers have succeeded with the problems as it is for them to have developed the skills and intuition for how to meet the challenge successfully the next time they occur (Christensen and Raynor, 2013)

Middle managers: development

The aspect of middle managers has also gained attention in the theory on human resources. Since most strategic proposals are shaped at lower levels of hierarchical organizations, it is the middle managers who eventually decide which projects or ideas they will support and carry to upper management for approval (Christensen and Raynor, 2013, Yu and Hang, 2010). Christensen and Raynor (2013) emphasize how an organization typically instruct middle managers to support their proposals with credible data on the size and growth potential of the markets that each idea targets. This practice often lead managers to hesitate to promote ideas or products whose market are not completely assured. This is also related to the concern of loosing future career possibilities if backing projects for markets that eventually does not materialize. In this sense, the middle managers have the most to lose, and will therefore tend to support projects or ideas for which market and growth potential can be backed with credible data (Christensen and Raynor, 2013, Yu and Hang, 2010).

Christensen and Raynor (2013) also focus on the management development programs in mature companies and its possible effect on shaping how managers assess and values different project proposals. Of particular interest are those development programs that expose the management talents to different positions and to new assignments within the company to broaden their skills and experience. No matter how well structured these programs are to give the candidates the required skill-set to live up to become higher-level managers, these programs reinforces middle managers, who want a reputation of delivering results, to promote and prioritize those new-growth ideas that will pay off within the time that they reside in that particular job. During the process of sorting through and packaging ideas into plans that can win funding, the authors claim that ideas are shaped to resemble the ideas that were approved and became successful in the past. With this in mind, the authors claim that it should be the senior or top-level management's responsibility to get involved in decisions related to promoting a response to disruptive innovations. This rationale is based upon the notion of how the current processes and values residing in the company promote sustaining developments, whereas disruptive innovations, by their definition, are in conflict with some, or even all of these processes and values. Because the values inherent in the company are built to weed out the disruptive ideas, the authors claim that it is only the senior top-management that can effectively endorse the use of corporate processes when they are appropriate, and break the grip of those processes and

decision rules when they are not (Christensen and Raynor, 2013).

Team members: skills, background, internal –external employment

Another aspect of human resources is related to the skills and attitudes of the team members responsible for the development of disruptive innovations. One example is related to the study of the Japanese mobile phone NTT DoCoMo's success with its i-mode project (Natsuno, 2003; Ratliff, 2002). This project was characterized by team members with diverse backgrounds, recruited both internally and externally. For instance, one of the external recruitments was the internet entrepreneur and start-up manager, Takshi Natsuno. This diversity of skills and attitude was pointed to as one of the reasons for the i-mode's success (Natsuno, 2003, Ratliff, 2002). The influence of external hires was an aspect prominent for the success of the new ventures in the study executed by Gilbert (2005) in the newspaper industry. He found that hiring external employees, often with experience from the disruptive innovation in question, greatly affected the decision processes and differentiation of the venture (Gilbert, 2005). In the same spirit, Christensen and Raynor (2013) propose to gather and train specialized teams of employees, preferably from sales, marketing, and engineering units, to capture and harness potential disruptive ideas. These teams should be trained in the language of sustaining and disruptive innovations, so that they can sort out ideas with sustaining or disruptive potential. This is what Christensen and Raynor calls "making the lowest level competent". Given the right competence, the authors claim that people in direct contact with markets and technologies may serve as first-level idea gatherers (Christensen and Raynor, 2013).

Incentive systems

Another important factor regarding the aspect of human resources is the incentive system employed by the organization to enhance and encourage the right actions and attitudes of its employees when meeting disruptive innovations. Research in organizational economics show that creating appropriate incentive regimes is a critical part of facilitating organizational response to changes (Kaplan and Henderson, 2005, Yu and Hang, 2010). Due to the uncertain or vague nature of disruptive innovations, building an incentive regime upon common performance measures such as market size, growth rate, and profitability, may be inappropriate. According to Govindarajan and Kopalle (2006), this implies that providing the right

environment for the development of disruptive innovations may depend more on long-term-oriented, subjective-based incentive plans, rather than short-term oriented, formula-based incentive plans for key executives and other employees (Govindarajan and Kopalle, 2006)

Customer competence

Having the right marketing and customer competence is highlighted in the literature as important for organizations to accommodate a good response to and enable the development of disruptive innovations (Govindarajan and Kopalle, 2006). Marketing competence is by Danneels (2004) defined as the ability of a firm to build new customer competencies, including the capacity to identify and build relationships with customers it has not yet served (Danneels, 2004, Henderson, 2006). A customer competence can be described as a competence consisting of the resources required to serve certain customers, including the understanding of the customer's needs and buying process, access to sales and distribution channels, brand a firm reputation within the targeted market, and communication channels with the customers (Govindarajan and Kopalle, 2006, Danneels, 2004).

Henderson (2006) stresses the importance of customer-oriented competence, as a central factor in a firms' success or failure in the face of disruptive innovations. In her view, many disruptive innovations lead to a reshaping of the pattern of preferences in the market. She argues that established market-based routines, such as market facing or customer competence, developed through experience with existing generation of technology, make it very difficult to respond to these changes, and hence to evaluate the promise of disruptive technologies. In this sense, the senior management team of the firm is not equipped with the information and understanding of the market that they need to make the appropriate decisions, and they become imprisoned by their current experiences regarding market dynamics and customer needs (Henderson, 2006).

Danneels (2004) is also of the opinion that incumbents fail in meeting disruptive innovations largely because of their lack of marketing competence to establish the resources needed to address the new market. As such, these incumbents lacked the skills to conduct research on a new market, to set up a distribution and sales channel, and to build a reputation in a different

market. To avoid getting trapped in old routines regarding market research and customer understanding, Christensen and Raynor (2013) proposes to conduct the activity in exploring what job a product gets 'hired' to do, and thus get a better understanding of the customer's needs.

2.4 Theoretical framework

This chapter has reviewed the theory of disruptive innovations, the main strategic choices for incumbents confronting disruptive changes, and organizational elements emphasized in literature to be decisive enablers or inhibitors for incumbents' response to such innovations. The reviewed theory of disruptive innovations has focused on their characteristics and their dynamics by which they have the possibility to enter the market and disrupt the incumbent firms residing in it. Key words from this theory are low-end, high-end and new-market disruptions, and disruptive business models. The reviewed theory of strategic options for incumbents confronting disruptive innovations has focused on the strategic options of ambidextrous and autonomous strategies and how and when these strategies should be pursued. Another key element is how the framing of the disruptive innovation as either a threat or an opportunity influences the success of the final strategic choice. The theory of organizational elements and their role as enablers or inhibitors for incumbents' response to disruptive innovations has focused on organizational structure and culture as well as human resources. Key elements in the organizational structure are autonomous and ambidextrous units and external partnerships. The reviewed theory of organizational culture has focused on promoting factors toward innovation and growth, such as acceptance of failure, experimentation and transformational leadership. The aspect of how the organizational culture of the corporate culture could affect the venture unit has also been reviewed. The theory of human resources has focused on three different levels of manager's mind-sets, skills and competencies and how they influence the success of an incumbents' response to disruptive innovation.

Figure 8 summarizes the key elements from this theoretical review. This framework will act as a guide in the further analysis and will provide a fundament from which the three research questions introduced in section will be answered. However, the boundaries are not set and the different research questions may draw on theoretical elements throughout this framework.

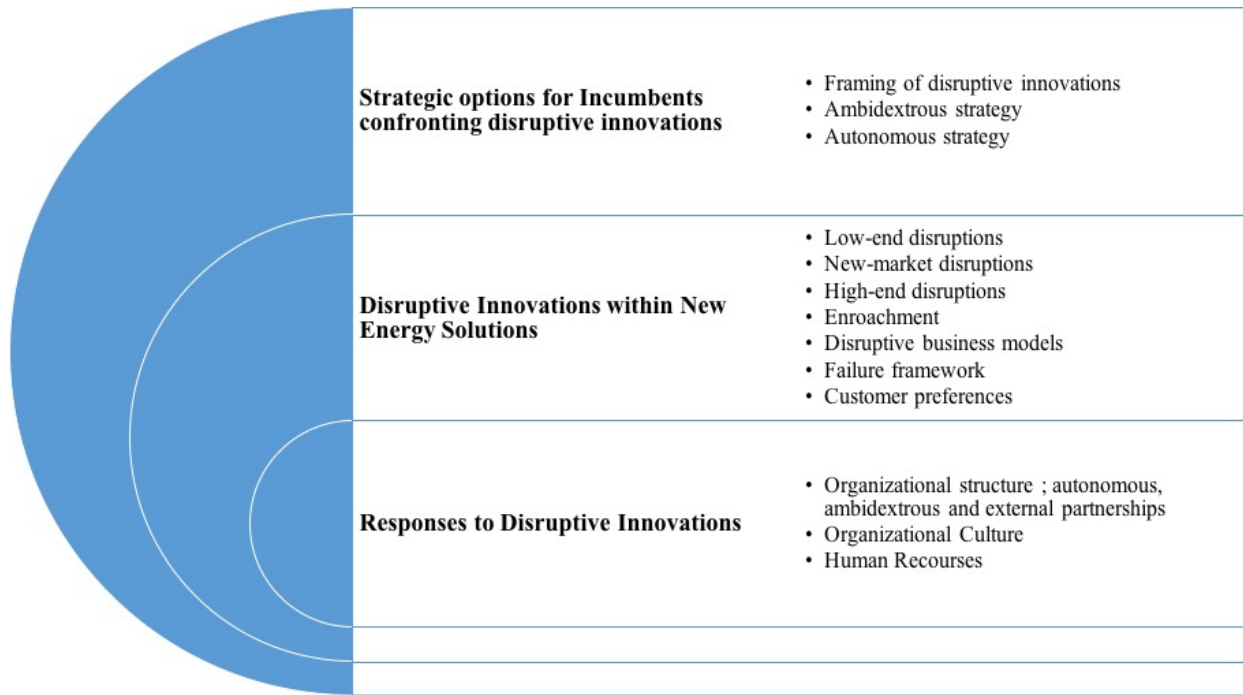


Figure 8: Theoretical framework

3 Research design and methodology

3.1 Research method

The research method applied in this thesis was the *case study*. The rationale of a case study is to attain in-depth knowledge of one (single-case study), or a small number of (multiple-case study), organizations, events or individuals, generally over time (Easterby-Smith et al., 2015). Robert Yin is widely known for this research method and present a twofold definition of case studies (Yin, 2014); (i) a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real world context, in particular if the boundaries between the phenomenon and context are unclear, and (ii) it deals with situations where there will be more variables of interest than data points, and will therefore rely on multiple sources of evidence, and benefit from prior advancements in theoretical propositions to guide the collection and analysis of data. According to Yin (2014, p.9-23), the case study approach is the appropriate methodology to choose for studies for which research questions are in the form of “how” or “why”, the focus of study is on contemporary events in which the focus of study cannot be manipulated or controlled by the researchers.

This thesis took on an explorative research approach, starting with the collaboration with one of Statoil’s innovation departments from which were granted two external supervisors. They were dedicated to assist us and to act as door openers during the research progression. This collaboration introduced us to the relatively new business unit New Energy Solutions in Statoil, which caught our interest and became the case study of our thesis. Prior to this, the term 'disruptive innovations' and how Statoil should assess and respond to such innovations was brought up as a prominent topic within the organization. Being related to NES and the processes leading up to the establishment of the unit, the phenomenon of disruptive innovations became the main lead in the further investigation.

Between our first meeting with Statoil to the conduction of the first interviews, our understanding and knowledge of NES was limited to the information available online and in newspaper articles, and later also from Statoil’s internal documents explicating the business unit’s structure and purpose. As far as we know, we are the first to study NES, which also may explain the limited information available about the organization. Hence, given the limited

information available, taking an explorative approach to the case study was considered appropriate. Therefore, when initializing the interviews, neither problem definitions nor concept overview were fully identified or articulated, giving the research an inductive approach. Contrary to a deductive research approach, in which a thorough theoretical review and understanding serves as the basis upon which hypothesis and research questions are completed before the data gathering starts, an inductive research method first approaches a theme or a phenomenon through empiric investigation, after which the gathered data serves as a fundament for analysis (Chava Frankfort-Nacmias, 2008). As such, this study had an empirical basis, in which the research theme of disruptive innovations started out as the fundament for the approach of the research setting and the case study in question. Consequently, the thesis' research questions were formed and re-assessed during the entire research period to accommodate our growing understanding of the topic of disruptive innovations in relation to NES and Statoil.

Having this explorative approach sent us on a professional journey, in which the thesis' path changed. It started out to (only) be a case study of NES as Statoil's response towards disruptive innovations within renewables and new energy solutions, but as information was gathered, it made the area of study wider. This widened perspective included what strategic choice Statoil took when confronted by disruptive innovations within new energy solutions, and how the various aspects of the energy transition could enhance the effect and speed of the development of these innovations.

As an exploratory single-case study, this study does not intend to offer a final and conclusive solution to an existing problem, but rather shed light on the nature of the problem (Saunders et al., 2009). Choosing a qualitative approach provides several benefits to both data gathering and analysis, as opposed to strictly quantitative methods. For instance, a qualitative approach allows for the use of multiple data sources, such as interviews and written records, and provides an opportunity to generalize the findings to a broader context (Easterby-Smith et al., 2015).

3.2 Research design

Following the definition proposed by Yin (2014, p. 28) a research design is “*a logical plan for getting from here to there*”, where *here* is defined as the set of research questions and *there* is defined as the set of conclusions or answers to these research questions. The case study took on an explorative, inductive approach, in which initial empirical data gathering together with a preliminary theoretical understanding and proposition served as the basis upon which the research questions were formed. The following section provides a more detailed account of the different data sources, collection methods, and analysis procedures that were followed in this thesis.

3.2.1 Data sources and collection

Conducting a research study quickly introduces a myriad of different data sources and types, however Yin (2014, 106) highlights six different sources he claims to be most commonly used for conducting case study research. These are documentation, archival records, interviews, direct observation, participant-observation, and physical artefacts. These are all connected with both strengths and weaknesses, but as highlighted by Yin (2014) none of them have a complete advantage over the others. Further, these sources are highly complementary, and using more than one is highly recommended as this may provide the researchers to address a broader range of historical and behavioural issues, but most importantly, it provides a means to develop *converging lines of inquiry* (Yin, 2014). In this case study three of the aforementioned sources of data were used; documentations (memo's, administrative documents, news clippings), archival records (reports IEA,..), and interviews. Additionally, we have had orienting meetings with our external supervisors from Statoil during the course of this case study. As these data sources consists of several different types of data, the further description of the thesis research design these types of data will be sorted into either primary or secondary data (see Table 1):

Table 1: Overview of different data sources and types

Data Source	Primary data	Secondary data
Interviews	Interviews with Statoil employees	
Documents	Statoil documents: memoranda, administrative documents	News clippings and other public articles available in the mass media
Archival records		Public use files: Climate reports, government proclamations, etc.

The orienting meetings were conducted either through phone and skype, or through personal meetings at the Statoil locations in Bergen and Porsgrunn. These meetings were meant to aid and drive the discussion of the thesis, as well as provide us with information related to the thesis content and focus of study. An overview of the type, place and content of these orientating meetings is given in Table 2 below.

Having external supervisors in Statoil have been important and valuable in order to get access to internal Statoil Documents, and in particular for the strategic selection process of interview objects. The orienting meetings with the supervisors have also resulted in many discussions leading to information and insight that otherwise would not have been included in the thesis. Additionally, various questions and thoughts have emerged during the course of this thesis. The open dialog with the external supervisors (meetings, phone or e-mail) have helped us to find answers through their key organizational and industry insights.

Table 2: Overview of orienting meetings

Orienteing Meeting with Statoil	Type of Meeting	Content
30.12.2016	Phone	Orienteing meeting. Agrees on sending a proposal to Statoil
09.01.2017	Phone	Follow up on the status of the proposal
17.01.2017	Skype	Review of research proposal. NES is discussed to be the case for the study
24.01.2017	Statoil, Bergen	Agreed on NES to be the case and the thesis structure. Discussed relevant information for the study.
09.02.2017	Phone	Preparing for the interviews, discussing interview questions
27.03.2017	Statoil, Bergen	Follow up on the interviews, discussing findings from the interviews
04.05.2017	Statoil, Bergen/Porsgrunn	Follow up on the thesis status

3.2.1.1 Primary data

The primary data used in this thesis comprised of five semi-structured interviews and internal Statoil documents.

Documents

The documents included memoranda accounting for the events prior to the establishment of New Energy Solutions (NES), and memoranda from the strategy unit covering the key strategic decisions to be taken during the re-structuring of Statoil and the operationalization of NES. These documents were used to build a basis for our knowledge and understanding of NES and why the unit was established. They also served as a tool to direct the content and construction of the interview questions. Using written documents as primary data is advantageous as they are stable and can be assessed repeatedly. Further, they can provide a detailed overview of among other the topics discussed, processes utilized, and the time span of events. However, documents may also have disadvantages in that they might be collected selectively – reflecting a selection bias, or that the content of the documents do not provide a true and complete picture of the events and process in question – reflecting a reporting bias (Yin, 2014). Table 3 gives an overview of the various Statoil documents, their content and codification.

Table 3: Overview and description of granted Statoil Documents

Statoil Document	Source context
SD1	CEO Invitation to participants
SD2	Taking Statoil Beyond 2025 Sustainability – CEC
SD3	Climate Risk TSB 2025 – CEC Pre-read
SD4	CEC Strategy summit pre-read
SD5	TSB25-S CEC submission
SD6	WS CEC – Norwegian Climate goals 2030
SD7	Transition to Low Carbon World – External Perspective
SD8	Strategic Beliefs Final
SD9	Strategic Choice Final - CEC
SD10	Competitive advantages – CEC Final
SD11	New Energy Solutions – Organisation, management and control

Interviews

The interview participants were approached and selected with help from the external

supervisors from Statoil, and comprised key personnel with different roles and positions within Statoil. The interview participants were selected based two criteria: (i) their knowledge and relation to NES as of today, and (ii) their knowledge about the processes leading to the establishment of NES. Having different functions in Statoil, and being related to NES in different ways, made it possible to attain different perspectives to the central topics of the research questions. As these interview objects where asked questions that sought to uncover both objective information and subjective-based views and opinions, they will be referred to as *respondents*. This specification conforms to the recommendations fronted by Sigmund Grønmo (2007, p. 120). Hence, in the further analysis and discussion, the respondents will be referred according to the codification reviewed in Table 4. The table also provides a short description of the respondents' relation to NES.

Table 4: Respondents and their position in Statoil and relationship with NES

Respondent code	Function in Statoil and role in NES/NES-establishment
R1	Position in NES
R2	Followed the TSB25-S project, position in Strategy
R3	Followed the TSB25-S project, position in Strategy
R4	Followed the TSB25-S project, position in Global Strategy and Business Development
R5	Working in Global Strategy and Business Development

The interviews were semi-structured in the sense that they followed an interview guide, but with the ambition to encourage a loose and natural conversation. This was done to enable the respondents to reflect freely on the questions and to clarify the respondents' thoughts and opinions on the matter. Face-to-face interviews were the preferred approach, as remote interviews lack the immediate contextualization and depth (Easterby-Smith et al., 2015). The interviews had a duration from 90 to 140 minutes and were conducted during a single sitting for each respondent. An audio-recorder were used during the interviews, to prevent the distraction of taking notes continually during the interviews. The interview questions centred on the following topics.

- Disruptive innovation

- Strategy
- Competence
- Culture
- NES

Disruptive innovations have been the fundamental theme of this thesis and were included in the interview guide to uncover what Statoil believed to be disruptive innovations within new energy solutions. Strategy, competence and culture were selected as we found these to be central topics in the literature review of disruptive innovations. Finally, the interview questions centred around NES aimed to identify organizational aspects such as structure, work processes, culture and human resources, as well as to gather information about its relation to Statoil. The actual questions would to some degree vary depending on the interview participant's function in Statoil and its relation to NES. The interviews were analysed and organized according to the topics as presented in the theoretical part of the thesis.

All the participants received a copy of the questions before the interview, as well as a paper copy to hold track of the questions during the interview. The decision to give the participants insight to the questions beforehand, had the purpose of giving the respondents information about the research' theme. Additionally, as some of the respondents were involved in the establishment of NES, it was considered valuable for the data collection that the respondents refreshed their memories about processes and situations taken place in the past.

3.2.1.2 Secondary data

The secondary data used in this thesis comprised of written documents, such as news clippings and available public articles, and archival records, such as climate reports and government proclamations.

Documents

Different web sites and the quality assured online-research tool "Atekst", which gives access to a variety of national and international newspaper and magazine articles, were of particular use during the explorative phase. The primary intent of using these tools was to map and get a basic

understanding of the contextual surroundings and development around Statoil, from its establishment in 1972 until today, with an emphasis on the organizational involvement in renewables. By doing this we wanted to shed light on how the strategic focus of the organization had changed as a response to changing surroundings in terms of their involvement in renewable energy sources. Other major oil companies' involvement in the renewable sector was also explored to further enhance our understanding of the dynamics of this market segment. Another aim was to explore the contextual events that may have influenced and led to the establishment of the New Energy Solutions as a separate unit. These findings were used to create a timeline over the major events leading to the establishment of NES and what significant changes that occurred in this time-period to its mandate.

Archival records

The main archival records utilized in this thesis was climate reports constructed by federal, state or local governments, but also reports from private and public corporations, such as sustainability or climate reports. These were used both to understand the temporary discourse around climate issues, and in particular to construct the background information necessary to answer the second research question.

3.3 Validity and Reliability

Finally, we will account for the reliability and validity of the thesis. Validity is defined as "*the extent to which measures and research findings provide accurate representation of the things they are supposed to be describing*" (Easterby-Smith et al., 2015). This thesis aims to go beyond a descriptive analysis of NES and the approach taken by the unit regarding disruptive innovations, to also provide an interpretation of their response in light of the theoretical framework. As a result, the validity in this thesis can be related to whether the interpretations carried out in the analysis are valid compared to the reality being studied. A good validity in this regard can be achieved by clearly describing the basis for the interpretations and conclusions, by showing openness about the data gathering, and by reflecting whether the results are transferable and valid in other contexts.

In order to ensure and strengthen the validity of the interviews, several measures were used in

the preparation of this thesis. In the preparation phase of the interviews, the techniques concept of "laddering up" and "laddering down" were used as a basis for the questions. Easterby-Smith et al., (2015), proposes laddering up to be a valuable method for qualitative researchers as it can help the respondent move from statements of facts or descriptive accounts about the questions posed upwards to begin to reveal the individual's value base. To achieve this, asking 'why' questions is essential. However, the use of 'why' questions should not be exaggerated as persistent use eventually could make the respondent run out of things to say (Easterby-Smith et al., 2015). Laddering down was also utilised as this is a good technique to explore the respondent's understanding of a particular construct. This can be obtained by asking questions that seeks to uncover illustrations and examples of events (Easterby-Smith et al., 2015).

During the interviews, some notes were taken to complement the transcription. If some of the answers were perceived as unclear, the respondents were asked to give a more detailed explanation or to illustrate their statements with examples. After the interviews, the transcriptions were carried out within two or three days to increase the understanding of the gathered information. Additionally, to give the respondents a chance to correct statements or potentially misunderstandings, every respondent received a copy of their transcribed interview. The respondents also received a complete draft of the thesis to give them a chance to read the thesis as a whole and to correct statements in the analysis and discussion section.

Many of the interview questions concerned events that happened two years in the past. Therefore, retrieving a complete understanding and overview of these events, drawing on the memory of participating individuals, will always be exposed to shortcomings. It is particularly important to highlight lack or faulty memories, or how memories from past events and the present may be affected by knowledge retrieved in the interim period. Therefore, using data retrieved from Statoil documents written at the time of interest provided a fundament to the understanding of the processes at the time and for the events happening therein.

The reliability of a study concerns to what degree the study can be repeated by other researchers, using the same described techniques and procedures, and produce the same results and arrive at the same findings. According to Robert Yin, reliability can be defined as "*..demonstrating*

that the operations of a study –such as the data collection procedures –can be repeated, with the same results" Yin (2015, p. 46). One central factor that may have affected this thesis' reliability, is the fact that semi-structured interviews have been utilized as a key method for collecting primary data for the case study. To re-create the findings uncovered during these interviews will depend upon the similarity of the interview setting for both interviewer and respondent. It will be possible to some extent, but the interviewer's personality and other situational based factors can play an important role in how the respondents answer the questions, and hence the type of information revealed. Additionally, the personal aspect of the semi-structured interviews can give a higher degree of confidentiality (compared to more structured interviews) as the interviewer has the opportunity to identify non-verbal clues. This can for instance be inflection of the respondent's voice or facial expression, which can be used to develop secondary questions (Easterby-Smith et al., 2015).

Showing transparency of the study's techniques and procedures are important to strengthen the reliability. We used audio recorder in all interviews and every interview guide are attached to the thesis (see Appendix A). Showing openness around the case selected to study also promotes this transparency.

3.4 Case presentation - New Energy Solutions

The purpose of this section is to describe the organization, mandate and operating model for NES.

3.4.1 New Energy Solutions: organizational structure and mandate

New Energy Solutions (NES) was established June 1st 2015 as a new business area in Statoil, thus becoming one of Statoil's eight business areas. NES was established to drive further profitable growth within renewables, reflecting Statoil's aspiration to gradually complement their oil and gas portfolio with profitable renewable energy and other low-carbon energy solutions (Statoil). The initial task of the unit was to gather all of Statoil's existing assets within renewables, which at the time were placed in different departments in the organization. NES' mandate today includes to develop and strengthen Statoil's position in new energy solutions through venture investments, business development and profitable operations. In addition, it is to incubate different ideas, identify, and develop different business models and investment

themes within new energy solutions to drive demand for their core products. This mandate is to be delivered through the different departments of NES, consisting of Strategy and Innovation (SI), Business Development (BD), Ventures (VEN), and Wind and Carbon Capture and Storage (WIC). These four units reflect the core activities of the business area (SD11).

NES is organised as a small, flat and focused unit with a limited number of employees. The unit has approximately 170 employees, distributed in the four departments representing NES (R1). NES has also the ability to exploit different expertise from the entire organisation as required (R1). The executive vice president (EVP) of NES reports to the CEO, and is also member of the corporate executive committee (CEC) (SD11).

Strategy and innovation (SI) is responsible for identifying megatrends and to link strategic thinking, analytics and innovation to identify new business opportunities for NES. This unit also operates an innovation lab for idea incubation and maturation. In cooperation with other business areas, the innovation lab seeks to identify solutions for specific problems by connecting ideas internally and externally, and through development of business models (SD11). The role of the **Business development (BD)** unit is to identify, develop and execute business development opportunities within the defined investment themes of NES. The unit also assist in the identification of new investment themes by screening relevant business opportunities in close dialog with NES SI. This unit is also accountable for appropriate engagement/alignment with internal/external regional/local stakeholders, country/asset managers (SD11). The **Statoil Energy Ventures (VEN)** unit is formed as a capital fund dedicated to do investments in attractive and ambitious growth companies in renewable energy. The Venture's role is to develop venture capital opportunities within NES's defined investment themes through a dedicated financial framework for venture capital investments. The NES venture team should also directly participate in selected companies e.g. through Board of Directors Positions. **Wind and carbon capture & storage (WIC)** is responsible for the operations and development of Statoil's business positions within existing and future wind and carbon capture and storage activities. NES WIC is both the owner of Wind and CCS assets and investment projects, and the mandate of the unit is to strengthen Statoil's business position within wind and build a brand for Statoil as a major player in this market (SD11).

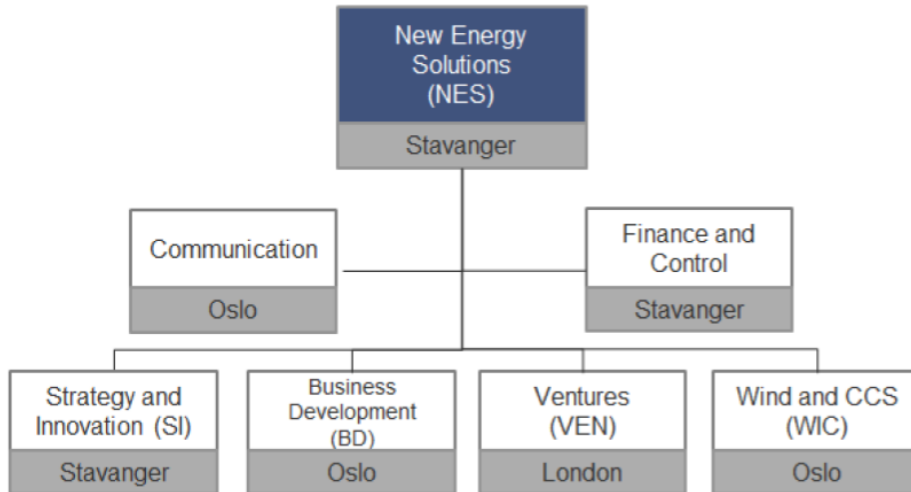


Figure 9: The structure of NES. The functions Communication and Finance and Control are support functions (SD11)

4 Analysis and discussion

The introduction of this thesis presented three research questions. By asking these questions, the goal was to analyse the strategic response taken by Statoil when confronted by disruptive innovations within new energy solutions, why NES became the response and how it will enable Statoil's ability to benefit from the disruptive innovations. The following research questions were asked:

1. *What was the rationale and strategic choice behind Statoil's decision to establish New Energy Solutions?*
2. *Addressing the energy transition for climate: How can new energy solutions be disruptive innovations for Statoil?*
3. *What aspects of New Energy Solutions enables or inhibits the unit to act as Statoil's response towards disruptive innovations in the energy sector?*

This chapter will present the analysis of the research questions and is structured according to the sequence above.

4.1 The rationale and strategic choice behind the establishment of NES

This study seeks to answer the first research question by analysing the processes taking place prior to the establishment of NES. This section will therefore explore the early processes and initiatives taken by Statoil in the advent of the COP21 summit (UN Climate Change Conference in Paris, France, December 2015) and how these processes eventually led to the establishment of the New Energy Solution unit. The aim is to reveal and discuss what strategic response Statoil pursues in relation to disruptive innovations within new energy solutions.

The first initiative was Taking Statoil Beyond 2025 – Sustainability (TSB25-S). The outcomes of this program were transferred to an operationalization phase that later resulted in NES. The most important outcomes of TSB25-S will be discussed as they had a significant impact on Statoil's commitment to the strategic choice "Building New Options" and the structure and mandate of NES. Figure 10 illustrates the course of events leading to the establishment of NES, and is intended to assist the reader through this section.

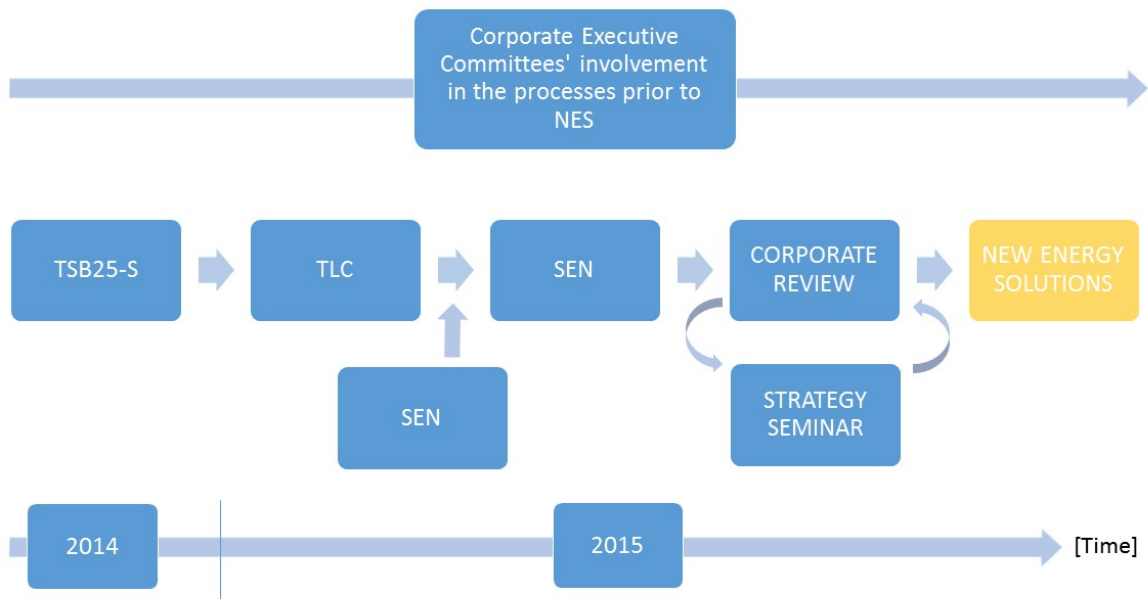


Figure 10: TSB25-S project and course of events

4.1.1 Taking Statoil beyond 2025 – sustainability

According to Statoil document SD1, in August 2014 the former CEO of Statoil, Helge Lund, initiated the Taking Statoil Beyond 25 Sustainability project (TSB25-S) in Statoil. The respondents inform that the original intent of the TSB25-S project was to put in place an increased focus on and establish enhanced knowledge of how the climate challenges would lead to changes in the oil and gas industry, and at the same time develop the TSB25 leaders knowledge around climate risk issues. Based on this knowledge, the project aim of TSB25-S was to build a set of strategic options with measurable business impact for Statoil in a climate context. Respondent R2 and R4 reveals that the project group consisted of eight leaders considered as “Executive Officer Talents” that within short, medium or long term could take a position in the corporate executive committee. All of them were selected from various departments in Statoil and divided into two teams, where each team was granted one person from the Global Strategy and Business development (GSB) group acting as support (SD3). According to respondent R2 involved in this process, the TSB25-S presented their final delivery to the Corporate Executive Committee (CEC) in November 2015. Respondent R2 states that at that point the TSB25-S' recommendations were only strategically guiding, and did not include any directions to create a new business unit. It did, however, include organizational aspects served to guide and affect the strategy selection process.

The TSB25-S project was composed of distinct project phases and milestones and it is apparent from both Statoil document SD3 and the respondents involved with TSB25-S (R2, R3, R4) that the focus of the program was very much external. An important initial phase was the exploration phase, in which the participants were to gather information through both external and internal involvements to understand climate change risks and their possible impacts on both industry and society. According to respondent R2, this would later serve as a fundament for the following project phases, in which the project participants would use their enhanced knowledge to develop a set of key strategic options for portfolio adjustments in Statoil.

The TSB25-S recommendations to the CEC were presented as five ideas. These ideas were based upon the strategic beliefs that the group had developed from their learning about the industry implications of the climate change. They conceptualized and presented these implications through three lenses: government, markets and civil society, that they considered to be the driving forces behind the energy transition. This was based upon their realization that the implications felt by Statoil not only could be ascribed to the climate issues; *"The oil and gas industry have always been dismissive of other energy sources, since none of them have been on the scale in which we operate [...], but when we started to put together all of these factors into a wider approach: customers that wanted diversification, regulators that wanted a greener profile, and a technology that now was capable of answering all of these demands and as such making other energy sources more attractive, then we saw that it all was moving in another direction, displacing the demand away from oil and gas."* (R2). Hence, the rationale of adding *markets* to the equation, was to place a focus on how the changes seen in Statoil's environment could translate into being more than only a corporate challenge regarding sustainability and carbon footprint, to also include a challenge about the market shares of oil and gas diminishing and being captured by other industry actors.

Taking this wider approach, and looking beyond the climate challenges, seems to have had an impact on the strategic beliefs and ideas for further work in Statoil presented by the group. As mentioned, these five prioritized ideas were strategically guiding and where built on Statoil's current strengths to further support the company's optionality to take broader steps in a future marked by change. According to Statoil Document SD5, the ideas had the objective of

providing the organization with the ability to build resilience, create a stronger learning organization with increased agility, and to become a more offensive player in the climate solution. Of particular interest is one idea concerning Statoil's actions towards the advent of disruptive innovations. The idea depicts the company's actions from a short-term perspective, involving monitoring and learning about these disruptive innovations, and a long-term perspective, involving evaluations of broader actions and investments. Another idea of interest is one involving the establishment of The *Broader Business Model Lab*, involving in the short-term to establish a cross-functional team to innovate, test and deliver business solutions, and on the longer term develop new business models for Statoil's products.

The strategic beliefs and recommendations from TSB25-S was approved by the CEC in November 2014. However, respondent R2 emphasized that the most important outcome of the TSB25-S processes was how the group managed to create an alignment among the CEC in their view on the pace of the disruptive forces present in this new energy paradigm and the need for Statoil to take significant actions in order to stay on top of them. According to the respondents, the question regarding the timing of these disruptions was heavily discussed among the members of the CEC and the TSB25-S project group, and still is an issue characterized by a lot of controversy and disagreement.

In sum, the initiation of the TSB25-S project and how the project opened up for impressions from externals, introducing both industry specific challenges and market specific changes, had a crucial effect of the project participants understanding of how these changes could eventually be disruptive for Statoil's core business. Fronting this understanding and these beliefs to the CEC, and by virtue of their key positions as executive talents, led to an alignment in the CEC-members' views on the pace of the changes happening in the company's surroundings, and their possible detrimental effects on the core business. In effect, the strategic decisions made included actions for Statoil to address these changes, among others through the establishment of NES.

4.1.2 The operationalization phase of TSB25-S and Statoil's strategic choice

The strategic beliefs and ideas from TSB25-S were then to be implemented through a final

operationalization phase led by one of the project participants. According to the Statoil Documents, this project was called *Towards a Low Carbon Future* and was initiated shortly after the completion of TSB25-S. According to the respondents (R2 and R3), this project operationalization coincided with and was combined with a broader re-organization project, SEN, related to the introduction of the new CEO, Eldar Sætre. Despite this combination, the final project composition of SEN, included key leaders from the TSB25-S project.

As revealed from the interviews, in parallel to the SEN-project, Global Strategy and Business Development (GSB) was preparing for the upcoming Strategy seminar, during which key decisions of the future strategic direction of the company were to be decided. During this strategy seminar, GSB presented two strategic options - "Sticking to core" and "Building New Options". The respondents were of the opinion that having key personnel in the GSB involved with the TSB25-S project, had an influential effect on and coloured the content of these strategic options. Progressing through the discussions during the Strategy Summit, the CEC eventually landed on the realization that the option "Sticking to Core" would eventually not be a sustainable choice for the future of the company: *"This strategy summit was very important. When the CEC went out from there they were for once pretty unified in their opinions that "Building New Options" was the right move"*. According to one respondent participating in the operationalization phase of TSB25-S, this choice of strategy taken by the CEC had a major influence on the proposed structural design and mandate of NES put forward by SEN.

4.1.3 Key elements in the two strategic options: "Sticking To Core" and "Building New Options"

Information from Statoil document SD9 reveals that the key elements in the option "Sticking to core" were related to a continued focus on the core portfolio, believing in a long-term resilience of the oil and gas business model. However, the strategic recommendation described in SD9 did imply important institutional changes to be considered. These included building a leaner and more cost-efficient organization involving a reorganization towards a leaner organization, focus on standardization, and develop the necessary capabilities to build a culture supportive of increased efficiency and cost competitiveness, as well as enabling increased onshore operations.

Based on the information from SD9 and respondents involved with GSB (R2, R3 and R4), the chosen strategy, "Building New Options", concerned how Statoil could adapt to the global trends by doing two things at once; (i) maintain portfolio flexibility by only investing in the most profitable oil and gas cash flows, and (ii) redistributing investments to wind, solar and/or other non-hydrocarbon options. In alignment with several of the respondents, choosing this strategy supported a belief that Statoil could take advantage of a wide variety of new opportunities for growth opening up in the new energy landscape. According to Statoil document SD9, this strategic choice aimed to mitigate the risk of over-commitment to oil and gas in a transition to a low carbon world.

4.1.4 The strategic choice taken by Statoil when confronted by disruptive innovations within new energy solutions: ambidextrous or autonomous organization

The previous sections in this chapter have explored and illustrated Statoil's processes and actions that together resulted in the organizations decision to establish NES and to pursue a new strategy. This relates to the fact that key personnel in Statoil realized the possible detrimental effects the changes occurring in its surroundings could imply to the core business and the subsequent actions needed to address these changes. As a result, the strategic choice taken by Statoil reflected the way in which they wanted to respond to potential disruptive innovations related to within the market of new energy solutions.

Statoil's strategy "Building New Options" can be defined as ambidextrous as it attempts to both exploit Statoil's current business and to explore new business opportunities. According to the research done by O'Reilly and Tushman (2008), depending on the nature of the disruptive innovation this approach may be the best response taken by organizations. Following their framework, ambidexterity is the proper strategic choice when the new opportunity is both strategically important and can benefit from the firm's existing assets and operational capabilities. Statoil's establishment of NES and the alignment in CEC to pursue the "Building New options Strategy" illustrates their view on new energy solutions as strategically important. This argument comes from Statoil's commitment to mitigate the climate challenges, and that renewables and other energy solutions may challenge their competitive advantage, thus

demanding more pro-active actions to secure flexibility and optionality in Statoil's portfolio. Additionally, Statoil sees leveraging opportunities in its existing assets, resources and capabilities in the projects pursued by NES. The respondents therefore highlighted this as the main rationale to keep NES as an integrated part of the company. In particular they emphasize the prominent benefits that the synergies with the existing value chain and competences between the old and the new business can bring to the development and execution of large-scale projects within the NES-portfolio. These elements substantiate the assumption of ambidexterity as the strategic choice taken by Statoil. Pursuing an ambidextrous strategy also includes some structural guidelines. However, the structural aspect of having NES as the unit responsible for strengthening Statoil's involvement within renewables and to explore new business opportunities will be analysed and discussed later in section 4.3.1.2.

Following the discussion above, the strategic choice taken by Statoil has many similarities with an ambidextrous strategic response. However, Christensen and Raynor (2013) claim that the only rational response and strategic choice of incumbents to enable disruptive innovations, independent of the nature of the disruptive innovation at hand, is to establish a separate unit with complete autonomy from the mother organization. The following discussion will compare the theoretical framework related to the strategic choice of autonomy with the strategic choice taken by Statoil.

According to the framework proposed by Christensen and Raynor (2013), choosing a strategy to establish an autonomous unit, does not necessarily imply complete geographical separation from the core business nor a different ownership. The key aspects of autonomy are related to the unit's freedom to create its own unique processes and cost structure (Christensen and Raynor, 2013). As described in section 3.4.1, NES is organized as a separate business unit and it has its four divisions spread across Statoil's locations in Stavanger, Oslo and London, indicating a geographical placement with the core business.

NES is set out to pursue business opportunities that can give a profitable growth within renewables and new energy solutions. As mentioned, some of these opportunities were considered to benefit from the existing processes and experiences in Statoil. It was for instance,

considered that Statoil's established relations to regulators and politicians, as well as their knowledge on large scale projects and the infrastructure related therein, could be leveraged by the offshore wind portfolio (Jostein Løvås, 2015). However, given that NES has its own functional units, indicates that some of their projects are in need of new processes and new types of team interactions to be successful. At the same time, NES' projects may not necessarily conform to the values placed upon Statoil's mainstream projects, and therefore might not be given the necessary resources needed in order to become successful. In sum, these business opportunities may have a poor fit with Statoil's values while at the same time have a good fit with Statoil's processes, ascribing to the position D in Christensen's framework. This region represents projects whose end-products or services that are similar to those in the mainstream market and that can leverage some of the main organizations logistics management processes. However, drawing on the indication that other projects require different processes and team interactions, these projects may be a better fit with position C.

As mentioned, for these business opportunities to be successful, Christensen states that an autonomous organizational unit is required for the conduction of such projects. However, it is important to note that NES' mission is to explore several business opportunities within the area of new energy solutions. Therefore, these opportunities can represent different disruptive innovations. This implies that having NES as an autonomous unit might not necessarily be the right strategy, but it might be beneficial for the success of individual projects in NES if they were to be separated from the business unit and placed in an autonomous unit. In that regard, NES could continue to monitor the surroundings, evaluating different disruptive innovations within new energy solutions and their impact on Statoil's core business. Thereafter, they could select projects to be further developed and place these in the responsibility of autonomous units. This view was fronted by one of the respondents when asked if NES should be an autonomous unit; *"Not NES. I think NES is part of Statoil, it is a business unit. But it would maybe be a better solution for parts of NES"*. As for ambidextrous businesses, having an autonomous unit implies different structural considerations to be taken. These will be discussed later in section 4.3.1.1.

NES' strategic focus today lies primarily in potential large-scale renewable projects, in

particular in wind-projects, such as the Hywind-park. Judging from the general answer from the respondents regarding NES' profitability and project focus, it is assumed that the main reason for this focus is the comparability and close synergies with the existing business portfolio. The current work-process of NES, in which the renewable projects from the business unit are compared with those in the oil and gas portfolio, requires a certain scale for the renewable projects to be comparably profitable, at least in their current business model.

4.1.5 The framing of the disruptive innovation and its importance for the incumbent's strategic choice

Gilbert and Bower (2002) claim that the success of the strategic choice taken by corporate managers when confronted by disruptive innovations, depends on how these innovations are perceived by the managers as either threats or opportunities (Gilbert and Bower, 2002).

As mentioned above, a key outcome of the TSB25-S project was the alignment with the executive committee about the detrimental and possible disruptive effects represented by the changes happening in the energy sector, and the realization that the pace of these changes could possibly be much faster than anticipated. Equally important was the Strategy Summit, in which the strategic direction for Statoil was to be chosen. One respondent, participating in both the TSB25-S project and in the Strategy Summit, put a particular focus to the approach taken by the strategy group in how they decided to present and frame the disruptive innovations lurking in Statoil's environment to the CEC. Deviating from the normal procedure in presenting the strategic choices in singular terms, the group developed and presented the two strategic options mentioned above "Building New Options" and "Sticking to Core". These strategies included elements of both positive and negative consequences for Statoil's activities, and highlighted the need for key structural and strategic changes to be made in the core organization. Whereas the "Sticking to Core"- strategy set the stage of a more defensive response to the disruptive innovations, "Building New Options" set a focus on the opportunity landscape these changes could represent to Statoil if the right actions were to be implemented.

According to the respondent, this dual framing of the disruptive innovations as both a threat and an opportunity had a crucial effect on the CEC reactions and final decisions. This is in

relation to the findings by Gilbert and Bower (2002), Gilbert (2005), and Christensen and Raynor (2013). They highlight how focusing exclusively on the threat perspective of the disruption will most likely lead the executives to overreact by committing too many resources too quickly. On the other hand, if seen as a pure opportunity, the managers will likely commit insufficient resources to the firm response and development (Gilbert and Bower, 2002, Gilbert, 2005, Christensen and Raynor, 2013). Hence, Gilbert and Bower (2002) recommend a dual framing strategy in presenting the disruptive innovation, first as a threat to create an expedite commitment and resource allocation, and later as an opportunity to give managers time and flexibility to set a proper strategy for the innovation (Gilbert and Bower, 2002). Drawing from the TSB25-S documents one can also consider how these innovations were framed to the CEC during the TSB25-S project phase. As such, the framing of the disruptive innovations to the CEC during the TSB25-S meetings were largely concerned around the challenges and threats these innovations posed to Statoil's core business (SD3 and SD4). However, during the strategy summit the framing of the disruptive innovations were opportunity driven. Hence, by choosing the "Building New Options" strategy and establishing a separate business unit, Statoil views the disruptive innovations connected with new energy solutions as opportunities. At the same time, it shows an understanding of the inherently difficult task presented by both exploiting the old and exploring the new.

4.2 Disruptive Innovations for Statoil within renewables and new energy solutions

The Statoil documents from the processes leading to the establishment of NES (e.g. SD4, SD7) reveals that Statoil views the combination of different aspects in the energy transformation, and not a single technology or innovation alone, to have the potential to be disruptive for Statoil's business models. In the Statoil document SD4, written by the participant in TSB25-S, a particular focus is placed upon technology developments in renewable energy sources and how this combined with regional policy developments, changes in consumer behaviour, business model innovations, and integration of different low-carbon technologies contribute to radical price improvements and high penetration. By using the theoretical framework of disruptive innovations together with an explorative view on some of the key drivers of the energy transition along with information gathered through interviews and Statoil documents, this section aims to answer the second research question: *Addressing the energy transition for climate: How can new energy solutions be disruptive innovations for Statoil?* This section aims

to provide a theoretical comparison to see whether this combination of aspects in the energy transition (e.g. climate, policies, subsidies, distributed energy) can transform renewables and other energy solutions into disruptive innovations for Statoil.

Technologies allowing for the conversion of renewable energy, such as solar and wind, are increasingly being deployed in several economies. See for instance the US development of electricity generated from renewable sources between 1970 and 2011, illustrated in Figure 11 (Midttun and Witoszek, 2015).

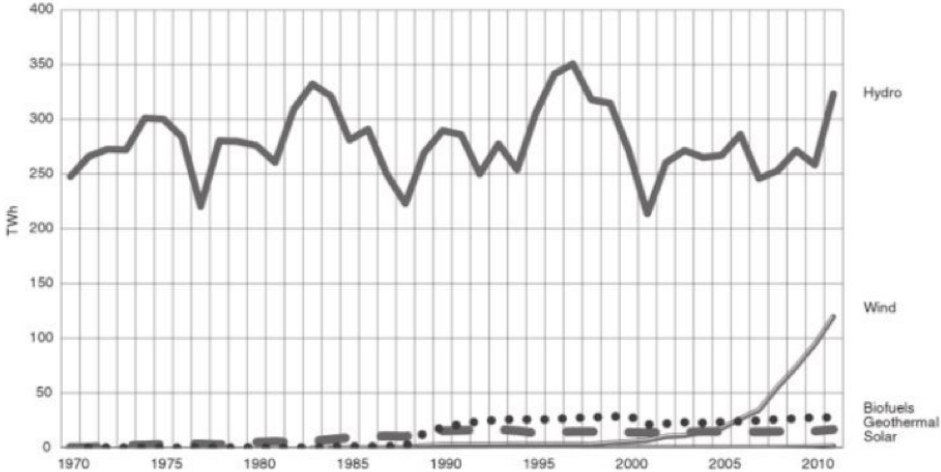


Figure 11: Electricity from renewable sources in the US, 1970-2011 (Midttun and Witoszek, 2015)

Drawing on information from both Statoil document SD4 and the interview respondents R2, R3, R4 and R5, this energy transition together with technological changes seen in both the transport sector, with the advent of electrical vehicles and, new business models, as well as the energy sector moving from centralized to decentralized systems, are highlighted as some of the major challenges facing Statoil as an energy company. The collected data also emphasize the important contribution played by climate politics in accelerating this development, such as the annual Conference of Parties (COP), promoting the establishment of regional policies to promote the use of renewable energy sources, such as budgetary transfers and tax incentives (COP). Such governmental actions also lead to increased resource allocation towards research and development of new energy solutions, speeding up the technological development of these resources (Stortinget, 2015).

An increased focus on sustainability from both key stakeholders and consumers adds to the pace of the energy transition. When introduced in 1987 through the UN Brundtland Commissions report, the term *sustainable development* had little meaning outside the political context including those that already then feared the implications on nature and climate of human activities. Today, the term has seen an increased 'popularity', and sustainability has become a mere prerequisite to succeed in business. This is for instance addressed by Carson et al. (2016), who argue that sustainability should be implemented in an organizations core strategy as it would increase the future success of the organization. In that regard, Corporate Social Responsibility concerns how the strategy of a company can be transformed from being purely reactive towards external demands and socially responsible operations, to adapt more proactive strategies (Siri Granum Carson, 2016). Customers, and in particular the younger segments, require transparency in how products are produced and where they come from. Even though these changes have been most apparent in the segment of consumer products, a growing demand of transparency is now evident in the energy production and the utility sectors (Haugstad, 2017). The interview respondents emphasized that the increased focus on sustainability among Statoil's key stakeholders, with the Norwegian State representing one of the main shareholders, had a major impact on Statoil's climate focus and actions to implement strategies and technologies to promote a decrease in the company's carbon-footprint. This is illustrated through the following statement from respondent R5; *"when you look back at the period before COP21, it was a period whereby you could see emerging opinions were coming up across different stakeholders within our external context. You began to see some concern emerging among investors, politicians, regulators, employees and of course given our position within Norway, we saw a need to be proactive around the change that was happening around us"*.

The disruptiveness of renewables and other new energy solutions

As a first approach, the development track of renewables and other energy solutions can be related to the theory of disruptive innovations, where new entrepreneurial initiatives build up alternative technologies that gradually come to take over market shares from the incumbents. Through substantial technological advances and cost-reductions, some renewable energy technologies have evolved from operating with significant losses to gain improved performance and margins.

According to Christensen (2013), each product based on a certain disruptive innovation will in its early development stage only serve niche markets, and they are further characterized by being initially inferior and underperform the established products in mainstream markets (Christensen, 2013). This can be related to renewable technologies as these technologies were initially seen to be inferior and of little significance compared to the mainstream products (hydrocarbon-based energy sources). One challenge that exemplifies this inferiority is the variable nature, also called intermittency, and low storage capacity of many renewable sources (Denholm and Hand, 2011). Oil and gas, on the other hand are perfectly storable energy sources, making their energy more accessible and flexible, hence leading to their associated high valuation. In addition, renewables and other new energy sources, in particular solar technology, originally served smaller market segments compared to those markets provided with carbon-based energy. Furthermore, features such as being cheaper and frequently more convenient to use (Bower and Christensen, 1995, Christensen, 2013, Christensen and Raynor, 2013, Richter, 2013a), characterize products based on a certain disruptive innovation. Historically this has not been the case for renewables, as they have been relatively expensive (compared to carbon based sources) and most investments in these energy technologies have come from developed countries, *"poorer ones felt they could not afford these energy sources. In addition, oil-rich countries, many of them in places well suited for solar, didn't bother either, because they could burn cheap oil. Both of those assumptions are swiftly changing"* (Nyquist, 2015). As a result, oil and gas companies have for the most part disregarded renewables and other energy sources. This can be related to Christensen's so-called "failure-framework", where he explains that incumbents fail to prioritize disruptive innovations as they generally promise lower margins, they are often commercialized in emerging or insignificant markets, and the incumbent's most profitable customers do not want or cannot use the products based on disruptive innovations (Christensen, 2013, Christensen and Raynor, 2013).

However, it is important to mention that several oil and gas companies have done considerable, but rather inconsistent, investments in renewable technologies. For instance, both Shell and Total established joint ventures with different companies for the development of solar PV technologies in the early 2000. However, Shell withdrew from these investments and sold-out in the late 2000's and started investing in CCS (Pinkse and Van den Buuse, 2012). British Petroleum, BP, invested largely in Solar PV in the 80's, 90's and early 2000's, but from which

they divested December 2011 (Tom Bergin, 2011, Pinkse and Van den Buuse, 2012). The lack of profitability of renewable energy technologies seemed to be a strong driver for the divestiture decision. BP Solar's sales climbed steadily over the years, but in 2008, BP's Alternative Energy was making a loss of \$800 million dollars, and the same year BP invested in oil recovery from Canadian tar sands. The following year, BP announced budget cuts in BP Alternative Energy while BP as a whole was profitable. Both Shell and Total established joint ventures with different companies for the development of solar PV technologies in the early 2000. However, Shell withdrew from these investments and sold-out in the late 2000's and started investing in CCS (Pinkse and Van den Buuse, 2012). The above mentioned can be related to asymmetric incentives between the existing healthy business and potential disruptive business, which can cause a market disruption. This occurs as the incentives for existing business to allocate resources towards serving customers in fringe markets is less attractive compared with the profits offered by products served to mainstream customers (Christensen, 2013, Christensen and Raynor, 2013, Yu and Hang, 2010).

Progressing through the framework of disruptive innovations introduces the concept of changing performance over time. Sustaining technologies in both disruptive and established products will lead to enhanced performance in key attributes, and since the pace of technological progress outstrips customers' abilities to use it, the disruptive innovation will eventually be able to fulfil the performance requirements of the mainstream customers, thus capturing a larger part of the mainstream market (Christensen, 2013). Considerable technological improvements have already increased the performance and quality of renewables and other new energy solutions. The development trajectory of these technologies can therefore be compared with that illustrated in Figure 2 by Christensen (2013). As the performance and quality of renewables also are dependent upon the ability to provide electricity when the conditions for their generation are suboptimal it can be related to the technological development in battery technology. Hence, improved storage capacity of batteries can contribute to the performance of renewables. This is underlined by respondent R4; *"If you create a human perfect storable product for energy, which is battery, then you are competing with oil, depending on the price of the battery is or where the oil is, you are storing electricity, you are storing energy. So, the competitive advantage that barrel has starts to disappear"*.

As pointed out in the Statoil Documents (SD2, SD3 and SD4), favourable and facilitating governmental initiatives and policies have added to the pace of this technological development. Both wind power and photovoltaics have followed learning curve trajectories and grown into viable green alternatives due to technology learning *and* strong policy initiatives, and are now taking over substantial market shares from the mainstream carbon-based energy supply (Energy and Transport in Green Transition, 2015). Denmark may serve as a good example in this context, in which policy regulations have contributed to a significant change in the overall energy system through the increased annual share of wind power in the electricity mix, from under 1% in 1980 to 33% in 2013 (Energined.dk, 2010, Energined.dk, 2014, Araújo, 2014).

This is a trend that is likely to continue (see Figure 12), also on a global scale. And according to EIA's World Energy Outlook report 2016, nearly 60% of all new power generation capacity to 2040 will come from renewables, which at that time also will be competitive without subsidies. Another prime example is the German energy transition, "Energiewende" initialized in 2010, entailing a nuclear phase-out by 2022 and a 80% renewable share in the country's electricity generation by 2050 (Araújo, 2014, Richter, 2013a). Generous financial support and strong political forces have been employed to increase the country's electric production from renewable technologies (Frondel et al., 2010). The "Renewable Energy Sources Act" is one such political action, granting priority grid access to electricity from renewable sources and providing the owner of the asset with a fixed feed-in tariff per kilowatt hour. Influenced by the politicians' incentives, the German energy sector strives to completely restructure its electricity supply during the next 40 years (Richter, 2013a).

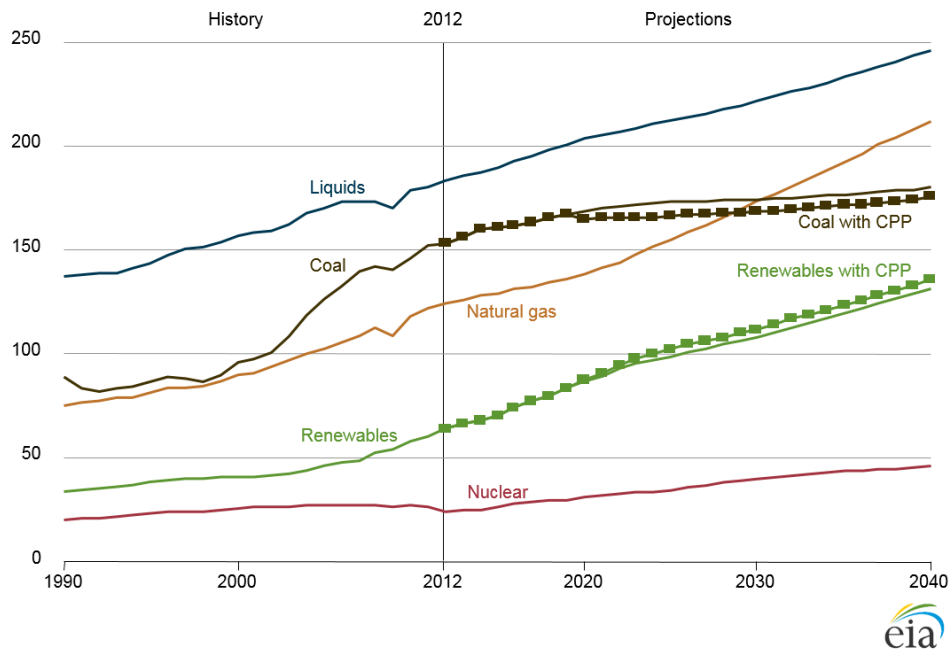


Figure 12: World energy consumption by energy source, 1990-2040, quadrillion btu (EIA, 2016).

The broader concept of disruptive innovations

In the further definition of disruptive innovations, Christensen and Raynor (2013) explains the different ways in which such innovations can originate either low-end disruptions or new-market disruptions. Additional contributions to the theory and understandings of the dynamics of disruptive innovations include the concept of encroachment (Schmidt and Druehl, 2008), the effect of changing customer preferences (Henderson, 2006), and business model innovations (e.g. Christensen and Raynor (2013) and Charitou and Markides (2003)). The following text, will explain how the changes in the energy sector related to the energy transition and new energy solutions can be aligned to these theoretical extensions.

Solar PV has seen impressive cost-reductions under pioneering deployment in mature economies, and has scaled up rapidly over the last decade and is now penetrating new middle-income economies (Midttun and Witoszek, 2015). For example, according to the IEA's World Energy Outlook 2014 solar power will by 2050 represent the largest source of electricity, generating up to 27% of the world's electricity (IEA, 2014). Additionally, this technology is more efficient and available (Temple, 2016). By comparing solar energy technology with that of low-end disruptions, some similarities are revealed. As defined by Christensen and Raynor (2013),

low-end disruptions introduce products or services that are cheaper and of lower quality than existing products but that offer no performance improvement. The aspect of lower performance can be related to renewable energy sources in the sense of lower storage capability and predictability. On the other hand, renewable technologies such as solar PV, have historically been related with high installation costs and to be more costly compared to use of the conventional grid, thus conflicting with the characteristic of low-end disruptions being cheaper than mainstream products. However, this is about to change. According to IEA's prognosis, the rapid deployment of renewables may bring about large cost reductions, around 40-70% average cost cut in solar photovoltaics (PV) by 2040 and 10-25% for onshore wind (EIA, 2016).

The second stream of disruptors, "new-market disruptions", are characterized by creating a new value network, and turning non-consumers into consumers (Christensen and Raynor, 2013, Henderson, 2006). This can be related to new energy solutions when looking at how industrialization in developing countries will increase the global energy demand. According to the projections, developing regions in India, Southeast Asia and China, as well as parts of Africa, Latin America and the Middle East will see a large increase in energy demand, placing a sustained pressure on the continued search for increased energy efficient solutions and low-carbon energy sources (EIA, 2016). Despite intensified efforts to increase availability of electricity, large parts of the world's population are set to remain without modern energy. According to the IEA Energy Outlook Report from 2016, more than half a billion people, mostly concentrated in rural areas of sub-Saharan Africa, will remain without access to electricity in 2040 (EIA, 2016). Therefore, these areas may have the option between no electricity at all, or for instance solar-based electricity, which does not require extensive infrastructures and grid-systems (Shah, 2013). Therefore, new energy solutions may be more readily applied to areas in which electricity generation from traditional energy sources is small or not available. In these areas, new energy solutions will compete with non-consumption, and create a market where none existed. How developing countries will solve their electricity and energy demands, and how this may represent a new market landscape for new industry actors, was something emphasized by the respondents as a crucial factor in the energy transition and in the industry market-change; "...So, if industrialized nations are moving away from gas power-plants and all the centralized systems, why should we think that Africa, India, and others would follow that model that Europe and the US now are leaving?" (R4).

According to Christensen's theory, disruptive innovations are characterized by bringing in new dimensions to the product in question, giving it a competitive advantage once initial performance handicaps are overcome. Renewable energy technologies come with an obvious climate bonus opposed to the incumbents' carbon-dominated industry (Midttun and Witoszek, 2015). Related to this is how changing customer preferences may influence the market dynamics and act as a key driver for disruptive innovations (Henderson, 2006). As previously mentioned, there is evidence that both private and public consumers place an increased focus on issues related to transparency and sustainability, along with a demand for more individual monitoring and control related to energy acquisition and consumption. This is also mentioned by the respondents as main driving forces for the transition towards the low carbon future, and as such a challenge to Statoil's core business: *"...what we see is two main dimensions. Picking out the first one, really is around – rather than just a policy push – we now see consumers pull it."* (R5). This is in line with Adner (2002) and Adner et al. (2003) who state that changing customer preferences may represent a fundament not only for the advent of new-market disruptions, but also for high-end disruptions (Adner, 2002, Adner and Zemsky, 2003). Introduced by Govindarajan and Kopalle (2006), high-end disruptions are defined as innovations having inferior performance in traditional attributes, and a higher price. This definition may be appropriate for new energy solutions considering how they originally have been associated with lower performance and higher price (Govindarajan and Kopalle, 2006).

Despite the increased deployment of new energy solutions as sources for energy generation, there is a high consensus in energy projections that increased demand for energy, approximately 30% increase by 2040 according to IEA (EIA, 2016), will require continued use of all types of energy sources, including those based on hydrocarbons. This was an aspect also expressed through both Statoil documents and interviews, stating that even with the advent of disruptive innovations in the forms of new energy solutions, the demand for hydrocarbon-based products would continue to be significant in an unforeseeable future. This can be related to the notion of *encroachment* in the extended theory of disruptive innovations, defined as the event in which a new product takes sales away from the old. As such, the disruptive innovation will have a significant impact on the existing market without necessarily displacing it completely (Schmidt and Druehl, 2008). This is another important aspect of Christensen's definition of disruptive

innovations, namely that of disruptive innovations being processes rather than events (Christensen and Raynor, 2013, Christensen, 2006). There was consensus among the respondents that the timing of the energy transition was uncertain, but that it could happen much faster than what the prognosis and the beliefs in the oil-and gas sector in general could account for: *"...the transition and the transformation of the entire energy system will take decades, but there are pockets that will move much, much, much quicker"* (R5), *"So, for me all these things when they happen is like a virus, they spread all over, and that's disruptive."* (R4).

Business model innovations

Another prominent factor is the advent of new and radically different business models developed and deployed to benefit from new energy solutions. As illustrated by various researches and practitioners (e.g. Markides et al. (2003), Shah (2013), Seba (2014), and Christensen and Raynor (2013)), the combination of new technology improvements and price reductions together with changing customer preferences, can facilitate the creation of disruptive business models that can generate attractive profits at the discount prices required to win shares at the low end of the market (Christensen and Raynor, 2013). Hence, the focus on climate issues and increased sustainability combined with the technological advancements in new energy solutions, have contributed to changes in customer behaviour. For instance, the key performance attributes historically considered as most important, such as price, stability and energy security, are now being altered to emphasize aspects of control and independence (Economist, 2017, Nillesen and Pollitt, 2016, PWC, 2015). This make room for new business models that address these changes by offering new sets of value propositions (Richter, 2013a). The solar company, SunEdison may serve as a good example of a company whose business model has solved the problem related to the high cost of installation for solar PV, and have managed to unlock the large promise in solar energy services industry. In 2008, the company introduced the concept of solar-as-a-service, in which they offered to finance, install, own, and maintain the solar panels on the customer's rooftops, while the customers only payed for the energy they consumed (Seba, 2014, Shah, 2013).

As pointed out by Chesbrough (2010), the challenge with disruptive innovations is that they often have no obvious business model. Together with the characteristics of such innovations

being for instance initially inferior of established products and promising lower profit margins, the challenge for incumbent firms is to develop and employ a business model for the disruptive innovations that is both radically different from the existing business model and includes aspects that are unfamiliar to the company (Chesbrough, 2010, Christensen and Raynor, 2013). This is an issue assessed by Statoil and NES through the establishment of the Innovation Lab, where key activities are business model development and testing. The action and ability to perform business model innovation is highlighted by several researches as important for an organization to respond to and develop disruptive innovations (Chesbrough, 2010, Hart and Christensen, 2002). According to Chesbrough (2010), a profound barrier inherent in many organizations is their unwillingness to experiment with different business models, and that these barriers may reside in the existence of what he calls a 'dominant logic' on how to create and capture value (Chesbrough, 2010). This is an issue that can be related to the challenges facing NES in the renewable energy space - in which the end products largely will be electricity that in turn may influence the whole value chain and blur the competition landscape. Compared to the traditional oil-and gas business, the renewable energy sector requires a fundamentally different business models: *"...So, what does NES produce? Electrons. So, you should start to think about – how you're going to market those electrons in a different way. Cause electrons are cheap... So, it's a very different model. And when Statoil enters into this it needs to think how it will make money out of selling the end product, and not on the subsidies to create a wind farm"* (R4).

Respondents R1 also believed that the energy transition would create a new market in which decentralized energy will play an increasingly important role. For this market-segment the synergies with the established business model of Statoil is less clear, which might make it more difficult to see a clear value and market potential, and consequently further complicate the task for the managers to search for and employ new business models. The growing market of decentralized energy systems was also the focus in the study conducted by Richter (2013a) on different utilities in the German energy market. The utilities in this study viewed large-scale renewable energy systems as a natural extension to their business as it did not require any radical changes to the conventional business model, while the small-scale energy systems business was not regarded as equally important or attractive.

This lack of attractiveness was by Richter (2013a) explained by the inability of managers to assess the new performance measures and value propositions offered by the decentralized technologies. Hence, when assessing business models significantly different from the current, the arguments against employing this model were largely based on the assumed high production costs and insufficient project size, thus indicating that the managers in the study applied traditional utility performance measures to a potentially disruptive technology (Richter, 2013a). Hence, the lack of profitability in small-scale energy systems was found as a main reason utilities did not pursue a business model significantly different from their current business model (Richter, 2013b). As in the case of NES, where potential projects within the new energies is in direct competition with other oil- and gas projects, the same was found for utilities. The author states that this kind of direct comparison represents a generic barrier for the deployment of new technologies. When a new technology is in direct competition with a long-established technology, the new technology is only adopted on a large scale if it is more cost- and performance effective (Christensen and Raynor, 2013). Further the author claims that this barrier only can be overcome when value propositions for the new market addresses new customer needs.

According to Richter (2013a), the large-scale renewable energy technologies had lost their disruptive character for utilities, and viewed the advent of decentralised energy systems to constitute a main disruptive force to the utility incumbents. Hence, Richter (2013a) suggested the utilities to explicitly differentiate between small-and large scale renewable energy in their organizational structure in order to enable the search for and deployment of business models better suited for this market (Richter, 2013a). These findings may offer important implications for NES, in which electrons constitute one of the main end-products, and the focus is largely being placed on the large-scale wind projects. As for the case with the utilities in the study by Richter (2013a), this focus was by the respondents explained by the comparability and close synergies with the traditional oil and gas business model. Therefore, drawing on the recommendations offered by Richter the act of placing the large-scale wind-projects in the WIC-subunit, allows the other subunits, BD, VEN and SI, to look at other projects. However, the action of business model experimentation and development, places several demands upon aspects of organizational and structural character. Some of these aspects will be reviewed in the following analysis in 4.3.

This analysis suggests that two perspectives can be undertaken when assessing how new energy solutions can acquire the characteristics of disruptive innovations for Statoil: the *Statoil-perspective* and the *NES-perspective*. Looking at the Statoil-perspective, the analysis above shows that the combined effect of climate policies, increased focus on sustainability amongst regulators and consumers, technological improvements in renewable technologies and the advent of new (disruptive) business models, can be regarded as disruptive innovations to Statoil's business model within oil and gas, having encroachment characteristics. In essence, this means that new energy solutions have the ability to take significant market shares away from Statoil's hydrocarbon-products. However, findings from this analysis also show that the most significant threat confronted by Statoil in the current context can be regarded as the characteristic factors within the regulatory space and how focus on sustainability and decreased carbon-emissions demands changes to the current business model. The combined effect mentioned above will have the same validity in the NES-perspective. But the approach taken can be more direct by considering the mandate and aim of NES being a central actor for Statoil's activities in the new energy solution-space. Hence, the ability of the unit to succeed in this industry, and not be disrupted by other actors, will largely depend on its ability to construct business models that captures and combines the changes related to the energy transition.

In sum, the technology changes within the renewable energy sector, together with the push from government for more sustainable solutions, customers demanding more transparency and autonomy and the advent and deployment of new business models can transform new energy solutions into viable alternatives for carbon-based energy sources. Along with the theory of disruptive innovations, these new energy solutions can therefore be viewed as disruptive innovations for Statoil's business model; *"So, when we put all of these factors together: customers that wanted diversification, regulators that wanted a greener profile, and a technology that now was capable of answering all of those demands and through that making other energy sources more attractive, then we saw that it was moving in another direction"* (R2).

4.3 NES as Statoil's response to disruptive innovations

The third and final research question this thesis aims to answer is; *What aspects of New Energy*

Solutions enables or inhibits the unit to act as Statoil's response towards disruptive innovations in the energy sector? To answer the research question, this section aims to analyse organizational aspects of NES, including structure, culture and human resources.

4.3.1 Organizational structure

NES was kept as an integrated part of the organizational structure of Statoil. Several researchers have found, through analysis of such units, that these units have significant difficulties in putting in place appropriate incentive structures, and in successfully imitating the behaviours of successful entrants (Campbell et al., 2003, Henderson, 2006).

4.3.1.1 *Autonomous unit*

Applying Christensen's definition of autonomy – having the freedom to create new processes and values- to NES, may indicate that the unit does not fit this category, and that it largely builds upon the values and processes contained in Statoil. Information retrieved from SD11 reveals that NES' investment projects follow the Capital Value Process applied to other projects conducted in Statoil. Respondent R1 substantiates this and states the following; *"The investment projects we deliver, must be as attractive as other projects in Statoil. So, in that sense we compete against other oil and gas projects."* This indicates that NES does not have the freedom to create new processes and values independently from those in Statoil. Rather, the investment projects are evaluated on the same basis, which contradicts how evaluation shall be performed (Christensen, 2013, Christensen and Raynor, 2013). NES is also connected to other units in Statoil, such as its support unit Finance and Control, which is responsible for providing economic analysis in line with Statoil's standard methodology on single projects and portfolios. Additionally, the NES management committee (NES MC), which includes members of NES' support functions, have a collective duty to safeguard and promote the interest of Statoil and to provide the Executive Vice President of NES with the best possible basis for managing NES' activities.

It is also worth mentioning that keeping the projects of disruptive character in-house is according to Christensen and Raynor (2013) an essential first step in the response of disruptive innovations. Provided NES's structural integration, along with the process-related similarities,

one can argue that NES may have the characteristic of being in the initial step as explicated by Christensen and Raynor (2013). Whether it is in Statoil's strategy and intention to give complete autonomy to the unit is however unclear, but if following the recommendations proposed by Christensen and Raynor (2013) this should be the next strategic choice to consider.

It is important to note that NES is not a response to one single disruptive innovation, but rather a variety of several innovations that has the potential to be disruptive for Statoil. And as most of the theory, most notably that of Christensen, concerns incumbents' response to single disruptive innovations, the question regarding autonomy may not be as relevant for NES as for different projects initialized from the unit. Hence, it may be beneficial for the success of individual projects in NES if they were to be separated from and placed in an autonomous unit. In that regard, NES could continue to monitor the surroundings, evaluating different disruptive innovations within new energy solutions and their impact on Statoil's core business. Thereafter, they could select projects to be further developed and place these in the responsibility of autonomous units. This view was fronted by respondent R4 when asked if NES should be an autonomous unit; *"Not NES. I think NES is part of Statoil, it is a business unit. But it would maybe be a better solution for parts of NES"*.

Furthermore, to fully assess the opportunity landscape these disruptive innovations represent, the authors highlight the importance of transferring the responsibility to an autonomous unit. Without obligations to or connections with the parent organization, such units see potential new businesses as independent opportunities and will accordingly put in place appropriate actions and processes to exploit these opportunities (Christensen and Raynor, 2013, Gilbert and Bower, 2002, Gilbert, 2005).

4.3.1.2 Ambidexterity

Ambidexterity is the action by which an organization seeks to both exploit current business and at the same time explore new ideas and business opportunities (March, 1991). By definition, exploration include search, variation, risk-taking, experimentation, flexibility, discovery and innovation (O'Reilly and Tushman, 2008). For these activities to be executed, O'Reilly and Tushman (2008) propose the organization to separate their exploratory units from their

traditional, exploitative ones. This is suggested to be beneficial as it allows the separate unit to explore new ideas and innovations and to develop its own processes, structures and cultures.

There are several aspects of NES indicating its function as a separate explorative unit in Statoil, while the rest of the organization handles the mature business with its emphasis on productivity and incremental improvements. For instance, NES is the only business unit in Statoil with a sub-unit that combines innovation and strategy. According to respondent R2 this is unique in Statoil as no other business unit has its own innovation department, let alone an own innovation lab with the responsibility to test and incubate ideas and business models. Another unique characteristic of NES is that it has its own business development unit; *"This is kind of unique as it is only NES that has its own BD-unit. This is probably due to the dynamic and structure of the business of NES being different than the business in oil and gas"* (R1). Additionally, the very nature of the projects conducted by NES are significantly different from those in the rest of the organization, with exploration as one of the main activities. Together with the Innovation Lab, the Business Development and Ventures sub-unit are main actors in this exploration activity. This is supported by respondent R1 who states the following; *"We know that the energy landscape between now and in 2030 will look different. But we don't know what's going to win, and that's different from oil and gas, which until recently have been pretty predictable. So, that's why we now are more open to explore this landscape, for which the Innovation Lab and Ventures represent important roles"*. Furthermore, a main activity of SI is to identify megatrends and to link strategic thinking, analytics and innovation to identify new business opportunities for NES (SD11). This indicates that the unit has a focus on discovery, which is another important factor in pursuing an ambidextrous structure.

Another important aspect of ambidexterity is the notion of having a proper architectural integration and alignment of the two strategies to fully benefit from the synergies existing between two business units (O'Reilly and Tushman, 2004). This is also emphasized by respondent R4, in stating the importance of having the EVP of NES present at the Corporate Executive Committee - *"NES has a person in the Corporate Executive Committee, so she represents the business area there, giving them a voice. Even though it is one voice among a lot of oil and gas, it is still one voice"*. This is in line with the theoretical framework by O'Reilly

and Tushman (2004, 2008), which states that the integration should be done through a tightly linked senior team.

A major challenge in organizations following an ambidextrous strategy is the balancing act between handling a mature business, and at the same time operating a separate unit with the mandate and sufficient autonomy to move quickly, learn from failure, and with the freedom to adapt and react quickly to changes in the environment (Crockett et al., 2013, O'Reilly and Tushman, 2008). The analysis of NES may indicate that the structural conditions given to the unit may not be fully aligned with the requirements stated in the theory. However difficult to fully assess the degree of autonomy given to NES, some indications can be retrieved by looking at cultural aspects and the work-related processes contained in the unit. For instance, when the aspect of failure was discussed, it became apparent that some parts of NES, and especially the Innovation-Lab, focuses on learning from their experiments; *"...the point is that you isolate a hypothesis, and then you test it. And if it proves out to be a good business opportunity it can further be developed and matured. If it turns out not to be of interest, then we view this as a learning gain"* (R1). This focus on getting a "learning gain" rather than being considered as a failed experiment, may illustrate an acceptance of failure. However, other aspects like the working processes of NES, does not seem to be fully autonomous from the work processes in Statoil. This was previously discussed in section 4.3.1. Drawing on the perspectives from the respondents as well as the document SD11 substantiates that NES yet suffers from too little autonomy, inhibiting its ability to develop its operational procedures and investment decisions. As stated by respondent R5; *"... we are probably trying to do new things in old ways, and I think that's holding us back"* (R5). According to Crockett et al. 2013, decision autonomy was a prominent factor in enabling venture success through better strategic performance (Crockett et al., 2013).

A possible reason for this seemingly high influence from Statoil may be due to the fact that all recruitments to NES were done internally. Even though emphasize were laid upon hiring people with the right mind-set and drive to work in environments characterized with blurred frames (*"... the ones applying for a position in NES are typically people who thrives with undefined tasks..."*), one can assume there is a degree of interrelation in culture and work processes

between NES and Statoil.

As seen in the analysis of the strategic choice taken by Statoil (section 4.1.4), several elements in this process indicate that the company attempts to adapt an ambidextrous structure. Furthermore, this choice of strategy indicates the ambition to build dynamic capabilities, which following the definition by Tushman and O'Reilly (2008) is the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. By definition, these abilities are closely connected to the routines and culture in Statoil, and as such constitute a major reason for the competitiveness within the current business. The challenge in building dynamic capabilities lies in the actions of both nurturing the existing capabilities and refine and reconfigure these as the problems met by the company starts to change. Considering the successful deployment of several large-scale wind projects indicate that Statoil has successfully attained an ambidextrous structure to accommodate business opportunities within new energy solutions that share similarities with the processes utilized in the core business. However, if considering other energy solutions with a more disruptive character (as seen in section 4.2), the analysis of NES indicates that Statoil experiences certain barriers to accomplish the capability reconfiguration required to accommodate such disruptive innovations, including incomplete autonomy and flexibility. Such reconfiguration also includes the action of accommodating a longer time-perspective in the unit. Drawing on the respondents' statements, this aspect is also viewed as insufficient in how the unit currently operates. According to them, the way NES evaluates ideas, projects and possible investments, indicate that the units' focus lies in the short and medium term perspective. As stated by one of the respondents regarding the long-term perspective of NES in the renewable market space: *"...you could make a case for the short run, I think, just for building a profitable renewables business, and it's probably mainly structured for that. I think it's structured [...] to allow ourselves to take [...] kind of the first few steps, but I don't think it's set up for the long term. And I think there is [...] a key distinction between growing a profitable renewables business and the new energy solutions business, because for me [...] they are very different things"* (R5). In the context of ambidexterity, having a long-time perspective constitute a key success factor to enable the exploitation and development of disruptive change, and the ability to engage in this kind of activity requires a complete different configuration of competencies, systems, structure and culture (O'Reilly and Tushman, 2008).

The previous analysis shows that Statoil experiences certain barriers to succeed in this approach, particularly regarding the autonomy provided to NES. In sum, the structural choice taken by Statoil have several similarities of ambidexterity, however there seem to be some deficiency regarding key factors to assure the success of such a structure. One major element might here be insufficient autonomy given to NES.

4.3.1.3 *External partnerships*

An external oriented focus is highlighted as essential in the innovation landscape. This is related to the objectives of being able to maintain and improve profitable growth and explore new business opportunities, but also to the action of monitoring potential disruptive innovations that can potentially threaten existing business and business models (Chesbrough, 2010).

Historically, innovation and R&D has been the space of internal forces and activities. This is also expressed in the interviews as a central element characterising Statoil's approach to innovation. This was partly ascribed to the historical way industry actors within oil-and gas has gained competitive advantage through well-kept technological secrets and in-depth geographical understanding enabling the finding and recovery of oil; "*...it's hard to partner with externals, in a Statoil way. Or in an oil and gas, or a big organization-way.*" (R4). However, as highlighted by respondent R4, open innovation is becoming increasingly more important; "*One of the largest differences that we see now is that innovation is shifting from being introspective, having R&D-centres, while now innovation efforts are becoming more extrovert*". The enhanced competition met by incumbents further increases their need to look for partners to innovate. Therefore, respondent R4 highlights the importance of having an open innovation mind-set to enable external partnerships, so that Statoil can increase its competitiveness in the new energy landscape, and to be able to respond to potentially disruptive innovations. Additionally, the aspect of external partnerships was viewed as an important strategy for not only increasing the ability to assess changes happening in the energy space and to take advantage of these changes, but also as a means of creating the right motivation and entrepreneurial mind-set; "*...they would gain a lot of adding external air to the table. It doesn't need to be external recruitments, it can be partnerships. This may create motivation, because*

once you're working with externals you're more pushed, even if you're not motivated, you're pushed to deliver. If you're just working with internals, the push to deliver is much lower, because I mean, you have more commitment when you're working with externals, right." (R4).

This indicates that Statoil views open innovation as an important tool, with NES being the responsible party conducting this activity in the new energy landscape.

There are several actions that organizations can pursue to achieve a more open innovation approach. Some of the most prominent actions are making small investments in early stage unproven technology, get a seat within the board, and establish joint development with start-ups by providing them with access to internal resources. Establishing a venture capital fund is also highlighted as means to achieve an open approach, with the aim of gaining knowledge of and assess new technologies and innovations (Chesbrough and Crowther, 2006). Analysing NES may indicate that the unit has constructed much of the required elements in order to benefit from open innovation and to get involved with external parties. This is also fronted as one of the main objectives of NES, and is reflected through the unit's structure, with the Strategy and Innovation (SI) and Ventures (VEN) being two of the most externally oriented sub-units. NES SI has the responsibility for identifying broader megatrends and new market opportunities and set the frames for the opportunity space for Business Development and Ventures (SD11). Beyond building and maintaining NES's investment portfolio, Venture should also directly participate in selected companies, for instance by having Board of Directors positions (SD11). According to respondent R1; *"Having a seat at the board may provide NES with learning outcomes in the industries the companies are operating within"*.

Regarding NES's involvement in external partnerships so far, the respondents emphasize both positive and negative elements. Compared to Statoil's peers, Ventures represent the largest venture fund within the new energy space, handling USD 200 million; *"...establishing a venture fund of two hundred million is a great thing for this external orientation. Externally you are seeing the oil and gas company that has the biggest venture fund for renewables"* (R4). Additionally, NES' engagement within the solar energy space, where potential partners are being evaluated, is seen as a large step for both increasing knowledge on new opportunities, but also to get a clearer understanding of the structural and procedural aspects related to this kind

of involvement, and thus increasing the corporate ability to partner; *"What happens within solar is very exciting, and particularly our efforts in finding external partners. Even though partnering is not a new thing to oil and gas, we are now trying to partner with companies of which we know nothing about. [...] And I believe this will bring a lot of learning outcomes for the company, both in terms of how you do these kind of partnering, and how the set-up should look like with the contracts and everything, in an efficient and smart way."* (R5).

However, respondent R5 is of the belief that NES's external focus today and their activities regarding external partnerships is not sufficient; *"There is more you can do, there is more ways that we can work with external companies that are in the leading groups around this types of disruption that we see, and the way we work with them could be very different [...] Whether it is around exchanging people, exchanging our ideas, partnering around developing business in other certain geographical areas or certain parts of the value chain. It could be venture funding into one of these companies that allows us to have a seat on the board to understand the way that they are constructing their business. [...] So, I think, NES has a huge role to play, but it can't just be NES"* (R5). On the other side, as pointed out by respondent R3, spending time on understanding the challenges and issues related to this new business area and market space, and identifying NES' requirements, may be one reason for the low activity towards externals. Either way, respondent (R1) stressed that it is not in NES' intention to solve these issues completely internally. This statement gives an indication that NES realizes the inherent limitations to accomplish the set ambition for growth and the benefits from adopting a more open innovation approach. This realization was identified by Chesbrough and Crowther (2006) to be one of the key steps in overcoming the 'Not invented here'-challenge, preventing an open-innovation adoption. The second identified key challenge, related to the ability to sustain a commitment to open-innovation, was having senior managers show support and give funding to the initiative, and create open-innovation champions (Chesbrough and Crowther, 2006).

According to the respondents (R4 and R5) there are certain barriers connected with the ambition of increased external involvement in the landscape of new energy solutions. The action of entering into partnership is mentioned as a prerequisite for NES to acquire the knowledge and competences needed to understand the industry landscape, and to assess where in the value chain NES and Statoil can best build a competitive stance. Entering partnerships with players

operating in the oil and gas industry is a widespread activity. However, when it comes to NES, the very nature and structure of the different companies and start-ups that the unit is evaluating as potential partners are fairly unknown to the company and might therefore be evaluated as riskier. One can assume that the historical view on innovation and R&D in Statoil may have shaped the culture and mind-set of its people to become more inward looking, which also affects NES being an integrated part of Statoil and considering that the autonomy given to the unit might be limited. As stated by respondent R5, doing things the "Statoil way" may therefore make it difficult to partner with externals towards specific projects. Indeed, the importance of establishing collaboration with externals beyond the typical oil and gas partners, and the ability to do so may seem to be an issue related to Statoil as a whole; "*...Statoil requires a way which these ideas could be matured, either internally or, indeed, working much closer with the external parties to allow them to be developed. And that's something that's lacking beyond just in NES*" (R5). Several of the respondents also points to the physical, geographical position of NES and its employees, seated primarily in Oslo and Stavanger, and how this might further increase the barriers to accommodate an external approach. Respondent R4 viewed these geographical positions to be insufficient with regards to the characteristic business and knowledge environment of these areas. Furthermore, the respondent proposed the unit to be positioned in areas with more entrepreneurial-like characteristics. Exemplary businesses highlighted in this context were major utilities, such as Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) and Électricité de France (EDF), as well as several oil and gas companies (e.g. Shell and Total), who have established outposts in the Bay Area to enhance their innovation capabilities through the proximity and close corporations with entrepreneurs and start-ups.

4.3.2 Organizational culture

Considering the short timeframe of NES' existence, approximately 2 years, it is difficult to assess if a distinct culture has evolved in the unit. However, since the unit's employees were all hired internally from the corporate organization at the time of its establishment, there is reason to believe that much of the unit's culture may reflect that of the larger organization. However, some difference in cultural aspects might be detected considering the different nature of the unit's mandate and the industry in which it operates. When confronted by this question, respondent R1 was of the opinion that the cultural characteristic in NES could be considered somewhat different from the corporate culture. R1 assigned this to the type of people who

applied for and was hired to work in NES, which the respondent viewed as people who enjoyed undefined assignments and prospered in environments with many unanswered questions.

NES' structure has similarities with both autonomous and ambidextrous organizations. However, the analysis indicates that the unit seems to suffer from lower autonomy than literature recommends to be applied to venture units of both autonomous and ambidextrous designs. Considering that the ability to create a unique culture in a venture unit may be viewed as depending on the degree of interdependency to the corporate organization along with the autonomy provided to the unit (e.g. Crockett et al., 2013), one can assume that the ability of NES to establish its own unique cultural environment might be somewhat prevented.

As previously mentioned in section 4.3.1, one of the main rationales of keeping NES integrated in the corporate organization, was the related nature of several of the processes utilized for some of the projects conducted in NES and Statoil. The large offshore wind-projects were mentioned in this context, for which many of the central offshore, and 'big-project' competencies in the oil and gas business could be leveraged. As stated by the NES EVP to the newspaper Dagens Næringsliv, August 31'st, 2015; *“Our offshore wind portfolio has much in common with our oil-and gas activities. The projects are large, with many subcontractors, marine operations and maintenance, as important elements. Offshore wind was as such a natural transition for Statoil a few years ago. Now, there is much talk about solar. That is a much larger step for Statoil to take. We must analyse the whole value chain to find a business model where Statoil can take hold. In addition to look at various technologies, we will have to look at various geographies and markets...”* (Jostein Løvås, 2015). As the EVP highlights in this statement, the mandate of NES goes beyond wind to also include various energy solutions within the landscape of low-carbon and renewables. There is therefore reason to believe that a different set of processes and values is required to be able to pursue such projects. Particularly with respect to potentially disruptive ideas, whose risk picture, structure and profit margins might be distinctively different from that of other wind- or oil projects, acquiring a different set of processes and values might be essential.

According to literature, to accommodate a proper response to disruptive innovations, the

responsible venture unit should have an adhocracy culture that value entrepreneurship, risk-taking, flexibility and creativity, and a mind-set based upon an acceptance of failure (Christensen, 2013, Govindarajan and Kopalle, 2006). A failure-accepting culture in this regard relates to the approach an organization takes in promoting experimentation, creativity, and how it promotes entrepreneurship (Deshpandé et al., 1993, Govindarajan and Kopalle, 2006). According to the respondents, during the time before the establishment of NES, the general opinion and understanding of building a separate unit was to allow the unit to establish an environment characterized by the ability to experiment, and a freedom from the organizational investment handbook, and generally from the "Statoil way" of making decisions. As stated by one of the respondents; *"...you might have to make 100 investments before you succeed in one or two [...] and if you don't have the will to do that, you don't have a disruptive innovation either"* (R3). Considering the nature and activity of several of the sub-units in NES, there seem to be elements in the unit with characteristics that conform to an adhocracy culture. This is particularly prominent in the Innovation and Strategy-unit, where creativity, business model-identification and experimentation, and idea maturation are central activities. For instance, the work processes utilized in the innovation lab to test ideas may serve as a good example; *"...if someone within Statoil have an idea, they can use the innovation lab to test and experiment this idea for a couple of weeks..."* (R1).

In addition to the prominent role of enhanced autonomy, another important factor for developing a culture with adhocracy characteristics is transformational leadership. According to the findings of Sarros et al. (2008), the factors of transformational leadership most influential to promote a climate for innovation was their ability to articulate a vision for the future, to set high performance expectations, and provide individual support (Sarros et al., 2008, Statoil, 2017). According to respondent R1, the leaders of NES are perceived to be assertive and supportive when it comes to innovation, and might therefore indicate that the leaders promote a climate for innovation. However, due to lack of confirmative data it is difficult to assess whether this characteristic is an indication of transformational leadership or not.

However, when considering media statements from Statoil's top leaders concerning Statoil's ambition for future growth and investment within new energy solutions, articulates a clear

vision for the future direction of change in the organization. As stated by Statoil's vice president for sustainability, Bjørn Otto Sverdrup, when Statoil's climate roadmap was published; *"The roadmap is also a platform for engaging all our employees and an invitation to suppliers, governments and others to work with us in realising our vision of shaping the future of energy"* (Statoil, 2017). This is further shown in the Capital Markets Update document with the announcement that Statoil aims to increase investments in profitable renewables and low carbon solutions, amounting up to 15-20% of all investments by 2030 (Statoil, 2017). Having the members of the CEC articulate such a vision, and with NES being an important unit to carry out this ambition, indicates a shared entrepreneurial vision between the mainstream business and the venture unit. According to Crockett et al. (2013) this might contribute to a consistent culture and identity in the business unit, and enable a better communication and coordination of activities across the organizational boundaries (Crockett et al., 2013).

As mentioned above, much of the focus in the innovation and strategy unit relates to aspects of experimentation and maturation. These aspects also make out the general criteria for disruptive innovations to become successful in receiving market acceptance and market share. To accommodate these activities, organizations must provide sufficient space, time and resources into the new concepts (Christensen, 2013, Christensen and Raynor, 2013). The innovation funnel in NES is meant to provide this through the processes of business model development and experimentation, and through the Venture unit whose interests and investments in new ventures might bring valuable information and ideas back to the unit. However, drawing on the views of several of the respondents indicate that there is a significant gap between the intention of this maturation and the actual operationalization of it; *"The focus is very much on only looking at opportunities that could be parted back in to the business as it currently sits. And because they are very much focused on maximising profitability from their current business, what you tend to find is that after you have spent the initial 4-6 weeks maturing these ideas, there isn't really a home or a place within Statoil for them to be taken any further. So, they die away, even though they might be good"* (R5).

Several of the respondents highlighted what they claimed to be several shortcomings in the culture of NES as a main reason for this issue. In this regard, they stressed that keeping NES as

a business unit in Statoil's core structure was viewed as a significant source of these cultural barriers in NES, with fear of failure being one particularly prominent cultural barrier to adapt a flexibility and a willingness to experiment in the unit; "... *If you are within a specific business area, you need to answer to the needs of this specific business area. You shouldn't spend money on things that might not be profitable. You shouldn't make mistakes, cause that will affect your returns and your results. And you will be measured by your results*" (R4). This statement draws attention to the way in which people and managers in Statoil and in NES are being evaluated by their ability to deliver results, and how it may affect the work and selection processes by which ideas and concepts are chosen to be further tested through NES; "*So, if you start to think about smaller things that need fast action and fast delivery, then the processes that we apply in Statoil, or in any other big organization, will provide a barrier to this. And people will make decisions and conclusions with the mind-set of big projects*" (R4). Respondent R4 therefore calls for a more corporate view, elevating the decision-making authority to the top managers, and giving the unit a cost centre with a lower emphasis on profitability and deliverance. According to respondent R4, this would enable the unit to develop a failure acceptance and an ability to perform and execute experimentation and more daring investment decisions. Some of the respondents (R3 and R5) also believed that utilizing the same investment procedures to the projects in NES on par with other oil and gas projects in Statoil, could be influential for the scope of the possible ideas considered; "...*the ideas that they look to mature is a fairly narrow scope...*" (R4). This also relates to the investment decisions taken by the Venture team in NES. Several of the respondents pointed out that these investments tended to be done in start-ups with already proven technologies and business models, and with more or less proven returns in two or three years. Consequently, this would influence the unit's ability to discover and assess the full and diverse space of possibilities.

The reviewed statements and examples above indicate a conformity to the initial statement presented in the beginning of this section, that the degree of autonomy given to NES, may not have been sufficient for NES to create a unique culture. Hence, to understand the barriers confronted by the unit, one must turn to the specific cultural characteristics in Statoil.

The very nature of the industry in which Statoil operates and how the processes of discovery,

extraction and production, is highly related to risk, the development of an integrated risk management and risk mitigation system along the value chain has been an essential ingredient to operate and prosper in this industrial landscape. According to Christensen and Raynor (2013), once members of an organization begin to adopt the organizational processes and values by assumption rather than by conscious decision, they become inherent in the organizational culture (Christensen and Raynor, 2013). As such, the culture in an organization is highlighted as a powerful tool to ensure that the organization's people and resources are working and allocated in a way that promote the organization's success (Christensen and Raynor, 2013, Jones, 2010). Drawing on these theoretical findings, one can therefore assume that much of the characteristic processes and values in Statoil also is reflected in its culture.

The aspect of risk management and risk mitigation, and how this is controlled through the deployment of a much-formalized operational system, have according to many of the respondents influenced the entire decision-making process and corporate culture. In this context, the term 'late bureaucracy' is used to characterize Statoil as an organization. Therefore, even though important in the oil and gas industry, decision-making processes largely based on risk mitigation and management, whereby all projects and decisions are measured by the involved risks, is viewed by the respondents as a large organizational challenge for Statoil. *"As a player in the oil and gas industry, Statoil has created a system to assure complete safety in all project phases, and I think this has made people adapt to a safety-reflex in everything they do, which also may influence how they approach new and different ideas. So, you need a unit that can do things faster, and dare to jump on different ideas, but I think that our present system and the way it is constructed, with its myriad of steps and processes, does not allow for these types of projects to be implemented"* (R3). This bureaucratic system for decision-making and project development may therefore represent a barrier for the development and progress for some of the ideas and project-proposals in NES. Drawing from the statement above, one can also assume that such a system has created a culture in which people are inherently accustomed to formalized procedures and systems to follow, that when confronting ideas with an unknown scope and risk picture will lead to a degree of uncertainty and risk-averseness.

As mentioned, the aspect of employee evaluation is highlighted by the respondents as influential

to the way by which people approach and evaluate ideas and project proposals, and hence their acceptance of failure. According to the respondents the employees, and in particular the managers of Statoil, are continually being evaluated by their ability to deliver; “...*the leaders in NES clearly have a long history in Statoil and a strong track record within the organization to deliver. And that’s where they are coming from*” (R5). This statement also emphasizes the important interconnection between NES and the corporate organization, and how this indirectly may have influenced the culture in NES. Another respondent also points to the various project proposals that have not been taken any further because “*nobody feels they have the mandate nor the guts to take the responsibility for their execution*” (R3). This is further coupled with the extensive, bureaucratic, system employed in Statoil and in NES for project approval. As seen in section 2.3.3 building an incentive system that promotes entrepreneurial actions is important to develop the right attitudes, evaluations and work processes. As was stated there, the application of a long-term oriented, subjective based incentive regime would facilitate a shift in focus from short-term to more longer-term projects (Govindarajan and Kopalle, 2006).

Statoil acknowledges the possible industry effects the energy transition may represent, and that there still are uncertainties regarding how this transition will develop; “*Game-changing technologies are likely to emerge; climate policies will shift in unexpected ways and new entrants will disrupt the energy industry*” (Statoil, 2017). This confession further reinforces the importance of having an agile and flexible tool to assess and act on the changes happening in the energy space. According to the respondents’ opinion, there seem to be several prominent barriers that inhibits an entrepreneurial culture to be developed in NES. Further, they allocate much of these barriers to the ‘bureaucratic’ processes and systems applied to project approval and progression in Statoil. Hence, to facilitate a more flexible, and risk-taking culture, NES calls for more autonomy from the corporate organization, that will enable the unit to create a distinct culture that may strengthens Statoil's response towards disruptive innovations within new energy solutions. Additionally, to promote and develop an entrepreneurial mind-set and an environment in which experimentation and failure is accepted and promoted, the theory highlight the importance of giving the unit's leaders the task of promoting entrepreneurial values by acting as role-models. The interviews also reveal that Statoil as a whole is undergoing a transformation to make the organization more commercially and externally oriented. This may indicate that attempts are being made to make changes in the culture to create a more agile

organization.

4.3.3 Human resources

Corporate managers

According to the interview respondents, when established, NES was built up exclusively from internal hires with a variety of competences, covering many but not all the business unit's needs. Therefore, the respondents emphasized leveraging activities for human resources from the corporate organization as key to find required personnel and competences. Additionally, the respondents were of the opinion that the unit's leveraging ability was well established, and often a prerequisite to find the expertise required to conduct many of the processes and projects. As respondent R1 states; *"Even though the ambition is to deliver projects supporting the mandate of NES, the resources and the expertise employed can and should be leveraged from other units in the organization [...] There are so much expertise in this organization, and NES is dependent of this expertise"* (R1). According to Crockett et al. (2013) it is in the corporate managers' responsibility to give the venture unit the freedom to leverage key assets and resources in the corporate organization (Crockett et al., 2013), and judging from the respondents' opinion, Statoil has constructed good leveraging opportunities for NES. However, as one respondent states, the ability to leverage resources very much depend on a person's ability to build a network and utilize this effectively.

Additional emphasis was laid upon the corporate presence in NES, which was claimed to have an important effect on how the decisions, requirements and demands in the unit were prioritized among the corporate managers. As Executive Vice President (EVP) of NES, Irene Rummelhoff also has a seat in the Executive Committee; *"Irene is in the Corporate Executive Committee, so she represents the business unit there. If she wouldn't be there then I would say we would be in tough times. Having Irene in the Committee gives the unit a voice. It is one voice among a lot of oil and gas, but it is one voice"* (R4). This is in line with what Crockett et al. (2013) claims to be an effective way to remove intra-organizational barriers that may inhibit the sharing of resources.

Managers- selection process for new growth business and middle managers: development

Giving a characterization of the managers in NES, the respondents highlighted the managers' long history as employees in Statoil, as well as their long track records to deliver. As stated in section 4.1.1, the TSB25-S program had a twofold function in Statoil, one being a development program for future leaders of the CEC. As stated by one respondent, the nature of this kind of leadership career program in Statoil, in which candidates are periodically moved around in different positions and units to provide the future leaders with a variety of experiences are a common way to conduct management development in Statoil. According to respondent (R3); *"...this may create a mind-set focusing on short-term achievements in favour of longer perspective planning"*. And as NES as a business unit was built up exclusively from internal hires, it is reasonable to assume that this also holds for their managers. This is in accordance with what Christensen and Raynor (2013) highlight as key issues regarding developments programs that expose management talents to different positions and new assignments to broaden their skills and experience. Of particular interest is the effects such rotational programs may place upon the evaluation and prioritization processes made by middle managers, who often want to develop a reputation for delivering results. According to Christensen et al (2013), such manager-talents tend to promote and prioritize new-growth ideas that will pay off within a short-term rather a long-term perspective (Christensen and Raynor, 2013). This is pointed towards by one respondent stating the following; *"I think that at the moment the mind-set is really around NES to grow you need to build a track record of successful delivery, and then build up the confidence of the top management that you can deliver upon the expectations"* (R5).

In sum, having a focus on ideas that promise results on a short-term rather than on the long-term perspective may inhibit the unit's ability to find, prioritize and develop potentially disruptive ideas. This lies in the inherent nature of such ideas, having vague or non-existing markets. However, given the EVP's central position at the CEC may provide her with the ability to get corporate approval to prioritize ideas with a more disruptive character. The action of giving the responsibility to promote potentially disruptive ideas to the top-level management of the venture unit is also suggested by Christensen and Raynor (2013) as a way to mitigate the problem of middle-management hesitation to prioritize these same ideas. However, it is not clear from neither Statoil documents nor interviews regarding the level of involvement exerted

by the EVP in the processes of choosing ideas at the lower levels.

Team members: skills, background, internal -external employment

According to the theoretical findings, team-diversity and external hires may be influential for the success of a venture unit's response to disruptive innovations, as this may promote different processes of idea generation and evaluation (Natsuno, 2003). Even though both managers and employees in NES were acquired internally from the corporate organization, both Statoil Document (SD8) and respondents (R2, R3, R4) indicated a need to look for external hires to both diversify the skill-set and to obtain the competences required to achieve the mandate and ambition of the unit in the new energy landscape. Several of the respondents saw the value in and a need to attract young talents within the landscape of entrepreneurship and start-ups and competences related to these areas; *“We believed that we needed to hire people with a real hunger to invest in ideas. To get someone financially driven, even more financially driven than our internal resources, to build up investments in new ventures”* (R2). Hiring externals, preferably with competence and knowledge about the disruptive innovation in question, was found by Gilbert (2005) to be an effective way in obtaining new and often ground-braking perspectives on strategic decisions that could eventually lead to better processes and success of the unit.

However, this talent group were also considered by some to be too volatile and hard to keep internal to hire. Instead, they proposed to partner or engage such competences for a limited time-period to benefit from new perspectives and knowledge; *“So, you can partner with them, but you cannot contract them, because they will be too expensive and they will leave in six months.”* (R4). When questioned about making external hires within areas radically different from Statoil's core business, one respondent pointed to the potential cultural barriers and related work-habit conflicts such hiring could generate; *“These external hires should also be able to work and thrive according to the values and the culture that defines Statoil”* (R1). However, according to Christensen and Raynor (2013) it is not as important to whether the managers and employees originate from external or internal hires as it is for the career allocation process to be based upon the correct set of attributes, specifically regarding how the potential candidates had learned from past errors. They propose to gather team-members, preferably in market-

facing positions, and train these to be able to distinguish between ideas with sustaining and disruptive potential. Regarding the hiring process applied in NES, respondent (R1) believed that the candidates' attitudes were as equally important as their competences, and that they further should develop and grow in their position through on-the-job training. Additionally, several of NES employees were hired from Statoil's MMP department, which, according to respondent R3 is the most commercial unit in Statoil; "*...we saw the need to have commercially driven people in NES, and deployed people from MMP, the unit in which renewables previously were located, as the unit was commercially driven, dealing with downstream in selling our products and customers*". Other than this, the data retrieved does not indicate the specific candidate attributes that are emphasized in the hiring processes. However, the findings by Christensen and Raynor (2013) may serve as a practical implication for NES and Statoil to consider.

It is important to note that the timing of the unit's establishment coincided with a prolonged period with low activity for Statoil due to low oil prices and market uncertainty. This was mentioned by several of the respondents as a main reason for why the potential recruitment pool was limited to internal resources. However, a focus to expand the interaction and involvement with externals may be decisive for the further success of NES, particularly in the disruptive space of new energy solutions. It was also a consensus among the respondents (about remembering NES's young age) that external hires were likely to happen as a next step for the unit. As shown by Gilbert (2005) in his study of the newspaper industry, those firms choosing to differentiate the new venture from the core, and add external hires, was better able to avoid the routine rigidity so often formed within ventures too closely integrated in the core business.

Incentive systems

Govindarajan and Kopalle (2006) found that by employing an appropriate incentive regime is a powerful way to promote and encourage the right actions and attitudes among a venture unit's employees. To avoid senior managers to be confined by rigid incentives and avoid ideas with a potential disruptive character, the authors propose the adoption of long-term-oriented, formula based incentive plans instead of building an incentive regime based upon common performance measures such as market size, growth rate and profitability (Govindarajan and Kopalle, 2006).

Drawing on the respondents' viewpoints there are arguments supporting the assumption that the managers in Statoil, and in NES, are measured by their results and their ability to deliver. If NES is to act as a tool for Statoil's response to disruptive innovations in the space of renewables, adopting an incentive system promoting actions to prioritize potential disruptive ideas should be considered.

Competences

Wind as a business area has been a part of the Statoil-portfolio since late 90's, and is therefore a result of an organic evolution. There was, however, a broad consensus among the respondents that NES lacks key competencies if it is to engage into other renewable sectors. According to the respondents, market and customer-related competences were all seen as key competencies for NES to acquire (R3). These competences were seen as important to build up an understanding of the development and dynamics of different energy and electricity markets, particularly in developing industries such as Latin-America and Africa, as well as an increased understanding of end-user behaviour pattern. Even though technology is not a key focus-area in NES, most the respondents believed competencies within distributed energy systems and other renewable technologies were important. This is in line with the key competencies found in the literature to be influential in promoting product innovation, also within disruptive innovations. In this regard, the ability to build new customer competencies, and to identify and build relationships with customers not previously served by the company, is promoted as one such key competence (Danneels, 2004). Following the argument of Henderson (2006) that disruptive innovations tend to reshape the pattern of preferences in the market, she proposes the establishment of market-facing and customer competences as a requirement in order to succeed in the area of disruptive innovations. This is in accordance with Christensen and Raynor's (2013) theory, who propose that incumbents can gather such competences by finding out *"...what job a product gets hired to do (and knowing what jobs are out there that aren't getting done very well)"* (Christensen and Raynor, 2013). Information from the respondents reveals that Ventures is an important tool for NES to learn about new markets and customers; *"So, Ventures is a rather interesting tool as they are involved with various start-ups [...] They are very much exposed to what happens in the market, giving us a sense of direction [...]"* (R1). Further on Henderson (2006) emphasizes that these competencies must be detached from the established market-based routines since these are developed through experience with the mainstream

technology and products, and as such is ill equipped to make an appropriate evaluation of the disruptive innovations.

5 Summary and practical implications

5.1 Summary

The starting point for this thesis was a collaboration with Statoil and key personnel from one of its innovation units, Øystein Engen and Rolf Helland. The newly established business unit New Energy Solutions (NES), and the much discussed concept of disruptive innovations, became the case and the topic of this study. The thesis' aim was to explore the strategic choice taken by Statoil when confronted by the possible challenges of disruptive innovations within new energy solutions, and if these disruptive innovations identified by Statoil could be aligned with the theoretical explanation of such innovations. With NES as Statoil's player in this industry, the final aim was to explore the strength's and weaknesses of the unit related to it's ability to respond and benefit from disruptive innovations within new energy solutions.

The research method was explorative, in which the initial data gathering constituted the fundament upon which the final research questions would be articulated. This data gathering included written data, such as academic papers, internal Statoil documents, climate reports, newspaper articles, and personal interviews of personnel in Statoil with key knowledge about NES. Henceforth, based on this data the following research questions were formed:

1. *What was the rationale and strategic choice behind Statoil's decision to establish New Energy Solutions?*
2. *Addressing the energy transition for climate: How can new energy solutions be disruptive innovations for Statoil?*
3. *What aspects of New Energy Solutions enables or inhibits the unit to act as Statoil's response towards disruptive innovations in the energy sector?*

Hence, the gathered data accounting for the processes and decisions before and after the establishment of NES served to answer the first research question. Established in May 2015, NES' mandate is to lead Statoil's initiatives within the industry of new energy solutions, and

hence as a corporate tool to respond to disruptive innovations in this industry landscape. Starting out as a reaction towards the climate issues and the upcoming climate summit COP21 in Paris, the TSB25-S processes revealed important movements in the regulatory space, technology development, customer preferences and market dynamics, as well as novel business models for new energy solutions. Together, these were viewed as key forces driving the disruptive effects of new energy solutions, and therefore posed a major challenge for Statoil's business model. This realization was found to have a shaping effect on the project participants and influenced their proposals to the Corporate Executive Committee (CEC), and further the choice taken by the corporation to pursue the strategy of "Building New Options". Furthermore, the data reveals that the choice of how the disruptive innovation was framed to the CEC, as both a threat and an opportunity, had important implications for the degree of commitment and effort given to the business unit. Choosing this strategy gives Statoil a structure with ambidextrous characteristics, in which it attempts to simultaneously exploit the core business within oil and gas and explores new opportunities within new energy solutions. Hence, the rationale of establishing NES can be viewed as a combined effect of the above mentioned processes and how they contributed to reveal the opportunities and threats in the disruptive innovations in the new energy landscape.

The theoretical understanding of disruptive innovations along with findings from other case studies, together with a review of key contextual forces including climate and energy policies, projections of energy demand, and technological improvements was used to answer the second research question. The findings revealed that the combined effect of new energy solutions with the contextual forces as depicted above could be designated as disruptive innovations for the business models used by Statoil within oil-and gas. Considering their initial inferiority and new performance attributes, new energy solutions show similarities with both low-end, and high-end disruptions. However, the most apparent similarity is with new-market disruption. In this regard new energy solutions, and PV in particular, offers other performance attributes than conventional fossil-based energy solutions, including their non-polluting nature and increased availability, not requiring any extensive infrastructure to be employed. Following increased industrialization and energy demand, new energy solutions may therefore build a market where non existed. Further accelerating this development is changing user preferences characterized by an enhanced focus on control and sustainability, and the advent of disruptive business

models that can build upon the new value propositions offered by new energy solutions in a way that generate attractive profits for new entrants.

Interview data along with the extensive literature review on organizational elements important to accommodate a successful response to disruptive innovations was used to answer the and final research questions. The findings suggest that NES has several structural and organizational characteristics that may provide the unit with the means to accommodate a successful response towards disruptive innovations. By having subunits, such as Ventures and Strategy and Innovation, with the mandate to exercise experimentation and creativity, and to make investments in start-ups and companies within the new energy landscape, is powerful means by which increased knowledge and understanding of the market-dynamics can be collected. However, compared to literature findings the analysis shows that NES lacks key elements to be able to fully exploit these structural advantages, the most prominent being incomplete autonomy in processes and values and cultural barriers, such as lack of failure acceptance. Additionally, a more extrovert approach engaging into external partnerships and hiring people with different backgrounds and entrepreneurial mind-sets, was viewed by the respondents as key to gain the appropriate knowledge and competences to prosper in the new energy solutions landscape.

5.2 Practical implications

The analysis of NES and the TSB25-S processes leading to the establishment of the unit can be viewed as an important 'first step' in placing disruptive innovations on Statoil's agenda, and for the understanding of the impact and opportunity space generated by such innovations. The findings from the analysis may provide some practical implications for Statoil. As a first approach, the analysis reveals that the TSB25-S processes served as an important tool to explore areas little familiar to Statoil. By engaging key executive talents in these processes may have positively affected they way by which the uncovered findings and the presented propositions were evaluated and implemented by the top management of the organization. Furthermore, the theoretical review reveals autonomy as an important measurement for venture success. Therefore, a practical implication for Statoil is to review the interconnectivity with the business unit to assure sufficient autonomy to be provided in work processes involved in project and

investment evaluations, and particularly to those departments involved in exploration, testing and incubating ideas. Another possible approach is to give more autonomy to individual projects identified as potentially disruptive. Another important implication is related to cultural elements and how establishing a culture with adhocracy characteristics can promote the identification and development of potentially disruptive innovations. In addition, an increased external orientation would be advantageous, especially with players in the new energy landscape, to increase knowledge of this industry and promote an open innovation approach. Acquiring people with the right mind-set and will to engage in entrepreneurial activities may give NES more flexibility. Increasing the market-facing competence will be important to better understand the dynamics and demands of this new business and to better find a position where Statoil best can develop a competitive stance.

6 Conclusions

This study has found that Statoil's rationale for establishing NES was to respond to disruptive innovations within new energy solutions, uncovered by Statoil through their processes and actions preparing for COP21. Statoil's strategic choice to pursue "Building new options" was found to have elements of an ambidextrous strategy as it attempts to both exploit Statoil's current business and explore new business opportunities within new energy solutions. Furthermore, this study has found that new energy solutions can be designated as disruptive innovations for Statoil's business model in line with the theoretical definition of disruptive innovations. This will be reinforced by the combined effect of climate change, climate politics, new technology development, and changing customer preferences. This study has found NES to have several elements and characteristics which, according to theory, may provide the unit with the means to develop a successful response to disruptive innovations. However, NES possess some organizational elements that does not correspond to the theoretical recommendations and that could inhibit the unit's response to disruptive innovations in the energy sector. The most prominent factors are lack of autonomy and the influence imposed by the corporate organization's culture.

7 Limitations and future work

7.1 Limitations

A limitation of having an explorative approach is related to the methodology's tough requirements to the researchers, including the action of simultaneous data gathering and theoretical search and understanding. Therefore, throughout the data gathering and the increasing knowledge and understanding of the case at hand, the problem definitions formed in the beginning of the case study might undergo significant changes, requiring a re-structuring and review of the work conducted. This is both a time consuming and extensive work. As this thesis has been explorative, the direction of the thesis changed to also look at Statoil's strategic choice when confronted by disruptive innovations. As this thesis only include strategich approaches incumbents can purcue in such situations, this study can be critescised for not including more theory on strategy and in particulare innovation strategy. Another limitation of this study is related to the selection process of the interview objects. A more systematic approach, selecting interview objects within all the subunits in NES could have added more insight to internal characteristics in the unit such as the work processes utilized and the unit's culture.

7.2 Future work

This study has focused on a selection of organizational elements found in literature to have important implications to accommodate a successful response to disruptive innovations. Other topics emphasized in literature, but not discussed here, are resource allocation, work processes and acquisitions. In order to get a more complete understanding of how organizational elements of venture units affect their ability to respond to disruptive innovations, these are topics that could be further investigated.

8 Postface

The processes behind and the establishment of NES can be viewed as an important "first step" in placing disruptive innovations on Statoil's Agenda, and for understanding the impact and opportunities generated in the advent of such innovations. During the course of this thesis information has been revealed that Statoil has an ongoing TSB project group concerning digitalization and with an increased focus on disruptive innovations. Additionally, GSB has developed a separate unit with increased focus on innovation.

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Appendices I: Interview guide

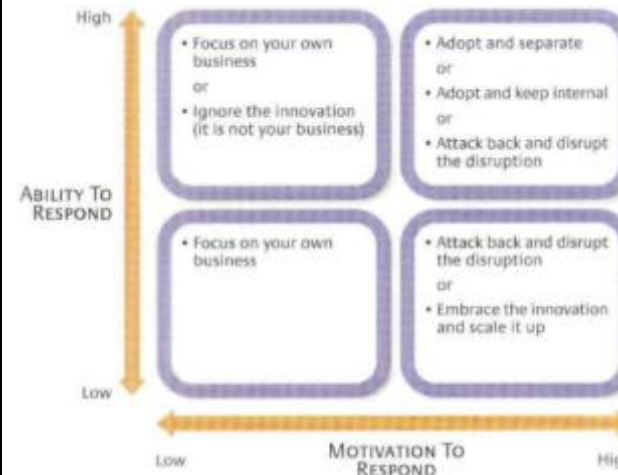
INTERVIEW GUIDE I

	Topic	QUESTION	SUB-QUESTION	
	Personal experiences	Can you please tell us a little about your previous professional experience and your position and role in Statoil today?		
		In the beginning of 2014 Statoil set down a project group called Taking Statoil Beyond 2025 – sustainability, to assess Statoil’s role in a low-carbon future		
		What caused the initiation of this group?		
		In your opinion, what were the most significant events in Statoil’s surroundings that made Statoil initiate TSB25-S project?		
		Eldar Sætre was appointed as acting CEO after Helge Lund resigned in mid October 2014.		
		In your opinion what significance did the change of CEO have on the TSB25 project work?		
		And in what way do you think this has affected the long-term strategic decisions taken by Statoil?		
		New Energy Solutions, established in May 2015, was one of the outcomes from the TSB25-S-project, and later the SEN - project:		
		Can you please describe your role in Statoil in relation to New Energy Solutions both in the processes before the business establishment and afterwards?		
		In your opinion, what was the mandate or purpose of establishing this business unit?		
			How does the strategy unit in Statoil work with NES today?	How integrated are the two business units? Do you establish guidelines for which areas the business unit should make investment decisions?
	NES in relation to Statoil	The establishment of New Energy Solutions has received much attention in the Norwegian media, and the CEO Eldar Sætre has stated that the ambition is for NES to become an integrated part of the core-strategy of Statoil.		
		What is the main purpose of having NES as an integrated part of Statoil’s core strategy?		
		What do you see as the main challenges in implementing NES in Statoil’s core strategy?	How different are the two strategies (in Statoil and in NES)?	
		How are you working to solve these challenges?	Are there specific aspects that are prioritized?	
		What strategic decisions has been made in Statoil after the establishment of NES?	In what way has this influenced Statoil?	
		What does sustainability mean for Statoil? How important is sustainability for Statoil?		
		In May 2016, a Shell shareholder meeting resulted in a 97% vote rejecting a proposition to invest profits from fossil fuels into renewable energy projects		
		What is your perception of the stakeholders’ attitudes and reactions towards the establishment of NES?	What has been the strategic explanation or reassurance towards those stakeholders that has uttered scepticism?	
		In your opinion, how vulnerable is the renewable energy focus of Statoil towards stakeholder scepticism?		
		We have got indications that the general opinion in Statoil is that the systemic changes occurring in the energy sector is slow, and that it will take decades for the energy mix to become significantly changed (this was written in one of the memos). There are, however, some that would disagree with this opinion. For instance, the Silicon Valley entrepreneur Tony Seba, believe that within 2025, gasoline vehicles will be unable to compete with electrical vehicles. He also believes that the drivers within the clean-energy sector, complement and accelerate each other such that the disruption of energy and transport will be a dynamic one.		

	Can you please explain on what basis Statoil believe they can predict the speed of change and development in the energy sector?	
	How do you assess and capture changes occurring in different market-segments and in the energy sector in particular?	What major trends do you see today that significantly will change the energy sector and the way Statoil operates? How do you convert and implement these signals into the company strategy?
	And what if you are wrong- how will Statoil react?	
	What major geographical and cultural differences do you experience regarding the climate change issue and the “green shift”?	Are there any differences regarding how the energy world is being perceived Does this affect how the energy sector is perceived in Norway?
	How do Statoil adapt and respond to these signals? How do other divisions recognise what you in strategy see?	
	In what way do you think this affects the attitudes of these issues in Norway?	
	Are there any differences in how Statoil see the surroundings	
	In what ways do you believe NES will provide Statoil with the necessary tools to jump on the disruption wave?	
	What do you see as Statoil’s main strengths and weaknesses?	In relation to the threats of disruptions within renewable energies?
	Disruptive innovations are often characterized by happening very quickly and abruptly when they first occur - and in the energy sector you often talk about the cumulative effect	
	Considering the structure and strategy of NES; in what manner do you think the business unit is flexible and agile enough to be able to capture and take advantage of disruptive innovations?	
	The utilization potential of solar energy is regarded as unlimited, and the market share of solar is already significant, and will most likely have a substantial growth in the years to come. This increasing trend is mainly due to decreasing prices and large cost reductions. At the same time these price reductions creates issues regarding good profit margins for industrial actors.	
	In your opinion, in what way is Statoil capable of assessing the value potential in coming markets with an unclear marginal profit frame ?	In what way is NES and Statoil capable of exhibiting risk acceptance that often is needed in relation to disruptive innovations and business models?
	How a company responds to disruptive Innovation depends on two main factors: its motivation and ability to do so. If motivation is low, the response should be to ignore the disruption and focus on the main business. If motivation is high, the appropriate response is dictated by ability and circumstances. From “Responses to Disruptive Strategic Innovation” by Constantinos D. Charitou and Constantionos C. Markides, MIT 2003.	

Innovation and Strategy

How would you describe Statoil's approach to this statement and which position would you give Statoil/NES according to this figure?



When asked about how NES is able to respond and operationalize disruptive innovations today, Elisabeth and Jens were of the impression that NES, as it is structured and organized today, had too little flexibility and capacity (in terms of personnel), as well as lack of the right competence to do this in an optimal way.

In what way do you think NES is capable of responding and take advantage of disruptive innovations?

Considering NES' structure and strategy - What do you see as the main challenges?

Another question that materialized itself during the interview was: To what degree is NES structured and organized to succeed in the short-run and the long-run?

In order to succeed in maturing and bringing forward new and potentially disruptive ideas or innovations, you need leaders who embrace change and can act as role models for an entrepreneurial mindset. Another important factor is the ability to accept and embrace failure - and the ability to learn and develop from that failure.

How do you find NES' ability, as it is today, to meet these requirements?

What do you think needs to be changed in its structure, culture or it's relation to Statoil in order to succeed?

To what degree do you think Statoil, being an Oil and Gas company, has the ability to show flexibility and adaptability?

NES EVP Irene Rummelhoff notes that Statoil's commitment to offshore wind will be dependent on Statoil's experience and expertise in the development of technology and innovation, as well as experience from large projects.

In your opinion, how compatible is the competence requirement of NES with the existing competence in Statoil?

From a strategic standpoint how much of a focus was/is the need to create an innovative culture in NES?

In a future scenario where Statoil goes from being an oil and gas-company to become an Energy company, or where the New Energy- segment becomes an increasingly important part of Statoil:

How will the necessary capabilities needed for such a transition be acquired?

In what degree may existing capabilities in the oil-and gas portfolio be transferred to new energy segments like wind, solar, geo-thermal or other?

Competence

In our previous interviews we have heard some mixed opinions about whether NES has the right expertise and the right drive and motivation needed to succeed with the mandate the TSB25 group put forward. These includes the level of competence and knowledge of innovation, and the fact that the people working in NES today are internally recruitments.

What do you see as the strengths and weaknesses of the competences in NES?

What capabilities or competences do you think would strengthen NES' mission and strategy?

How do you think the organizational culture and structure in Statoil influences the strategic choices in NES?

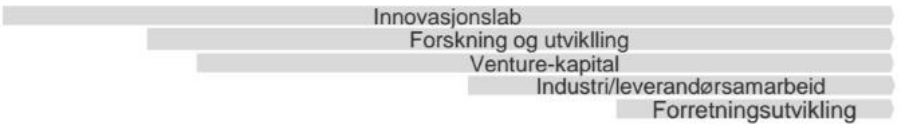
In a positive or negative manner

How do you think it affects NES' ability to be flexible and agile in the face of disruptive innovations?

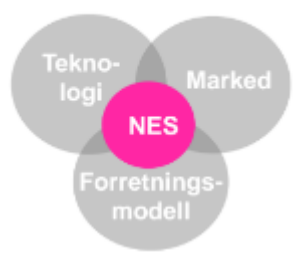
		It is also said that for a business model or a disruptive innovation to be viable it requires some maturation
		How do you think the strategic decision processes in relation to new business models or disruptive innovations in NES allows for this type of maturation?
	Legitimacy	Statoil has been criticised of having a vague or non-existent communication about their climate efforts. Additionally, Statoil's climate message has suffered from a credibility/legitimacy standpoint due to Mongstad and the oil sands investment in Canada. Clearly the establishment of NES sends out a clear message of Statoil's climate intentions.
		From a strategic standpoint, in what ways do you think the establishment of NES will contribute to improve Statoil's credibility and legitimacy?
		What other measures for putting Statoil on the climate map has been or is considered? (if any)
		What do you perceive as the external responses to the measures done by Statoil in order to become a part of the solution rather than the problem in the climate issue?
		What in your work today do you find most challenging considering the future strategy of Statoil?
	Final questions	In what way does the GSB group work with innovation
		If you should try to predict the future - where do you see NES in 5, 10 or 20 years?

INTERVIEW GUIDE II

TEMA	SPØRSMÅL	UNDERSPØRSMÅL
Erfaringer og beslutningsprosesser	Hva var din rolle under etableringen av NES?	
	Dere som satt i prosjektgruppen, hva opplevde dere var årsaken til at TSB-25 ble igangsatt?	
	Hva var det som førte til at prosjektgruppen TSB25-S ble igangsatt?	Interne krefter? Ledelse, styre? Hadde skifte av konsernleder noe å si? Helge Lund startet initiativet til TSB-25 i juni 2013, gikk av i oktober 2014. Eldar Sætre tok over - februar 2015.
	Hvilken betydning hadde lederskiftet på beslutningsprosessene i prosjektet?	
	Hva foregikk i Statoils omgivelser og påvirket dette initiativet om å starte TSB25? (Hvilke kontekstuelle faktorer har bidratt til den fornybare satsingen til Statoil og opprettelsen av NES?)	Var det noen utenforstående parter som bidro, eller presset på? For eksempel: Politikk-grønt skifte, klimamøtet i Paris, pressgrupper, Bellona? Kan Statoils satsning i oljesand ha vært medvirkende? Forberedelse til klimamøtet i Paris? Oljepris?
	Hva var målsettingen til TSB25-S?	
	Kan du beskrive prosessen til prosjektgruppen TSB25-S (som ledet til etableringen av NES)	Hvordan var dette organisert? (Egen prosjektgruppe - TSB25, Hvorfor ble prosjektgruppen bestående av to team? Mye involvering og interaksjon med både eksterne og interne aktører, hadde de forskjellige målsettinger, Hva var resultatene/konklusjonene disse kom fram til? Var de ulike? Konsulenter, Hvorfor ble Xynteo valgt som prosjektpartner)
	På hvilket tidspunkt ble det klart at det skulle etableres et nytt forretningsområde i Statoil - New Energy Solutions?	
	Hva var hensikten med NES da dere etablerte det?	
	Hvilke funksjon skulle NES ha for Statoil?	
Innovasjon	Fra memo: Approval for documentation to the Corporate Executive Committee (CEC) - 1.des. 2014 <i>Hensikten med dette memoet var å søke om godkjenning fra konsernledelsen om forslagene til TSB25-S teamet og den videre fremdriften. I dokumentet fremstilles TSB25-S sine meninger om hvilke implikasjoner klimaendringene vil ha for Statoil. Disse blir konseptualisert vha. de tre linsene - <u>Regjering</u>, <u>markeder</u> og <u>sivilsamfunn</u>. Deretter fremstilles fem idéer for hvordan Statoil skal møte utfordringene - disse ideene baserer seg på 4 strategiske utgangspunkt</i>	
	Hvorfor valgte dere å benytte akkurat disse tre filtrene - regjering, marked og sivilsamfunn ?	
	De foreslåtte idéene til TSB25-S var basert på noen strategiske utgangspunkt. Et av disse var følgende: "Systematisk endring er treg. Dagens energimiksl vil ta flere tiår å endre, men det vil endres og disruptiv innovasjon og endrede reguleringer vil forme utviklingen. Timingen er usikker."	
	På hvilket grunnlag ble denne påstanden tatt?	
	Hva om dere tar feil - og at utviklingen går raskere enn man tror - hvordan skal Statoil evne å respondere raskt nok på endringen?	
	Ideene som ble utarbeidet skulle bygge på Statoil sine nåværende styrker, men som også tillot Statoil å ta bredere steg ettersom risikobildet ble tydeligere.	
Hva blir trukket frem som Statoils sine største styrker?		

	<p>Idéene eller anbefalingene for fremtidig arbeid i Statoil var</p> <ol style="list-style-type: none"> 1. Bygge en motstandsdyktig portfolio 2. Observere og lære om disruptive innovasjoner 3. En bredere forretningsmodell-lab 4. Energinettet 5. Forbedre vår historie og lederskapsskapabiliteter 	
	<p>Hvilke deler av de foreslåtte anbefalingene ble tatt med videre inn i NES? - Har disse blitt til verktøyene?</p>	<p>Hvorfor og hvorfor ikke? Hvilke funksjoner i NES tar hånd om disse anbefalingene? Hvordan preget disse ideene den funksjonen dere ønsket at NES skulle ha?</p>
	<p>I hvor stor grad evner NES å tilfredsstille de foreslåtte ideene?</p>	
	<p>Bred verktøykasse</p> 	
	<p>“Fremme en lærende organisasjon som er forberedt på en fremtid preget av disrupsjon” var formålet for følgende ideer:</p> <ol style="list-style-type: none"> i) Monitorere disruptiv innovasjon for å lære og forstå dets potensielle innvirkning på markedet ii) Danne en forretningsmodell-lab for å designe og teste nye forretningsmodeller for å fange opp markedsmuligheter 	
	<p>På hvilken måte blir denne ‘monitoreringen’ ivarettatt i NES?</p>	<p>Ble det etablert en funksjon/kapabiliteter som skulle “monitorere” disruptive innovasjoner?</p>
	<p>Hvordan har idéen om en forretningsmodell-lab blitt håndtert i den endelige strukturen og strategien til NES?</p>	
	<p>Når det gjelder idéen om en forretningsmodell-lab, så ble denne beskrevet som følgende: En dedikert enhet med frihet fra organisasjonelle hindringer for å forberede nye forretningsmodeller til å dra nytte av nye fremtidige muligheter Statoil ellers ikke ville hatt mulighet til å fange opp</p>	
	<p>Her nevner dere organisasjonelle hinder - hva definerte dere som organisasjonelle hindringer?</p>	
	<p>Fra memo: CEC Strategy Summit Pre-Read - 5.nov. 2014: Memoet beskriver noen nøkkeltrender og drivere identifisert av TSB25-S arbeidsgruppen som skal brukes som innspill til en diskusjon om mulige påvirkninger det kan ha på CEC strategi toppmøte.</p>	
	<p>Disruptiv innovasjon og hvordan det kan påvirke industrilandskapet for olje og gass blir diskutert i memoet: Hvis solenergi, elektriske kjøretøy og batteriteknologi integreres på en optimal måte med andre teknologier har de potensialet til å disruptere etterspørselen av hydrokarbon produkter.</p>	
	<p>Hvordan kan NES relateres til Statoils forsvar mot å bli disruptert?</p>	<p>Ved å etablere NES, var tanken at Statoil skulle forhindre å bli disruptert?</p>
	<p>Ut ifra hvordan NES formet med tanke på strategi og struktur- Hva mener du er den største utfordringen til NES med tanke på det å kunne fange opp og respondere på disruptive innovasjoner?</p>	
	<p>Helene Rodvelt i New Energy Solutions sin innovasjonslab mente den største utfordringen til NES var knyttet til det geopolitiske bilde og at den største utfordringen ville være om større kriser ville flytte fokuset vekk fra satsingen innenfor fornybart</p>	
	<p>Hva mener du om dette?</p>	
	<p>Hva er utfordringen til Statoil med tanke på nye energiløsninger?</p>	

	Hvilke fornybare energiformer ble evaluert som potensielt disruptive for Statoil under etableringen av NES?	
	Har NES bidratt med ny kunnskap og/eller kompetanse for hvordan Statoil kan svare på potensielle disruptjoner	
	I memoet strategic choice – GSB (Final) som kom 25 februar 2015 ble det presentert at Statoil kunne velge mellom strategiene «Sticking to core» eller «Building new options» for å takle utfordringen med produksjonen av "white space" som åpner opp fra 2022.	
	Hvilken strategi ønsket TSB25-S skulle ha for NES? Og hvorfor?	Hva ble forfulgt og hva ble utelatt?
	Hvordan syns dere NES ble i forhold til disse strategiene? Gikk dere for den ene eller andre strategien? En blanding?	Hvordan var prosessen ved å bestemme strategien til NES? Var det vanskelig å få aksept for deres forslag?
	I «Building new options» strategien ble det foreslått flere strategivalg for ulike forretningsmodeller som burde vurderes:	
	1. Starte en «New Venture» organisasjon som tilbyr kapital og HR til start-up bedrifter, med hensikt å modne frem 1/10 til potensielle muligheter for statoil	Ble dette noe av? Hvor gjøres det i NES? Er det Ventures?
	2. Ta steget videre i offshore vind og reposisjonere seg i verdikjeden for at en forretningsmodell av gass + fornybar verdikjede skal fungere- Vurdere oppkjøp av Statkraft for å unngå fremtidige direkte konkurranse av Norsk statskapital.	Hvorfor ønsket dere dette og hva ble konklusjonen?
	3. Definere en ambisjon og et rammeverk for å utvikle «disruptiv teknologi» for å støtte nye forretningsmodeller	Hvordan har dette blitt gjort? Er det gjort? Var det tenkt at NES skulle gjøre dette?
	4. Slutte å investere i CCS teknologi	Har dere redusert investeringene i karbonfangst og lagring? Dette er jo ett av hovedområdene til NES. Ble ikke dette rådet fra TSB-25S etterfulgt i etableringen av NES? Hvorfor ikke?
	Strategisk Allianse og skille ut en autonom enhet er eksempler på virkemidler flere virksomheter har nyttiggjort seg av for å styrke sitt forsvar mot disruptjon.	
	Ble disse virkemidlene vurdert også for NES eller Statoil alene?	Hvilke andre strategiske virkemidler ble evaluert?
	På generelt basis- var det utfall, konklusjoner som kom frem i TSB25 gruppen som ikke ble implementert eller som ble endret underveis?	
	Var det elementer ved sluttanbefalinger som ikke ble inkludert i den endelige «løsningen» (NES)?	
	Etter etableringen av NES (Mai 2015) - Hva var prioriteringene til Irene Rummelhoff de 100 første dagene?	
	Statoil har tidligere «flagget» grønne initiativ. Etableringen av NES som et av Statoil sine forretningsområder, ser ut til å være en større satsning enn tidligere.	
	OM NES Hvorfor ble etableringen av et eget forretningsområde det strategiske valget for Statoil i møte med disruptive innovasjoner?	Hvorfor ble det avgjort at Statoil skulle satse på nye energiløsninger akkurat nå og ha det som ett av åtte forretningsområder?

		NES består i dag av underenhetene <i>RDI, SI, BD, VEN og WIC</i> ?	
		Hvilken organisasjonsstruktur ønsket Statoil å ha for NES? Hvilke egenskaper/funksjoner var det viktig for Statoil at NES skulle bestå av?	
		Mener du den ønskede/mest optimale løsningen ble valgt?	
		Samsvarer den tiltenkte funksjonen for NES med det som faktisk ble etablert som NES?	
	NES arbeids-prosess	<p>Hvorfor ble det bestemt at NES skulle ha følgende tre fokusområder:</p> <ol style="list-style-type: none"> 1. Teknologi 2. Marked 3. Forretningsmodell 	<p>Søker løsninger, ikke teknologier</p>  <p>The diagram consists of three overlapping circles: 'Teknologi' (top-left), 'Marked' (top-right), and 'Forretningsmodell' (bottom). The central intersection of all three circles is labeled 'NES'.</p>
		Hvilke rolle var det tenkt at NES skulle ha i forhold til de prosjektene de investerer i?	
		Ble det diskutert hvordan NES som forretningsområdet skulle utvikle seg fremover for å håndtere disruptiv innovasjon?	
		Slik NES fungerer i dag så må de konkurrere på lik linje som andre O&G-prosjekter	
		Hvordan var dette skissert av TSB25-S?	
		På hvilken måte tror du dette har påvirket NES?	Fremmede eller begrensende for NES med tanke på hvordan de håndterer disruptive innovasjoner? (Disruptive innovasjoner som ikke er lønnsomme i dag)
	KOMPETANSE	Ett av områdene som ble fremhevet som essensiell for at Statoil skulle kunne oppnå konkurransedyktighet innenfor et nytt markedsområde var kapabiliteter. Her var prosjektgruppen av den oppfatning at kapabilitetene tilknyttet kjernevirksomheten til Statoils O&G portefølje ikke skulle være førende for Statoils inntreden i nye forretningsområder.	
		Men i følge denne plansjen, er det nettopp kjernekompetansen nye forretningsområder skal bygge på. Hvorfor ble det slik?	<p>Disiplinert investering</p> <ul style="list-style-type: none"> • Konkurransedyktig: Risikostyrt avkastning • Materielt: Kan gi skala innen Statoil • Relevans: Bygger på kjernekompetansen
		Irene Rummelhoff påpeker at Statoil sin satsing på havvind vil være avhengig av Statoil sin erfaring og kompetanse innen utvikling av teknologi og innovasjon, samt erfaring fra store prosjekter.	
		Hva mente prosjektgruppen var kompetansebehovet for NES?	
		Hvordan ble kompetansebehovet for NES kartlagt? og hvordan ble riktig kompetanse funnet?	Hvilken kompetanse har NES behov for, slik at de kan gjøre gode investeringsvalg og utvikle lønnsomme fornybare energiprojekter?
	KULTUR	Hvordan ønsket dere at kulturen til NES skulle være?	Hvordan skulle dere skape den ønskede kulturen i NES?
		Ledelses- og etikkspert Jørn Bue Olsen uttalte i Ukeavisen Ledelse fra 19.juni 2015 at “Det kreves en kulturrevolusjon for å få Statoil til å endre sin bedriftskultur i en grønnere retning” og at Irene Rummelhoff må kjempe mange kamper mot en ledelse som i utgangspunktet ønsker å tviholde på den gamle tenkningen i selskapet.	
		Hva synes du om dette utsagnet? og mener du Statoil har klart å gjøre bedriftskulturen “grønnere” ved å etablere NES?	

		For begge hovedstrategiene ("Sticking to core" og "building new options") blir det fremlagt viktige strategivalg innen kultur og ledelse.
		Hvordan evaluerte dere kulturen i Statoil? Og hva fant dere av positive og negative ting med tanke på de ulike strategiske retningene?
		I memoet Brief 5: Competitive Advantages blir det å ha ledere som er endringsvillige, som har evne til å lære og til å akseptere feil, og som kan fungere som rollemodeller for entreprenørielle tankesett trukket frem som en av konkurransefortrinnene som kreves for at Statoil skal lykkes med det fremtidige strategiske valgalternativet - <i>Bygge nye muligheter</i> . Dette er også er noe som trekkes frem som mangelfullt hos Statoil sammenlignet med andre O&G-selskap
	Hvilke muligheter eller tiltak ble evaluert av prosjektgruppen (i samarbeid med CEC) for hvordan dette kunne forbedres?	Ring fencing new business models will be critical to learn and grow. Shell uses portfolio "superbuckets" to allocate capital and let projects within each bucket compete
	Hvilke tiltak ble igangsatt for å oppnå nettopp en slik kultur i NES?	
	Fra memoet som heter Strategic Beliefs - about the pre-read and the Geilo Session	
	Det kommer frem i meomoene at konsernledelsen skulle benytte fem filtre for å evaluere og videreutvikle ulike synspunkter på hvilke langsiktige og eksterne krefter som kunne ha innvirkning på Statoils forretningsutvalg. Et av disse filtrene var teknologi der de mener den største disruptøren vil være bredere, smartere og mer allsidig bruk av teknologi. Her stilles spørsmål om det er en innovasjonskultur i Statoil og om Statoil har verktøy for innovasjon og verktøy for å få fram nye forretningsmodeller?	
	Hvilke standpunkt har du med tanke på disse to spørsmålene?	
	Kan du si noe om hva konsernledelsens svar var?	
	Hvordan anser du legitimiteten til Statoil i dag sammenlignet med før NES ble etablert?	
	Legitimitet	På hvilke måte tror du opprettelsen av NES har og vil påvirke legitimiteten til Statoil?
		Blant Statoil sine interessentgrupper, shareholders, markedet osv.

Avslutningsvis	Var det elementer ved TSB25-S prosessen som man i retrospekt mener kunne blitt gjort annerledes?
	Har det tidligere vært etterlyst et slikt initiativ? På hvilke nivå i ledelsen kom dette isåfall fra?
	På 1980-tallet gjorde Shell investeringer i sol, og som ble ytterligere trappet opp i 1997. I 2009 trakk de seg ut av alle fornybar investeringer bortsett fra biodisel. Aktivitetene her ble forsterket grunnet dens nærhet til kjerneaktivitetene selskapet hadde innen olje-og gass - og at den derfor enklere kunne integreres i verdikjeden deres. På denne tiden satte de også mer fokus på utvikling av renere bruk av fossilt brennstoff gjennom CCS.
	Hvordan har Statoil lært av andre olje og gass selskapers aktivitet innen fornybart?
	Et kjennetegn ved disruptive innovasjoner er at det skjer veldig raskt når det først skjer.
	<i>Hvordan mener du NES, slik den ble satt sammen, er i stand til å fange opp og reagere raskt nok på disruptive innovasjoner?</i>

Appendices II: Consent form

Description of master thesis and consent form

Description of master thesis

We, Hanne Vabø Sæle and Marit Eggen, are students at the masters program Innovation and Entrepreneurship at the Western Norway University of Applied Sciences (HVL). Supervisors are Tom Roger Skauge and Åge Garnes.

The thesis' research question concerns disruptive innovation, and as a case study we have been granted the opportunity to study Statoil's new business area New Energy Solution (NES). Our purpose is to study the processes behind the creation and establishment of NES and its function today in light of disruptive innovation theory.

As part of the project we want to carry out interviews with key personnel who either are part of NES today, or have been involved in its formation. The interview data will assist us in answering our research questions.

Under the interview we would like to ask questions concerning your role in the formation of NES and its function today, as well as strategic choices made in the past and those for the future.

Voluntarily participation

Your participation is entirely voluntary, and even if you agree, you may withdraw at any time without any negative effect, including during the interview itself. We will ask you to sign this consent form at the bottom, which is a standard document that both interviewer and interviewee must sign in order for the Library to legally place the interview in its publicly accessible collections. We will also provide you with a draft copy of the transcript of the interview so that you may review its content and add any clarifications and corrections that you feel necessary. For the transcription to be as accurate as possible we would like to record the interview.

Anonymity

If desired, your identity and any other information that might lead to your identification will be anonymized in the final thesis.

I have read this document and I understand what is requested of me as a participant in the Master thesis project, I freely consent to participate.

Name of Interviewee (Printed)

Name of Interviewee (Signed)

HANNE SÆLE

Name of Interviewer 1, (Printed)

Name of Interviewer 1, (Signed)

MARIT EGGEN

Name of Interviewer 2, (Printed)

Name of Interviewer 2, (Signed)