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Assessing Capabilities for Innovation

The Case of Statkraft AS

Master of Science Thesis
in the Management and Economics of Innovation Programme

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Abstract

Most modern markets are characterized by both fiercer competition and higher velocity than ever before. In such an economic environment, companies experience a strong need to adapt and rejuvenate themselves in their pursuit for growth and profitability. This development is increasingly apparent in the energy industry, where Statkraft is a large and global utility corporation.

The purpose of this report is to map out, evaluate and analyze Statkraft's innovation capabilities. To do so, a conceptual framework that synthesizes the existing theory has been developed. This was done through a comparative research design where several existing frameworks conceptualizing innovation capabilities were compared and cross-analyzed. The result of this study is a system with seven dimensions that are deemed the most central when analyzing innovation capabilities, namely Organizational Structure, Culture & Learning, Innovation Strategy & Vision, Leadership & Innovation Management, External Linkages, Implementation, and finally Creativity

This framework was then applied to assess the innovation capabilities of Statkraft. A so called innovation audit was performed, of which 20 qualitative interviews with employees of the company were an important feature. Another data collection method used was a qualitative content analysis of various documents about Statkraft and the energy industry.

On a general level, it was found that the innovation capabilities of Statkraft are rather weak. The company has over a long period of time focused on strengthening the current operations and core business, which revolves around hydropower. Therefore, innovation has had to take a step back and it is for instance not a factor that the performance of employees and business units is evaluated on. However, innovation capabilities always need to be put in relation to the strategic intent of the company, and it is argued in the report that possessing strong capabilities of this type might not be crucial for Statkraft's current competitive advantage.

Acknowledgements

During the performance of this thesis project, the contribution and assistance from a large number of individuals have been of critical importance. We would therefore here like to express our appreciation and gratitude towards these individuals for their time and the sincere interest they have shown in our thesis project. We thank the 20 Statkraft employees who agreed to spend one hour to discuss and reflect upon issues of innovation for their time, openness and genuine interest. We also thank our tutor, Prof. Sofia Börjesson for her valuable feedback, many tips and tricks on report-writing and for introducing us to the interesting field of innovation capabilities.

Especially, we would like to extend our gratitude towards Statkraft and the employees of the innovation unit for generously agreeing to allow us to undertake this investigation in their organization. Their willingness to openly share information and spend time on providing us with an overview of Statkraft, its organization and activities is highly appreciated. The significant level of assistance we received with administrative matters such as identifying potential interviewees and the booking of both interviews and meeting rooms in accordance to our preferences is also very much appreciated. Without this level of assistance, completing the thesis project within such a narrow timeframe as was now the case would not have been possible. In return, we hope that we through performing this project have been able to provide Statkraft with, at least some, new and valuable knowledge that will prove practically useful in the future.

Sincerely,

David & Anton
Gothenburg April 2013

Table of contents

Table of figures

1. Introduction

In this thesis report, the field of innovation capabilities will be conceptualized and investigated. Innovation capability is an academic term that has come to be established within innovation management research in recent years. A firm's innovation capabilities refer to the set of capabilities relevant in order for the firm to be able to systematically generate and appropriate value from innovations in the organization. Such generation and appropriation of innovations can for instance include the introduction of new products, processes, service or ways for the firm to organize (Börjesson & Elmquist, 2012). Academic authors do however have differing views concerning exactly what type of abilities and capabilities make up a firm's set of innovation capabilities. In line with major trends in today's economic system, managing these types of capabilities has for many firms become an issue of increased strategic importance.

The modern economic system is in several aspects distinctly different from all previous economic systems seen throughout the human existence. According to Drucker (1992), the economic system has after an era of stability and smooth growth during much of the 20th century now entered into a new era of discontinuity and disruption. Trade agreements, cheap transportation and global communication systems have all paved the way for an emerging economy that is connected, global and rapidly shifting rather than decoupled, local and predictable (Christensen, 1997). Nations, companies and individuals operating in this environment are faced with a spectrum of new possibilities as well as a set of new challenges. As the economy becomes global the number of potential customers for a company's products and a nation's export goods increases, but so does the competition. The rapid velocity in which the economy shifts furthermore increases the competitive pressure in the system as new competence requirements surface and new competition is introduced from unexpected directions (Beinhocker, 2006).

Part of the explanation behind the high velocity seen in the modern economic system can be found in the evolution of new technologies (Schilling, 2010). Technology has long been a key driver in the evolution of the economy and several quantum leaps in the course of human history can be attributed to technological innovations (Sundin, 2006). Technology thus acts as the enabler of new behaviors, new products and new strategies for individuals as well as companies and other entities in the economic system (Beinhocker, 2006). This has for instance been the case in transportation, a field within which technological developments in the past 100 years have created the foundation for a more interconnected world. The same argument can be made for fields such as production, extraction of natural resources and perhaps most importantly digital technology (Moore, 1965).

The new characteristics of today's economic systems have drastically changed and increased the competitive pressure in many industries. In a high-velocity economy such as this, the winners of today might be tomorrow's biggest losers when what is now a competitive advantage quickly can transform into a fatal liability. In this environment, it is for many firms no longer enough to possess the capability to efficiently transform resources to goods, products and services demanded on the market. Instead, to maintain their long-term competitiveness and market position, firms also need to be able to transform themselves (Lawson & Samson, 2001). In practice this often means that a firm needs to possess the capability to embrace new possibilities, question existing practices, put innovative new offerings on the market and reorganize (Teece, et al., 1997). Building up and maintaining these types of capabilities is however a complex task, especially for large companies operating on traditional markets. But as recent economic history might suggest, business conditions often change faster than

expected and the largest players that lack the capabilities necessary to adapt and adopt new realities might soon find themselves unable to compete efficiently (Christensen, 1997). Well known examples of this phenomenon include the Kodak Company, Nokia and Polaroid. In all of these cases, technological innovations introduced to the market fundamentally changed the conditions for competition in a way that disfavored the value of much of the main competencies these companies possessed.

Innovation capabilities can be of decisive importance for an organization's ability to handle rapid changes in its competitive environment as well as for its ability to obtain and sustain long-term growth (Balan, et al., 2009). Using an analogy, the concept of innovation capabilities can perhaps best be understood as a company's set of *innovation muscles* (Börjesson & Elmquist, 2012). These can be regarded as a set of muscles made up of abilities in different dimensions that, seen as a system, together determine the firm's *innovation strength*. When flexed, the innovation muscles are what enable the company to systematically generate, create, implement and capture value from innovation. The size and character of a company's innovation muscles determines its innovation capabilities and how well the company is able to perform when it comes to generating innovation. By this analogy, a company with a powerful set of innovation muscles will possess greater capabilities for innovation than a company whose set of muscles is less powerful. Organizations that are not actively pursuing innovation might furthermore still possess significant innovation capabilities even though these are not in active use. In such an organization the firm's innovation capabilities can constitute an untapped resource (Börjesson & Elmquist, 2012).

Looking at innovation capabilities, it is important to consider the needs and ambitions of the individual organization that is being analyzed (Börjesson & Elmquist, 2012). The need and ambition to engage in different types of innovation varies among firms and industries and thus do also the ideal set and level of innovation capabilities (Assink, 2006). Taking the muscle analogy one step further, this means that having the largest and most powerful set of innovation muscles is not always the best solution for each individual company. Rather, possessing a set of innovation capabilities that is relevant and appropriate in relation to the position a company has and to where it wants to be in the future is more important. Spending time and resources to build innovation capabilities that are not needed in practice could as any other type of excessive spending be regarded as an inefficient use of resources. In later parts of this report, the following definition of the concept will be proposed: *"innovation capability refers to the internal ability to systematically generate and pursue new innovation to achieve or enhance the competitive advantage, aligned with the firm's strategy".*

In this report, the innovation capabilities of Statkraft AS (Statkraft), the largest domestic Norwegian power producer, will be mapped, assessed and analyzed with the goal to determine whether the organization has the capabilities required to systematically generate innovation in accordance with its ambitions. In order to enable such an assessment, a new conceptual representation of innovation capabilities and its various components has been developed and will also be laid forward in the report. This report is the result of a master's thesis project at Chalmers University of Technology performed in 2013 by two students from the Management and Economics of Innovation master's program: David Rådesjö and Anton Sandström. The thesis project has been conducted with and for Statkraft's innovation unit at the company's headquarters in Oslo, Norway.

A guiding principle throughout the thesis project has been to give priority to those aspects of the report that can be of real value for Statkraft. In line with this ambition, the thesis project is reported by the means of two project reports, of which you are now reading the first. This report is a traditional thesis report and thus e.g. includes a strong focus on theoretical reasoning and maintaining an academic

structure in the presentation. In contrast, the second project report contains less details, being stripped of many academic elements and primarily providing a summarized account of the project's findings of particular relevance for Statkraft.

1.4 Project motivation

Statkraft is a large company operating in a mature industry. However, there are today significant indications that Statkraft's industry will face substantial change and restructuring in the coming decades due to current technological and market developments (Burger, et al., 2008). As can be readily seen by reviewing the historic record, possessing an appropriate level of innovation capabilities typically is more important for companies during times of a high rate of change. Being a player in a mature industry now gradually facing an increased pressure in the direction of innovation, Statkraft was approached with a proposal to perform a project to assess and analyze the company's innovation capabilities. In performing such a project, the intention has been to provide Statkraft with a more updated and objective perspective of the organization's current ability to innovate and meet a potential future restructuring process in a proactive manner.

Within Statkraft's organization, the innovation unit has the main responsibility to manage, facilitate and provide guidance to the rest of the company on issues related to innovation and research and development (R&D). The innovation unit's responsibilities also include deriving and updating Statkraft's innovation strategy and setting relevant goals for the activities Statkraft undertakes in this area. In line with these responsibilities, it is highly relevant for the innovation unit to possess an updated and accurate view of the state of Statkraft's innovation capabilities.

To be able to make informed decisions and achieve high resource utilization, having access to accurate information of the conditions within the organization is vital to any firm. This reality also holds true for the conditions for innovation. Through mapping and assessing the innovation capabilities of Statkraft, new and valuable knowledge concerning the current conditions for innovation in the organization can be created. This new knowledge is intended to contribute to an increased self-awareness and be an indication of where the organization is positioned in terms of its capabilities to innovate. Such an indication is desirable for Statkraft as it should increase its ability to make well-informed decisions and to formulate appropriate innovation strategies. In addition, the increased awareness of the organization's innovation capabilities can work as a powerful departing point for future efforts in this area.

A summary of the underlying motivational factors for Statkraft and the innovation unit in conducting this thesis project is given in the form of a bullet point list below. Each point on the list represents a potential benefit the innovation unit will be able to derive from the project outcome;

- Increase Statkraft's and the innovation unit's knowledge as to what constitutes its capabilities for innovation
- Creating greater awareness concerning the reality of the firm's current level of innovation capabilities
- Being able to hear voices of the employees concerning the firm's efforts within innovation, and thus learn how such issues are perceived in the general organization
- Gaining insights on opportunities for possible improvements of Statkraft's innovation capabilities
- Building a basis for future decision-making based on company-specific information

- Contributing with conclusions derived from the analysis, e.g. concerning recommended actions of relevance for the innovation unit
- Providing the innovation unit with insights of Statkraft's innovation capabilities that can later be matched against the ambition level of the firm in regard to innovation

1.5 Project purpose

Based on the background and motivations for performing this master's thesis project as described above, a general purpose and three accompanying research questions were formulated. The more general purpose acts as a description of the project's main intentions and goals. The three research questions were added to further guide the project process at a level of greater detail and to concretize the research intention expressed in the purpose by breaking it down into components.

The purpose of this report is: "*to map, evaluate and analyze Statkraft's innovation capabilities. To do so, a conceptual framework that synthesizes the existing theory within the field will be constructed. Through reporting the result of this analysis back to Statkraft's innovation unit, the purpose moreover entails increasing the awareness concerning the organization's innovation capabilities as well as generating new knowledge to guide or inspire future initiatives related to innovation in Statkraft".* Based on this general formulation of the report's purpose, the following research questions were formulated to guide the project:

i. How can a qualitative representation of innovation capabilities be conceptualized to provide a basis for analysis of such capabilities in established firms?
ii. What is the current state of innovation capabilities in Statkraft's organization in terms of the representation derived from research question one?
iii. Judging from Statkraft's ambitions, environment and current position, are the innovation capabilities of the organization developed to an adequate degree?

1.5.1 Contribution to the academic field of innovation management research

In addition to an assessment and analysis of the innovation capabilities of Statkraft and its organization, this report will also provide contributions to the more general field of innovation management research. Specifically, this report will draw on existing literature and propose a conceptual framework that enables accurate representation and qualitative analysis of innovation capabilities in different organizations. Defining this conceptual framework as a contribution to the broader academic field has been an important component of the project process and should thus be regarded as a significant portion of the thesis project. The conceptual framework has been developed with an intention to be useful both as a representation of innovation capabilities, and as a tool for analyzing such capabilities in various organizations. The framework is general, which in turn enables it to be generalized to contexts other than that of the analysis performed in this report.

Generating a real academic contribution in the form of a conceptual framework to analyze innovation capabilities entailed going through a significant process of analyzing the present volume of academic literature on the subject. This analysis was performed in the first phases of the thesis project as the framework was later intended to be used to assess and analyze the innovation capabilities of Statkraft's organization. Following this structure of the project, the results presented in this report can be regarded to consist of one part that is general to the field of innovation capabilities and a second part where insights specific to Statkraft is presented. The framework is presented in detail as part of the report's findings in Chapter 6.

1.5.2 Project delimitations

The thesis project has been subject to a number of delimitations concerning both the scope and depth of the investigation performed. Delimitations in the scope and research depth were introduced as a consequence of specific requests from Statkraft, subjected to ensure that the project would carry a high degree of relevance for the company. In addition to this, a number of delimitations were also introduced as a reflection of limitations of the project time and resources. The project's delimitations mainly affected the choice and set of methods used in conducting the assessment of Statkraft's innovation capabilities.

Ensuring that the project would generate results of high relevance for Statkraft and its innovation unit has been an outspoken focus throughout the project process. After previously carrying out a number of thesis projects in the organization, the innovation unit had often experienced difficulties in capturing company-specific value. A common reason for these challenges was according to Statkraft that thesis projects often have a too general scope in its investigation. Based on this, the innovation unit requested that this project, to the extent possible, would be kept specific to Statkraft's organization rather than drawing on general conclusions. In line with these ambitions, the scope of the project was formulated to focus specifically on gathering data indicating the current innovation capabilities of Statkraft and, to a lesser extent, generate recommendations for how these can be improved. In this way, the results of this project were intended to work as a source for information on actual conditions in the organization, and as a starting point for Statkraft in case the company wishes to further look into and develop its innovation capabilities. Relevance for Statkraft was thus ensured through focusing the investigation onto how the organization is performing today rather than suggesting more or less feasible ideas for improvement.

Following the limitations in project time and resources, the investigation was delimited to only include the central parts of Statkraft's organization and to disregard of for instance its presence on several foreign markets. This delimitation was also motivated by the intention to generate specific conclusions as a greater effort could be directed towards relevant parts of the organization. The innovation unit was with its experience and knowledge of Statkraft the one who selected what parts of the organization should be part of the investigation. Resource limitations also made it necessary to make adjustments and delimitations in the number of interviews that were performed as part of the data collection effort. These and other limitations related to the thesis project will be further touched upon in the methodology chapter of this report.

2. An industry facing an era of discontinuity

As a large energy utility in Europe, Statkraft is part of a market that for decades has been characterized by attributes such as relative stability and predictability. A commonality for the companies operating on this market is perhaps that they are not best known for their innovativeness. Energy utilities live out of generating and selling a non-differentiable product on an almost perfect commodity market. In addition, the product is distributed through a system that typically is provided by the state. On this market, the underlying business logic of the industry has for many years been practically the same – generating energy at the lowest possible unit cost and delivering it to the grid (Weinmann & Burger, 2012). According to Burger et al (2008), this 20th century type business logic of the utility industry rests on three major assumptions concerning market dynamics. First of these assumptions is that all customers can demand any quantity of power needed to a fixed price and expect the system to deliver it. Secondly, it is assumed that economies of scale derived from running large power generation plants outweigh any efficiency increase that could result from locating production of power closer to the consumption. Thirdly, Burger et al (2008) argue, that the business logic assumes that no externalities are accounted for and priced within the system, applying to for instance environmental pollution. In this environment the main focus of energy utilities has naturally not been to generate new and innovative customer offerings or to integrate downstream. Rather, the main focus has been on managing the expensive generation assets and infrastructure in the best possible manner, making sure these continuously generate energy in scale and to a competitive price (Ahlqvist, 2005).

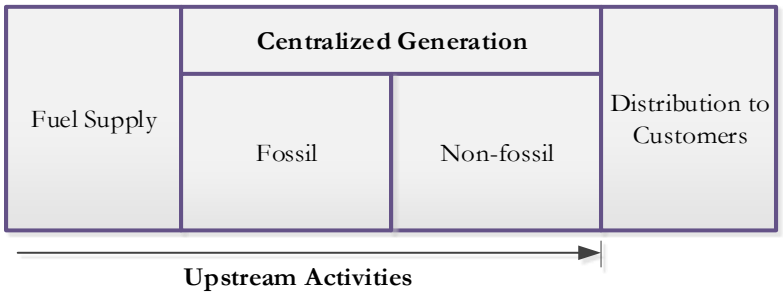

Figure 1 Illustration of the previously existing business logic in the utility industry

Today, the energy utility industry is dominated by a relatively small number of large incumbents. This is especially the case for the European market, on which this report will mainly focus. Many of today's large utilities have a history as a dominant national power supplier on a domestic market and several are or have been owned by a state. This is for instance the case with French utility giant EDF, Finland's Fortum as well as the Italian utility Enel (EU Joint Research Centre, 2011). Following the rather recent liberalization and deregulation of the energy market, several of these companies have taken on a geographic expansion inside as well as outside of Europe (Weinmann & Burger, 2012). In this process, which has been ongoing since the 1990s, consolidations and take-overs have contributed in creating a market consisting of a few giant power suppliers as dominant actors (Burger, et al., 2008).

Subject to a historically increasing demand for energy and protected by substantial entry barriers, the direct competition faced by large utilities has long been small compared to that seen in many other industries (IBM Institute for Business Value, 2010). The high barriers to entry in the power utility market stem from the expensive large scale generation assets that have been required to compete. The investment required to build a large scale power generation facility has in several instances been calculated to be around 1-6 billion Euro, even though large variations exist (Kuhr & Vivenzio, 2005) In recent years, however, new technological developments as well as important socio-economic and

environmental trends have gradually started to affect the underlying market conditions in the utility industry (DNV Research and Innovation, 2012).

Fueled primarily by the prospect of a rapid human-caused increase in the earth's average temperature, the political will to regulate emissions and stimulate new technologies has increased over the last decade (DNV Research and Innovation, 2012). It is estimated that government spending through subsidies and direct investment in various efforts to reduce greenhouse gas emissions in the European Union alone amounted to 5-7 percent of the union's total 128.3 billion EUR budget (European Union, 2012). Figures circulating related to the ongoing (March 2013) negotiations over EU's 2014-2020 budget suggest that up to 20 percent the total budget in this time period will be devoted to change the European energy system to become carbon-free (Renssen, 2013). Although more supposedly could be done to further address this issue, the growth of this particular category of directed spending illustrates a political determination in this area.

Being one of modern society's major generators of greenhouse gas emissions, energy utilities have often been the subject of political efforts to mitigate the threat of climate change. The results of such political efforts can be seen, e.g. in government support for new technology development projects, government subsidies for wind and solar farm construction as well as in the discussions of a carbon tax system (Weinmann & Burger, 2012). The final results of these political efforts are yet to be seen. But already today they have had a clear effect on a previously predictable European energy market, both directly and indirectly (DNV Research and Innovation, 2012).

In addition to the purely political engagements concerning the energy utility industry, the evolution of technologies also contributes in setting the scene for the future energy system and what changes it might bring. New as well as older technologies that have evolved into cleaner and cheaper versions are today entering the market and can in several cases be said to have a real impact on the large established players (IBM Institute for Business Value, 2010). Examples of such technological developments are the drastic drop in life-time cost of solar cells and the emergence of various so called "smart" technologies (Weinmann & Burger, 2012). The concept of "smart" technologies in this context refers to systems, software and technological components that are able to generate, process and share information to, e.g. communicate with other system components and engage in self-regulation. The development of a smart energy grid connecting consumers and producers is often highlighted as a major enabler and driver in the evolution of a new energy system (Burger, et al., 2008). In contrast to the current grid, a smart energy grid incorporates a two-way flow of both energy and information. In turn, this can be expected to open up the energy system for integration of a more diverse spectrum of generation technologies through lowering the entry barriers significantly. In the wake of such a scenario, new types of previously unseen business opportunities are likely to surface in the downstream energy market (IBM Institute for Business Value, 2010).

On the German market, which by many is regarded to be at the frontier of a new emerging energy system, generous government arrangements to promote small scale energy generation have been in effect for several years. In addition, ambitious plans to phase out the country's current nuclear power assets before the year 2020 has increased the pressure on many actors to look for alternative generation technologies. This has resulted in a situation where it is increasingly common for German households to generate at least a portion of their own energy need. Supported by software systems and a smart energy grid, a new energy infrastructure where even small scale generators are able to sell their energy surplus on the open market has emerged (Weinmann & Burger, 2012). The traditional one-way flow of energy from producer to consumer is in this type of system a thing of the past (IBM Institute for Business Value, 2010). The rapid drop in price of solar power has been an important

driver in this development. And as prices continue to drop while the efficiency increases, new geographical markets become feasible for small scale solar installations, including the Scandinavian Peninsula. As an illustration of this development, Mr. Thor Christian Tuv on the 22nd of January 2013 became the first ever Norwegian private consumer to install a system to deliver surplus solar power back to the national grid (Sprenger, 2013). This development is moreover not isolated to solar power technologies but includes a spectrum generation technologies including, e.g. combined gas and power installations and small scale fuel cells.

In time, these types of developments can have the potential of disturbing the established business logic of portions of the utility industry. Burger et al (2008) predict that the utility industry will see significant change and restructuring especially in the downstream segments of the value chain and that these segments will constitute practically all of the future growth in the industry. Moreover, Burger et al (2008) argue that large utilities operating carbon-based generation technologies cannot expect any growth in coming decades and utilities having large centralized renewable generation assets will experience only modest growth in the same period. According to Marius Holm, leader of the Zero Emission Resource Organization, the incorporation of renewable energy technologies in the European energy system has already put significant pressure on the margins of the large energy utilities. This is a trend that Holm argues will be persistent and points to indications that utilities operating large scale generation assets in the future will have to cope with, at times, negative energy prices on the market, i.e. having to incur a cost to distribute energy (Lie, 2013). A situation with negative power prices can for instance occur during times of the day when production from renewable generation technologies such as wind and solar reaches high levels, flooding the market with energy and pushing prices down. On the German market, where smaller scale and renewable generation technologies have reached a significant level of penetration, a development towards decreased margins for the large energy utilities can already be seen. In a recent interview with the global news agency Reuters, Vattenfall's German country head Tuomo Hatakka when discussing this situation for instance referred to the generation margins of Vattenfall's German plants as " …*[they are] not a pretty sight*" (Eckert & Gloystein, 2013). These and many other developments now visible on the global and European energy market have gradually increased the pressure on the large established utilities to actively face new treats and seize emerging market opportunities (Burger, et al., 2008)

With the prospect of having their market undergo significant changes in coming decades, several of the major European electricity producers have responded by gradually showing an increased interest for R&D and innovation activities (EU Joint Research Centre, 2011). One illustration of this trend is the growth in R&D expenditures shown by the largest power generators on the European market. Between 2007 and 2010 the total amount spent on R&D by Europe's 15 largest power generators rose by more than 40 percent (Weinmann & Burger, 2012). Despite this sizable increase, the utility industry as a whole still show low to moderate levels of investments in R&D seen in relation to their total net sales when compared to other industries (EU Joint Research Centre, 2011). This fact can be seen as an indication of the traditionally low focus on R&D and innovation efforts in the utility industry. Figure 2 below shows a diagram illustrating the top 15 R&D spenders among European power producers in 2011.

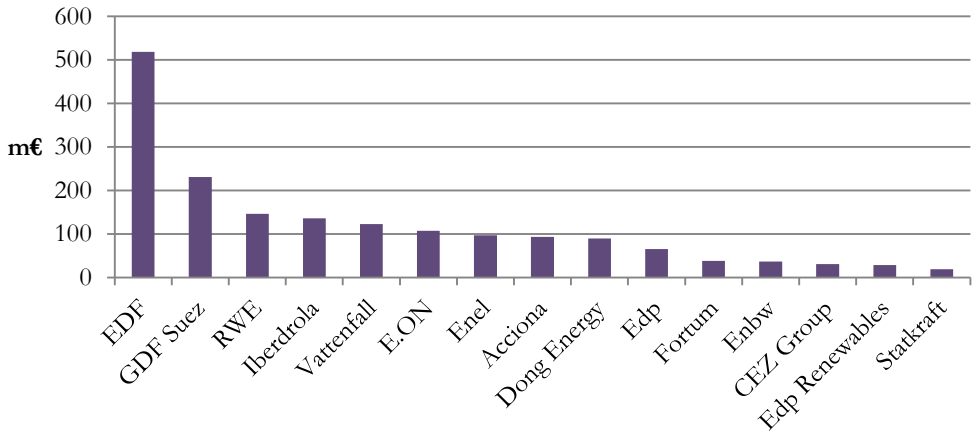

Figure 2 R&D expenditures of the top 15 of European electricity producers ranked by the size of the total R&D investment. As is evident from the data presented, the spread of investment size is substantial, reflecting variations in strategic focus and company size

Even though R&D investment levels generally are rising among large electricity producers, exceptions do exist. Several of the large firms take on a passive role of monitoring market developments rather than engaging to take part in them (Weinmann & Burger, 2012). In addition to this, the intention and goal related to engagements in R&D and innovation activities vary significantly among utilities. A majority of the spending on R&D and innovation efforts in these companies can be expected to be allocated to developments of a more incremental type than what might be viewed as motivated by some of the current market developments. Even though maintaining its current market position and guaranteeing the future value of existing generation assets is the dominant driver of R&D and innovation activities among European utilities, exceptions do exist (Weinmann & Burger, 2012). One such example is the German utility E.ON who in light of present market developments 2012 chose to restructure much of its R&D to focus on new business areas rather than sustaining existing ones (E.ON Technology & Innovation, 2012).

A common trait among established utilities is a coinciding labeling of all activities they undertake in the area of innovation and development as R&D activities. However, R&D does not necessarily mean innovation and while it is generally perceived that the pressure on utilities to become innovative will increase in the future, innovation is not traditionally a core competence among utilities (Burger, et al., 2008). A future energy market that likely will consist of a wider spectrum of different actors than what is seen today raises serious issues as to how such new market dynamics should be managed by the now established players. As the three main assumptions upon which the energy system of yesterday was built seizes to hold true, a period characterized by a lesser degree of stability and predictability likely awaits all actors in the utility industry. And even though the role of innovation within large energy utilities today is highly ambiguous, it can be expected that several established utilities soon will find themselves in a position where their capabilities for innovation will be of a more decisive meaning than what has earlier been the case (Weinmann & Burger, 2012).

3. Statkraft AS

Statkraft is a state-owned Norwegian energy producer and the largest of its kind on the Norwegian market. On this domestic market, Statkraft was responsible for about 30 percent of the total Norwegian power production in 2011 (Statkraft AS, 2011). Like many of its main European competitors, the company's history dates back in time as far as to the end of the 19th century (Holtz, 2010). At this time, several European states launched national power utilities to engage in building a national power generation and distribution system to facilitate the energy needs of emerging industries (Sundin, 2006). Since then, the company has developed into a specialized market-type power producer. In its current configuration, Statkraft was created in the early 1990s when the original organization was divided up into several smaller entities. In this process, Statkraft became responsible for the actual energy production and tasked with the management of the national generation asset portfolio (Holtz, 2010).

The organization has its headquarters in Lilleaker, Oslo; where close to 30 percent of the company's total of 3,400 employees are stationed. According to official data, the company's net sales for 2011 reached 2,877 m€, which places Statkraft in the small-to-medium sized segment of major European energy utilities (Statkraft AS, 2011). However, due to a relatively low number of employees in combination with a large hydropower asset portfolio, the company shows top-of-industry figures in terms of net sales per employee (Weinmann & Burger, 2012). In 2011, Statkraft's generated a total of 51.5 TWh of energy, and the company's most important segment of customers was large scale industrial clients to which about 21 TWh of the total production was delivered (Statkraft AS, 2011). Energy that is not sold directly to industrial customers is distributed to and traded on the common Nordic power exchange, Nord Pool. Following from Norway's and Sweden's early decision to establish the Nord Pool power exchange back in 1996, Statkraft has been able get a head start compared to several of its major competitors when it comes to modern trading of energy. Today, although energy trading is a widespread phenomenon, Statkraft has managed to maintain its leading position in this field, which is also growing in commercial importance (Statkraft AS, 2011).

In addition to its presence in Norway, Statkraft has through a process of strategic geographical and technological expansion obtained market presence on roughly 20 different national markets (Statkraft AS, 2011). The company's expansion has thus been significant, but still not as aggressive as that of many of its European competitors following the liberalization of the national energy markets. The more aggressive expansion of many of the competitors can in part explain their often larger size in relation to Statkraft (Weinmann & Burger, 2012).

Statkraft's portfolio of generation assets is dominated by renewable technologies, especially hydropower. Due to topographic conditions in Norway, the construction of hydropower plants has been very favorable and a large installed generation capacity of energy from hydropower therefore exists today. In addition to its hydropower plants Statkraft also operates gas power plants, wind power technologies and has in recent years expanded its business to also include district heating (Statkraft AS, 2011). Out of these technologies, hydropower is the dominant one making up more than 80 percent of Statkraft's total installed production capacity. As a comparison, the operational installed wind power capacity amounted to about 0.02 percent of the company's production capacity in 2011 (Statkraft AS, 2011). Statkraft is thus, just as throughout its entire history, very much a company revolving around its hydropower assets. The company's long history of being a hydropower operator has resulted in a significant build-up of competence in this particular technology area. Following from this strong competence base, the geographical expansion both in Europe and internationally have often been centered around acquiring or constructing new hydropower plants on new markets (Holtz, 2010).

3.1 Statkraft's corporate strategy

Statkraft is at the time of writing this report (March 2013) engaged in a process that aims at establishing a new strategy to guide the company's activities in coming years. The corporate strategy in place today is expressed in the form of a strategic platform, outlining the main focus areas and Statkraft's strategic intentions within each of these areas. According to Statkraft's CEO Christian Rynning-Tønnesen (Statkraft AS, 2011), the company's strategic platform was during its formulation based on an evaluation of which markets that possess a future attractiveness for Statkraft in relation to its current competitive advantages. Following from this standpoint and under the assumption that demand for environmentally friendly energy will continue to grow, the focus areas of Statkraft's corporate strategy all represent areas where the company has existing business activities. These strategic focus areas are (Statkraft AS, 2011):

i. European flexible generation and market operations
ii. International hydropower
iii. Wind power in Norway, Sweden and the UK
iv. District heating in Norway and Sweden
v. Small scale hydropower in Norway

According to Statkraft's current strategic platform, the company expects these five strategic focus areas to represent the main possibilities for future growth for the company. Innovation activities are listed to have the function of strengthening the company's performance within these same strategic areas (Statkraft AS, 2011). For the first of the five strategic focus areas, *European flexible generation and market operations,* Statkraft's main ambition is to maintain a position as the largest generator of hydropower in Europe while becoming a significant provider of flexible power generation on the European market. The company's main ambition in the strategic area of *International hydropower* is to strengthen its position on what is considered attractive growth markets, especially Asia and South America. The third strategic focus area, *Wind power in Norway, Sweden and the UK,* entails an ambition to establish a position in onshore wind in Scandinavia that is top of industry in terms of profitability cost efficiency. Ambitions for the UK wind segment are mainly directed towards establishing a strong position in offshore wind generation (Statkraft AS, 2011).

The fourth and fifth strategic focus areas, *District heating in Norway and Sweden* and *Small scale hydropower in Norway*, respectively, are both smaller in size, emphasis and scope than the preceding three. For the first of these, *District heating in Norway and Sweden,* Statkraft's ambition is to strengthen its position on both the Norwegian and Swedish markets while ambitions for the last strategic focus area, *Small scale hydropower in Norway,* is limited to growing the segment through Statkraft's ownership position in other organizations (Statkraft AS, 2011).

In addition to its corporate strategy, Statkraft has establishes a set of three corporate values that are intended to further guide the actions and decisions of employees and individual business units. These corporate values are: (i) competent, (ii) responsible, and (iii) innovative. The values as well as the current strategic platform have been formulated on the basis of Statkraft corporate vision to *provide pure energy* (Statkraft AS, 2013).

3.2 Statkraft's organization

Statkraft is primarily organized along four different business areas: Market Operations & IT, Power Generation & Industrial Ownership, International Hydropower and Wind Power & Technologies. These areas are supported by functions such as accounting, procurement and corporate HR. These higher-level, supporting functions are in turn organized under the CFO, Chief of Staff and Corporate Strategy department. This organizational structure was established in 2010 after the new CEO, Christian Rynning-Tønnesen, was elected. The aim of implementing this structure was to achieve a more dynamic and flexible organization, wherein the strategic focus areas are emphasized and the results visible (Holtz, 2010). An organizational chart over Statkraft is provided in Figure 3(Statkraft Development AS, 2013).

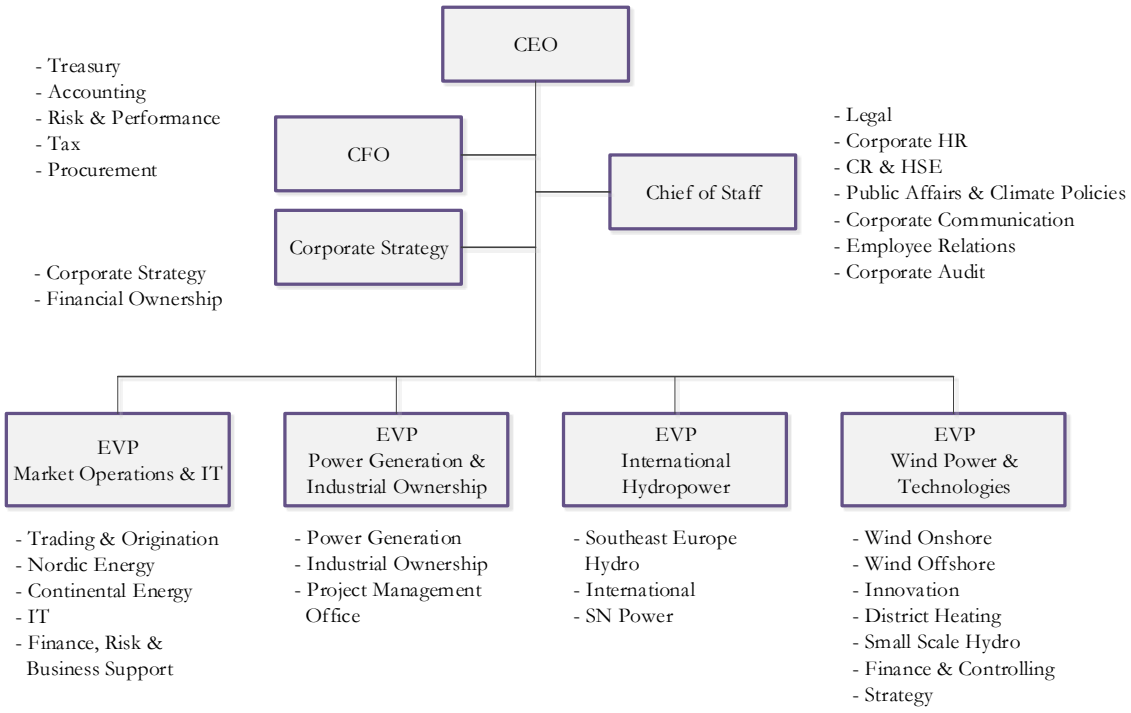

Figure 3 Chart over Statkraft's organizational structure

The business area Power Generation & Industrial Ownership is the biggest of the four and has historically constituted Statkraft's core business. It mainly revolves around the generation of hydropower within Norway, which is still the main activity of Statkraft. 84 percent of the power that is generated by the company comes from the hydropower plants, and the vast majority of these are located in Norway. The International Hydropower business area is much smaller, although it is growing. This growth is mainly due to an increasing demand for energy in Asia. Statkraft estimates that also Wind Power & Technologies will growth rapidly over the coming five years (Statkraft AS, 2011). This business area is diverse, including for instance functions related to wind power, the innovation unit, and a district heating and small scale hydropower unit. The geographical scope of this business area is not limited to Norway. For example, a significant and currently ongoing project is the projection and construction of a major offshore wind park on the Dogger Bank outside the U.K. The Market Operations & IT business area includes both support functions such as IT and business support as well as the company's trading and market activities. Trading and market operations are commercial segments that have grown in importance for Statkraft as well as for the utility industry at large following the establishment of energy trading exchanges such as for instance Nord Pool. Seen in

relation to the number of employees working with trading in Statkraft, this commercial unit is the most profitable in the organization (Statkraft AS, 2011).

3.3 Statkraft's R&D and innovation activities

Statkraft undertakes R&D and innovation activities in a number selected operational fields. The company's R&D project portfolio is a shared responsibility between a devoted innovation unit and the various business units that are part of the organization. R&D is something that from an official standpoint is highlighted as an important tool for creating and sustaining the company's competitiveness. The owner of Statkraft, the Norwegian state, has clearly stated that it expects Statkraft to have high ambitions in terms of R&D (Statkraft Development AS, 2013).

3.3.1 Innovation strategy and ambition

The innovation strategy Statkraft has in place today dates back to the beginning of 2011 and was formulated to follow the company-wide direction set by the corporate strategic platform outlined above. According to the wording of the innovation strategy, the main function of this is to further support the direction set by the corporate strategy. The innovation strategy thus has an orientation towards developing already existing business segments further. In addition to this, the strategy also entails that Statkraft should investigate and engage in relevant growth areas when such actions are found to be motivated. Statkraft's innovation strategy moreover states the mission description of the innovation unit in the organization. This is formulated as: "*the innovation unit shall increase future competitive advantages for Statkraft's core business through corporate R&D programs, technology analysis and portfolio management*" (Statkraft AS, 2011).

The innovation strategy also identifies three strategic objectives of the innovation unit and specifications as to how the responsibility to perform innovation activities in the company shall be distributed among different units. Statkraft's way of organizing its innovation activities will be outlined in greater detail in the following sub-section. According to the current innovation strategy in Statkraft, the main objectives of the innovation unit are to (Statkraft AS, 2011):

i. Run corporate R&D programs and perform technology analysis in order to increase future competitive advantages
ii. Ensure strategic focus and balance in corporate innovation portfolio
iii. Optimize Statkraft's R&D spending by providing tools and support to the corporate strategy

3.3.2 The organization and management of innovation activities

Statkraft's effort within the field of innovation is today organized as a shared responsibility between a separate innovation unit and each of the individual business areas. Each business area is responsible to by itself initiate, fund and perform projects and activities related to innovation that it finds to be of interest for its current operations (Statkraft AS, 2011). The innovation unit's responsibility is to manage activities related to innovation that have a longer planning horizon and involves several different business areas in some way (Statkraft Development AS, 2013). According to Statkraft's innovation strategy, the innovation unit's role in relation to the company's innovation effort is to act as a facilitator and enabler of innovation in the organization. Specifically, the innovation unit is responsible for initiating, executing and managing R&D programs that are in line with the corporate strategy, as well as running breakthrough innovation projects. Furthermore, the innovation strategy specifies the innovation unit's areas of responsibilities to include (Statkraft AS, 2011):

i. Overview content and spending in the innovation project portfolio

ii. Provide the organization with tools and systems that can be used to optimize R&D spending
iii. Manage relationships with external R&D institutions and act as a representative for Statkraft's innovation activities externally
iv. Optimize the use of external funding
v. Provide IPR counsel to the rest of the organization

The innovation unit is organized as a part of the Wind Power & Technologies business area and consists of approximately 20 employees, mainly charged with administrative tasks related to the company's innovation activities (Statkraft Development AS, 2013). The innovation unit is in turn divided into three sub-units, each representing one of the three main tasks placed on the unit as of the first quarter of 2013. In addition, the three sub-units the innovation unit coordinates with an entity referred to as the "innovation board". The innovation board consists of representatives from all the core business areas in Statkraft as well as personnel from the innovation unit and has an advisory function against the innovation unit. The innovation board is furthermore charged with reviewing the strategic direction of current R&D and innovation projects and to act as a platform for information sharing over the business areas related to innovation (Statkraft AS, 2011). The three sub-units of the innovation unit are: Corporate R&D, Technology Analysis, and Osmotic Power. A schematic illustration of this setup is provided in Figure 4 (Statkraft Development AS, 2013).

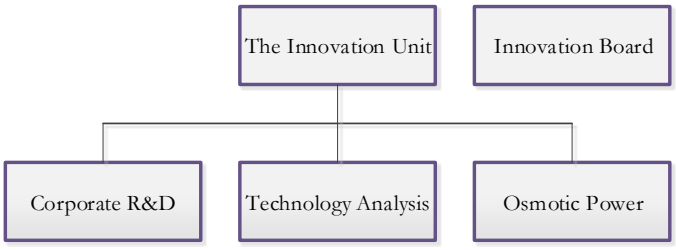

Figure 4 The internal structure of Statkraft's innovation unit

The Corporate R&D sub-unit is tasked with managing and steering Statkraft's corporate R&D portfolio. The corporate R&D portfolio is in turn organized in the form of three larger umbrella programs, each representing an area of strategic focus for Statkraft as a whole (Statkraft Development AS, 2013). The three umbrella programs each consists of a large number of smaller projects and one appointed program head from the Corporate R&D sub-unit who is responsible for coordination within the respective program. The three Corporate R&D programs run by Statkraft are: (i) Future hydropower, (ii) Wind power, and (iii) Bio energy. The intention is that the R&D projects admitted to be part of these programs should have a longer time-horizon than the typical incremental improvement project, be relevant in relation to Statkraft's strategic focus and possess some element of relevance for more than just one part of the organization (Statkraft AS, 2011). Incremental R&D projects that are closely related to the ongoing operations are intended to be conducted and founded by each respective business unit (Statkraft Development AS, 2013).

In addition to managing the composition of the Corporate R&D programs, the innovation unit is also responsible for performing monitoring activities. This task is handled by the Technology Analysis sub-unit (Statkraft Development AS, 2013). Monitoring market developments and analyzing the potential of technologies are features commonly seen in many power utilities' R&D and innovation effort (Weinmann & Burger, 2012). The Technology Analysis sub-unit consists of a number of technology analysts specializing in various technological fields. The role of the sub-unit is to help Statkraft to identify potential threats and new opportunities emerging in its environment and perform various analyzes on behalf of other departments in Statkraft's organization (Statkraft Development AS, 2013).

The third of the three innovation sub-units is Osmotic Power. Osmotic Power is a flagship R&D project in which Statkraft has been investing for a number of years. The technology being investigated for large scale power production is based on harvesting the energy released when fresh water in for instance a river mixes with the salty water of the ocean. Statkraft is one of a very few companies worldwide to pursue this type of technology and the project has generated significant publicity and interest on many markets. A test facility for the technology has been built in Norway where practical research activities are conducted. Statkraft is in the year of 2013 expecting to review the Osmotic Power R&D program to decide if the project should continue into the next phase, entailing investing in a pilot facility (Statkraft Development AS, 2013).

The overall structure of Statkraft's activities related to innovation consists of three levels ordered by the expected time-horizon and the activity's vicinity to existing operations (Statkraft AS, 2011). On the first level, activities with short time-horizons and an obvious connection to the existing operational activities can be found. These first level activities are in Statkraft initiated, funded and managed solely by the department in which they originate and are thus not a responsibility of the innovation Unit. First level activities are therefore mainly related to incremental improvements in the organization and are rarely cross-sectional (Statkraft Development AS, 2013).

Second-level activities within innovation in Statkraft typically have a longer time-horizon and are to a lesser extent incremental in their nature. These activities are managed by the innovation unit through the three Corporate R&D programs, as outlined above (Statkraft AS, 2011). The third-level activities, categorized as "exploration" by Statkraft, are activities associated with a higher degree of risk and uncertainty than those on the previous two levels. All activities of the Technology Analysis sub-unit and as well as the Osmotic Power R&D project are today what constitutes these third-level activities (Statkraft Development AS, 2013). For illustrative purposes a schematic representation of Statkraft's way of classifying its R&D and innovation activities is provided in Figure 5, below.

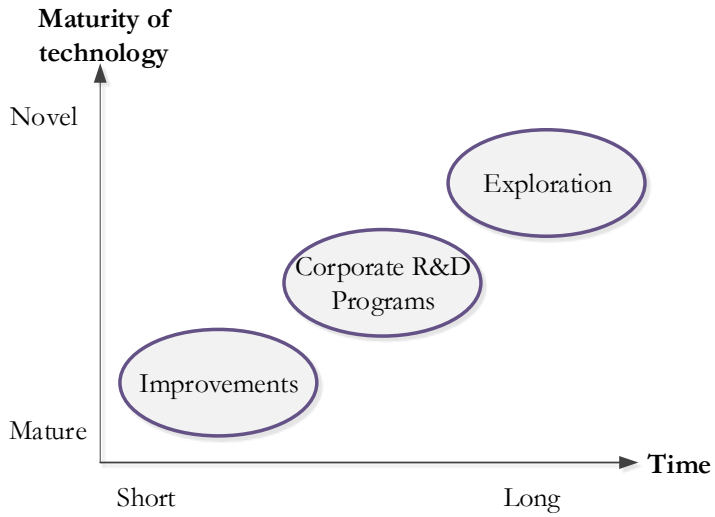

Figure 5 Statkraft's R&D activities are organized and managed based on their classification in one of three different levels

Statkraft does not possess any significant internal resources to conduct its own R&D projects in the form of for instance a technology development unit. Instead, almost all of the company's R&D activities are purchased and performed externally in cooperation with specialized research consultants, technology suppliers and universities. Projects are often initiated based on initiatives from external organizations since being the dominant actor in its field on the Norwegian market makes Statkraft an attractive and well-funded research partner (Statkraft Development AS, 2013).

4. Methodology

In order to map and assess the innovation capabilities of Statkraft's organization, a conceptual framework of innovation capabilities was first developed through a comparative literature study. This process will be described more thoroughly below. The actual assessment of Statkraft's innovation capabilities was later performed by applying this conceptual framework in a process known as an *innovation audit*, performed at the company. An innovation audit is a process through which a structured investigation is conducted to generate knowledge concerning an organization's capacity for innovation (Hallgren, 2009). An innovation audit can thus be regarded as a tool that an organization can use to generate a perception of the state of the organization in terms of its inherent capabilities to generate innovations (Destination Innovation, 2011).

Innovation audits come in many different shapes and forms and can be structured in several different ways depending on the purpose of the audit (Hallgren, 2009). Typically, an innovation audit relies on a predefined frame of reference that describes what having capabilities for innovation actually means in practice. Such a frame of reference can often consist of a set of dimensions, each deemed to have a significant impact on an organization's innovation capability. Performing an innovation audit hence entails that data is collected from the organization trough e.g. focus groups or a questionnaire and analyzed according to the predefined frame of reference. In this way, an organization can through conducting an innovation audit obtain information as to what is the state of the organization's innovation capabilities as well as identify in which particular dimensions improvements could or should be made (Biloslavo, 2005).

The audit process performed at Statkraft as part of this thesis project was inspired by an innovation audit tool developed by the Center for Business Innovation (CBI) at Chalmers University of Technology. The original intention for the thesis project was to apply the original CBI innovation audit tool in the analysis of Statkraft's innovation capabilities. However, due to issues of timing and the size of the investigation entailed by the CBI audit tool, Statkraft's innovation unit judged that performing the audit in this manner would mean a too large commitment for the company at the time in question. Instead, an alternative innovation audit process was defined. The new audit process was defined to be both smaller and less intrusive to the organization than the originally proposed audit tool. This was mainly accomplished through redefining the audit process to be based on a qualitative rather than quantitative analysis of the innovation capabilities. To allow this, a central component of the new audit process was to develop a conceptual framework to act as a basis for the analysis. The new conceptual framework describes and defines the components of innovation capabilities and was used to guide both the data collection process and the assessment of Statkraft's capabilities for innovation.

4.1 Research design and the assessment process

The process of performing this thesis project can, seen from a methodological perspective, be divided into three consecutive stages. The first stage of the project consisted of defining a conceptual framework for innovation capabilities to facilitate a qualitative audit process. The second stage involved performing the audit at Statkraft. The main purpose of this stage was to collect and assess data from Statkraft's organization along the dimensions of the conceptual framework. In the third and last stage, the framework was again used to analyze Statkraft's innovation capabilities and derive a final assessment of these. It should here be noted that although it is possible to conceptually distinguish stage two and three, the boundary between these was blurry in practice. Some analytical

work was made during the audit, while some additional data was collected in the final stage. However, it is deemed that this did not flaw the overall methodological process in any major way.

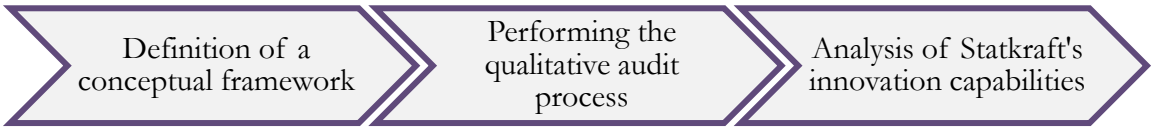

Figure 6 Seen from a methodology perspective, the thesis project can be divided into three separate parts as outlined in the figure.

In discussing the methodology of this thesis project, it is first important to review some of the constraints the project was subjected to. These included resource and time constraints as well as constraints introduced through instructions from Statkraft and its innovation unit. Time and resource constraints are an issue in every research project (Bryman & Bell, 2011). Such constraints stem from naturally occurring limitations such as the project time table, the staffing and the level of difficulty in the investigation (Flick, 2009). In conducting this project, such constraints applied following the general size of the investigation and its resources in relation to the size of the investigated organization. The time-table for the thesis project was approximately 15 weeks and the project was staffed with two students. Seen in relation to the size of Statkraft's organization, it is reasonable to argue that an investigation disposing additional resources would have been better equipped to execute the project with greater precision. To mitigate the potentially negative effect the project's limited resources could have had on the end results, all aspects of the study possible to influence were treated with great care. Examples of such practical measures include the sampling procedure and the structure of the data collection methods used.

The extent to which potentially negative effects following time and resource constraints were possible to mitigate was however limited by another set of constraints. These constraints concerned those introduced by Statkraft, either directly or indirectly. These constraints acted like boundary conditions for the project and did in several instances define what sets of methodological choices that were available. Examples of such constraints involved the level of intrusion the company was willing to accept and the extent to which access to high ranking employees could be facilitated. As already mentioned, these conditions did for instance impose restrictions on the investigation as the intended audit process had to be scaled down and made qualitative, potentially reducing the quality and validity of the conclusions drawn.

4.1.1 The research design

The research design used in performing this thesis project consisted of a combination of the comparative research design and the case study research design. This approach to the research design of the project is illustrated in Figure 7 below. The first phase of the project included defining a conceptual framework of innovation capabilities to be used during the subsequent stages of the project process. Here, the aim was to create a representation of innovation capabilities that would be of relevance to Statkraft's setting and at the same represent the authors' perception of the concept. The conceptual framework differs from many previously existing frameworks in that it was constructed with the specific intention to enable a qualitative audit approach and not to overly-emphasize capabilities relevant only for radical innovation. This framework is also this thesis project's general academic contribution. The research design applied in this phase was a comparative design where prior existing definitions and literature on innovation capabilities were collected and cross-analyzed.

In the project work that followed, the conceptual framework was applied to assess and analyze the innovation capabilities of Statkraft's organization. The overall research design used here shares several

characteristics with a qualitative case study design, in this case with Statkraft's organization as the unit of analysis. The case study research design entails investigating and analyzing the conditions of a specific case in a detailed manner (Bryman & Bell, 2011). According to Flick (2009), one of the major qualities of the case study design lies in its strong focus on the specific conditions in the case under investigation. In turn, this enables a case study to capture and produce very exact representations of what is being investigated (Flick, 2009). As the main purpose of this thesis project was to map and assess the innovation capabilities of Statkraft's organization, the case study design was deemed a suitable option. Adding to the suitability of the case study design was the outspoken intention of the project to be highly specific for Statkraft's organization. Hence, no desire that the assessment of Statkraft's innovation capabilities should generate results generalizable to contexts other than that of Statkraft existed. Not being able to generate a solid base for generalisability of results is otherwise considered to be one of the major drawbacks of the case study research design (Bryman & Bell, 2011).

Figure 7 A figure illustrating the overall research design used in performing the thesis project. The research design used was a combination of the two different research designs; the comparative and case study designs.

Following the redefinition of the audit project process at Statkraft to be made smaller and less intrusive, the case study was implemented as a qualitative case study. Quantitative elements common in many innovation audits, such as questionnaires, were thus not part of this thesis project. This decision was made in collaboration with Statkraft and moreover motivated by the limitations of the investigation's size that had been introduced. This decision however also introduced a number of drawbacks in term of the manner in which conclusions could be drawn and presented. For example, not being able to quantify the results in a meaningful manner reduces the clarity with which results can be presented and communicated. These and other issues related to the design and methods used in performing this thesis project will be discussed in the final section of this methodology chapter.

4.2 Data collection methods

The division of the thesis project into two rather separate components: defining a conceptual framework of innovation capabilities and later applying this in an assessment of Statkraft also had implications for the use of data collection methods. Overall, two major methods for data collection were used in the project process. The first project part, which focused on defining a conceptual framework for innovation capabilities was, as mentioned, designed as a comparative study. Here, a large number of existing definitions and perspectives on the concept of innovation capabilities were collected and analyzed using qualitative content analysis. Qualitative content analysis is a commonly used method in this type of context and used to interpret the content of written documents (Bryman & Bell, 2011). The use of the qualitative content analysis method in a comparative study was further motivated by the projects ambition to generate a new conceptual representation of innovation capabilities on the basis on already existing research.

The existing definitions and perspectives on innovation capabilities that were used as a basis when formulating the new conceptual framework were collected from a sample of available literature in the

field. The data collected and analyzed was hence in its entirety secondary data, gathered through a literature review. This literature review included a substantial number of academic sources, as well as a smaller number of non-academic sources. As the concept of innovation capabilities is a relatively recent addition to the general research field of innovation, the amount of material available in this area is still limited. Following this fact, the sampling of literature performed as part of this thesis project should be regarded as comprehensive enough to have generated a highly reliable representation of the concept.

The second project component included performing the actual assessment at Statkraft. After reconfiguring the originally proposed audit process, the audit primarily relied on two methods for data collection, qualitative interviews and an analysis of Statkraft's own company documents. The framework of innovation capabilities and its dimensions guided the data collection and interpretation effort throughout the assessment of Statkraft's performance.

4.2.1 Interviews

As the main data collection method in the innovation audit process, 20 qualitative interviews were conducted with employees from different parts of the Statkraft organization. Each interview lasted for approximately one hour and followed a hybrid unstructured to semi-structured outline. The key consideration here was to allow the interviewees a great deal of room to come forth with their own reflections and thoughts on the various themes guiding the interview. A main characteristic of the unstructured and semi-structured qualitative interview methods is, according to Bryman & Bell (2011), the allowance of flexibility during the process of the interview. This fact acted as a major motivation to why qualitative interviews were chosen as the main data collection method. In addition, qualitative interviews are according to Silverman (2008) useful when assessing and analyzing the attitudes and personal values of the interviewees.

This trait of the qualitative interview method was furthermore found to be relevant for this project as it according to Hallgren (2009) is crucial for any innovation audit to capture opinions and attitudes among employees to make a fair assessment of an organization's innovation capabilities. In addition to this, the choice of main method was in part also influenced by explicit wishes from Statkraft's innovation unit who did not support the use of, e.g., a broad quantitative survey.

The 20 interviews were all conducted at Statkraft's headquarters in Oslo during the month of February 2013. The initial ambition was to conduct the interviews in an as open spirit as possible to provide room for the interviewees to express and formulate their own assertions. As pointed out by Flick (2009), providing an interviewee with some level of structure can however often be beneficial, even in qualitative settings, as it helps the interviewee to reflect on a certain set of themes. Bryman & Bell (2011) adds to this reasoning and underlines the importance of asking the interviewee additional questions to probe deeper into specific issues of interest. Following such considerations, the interviews were structured around the predefined dimensions of innovation capabilities established by the conceptual framework developed in the first part of the thesis project. The intention of using these dimensions to provide a general structure to the interviews was to help guide the interviewee through the interview and to simplify the note-taking. Providing a rough structure in the interviews also helped simplify the subsequent analysis of the collected material.

Two researchers were present during all the interviews. One person was responsible for conducting the actual interview and interacting with the interviewee, while the other could focus on taking extensive notes. Both researchers had the possibility to ask additional probing questions. A so called *quick-note* system was developed and used after each of the interviews. This method entailed spending a few

minutes after each interview to quickly note the main themes and reflection from the interview. Combined, these methods of recording the information that was shared during the interviews are considered to be both comprehensive and provide a satisfactory level of accuracy.

The relatively small number of interviews performed followed from two main reasons. Primarily, the number of interviews that could be conducted was limited following the projects limited set of resources. Performing long qualitative interviews typically generates a substantial amount of data that has to be analyzed and is thus often a time consuming process when the number of interviews grows large (Silverman, 2008). Secondly, the number of interviews were limited by the extent relevant employees in Statkraft's organization could be found and agreed to be interviewed. In the latter case, accessibility was largely regulated by Statkraft's innovation units who identified the employees that were possible to interview as part of this project.

Following from requests from several of the interviewees at the time of the interviews not to be mentioned by name in connection to some of the information they shared, no direct references to individual interviewees will be given in the report. It was discovered early in the interview series that several of employees did not feel comfortable in stating their opinions on certain issues if this would later be reproduced in a public report. The decision not to include references to individual employees together with their statements was therefore taken. All interviewees were informed of this measure prior to stating their answers. Even though the lack of direct referencing reduced the traceability of some of the data that is presented in this report, the project as a whole is believed to have gained in relevance from implementing this measure. The main reason for this gain being that a less restrained interview situation where all interviewees knew that they could speak freely was created. As capturing many of the underlying attitudes and opinions in an organization is a central part of a precise innovation audit, this development can therefore be seen as desirable.

4.2.2 Sampling of interviewees

A central issue following from the use of a relatively small number of interviews in the data collection is the issue of how representative the findings can be regarded to be. Performing 20 interviews as the basis for making an assessment of a 3000+ employee organization is arguably not an ideal situation. To reduce the potential threat of misrepresentations, an effort was invested in finding a highly relevant and representative employee sample for the interviews.

The actual sampling was performed in cooperation with Statkraft's innovation unit. The innovation unit suggested a set of potential interviewees based on their position and familiarity with innovation in Statkraft. Involving the innovation unit was regarded necessary since a significant level of familiarity with the organization would be required to identify interesting and relevant subjects. In selecting a sample of interviewees, priority was given to individuals thought to be in a position where their observations could be relevant in relation to the project purpose. In practice, this meant that the sample might have had a distribution containing a higher concentration of employees that in some way were related to the innovation effort of Statkraft than what would otherwise have been the case. The decision to in this manner prioritize "content" rather than representativeness was primarily motivated by how the audit process was qualitative and thus more concerned with finding all relevant data than the distribution of this data. The held position and business area of the employees that were part of the final sample of interviewees for this thesis can be seen in Table 1 below.

Interviewee number	Position	Organizational unit
1	Senior Environmental Advisor	Corporate Responsibility
2	Senior Project Engineer	Offshore Wind Power

3	Turbines and Mechanical Equipment	Hydropower
4	Strategy & Business Dev. Advisor	Onshore Wind Power
5	Trainee	Market Nordic
6	Head of Innovation	Innovation
7	Regional Director	Hydropower
8	Head of Origination	Statkraft UK
9	Mechanical Engineer	Hydro
10	Development engineer	Offshore Wind Power
11	Technology Analysis	Innovation
12	Senior Advisor Offshore Wind Power	Offshore Wind Power
13	Vice President Procurement	Corporate Procurement
14	Business Development Manager	Statkraft Markets
15	Sen. Vice President Demand Side Mgmt.	
16	Technology Manager	International Hydropower
17	Senior R&D Advisor	Hydropower
18	Head of Business Development	District Heating
19	Senior Originator	Trading & Origination, Market Access
20	Senior Hydrologist	Market Nordic

Table 1 List of the 20 interviewees and their respective position in the organization

Even though the involvement of the innovation unit in the sampling process was deemed necessary for conducting the thesis project, its involvement could potentially have had a negative impact on the quality of the audit. Issues to consider here for instance include the possibility that the innovation unit presented candidates known to have certain positions. Although such conscious attempts at misrepresentation are regarded to be highly unlikely, it is important for the reader to take the innovation unit's involvement into consideration while taking part of the report's findings.

4.3 Methodological considerations

Based on the research design, used methods and project constraints described above it is relevant to also discuss some of the implications these might have had on the project quality. Quality is here taken to include mainly the concepts of investigative precision, the validity of the investigation and the reliability of the results. In this discussion it is perhaps most important to first acknowledge the boundary constraints that the project was subject to and the type of results the project aimed to produce. As has already been made clear in this chapter, the scope and depth of the investigation performed at Statkraft was limited by a number of different factors. For example, the investigation was made to be qualitative and involve only a smaller number of interviews as the primary means of data collection. In addition, seen in relation to the size of Statkraft's organization and the scope of the investigation, the project itself must be considered to be small and lacking sufficient resources to cover the whole organization in a detailed manner. Within the frame of these and other related constraints, the main possibility achieved an acceptable level of project quality was through carefully defining the project process and the use of different methods.

In terms of generalisability the project results, these can be considered in two different parts. The main portion of the project consisted of a company specific analysis of Statkraft's innovation capabilities. The results generated here can following from natural reasons not be generalized to any setting other than that Statkraft. This is in line with project's ambition to generate company specific results and value. The first part of the project and the result it generated, a conceptual framework for innovation capabilities to enable a qualitative analysis, is however in several regards highly generalizable to

external settings. Since this framework was constructed based on already established sources and perspectives, the quality of this framework can arguably be considered to be high seen in relation to its purposes. The conceptual framework is furthermore the basis for the validity considerations for the entire project. Since the framework was used not only to analyze Statkraft's innovation capabilities but also to guide the data collection. Based on the reasoning that the framework itself is based only on accepted theories and concepts, and therefore can be considered to accurately define the concept of innovation capabilities, this project can in itself also be considered to possess a relatively high level of validity.

Ensuring the reliability of the results generated from the project was considered of key importance in order for the project to bear a sufficient degree of relevance and value for Statkraft. Based on the constraints the project was subjected to, the project has been subject to a number of significant issues in relation to reliability. For instance, it was only possible to perform a small number of interviews, none of which with high ranking company leaders. Another important consideration to be made in the context of the reliability concerns the qualitative nature of the investigation performed. Problems with reliability are among the main drawbacks with applying a qualitative research method (Bryman & Bell, 2011). An innovation audit will likely always benefit if a research approach combining both qualitative and quantitative methods is used. In this way, results can be made more traceable, hard data can be combined with qualitative discussions and the results can be easily communicated, increasing the reliability of the results.

In this project however, Statkraft explicitly requested that a qualitative research approach should be taken. Furthermore, the project's ambition was in this case to perform a quick investigation to generate an indication as to the state of Statkraft's innovation capabilities. Seen in relation to these circumstances and the general constraints related to the project, it can be argued that the project based on these conditions carries a sufficiently high level of reliability of results. For this to be the case it should however from the reader be carefully noted that the project has been subject to significant constraints and that the results presented in this report hence mainly are to be considered as first indications of the actual state of Statkraft's innovation capabilities.

5. Theoretical background

Chapter 5 provides a comprehensive theoretical background that is considered necessary for the later proposal of a conceptual framework for innovation capabilities. The first section of this chapter aims to briefly discuss different types of innovations and relate these to each other. Here, the existing linguistic ambiguity will be dealt with as well as how different concepts should be interpreted in this report. After this section, the chapter puts innovation capabilities into a theoretical context by providing an overview of two common analytical perspectives of the firm: the so called resource-based view and the closely related capabilities view. These views represent two streams of literature on which much of the theory regarding innovation capabilities is grounded. However, there are several other approaches through which the innovation capabilities concept can be analyzed. These for instance include open systems theories of the firm and organization innovation theories (Balan, et al., 2009). Although a multitude of perspectives on the concept exists, the resource-based and capabilities views are here regarded to provide the most extensive theoretical base and are therefore in focus in this report. The subsequent sections of this theoretical framework deal more thoroughly with innovation capabilities per se, and will constitute a solid base for Chapter 6, where a framework for assessing these capabilities in a company setting will be proposed.

5.1 Innovation

There exists a vast collection of definitions of the concept innovation. In general, an innovation can take the shape of a new idea, practice or object. It can also refer to the process that leads to any of these concepts (Granstrand, 1999). It is not always clear who it has to be new for, but the standpoint of this report is that the innovation merely has to be new to the organization. Statkraft claims that an innovation refers to the realization of ideas and application of new knowledge to generate real value. With Björkdahl & Börjesson (2011) as a major inspiration, the following definition of the concept is used throughout this report: *in the context of the firm, the implementation of a new or significantly improved product, service, business model or general practice.* The concept of *innovation* should furthermore be distinguished from *innovativeness*, which is typically used as a measure of the potential discontinuity that a product can generate (Garcia & Calantone, 2002). On an organizational level, the concept of innovativeness can instead be interpreted of as a measure of the current performance in terms of innovation.

Garcia & Calantone (2002) claim that there is also an ambiguity in the way different types of innovations are referred to. These types include incremental, minor, really new, radical, major and discontinuous innovations and can be organized through adopting a market and technology as well as a micro and micro perspective. Radical innovations then refer to innovations that represent a new technology and create a new market infrastructure. They furthermore have to create discontinuities on both a micro and macro level, i.e., both for the company and its wider environment. The innovation type on the opposite side of the spectrum is typically called incremental or minor. These types of innovation constitute improvements upon existing products, services or processes tied to existing technologies and markets. Incremental innovations can generate micro level discontinuities, but not macro level ones. Between these two types lie the moderately innovative innovation often called ‘really new’ innovation. With Garcia & Calantone’s (2002) typology in mind, it is possible to construct a schematic representation of different types of innovations, see Figure 8.

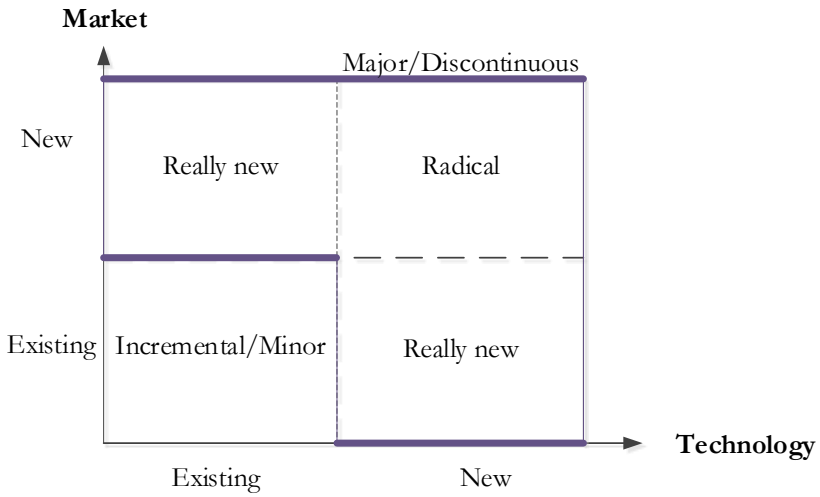

Figure 8 Schematic classification and systematization of different types of innovations

5.2 Resource-based and capabilities view

The first fundamental insights regarding the resource-based view of the firm are typically accredited to Penrose's late 1950's work '*The Theory of the Growth of the Firm',* and has since been further developed and elaborated upon by a multitude of scholars. The resource-based view recognizes companies as systems that become profitable due to their resources and capabilities (Wang & Pervaiz, 2007). Competitive advantage is therefore created through capturing entrepreneurial rents stemming from significant efficiency on the level of the firm. In this context, resources should be distinguished from mere factors of production and instead be conceived as firm-specific assets that are hard for competitors to replicate or buy on factor markets. Resources are heterogeneously scattered among companies and determine both what markets a specific company is able to enter and the magnitude of the profit stemming from these. Resources furthermore possess what Teece et al (1997) refer to as a 'sticky' character, meaning that companies in the short run are stuck with what they have, at least to some extent. As a consequence, it often takes a long-term commitment from a company to alter or change its resource base.

Capabilities constitute a company's ways of organizing and coordinating activities with the purpose of making better use of its available resources (Wang & Pervaiz, 2007). As the case for resources, capabilities cannot be bought from the outside and therefore have to be developed and grown from within the firm. Due to this situation, capabilities cannot be evaluated and analyzed through the balance sheet, but rather need to be understood in the more complex nature of organizational structures and managerial processes (Teece, et al., 1997). The capability perspective of the firm is general in its nature and by Börjesson et al (2012) criticized of being difficult to apply in practical settings. For this reason, academics typically break the perspective down through recognizing different types of capabilities such as adaptive, absorptive and innovation capabilities.

5.3 Organizational capabilities

Organizational capabilities can somewhat loosely be described as the ways in which corporations deploy their existing and available resources to develop a competitive advantage (Björkdahl & Börjesson, 2011). In accordance with this view, Ulrich & Norm (2004) claim that organizational capabilities are a type of key intangible assets. A more detailed definition is given by Helfat & Peteraf

(2003), who argue that this type of capabilities refers to "*the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources, for the purpose of achieving a particular end result*". According to Christensen (1997), organizational capabilities encapsulate three dimensions:

i. Resources, consisting of people, equipment, technology, product designs, brands, information, cash and relations with external partners.
ii. Processes, which refers to the methods aiming at transforming input into value-added output, thus including interaction patterns, coordination, communication and decision-making.
iii. Values, which can be thought of as the criteria used for decision-making.

The same author adds that organizational processes are typically designed for reliability and repetition. Due to this, organizational capabilities constitute a potential inhibitor of change. Some scholars claim that the two concepts organizational and core capabilities are essentially the same. However, it can be argued that this is merely a matter of interpretation and that they should be distinguished as two different notions. For instance, while Christensen (1997) discusses organizational capabilities in terms of impeding change, Prahalad & Hamel (1990) claim that core competencies work as the very engine of new business development. Moreover, Wang & Pervaiz (2007) make a clear distinction between the terms capabilities and core competencies, where the latter concept constitutes a bundle of resources and capabilities. However, Schilling's (2010) description of core competencies as the abilities that differentiate a company strategically closely resembles the notion of organizational capabilities. Identical or not, there is a rationale behind synthesizing the theory of core competences and organizational capabilities.

Companies can become prisoners of their own core competencies through being overly committed to inappropriate skills and resources. This entails that a company's core competencies are rendered obsolete and transformed into core rigidities (Schilling, 2010). This phenomenon is also described by other researchers, for example by Christensen (1997) who uses the term "path dependency". Being overly committed to the core competencies can lead to a rapid loss of market share and decline in profits due to an inability to efficiently respond to a changing environment.

5.4 Dynamic capabilities

With the concept of core rigidities kept in mind; rather than stifling the status quo through strengthening the existing organizational capabilities, companies also need to be able to respond to changes in the external environment (Börjesson & Elmquist, 2011). This is especially true for companies of today that typically operate in Schumpeterian environments of rapid technological development. External changes can be caused by for instance economic cycles, an altered competitive nature of the industry as well as by regulatory changes. In order to become successful, companies have to exhibit timely customer responsiveness in addition to effective organizational capabilities tied to for example speed, quality and efficiency (Lawson & Samson, 2001). However, profit stems not only from the resource structure, but also from companies' abilities to transform (Teece, et al., 1997). This constitutes the rationale behind why the static organizational capabilities view has been extended and complemented by the notion of dynamic capabilities.

The dynamic capability concept is related to a company's ability to examine and potentially alter regular organizational capabilities. According to Teece et al (1997), the term *dynamic* refers to the

capacity to achieve congruence with a changing environment, while the term *capabilities* underlines the role of appropriately adapting, integrating and reconfiguring organizational competences and resources. In this manner, dynamic capabilities can be viewed as the ability to change static components (Börjesson & Elmquist, 2012). Barreto (2010) gives a complementary definition of the concept: "*dynamic capability is the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions and to change its resource base*". A company's dynamic capabilities could furthermore be said to determine the available options to achieve new forms of competitive advantage. However, these options are heavily influenced by path dependencies and current market positions (Teece, et al., 1997). In other words, the set of alternatives a company faces at any given point is limited by the strategic decisions it has made in the past, even though past circumstances may not be relevant anymore. Important issues to raise in this context are established power structures, norms and routines. All these issues have the potential of fortifying the current situation, which in turn can lead to structural inertia of the organization (Börjesson & Elmquist, 2011).

Eisenhardt & Martin (2000) argue that dynamic capabilities exhibit different features depending on the market context. In markets where changes are frequent but follow predictable linear paths, companies can rely on existing knowledge. However, in high-velocity markets where changes are nonlinear and less predictable, dynamic capabilities must focus on generating situation-specific knowledge. A remark that one might make in this context is that the same should then be true for high-uncertainty markets in general, since they are also nonlinear and hard to predict, but not characterized by high velocity per se.

5.5 Combining different approaches to theorize the firm

There have been several attempts made to structure the resource-based and the capabilities views and relate them to each other. Börjesson & Björkdahl (2011) claim that an important distinction between organizational and dynamic capabilities is that the latter involves innovation and renewal outside the company's existing routines. Teece & Pisano (1994) argue that dynamic capabilities constitute so called second-order capabilities aimed at developing first-order ones, i.e. organizational, capabilities. This approach is shared by several academics, among those Wang & Pervaiz (2007) who further extend it through incorporating additional elements. Wang & Pervaiz (2007) propose a hierarchy which looks as follows:

- Resources are considered zero-order elements since they typically fail to generate any sustainable competitive advantage.
- Capabilities, which they describe as a firm's capacity to deploy resources to attain a desired goal, are first-order elements.
- Core competencies, which in their view are bundles of a company's lower order capabilities and resources, are considered second-order elements.
- Dynamic capabilities are then the final, third-order elements.

The general idea behind this approach is drawn on in this report but is also complemented by the element *factors of production* as proposed by Teece et al (1997). This yields a framework in accordance with Figure 9.

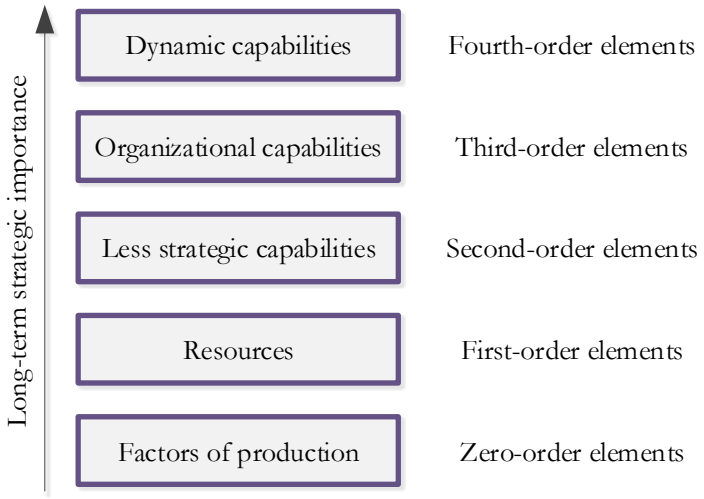

Figure 9 A general framework for combining the resource-based and capabilities views

This illustrative figure might need some further explanation. The elements are ordered after their long-term strategic importance. The *factors of production* are completely undifferentiated and can be bought on any market. Therefore, they do not contribute to the company's competitive advantage. This is to some extent true for the *resources*, but if they exhibit valuable, rare, inimitable and non-substitutable features they can constitute a source of competitive advantage. However, such an advantage is unlikely to persist for long in modern dynamic markets (Wang & Pervaiz, 2007). The next element is *less strategic capabilities*, which is equivalent to *capabilities* in the model proposed by Wang & Pervaiz (2007) above. The name is changed to emphasize the difference between *organizational capabilities*. Both are firm-specific, but the latter are more strategically important to the firm's short-term and medium-term competitive advantage. As mentioned above, these are also referred to as the core competencies. The last and fourth-order element is *dynamic capabilities* with a clear focus on positioning the company for the future.

5.6 Innovation capabilities

Innovation capabilities relate to a company's ability to create new products, processes, services or ways to organize (Börjesson, 2009). According to Börjesson & Elmquist (2012), innovation capabilities can be described as a company's ability to be competitive through systematic innovation. This innovation builds not only on reconfiguration of resources and processes, but also on the values that influence how decisions are taken within the organization. Assink (2006) claims that developing innovation capabilities is not a one-time effort; it requires a continuously improving absorptive capability. This view is shared by Balan et al (2009) who argue that modern companies need to be able to innovate on a systematic and continuing basis. In the context of innovation, they moreover claim that firms do not only compete in terms of new offerings, but also their capability to develop new products. This distinction is important and it is the latter that constitutes the innovation capability.

Say Yen & Shun (2009) propose incremental and radical innovation capabilities as two different types. The former refer to the capability to generate innovation in a continuous manner, which refines and reinforces existing practices. On the contrary, radical innovation capability is then the ability to significantly transform existing products and services. This latter concept exhibits striking similarities with disruptive innovation capability as presented by Assink (2006). Although rationales to break up

the concept of innovation capabilities into sub-parts might exist, most scholars discuss the concept in its more general nature. A number of different definitions of innovation capabilities are provided in Appendix 1. These have been analyzed and constitute the base for the following definition, which moreover is the definition used in this report: *"innovation capability refers to the internal ability to systematically generate and pursue new innovation to achieve or enhance the competitive advantage, aligned with the firm's strategy".*

Börjesson & Elmquist (2012) strongly argue that innovation capabilities should be distinguished from the more general notion of dynamic capabilities. Innovation capabilities should instead be conceived as a subset of organizational capabilities and linked to a certain strategic intent. This does however not mean that innovation capabilities do not have a dynamic component. Just as any other organizational capability, there is typically a need to develop and improve the innovation capability over time. However, it should be noted that this is not the only way in which innovation capabilities are envisioned in relation to other concepts in the literature. Wang & Pervaiz (2007) argue that dynamic capabilities are comprised by three components, where innovation capability is one. Another possible perspective on how to organize innovation capabilities into a wider context is to claim that organizational capabilities govern innovations of incremental character, whereas dynamic capabilities spur more radical innovation. One could argue that this approach gains some support by Björkdahl & Börjesson (2011) who claim that dynamic capabilities allow the company to innovate outside its current routines, whilst organizational capabilities do not. Whichever of these logically non-complementary views on how to relate innovation capabilities to a wider framework one adopt might be of theoretical value, but will perhaps not create significant practical value. Regardless of being classified as organizational or dynamic capabilities, academics have a fairly unanimous opinion regarding the character of innovation capabilities and the elements comprising it, as will become evident in the following paragraphs.

Large and established firms do typically not perform at a desirable level in terms of innovation capabilities. Assink (2006) argues that many companies are not organized to embrace new ideas, to early recognize external changes and adapt accordingly. Established companies are furthermore often not able to both sustain current operations and explore new opportunities at the same time. Börjesson & Elmquist (2012) share this view and claim that improved efficiency in for example production is typically the main focus of large established firms, and that efforts of this character are unlikely to yield radical innovations. They furthermore claim that idea generation is not the major problem. Lawson & Samson (2001) extend this reasoning by describing problems on deeper levels that large companies face. Operational challenges and quarterly revenue objectives are two aspects that create a short-term focus. Innovation efforts of a more radical nature, which often require long-term vision and commitment, therefore work as force of instability, although in many cases being essential for the company's future success.

Most scholars are in stark agreement that innovation capabilities are constituted by several elements, by some referred to as dimensions or attributes, which are furthermore interdependent. According to Balan, Lindsay & O'Connor (2009), innovation capabilities have many dimensions and are built up by a wide range of elements such as assets, resources and abilities. These elements can either be classified as enablers or barriers to innovation capabilities. In a review of innovation barriers, Assink (2006) argues that improving the performance in one dimension is unlikely to lead to a significantly improved overall performance. Instead, reconfiguring multiple interrelated elements has the potential of significantly improve a company's innovation capabilities.

Colarelli O'Connor (2008) goes even further in explaining the interdependency between the different elements by recognizing innovation capabilities as a system. A system can be defined as "*a complex of elements in mutual interaction where each individual part depends not only on conditions within itself, but also to a greater or lesser extent on the conditions within the whole, or within super ordinate units of which it is a part"* (Colarelli O'Connor, 2008, p. 315). Another characteristic of a system is that the whole is greater the sum of its elements. Thus, the overall behavior and performance cannot solemnly be analyzed through the properties of its elements. This systems view on innovation capabilities is shared by for instance Björkdahl & Börjesson (2011). Moreover, coherence between the elements and the company's strategic intent is furthermore a necessary consideration when analyzing innovation capabilities through a systems perspective (Colarelli O'Connor, 2008). Although the elements collectively constituting innovation capabilities are correlated, they are still conceptually distinct (Wang & Pervaiz, 2007).

Some researchers propose that innovation management should rather be regarded as industry-specific, or perhaps even firm-specific. Without rejecting this notion, Lawson & Samson (2001) address this criticism towards a general systems perspective on innovation capabilities by claiming that there exist commonalities in terms of the environment and conditions of successful innovative companies, and that a number of core elements can be identified. Without these commonalities, it is hard to generate ideas and develop them into successful innovations regardless of for example the industry.

6. Proposal of a framework for assessing innovation capabilities

In this chapter, a general and qualitative conceptual framework for assessing innovation capabilities is presented. The general arguments and reasoning furthermore draw on the existing streams of research that were introduced in the previous chapter, but new theory is introduced as well. The main purpose of the conceptual framework is to create a solid ground that constitutes an important assistance in terms of both data collection and analysis related to the thesis project. However, the framework has been developed with the aim of being general rather than case-specific, and it is thus possible to apply when assessing the innovation capabilities also in other companies. This is a clear and important purpose that was stated earlier in the report. For this reason, the conceptual framework of innovation capabilities presented in this chapter might cover more aspects than in the end were deemed necessary to analyze Statkraft's innovation capabilities.

The conceptual framework draws on the systems perspective of innovation capabilities that was outlined in the previous section. The systems proposed by Björkdahl & Börjesson (2012), Colarelli O'Connor (2008), Lawson & Samson (2001), Guan & Ma (2003), and Assink (2006) listing innovation enablers and barriers have constituted important sources of inspiration in constructing the new framework. These systems aim to take a holistic perspective on innovation capabilities in companies. All of them, except for perhaps Assink (2006), do so by breaking the concept down into several dimensions that collectively are intended to provide the whole picture. The studied systems are tabulated in a concise form in Appendix I and have in generating the new conceptual framework been thoroughly analyzed and compared. Examples of issues that were brought up in this analysis process are what scope and focus each system has, what the overlaps between them are, how they relate and consolidate other theory regarding innovation management as well as issues concerning the existence of potential contradictions between certain systems. This led to the construction of a new system that aims to synthesize the literature and describe the most important elements that affects a company's innovation capabilities. Overall, the studied systems were not very divergent in relation to each other, and therefore all of them exhibit similarities with the one presented here.

A noteworthy remark is that a major part of the literature on innovation capabilities has a more or less strong focus on radical innovation. Since the system presented in this report builds on this already existing theory, it is possible to argue that it might share this focus. However, attempts have been made to make the conceptual framework as general as possible to also include important aspects that relate to incremental innovation. By also acknowledging this, it aims to fill an academic gap that was identified among the existing framework. This strongly relates to the more general lack of a clearly qualitative and holistic framework for innovation capabilities that works on a significantly aggregated level. Such a conceptual framework enables a quick and accurate assessment of an established company in any industry.

The new conceptual framework that constitutes the foundation of this report has seven dimensions: Organizational Structure, Culture & Learning, Innovation Strategy & Vision, Leadership & Innovation Management, External Linkages, Implementation, and finally Creativity. These are graphically illustrated in Figure 10 and each will be described more thoroughly in the subsequent sections. The theory that builds up each dimension is not restricted only to the literature on innovation capabilities specifically. Instead, sources that can be considered to work within the more general field of innovation management have frequently been used. It should however be emphasized here that since the framework is regarded a system, it is more complicated than a mere bullet list. For example,

several of the dimensions that constitute the system exhibit a degree of overlap with one or several other dimensions. This overlap can furthermore vary for instance depending on the characteristics on the organization that is analyzed. The aim has been to minimize such overlaps to the largest possible extent and in this way creating mutually exclusive dimensions of the innovation capability. However, due to the nature of the theory, this has in some instances not been possible to achieve. Moreover, the exact importance of each dimension is complex to estimate on a generally applicable level. Being a system, it exhibits the system characteristics described in section 5.6, concerning for instance the interconnectivity of its various elements.

In the context of the new conceptual framework, the *system environment* is constituted mainly by the company as a whole, but also its external context. The *system boundary* is where the innovation capabilities border to this environment. This boundary is not distinct, something that is illustrated by the dotted line in Figure 10. The grey area makes up everything that relates to a company's innovation capabilities. As captured in the figure, the seven dimensions or elements aim at describing this internal ability as well as possible. However, it is deemed impossible to cover all aspects completely which explains the grey area outside the circles that constitute the seven *system elements.*

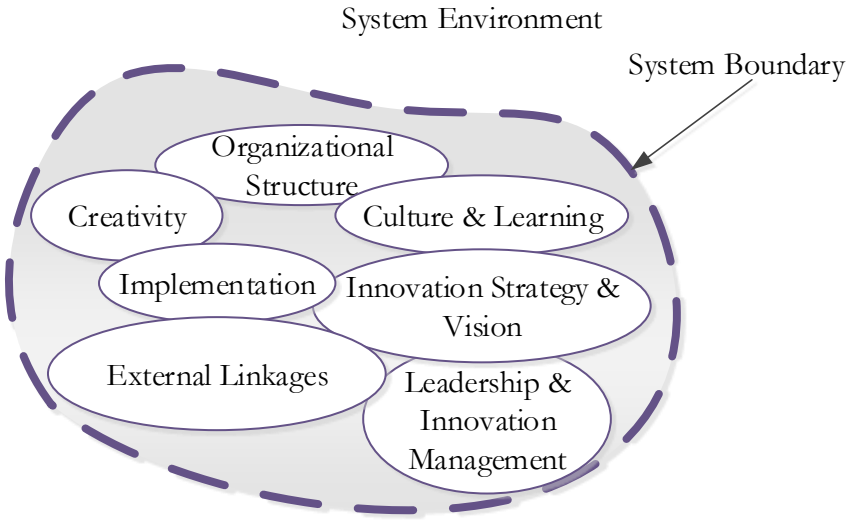

Figure 10 A conceptual framework of innovation capabilities

Moreover, the environment includes aspects such as a company's general routines, beliefs, history, stakeholders, technological development, et cetera. These clearly influence the innovation capabilities and it is important to recognize this when applying the framework in any situation. In practice, this essentially means that there is a need to include considerations that work on a higher level than the system elements themselves. This could for instance be done through looking at industry-specific issues or societal trends. A basic tool that could be useful for this is the PESTEL-analysis. Each capital letter represents one of the aspects that this tool covers, namely political, economic, societal, technological, environmental and legal respectively.

6.1 Organizational Structure

The organizational structure in a company refers to activities such as supervision, coordination and task allocation that are designed to facilitate the achievement of the company's various objectives (Pugh, 1990). According to several authors, including e.g. Schilling (2010), the organizational structure of the company affects its ability to innovate. One aspect that influences this ability is the

degree of centralization, which concerns what level the decision-making authority is kept on. In an organization where decision-making authority is distributed to a low level, a decentralized structure prevails. In relation to innovation and new growth, the extent to which R&D activities should be centralized is for instance important to consider. Here, decentralization could lead to projects that closely respond to the need of the specific division, but at the same time result in duplication of work and lack of economies of scale (Schilling, 2010). Swann (2009) argues that decentralized organizations in general tend to generate more radical innovations, while a more centralized one typically works satisfactory for incremental innovation.

Another aspect that relates to the structure of the firm is the so called formalization. This concept refers to the degree to which the company uses formal rules and procedures to structure the behavior of its employees. A high degree of formalization in combination with standardization and specialization tend to generate an overall mechanistic structure. This structure typically provides efficiency, but is not optimal for fostering innovation since the employees' creativity and entrepreneurial attributes are suppressed by tight control systems. An organic organization is essentially the opposite and is characterized by more dynamism, which in turn has a positive impact on innovation efforts. This view is shared by Lawson & Samson (2001) who claim that the more organic the structure of an organization is, the better the environment for generating and spreading innovative ideas. Aaben & Lövgren (2007) provide a comprehensive comparison of the organic and mechanistic structure, for which the most important elements are presented in the table below.

Organic Structure	**Mechanistic Structure**
Freedom from rules, participative and informal, many different views considered, inter-disciplinary teams, willingness to take on external ideas, information flow both upwards and downwards, non-hierarchical	Department separation and functional specialization, hierarchical, bureaucratic, many rules and fixed procedures, long decision chains, little individual freedom of action, centralized knowledge

Table 2 A comparison between the organic and mechanistic structure

According to Colarelli O'Connor (2008), merely having an organic structure will not generate innovations automatically and is therefore not sufficient. To succeed in innovation it is also crucial to combine an organic structure with an identified team, group, department, or other entity that is responsible for more non-incremental innovations. This unit should according to Colarelli O'Connor (2008) be loosely coupled with the mainstream organization so that it is allowed to develop its own competencies, mental models and processes and not forced to conform to those of the current operations. This arguing exhibits similarities with Assink's (2006) emphasis on organizational dualism. He states that established companies typically lack a two-fold structure that combines consistency for incremental innovation, and flexibility for radical innovation.

6.2 Culture & Learning

Norms, shared values and beliefs are all factors that make up an organization's culture (Björkdahl & Börjesson, 2012). Assink (2006) claims that a climate that accepts uncertainties, unusual ideas and a probe-and-learn approach is a necessary requirement for radically new ideas to get accepted. A similar view is shared by Lawson & Samson (2001) who argue that the innovation success to a large extent is dependent on an appropriate culture and climate. These researchers moreover claim that there are four underlying components that together constitute the culture in a company:

i. Tolerance of ambiguity, which means a certain willingness to take risk. However, this is not the same as taking unnecessary risks. Successful innovative companies accept ambiguity, but seek to reduce risks through efficient information management and firm control in terms of project milestones.
ii. Empowered employees, entailing respect for people along with investments in them. Here, training programs and courses might be relevant, but also job rotation is a method that could improve the various skills of employees.
iii. Expect creative time, or *creative slack*. Short-term operational task should not take up so much of the employees' time that they do not have time for thinking and pondering on issues that could be improved. Time, funding and facilities aimed at innovation should be provided to the people within the organization.
iv. Communication, both internal and external, is important for knowledge sharing and improving other people ideas. One typically distinguished feature of innovative companies is that they break down the functional, hierarchical, cultural and technological barriers, and facilitate communication between these areas. An example of this is provided by Song & Dyer (1995) who claim that it is necessary for successful innovation that the three functions which most manufacturing companies are build around, namely R&D, manufacturing and marketing, are closely integrated and coordinated. Biloslavo (2005) claims that an organization's culture determines the type of knowledge that is looked for and nurtured, and that readiness for risk-taking and willingness for collaboration are important aspects in this context.

The learning within an organization can be defined as the ability to identify, absorb, and apply both existing and new knowledge to achieve competitive success. In this context, aspects such as systematically monitoring technology trends, acknowledge tacit knowledge, learning from past experiences et cetera are important to consider (Guan & Ma, 2003). Argyris (1990) provides a similar description of organizational learning and claims that it refers to the knowledge generation and diffusion in the organization. It is not only the absolute level of knowledge that is important for competitive advantage, the rate with which is circulates within the organization also plays a significant role (Biloslavo, 2005). According to Björkdahl & Börjesson (2012), learning is important since uncertainties are inherent in the innovation process, which sometimes leads to unexpected problems and non-optimal decisions. These are things that the organization as a whole should learn from in order to improve the overall innovation performance.

Colarelli O'Connor (2008) emphasizes the allowance of exploratory processes to foster innovation capabilities. She argues that new and situation-specific knowledge is required to successfully handle uncertain environments. This type of knowledge is generated if the organization's employees engage in experimental and exploratory activities aimed at quick learning, evaluation and redirecting. Assink (2006) discusses two important barriers to innovation that are related to learning. The first one regards the inability to 'unlearn'. It is important that companies are able to continuously eliminate old logic and replace it with something new instead. The other barrier that is presented is the so called learning trap. Companies, especially large and established ones, typically adopt an inward-focus that generates groupthink bounded by the existing ways of doing things. This works as deteriorating to innovation.

Related to the topic knowledge and learning Argyris & Schön (1974), discuss the concepts of espoused theories and theories-in-use. The former refers to the actions a person claims to others (s)he would take under certain given circumstances, while the latter are the ones (s)he would actually take, i.e. the action theories-in-use. Inconsistencies between these two do often exist and the person is not always aware of this. Argyris & Schön (1974) furthermore claim that people tend to fall into two

categories in term of how they think and act. The first category, also referred to as Model I, consists of people who are reluctant to share ideas through open discussion. Instead, they act individualistically and try to maximize personal winning, while minimizing loosing. People exhibiting the other mental model, Model II, are more open in sharing goals, ideas and checking each other's assumptions. They are keen on public testing of ideas, and trust the group enough which makes them not fearing being criticized or ridiculed. People with this mindset will facilitate learning on an organizational level (Cheung, et al., 2012).

Model I	**Model II**
Reluctant to share ideas, individualistic behavior, maximizing personal winning.	Share ideas and goals in open discussions, trust other people, no strong fear of being criticized or ridiculed.

Table 3 Characteristics of Model I and II personalities.

Argyris (1977) moreover make a distinction between what he refers to as single and double loop learning. The process that enables the company to follow through with its existing policies to reach its objectives is single loop learning. Then the employees make use of a certain action strategy that will yield corresponding consequences. Double loop learning is more effective and involves questioning and understanding the underlying variables that govern the policies and goals.

6.3 Innovation Strategy & Vision

Lawson & Samson (2001) claim that clear articulation of a common vision along with the expression of the strategic direction are requirements for successful innovation. This is important since it contributes to the institutionalizing of innovation, making it a continuously ongoing activity. Without this type of strategy, there is a risk that the interest of and attention given to innovation will be too low. On the contrary, if the employees are aware of the strategy, they have clarity of purpose to find new ways of doing things to achieve a certain goal. In this manner, the innovation strategy is of major importance when it comes to direct the organization's attention.

Björkdahl & Börjesson (2012) stress that a company's innovation strategy has to be well articulated, known and understood throughout the whole organization. It should furthermore be translated into rules that promote and govern new ideas and behaviors. The same authors further discuss the prioritization given to innovation, and argue that it mirrors the strategy that is implemented. The systematic allocation of resources to support new business opportunities provides a very rough measure on this prioritization. In the same context, Assink (2006) discusses the barrier to innovation which he calls 'unwillingness to cannibalize'. This barrier refers to the situation where companies have promising new ideas and projects, but are still unwilling to prioritize these over the existing business alternatives due to fear of cannibalize their already made investments.

One can argue that the notion behind espoused theories and theories-in-use on a personal level described earlier is transferable to a more general organizational context related to strategy. An organization can have a very elaborate official strategy which it communicates to the outside world, i.e. an espoused theory. However, this does not automatically mean that its employees will carefully follow it. Here, there might be an inconsistency that is important to map out in an innovation audit.

Saleh & Wang (1993) state that a commonality between innovative companies is that their strategies can be describes as proactive with sophisticated environmental scanning and intelligence systems rather than reactive. This is also in line with Porter (1980) who distinguishes between two different

and generic innovation strategies: innovation leadership and innovation followership. A company that pursues the former has the aim of introducing novelties faster than its competitors. This strategy is often enabled by technological leadership, close relationships with important sources of new knowledge as well as responsiveness to customers needs. Innovation followership as a strategy instead entails learning from others and become successful through imitation, reverse engineering and cost cutting.

Another aspect that Saleh & Wang (1993) emphasize is the management commitment to the innovation strategy. Top management needs to keep pursuing this strategy and allocate sufficient financial means to innovation projects even in tough times. An efficient innovation strategy is typically characterized by some 'slack' in the resources (Saleh & Wang, 1993). This is the case not only in terms of some creative freedom for the employees, but also when it comes to the capital structure. O'Brien (2003) claims that there is an inverse relationship between efficient innovation and leverage on the capital. This financial slack is essential since it provides protection against cash flow volatility which can create stability in the investments made in innovation projects and new product launches.

6.4 Leadership & Innovation Management

Colarelli O'Connor (2008) argues that major innovation capabilities must be incorporated into the mainstream organization through a senior management team. Leaders should ideally view major innovation as a crucial element of their efforts to safeguard both the future and long-term health of the company, while understanding the risks that are associated with innovation. However, senior managers come and go, and it is therefore important to view leadership on a more aggregated level and as more deeply rooted in the organization than the current set of senior managers that happen to be engaged in innovation. In this way, leadership is part of an organization's culture.

Lawson & Samson (2001) adds to the discussion regarding leadership in the context of innovation by claiming that managers need to know how reward systems affect behavior. Successful innovating companies use rewards such as public recognition and financial bonuses to spur creative ideas. It has been recognized that individual rewards typically boost the idea generation and radical innovation efforts within an organization, whereas group-level rewards tend to improve innovation implementation and continuous innovation (Angle, 1989). Ahmed (1998) lists elements that top management of innovative companies typically possess. This list includes putting a lot of effort into accurate market analysis, working closely together with end users, and assuring that innovation projects are supported at all levels in the organization. Leaders furthermore need have trust in employees' abilities and competences, be good at communicating, and have a tolerance to change, ambiguity and slack resources.

Björkdahl & Börjesson (2012) claim all generated ideas must be systematically evaluated and promoted. It is therefore crucial for companies to have efficient idea management in place. This includes structures, systems and routines that support the required management of ideas. Employees for example need to know which person or function to turn to when having a new idea. The generated ideas within a company cannot all result in an implemented innovation; some gets cancelled somewhere on the way.

According to Aaben & Lövgren (2007), the innovation funnel provides a good overview of the process of innovation management. This general framework recognizes that ideas are screened and filtered

through so called gates, and only the most suitable ideas get implemented. The initial part of this process is often referred to as 'the fuzzy front end' since it is characterized by creativity. To what extent this phase should be left unstructured is an issue that is up for debate (Aaben & Lövgren, 2007). Boeddrich (2004) claims that some structure is necessary and that successful innovation have to be linked with the strategy at a very early stage. In most cases, managing new ideas through this described funnel process is more problematic than actually generating them. Here, an efficient idea management system that aims at transforming the most promising ideas into innovation projects can play an important role (Gomez de Ayala, et al., 2007). This system should track the development of the ideas, and it is important that the employees understand why some ideas are rejected while others make it farther in this screening process. This would facilitate the understanding of the desired direction of the company (Stamm, 2005). Bakker et al (2006) claim that it is one viable way of evaluating ideas is to assign the task to a committee consisting of one responsible person assisted by at a minimum one person from each department. Gomez de Ayala et al (2007) discuss some success factors when implementing an idea management system. Among these are resource efficient administrative procedures, reasonable and quick evaluation, sympathetic communication with employees along with a functional structure for rewards and recognition.

Assink (2006) furthermore describes how the innovation process often is mismanaged and raises several factors that are related to this phenomenon, for example the personalities of the people involved in the innovation process. It is crucial to create the right team with a good chemistry to be able to be truly innovative. Another factor brought up is the 'lack of realistic revenue and ROI expectations'. Companies want to be able to as accurately as possible estimate financial returns on investments, and this can work as an inhibitor of innovation since these types of efforts have uncertainties as an inherent feature. Christensen, Kaufman & Shih (2008) agree and claim that financial models such as net present value and discounted cash flow are often misused in a way that impedes innovations where financial performance is hard to predict. Colarelli O'Connor (2008) furthermore claims that there should be an allowance for some slack in the innovation process due to its experimental nature. For this reason, the rewards and expectations of an innovation unit should be different from what the operating units are facing, and there is a need to complement performance-based measures with activity-based ones since the commercial success is uncertain on beforehand.

Bessant et al (2010) moreover claim that the innovation selection process needs to be adjusted depending on the type of the new idea. Incremental innovations follow already established trajectories, and a business case including costs and benefits can easily be assembled for them. Innovations of a more disruptive character however, do not fit the same frame of reference, and can therefore not be evaluated on the same premises. They often require different funding structures, mobilizing of both networks of support and entrepreneurship, as well as new visions and learning. The conventional funnel-systems for selecting innovations, such as the Stage-Gate approach, are designed for incremental innovations and do typically not work equally satisfactory for disruptive ones.

6.5 External Linkages

Linkage with the external environment is something that is emphasized by many researchers on the subject of innovation capabilities. Schilling (2010) argues that users are often the ones that most accurately can identify the best potential value proposition. Hence, including users in the innovation process can assist the company in focusing its efforts on aspects that are valued on the market. Lead users are frequently involved in innovation projects since they face new needs earlier than the regular actors in the marketplace. However, Verganti (2008) claim that even lead users do not always know

what types of needs they actually have. Their preferences and behavior should still be an important input in the innovation process, but should also be complemented with collaboration with other external actors. If choosing the right ones, these actors work as interpreters of reality and can collectively foster innovations. Schilling (2010) argues that one such type of actor is the supplier, whose resources can be taken advantage of. Close supplier collaboration can minimize the development time, reduce the asset commitment, increase flexibility and provide an opportunity for learning. Grant (2004) lists other types of important external collaboration forms including working with researchers from universities, collaboration in basic R&D and new product development as well as patent collaboration.

Chesbrough (2003) claims that possessing strong internal R&D capabilities have declined in importance as a strategic asset for companies in several industries. Companies no longer have to generate their own ideas, develop, manufacture, market and distribute new products by themselves. Instead, it gets increasingly important for companies to combine their internal capabilities with external expertise and ideas. This process is referred to as open innovation. Von Hippel (2005) proposes similar arguments and claim that the development towards a more open innovation process has been fueled by an increasing ability for users to participate in product development, especially through new and efficient information and communications technologies. However, collaborating with external partners also comes with some risks. Birkinshaw et al (2006) claim that companies can get locked into their own networks, which makes it hard to adapt to discontinuous changes. Some other disadvantages with external collaboration are problems in aligning the objectives of different parties and the costs that are incurred through coordinating these collaborating actors (Grant, 2004).

6.6 Implementation

Björkdahl & Börjesson (2012) argue that implementation, which is the company's ability to develop new ideas into a new offer or concept, is a dimension that affects the innovation capabilities. This is also recognized by Guan & Ma (2003) who in this context discuss the importance of manufacturing and marketing capabilities. The former refers to the ability to convert R&D results into products that are demanded on the market and are within the scope set by technological and production constraints, while the latter entails an ability to identify customer needs and successfully promote the company's products. Yam et al. (2004) claim that the firm's ability to acquire and allocate sufficient capital along with expertise and technology is crucial in the innovation process in general. This also holds true in the implementation phase. Innovation is rarely completely isolated to one single business unit. On the contrary, most successful ideas have an inter-functional origin involving many different competencies. Therefore, it is important to facilitate integration between department and hierarchical levels when implementing an innovation (Kanter, 1983). Assink (2006) states that many established companies fail to seize the business opportunities that lie in disruptive technologies. To do so, it is important to develop not only the new technology, but also the business model that comes with it. This line of reasoning is also stressed by McAdam et al (2007) who claim that innovation must be approached in a broader sense than a mere technical issue, and implantation then becomes crucial.

Carlopio (1998) claims that innovation and technical change always make up social processes and proposes a model which put implementation in relation to these processes that is illustrated in Figure 11. According to this model, the implementation process starts on an organizational level with an individual or group concluding that a certain innovation could generate benefits compared to the current status quo. This entails becoming aware of both the external and internal environment. The next two steps involve screening different alternatives and making a decision. Carlopio (1998) argues

that the three initial stages of this innovation model are less problematic than the subsequent one: the implementation depicted in the right-hand side of Figure 11. One reason for this is that organizations often fail to recognize the importance and the complexity of this stage. For the implementation to be successful, the affected parts of the company must gain knowledge regarding the changes. This might require education and training. To reach a sufficient commitment within the organization, the employees also need to understand why the suggested innovation is pursued. The implementation model also regards the facilitating structures that need to be in place and Carlopio (1998) provides some examples of these including detailed implementation planning, working groups and steering committees, reward systems and performance indicators as well as optimizing communication systems and procedures. In addition to this, the organizational culture also affects how successful the implementation phase gets.

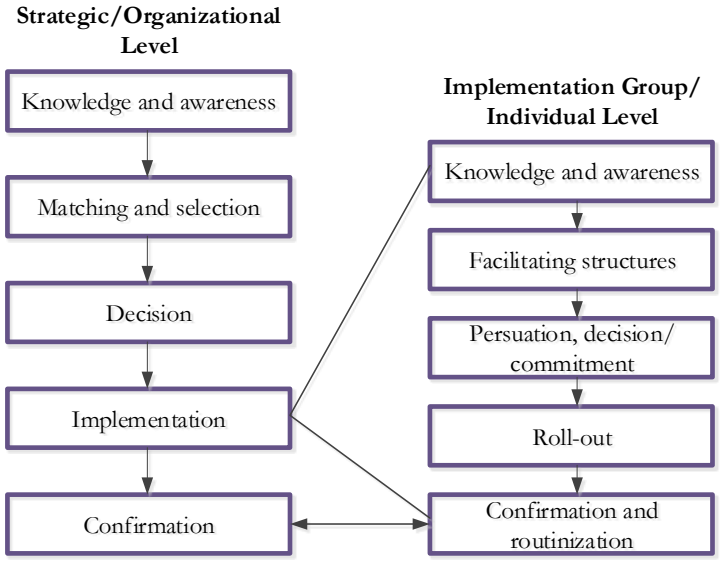

Figure 11 The innovation model as presented by Carlopio (1998)

6.7 Creativity

Lawson & Samson (2001) claim that creativity can be considered the process of generating ideas and it exists in the shape of a wide spectrum. On one extreme are small continuous improvements that employees make in their everyday-tasks. All these can jointly add up to significantly improved performance in some aspect. On the other extreme are radical ideas that for instance transform a company's business strategy. It is important that creative efforts along this whole continuum are encouraged and acknowledged. Creativity can furthermore be either vision-driven or knowledge-driven, and requires divergent thinking.

Swann (2009) argue that there are two main streams of literature regarding creativity: economics of networks and division of labor. The former revolves around the notion that people create knowledge and ideas by combining and reorganizing existing concepts. In this perspective, creativity is best fostered through group efforts. Another implication is that the larger the network of people with diverse experiences, the higher the likelihood of successful innovation. However, group efforts can also give rise to friction in terms of collaboration, and especially so if the group is too heterogeneous. The other perspective on innovation, namely division of labor, has its starting point in the observation that people are more likely to improve methods and innovate if the of attention of their minds is directed to a single task. Autonomy and certain personality characteristics work as enhancers of

creativity. Introversion, courage in facing criticism and liking for solitude are examples of these types of characteristics.

Swann (2009) furthermore argues that people who are intrinsically motivated typically perform better in terms of creativity than people who are extrinsically motivated. According to Assink (2006), it is often harder for large companies than it is for small ones to motivate innovative people. This is partly due to the vast amount of standard business routines large companies typically have implemented, which inhibit both the generation and follow-through of creative ideas. Andriopoulos (2001) discusses creativity on an organizational level and claim that it is to a large extent dependent on five variables. These variables, along with corresponding aspects that foster creativity are presented in Table 4. As will be clear, there is a strong overlap between these and the content of the other dimensions presented in this framework. He furthermore argues that it is both important and challenging to direct the employees' creativity into the generation of new products, services and process that are profitable.

Variable	Corresponding aspect that foster creativity
Organizational climate	Participation, freedom of expression, freedom to experiment, building on earlier ideas, large number of stimuli, interaction with small barriers
Organizational culture	Open flow of communication, risk-taking, self-initiated activity, participative safety, trust and respect for the individual
Leadership style	Participative, leader's vision, develop effective groups
Resources and skills	Sufficient resourcing, effective system of communication, challenging work
Structure and systems	Long-term focus, flat structure, fair and supportive evaluation of employees, rewarding creative performance

Table 4 Organizational creativity according to Andriopoulos (2001)

Ekvall (1987) provides a similar list of dimensions that affect the creativity within a company. This list is not as broad as the one presented by Andriopoulos (2001), but instead it goes more into depth on the organizational climate and culture for creativity. For example, Ekvall (1987) emphasizes the importance of having the employees experience their jobs as challenging and meaningful since this will lead to more engagement. He also claims that a large degree of humor along with a lack of conflicts and tensions at the workplace spur new ideas and is therefore desirable to enhance the creativity (Argona, 2001).

7. Statkraft's Innovation Capabilities: Empirical findings

In this chapter of the report, the findings from the innovation audit conducted at Statkraft will be presented. The data presented here is hence the result of a series of 20 interviews held with employees from various parts of Statkraft's organization. To complement this information, data collected from official Statkraft documentation is also included in the presentation. Following from the qualitative characteristic of the investigation, the findings will here be presented through a reflective narrative, supported by quotations from the interviewees. Due to direct wishes of several interviewees, the quotations given will not be accompanied by identifiable references to specific individuals.

The presentation is structured in accordance with the conceptual framework of innovation capabilities that was introduced in the preceding chapter. The same structure is also used in the subsequent chapter where the findings presented here are analyzed to derive a concluding assessment of Statkraft's innovation capabilities. This way of structuring the report can potentially be perceived as repetitive by the reader, but has been implemented to ensure that the report offers a high degree of traceability and clarity of argument. The structure here entails that the empirical findings relating to each of the seven dimensions of innovation capabilities are outlined separately. The data presented for each dimension is a representation of what was said during the interviews concerning Statkraft's performance in that particular dimension.

7.1 Organizational Structure

The way in which Statkraft is organized in terms of business areas, units and responsibilities was outlined in Chapter 3 of the report. According to this official outline, Statkraft is in regards to its structure a company that exhibits a clear division of business segments and responsibilities into more or less independent departments and units. It was during the series of interviews clear that the opinions regarding Statkraft's degree of centralization are far from unison among the company's employees. Some of the interviewed employees claimed that the power in the company is clearly centralized to headquarters in Lilleaker. One interviewee went so far as to state that Statkraft "*without doubt is the most centralized organization I have ever worked in*", while a majority appeared to be of the opinion that the current level of centralization to a large extent can be motivated by e.g. the size of the organization. One employee stated that having an informal network of contacts located in Lilleaker is very important if you want to get something done. For instance, all decisions regarding major investments are taken centrally at this location. Another interviewee said that there exists a strong heritage from the time as a public institution in Statkraft, and that a clear turnover has yet to take place since the managers tend to stay on their positions for long periods of time. The same interviewee continued: "*in this way, the organizational structure gets rigid and the same organizational values tend to persist*". In addition, several voices were raised about senior management getting involved in too many issues. However, many interviewees also claimed that the degree of centralization could be higher. These individuals for instance were of the opinion that there is a fair amount of freedom under responsibility in Statkraft and that this freedom in most cases is sufficient, at least for maintaining the daily operations. There seem to be a general opinion that the amount of rules and procedures that need to be followed depend on an employee's immediate manager. To quote one of the interviewees, *"my boss appreciates when things happen, even if not every quality assurance system is followed"*.

Faced with the question whether Statkraft is bureaucratic or not, the employees again appeared to have differing views. A number of the interviewees claimed that the answers is "*yes"* and continued by describing how long processes, lots of paperwork and cumbersome reporting procedures are common

features in the organization. Several of the interviewees also proposed that the company is quite hierarchical and that many different managers typically need to be involved if someone wants to change something. A number of the employees pointed to this condition as being "*at times very frustrating*". However, several employees also exhibited acceptance towards these aspects. These employees agreed that Statkraft to some degree can be considered bureaucratic, but also claimed that this is necessary due to the size of the company. One interviewee added that "*this is a type of issue you will find in every large organization*". Concerning the level of separation within the organization, most interviewees stated that there is a strong separation of departments and business units in Statkraft. One person claimed that this separation is not necessarily unnatural or illogical by itself, but that it would be healthy for the organization to collaborate more between the silos. This opinion was reoccurring throughout a majority of the interviews. Another employee pointed out that "*communication and collaboration including professionals from different business areas or departments are very rare*". Adding to this line of thought, a third employee added that there is a lot of coordination taking place in Statkraft, but that "*coordination almost always takes place on a managerial level and no clear results are visible for us working on the floor*".

7.1.1 The perceived role of the innovation unit

The role and function of the innovation unit in Statkraft's organization was outlined in the third chapter of the report. However, among the interviewed employees, the role and responsibilities of the innovation unit was not completely clear. This was also true for employees holding positions related to Statkraft's effort within the field of innovation, such as for example a number of the R&D Coordinators. In general, there existed an understanding among the interviewees that the innovation unit can assist with both strategy and financial means related to innovation. In the context of assistance, a number of the interviewed employees claimed that receiving funding for improvement or innovation projects from the innovation unit is typically not a problem. Many projects are financed by the business unit to which the project relates, without involving the innovation unit. One of the interviewees stated that "*the innovation unit is not at all visible out here in the general organization*", a perception also shared by several of the other interviewees. A few employees moreover stated that the role of the innovation unit needs to go beyond the current administrative one to become more powerful and involved in Statkraft's innovation effort. One interviewee stated that "*an innovation unit that is more visible, powerful and active in the general organization is a requirement if Statkraft wants to foster innovation other than only incremental improvements*".

A major concern relating to the role of the innovation unit that was expressed in the interviews was that the boundary between the innovation unit and the business areas is perceived as too blurry. According to several interviewees, this leads to a situation where it is often unclear what responsibilities fall under which unit when it comes to initiating, managing and funding innovation projects. One R&D Coordinator for instance stated that (s)he regularly interacts with the innovation unit, but added that "*I am not always sure about the dividing line between their and my responsibilities*". According to the same R&D Coordinator, the uncertainty concerning division of responsibilities is something that "*is a source of confusion and redundancy in some situations*".

7.2 Culture & Learning

In its annual report for 2011, Statkraft clearly expresses what beliefs it stands for and what culture it aims to foster. Corporate responsibility is emphasized and claimed to constitute an integral part of the day-to-day activities. There is for instance a code of conduct that applies to all employees, and the company has furthermore developed ethical guidelines that are aimed at its suppliers. Some issues that

are brought up include health and safety, environment, human rights and anti-corruption (Statkraft AS, 2011). As was outlined in the third chapter of the report, the company has also defined three general corporate values and a vision for the company. The corporate values of Statkraft are to be (i) competent, (ii) responsible, and (iii) innovative. Readers interested in a more detailed outline of these and related structural aspects of the organizational culture in Statkraft are referred to Chapter 3. According to its annual report, Statkraft also strives to develop a diverse working environment where individuals are treated as equal as possible (Statkraft AS, 2011).

In discussing what type of culture characterizes Statkraft's organization, significant variations in the employees' perceptions could be recorded. However, even though the interviewees to a large extent expressed diverse thoughts about the organizational culture, some general themes are noticeable. For instance, most employees associated sound and ethical values with the Statkraft culture. A number of the employees raised the sense of responsibility that follows from being Norway's largest energy utility that is furthermore publically owned. The company has a long tradition of producing clean and renewable energy and one employee claimed (s)he would "*not feel good about having the same type of job in a company within for instance the oil industry*". In addition, several interviewees expressed a concern that if Statkraft does not take the lead in terms of developing renewable energy in Norway, no one will. The company furthermore has a strong focus on deep, professional knowledge within the areas in which Statkraft is already established, especially hydropower. Hydropower is by far the largest business area that keeps efficient operations and as little downtime as possible on the top of its agenda. One interviewee claimed that "*providing 40 percent of the population with electricity naturally creates a focus on optimizing the current operations*". Also in this regard, a responsibility stemming from being Norway's largest energy utility shined through in the interviews.

Another aspect of the culture that several interview subjects raised was the difficulties in making decisions on an organizational level, partly due to a very strong emphasis on consensus in the organization. Several employees pointed to this aspect of the Statkraft culture as being frustrating at times. The implications of this include a significant amount of meetings, the involvement of many individuals on various levels, upwards reporting, and long decision making processes where top management typically has the last say. One interviewee added that when it comes to projects involving a higher degree of change "*it is often hard to get all employees that have a say to reach an agreement*". According to another interviewee, even after decisions have been made, discussions continue and the level of commitment is not always adequate. The same interviewee later went on to state that "*the fact the employees can continue to openly oppose an initiative after a decision has been taken is highly frustrating and reduces the actual impact of the initiative*".

A reoccurring opinion concerning the organizational culture in Statkraft was also that it can be perceived as somewhat rigid. According to a number of the interviewees, it is common that employees have the same position for a very long time. Following from the fact that this is common on a middle management level, it works as a deteriorating force in terms of developing talented leaders, according to a number of the interviewees. One of the interviewees indicated that a lack of rejuvenation in terms of new people and new perspectives on management positions in Statkraft works as a force resisting change in the organization. In this context, an opinion that was heard was that people do not have to switch employer for this situation to change; instead, an increased internal mobility could ease the situation. One employee added that a step in the right direction here would be to increase the transparency of how new managers are recruited and promoted. The same employee added that "*there are today clear tendencies that some positions are not advertised openly and that some managers appoint their own successors*". (S)he later went on by stating that this situation is undesirable for the

organization in terms of providing room for new ideas and perspectives and added that the lack of transparency "*is a significant source of frustration for many younger employees*".

No interviewee claimed that there is too little room for individuals to present own ideas and initiatives in the organization. Instead, having new ideas is according to several interviewees generally encouraged and people are not afraid of criticizing current methods of doing things. One individual stated that the employees typically work closely together with the manager just above them, and that it is easy to present new ideas in this way. Although Statkraft has an open climate in this aspect, being innovative and suggesting new ideas was per se not considered good for your career as far as the interviewed employees were concerned. Instead, it was claimed, it is up to each individual employee to pursue the new idea and being too creative can sometimes make you come off as annoying.

7.2.1 A multi-faced company culture

The sub-section above describes some general features of the culture within Statkraft. However, in several of the interviews it became clear that the culture is not the same in the whole company; rather, it differs quite substantially between different departments and units. Employees described that the culture differs depending on for instance the country, region and business area. In Norway, there is according to several of the interviewees a significant focus on incremental improvement and efficiency of operations. Subsequently, the departments located in areas such as Germany, the Netherland and U.K. were described as flexible and open for change. One employee pointed towards these differences as being "*nothing but a natural consequence of geographic spread, differences in national cultures and the type of business activity units are engaged in"*.

The type of business area was by several employees pointed out as a differentiating factor for culture. Some interviewees held the opinion that the big and powerful Power Generation business area is very different from many of the other, smaller and newer parts of the organization. A large number of the employees regarded the position of the Power Generation business area as dominant and agenda-setting for the whole of the organization. The Power Generation business area was here regarded as more bureaucratic and conservative, consistently prioritizing short-term profits over long-term project of an exploratory character. However, several employees added that the culture is not completely homogenous within this unit since each regional organization has some degree of autonomy. One employee expressed that the norms and believes also can vary depending on the level in the organizational hierarchy. "*Sometimes*", one employee added, "*blue collars and white collars do not speak the same language and it can be hard for those working out in the regions to feel involved in decisions and initiatives originating centrally*".

Among the interviewed employees, there seemingly existed a general option that cross-functional collaboration is not prioritized within Statkraft and that there is a tendency for employees to stick within their own silo. According to several of the employees, this is so partly due to a large amount of paperwork required to collaborate beyond boundaries. One interviewee claimed that it is typically the case that cross-functional interaction is limited to only a single contact person from another part of the organization if collaboration is deemed necessary. According to the same interviewee, this "*does not lead to any kind of close interaction*". Several individuals also claimed that there are probably significant advantages to be gained from improving the collaboration between departments. A number of the interviewees also highlighted the positive impact increased collaboration would have on organizational learning in Statkraft. Among the employees underlining this aspect was one who claimed that "*I believe that there exist significant pools of knowledge in other units that my unit could learn and benefit from, but today, there is no natural force for such collaboration and knowledge*

sharing in Statkraft". Another employee claimed that closer collaboration entails learning from each other, and that through working less hierarchical, it would be possible to tie competences together.

The opinions regarding the employees' possibilities for further education varied greatly among the interviewed individuals. A few claimed these possibilities today are sufficient or even good, while others claimed that significant improvements could or should be made in this area. One employee stated, "*I do not think management has bad intentions regarding these types of aspects, rather, there is not enough time for external courses or conferences*". Among the different departments and units represented in the interview sample, Power Generation stood out as one where several employees called for or indicated that more resources should be reserved for further education of the employees. One interviewee stated that "*it has been a trend over the last 5-8 years that less resources are diverted towards this type of activity in my unit*", and added that "*the situation was in this particular regard better before*".

7.3 Innovation Strategy & Vision

The strategic importance of successful innovation and R&D is explicitly expressed in Statkraft's most recent annual report. Innovation is one of three organizational core values promoted by Statkraft. According to the company's central strategy formulation, the objective of all innovation activities in Statkraft is to increase existing competitive advantages through R&D projects and technology analyzes (Statkraft AS, 2011). It is claimed that this focus will strengthen the company's competitive advantage within core activities and growth areas and facilitate the monitoring of trends and developments that might come to influence the markets on which Statkraft operates (Statkraft AS, 2011). In this manner, it is stated that innovation leads to better utilization of resources. The osmotic power is brought up as an important example of what the company is working on, both in the annual report and in other official publications (Statkraft AS, 2011) . A more detailed outline of the content of Statkraft's innovation strategy was provided in the third chapter of the report.

In 2010, a major reorganization of Statkraft's innovation activities took place. In this process, the diversity and scope of the company's innovation activities were reduced and the innovation unit was reorganized. Efforts to engage in several emerging technologies, including solar and wave power, were discontinued and a less proactive and more incremental approach to innovation was put in place (Statkraft Development AS, 2013). According to the company's mission statement, formulated by the Norwegian government in its role as Statkraft's owner, Statkraft is expected to maintain *"high ambitions for the company's research & development activities"* (Statkraft AS, 2012).

A majority of the interviewed employees stated that there exists a gap between what is said of Statkraft's innovation activities centrally and how the activities are carried out and managed in practice. The fact that innovation is communicated as a core value for Statkraft e.g. appeared to be something very few employees could readily identify with. One interviewee for instance stated that *"during my years at Statkraft I have encountered both significant competence and genuine responsibility, but, truth be told, not very much innovation*". Several other employees also argued that two out of the three corporate core values provided an accurate description of the organization and its culture, but that innovation was not one of them. None or very few employees were ready to classify Statkraft as an innovative company.

During the interviews it became clear that a significant number of the interviewees were not able to identify a clearly communicated corporate vision in relation to innovation activities in Statkraft.

Several of the employees stated that a clear vision to guide the company's R&D and innovation effort would be beneficial for Statkraft, as that *"would provide a goal, stating where we want to be within specified time interval and thus help guide innovative thinking throughout the organization"*, as one interviewee put it. A second employee added that *"ideally, corporate leadership should provide a vision of where we should be going to guide the mental process of employees in the process of innovation and spur this type of thinking. Today, no real purpose other than making more money on a shorter period of time exists, which leads to a type of small improvement(s) mind-set".*

Several of the interviewed employees pointed towards public relations and marketing purposes as major motivations for the use of innovation in Statkraft's internal and external communication. In this context, a handful of the employees used the Norwegian phrase "*festtale*" to describe this strategy, which essentially means it is constituted by nice words, but that the practical implications can be questioned. One employee pointed towards the extensive use of the Osmotic Power R&D project in marketing and PR-contexts and stated "*I believe that the PR-value that has come out of that project greatly exceeds all the money that technology ever will be able to generate in income from operations*". Being perceived as innovative by the public is according to several of the interviewees important for Statkraft as it helps the company to maintain a positive image and attract new employees. Out of the 20 employees interviewed for this study, two specifically stated that Statkraft's work within new technologies and innovation was the most important reason for seeking employment in the company. One of these employees later added that the (s)he soon realized that *"the innovation activities were far from as significant as might have been suggested externally".*

The lack of key performance indicators (KPIs) in relation to innovation was also an issue that was raised in several interviews. The general opinion was that it is hard for the business units to prioritize innovation if innovation is not something that the business units are measured and evaluated on. One employee said it would be relevant to introduce a KPI measuring the investments made in innovation projects as a percentage of the yearly turnover. Another interviewee claimed that it is somewhat ambiguous what types of strategic innovation projects are wanted and encouraged in general. None or very few of the interviewees had a clear view of the content of Statkraft's centrally established innovation strategy. Among employees that were not themselves part of Statkraft's innovation effort, none or very few had seen or heard about the existence of such a strategy document. In addition, one interviewee argued that not even all employees in the innovation unit itself fully understand the strategy, and expressed that it needs to be updated.

Although the strategy might not reach out to the organization in a desirable way, employees do not disregard innovation. Smaller, incremental improvements are according to many interviewees prioritized in Statkraft. Several employees claimed that this focus is generally sound and logical, pointing to Statkraft's current favorable position in the market. One interviewee highlighted the fact that the vast majority of Statkraft's income comes from the hydropower operations, before adding "*and in the hydropower area, all major innovations are likely behind us*". At the same time, several other interviewees explicitly expressed concerns about not focusing enough on the long-term. They claimed that the energy industry is changing fast, and that both the strategy and organization need to reflect this. Two interviewees described the strategic focus on innovation in Statkraft as a moving pendulum. Before the new CEO and the reorganization in 2010, innovation efforts were strongly encouraged. There existed different programs such as the *innovation agent program* that made this strategy clear throughout many parts of the organization. However, after 2010 this pendulum moved back and innovation became less visible and prioritized. One interviewee claimed that the senior management went too far in cutting innovation efforts and that it is now possible to see that the pendulum is moving back towards more innovation yet again.

7.4 Leadership & Innovation Management

Issues related to Leadership & Innovation Management are in Statkraft closely connected to those related to Innovation Strategy & Vision. As has already been indicated in the preceding section, the employees hold diverse perceptions of what opinions top leaders in Statkraft have on issues of innovation. In general, the experienced top management support for innovation activities in Statkraft was throughout the interviews described as low or very low, even though exceptions did exist. One employee regarded top management support for innovation as substantial and genuine, and added that *"otherwise we would not have a hydropower R&D program".* Despite this and other similar opinions, the majority of the interviewees maintained that they do not perceive that top management in Statkraft has a genuine interest in innovation per se. Depending on the position of the interviewee, significant variations in the perceived management support for innovation was clearly visible during the interviews.

According to a number of the interviewees, the limited support for innovation activities from corporate management is clearly visible through what was often described as an *"extensive short-term economic focus".* Several of the interviewees expressed views that the perceived short-term perspective of the organization's activities has become more predominant in recent years. This short-term focus was by the interviewees often considered to generate a dualism in the communication of innovation coming from top management. Examples given of this dualism included that the corporate leadership on the one hand communicates innovation as a driver of future growth, while on the other hand only measuring the performance of each business unit on short-term economic parameters. This is according to one employee a *"significant inhibitor of innovation in this organization"*. Another employee added that *"what is measured is what gets done"* to underline the negative effect (s)he believed this set-up has on innovation. The same employee later went on by stating that while *"innovation and R&D is not among the parameters on which business units are measured and evaluated, no significant results or improvement should be expected in this field".*

The guidelines and directions corporate management lays out for Statkraft's innovation activities are by several of the interviewees regarded as too loosely defined and too open for individual interpretation by business unit managers. *"In practice",* one employee stated, *"this means that the level of ambition in the R&D effort differs among business units and to a large extent is determined by the personal interest of the unit's manager".* Several additional employees witnessed of a situation where individual managers can differ in how they chose to interpret the level of ambition for innovation activities. According to one employee, this variation within the company is further strengthen by how the performance of each business unit is measured primarily on short term economic parameters. The same employee stated that *"this leads to a situation where innovation and long-term development is undermined and under-incentivized"*.

No clear and common perception among the interviewees concerning how R&D projects are initialized and on what grounds proposals are evaluated emerged during the interviews. A few employees expressed a frustration over what they regarded as lack of transparency concerning why some and not other technology areas are selected to be part of the centralized R&D and innovation effort. One employee stated that (s)he had a *"distinct feeling that personal interest from top managers, rather than real technological potential"* plays a role in this selection process. Several interviewees highlighted how R&D and innovation projects to a large extent are judged based on the short-term economic potential of the projects. According to these interviewees, this works as an inhibitor of more

radical innovation in Statkraft through increasing the focus on incremental improvements in current operations.

When interviewees were asked where they would turn if they had an idea for an innovation project, a majority stated that their closest superior would be the natural choice. Another commonly provided answer was that informal and personal contact channels would be used. One employee stated that *"detailed knowledge of the organization and its power structure is a big plus when trying to initialize a project".* In general, the interviewed employees had the view that a significant personal effort is required if a person wants to initiate an innovation project of their own. The decision-making chain one has to go through to have a new type of project approved was by many regarded as a cumbersome and slow process. One interviewee especially pointed out that the shared responsibility for innovation and R&D projects between the individual business units and the innovation unit could be a source of confusion in the process of initiating new projects. This unclear split of responsibilities did in the eyes of this employee contribute in creating a situation where *"innovation and R&D are overly administrated activities in Statkraft".*

7.5 External Linkages

Statkraft has chosen to practice an open model to organize and conduct its R&D and innovation activities. The open model towards especially R&D entails that the company itself possess only limited capabilities to undertake complex projects internally (Statkraft Development AS, 2013). Instead, Statkraft relies on external resources in conducting its R&D, either through collaboration or direct purchasing. As of the first quarter of 2013, 87 percent of projects classified as R&D projects were conducted by or with the support of an external party. According to Statkraft, the reliance on external rather than internal resources for R&D and innovation is intended to correspond to the company's role in the value chain and bring flexibility. Three organizations stand out as frequently reoccurring partners in Statkraft's R&D portfolio. The Norwegian University of Science and Technology (NTNU), the Norwegian Institute for Nature Research (NINA) and the Foundation for Scientific and Industrial Research (SINTEF) together receive over 70 percent of all funds spent on R&D and innovation by Statkraft (Statkraft Development AS, 2013).

Statkraft's linkages to the firm's external environment were perceived as strong by employees throughout the organization. Several interviewees maintain the position that the open model towards R&D Statkraft has chosen is necessary seen in relation to the company's position and future challenges. One employee points out that "*who performs the R&D is not really important, what matters is who can take advantage of the results and if we can do that we have no need for any internal R&D capacity*". An open model was by many of the interviewees supported by the perception that Statkraft as the major player on the domestic scene has a responsibility to invest in competence building, also outside its own boundaries. A majority of the interviewees viewed competence building as a rationale for both the open R&D model and for Statkraft's R&D activities in general. This standpoint was especially true for the hydropower field where practically all employees regarded Statkraft to be world leading in technical competence. To maintain this position, it was claimed, a healthy regeneration of qualified expertise in the Norwegian hydropower research environment in general is required. One interviewee highlighted the need to invest externally to build a domestic competence base by stating that "*as it looks today, Statkraft's greatest assets might have retired within a 10 year period*", but then added that despite the external R&D investments that are made, *"enough is not done to support the regeneration of this competence and to create new knowledge*".

Even though a majority of the interviewees spoke in favor of Statkraft reliance on external competence and resources, many also saw problems in this approach. A number of the interviewees were to some extent concerned that the reliance on external project resources could weaken Statkraft's ability to capture new knowledge from its innovation effort. In this instance, the interviewees especially identified Statkraft's ability to understand and implement the results from the R&D projects as the most important tool for building knowledge. One of the interviewees for example stated that "*there are significant risks with doing everything externally, related to e.g. competence building",* and added that *"the share of internal projects should at least be increased up to 40 percent".*

Statkraft is seen as a highly attractive project partner on its domestic market and ideas for projects often originate externally. According to all interviewees involved in the innovation effort, Statkraft is a significant player and contributor of funds to energy-related research in Norway. Several national research institutions receive significant funding from one or several of Statkraft's R&D programs. Several interviewees point out that it follows from this situation that Statkraft possesses a significant influence over the research priorities of some external institutions. In line with this viewpoint, one of the interviewees expressed serious concerns over the effect Statkraft's actions can have on the entire Norwegian energy research scene and its long-term competitiveness. According to this interviewee, tendencies can be seen that Statkraft's incremental short-term economic approach to R&D has put significant pressure on many of the smaller research providers in terms of both economic margins and research scope. The same interviewee stated that "*Statkraft's short-term focus is pressuring an already thinly stretched research environment in Norway and steering almost all research activities to support the short-term perspective of generating income now – this is a real threat to our long-term competitiveness, especially on markets in other countries where we face challenges not traditionally seen at home*".

Statkraft's strong position as a research partner was further acknowledged by an interviewee with detailed insights into the innovation effort in Statkraft, who stated that "*the company receives a large number of project proposals each year*". According to the same interviewee, most of these project proposals are orderly dismissed, if not coming from a known actor. Several other interviewees form various parts of the organization added to this perspective by underlining how the organization for quite some time has had a tendency to accept project proposals coming from specific actors. One employee stated that (s)he has seen "*tendencies to accept all and any suggestions coming from for example a known researcher at NTNU*", and continued "*this has historically been a problem for Statkraft, less so nowadays, but it is still clearly visible*".

In recent years, the company has worked actively to reduce the number of projects in the corporate R&D portfolio to increase the return on investment from innovation efforts (Statkraft Development AS, 2013). A common suggestion among employees that are not personally involved with innovation activities was however to reduce the number of projects even further. Educational and research institutions are together with suppliers the most common types of collaboration partners in Statkraft's efforts. No interviewee was able to mention an instance when customers or other down-stream actors have been directly involved in a R&D or innovation project.

7.6 Implementation

Implementation of knowledge and R&D results into the organization is highlighted as a cornerstone in Statkraft's innovation strategy (Statkraft AS, 2011). According to the company, it is through the implementation process that innovations are created. Following the set-up of Statkraft's R&D and

innovation effort, each business area is responsible for implementing the results from its own projects into the organization. To support the implementation of R&D results or other knowledge, the innovation unit has developed a tool called the *implementation card* (Statkraft Development AS, 2013). The adopted innovation model, used by the innovation unit to characterize and describe Statkraft's innovation processes has, without detailed specifications or predefined processes, implementation as its final step.

The implementation of new directions, knowledge or results from R&D projects in general was by practically all interviewees regarded as an area in which Statkraft's performance today is weak. Very few of the employees were able to mention a successfully implemented innovation and several stated that it in retrospect often is hard to specify what value a specific project actually generated. One interviewee argued that the lack of implementation performance is a distinguishing feature for Statkraft by stating that the company in general provides a *"very bad environment to implement any kind of change, not only when it comes to R&D and innovation"*. Another interviewee added that the *"ability to implement change and R&D results differs significantly between units and departments",* before (s)he added that this fact *"to a large extent can be attributed to the priorities of individual project leaders"*. The viewpoint that the individual project leader determines the extent to which implementation is prioritized or successful was further supported by a majority of the interviewees.

A large number of the employees arguing for the case that Statkraft's ability to implement results from innovation projects is limited pointed to the extensive use of external R&D resources as part of the explanation. Several of the employees witnessed of situations where R&D results in the form of external reports *"tend to end up in a drawer somewhere",* rather than being implemented. Additional interviewees viewed the distance between Statkraft and the external research supplier as the most important issue in regards to lacking implementation capabilities. This distance is visible in several respects, for instance in the use of language, which according to a few interviewees in some cases can make it hard for Statkraft to identify what part of the reported R&D results are relevant for the organization. To solve some of the issues related to implementation of external R&D results, several of the interviewed employees highlighted the importance for Statkraft to become a better equipped buyer of R&D. One interviewee stated that *"close involvement with the supplier is the key to implementation",* and added that *"this is an area of great improvement potential for Statkraft".*

Very few of the interviewees had heard of or used the implementation card tool put in place to facilitate the implementation process. Out of those who actually had used the tool, none was ready to say that it had led to any significant improvement of the implementation performance. One of the interviewees described the implementation card as a tool that *"can help trigger the mind to start thinking about implementation at an early stage",* but then added that the tool generally is perceived as *"not that useful".* According to the view of yet another interviewee, the implementation card is merely *"an additional source of paperwork".* A number of the employees argued that the question of implementation could benefit from a more structured approach and that such an approach should be initiated centrally.

Looking past individual business units and R&D projects, a number of the interviewees raised issues concerning Statkraft's ability to implement changes or new procedures throughout the whole of the organization. According to several of the employees, information concerning R&D results travels slowly across the organization; an area that was often highlighted to be in need of significant improvement. In several instances, this issue was connected to what by some interviewees was described as a *"non-existing tradition for information-sharing on an operational level over departments and units"*. Interviewees maintaining this position also pointed out that coordination

between departments and units do occur frequently, but that such coordination often is limited to the management level. Along this line of reasoning, one interviewee argued that more interaction over implementation issues should be kept on a lower, operational level since *"personnel not familiar with detailed technological knowledge might not be suited to identify new possible areas of applications for knowledge generated in other departments".* Another interviewee that often sits in on cross-department coordination meetings added that *"cross-department communication typically is limited to the medium management level, where these types of issues often drown in other operational discussions".*

7.7 Creativity

Also in regard to the issue of creativity, the interviewees' opinions turned out to be diverse. Several of the employees claimed that Statkraft does not constitute a creative environment. One individual claimed that too many formal rules and fixed procedures are deteriorating and discouraging for employees' willingness to be creative. Another employee raised the structure of most meetings as an example of how creativity is hampered. (S)he claimed that all the meetings follow "*the same structure almost every time and that people might get frustrated or irritated if someone tries to go outside the norms*". On the contrary position, several interviewees had the view that the environment within Statkraft indeed can be considered creative. These interviewees typically claimed that the employees are knowledgeable and interested in solving problems.

A few of the interviews illuminated a more balanced view on creativity. One interviewee stated that "*it is not easy to claim whether Statkraft is creative or not*". For instance, there are according to this employee innovative ideas originating from the company, but it is difficult to get them implemented and new ideas tend to stay within the business area where they emerged. Extending the discussion regarding idea generation, several employees also claimed that there are too few ideas generated within the company. One employee added that providing a more creative environment likely would "*cause employee job-satisfaction to go up*", but later admitted that (s)he did not have "*any clear vision of how this could be done*". Not everyone agreed on that more creativity within the organization would benefit Statkraft. On the contrary, others proposed that more creativity would instead lead to inefficiencies and divert employees' focus from the core activities. In light of this line of discussion, a number of the interviewees used previous creativity-boosting efforts in the organization as deterrent examples. For instance, one interviewee expressed the experience (s)he had from the now terminated *Innovation Agent program* by stating that "*such creativity-boosting initiatives are not really relevant for a company working mainly with hydropower plants*". The same interviewee continued by referring to this particular program as "*too chaotic and not concrete enough*". Other interviewed employees did however express a strong support for this particular program by stating regrets of its cancellation.

Whether there exist incentives for employees to be creative in Statkraft seemingly depend on the part of the organization and the individual manager leading that particular part. In order to boost the creativity and will to come up with new ideas on a more general basis, several of the interviewees pointed to the introduction of bonuses as a viable option for Statkraft. However, according to one employee it would be difficult to make use of financial bonuses to spur creativity in Statkraft for two reasons: (i) it is hard to tie a successful idea to only one or perhaps a few employees, (ii) there is no culture for these types of incentives in Statkraft. Another interviewee claimed that the lack of innovation-related KPIs lowers the incentives for being creative. The general view on job satisfaction appears to be that people enjoy their jobs, find them stimulating and that they have interesting tasks.

8. Assessment of Statkraft's Innovation Capabilities

In this chapter the empirical findings from the investigation conducted at Statkraft will be analyzed to derive an assessment of the company's innovation capabilities. The analysis presented here has been conducted based on the conceptual framework of innovation capabilities that was presented in the sixth chapter of the report. The text has also here been structured to correspond to the seven dimension of the conceptual framework, as to increase traceability for the reader. As for the structure of the presentation, this means that the chapter will first analyze the findings in each dimension individually. Following this presentation, an additional section has been provided which aims at analyzing Statkraft's innovation capabilities on a more aggregated, system level. It should be noted by the reader that several of the issues dealt with in the analysis need to be viewed in a wider context than merely relating to innovation capabilities. However, here the implications these issues have on the innovation efforts have been the focus in this analysis, why this is something that the reader has to keep in mind. In other words, the analysis is here restricted to deal with innovation capabilities only and will not consider any wider organizational implications.

8.1 Organizational Structure

As was evident from the presentation of the empirical findings, the interviewed employees exhibited a significant ambiguity in their opinions regarding Statkraft's degree of centralization. Some claimed that there exists a top-down structure that is too strong, while others argued that the current degree of centralization is motivated by efficiency aspects. Although the latter might very well be true, one can argue that there is a fairly strong degree of centralization within Statkraft's organization. Consequently, there are factors related to this centralization that could be brought up and perhaps criticized in the context of innovation capabilities. For instance, Swann's (2009) claim regarding how centralization typically is deteriorating in terms of radical innovation seems to be valid in Statkraft's case. Many employees expressed that the company mainly focuses on short-term, incremental improvements at the expense of lower performance in terms of exploratory projects that potentially could provide value in the long term. Another example on how the current degree of centralization is negative for the capabilities to innovate regards the importance of a contact network with employees at the headquarters. Without this, it is seemingly hard for many employees to initiate and get support for a new idea. This problem is for example apparent for employees working at locations far from Lilleaker. On the other hand, an aspect related to centralization that could be considered positive for the innovation capabilities is the corporate-level R&D programs. By collecting and conducting these types of projects on a centralized level, there should be possibilities to achieve economies of scale and perhaps even more importantly avoid redundant work in the organization. Running corporate-level R&D programs should furthermore be considered especially relevant for Statkraft as there is an apparent lack of tradition for cross-sectional interaction and cooperation in the company. In this context, running at least some centralized R&D and innovation activities should be considered a necessity for Statkraft.

A general notion among scholars is that an organic organizational structure positively influences a firm's innovation capabilities, while the opposite is true for mechanistic structures. Therefore, there is a strong rationale to analyze where Statkraft stands in terms of this issue. Looking to the data from Table 2 in Chapter 6, with the empirical findings in mind, there are several arguments to be made supporting why Statkraft is clearly more mechanistic than organic in its structure. Employees describe a strong separation of departments, a fairly bureaucratic organization, long decision chains and fixed

procedures. Statkraft was by many interviewees described as a heavy organization that is very concerned about reaching consensus on many hierarchical levels. When asked about aspects that relate to organic structures, such as the appearance of inter-disciplinary teams and freedom of rules, the opinion was typically that these do not describe the character of Statkraft well. It might not be possible to claim that Statkraft is either mechanistic or organic; these two structures are best conceived as two extremes on a wide continuum. However, it is possible to state that the interviewed employees collectively are of the opinion that Statkraft is clearly closer to the mechanistic extreme than the organic one. This should be perceived as negative in terms of the organization's innovation capabilities.

In Statkraft's case, it is possible to identify several advantages with being a somewhat mechanistic organization. Throughout most of its history, the company has reached success through a clear focus on efficiency and strengthening the existing organizational capabilities. This is moreover what has been necessary for many companies within the energy generation industry. This situation has not required Statkraft to implement a structure that fosters innovation capabilities. However, whether or not this will be the case in the future seems more uncertain.

In general, it is hard to argue that Statkraft is characterized by the two-folded structure that both Colarelli O'Connor (2008) and Assink (2006) claim is desirable in relation to innovation. Statkraft's business today mainly consists of operating flexible and cost-efficient hydropower assets. Not having a two-folded structure hence means that any new initiative, project or potential business area in Statkraft is incorporated into the main organization where it is measured against the efficiency and margins of today. As these parameters in Statkraft's case arguably are at the very top in the industry, the threshold for finding new types of businesses, technologies or initiatives to be interesting is naturally very high. Therefore, this current organizational structure is arguably negative in terms of Statkraft's capabilities for innovations that are not merely incremental or otherwise clearly lies within existing business areas.

The company's innovation unit spends most of its resources on projects that aim to strengthen the mainstream business. However, there are successful examples of initiatives that are carried out with a fairly high degree of autonomy. One employee gave the small, but growing, business called Small Scale Hydropower as an example. This project was initially put under the responsibility of the regular hydropower unit, i.e. Power Generation. However, placed within this business area it never reached success. After some time, it was instead put in a small and autonomous company partly owned by Statkraft and this was when the project started to take off. Another example of a project that does not have to conform to the mainstream operation to a large extent is Osmotic Power. Although somewhat anecdotic, these examples are well in line with the theory regarding how a two-folded structure can enhance innovation capabilities in terms of a company's ability to succeed with not only incremental innovation efforts. In general, it can in this context clearly be argued that there seems to be a significant potential for Statkraft to conduct stand-alone projects in this way and hence also increasing its capabilities for innovation significantly.

8.2 Culture & Learning

In terms of the Statkraft's culture, one important conclusion that can be drawn is that it has to be classified as heterogeneous. Different parts of the organization clearly have differing characteristics, not least when it comes to innovation. The non-Scandinavian units in Europe, especially Germany, Netherlands and the U.K., seem to have developed a culture that promotes flexibility and an openness

for new ideas. This clearly should, and arguably also does, work as a positive force on the innovation capabilities of these business units. Another dimension along which the culture can vary is between blue collars and white collars in the organization. These two groups appear to not always have the same ideas of what is important for the company, for instance in the context of innovation. The former category is often located at a power plant somewhat isolated from the headquarters. This situation seemingly leads to differences in opinions, where the blue collars are mainly concerned with the daily operations and ongoing power generation. For them, it is seemingly easier to see the rationale behind a culture that governs efficiency and reliability than one that promotes creativity and innovation. However, this opinion occurs on all levels in Statkraft and the divide between blue and white collars should therefore not be overemphasized. Although the culture is not homogeneous in all aspects, the rest of the section seeks to analyze some general issues that were identified during the interviews. The following three paragraphs mainly draw on Lawson & Samson's (2001) view that was presented in the conceptual framework.

There are one-off examples of when Statkraft clearly has exhibited a tolerance of ambiguity, the osmotic power project perhaps being the most prominent one. However, on a more aggregated level it is difficult to argue that the company has a high willingness to take risks. Most innovation projects that are pursued have a clear focus on smaller improvements that yield a fairly predictable and quick return on investment. Consequently, negative implications for more exploratory projects arise. These projects, strongly encouraged by Colarelli O'Connor (2008) when building innovation capabilities, are frequently met with an organizational reluctance and aversion within Statkraft.

In terms of empowering employees, strong conclusions regarding Statkraft's performance is not as clear-cut to make. There are positive aspects, primarily relating to respect for people within the organization. Interviewees claimed they work in an ethical and sound company. Moreover, new ideas are listened to and, if motivated, it is possible to criticize current practice. However, investing in the employees for instance through further education is something that could be improved. This could be in both external and internal forms such as gatherings and collaborations, something that will be discussed more below. The prioritization that is given to further education is however partly dependent on the responsible manager, and opportunities for this seem to exist in some parts of Statkraft.

One observation that was made during the interviews is that the culture does not promote cross-functional collaboration. Employees tend to work within their own silos and trying to initiate collaboration with another business area or unit is complicated. This is partly due to administrative issues such as paperwork, but also because it is difficult to identify and get access to the person or people with the right competencies. This makes the cross-functional collaborations that actually exist shallow at best. With respect to innovation capabilities, there are two major problems with this situation. To begin with, it limits the advantages related to having a diversity of knowledge and ideas within a company. As stated in the theoretical framework, networks of people with diverse backgrounds increase the likelihood of successful innovation if they are managed in the right way (Swann, 2009). The other problem relates to the organizational learning. If merely little collaboration over boundaries is conducted, it gets harder for new knowledge and ideas to diffuse throughout the organization (Biloslavo, 2005). In turn, this also impedes the implementation of new innovations. That successful new ideas due to isolated units only were embraced where they actually emerged was an opinion that was raised in the interviews and should be considered an undesirable consequence of the situation described above, in turn diminishing the innovation capabilities.

There are several ways through which innovation-related knowledge is spread today, regular meetings and occasional events that are arranged by the innovation unit perhaps being the most important ones.

These should both have a positive influence on maximizing the diffusion of knowledge and in turn the organizational learning. However, there is most likely more that can be done in this aspect. The positive effects of increased cross-functional collaboration have already been mentioned. Another suggestion is to investigate if it is possible to optimize the use of information technology. Developing the functionality related to knowledge management on the internal intranet might be relevant, as well as more extensively making use of for example newsletters through e-mail. Somehow creating incentives for employees to share their knowledge and new ideas is also crucial for it to diffuse sufficiently.

One positive aspect of the culture that has already been touched upon indirectly is the open climate for new ideas and reflections that seemingly exist in Statkraft. With the framework developed by Argyris (1990) in mind, it could be argued that Statkraft, deliberately or not, encourages Model II behavior. Employees do not seem to hold back their ideas and opinions, which furthermore seem easy to discuss both during meetings with peers and with managers. Throughout the interviews, it was pointed out that there is trust towards colleagues that they will not too harshly criticize or ridicule a new and unproven idea. It should also be noted that the company's employees possess vast knowledge in specialized areas. It is believed that this, in combination with a Model II behavior, constitute a significant potential in terms of innovation capabilities. However, to reach the full potential of the Culture & Learning dimension, it is necessary to remove some bottlenecks; the lack of cross-functional collaboration being one very important example.

8.3 Innovation Strategy & Vision

Lawson & Samson (2001) argue that a clear articulation of a common vision and strategic direction is an integral part of any company's innovation capabilities. However, this aspect is seemingly not adequately emphasized in Statkraft. Many interviewees did not know what the company wishes to achieve with its innovation efforts. Several employees provided very general statements of why innovation could be considered important, but no unison vision related to Statkraft's situation was expressed. One consequence of this might be that the employees experience a lack of purpose in pursuing innovation. Interviewees even expressed wishes that Statkraft should communicate a clearer vision as to what the company wants to achieve with its innovation effort as they thought this would point out a direction to guide a collective line of thought for all employees in this field. This relates to the double-loop learning discussed in the theoretical framework - it is hard for people to change a behavior and embrace new ideas and methods if the underlying reasons for doing so are not clear (Argyris, 1977).

Despite what was indicated by several of the interviewees, there exists a corporate-level strategy and vision for innovation in Statkraft and these are moreover available to the stakeholders. Hence, the main problem seems to be that there is a disconnection between this official stance and what is actually understood and diffused throughout the organization. This disconnection exhibits similarities with Argyris & Schön's (1974) notion of espoused theories and theories-in-use. Innovation does not appear to be something that is a crucial part of every employee's agenda, which might be the impression one gets after reading official material such as annual reports. It is then possible to argue that at least part of the reason why innovation is brought up and emphasized in public relations is due to its strategic value as a PR resource. Several interviewees for instance claimed that the osmotic power R&D project area has generated plenty of positive attention from the outside, although the technology is not commercially viable in itself. This might, or might not, be a clever way of marketing and positioning Statkraft. Such an assessment is outside the scope of this report. If only looking at

innovation capabilities, this difference in espoused theories and theories-in-use in terms of the innovation strategy should however not be considered desirable for the company. It is important that this strategy is given sufficient attention and prioritization if Statkraft truly desires to strengthen its innovation capabilities.

Another indication of the lack of prioritization of innovation is the unwillingness on the senior management's behalf to introduce KPIs for innovation performance. Employees had opinions in line with the saying "*what gets measured, gets done*" and claimed that innovation projects often have to step back due to a focus on other, often short-term and profit-related, aspects. In a set-up as the one seen today, there is no automatic pressure on business units and managers to move in a direction of increased attention towards innovation. This fact adds to the perception among several employees that there is a clear gap between theory and practice when it comes to the attention given to innovation in Statkraft. In practice, this has resulted in a situation where the level of prioritization given to innovation and related issues is determined largely by a personal interest and commitment on the level of individual managers, in turn resulting in large variations in the commitment to innovation throughout the organization. Having variations in the level of commitment towards innovation between different parts of the organization need not in itself be a problem for Statkraft. The organization is in several regards fragmented by its nature, and the apparent need and ambition for innovation likely varies greatly between the various parts. However, what is notable about the current situation is rather how random chance and personal preferences of line managers and not conscious strategic decisions are what determines if and how innovation is prioritized.

Recalling from the conceptual framework, companies with a sophisticated environmental scanning and proactive approach typically exhibits stronger innovation capabilities than companies that are more reactive (Saleh & Wang, 1993). Statkraft certainly conducts environmental scanning; for instance through the Technology Analysis sub-unit which has a clear mandate to investigate and assess new technologies. This is not the only intelligence system within the company and various types of business and market analyses are conducted by and for individual units and functions in the organization. However, it became evident in the interviews that the employees still characterize Statkraft as much more reactive than proactive, and furthermore that the company is more concerned about the consequences of changes in the outside world than the opportunities that these changes may hold.

Spreading and incorporating knowledge and data generated from environmental scanning activities is moreover an area in which Statkraft has a great potential to improve. This issue is of course closely connected to more general systems for information spreading and sharing in the organization, but should be considered of higher relevance in terms of Statkraft's innovation capabilities. Making sure updated information concerning market and technology developments is diffused in the organization arguably helps employees to relate current practices, ideas and initiatives to large-scale developments and act accordingly. Several employees also expressed a great interest in getting access to this type of knowledge, which according to several interviewees today has a tendency to get stuck in isolated units of the organization rather than being diffused. A number of the employees specifically stated that they thought that having better access to this particular type of knowledge would help them in seeing new possibilities and to initiate relevant innovation activities. If Statkraft should wish to enhance its innovation capabilities at a general scale, deploying initiatives to improve in this area could therefore be considered.

It is important to always put innovation capabilities in relation to the company's strategy. If the strategy does not require the company to be innovative, the value and potential benefits of these

capabilities decline. In the case of Statkraft, there is a clear and official standpoint that innovation is important, here referred to as an espoused theory. It is moreover stated that Statkraft is, and should continue to be, in the forefront in terms of production and technological development of renewable energy. If not just constituting an action aimed at marketing the company, this provides an underlying rationale behind developing the innovation capabilities within Statkraft.

8.4 Leadership & Innovation Management

As was described in the conceptual framework, leaders who display support, interest and understanding for innovation and its role for the organization are important to develop strong innovation capabilities (Colarelli O'Connor, 2008). In several of the interviews, employees expressed what they saw as a lack of leadership in innovation in Statkraft. Disregarding of the corporate value statement which includes innovation, the role and aim of innovation in Statkraft is not well known among the employees. As the sample interviewed for this project consisted mainly of individuals that come into contact with innovation activities in their line of work, it is moreover reasonable to believe that this is even more so the case seen to all employees. The main interest of top leaders when looking at innovation appears to be isolated to specific technologies or existing strategies and to a lesser degree directed towards promoting innovation in general terms. Taking a more holistic view of leadership in innovation though incorporating aspects of Statkraft's organizational culture, the company today does not have a strong pro-innovation culture.

Several of the interviewees described how they experience that Statkraft has increased its focus on short-term economic gains in recent years. This has according to the same individuals led to a situation where innovation activities, and especially more radical and long-term activities, are not prioritized by top leaders in Statkraft. Among personnel that have a personal interest and engagement in innovation, a noticeable frustration is present while discussing the engagement from top leaders in the company. In turn, this could in part be attributed to the gap between theory and practice in Statkraft innovation effort that practically all employees acknowledged to exist. It can in this context be argued that it is reasonable to believe that at least some of the now clearly visible frustration against lacking interest in innovation from company leaders could be mitigated by reducing this gap.

A lack of clear incentives for employees to engage in innovation at a more general level could possibly in part explain the perceived lack of a pro-innovation culture in Statkraft. The absence of an established reward system for employees that successfully engage in innovation could also be a factor that contributes to this perception. According to Lawson & Samson (2001), applying reward systems can often result in improved success in generating ideas as well as to increase the focus on more radical innovation in the organization. A few employees specifically mentioned the lack of reward systems connected to innovation as an indication of a lack of will from top leaders to promote innovation. Another negative incentivizing force on employees who want to initiate a project related to innovation could be the amount of personal effort that appears to be required to get such an initiative accepted.

Looking at the incentives for business areas to prioritize investments of resources in R&D and innovation activities, much of the discussion revolves around how the overall performances of individual units are measured. As pointed out in the empirical findings chapter, the resources invested in innovation activities are not included as a goal parameter guiding the operational focus for each unit. In practice, this means that investments in innovation appear only as a cost in the quarterly reporting, thus burdening the performance of other goal parameters on which the units' performance

actually is evaluated. According to several interviewees, this situation leads to a reduced focus on innovation activities in Statkraft in general. This issue has been up for discussion in corporate management, who then decided not to introduce any new goal parameters related to innovation. From an external perspective, this situation can be regarded to further support the claim that there exists a gap between what is communicated and what is done in practice when it comes to innovation in Statkraft. And again, in an effort to increase or improve Statkraft's innovation capabilities, reducing this gap through introducing some sort of innovation evaluation parameter could be considered.

Interviewees frequently described that difficulties in gaining acceptance for a new project proposal could possibly be connected to an apparent lack of knowledge among employees as to how R&D project proposals are evaluated. No widespread and formal process for evaluating project proposals in a coherent manner is known among the employees today. This situation is of course to some extent related to the fact that each individual business area is responsible for a significant portion of its own innovation initiatives. Accordingly, different systems or practices for how proposals for new innovation activities are handled are in place within the business areas. Judging by employees' testimonies during interviews, the degree to which a structured process for collecting and evaluating such proposals exists varies significantly depending on the location in the organization. Having a transparent and systematic approach to collecting and evaluating project ideas and initiatives is important for a company's long-term capability to generate innovations successfully (Björkdahl & Börjesson, 2012). The fact that several of the interviewees did not know e.g. who to turn to with a new initiative or otherwise suggested relying on informal channels can be seen as an indication that Statkraft in practice does not have this kind of transparent system in place today. This finding in turn adds to the perception that much of the predefined structures and processes for innovation that exist in documentation on a central level not have been successfully spread in the organization.

The present configuration of shared responsibility for R&D and innovation activities between the innovation unit and each individual business area is a source of confusion for many employees. Very few of the interviewees were for instance able to accurately describe the role of the innovation unit. In the individual business units, no real distinction is seemingly made between the types of projects that are part of the corporate R&D programs administrated by the innovation unit and the incremental improvement projects found within each unit. This view of the situation possibly contributes to the perception a number of the interviewees had of innovation in Statkraft being overly administrated. As it appears today, the innovation unit and its corporate R&D programs are to a significant degree used as an alternative source for financing projects the individual business units want to perform. The fact that the differences between corporate R&D programs and incremental improvement projects are perceived as small might indicate that the line separating the responsibility of the innovation unit from that of individual business units is fuzzy at best. In turn, this might indicate that many of the projects that are part of the corporate R&D programs are in fact incremental improvement projects belonging in a business unit.

Allowing a large amount of incremental improvement projects to be part of the corporate R&D programs could potentially reduce the room for more radical projects. The structure of the R&D programs to correspond to existing strategic business focus areas can also act as an inhibitor of what can be referred to as *unrelated* innovation. *Unrelated* in this context refers to an innovation that is not directly connected to an existing business area or business model in Statkraft. Following this clear-cut way of organizing the innovation activities that require cross-organizational competencies, it can be argued that no obvious pathway for unrelated innovations exist in Statkraft. This was also pointed out by one employee during the interviews, who thought that the organization is lacking a channel for innovations that are not connected to the existing business model or focus areas. Seen from a

innovation capability perspective, this situation clearly reduces Statkraft's innovation capabilities in terms of generating and appropriating so-called unrelated innovations.

8.5 External Linkages

Statkraft has taken a strategic decision to mainly rely on external resources in conducting its R&D and innovation activities. As can be recalled from the conceptual framework, it is in many industries increasingly common for companies to increase their reliance on external contractors and partners for generating innovations. These types of open innovation models are also embraced by several academic researchers. Chesbrough (2003) is among the scholars that point to a decline in the strategic importance for firms to possess significant internal resources for R&D and innovation activities. Looking at how Statkraft's open innovation model affects the company's innovation capabilities, it can be argued that this model likely entails both advantages and disadvantages.

Following from its open innovation model, Statkraft is well connected to its external environment. Judging from the interviews, the support for the open model is widespread among the employees and only a few actively argue for a need to increase the internal project capabilities. It is in this context also interesting to note how a significant portion of the employees refer to Statkraft's responsibility as the largest actor on the Norwegian market as being a rational for adopting an open model to innovation. The argument is made that Statkraft's investments are needed to maintain a healthy research environment in Norway. This relationship can be regarded to be mutual as Statkraft in turn is served through having access to a pool of competent individuals from which important competences can be recruited.

Having an open model for innovation has the potential of bringing substantial benefits to a company's ability to innovate successfully, if managed with care. Schilling (2010) points out that engaging in R&D collaboration with, for instance, suppliers is likely to increase a company's alertness towards new technological developments. Statkraft's extensive connections to both technology suppliers and research institutions are thus advantageous for the company in several respects. Suppliers often bring valuable resources and a commercial perspective to a collaboration project, why such partnerships can contribute to increase Statkraft's innovation capabilities. In addition to suppliers, customers are by e.g. Schilling (2010) promoted as a highly attractive partner category in innovation efforts. Including customers often entails an increased understanding for what types of offerings are or can become attractive on the market (Schilling, 2010). According to the interviewees, customers are however not commonly included as part of Statkraft's open innovation model. This might be a consequence of Statkraft's role as an energy utility on a commodity market, a role in which direct customer interactions are less common than in other industries. However, Statkraft do have customers and it can be argued that Statkraft through creating a contact surface to reach this important group of stakeholders would increase its sensitivity to downstream developments in the value chain. Several projections of future developments on the energy market specifically point out the downstream segment of the value chain as an epicenter for much of the coming change and new possibilities (Burger, et al., 2008).

In general, issues related to external linkages and innovation capabilities in Statkraft are perhaps not mainly connected to the lack of external connections. Rather, what is important in Statkraft's case is to consider what consequences the almost total reliance on external providers has in terms of the company's innovation capabilities. As the reader might recall from the conceptual framework, adopting an open approach to innovation can be related to different types of risk. Birkinshaw et al

(2006) point out that one major risk a company can face when relying on external resources for innovation is to get locked into its external network. As evident from the distribution of R&D projects in Statkraft, a few selected partners constitute the backbone of Statkraft's external linkages for R&D and innovation (Statkraft Development AS, 2013). This rather limited diversity of partners can increase the risk of lock-in for Statkraft as a mutual dependency is likely to develop over time. Several interviewees also pointed to a tendency of Statkraft to readily accept project proposals coming from these selected actors, acting as testimony that a lock-in to some extent already exists. Being locked-in with its external environment can reduce Statkraft's ability to navigate rapidly in response to unexpected developments, in turn arguably reducing its innovation capabilities.

Having a share of internal R&D as low as the current 10 percent might also raise questions as to whether the pace of internal competence building can match that of the external environment. If this is not the case, it is reasonable to argue that Statkraft might run the risk of gradually becoming more dependent on external competence. In this scenario, Statkraft could end up in a position where a lack of cutting-edge competence internally lead to a reduced ability to identify and understand implications of events taking place on the market or within specific technology areas. In turn, such trends can gradually come to undermine the company's long-term competitiveness as well as its innovation capabilities.

According to Shilling (2010), performing a significant portion of the innovation activities internally can generally be regarded as positive in terms of innovation capabilities. Benefits from having internal innovation activities include, e.g. easier knowledge transfers and a greater potential for taking advantage of positive externalities stemming from innovation projects. Such positive externalities can for example include the realization of an employee how the knowledge generated in one particular project also can be used in a second et cetera. As has already been stated, this need not necessarily be the case and organizations relying on external providers for innovation can also be very successful (Schilling, 2010). To be successful in terms of innovation while relying extensively on external actors to conduct the innovation projects, well developed capabilities to administrate the external linkages and knowledge transfers are required. Judging by statements made during the interviews, it is however not clear to what extent Statkraft actually possesses any significant capabilities of this kind. While Statkraft has extensive experience of running R&D projects in collaboration with external partners, several employees pointed towards problems related to e.g. the transfer of knowledge from the partner back to Statkraft.

Statkraft is a major player and an important contributor of research funds to several national Norwegian institutions. As pointed out by several interviewees, Statkraft's R&D interest is today to a high degree incremental with a short term economic perspective. Acting as an agenda-setting actor with a relatively short time horizon in its R&D activities, it is therefore possible that the accumulation of competence on the national research scene will be concentrated to areas of importance for Statkraft today. According to some employees, indications that this is happening can already be seen in how a too narrow focus on hydropower research based on Statkraft's needs on the Nordic market has resulted in a lack of relevant competences in asset construction abroad. This fact might act as an illustration of how Statkraft could benefit by diversifying the linkages in its portfolio.

Deciding on how to organize its innovation activities is a strategic decision Statkraft has taken based on a number or considerations. Relying on external resources is in itself is not necessarily a strategy that will reduce a company's innovation capabilities. What is more important in this setting is to consider how the strategy is maintained and managed. To reap the same long-term benefits from research investments while relying on external resources, Statkraft therefore needs to manage this

situation with great care. This is an area in which Statkraft can improve its ability to generate innovation without a shift in the overall strategy. Whom to collaborate with and what types of research activities should be sponsored, e.g., become important issues to consider in this context.

8.6 Implementation

At Statkraft, the issue of implementation is intimately connected to the strategy the company has chosen to rely on external resources for conducting much of its innovation activities. Several of the interviewed employees were quick to point to the use of external resources for innovation when reflecting on Statkraft's implementation performance. Judging from the concerns raised by these employees, Statkraft has not been able to foster a climate that favors its ability to implement new knowledge or changes in the organization. Very few employees can identify any successful innovations implemented in the organization. This moreover appeared to be especially true for innovations implemented in other parts of the organization than that in which an interviewee worked. Whether this fact is a consequence of a historically limited success in implementation and generating innovations or rather an expression for lacking communication of such results is however hard to tell.

One important issue raised by several employees concerned the distance between Statkraft and its external innovation resources. Here, Statkraft's extensive reliance on external resources for innovation activities can become a challenge as far as implementation is concerned. This distance has already evidently resulted in difficulties for the organization in terms of a reduced ability to absorb and implement results from projects conducted externally. The loss of value that might accumulate when, e.g., project debriefs *"end up in a drawer somewhere"* should not be overlooked. Even if this phenomenon might not be common in the organization, it illustrates what appears to be a limited ability to relate and implement results from external R&D projects to a practical area of use. Since the company pursues a strategy of extensive use of such external R&D projects, this challenge could be argued to impose a negative effect on Statkraft's innovation capabilities at large.

Implementation has a central and important role in Statkraft's current innovation strategy (Statkraft AS, 2011). According to this strategy, investment in R&D is supposed to be a driver of innovation in Statkraft, and innovations should moreover be achieved through implementation of R&D results (Statkraft AS, 2011). The innovation unit is today aware of some of the difficulties that Statkraft has experienced in relation to implementing and absorbing results from external R&D. In its effort to increase Statkraft's performance in this field, the unit has chosen to focus on developing Statkraft's competence as a buyer of external R&D. This action might very well be highly effective for the organization in the sense of making sure only projects with a clearly identifiable application within the organization are invested in, thus making it easier to absorb the new knowledge that is generated. However, additional issues relevant for the organization's ability to perform in implementation remain. In several interviews, employees e.g. pointed to large differences between project leaders in terms of if and how external R&D projects resulted in implementation of new knowledge or practices. This should be regarded as an indication of that there exists a potential for improving the performance in this dimension through educating project leaders or otherwise increase their focus on implementation. Clear indications from the investigation also suggest that the important facilitating structures brought up by Carlopio (1998) provided to facilitate implementation today, e.g. through the implementation card, have not reached any significant level of penetration. Instead, conditions specific to each project and the unit that undertakes it does to a large extent determine the degree to which issues of implementation are prioritized.

Adding to the negative perception of Statkraft's performance in the implementation dimension are also numerous statements made by employees describing the organization as slow moving, stiff and hard to change. These findings should generally be regarded as negative for Statkraft's overall ability to achieve innovation through successful implementation and therefore also for its innovation capabilities. Many of these characteristics might however be desirable for Statkraft seen to the organization and its operations in a broader perspective. Efficiency and stability might, e.g., be qualities that are more important to fulfill the strategic goals than what organizing for innovation is.

Truly successful implementation often requires a company to possess the ability to bind together knowledge and competencies across departments and unit boundaries (Kanter, 1983). Several employees pointed out that this however is a large problem in Statkraft. It is therefore reasonable to argue that cross-functional collaboration constitutes an area of significant improvement potential, which indeed has been discussed earlier. Employees state that coordination today takes place mostly on a management level and that the consensus culture in Statkraft acts like a glue on transfers of implementation-relevant knowledge across departments and units. Exhibiting a weak culture for information sharing and coordination across organizational boundaries is a sign that Statkraft might be lacking in its ability to implement and utilize innovation globally. The organization is in several respects highly fragmented and divided. Different units have different cultures, needs and perspectives on most issues, which likely contribute to this situation. Attempting to implement common processes or centralized power mandates could therefore be related to significant inertia. In addition, possible efforts to increase the implementation performance should take into account that the tolerance for introducing additional bureaucratic structures and paperwork is low among the employees.

Based on these considerations of Statkraft's performance in the implementation dimension, a significant potential for improvement in this dimension can readily be identified. Many of the biggest challenges that Statkraft faces in this dimension are related to one of two main issues. First, the company does face significant challenges in relation to putting in place systems to better absorb and utilize the results generated from external R&D projects. Secondly, the structure and culture of the organization itself contributes to an environment that in several regards not has been build with quick implementation in mind. As has already been pointed out, the organization can however be assumed to be structured according to what is found appropriate in relation to Statkraft's current core business.

8.7 Creativity

As part of the conceptual framework, it was stated that many large firms experience difficulties in motivating creative employees, partly due to many standard routines and lack of incentives (Assink, 2006). To a fairly large extent, this seems to be the case for Statkraft. The employees have to follow many formal rules and fixed procedures, and this apparently makes it hard to generate and pursue new ideas. This was claimed during several interviews and is also well in accordance with the theory on the subject. However, the formal rules and processes are in place for a reason. To assure for instance reliability and quality, two factors that are crucial for Statkraft, a large degree of formalization is probably necessary. Therefore, it is possible to claim that there is a trade-off where the right balance needs to be found. Too much formalization is deteriorating for creativity, while too little would lead to various inefficiencies. However, this is a complicated strategic issue and throughout the remainder of this section, only the conditions for creativity will be regarded.

One central issue in terms of creativity regards the structure for incentives (Swann, 2009). In Statkraft, there are seemingly not a lot of incentives in place to foster creative and innovative behavior. This is

certainly true for the extrinsically motivational aspects. Overall, the company does not have a culture for implementing bonuses, at least not in this particular area. It could be argued that this constitutes a problem if wanting to motivate employees to be more creative. Another problem with bonuses in relation to new and successful ideas that was raised during the interviews was the difficulties in tracking down the origin of that idea, i.e. deciding who should receive the bonus. A perhaps even more serious hurdle is the lack of KPIs related to creativity and innovation. Many interviewees came back to this issue many times during their interview, and claimed it is hard to think new if that is not something the business unit gets evaluated on.

However, an interesting aspect for Statkraft can be found in Swann's (2009) claim that intrinsically motivated people are typically the most creative ones. Within the company, there seems to be a significant amount of employees with very specialized knowledge and a great interest in the certain area they are working with. Not seldom, these employees are highly trained technical experts with a burning passion for achieving technological improvements in their field. These individuals collectively make up a significant potential in terms of transforming Statkraft into a more creative company. Enabling and encouraging their creativity also relates to the current problem of not having enough new ideas originating from all parts of the internal organization. These intrinsically motivated employees are seemingly scattered over all business units; and through for instance providing them with possibilities for creative slack time, additional new and potentially promising ideas could emerge throughout all parts of the organization.

Reconnecting back to the framework for creativity developed by Andriopoulos (2001) and presented in Table 5, it becomes even more evident that there are both positive and negative aspects related to creativity within Statkraft. Many of these have already been discussed in other dimensions such as Organizational Structure and Culture & Learning. Several of these can be interpreted as negative for creativity, for instance the short-term focus, hierarchical structure and risk aversion. However, there are also positive aspects, several of which relate to the complementary framework proposed by Ekvall (1987). Generally, the employees find their working tasks to be meaningful and challenging, there is a trust and respect for the individual along with a productive way of communicating without too many conflicts. With this kept in mind, a strong foundation for creativity is arguably already in place. However, it became clear in many interviews that Statkraft is not perceived as a particularly creative company and there is therefore most certainly work that needs to be done before the company can reach its full potential in this aspect.

8.8 System-level analysis of innovation capabilities in Statkraft

In the preceding sections of this chapter, each of the seven dimensions of innovation capabilities has been reflected upon individually. However, as the reader may recall, the innovation capabilities of a company is not merely the sum of its performance in these individual dimension. Rather, to derive a fair assessment of a firm's capabilities for innovation, these dimensions should be considered dynamic elements in an interconnected system. In this complementary section of the analysis, the individual dimensions will be viewed and related to each other to provide this system perspective on Statkraft's capabilities for innovation. An illustration of this system perspective has been reproduced in Figure 12.

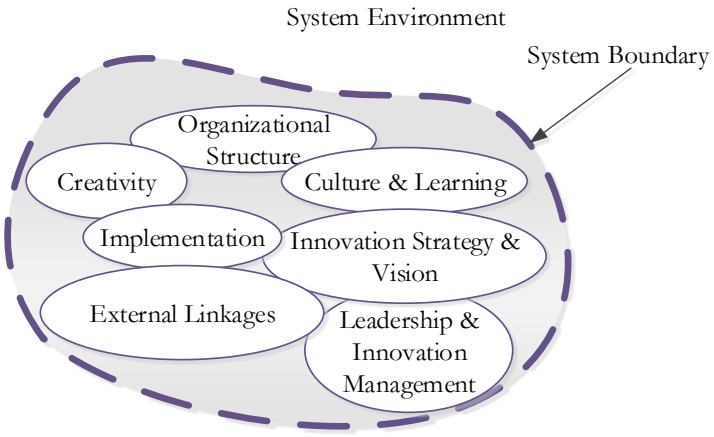

Figure 12 The total performance of a company in terms of its innovation capabilities can only be fully understood if the various dimensions and their relations are viewed as components in a holistic system.

Looking back at the preceding sections of the analysis, strengths and weaknesses in terms of Statkraft's capabilities to innovate have been highlighted for each of the seven dimensions. A summary of what can be regarded the most important of strengths and weaknesses within each dimension are briefly presented in tabulated form in Table 5, below. Many of these areas relate to aspects that are deeply rooted within the company, such as the values and norms that circulate throughout the organization and together make up its culture. Areas like these will certainly take plenty of time to alter, even if top management would actively support such an endeavor. However, there are also a number of smaller initiatives that immediately can be initiated to contribute to Statkraft's efforts in becoming a more innovative company. For instance, the innovation unit could continue and perhaps scale up its communication regarding new technologies and the implications and opportunities that these might hold. Between these two types of initiatives lies a broad spectrum of improvement areas in terms of required time and effort.

	Strengths	**Weaknesses**
Organizational Structure	- Successful examples of autonomous initiatives (e.g. small scale hydropower)	- The degree of centralization - Mechanistic structure
Culture & Learning	- Sound and ethical values seem characteristic for the organization - Model II behavior	- Strong focus on short-term profits - Somewhat weak possibilities for further education - Too little cross-functional collaboration - Insufficient systems and initiatives to diffuse knowledge
Innovation strategy & Vision	- The existence of a corporate innovation strategy - Innovation strategy closely linked to general strategic aim	- No unison vision regarding innovation among the employees - Gap between espoused strategy and strategy-in-use - Strategy is reactive rather than proactive
Leadership & Innovation Management	- Much room for individual interpretation around the ambitions for innovation - Depending on the circumstances and business unit, some leaders give the employees a fairly high degree of freedom - Structures and processes to guide and define innovation activities in place at a central level	- Innovation activities (especially long-term ones) are not prioritized - Lack of incentives to innovate - No KPIs related to innovation - Lack of a transparent and systematic approach to collecting and evaluating project ideas - Centrally initiated structures not in use in practice - Unawareness of the assistance that the innovation unit can provide

		- Ambiguous leadership gives lacking consistency
External Linkages	- Suppliers bring valuable resources and competences to the collaboration projects - Strong position on the domestic scene	- Not any extensive collaboration with customers - Risk of getting locked into the external network - Risk of undermining the internal competences and becoming too dependent on external parties
Implementation	- Are aware and taking action to improve in this dimension - Has implemented structured procedures to enhance the implementation performance	- Limited ability to relate and implement results from external R&D partners - Large differences between project leaders in terms of implementation - The current structures to facilitate implementation are not efficient - Too little cross-functional collaboration, fragmented and divided organization
Creativity	- Many intrinsically motivated employees - Employees find their jobs meaningful and stimulating - Trust and respect	- Lack of extrinsically motivational incentives - Employees have to follow many formal rules and procedures

Table 5 *A tabulated summary of the primary strenghts and weakniesses identified for each of the sevel dimensions of innovation capabilities part of this investigation*

As has been evident throughout this report, the seven dimensions defined to describe innovation capabilities are in several aspects interlinked and dependent upon each other. This also hold true for Statkraft's organization. It is therefore difficult, if not impossible, to single out one or a few dimensions that are more important than the others. And due to the system structure of the framework, it is a complex task to assess how each dimension affects the overall capabilities to innovate. However, one could claim that support and commitment from top management is a necessary, yet not sufficient, condition when improving the innovation capabilities. This should be the case in any large company, and Statkraft is not an exception. The top-down support primarily relates to the Innovation Strategy & Vision and Leadership & Innovation Management dimensions used in this report. Strengthening this area is regarded as a critical issue if Statkraft is to improve its capabilities to innovate. The support of innovation from the top management has seemingly been fluctuating to some extent. This is probably due to various factors, whereof personal interest of the senior management that happens to be in charge appears to be one. It is believed that this fluctuation is clearly negative for the long-term innovation efforts.

As is apparent in Table 5, a few of the identified weaknesses span over more than one dimension. The three most noticeable ones are the lack of both cross-functional collaboration and incentives to innovate, along with the fragmented organization. These could therefore potentially be considered extra important for the overall performance. To increase the cross-functional collaboration within the organization is deemed a major project with a long time horizon since it would entail changing the culture. Here, the innovation unit might be able to take on a key role working as a central hub in initiating and administering collaboration between different units within Statkraft. This would bring various parts of the organization closer to each other, which in turn also could have a positive impact on making Statkraft less fragmented in this regard. A more homogenous organization in this regard is believed to facilitate for instance the flow of new ideas, knowledge and the implementation processes in general. In terms of raising the incentives to innovate, it is crucial with support from top management. The KPIs seem to be of significant importance in Statkraft and if the employees and business units are not evaluated on innovation, it will not be prioritized. Therefore, implementing KPIs

related to innovation could potentially have strong positive implications. These KPIs could be either traditional financial-based ones such as "*x percent of the turnover should be invested in innovation projects*", or activity-based measures as for instance "*the business unit's employees should collectively spend y hours on innovation activities each month*".

During the interviews, employees also tended to circle back to and emphasize other factors that Statkraft's innovation performance heavily depends on. Judging from the interviewees' testimonies, aspects such as leadership in innovation, external R&D linkages and, again, the lacking culture for cross-functional collaboration all act as determinants for the overall performance in innovation. For instance, following from issues related to the use of external R&D resources and a limited tradition for cross-functional collaboration, the organization's performance in terms of implementation is affected in a negative way. Furthermore, what some regard as an ambiguous message sent out by leaders regarding Statkraft's ambitions for innovation, has far-reaching effects on the attitudes towards innovation in the organization.

Being an organization that has developed in a direction of stability and efficiency over a substantial period of time, there are clearly many organizational features that hamper the capabilities to innovate. However, there are also positive forces within Statkraft that collectively make up a foundation for building up and improving these capabilities. Employees seem to like their jobs and support the values that Statkraft stands for whole heartedly. They are moreover not afraid of discussing new ideas, and collectively they possess vast competences within advanced technical fields. There is furthermore an open-minded climate within Statkraft that some attribute to the Nordic business culture in general. This should also be combined with available resources and some success stories of attempts aiming at creating a two-folded structure through the implementation of autonomous business units. An example of this is the subsidiary for small scale hydropower plants. If managed the right way, all these aspects constitute an important potential in terms of further developing the innovation capabilities within Statkraft.

8.8.1 Corporate strategy and the current level of innovation capabilities

Based on the findings presented in this report, a fair assessment would be to say that Statkraft on the whole does not possess a particularly strong set of innovation capabilities. This is especially true in regard to the capabilities to generate and implement innovations that are unrelated to the current set of business activities and competencies in the company. Simultaneously, the capabilities to generate and implement incremental and highly related innovations or improvements should be considered to be at a higher level. However, innovation capabilities always need to be put in relation to the strategic intent of the company and the environment in which it acts to provide the full picture. If a company desires to pursue a strategy that entails continuous rejuvenation and being at the forefront of technological development, capabilities to innovate are crucial for success. On the other hand, the importance of these capabilities decreases if the company instead prioritizes efficient operations and maintaining the current situation and acts on a market characterized by stability and low levels of competition.

For Statkraft, the extent to which the current level of innovation capabilities corresponds to the company's strategy, ambition and external environment is an issue that can be analyzed from several perspectives. On one hand, corporate management has clearly declared that Statkraft's strategic focus should be to advance those areas that are already considered core activities in the business. Such strategic focus naturally reduces the pressure to possess a degree of innovation capabilities that might have been relevant if searching for new ways of expanding the business portfolio or otherwise improving the dynamic capabilities. This is perhaps even more so the case for Statkraft as its core business, hydropower, in most regards can be considered mature. Corresponding to this strategy, the

corporate R&D programs have been put in place to support this strive by the means of what is arguably mostly incremental improvements and rare instances of true innovation. On this level, the current set of innovation capabilities could therefore very well be considered sufficient to support the goals and intentions of the corporate strategy. However, considering the company's current environment and the ambitions for innovation that are communicated through, e.g., various publications and the innovation strategy, a different conclusion can be reached.

Innovation is in Statkraft quite heavily used in various internal and external publications. In addition, innovation is listed as a company value and is claimed to be prioritized in various ways. As has been made clear in this report, few employees can readily identify with this image. In relation to the perceived gap between what is said and what type of activities are actually supported in the business units, it can be claimed that Statkraft's innovation capabilities not entirely can measure up to a level corresponding to what is claimed to be the ambition. Adding to this perspective of innovation capabilities in Statkraft is the specific wordings in the current innovation strategy, stating for instance that part of the organization also will engage in innovation through: "*initiate(ing) and run(ing) breakthrough R&D projects*" (Statkraft AS, 2011, p. 6). Developments taking place on the energy scene at large, for instance including development such as those mentioned in the report's introductory chapters, could also be used as an indication that an enhancement of the innovation capabilities could be motivated.

There is hence a clear focus on innovation in the espoused strategy, but the will to prioritize it in the day-to-day activities appears to be lacking on many levels of the organization. This is also related to the absence of a clear vision that the employees are experiencing in relation to innovation. Due to this situation, it is difficult to assess whether the current innovation capabilities are sufficient or not. If Statkraft wishes to successfully grasp the new opportunities that arise from the changing environment, there is probably a need to strengthen the innovation capabilities. On the contrary, if the current emphasis on maintaining efficient operations prevails, it is possible to find support for stating that the existing capabilities should be sufficiently strong or even that they could be reduced.

The extent to which the current state of Statkraft's innovation capabilities is in line with the company's strategic intent is, based on the above discussion, thus an issue that can be put up for debate. Convincing arguments can here be made both for and against a need to improve the performance in this area. However, independently of which side of the argument Statkraft chooses to adopt, it should in this context be noted that improving on the company's innovation capabilities in a number of areas likely would increase its ability to generate value from the investments that are made already today. This perspective makes improvements in this area an issue of maximizing the value generated from a fixed amount of spending and not only an issue of innovation. Several findings of this investigation indicates that even with an unchanged level of ambition and resource allocation to innovation, Statkraft could through improving in a few dimension significantly increase its performance in terms of innovation. Working to improve the organization's ability to implement change and facilitating better interaction between business units are examples of initiatives with a potentially high return on investment. Improving the innovation capabilities on this basis should not primarily be seen as a strategic decision to increase the focus on innovation per se, but rather as an issue of operational optimization.

9. Discussion

Statkraft is in several regards situated in a favorable position compared to many of its main competitors. The company today relies heavily on its efficient and flexible hydropower generation asset as its core business. The advantages of the hydropower technology compared to other centralized generation technologies based on e.g. fossil fuels are obvious when it comes to issues such as flexibility, environmental friendliness and fuel costs. Because of this, several of the market developments that now clearly can be seen emerging in the utility industry may appear less threatening for Statkraft than for some of its competitors. Increasing demand for, and a political will to promote, renewable energy seemingly maps out Statkraft's position as both safe and highly attractive compared to that of several industry peers. Still, the market is in many regards undergoing significant change and large-scale centralized energy generation is according to several sources quickly going out of fashion. Battling the pressure towards increase cost-efficiency while being proactive enough to adapt, face or capitalize on new market threats and opportunities raises issues as to what level of innovation capabilities are motivated. For Statkraft, finding an appropriate role for and level of emphasis to put on innovation is in this context a complex task.

One could easily find support for the claim that Statkraft historically has not had a strong focus on building innovation capabilities in its organization. Such capabilities have on the other hand probably not been necessary or even desirable, as economies of scale and cost efficiency traditionally have been the central factors in determining success within the industry. This is to a large extent still the case, but what the future will hold for energy utility companies seemingly is more uncertain than it has been in a very long time. Several predictions for instance point towards lower or at times even negative sales margins for the large utilities, including Statkraft (Lie, 2013). Renewable energy gets more important and Statkraft has a very strong position in this area. However, this might soon change as competitors are advancing in this aspect, both in terms of technology and perhaps even more importantly, business models. In this context, it could be of relevance for Statkraft to lift innovation capabilities up on the agenda. However, this is a complicated issue that involves a large spectrum of considerations. To cast light on some of these considerations, this short chapter aims to reflect on the findings concerning Statkraft's innovation capabilities in relation to future developments on the energy scene.

9.1 Statkraft: why innovation capabilities might come in handy

Today, there are clear signs of the emergence of a more complex and decentralized future energy grid. According to some researchers, the very rationale for building centralized power generation facilities far from consumers will be eradicated, sooner rather than later (Burger, et al., 2008). This is largely due to new technical, societal and political conditions favoring such developments. In this context, it is reasonable to believe that energy in the future to a large extent will be produced at, or close to, the location at which it is consumed. This development has a strong inherent potential to create significant problems for the large utilities of today. This also holds true for Statkraft. As of January this year, Mr. Thor Christian Tuv, after installing a decentralized energy system in his home capable of delivering surplus power to the national grid, stopped being a customer and instead became the first real face of a new category of competition facing Statkraft. As there is currently very little to suggest that this development will come to a halt, Statkraft has reason to believe that it likely will have to see more of its customers follow in Mr. Tuv's footprints.

Even looking past the potential of just decentralized generation technologies, the level of uncertainty as to how the future energy market will develop and what type of business models will be successful is

palpable. Downstream value chain activity in the industry is now significant and the requirements for untraditional competencies are inviting new types of competitors. Burger et al (2008) claim that most energy utilities will have to balance the task of optimizing the current business while concurrently taking part in new more or less disruptive innovations in order not to lose their market position in the long run. Judging from the trend that operational margins of many major European energy utilities are now undergoing significant pressure, this delicate act of balance might become even more challenging. For a foreseeable future however, industrial customers might be able to constitute a somewhat safe haven and uphold much of the demand for centralized energy, especially from renewable sources. The extent to which this potential safe haven will persist is however dependent on the future development of the traditional Norwegian energy intensive industries. Due to the recent closures of several such industrial facilities in the country, mostly due to high operational costs, this is an issue now under lively public debate.

With the ambition of continued growth, two general responses to this development stand out as the most relevant ones for Statkraft. These responses correspond to the two generic innovation strategies that were mentioned in the sixth chapter of the report: innovation leadership and innovation followership. In Statkraft's case, these strategies could translate into the following alternative responses:

(i) Engage in new market changes, e.g., decentralization by adopting new technologies and business models.
(ii) Reach more industrial customer by growing the existing hydropower business internationally.

Statkraft clearly seems to have chosen the second path – the company has made use of related rather than unrelated diversification to grow. International diffusion of hydropower has in this manner been prioritized over introducing new technologies and business models, and this choice has not created high demands on being innovative. It is difficult to assess whether this strategy is the right or the wrong one, much of the answer is buried in issues that belong to the future. The risks associated with it include the possibility of getting locked-in in the existing value network, and through this become a prisoner to what Christensen (1997) refers to as resource dependency. This could make Statkraft unable to seize future opportunities beyond its current realm; an inability that in the long run would be deteriorating for the company. However, considering both the unique situation of Statkraft and the inherent problems that large incumbent companies experience when faced with technological shifts, strengthening the established core business instead of adapting to the changes has its clear advantages. Statkraft has over a time developed an organization that efficiently is able to produce renewable energy, something that arguably will stay important in many years to come. Another advantage with the company's focus on hydropower is the ability to stay rather flexible in terms of production due to the ability to store the water and start the production when society needs energy or prices are peaking. This, in combination with Statkraft's competences in trading inevitably create a strong competitive advantage, and the allure of scaling this existing business up, continue to draw on the existing organizational capabilities and growing through international diffusion is obvious. Adding to the advantages of the alternative chosen by Statkraft, path dependency is here something positive that can be taken advantage of. Through taking this less proactive approach to innovation, Statkraft can take a position from which it observes and monitors developments in the market and delays any real actions or commitments until market uncertainties have been reduced. This type of position indeed appears to be similar to that Statkraft has taken in practice.

The first alternative, i.e. embracing market shifts and decentralization, would require stronger dynamic capabilities and a capacity to introduce more radical innovations. In sum, it would clearly require a bigger turnover within the company than the former alternative would. New competences would have to be developed and uncertainties are far bigger than sticking to the current business of hydropower. Being a large and established company, pursuing new opportunities that a drastically new energy system might hold is arguably very hard. When compared to its competitors, this claim should especially be valid for Statkraft. Most other energy utility companies produce a significantly lower proportion of renewable energy and therefore experience a stronger pressure to change in accordance to trends in society, for instance created by global warming. Statkraft does not yet share the same degree of incentives to change due to its already strong position in clean energy generation. This most likely creates an even stronger organizational inertia that further complicates a real embrace of new business diversification. However, the potential drawbacks with not being a part of this development are hard to evaluate and assess today, as is the case for most approaching and potentially disruptive technology shifts. A strong and long-term drop in customers or economic margins can impact the future profitability despite the company's international growth. One aspect that is central to consider in this context is how big the opportunities for global growth of the hydropower business are in a long perspective. For instance, building hydropower plants entails constructing large dams that often have a negative impact on the local environment. If other energy sources become more accessible, the societal acceptance for new hydropower plants could decrease radically. Such developments are indeed also already visible in many regions.

The discussion so far is perhaps too polarized in its character. The two alternatives proposed above might not be mutually exclusive but rather possible to combine through some sort of path in the middle. Statkraft could for instance keep its strong focus on the traditional centralized generation, while at the same time being a part of the development of the decentralized energy grid. The latter could be done through monitoring trends through technology analysis and ensure that there is a sufficient level of competence within the company in areas such as cogeneration, solar and wind power. The disruptive technologies that are considered the most promising could further be invested in through the creation of small-scale and autonomous subsidiaries, perhaps owned through partnerships. In this way, such initiatives would not have to conform to the short-term focus of the traditional business which otherwise is likely to be a significant problem for Statkraft.

On a general level, one can claim that the development within the energy utility industry follows a pattern exhibited in most modern industries the last decades. It is now, to a larger extent than ever, characterized by both high uncertainty and high velocity. Driven by strong competition and technological development, this causes implications for the business models. Different actors have different advantages in this situation. Established incumbent firms have the financial resources and reputation to embrace the changes, but they also possess path dependencies and rigidities that new entrants lack. As has been discussed above, Statkraft holds a favorable position in this new environment and is deemed to prevail as a strong actor in the foreseeable future. The hydropower business stands strong as a somewhat safe alternative, and if having higher ambitions in terms of future growth, it could be combined with investments in technologies and business models whose future is more uncertain. After all, we are now living in what Drucker (1992) refers to as the era of discontinuity.

9.2 A short note on the application of the conceptual framework

Applying the conceptual framework for innovation capabilities that was proposed in the sixth chapter on Statkraft's particular case was overall deemed successful. The interviews were structured according to the different dimensions and there was rarely an experienced need to go beyond these when speaking with the employees. It is therefore possible to argue that the aim with keeping the conceptual framework as holistic as possible was fulfilled. The criticism that is sometimes proposed claiming that innovation capabilities frameworks often are too general and thereby losing some relevance does not seem to be valid in this case. This is because the conceptual framework proposed in this report stresses the existence of a so called system environment that includes more case-specific aspects related to for instance the industry or more general parts of the company. This enabled the system dimensions to be put into a context, and the framework could by doing so be customized to fit well with the particular case.

One drawback that could be mentioned is that some of the dimensions of the framework turned out to overlap quite a bit. This was for example the case with the Implementation and External Linkages ones. However, this was expected on beforehand and the downside with this is perceived as very limited. It might result in some repetition of arguments in the report and interviews, but it is considered more important that all relevant aspects in the context of innovation capabilities are covered. If attempting to minimize the overlap to a large degree, this comprehensiveness could potentially have been negatively affected. In addition, the overlaps evident when applying the framework to the organization can be seen as positive as these overlaps helped in identifying dependencies among different issues. Thus, these overlaps made it easier to identify what can be regarded as high-impact areas where improvements could bring a broader performance increase of the innovation capabilities.

10. Conclusions

This report has investigated and assessed the innovation capabilities inherent in Statkraft's current organization. To enable this assessment and provide the answer to the thesis' first research question, a conceptual framework for assessing innovation capabilities was developed and presented in the sixth chapter of this report. The framework is also this report's contribution the general field of academic innovation management research. It draws on existing theory within the field, and especially on the systems perspective that many scholars take on this category of capabilities. Being a system, the framework consists of three major components: the elements, the environment and the boundary between these. The environment is constituted by the company that is subject to analysis as well as its wider context. It therefore includes the organization's general routines, beliefs and stakeholders. This environment clearly has vast implications for the innovation capabilities and it is not possible to isolate it from this concept. Therefore, the boundary between the system's environment and its elements is blurry. The elements that were included in a framework for assessing innovation capabilities are: Organizational Structure, Culture & Learning, Innovation Strategy & Vision, Leadership & Innovation Management, External Linkages, Implementation, and finally Creativity. These elements are furthermore interdependent and exhibit some degree of overlap between each other. If analyzed collectively with respect to the inherent structure and characteristics that follows from constituting a system, they should provide a comprehensive picture of the company's capabilities to innovate. The framework was illustrated graphically in Figure 10 on page 31 of this report. It was later applied on Statkraft to map out and assess the company's innovation capabilities. More specifically, the project here sought to answer what is the current state of innovation capabilities in Statkraft's organization and to what extent these are developed to an adequate level.

The overall approach to evaluate the current state of the innovation capabilities taken in this report was to identify strengths and weaknesses with the aid of the developed framework; and then analyze these on an aggregated level. This was made in order to provide an answer to research question two. It was clear from the interviews that Statkraft is not perceived as an innovative and creative company and that it is possible to point out a multitude of contributing reasons to this situation. From an outside perspective, the support for and commitment to innovation efforts from leaders at all levels within Statkraft can be questioned. The strategic importance of innovation is possible to describe as a back-and-forth moving pendulum and the actual priority given to rejuvenation of the company is fairly limited. This also relates to the lack of incentives related to innovation that employees are experiencing. What matters the most in the organization are efficient operations and growing what is already in existence; not new ideas. Even if new ideas turn out to be promising, it is hard to get them implemented due to both structural and cultural reasons. Despite these negative aspects however, there are also more positive ones in terms of innovation capabilities. The most prominent ones include a high workplace satisfaction, important technological competences and availability of resources and financial means.

As stated in the analysis, it is difficult to accurately address the third research question due to the ambiguity in terms of Statkraft's strategic intent. The official stance in terms of innovation gives one picture, but the actual priority given to it provides another one. If Statkraft strives to be in the forefront of the energy industry and take advantage of opportunities that the present and future provide, is has much to win on improving its innovation capabilities. The industry is more uncertain than in a long time, and these capabilities can assist Statkraft in not becoming too rigid for the fast paced environment. However, the company holds a favorable position since it is already an established player within renewable energy. This is a clear advantage in the pursuit of future success. If the

company believes that the current business areas will provide growth that is in line with the level of ambitions and willingness to take risks, the rationale for improving the capabilities for innovation decreases.

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Appendix I

Concept	Author	Definition/Description
Innovation capability	Lawson & Samson (2001)	"The ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders".
	Kim (1997)	"The ability to create new and useful knowledge based on previous knowledge".
	Hurley & Hult (1998)	"The ability of the organization to adopt or implement new ideas, processes or products successfully".[1]
	Burgelman et al. (2004)	"The comprehensive set of characteristics of an organization that facilitate and support innovation strategies".
	Assink (2006)	"An internal driving energy to generate and explore radically new ideas, to experiment with solutions and develop them into innovation on the market".
	Börjesson & Elmquist (2012)	"Innovation capabilities can be described as the ability of a firm to be competitive through systematic innovation, building not only on reconfiguration of the firm's resources and processes but also on the values that influence how decisions are taken in the organization. This means that innovation capability is an organizational capability among others".
	Francis & Bessant (2005)	"Companies with an aptitude for successfully exploiting new ideas can be described as having innovation capability".
	Wang & Ahmed (2007)	"The concept of innovative capabilities refers to a firm's ability to develop new products, services and/or markets through aligning strategic innovative behaviors and processes to achieve the usual and novel solution".

Björkdahl and Börjesson (2012)	
Dimension	**Short description**
Strategy for innovation	"The firm's strategy in relation to innovation refers to the conscious and systematic application of an expressed intent with respect to innovation and the extent to which it is known and understood throughout the firm".
Prioritization	"Prioritization refers to the importance given to innovation".
Culture	"The innovation culture refers to the organization's overall attitude to experimenting and exploration".
Idea management	"Idea management refers to the systems, structures and routines in place to support the search for and generation of ideas and their management within the organization".
External environment and linkages	"This dimension is related to activities aimed at building network, alliances and relationships with external actors… and the ability to absorb external knowledge and to open up the firm to new stimuli and experiences".
Implementation	"Implementation refers to the firm's ability to develop a new idea into a concept or a new offer".
Systems and decision rules	"This dimension refers to the rules and principles in place in the firm to support its strategy and operations".
Organizational context and learning	"Organizational learning refers to knowledge generation and diffusion in the organization".

[1] Quote about '*capacity to innovate'*, a concept that significantly resembles innovation capability.

Colarelli O'Connor (2008)	
Dimension	**Short description**
A clearly identified organizational structure	"The first element is an identified team, group, department, or other entity in the firm that is charged with the responsibility for making major innovation happen".
Internal and external interface mechanisms	"Case studies have shown that physical separation at the project level may work for a time, but complete separation at the system level may not be wise given that the purpose of a major innovation system is to leverage and stretch current competencies while simultaneously building new ones. Thus, the interface to the mainstream organization becomes critically important".
Exploratory processes	"Effective dynamic capabilities in high-uncertainty environments require new, situation-specific knowledge, which accumulates as project members engage in experiential activities to learn quickly, to evaluate, and to redirect".
Requisite skills	"Major innovation thus requires broadly skilled employees who can be flexible as circumstances require".
Appropriate governance and decision-making mechanisms and criteria	"There are three levels of governance to consider: (1) the portfolio of major innovation projects; (2) specific projects within the portfolio; and (3) the major innovation system itself".
Appropriate metrics	"A major innovation dynamic capability requires establishing metrics that are appropriate for the high-risk, high-uncertainty objectives of the major innovation management system".
Cultural and leadership context	"The ideal organizational culture and leadership team values major innovation as a key component of their efforts, acts as caretakers of the firm's future health, and understands the risks inherent in major innovation".

Lawson and Samson (2001)	
Dimension	**Short description**
Vision and strategy	"Successful innovation requires a clear articulation of a common vision and the firm expression of the strategic direction. This is a critical step in institutionalizing innovation. Without a strategy for innovation, interest and attention become too dispersed".
Harnessing the competence base	"The ability to correctly and effectively direct resources to where they are required has long been recognized as critical to innovation success. "
Organizational intelligence	"Organizational intelligence is primarily about learning from customers and learning about competitors".
Creativity and idea management	"Creativity requires divergent thinking of what may be unrealized, unproven or untested…Creativity may be viewed as the process of generating ideas".
Structures and systems	"Successful innovation requires an optimal formal business structure". This structure is constituted by for instance organizational structure and reward systems.
Culture and climate	"The components underlying the culture and climate construct are tolerance of ambiguity, empowered employees, creative time, and communication".
Management of technology	"Innovative firms are able to link their core technology strategies, with innovation strategy and business strategy".

Guan and Ma (2003)[2]	
Dimension	**Short description**
Learning	"Learning capability is the capacity to identify, absorb, and use existing and new knowledge for competitive success".
Research and development	"R&D capability measures the ability of the firm to adopt new technologies and systems".
Resource management	"Resource management capability is the firm's ability to organize and manage its technology, human, and financial resources."
Manufacturing	"Manufacturing capability describes the ability of the firm to apply its R&D results into products that meet market needs as well as technical and production constraints".
Marketing	"Marketing capability refers to the ability to identify current and future customer needs and to promote and sell the firm's products in a competitive environment".
Organization structure and systems	"Organization structure and systems capability refers to the ability to develop, structure, and manage all activities to meet organizational objectives and increase the speed of the company's innovation processes",
Strategy and leadership	"Strategy and leadership capability is the ability to form, adapt, and lead the right strategies for commercial success in a competitive environment".

Assink (2006)[3]	
Dimension	**Short description**
Dominant design, path dependency and successful concepts	"Many enterprises limit themselves for too long to incremental innovation, such as improvements of existing designs and technologies, the so called dominant design". "Many companies have become prisoners of their own successful business model".
Organizational dualism	"Large corporations often lack a clear two-fold structure, combining consistency for incremental innovation, and flexibility and experimenting capabilities for radical innovation".
Excessive bureaucracy	"Excessive bureaucracy is often synonymous with large organizations that demand allegiance to rules and procedures that ultimately frustrate creativity, and as a result are slower to react and less willing to take risks".
Stifling of the status quo	"Because many companies prefer the stable, efficient environment to fulfill market requirements, the status quo is reinforced".
Inability to unlearn	"Unlearning is defined as the process by which people and firms eliminate old logic and substitute it with something fundamentally new".
Lack of distinctive competencies	"In general, most large corporations lack the management ability to adapt the necessary skills to engage in and profit from new technology and to manage the challenges that will reap the business opportunities that lie in disruptive technology".
Obsolete mental models and theory-in-use	"Mental models, individual and organization-wide beliefs about the world and how to make sense out of it, that no longer fit the changing environment or competitive situation … forms barriers on the way to developing disruptive innovations".
The learning trap	"Inward-focus, which often reinforces the 'not invented here" syndrome and groupthink, is one of the traditional barriers to innovation".
Lack of realistic revenue and ROI	"… several innovation inhibitors, such as high and difficult to manage innovation costs, fear of imitation, long pay-back time, lack of adequate

[2] The quotes are from Batan, Lindsay & O'Connor (2009) who describe the model developed by Guan & Ma (2003)

[3] Assink (2006) provides a list of interdependent elements that constitute barriers, not enablers, to disruptive innovation capabilities.

expectations	financial resources and high-risk expectation".
High risks and uncertainty	"… radical innovation explores areas that are novel; the technological feasibility is usually a major problem and forecasting sales is nothing more than a reasonable guess".
Risk averse climate	"Even when a radical idea is accepted, it does not mean it will lead to radical new development. It requires a climate that is receptive to uncertainty, to unusual ideas, to a probe-and-learn approach".
Unwillingness to cannibalize	"Firms that dominate markets are often reluctant to foster radical innovation because they are unwilling to cannibalize their own investments and assets until it is too late".
Lack of creativity	"Large corporations lack the motivational capacity of small companies to 'nurture' or motivate innovative people who have new, creative and 'break-the-rule' ideas".
Lack of market sensing and foresight	"Trying to please customers in established markets, where performance expectations are high, will often lead to failure. Initially, focusing on emergent markets or low-cost applications where requirements satisfy the lowest common denominator is a more secure way to leverage the breakthrough in design and manufacturing".
Innovation process mismanagement	"… the personality of the individuals involved in the initial phases of the innovation process is as important as the innovation process itself. Only when the team 'chemistry' is optimal, can the team be truly innovative".
Lack of mandatory infrastructure	"Disruptive innovation often lack the necessary infrastructure, or may be too underdeveloped to be easily integrated".
Lack of adequate follow-through	"A successful disruptive innovation often demands an innovative business model. Rapid business model prototyping is as critically important as is technological innovation".