



Norwegian University of
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Financing the Transition to a Green Economy

An empirical investigation of how Norwegian
firms can achieve business models for
sustainability

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Problem description

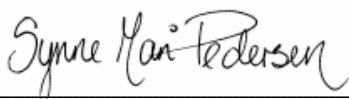
In line with the new agenda for sustainable development and adoption of the UN Sustainable Development Goals, companies now have a responsibility to transition their business to be a key societal and environmental player. The thesis seeks to explore the relationship between businesses and financial actors in how corporations can become more sustainable. More specifically, the objective of the thesis is to address the practical implications of how firms can finance their efforts to achieve business models for sustainability. This will be investigated by uncovering tensions in corporate sustainability that characterize the strategic implementation and financing of business models for sustainability. Further attention is then devoted to how firms can address these tensions in their communication and engagement with stakeholders. Finally, the thesis investigates what is required by the financial sector and business community to achieve green competitiveness for Norwegian businesses. Implications and recommendations for the Norwegian Expert Committee on Green Competitiveness will be explored in greater detail.

Preface

This Master's thesis has been conducted at the Norwegian University of Science and Technology (NTNU) during the spring semester of 2016. The study is part of a specialization in Strategy and International Business Development at the Department of Industrial Economics and Technology Management (IØT). The research is performed as a part of NTNU Sustainability, one of four strategic research areas from 2014 to 2023. It is also a contribution to the ongoing assessment by the Norwegian government's Expert Committee for Green Competitiveness. The Committee will deliver a strategy to the government in October 2016 that addresses the barriers, challenges and opportunities for Norwegian industries on the path to a low emission society. One of the Committee's objectives will be to look at measures to finance the transition to a green economy. With this context, the thesis will further investigate these topics through a case study looking at the establishment of a Norwegian Green Investment Bank.

Trondheim, June 10th 2016

Sustainably yours,



Synne Mari Pedersen



Sunniva Bratt Slette

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First of all, we would like to extend our gratitude to everyone we have had the privilege to interview, for sharing their knowledge and providing valuable insights. Our appreciation also goes to Finance Norway and SINTEF for financial support to cover our travel expenses. NTNU Sustainability has also been a great support with economic and academic contributions through the university's ongoing research projects and industry initiatives. Furthermore, we thank our academic supervisors Annik Magerholm Fet, Sigurd Sagen Vildåsen and Ekaterina S. Bjørnåli for nudging us on the right path and providing motivating feedback. We have been overwhelmed by the response and welcoming attitudes of the people we have met through our work with the thesis. Our journey also extended beyond national borders, and we have been fortunate to visit London and Brussels to get an international perspective. There is no doubt that there are strong forces working for the greening of Norwegian industry. We have observed a great will among both incumbent actors and newcomers to change current practices and explore new markets and technologies. Thus, we are left with a positive outlook on the continuing efforts to transform the Norwegian economy to a new and more sustainable state.

Executive summary

The objective of this Master's thesis is to explore the interaction between the state of the current financial system and sustainable value creation of companies. This is done by examining how the financial community and business actors can address tensions that currently provide barriers for sustainability investments. The thesis is structured as an exploratory case study within the context of Norwegian industry development in the transition to a green economy. More specifically, the study investigates how a Norwegian Green Investment Bank (GIB) could incorporate sustainability in investment decisions with the mission to facilitate a transition to business models that are more sustainable.

With this objective the thesis addresses a gap in corporate sustainability literature, where less attention has been devoted to the financial aspects of the tensions used to characterize sustainability. This gap is also valid for the emerging business model literature, which is often found to have a normative approach to sustainability. Our contribution is to look at tensions that describe the financial characteristics in companies' quest to become truly sustainable, using the business model view as our theoretical lense. The thesis thus explores which tensions related to financial characteristics that provide the most substantial barriers for the development and implementation of business models for sustainability. Tensions are used to provide a theoretical context to describe issues related to short-termism versus long-termism, conflicts of organizational change in the financial system, along with weaknesses of the business model view. We contribute directly to the literature by expanding the integrative tensions framework of Hahn et al. (2015) and include a new tension termed "Stakeholder significance". The tension describes firms' limited resources in the task to address stakeholders in corporate communication and business model innovation.

The thesis is structured to describe and discuss the financial characteristics of *business model innovation*, *communication* and *financial evaluation methods*. Findings show that since business actors hold the power to innovate and upscale business models for sustainability, they also have a responsibility to incorporate ESG values in their strategies. A strong ESG focus implies that the firms have a "futureproof" strategy and have consciously addressed risks beyond the direct financial risks. Furthermore, we identified a gap in the Norwegian public funding system and capital market in what is termed "the valley death", in the phase between conceptualization and commercialization on the technology maturity scale. Tied to this, there is a need for investments in business model innovations that promote market creation over incremental efficiency and performance improvements.

Improved communication and interaction can bridge the current gap for sustainable investments between the financial community and business. Additionally,

sustainability communication could help companies to align their efforts and lift businesses that fulfil the SDGs and climate targets. Through our analysis of the countless sustainability initiatives that exist for internal and external communication, we found that companies have a wide range of tools to improve their sustainability. Yet, it is mostly large, established firms that deploy these measures, compared to SMEs who do not possess the same resources. As a result of the empirical analysis, along with the expansion of the tensions framework, the findings suggest materiality as a solution to the identified challenges related to “greenwashing” and “death by reporting”. In addition, materiality can be a good starting point for identifying and devoting resources to key sustainability issues.

Financial evaluation methods are essential to accelerate sustainable development in industries. One of the most important findings across all three areas of business model innovation, communication and financial evaluation methods, is the call for standardized KPIs that can incorporate ESG factors for comparison between investors and companies. The power to channel investment flows gives financial institutions a responsibility to consider the impact of their investments on relevant stakeholders, including the society and environment. Hence, investors should take considerations of both financial and ESG values into investment decisions. Active ownership becomes increasingly important for investors to reduce climate-related risks, for instance by the inclusion of firms that score high in sustainability rankings and divestment from firms that lag behind.

Lastly, findings indicate that interaction between the financial community and business has the potential to address tensions related to sustainability, and that a Green Investment Bank could function as an intermediary. The GIB could accelerate the implementation of standardized KPI's, ESG metrics and a long-term investment horizon. Findings clearly indicate that the Norwegian industry would benefit from a GIB to mitigate risks and attract private capital for sustainability investments. The need for a GIB was especially large in the valley of death. The GIB was recommended to have an international scope, to promote industry development and enhance business model innovation. Furthermore, it could be configured to provide a resolution strategy to the intertemporal tension by reinforcing a long-term perspective in investment decisions. It can also respond to the tensions related to change, by offering risk mitigating financial instruments as a venture capital investor. A more practically oriented discussion of the GIB's role in the Norwegian market can be found in the separate report called *Establishing a Green Investment Bank*, found in Appendix A.

As an exploratory case study, the thesis prepares the ground for further research. A logical next step could be to adopt a more pragmatic perspective, quantify the connections between the financial system and business that promotes sustainability, and assess implications of the proposed new tension related to stakeholder significance.

Sammendrag

Formålet med denne masteroppgaven er å utforske forholdet mellom selskapers verdiskaping knyttet til bærekraft og deres interaksjon med aktører i dagens finansieringssystem og kapitalmarked. Oppgaven utforsker med dette hvordan næringslivet og finansielle aktører kan adressere spenninger (i.e. *tensions literature*) som utgjør barrierer for flere investeringer i bærekraftige prosjekter. Videre er oppgaven strukturert som en utforskende casestudie med Norges industrielle skifte mot en grønn økonomi som overordnet kontekst. Mer spesifikt vil denne studien se nærmere på hvordan en norsk grønn investeringsbank (GIB) kan inkorporere bærekraft i sine investeringsbeslutninger med formålet om å fasilitere en endring mot forretningsmodeller som er mer bærekraftige.

Med dette som overordnet formål adresserer oppgaven et behov for mer forskning innen *corporate sustainability*, der finansielle aspekter knyttet til utfordringene med å utvikle mer bærekraftige forretningsmodeller er lite behandlet. Dette gjelder også for den relativt nye og fremtredende *business models for sustainability*-litteraturen, som ofte har en normativ tilnærming til bærekraft. Vårt bidrag til disse forskningsområdene er å se nærmere på hvordan ulike spenninger og tilsynelatede motsetninger innenfor bærekraft kan brukes til å beskrive finansielle utfordringer, med bærekraftige forretningsmodeller som teoretisk utgangspunkt. Ved å se på ulike spenninger kan vi beskrive utfordringer som er særlig knyttet til et kort- og langtidsperspektiv, organisasjonelle endringsprosesser, og vi vil samtidig kunne peke på svakheter ved business model-litteraturen. Vi bidrar med dette direkte til forskning ved å utvide eksisterende rammeverk av Hahn et al. (2015) der vi introduserer en ny spenning kalt "Stakeholder significance". Denne beskriver situasjonen som oppstår når selskaper, gitt begrensede ressurser, opplever en draging mot å adressere enten alle eller et utvalg interessentgrupper i sin eksterne kommunikasjon og ressursallokering for å bli mer bærekraftige.

Oppgaven er strukturert etter de finansielle aspektene knyttet til *business model innovation*, *communication* og *financial evaluation methods*. Disse tre overordnede kategoriene brukes videre i den empiriske analysen, syntese og diskusjon. Innovasjon av forretningsmodellen er essensielt for å sikre bærekraftig utvikling. Funn fra case studien viser at fordi næringslivsaktører har midler til å endre sine eksisterende forretningsmodeller, så har de også et ansvar for å inkludere ESG (i.e. environmental, soical and governance) faktorer i sine forretningsstrategier. Et sterkt fokus på ESG indikerer videre at bedriftene har en langsiktig strategi som adresserer risiko utover de rent finansielle. Videre har vi også identifisert mangel på kapital i det norske virkemiddelapparatet til selskaper som befinner seg i den såkalte "valley of death", som er fasen mellom demonstrasjon og kommersialisering. Tett knyttet til dette finner

vi et behov for investeringer i innovative forretningsmodeller som har potensiale til å skape nye markeder, fremfor innovasjoner som fremmer inkrementelle forbedringer.

Bedre kommunikasjon kan være et ledd i å bidra til flere investeringer i bærekraftige prosjekter. Gjennom vår analyse av tilgjengelige globale bærekraftsinitiativer for intern og ekstern kommunikasjon, finner vi at det er de store aktørene som er flinkest til å ta i bruk disse. Mindre selskaper har ikke de samme ressursene og fokus på bærekraft. Funnene fra den empiriske analysen sammen med vårt forslag om å utvide eksisterende rammeverk for tensions, lanserer materialitet som en løsning på utfordringene knyttet til ”greenwashing” og det som omtales som rapporteringsdøden. Materialitet kan være et godt utgangspunkt for å identifisere hvilke områder som krever mest oppmerksomhet og ressurser.

Finansielle evalueringsmetoder er essensielle for å akselerere bærekraftig utvikling. Ett av de mest sentrale funnene på tvers av de tre områdene *business model innovation, communication and financial evaluation methods*, er et samlet ønske om å utvikle standardiserte KPIer som integrerer ESG faktorer. Dette vil gi et bedre sammenligningsgrunnlag for både investorer og bedrifter. Finansinstitusjoner har et ansvar for å vurdere påvirkningen av sine investeringer på relevante interessenter, inkludert miljø- og samfunnspåvirkning. Derfor burde investorer integrere ESG i sine evalueringsmetoder og beslutningsprosesser. Aktivt eierskap blir viktigere og viktigere for å kunne redusere klimarelatert risiko. For eksempel ved å aktivt investere i selskaper som har en høy score på bærekrafranking, og ved å trekke seg ut av bedrifter som viser dårlige prestasjoner evaluert på bærekraft.

Vi har konkludert med at en grønn investeringsbank kan adressere spenningene knyttet til bærekraft ved å fungere som et viktig mellomledd mellom finansieringskilder og fremtidsrettede selskaper som trenger kapital. En slik bank kan akselerere implementeringen av standardiserte KPIer, og ESG-parametre gjennom en langsiktig investeringshorisont. Funnene viser tydelig at norsk industri kan ha en fordel av en slik bank for å redusere risiko og for å tiltrekke privat kapital. Behovet for en GIB er spesielt stor i the valley of death. Banken er anbefalt å ha et internasjonalt omfang, bidra til industriutvikling nasjonalt og å fasilitere innovasjon av forretningsmodeller. Videre kan banken respondere på de identifiserte spenningene ved å bruke finansielle instrumenter både som en langiktig investor, men også gjennom å bidra med venture kapital. En mer detaljert og praktisk rettet diskusjon finnes i vedlagt rapport *Establishing a Green Investment Bank*, i Appendix A.

Opgaven har lagt et godt grunnlag for videre forskning. Et logisk neste steg er å ha en mer pragmatisk tilnærming til bærekraftige forretningsmodeller gjennom studier som kan kvantifisere deres tilknytning til finans. I tillegg kan vårt bidrag med den nye spenningen stakeholder significance utforskes videre gjennom både kvalitativ og kvantitativ forskning.

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1 Introduction

The adoption of the UN Sustainable Development Goals (SDGs) denote a renewed and intensified focus on sustainable development. It also calls for substantial allocations of capital to ensure investments that contribute to a greener world economy. More importantly, the shift is already underway, and implies a responsibility of business and capital providers to attract and realize these investments for innovations that promote long-term prosperity. Through an exploratory case study, we take a stakeholder approach to investigate the establishment of a new Green Investment Bank as part of Norway's transition to a green economy. In this introductory chapter, we first outline the global context and challenges connected to financing the transition, before presenting our two research questions and the structural logic of the thesis.

1.1 The UN SDGs

The notion of sustainability and its urgency has developed over the past decades. It has been put first on the political agenda by the UN and national governments, with the result that the world leaders in 2015 agreed to adopt the SDGs as part of the resolution for sustainable development towards 2030 (United Nations, 2015). The goals are a continuation of the Millennium Development Goals (MDGs) and aims not only to protect the planet, but also to promote prosperity. This is founded on the belief that all future strategies designed to address societal and environmental challenges also must contribute to build economic growth. According to the Global Opportunity report issued by DNV GL, SDG number eight, decent work and economic growth is the goal with the largest business potential (DNV GL, 2016). Furthermore, some of the goals will foster especially large investments. One of these goals is SDG 13, climate change, being one of the most pressing, global issues. The threat of a warmer climate has led the discussion about economic development to be complemented by the transition to a low carbon society. In order to make this shift to a green economy, estimated investment needs for reaching the two-degree target will reach at least \$1 trillion each year by 2030 (Zuckerman et al. 2016). In comparison, an estimated total of \$93 trillion is needed for infrastructure investments in transport, energy and water systems over the next 15 years to the meet global infrastructure needs to a low-carbon economy (Global Commission on the Economy and Climate, 2014). These infrastructure investments promote climate mitigation and adaptation, along with development of new technological solutions and infrastructure for renewable energy. Thereby, the economy is on a pathway from a fossil-based to a more sustainable economy. The finance sector will play a central role in this shift, by helping to price climate risks and facilitate investments in renewable energy and efficient technologies (Richardson, 2009).

1.2 New models for business and finance

Implementation of the SDGs rely on mobilization of public and private financial resources to support the diverse private sector, ranging from micro-enterprises to cooperatives to multinationals (UN General Assembly, 2015). The discussion of the responsibility of business to solve societal challenges has moved to acknowledge that corporate ingenuity can meet demands of growth and wealth creation (Margolis & Walsh, 2003). The focus has instead been to answer the question of how to simultaneously evolve business and society (Sætre et al., 2016). In other words, the stakeholder view of the firm has emerged as an underlying assumption for the responsibility of business. Similarly, recent attention in the academic and commercial sphere has been devoted to refute fiduciary duty as a legal barrier to consider environmental, social and governance (ESG) issues as long-term investment drivers. In a UNEP report, the authors conclude that the integration of ESG factors into an investment analysis is clearly permissible and arguable a requirement in all the jurisdictions examined across six continents (Sullivan et al., 2015).

With mobilization and allocation of capital to meet the SDGs comes new opportunities for business (DNV GL, 2016). Recent industry development and research prove that business and investors are moving beyond the mere ethical arguments in favour of the business case for sustainability (Eccles, Ioannou & Serafeim, 2014; Richardson, 2009). New business models are emerging, but there is also a need for existing businesses to adapt and reform to stay competitive in a changing market. Authors such as Ehrenfeld (2005) and Christensen and van Bever (2014) call for more radical changes that have a greater impact on society and the environment than incremental improvements. According to Christensen and van Bever (2014), investors are driven by short-term capital maximization, rather than investing in innovations that promote long-term prosperity through creation of new markets and jobs. Nevertheless, capital is a key asset for firms that seek to evolve their current state of business by engaging in new innovations and providing leverage for long-term structural changes. Market-creating innovations rely on enabling technology and a novel business model, all together making such innovations very capital intensive (Christensen & van Bever, 2014).

To describe and advance the focus on a business case for sustainability, two research streams will be further explored. First, the concept of business models for sustainability has emerged from corporate sustainability as a research area that is progressively being adopted by market actors. The concept is introduced as a way to bridge the gap between sustainable innovation necessary for sustainable development and the strategies employed by firms (Boons & Lüdeke-Freund, 2013). However, the financial characteristics of how firms can achieve a business model for sustainability is scarcely treated in the literature, and there is limited research on the economic value creation that stems from companies' communication and relations with investors. To examine financial characteristics in greater depth, the second research stream

introduces tensions inherent in sustainability in business. When firms seek to optimize financial performance, trade-offs might arise with social and environmental performance (Van der Byl & Slawinski, 2015). According to Hahn et al. (2015), these tensions are often dismissed in the business model concept and other parts of the literature, by treating the economic, social and environmental dimension of sustainability as separate issues. Thus, the tensions perspective complements the business model view by providing an integrative approach to understand the barriers that currently prevent sustainability investments of a sufficient scale.

Considering the importance of finance to the development of sustainable business, there has been little research that explicitly address tensions inherent in financial characteristics. Our contribution is to extend the current integrative framework for analyzing tensions in corporate sustainability presented by Hahn et al., (2015). The tensions in the current framework does not go in depth to describe financial characteristics in areas such as business model innovation, communication and financial evaluation methods. The thesis will reflect on the tensions that are relevant for how companies create economic value and how communication of their sustainability efforts can attract investors. The mentioned research gaps are subject for further exploration throughout the thesis, with the business model view and tensions lense as the theoretical context.

1.3 Norway's transition to a green economy

As mentioned above, the thesis will explore how businesses attract capital as they pursue measures that will shape their business model to become more sustainable. This investigation is done through the empirical context of Norwegian industry, by examining the case of national transition towards a greener economy from the view of different stakeholder groups. The Norwegian government sees the future low carbon society as being accelerated by stronger political regulations on the national arena, but also globally (Regjeringen, 2016). Within this scenario, business models that contribute to reach a low carbon future will have a competitive advantage. A simultaneous decline of the oil and gas industry, which has previously been the fuel of the Norwegian economy, will eventually have to be replaced by growth in other sectors. In order to address such a comprehensive transition, the Norwegian government has formed an Expert Committee for Green Competitiveness. The Committee is set to deliver recommendations for a strategy to develop and strengthen what is termed "green competitiveness". This entails priorities made to enhance policy development and financing of key sectors and areas in the Norwegian industrial landscape. Part of the committee's task is to give accounts on new financial models and initiatives. This topic will be specifically addressed through the case study of establishing a Green Investment Bank, which has the potential to implement effective methods to finance business models for sustainability in the Norwegian industry.

1.4 Objective and research questions

It is widely acknowledged that companies have a responsibility to reshape their business to become a key societal and environmental player. Through the SDGs and other global initiatives, the business and financial community have signalled that they want to take meaningful action. However, less attention has been put on how to realize the necessary transformations to fulfill this responsibility. The Master's thesis will thus explore the interaction between the state of the current financial system and sustainable economic value creation of companies. More specifically, the objective is to investigate how the development of more sustainable business models is related to the interaction between business and financial actors. We contribute to the literature by expanding a tension framework to address weaknesses of the business model view. This will be done by answering the following research questions:

1. *What are the tensions, related to financial characteristics, when developing business models for sustainability?*

This first research question will be answered by using specific tensions relevant from a financial perspective. These are firstly the temporal tension inherent in the interaction between the current financial system and economic value creation of companies, and secondly the transformative tension associated with the efforts to develop new business models. The findings will form the basis for answering the second research question:

2. *How can the financial community and business together address tensions related to sustainability through the establishment of a Green Investment Bank?*

The second research question deploys a more practical lens by building on the identified tensions. It aims to discuss strategies for how firms and financiers can overcome the tensions through a new financial institution. Both research questions will be answered by central theories from the literature and empirical findings. The qualitative analysis is designed as an exploratory case study, and sets out to provide directions for further research and provide implications for business and policy makers. We commit our attention to the organizational level as unit of analysis, and wish to unravel connections and implications not only relevant for conventional firms, but also the providers of capital and the relationship between business and financial community. Implications of the findings in the case of Norwegian businesses will be further investigated in the form of a tailored report found in Appendix A.

1.5 Thesis structure

The structural logic of the thesis is shown in Figure 1. In chapter 2, we set the scope for the thesis by defining the financial characteristics of a business model for sustainability. The financial characteristics are found in the three topics of business model innovation, communication and financial evaluation methods. These topics are used to guide the structure of the empirical analysis, synthesis and discussion.

After the background context and relevant terms are introduced, chapter 3 describes the chosen methodology and accounts for the data collection and background analysis that were conducted as part of the case study. We then move on to introduce the relevant theoretical context in chapter 4, by describing the extant literature. The case study is introduced in chapter 5 with empirical findings in chapter 6.

In chapter 7, we synthesize concepts from the presented theory and findings from the case study to answer RQ1. The discussion in chapter 8 reflect on the findings and provide answers to RQ2. We then conclude in chapter 9 before outlining implications for business and industry along with avenues for further research in chapter 10. Finally, Implications for the establishment of a Norwegian Green Investment Bank is present in a separate report to the Expert Committee on Green Competitiveness in Appendix A.

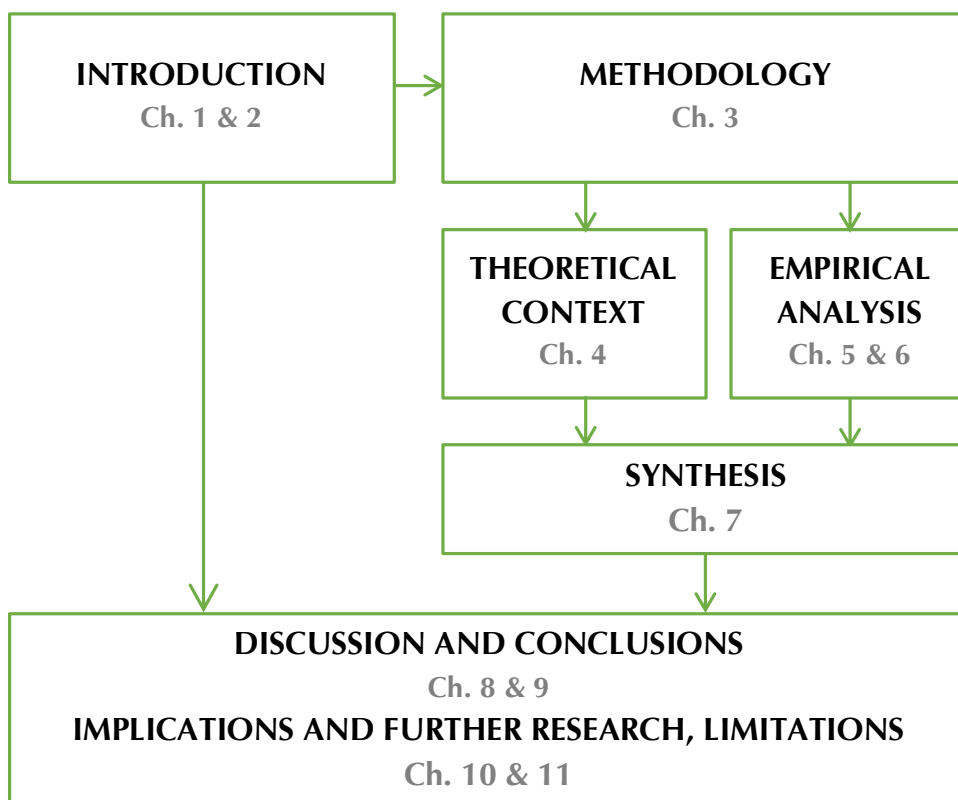


Figure 1. Schematic overview of the thesis structure.

2 Scope and context

The purpose of this section is to outline the scope of the thesis by providing relevant background information and serve as a context to answer the research questions. Firstly, we introduce financial characteristics of business models for sustainability through the topics business model innovation, communication and financial evaluation methods. After this, key historical developments of sustainability in business is summarized, before the state of the current financial system is presented. Following this, an overview of sustainability investing is introduced. The last section covers sustainability communication.

2.1 Financial characteristics of business models for sustainability

To be able to answer the first research question, we have identified three topics that can be said to treat business models for sustainability:

Identified financial characteristics of a business model for sustainability:

Business model innovation: How companies have configured their ability to capture economic value is a central part of the business model. In other terms, this involves the cost structure and revenue stream that realize the business case for sustainability. The economic value capture also determines the profitability and attractiveness for investors, and is closely tied to innovations of the current business model. Depending on the degree of transformation, changes to the business model requires different types and amounts of capital. As a consequence, various terms and obligations are tied to the different types of capital, such as debt and equity. In addition, creation of new business models are capital intensive and usually has to be externally funded, while smaller changes can be financed from the company balance sheet.

Communication: How the firm presents the value proposition and value creation to existing and potential investors. Communication consists of the internal governance structure and stakeholder engagement as part of external communications. Many firms experience confusion in navigating the the jungle of initiatives to find a suitable framework to guide these efforts. In a financial context the external communication is a medium for interaction with investors. External communication is often used to ensure credibility and legitimization of operations, for instance through communicating value creation through ESG by non-financial parameters. The use of ESG in communication can be taken as the same as using ESG as a *financial evaluation method*, as outlined beneath.

Financial evaluation methods: How investors use financial metrics, ESG factors, and other assessment methods that are included in the total evaluation of an investment opportunity. These methods are used by investors to assess the viability of investing

in a project. Analogous to the latter category, financial characteristics of evaluation methods can be found to overlap with *communication*.

2.2 Historical development of sustainability in business

As mentioned in the introduction, a recent major event on the global arena is the adoption of the SDGs. The goals seek to achieve what the MDGs did not by operating within the limits of the biosphere (Griggs et al. 2013). Within the academic sphere of strategic management, the research concerning sustainability in business has developed alongside the increased attention given to sustainable development in the global community. Global events coordinated by the UN have pushed the field forward as new terms have been introduced and established through adoption by the world leaders. Historically, the environmentalist view has been the key driver in putting sustainability on the agenda. In 1972, the UN Conference on the Human Environment was arranged, resulting in the establishment of the United Nations Environment Program (UNEP). In the following years, societal issues were increasingly interlinked with conservation of the physical environment and the notion of sustainable development introduced. It was then conceptualized and put on the global agenda by the World Commission on Environment and Development (WCED) in the report titled *Our Common Future*, leading up to the Earth Summit (UNCED) in Rio de Janeiro in 1992.

Sustainability initiatives have historically been developed separately from business, by being an additional factor companies should address together with financial performance. From *Our Common Future* until today, sustainability initiatives have increasingly developed towards addressing climate change and incorporating ESG values in business, as outlined in Figure 2. As of today, over 400 climate or sustainability disclosure regimes are estimated to exist (TCFD, 2016), which makes comparability very challenging. The broad diversity of sustainability initiatives show how the business and financial sector have already developed tools to nudge the transition of the global economy. Like indicated in the figure, new initiatives are also under development to be launched by the end of 2016.

One of the new sustainability initiatives is being developed by the Financial Stability Board (FSB), the international body that monitors and makes recommendations about the global financial system. The FSB has initiated the Task Force on Climate-related Financial Disclosures (TCFD) to systematize the wide range of sustainability initiatives. According to the Task Force, they will “develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders.”(TCFD, 2016).

Timeline: Historical development of sustainability initiatives, 1972-2016

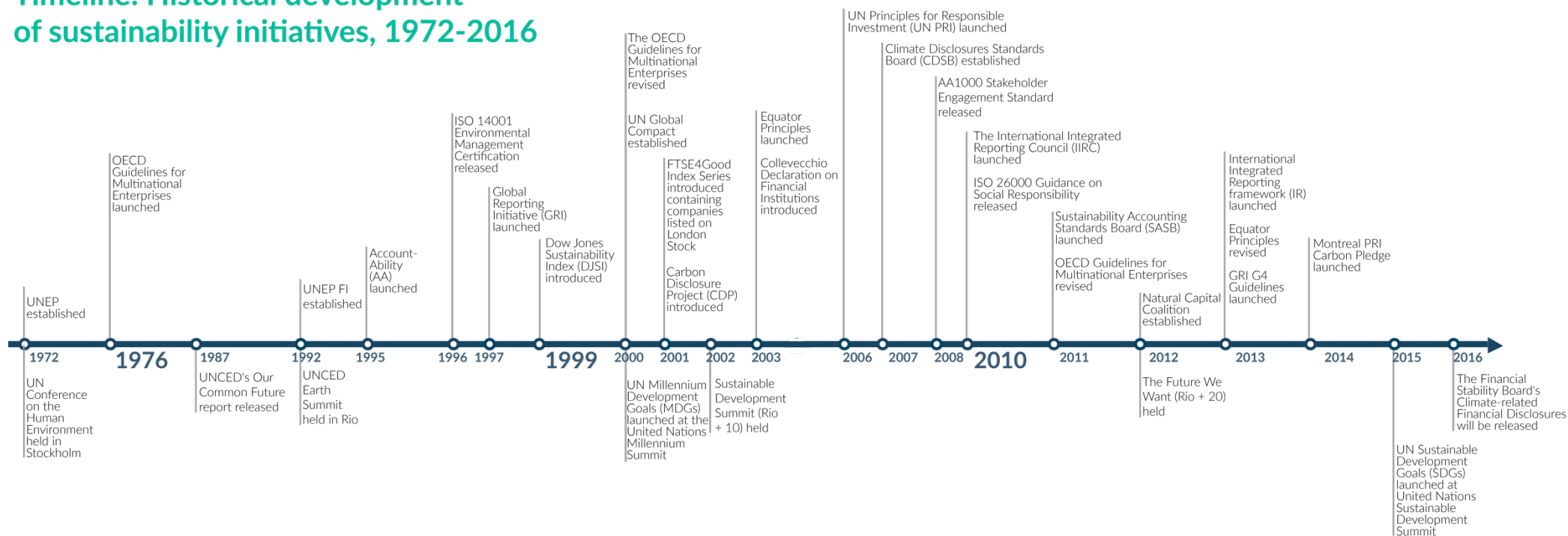


Figure 2. Timeline of key historical events of sustainable development.

In their work, the Task Force will assist companies to better understand the needs of the financial community regarding what kind of disclosures are necessary to sufficiently account for climate change risks, and also to align their disclosures with the need of investors.

2.1.1 Interpretations of sustainability concepts

Sustainability in business has been addressed through a diverse range of concepts. At pace with the shift from environmentalism to sustainability, the academic focus has diverged away from eco-efficiency to the “triple-bottom-line” view (TBL), which incorporates the three pillars of sustainability: economic, social and economic (Dyllick & Hockerts, 2002; Elkington, 1997). Companies have in the past used eco-efficiency as their answer to address sustainable development, although this is insufficient as a holistic solution (Welford, 1997). This entails implementation of measures on a micro level, thus led by objectives of incremental changes in the firm’s value chain as the system boundary. One of the main drivers for this view is the objective of obtaining financial returns in the short run. Later on, this view has been challenged by the growing concept of *corporate sustainability* as conceptualized by Dyllick and Hockerts (2002). They define corporate sustainability with the TBL approach as a requirement to succeed in the long run, and thereby shift the attention outside the firm level to a more holistic and systemic view. The SDGs promote an integrated approach to sustainability by balancing the economic, social and environmental dimensions as shown conceptually in Figure 3.

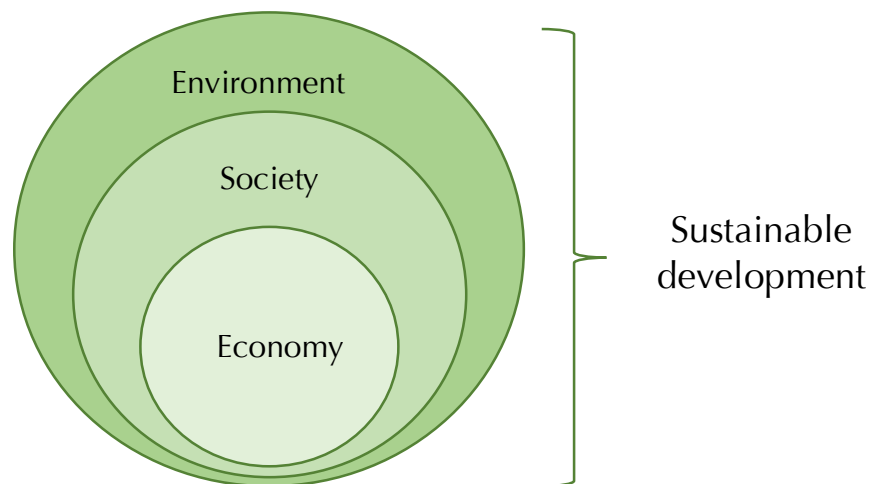


Figure 3. Visualization of the dimensions of sustainability. After Adams (2006).

In addition to corporate sustainability, the extant literature within organizational science and strategic management holds a range of different terms and concepts that are used interchangeably. Overall, the different branches all recognize the responsibility of business and address this through several perspectives. Thus, it is

important to emphasize sustainability as being multidisciplinary in nature (Stubbs & Cocklin, 2008; Schaltegger et al., 2016). As social constructs, terms related to sustainability may constitute different approaches dependent on the organizational context (Dahlsrud, 2008), but to a large extent they target corporate sustainability. Examples are sustainable entrepreneurship, sustainability innovation, sustainability management, shared value creation (Porter & Kramer, 2011), corporate social responsibility (CSR) (Schaltegger et al. 2015; Van der Byl & Slawinski, 2015; Dyllick & Hockerts, 2001, Porter & Kramer, 2006), base of the pyramid (BOP) (Prahalad & Hart) and business sustainability (Slawinski & Bansal, 2015). Defined as “the ability of firms to respond to their short-term financial needs without compromising their (or others) ability to meet future needs” (Slawinski & Bansal, 2015), business sustainability seeks to balance the need for short-term economic performance and a long-term view of value creation within the limits of the planetary boundaries (Rockström et al., 2009).

CSR is one of the most widely used sustainability concepts (Dahlsrud, 2008), and is defined as “The responsibility of enterprises for their impacts on society” by the EU Commission (EU Commission, 2011). Porter and Kramer (2006) emphasize how CSR can be beneficial for both the company and the society, but problematize that many CSR initiatives are uncoordinated and often address generic societal issues that are not necessarily linked to the company activities. Consequently, in 2011 Porter and Kramer changed their opinion of CSR and call for a new approach because the “social responsibility” mind-set places societal issues at the periphery, not in the core of business. They argue that the solution lies in the principle of shared value, which involves generation of economic value in a way that also creates value for society by addressing its needs and challenges. Some of the mentioned concepts can be taken to intersect and converge into a blur, like CSR and business sustainability (Slawinski & Bansal, 2015). Instead of delving on one concept, we build on the notion that sustainability encompasses and integrates both financial and ESG concerns.

2.2 State of the current financial system

As mentioned in the introduction, tremendous investments are needed into sustainable solutions. The financial services and investment sectors control trillions of dollars that could potentially be directed towards a green economy. More importantly, long-term public and private institutional investors are increasingly interested in acquiring portfolios that minimize environmental, social and governance risks, while capitalizing on emerging green technologies (UNEP, 2011). This section elaborates on the investment needs of a green economy, and outlines the ecosystem of financial institutions, before giving a critical view of the current system.

2.2.1 Investment needs for a green economy

The global financial system is still in recession since the economic crisis in 2008, which makes it the worst international economic crisis since the Great Depression (Barbier, 2009). In the process to restore growth, Barbier (2009) promotes the opportunity to “rethink” the financial system, and rather orients it towards a greener economy in order to avoid future crisis. One recent study indicates that the low-carbon energy market size will reach US\$ 2.2 trillion by 2020 (UNEP, 2011). Institutional investors, despite being considered risk averse and conservative, provided 65 per cent of the finance for renewable energy in 2008 to 2009, contributing with US\$ 192 billion out of a total of US\$ 294 billion. Of this amount the largest category of investors worldwide, pension funds, represented more than US\$30 trillion in assets (Christensen and van Bever, 2014). The remainder was spread among venture capital (VC), private equity (PE), and research and development (R&D) funds (UNEP, 2011). However, these flows are still small compared to investment needs and must be scaled up quickly if the transition to a green economy is to jump-start in the near term (UNEP, 2011).

Financial institutions can lead investments into certain industries and divest from other industries or companies, thus playing an important role in allocating capital across industry sectors (Jeucken, 2014). Large institutional investors are “Universal Owners”, as they often have highly-diversified and long-term portfolios that are representative of global capital markets. Their portfolios are inevitably exposed to growing and widespread costs from environmental damage caused by companies. In effect, they can positively influence the way business is conducted in order to reduce externalities and minimize their overall exposure to these costs. Institutional investors can, and should, act collectively to reduce financial risk from environmental impacts (UNEP FI, 2011).

2.2.2 Ecosystem of financial institutions

In the financial sector, there are many sources of capital available for businesses. The financial ecosystem involves the propagation of a complex system of banking services, securities markets, and other financial instruments (Richardson, 2009). All together, they play a crucial role in the global economy through their position as intermediaries. In addition to allocation of financial assets, risk management and provision of market prices, the institutions have information and knowledge about various market sectors and developments, and an influence on the direction and development of the economy (Jeucken, 2014). Financial institutions can largely be divided by two main distinctions, as seen in Figure 4. The first category, depository institutions, contains financial institutions that lend out entrusted funds. Hereunder we find commercial banking. Among the non-depository institutions, we find investment banking, with actors that specialize in investments through securities and loans. Such investments often entail higher risk than commercial banks, and hereunder we also find

venture capitalists. A pension fund is another non-depository institution, but is more vulnerable to systemic risk like environmental change. A third subcategory is securities market institutions that manage capital market transactions and provide advisory services. In this category we find what is conventionally termed investment banks. Finally, specialized funds for sustainable development are found in this category. These multilateral governmental institutions have the objective to stimulate specific wealth-creating activities and include guarantees for loans by commercial banks.

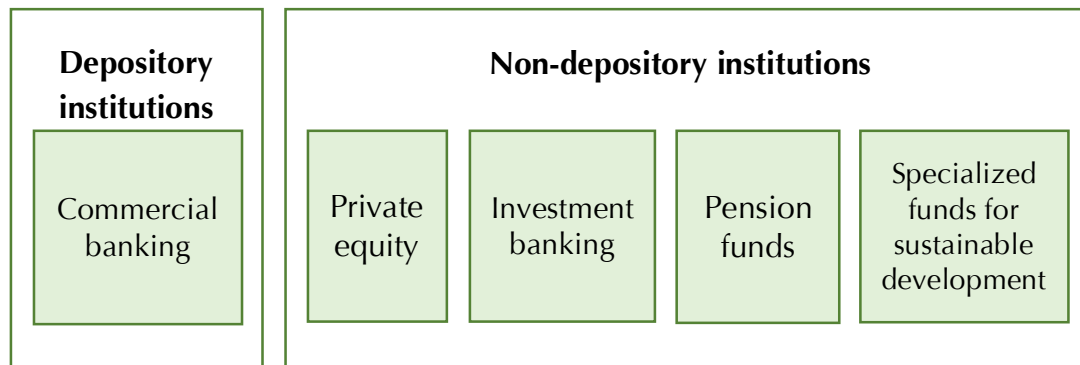


Figure 4. *Categorization of financial institutions.*

2.2.3 Criticism of the current system

Most large, diversified equity funds invest in many companies with significant environmental impacts that undermine the environment’s ability to support the economy (UNEP FI, 2011). Not because fund managers are unaware of climate-related risks, but due to flawed metrics and a variety of factors that demand short-term returns and high hurdle rates (Christensen & van Bever, 2014). Furthermore, despite the worldwide agreement to reach the SDGs and climate targets, real impact is not deemed possible without changes in the economic playing field (Griggs et al. 2013). The integration of sustainability in business is thus founded on greater planetary concerns in economic governance, meaning that the current trade, investment and financing regimes must comply with environmental goals (Biermann et al., 2012). The majority of the critique against the current system is the short-termism inherent in investment decisions. According to Christensen and van Bever (2014), this short-termism favours business innovations that are only improving efficiency and performance, rather than promoting market-creating innovations set for the long-term. With the current use of financial metrics, these investments are simply considered too risky.

On top of deficient metrics, there is an integrated and abiding belief that firms exist to maximize shareholder value (Martin, 2011). These beliefs call for a shift from short-term performance to long-term value creation: “No policy can maximize return for all shareholders, the only viable approach is to manage the company to maximize the value of the enterprise in the long term” (Christensen & van Bever, 2014). The

role of financial institutions is to receive, invest and return assets for the benefit of individuals and organizations, and invest where the return is highest. This can be contended in the sense to question the effectiveness of the current cost of capital, as it is no longer believed to serve as a means to efficiently allocate capital. Reasons for this can be connected with “capital market myopia”, when participants in the capital market ignore the consequences of collective investment decisions because they make sense individually (Sahlman & Stevenson, 1985). Sahlman and Stevenson showed that capital market myopia causes overfunding of certain industries and unsustainable levels of valuation in the stock market. There is a choice to value investment opportunities through the risk-adjustment of the cost of capital, since the true cost of capital makes investing for the long term much easier. Short-termism is created by investors (Barton and Wiseman, 2014) through the use of metrics that all value efficiency.

2.3 Investing for sustainability

Many measures have been taken to facilitate large-scale financing for the global economic transformation. The increasingly green orientation of capital markets, the evolution of market instruments like carbon finance and microfinance, and the established green funds and banks have all contributed to counteract the economic slowdown of recent years. This section introduces the notion of sustainability investing, along with the associated toolbox of financial instruments and establishment of specialized Green Investment Banks.

2.3.1 The emerging concept of sustainability investing

The financial sector's potential to leverage positive changes in the economy has historically been addressed through the movement for *socially responsible investment (SRI)* (Richardson, 2009). A more recent trend is *sustainability investing*, although it only constitutes a small fraction of total investments. In 2009, the global market size for institutional assets was estimated at just over US\$ 121 trillion. Of the actively managed components of these assets, controlled by a broad range of large institutional investors, only 7 per cent were subject to the integration of environmental, social and governance (ESG) considerations (UNEP, 2011). Sustainability investing, often used synonymously with sustainable investing, is sometimes split into the subcategories of socially responsible, green and faith-based investments because they have different approaches (Lesser et al., 2015). One example of a definition of sustainability investing is the one posed by RobecoSAM, the company that together with the S&P Dow Jones Indices publishes the globally recognized Dow Jones Sustainability Indices (DJSI): “Sustainability investing is when investors recognize the importance of corporate sustainability and explore ways to integrate environmental, social and governance factors into their investment strategies.” (RobecoSAM, 2016).

The various definitions are not further elaborated in this thesis, and we will use sustainability investing as the integration of ESG metrics in business strategies and investment decisions, to enhance and measure performance in both environmental, social, governance and financial returns. Investing in companies with good ESG policies has been shown to be competitive with market indices like S&P (Thomson Reuters, 2016). As shown in Figure 5, the performance of a sustainable index has been shown to outperform the market index over ten year period. An example of a sustainability investor is Arabesque, that has developed the ESG Quant fund, “which uses ESG performance as a core ingredient for quantitative models for buying and selling stocks with technology that integrates environmental, social, and governance (ESG) data with quantitative investment strategies” (Thomson Reuters, 2016).



Figure 5. Financial performance of a fossil free index compared to S&P 500. (Source: Thomson Reuters, 2016).

2.3.2 Financial instruments

Sustainability investing is characterized by new financial instruments and novel combinations of conventional instruments. Some of these are *green bonds and sustainability bonds, sustainability indices and sustainability networks*.

Green bonds and sustainability bonds

Green bonds share characteristics with conventional bonds, but are earmarked for projects that have a positive environmental or climate effect. This financial instrument makes borrowing for sustainability projects cheaper, and facilitates products that an investor wants and a developer can benefit from. *Sustainable bonds* is a very recent newcomer in the family of bonds. The movement has been driven forward by the

emerging popularity of green bonds: “There is a growing progression towards sustainable bonds with a wider focus on environmental and/or social positive impact” (Nasdaq, 2016).

Sustainability indices

A sustainability index is a tool intended to provide investors with objective benchmarks to guide their investments in and track the financial performance of companies that are sustainability leaders. Companies that appear in one or several of these indices are evaluated to incorporate sustainability in their operations and communication, and could be said to contribute to best practice. Some of the most important global sustainability indices are the Dow Jones Sustainability Indices (DJSI), S&P ESG Index Family, FTSE4 Good Index Series, Corporate Responsibility Index, MSCI ESG Indices and Thomson Reuters Corporate Responsibility Indices.

Sustainability networks

Sustainability networks have proved to be important for sustainability communication across sectors and national borders. Some of the most influential networks are the World Business Council for Sustainable Development (WBCSD), UN's Sustainable Energy for All by 2030 (SE4ALL), the World Resources Institute (WRI) and the network for companies going renewable by 2020, RE100. The sustainability networks all contribute to exchange information between firms and entities with the target to contribute to sustainable development. Networks were found to be important drivers for innovation and most importantly provides major business opportunities internationally.

2.3.3 Green Investment Banks

The mobilization of private funding to sustainability projects has been unproportional to the investment needs. And while banks have a fairly good consciousness of climate change problems and their consequent risks, this awareness is rarely followed by an effective commitment (Stanghellini et al., 2008). As a consequence, several nations have initiated Green Investment Banks (GIBs). For example, the pioneer UK Green Investment Bank has provided a foundation for more co-financing and risk sharing between the private banking sector and public entities (UNEP, 2011). For a full introduction of the historic development of GIBs, see the report *Establishing a Green Investment Bank* in Appendix A. The role of the public sector is indispensable in freeing up the flow of private finance towards a green economy (UNEP, 2011). For this reason, governmentally initiated GIBs have become important drivers for the attraction of private capital into low-carbon and climate resilient infrastructure. If such financial institutions improve their sustainability performance with profitable returns, it may motivate more and more financial institutions to assume a responsible behavior (UNEP, 2011). Their sustainability communication is usually based on best practice principles and indicators, which measure GIBs' sustainability performance. Such sustainability communication should ideally be implemented by all banks globally

because it helps banks to steer their activities towards green and sustainable financing, and actively contribute in the transition toward a lower-carbon society (Stanghellini et al., 2008).

2.4 Sustainability communication

Focus on sustainability has increasingly been reflected in firms' external communication, which includes all contact with stakeholders. Sustainability communication is not only important to attract the right investors, but is also tied to firms' internal governance structures and implementation of ESG factors. This section introduces means of communicating and an overview of the most acknowledged and commonly used sustainability initiatives today.

2.4.1 Overview of the most commonly used sustainability initiatives

Today, there is an extensive range of initiatives by non-profit organizations, global bodies and networks that firms can adopt in their efforts to become a truly sustainable company. However, there is no standardized system for sustainability communication which is sufficiently adopted by both firms and financial institutions. A range of attempts have been made to solve the problem, including different kinds of initiatives like CDP, Integrated reporting, UN PRI and UN Global Compact. A common approach to external communication is consideration of sustainability issues in a company report as a part of making and assessing corporate sustainability strategies. This information can be issued within the annual report, in a separate "sustainability report" or in an "integrated form" (Baumgartner & Ebner, 2012). Integrated reporting is here a combination of a traditional, financially oriented annual report with the material parts of a corporation's sustainability report, showing the relationships that exist between the different dimensions of performance (Eccles & Krzus, 2015).

Mapping of current initiatives

Before conducting interviews as part of the case study, a comprehensive background study was done to get an overview of the different sustainability related initiatives that exist today. This was done not only to guide the interviews, but to get a grasp of the diversity, recognition and significance of the hundreds of initiatives that companies can engage in. Based on the scope of analysis described in chapter 3.2.3, the selected initiatives are summarized in Table 1. The initiatives can be classified as normative frameworks, process standards, management systems or comparative mechanisms. Sustainability initiatives are useful for firms who want to systematize and communicate their sustainability efforts. The selected initiatives are intended to guide firms, investors (e.g. fund managers, financial institutions, private investors) and public bodies in their efforts to incorporate sustainability into the organizational strategy and daily operations. The initiatives are designed to fit the needs of different actors. Some are intended for all organizations to be implemented in their governance

structure, while others are only intended for investors to address sustainability in their investments. All of the listed initiatives are defined as being voluntary mechanism, also termed soft law. New initiatives are also emerging, of which some of the most promising are described in greater detail in the report *Establishing a Green Investment Bank* in Appendix A.

2.5 Summary

In this section we have defined the scope of our thesis as to be constructed around the financial characteristics described by business model innovation, communication and financial evaluation methods. These characteristics will be used to guide the further analysis. We have presented facts that establish a substantial need for investments in green technologies in the coming years. This is a result of an intensified focus on sustainability led by global events and the United Nations various initiatives, with the SDGs as the most recent event. The financial community will be a key contributor to channel funds to accelerate the green transition, albeit the current financial systems has some weaknesses that represent inertia related to realization of green innovations with a long-term perspective. These flaws of the current system will be examined in greater detail by looking at tensions in corporate sustainability. Furthermore, sustainability investing is a fairly new concept that has emerged among investors to specifically incorporate sustainability in investment decisions. Sustainability investing is done through the use of conventional financial instruments that are earmarked and tailored to meet the demands and features of renewable and low-carbon technology solutions. Finally, for companies looking to address sustainability in their internal and external communication, a number of different soft-law initiatives and standardized approaches are readily available. What initiatives that offer effective frameworks to target investors is also subject for further investigation through the empirical analysis.

Initiative	SRI governance and codes of conduct (Richardson, 2009)				Intended for
	Normative framework	Process standard ¹	Management system	Comparative evaluation mechanism	
AccountAbility ^b		•			A
B-analytics		•		•	I, F
Bloomberg ESG Database		•			A
Carbon Disclosure Project (CDP) ^a		•		•	A
Climate Bonds Standard				•	I, P
Climate Disclosure Standards Board (CDSB) ^a		•			A
Collecchio Declaration on Financial Institutions	•				I
Equator principles (EP)	•		•		I
Global Reporting Initiative (GRI) ^b		•			A
Greenhouse Gas Protocol Initiative (GHGPI) ^{2,a}		•		•	A
International Integrated Reporting Framework <IR> ⁴		•			A
ISO 14001			•		A
ISO 26000	•				A
Natural Capital Coalition		•			A
Sustainability Accounting Standards Board (SASB)	•			•	F, P
The Carbon Principles	•				I
The Climate Principles	•				I
The Climate Registry ^a		•			F, P
Trucost ^a		•		•	A
UN Global Compact	•				A
UN Principles for Responsible Investment (UN PRI)	•	•			I
UNEP Finance Initiative	•				I

I – Investors

F – Firms

P – Public entities

A– All of the above

1) “Process standard” includes

a) Carbon emission accounting and reporting tools

b) Sustainability reporting

2) The GHG Protocol Initiative is comprised of two separate, but linked modules:

1. The GHG Protocol Corporate Accounting and Reporting Standard

2. The GHG Protocol for Project Accounting.

3) IASB is the standard setting body of the IFRS Foundation

4) <IR> is the standard of International Integrated Reporting Council (IIRC)

Table 1. Overview of the most acknowledged global sustainability initiatives.

3 Methodology

In this chapter, we outline the chosen research design based on the purpose of the thesis, further described in chapter 3.1. We have deployed several research methods as part of our research design, and the empirical findings rely on convergence of evidence from multiple sources. The data collection was largely based on interviews with six different stakeholder groups, but also relies on data gathered from conferences and background analysis of sustainability initiatives, as found in chapter 3.2. In chapter 3.3, we comment on the quality of the research. Literature was mainly provided as a theoretical context and framework to guide the data collection and analysis.

3.1 Research design

The research design will be explained in further detail through the introduction to an exploratory study and the rationale for conducting a case study. Then the logic behind a revelatory case study will be presented, as well as the inductive analytical strategy and the associated coding process.

3.1.1 Exploratory study

The chosen research design was based on the exploratory nature of the topic of the thesis. With the objective to investigate the relationship between companies and financial actors, along with practical implications for how to finance business model changes, an exploratory study was found to be most suitable. Furthermore, the research field concerning business models for sustainability is emerging, and there has been little evidence of research that treats the financial aspects of how firms can embed more sustainable business models. Due to the novelty of this area, an exploratory study was found appropriate to provide propositions and avenues for further research.

3.1.2 Rationale for conducting a case study

An exploratory case study was chosen as the main design to guide the research. The definition of an exploratory study is presented as "A case study whose purpose is to identify the research questions or procedures to be used in a subsequent research study, which might or might not be a case study." (Yin, 2014). According to Yin (2014), a case study is used as a common research method within the field of business and management. It is here used to understand complex social phenomena, and allows for a holistic and real-world perspective when studying organizational processes, managerial processes and maturing of industries. In addition, a case study is often deemed useful in cases where the focus is put on contemporary issues and where the researcher has no control of behavioural events. The research on developing a business case for sustainability has emerged from global pressure on sustainable development, and the transition to a green economy is a highly contemporary process. It is dynamic in nature and develops differently depending on the geographic and temporal scope that is used. It is also a

global process characterized by great complexity and uncertainty which individuals are not able to control. In addition, a case study is deemed suitable when the research questions start with “how”, which is true for the second research question in our case.

3.1.3 Revelatory case study

The chosen research design is a revelatory single-case study. A revelatory study describes the process of observing and analyzing a phenomenon that has previously been inaccessible to social theory (Yin, 2014). As mentioned, the transition to a low carbon society is a societal and global process that is novel in historic terms. The chosen case is conducted within the boundaries of Norwegian industry and sets out to investigate the organizational level as the chosen unit of analysis. The findings rely on multiple sources of evidence from a range of different stakeholders through interviews, and collection of data from a background analysis. To some extent, theoretical propositions were used to guide the data collection and analysis, but the analytical strategy was mainly based on an inductive analytical strategy.

3.1.4 Inductive analytical strategy

An inductive strategy is used to analyze the case study evidence by working your data from the ground up (Thomas, 2003). In our case, this meant to use an inductive approach to examine the findings of the interview data. The inductive strategy provided a convenient and efficient way of analyzing the large extent of data that was gathered. It allowed us to condense the extensive amounts of data into a brief, summarized format and to establish links between the research questions and the key takeaways outlined through the summary. In this way, the analysis was determined in a deductive manner by the research objectives, and in an inductive manner through several readings and interpretations of the raw data. The overall findings are thus based on the research questions and empirical findings.

Coding process

The raw data was firstly organized by an initial read through followed by categorization into specific segments. This resulted in more than 70 categories that were used to guide further analysis. These categories were examined for overlap and similar findings, and new categories were formulated. In the next step, the raw data was examined a second time, now placed into new categories. Again, redundancy among the categories were reduced, resulting in three main categories with two to five subcategories. As the final stage to present the findings, the subcategories were placed in the three topics of financial characteristics: business model innovation, communication and financial evaluation methods. Figure 6 shows the coding process used to analyze the raw data. The empirical findings are presented in chapter 6.0 as short summaries categorized and labelled, and the key takeaways are then summarized at the end of each section. Direct quotations are clearly marked, of which all contributions are recited with the interviewees’ consent. Quotes from public conferences and seminars are directly recited without permission, since this is publicly available information. One weakness

connected to the thematic and highly summarized presentation form is that it deprives some of the richness and intricacies of the various perspectives in the interview data.

Initial read through raw data	Categorization into specific segments	Labelling of segments based on overlapping findings	Formulating new categories, second read through of raw data	Reduce overlap and redundancy among the categories	Compiling summaries of the most important categories
45 documents, many pages of text	One spreadsheet, 70-80 categories	One spreadsheet, 50-60 categories	One document, many segments of text	One spreadsheet, 15-20 categories	One document, 3 main and 2-5 subcategories

Figure 6. A schematic overview of the coding process.

3.2 Data collection

The case study data was collected through a qualitative approach, which is well suited for research that is exploratory in nature. The choice of a qualitative study allowed us to investigate the views of the chosen stakeholder groups by describing variations, group norms and explain relationships between the different actors. Moreover, unlike a quantitative study, the qualitative approach gives way for flexibility in the research design, in terms of the methods used and iterative style of analyzing and categorizing the data. Semi-structured interviews and a background analysis were chosen as the main methods of data collection. In total, the list of interviewees reached 49 persons from 45 interviews, distributed on 30 structured and 15 unstructured interviews. In addition, 13 conferences were attended or streamed, resulting in a total amount of 24 speaker references.

3.2.1 Semi-structured interviews







Format and general information

In total, 30 structured interviews were conducted with 33 interviewees in the period from March 1st to April 30th. The interviews were mainly performed through personal meetings in the locations of Oslo, Trondheim, London and Brussels, while some were carried out over telephone or by video conference calls. In the majority of the cases both researchers (i.e. authors) were present, while some interviews were conducted by only one investigator. Some interviews were shorter or longer, but in average they lasted for one hour. 25 of the 30 structured interviews were consented to be audiotaped, and notes were taken from all interviews for later records.

Selection of the interviewees

The interview process was designed with the intent to apply a stakeholder perspective inherent in the theory on business models for sustainability. As such, we sought to interview a wide range of different stakeholder groups. Overall, financial, governmental, research and

international institutions are represented together with interest organizations and companies representing 10 different sectors. Table 2 shows an overview of the chosen stakeholder groups and the organizations that was represented in each group.

	Stakeholder group	Stakeholder	Count
	Financial institutions	<i>Commercial banking</i> <i>Investment banking</i> <i>Pension fund</i> <i>Specialized funds for sustainable development</i>	8
	Governmental institutions	<i>Public enterprise</i> <i>Ministry</i> <i>Norwegian Embassy</i>	7
	Companies	<i>Oil & gas</i> <i>Utility</i> <i>Solar</i> <i>Bioenergy</i> <i>Technology</i> <i>Software</i> <i>Manufacturing</i> <i>Communications</i> <i>Consulting</i> <i>Electrical</i>	11
	Research institutions/academia	<i>Climate research</i> <i>University</i>	3
	Interest organizations	<i>Wind power</i> <i>Climate foundation</i>	2
	International institution	<i>Intergovernmental</i> <i>Global partnership</i>	2
Total number of stakeholders			33

1) EIB/EFSI – European Investment Bank (EIB)/ European Fund for Strategic Investments (EFSI)

2) FMFM/ EAIF – Frontier Markets Fund Managers/ Emerging Africa Infrastructure Fund

3) DECC - Department of Energy and Climate Change, UK

4) GFDRR - Global Facility for Disaster Reduction and Recovery (GFDRR)

Icons made by Freepik from www.flaticon.com

Table 2. Overview of interviewed stakeholder groups.

The context for selecting interviewees was industry development to meet the objective of enhancing green competitiveness in Norway. The interviewees were then primarily selected due to their position as experienced representatives for important stakeholder groups relevant for the establishment of a green finance institution. In the majority of the cases, the people interviewed were chosen based on their current workplace, while in some cases they were also asked about their former employment situation. In some cases, interviewees would express their personal opinions based on former experience, in which case they would also speak as individuals and not on behalf of their company. Overall, this has given valuable contributions to enlighten complex issues discussed in the thesis. All statements are interpreted in the light of the interviewees' experience and which stakeholder group they represented. It should thus be mentioned that there is bias due to varying degrees of vested interest in the development of industry policy and other business related developments. This is believed to have affected their ability to provide objective and unbiased reflections and answers to the questions. On the other hand, this gives way for interesting findings from a stakeholder view subject for further discussion. Furthermore, many interviews were performed in Norwegian. Some linguistic nuances may have been lost during translation to English.

Developing interview questions

The interviews were semi-structured, and open-ended, meaning they were conducted in a conversational manner subject to adaptation during the questioning. To guide the interviews, a general interview-guide was prepared in advance. The guide was initially based on the theoretical context of business models for sustainability and a background analysis of sustainability initiatives, and divided into the thematic areas of "Business models for sustainability", "Sustainability initiatives and reporting mechanisms", "Establishment of a green investment bank" and "company specific questions". The questions in each part were then adapted before each interview to fit the stakeholder group being questioned, either being a financial institution, industry actor or other type of public or private organization. The questions were also adapted to fit the background and position of the person being interviewed in order to get more in-depth information in certain areas. In other cases, the interviewees were encouraged to speak more freely and resonate around certain topics. Due to the broad range of topics founded in two different research streams, the direction of the conversations during interviews might have changed too soon or too late. Considering the extent of the interview process, both in numbers and time frame, we experienced a learning process that in turn allowed for alterations to the pre-prepared interview guide. More specifically, we were better positioned to frame the questions in order to get answers to desired and new topics which were revealed during the process. One of the weaknesses with such an approach, is that the collected amounts of data might vary with each question depending on the level of knowledge and relevance for the different interviewees.

3.2.2 Unstructured interviews

In addition to the semi-structured interviews, 15 informal meetings and unstructured interviews were performed. These were not audiotaped, and those that did not directly contribute to answer the research questions serve as background information and in-depth understanding of relevant

industries. A total overview of the interviewees and participants in the structured and unstructured meetings is found in Appendix B, listing full names and position.

3.2.3 Conferences and seminars

To expand the diversity of empirical data, attendance on conferences and seminars was included in the methodology for two reasons. Firstly, to strengthen the quality of the available material and secondly to buffer the weaknesses associated with exploratory research through interviews. The views expressed in conferences are not weighted as heavily as the one-to-one stakeholder interviews. However, by adding conferences as an additional source of information, the viability of the empirical data increases and chances that important perspectives were missed decreases. Conferences and seminars were selected partly out of targeted attendance and partly as a result of the snowball method after tips from interviewees and resource persons. The common denominator is high relevance for the topic of the thesis. A full overview of the attended conferences and seminars is found in Appendix B. In total, 13 relevant conferences were attended or streamed, which resulted in a total amount of 24 speaker references used in the empirical analysis.

3.2.4 Background analysis of sustainability initiatives

As outlined in the introduction, sustainability communication is an important aspect of the process of attracting capital to realize a more sustainable business model. To supplement the interviews, we sought to conduct an analysis of the current available sustainability initiatives in order to get an overview of the ones relevant for sustainability investments. Hundreds of sustainability initiatives have been found to exist globally, and thus a framework was chosen to guide the analysis along with a limitation of scope.

Framework for analysis

The sustainability initiatives most widely adopted have been categorized in four main categories after Richardson (2009). First, *normative frameworks* sets substantive performance standards for social and environmental conduct. Secondly, *process standards* enable the assessment, verification and communication of performance, and can be said to be a form of governance. To provide a greater level of detail, initiatives in this category were then classified to be either *carbon emission accounting and reporting tools* or a form of *sustainability reporting*. The third category of *management systems* represents initiatives that create a structure to guide the management and impacts of environmental and social activities. Finally, initiatives can also be categorized as *comparative evaluation mechanisms* that evaluate and rank corporate performance for the purpose of being a benchmark for investments.

Scope of the analysis

The initial list was found by screening relevant academic papers on climate finance and socially responsible investment. Afterwards, the snowball method was utilized to find initiatives that had missed the academic radar, especially with the many novel initiatives in mind that would

have escaped due to the natural “lag” associated with scientific research. The scope of the sustainability initiatives was limited to the codes of conduct and governance standards for responsible finance with a global reach. Initially, 120 initiatives were identified as especially relevant. The inclusion criteria was set to global initiatives that provided a relationship between socially responsible investments (SRI) and mechanisms for governance of climate finance. The required size of the initiative was set to substantial to ensure the global reach, measured on how many members participated in the initiative (nations, organizations, experts). To limit the scope, an exclusion criteria was set for initiatives with a narrow focus on specific sectors, limited size or an insignificant geographic scope. 70 initiatives remained after the screening process. To segregate overlapping initiatives and rule out insignificant ones, three groups were constructed: Sustainability initiatives, sustainability indices and sustainability networks. After the final screening, 19 sustainability initiatives remained.

3.3 Quality of research design

The quality of the chosen research design can be assessed by looking at the three concepts of constructed validity, reliability and confirmability.

3.3.1 Constructing validity

Validity refers to the integrity of the constructs and conclusions that are generated through the study. One way of assuring validity is by using triangulation, referring to multiple sources of evidence and methods of data collection. If the evidence converges it strengthens the validity of the case study (Yin, 2014). We sought to ensure validity by collecting data through interviews, conferences, seminars and a background analysis. The use of seminars and conferences to supplement the views uncovered during the interviews can be seen as a validation measure. This brings diversity to the empirical analysis, and provides other sources of evidence from industry experts and insiders on the same topics asked about in the interviews. Moreover, the background analysis provides written and publically available sources of information that increases the validity of the interview answers. Internal validity was not considered as this is not found relevant for exploratory or descriptive studies (Yin, 2014). Furthermore, external validity defines the domain to which the study’s findings can be generalized (Yin, 2014). In our case, the theory that is used merely provides a context to guide the data collection and is not used to generalize the findings. Due to the flexible and exploratory nature of the study, the findings are better to serve as foundation for future research and implications for industry and managers.

3.3.2 Reliability

Reliability refers to the quality and level of detail in the description of deployed methodology, and demonstrates that the operations of the study can be repeated (Yin, 2014). The reliability of this thesis could be questioned, since the repeatability of the study is difficult due to the exploratory nature of the research. One measure to ensure reliability was to document all the

steps and information related to the case study in a database. Through this database, other researchers and interested parties can inspect the raw data that was collected, and follow the steps of how it was refined into a shorter summary version. It also contains audio-taped and referenced field-notes, narrative compilations and other relevant case study documents. Despite collecting and organizing it, the information gathered may not be refined and presented in such a way that the study can easily be replicated. Even though the interviews were audiotaped, they were not fully transcribed. This step was omitted due to time constraints, but could have contributed to increase the reliability. Furthermore, the interviews were conducted in an open manner, being semi-structured. This form of questioning will naturally affect the reliability in the sense that the interviewees can give differing answers at different points in time. The key informants that were directly cited were requested to review the draft version to verify their contributions. All together, this documentation should lay the foundation to trace a chain of evidence from the conclusion back to the initial research questions. With that being said, a full replication of the study to yield the same result is not regarded plausible, as findings will vary even though the same methodology is deployed.

3.3.3 Confirmability

Confirmability is a measure of quality that relates to the perspectives and bias of the researchers that is brought into the study. It thus refers to the degree to which the results could be supported by others, being either reference to literature or other people involved in the study. There is an issue of confirmability related to this study, since the topic in the thesis is aligned with the personal values and opinions of the authors. Objectivity may consequently have been compromised when selecting key takeaways from the empirical analysis. When it comes to academic verification or review from peers that are working within the same research field, this was not regarded as a source of confirmability. Due to the exploratory approach and choice of case study topic, there is limited work that can be deemed to be of similar character, and thus this was not found relevant in our case. Before completion of the thesis, a draft version was sent out to selected people involved in the study to secure confirmation of the presentation of data and quotes selected for representation of the key findings. With that being said, we acknowledge that we could have addressed the issue of confirmability by more actively seeking to question our own bias. This could have been done by bringing in documentation of data checks by other researchers or conduct a data audit to make judgements of potential bias in the data collection and procedures of analysis. Researcher bias may also have been evident during the interviews, in the form of asking leading question that affected the answers given. Due to limited time during the interviews, some questions were not asked in favour of others, and this selection may also be the result of researcher bias. The objective however, was to encourage reflections and reasoning around the tailored questions posed to each interviewee.

4 Theoretical context

In order to provide theoretically grounded answers to the first two research questions, the academic context presented in this chapter treats three main subjects. Firstly, business models for sustainability is outlined. Since business models for sustainability is founded on stakeholder theory, this is treated separately in the following section, with focus on communication. Subsequently, an introduction to conceptual frameworks that analyze tensions in corporate sustainability is presented. The chapter concludes with a summary.

4.1 Business models for sustainability

Within corporate sustainability, research on business models for sustainability is an emerging concept (Bocken et al, 2014; Bocken et al.,2013; Boons & Lüdeke Freund; Stubbs & Cocklin, 2008). The concept evolves since other approaches have not proved sufficient and effective to create the radical changes that are required to reach sustainable development (Schaltegger et al., 2016; Ehrenfeld, 2005). This view stems from the fact that many companies base their sustainability efforts on ethically derived *values* rather than a *business case* which is what really matters to the investment community (Unruh et al., 2016). Stubbs and Cocklin (2008) were among the first to conceptualize a normative and ideal view of a sustainability business model. Here, profits are not seen as the company purpose, but rather as a means to ensure the sustainable organization's existence. There has been conducted several reviews and appraisals of the current literature (e.g. Schaltegger et al., 2016; Bocken et al., 2014), but there exists no common definition or unified framework. On a broad level, a business model for sustainability deploys a Triple Bottom Line (TBL) approach (Elkington, 1997), considers stakeholder engagement and is seen as a vehicle to drive innovation for system-level sustainability (Bockens et al., 2014; Lüdeke-Freund, 2010; Lüdeke-Freund et al., 2013; Shaltegger et al., 2016). The concept is also termed differently and used interchangeably as *sustainable business models* (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013) or *sustainability business models* (Stubbs & Cocklin, 2008). We will not attempt to either summarize the literature or find a unifying definition. We will use the term *business model for sustainability* defined by Schaltegger et al. (2016):

A business model for sustainability helps describing, analyzing, managing, and communicating (i) a company's sustainable value proposition to its customers, and all other stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries.

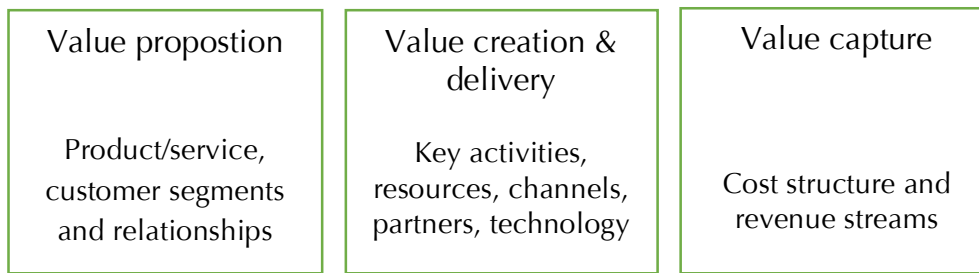


Figure 7. Main building blocks of the conceptualized business model framework (Bocken et al., 2014).

The definition is constructed from the main building blocks of a traditional business model. It incorporates sustainability in the value proposition for all stakeholders, in the creation and delivery of value in the firm's value chain, and finally in the business case for sustainability through how the firm captures economic value (Bockens et al., 2014). The three main building blocks are shown in Figure 7. The argument for adopting a business model view on sustainability can also be seen from a financial perspective. Firms that seek investor support has to be able to communicate how they satisfy the third building block of the business model framework and secure economic returns from sustainability. According to Unruh et al. (2016), this value capture stems from the three interrelated components of having a sustainability strategy, a clear business case, and accompanying business model changes that realize the benefits: "Organizations that have made a sustainability-related business model change are twice as likely to report profit from sustainability than are companies that haven't". Viewed this way, the definition can also be said to encompass the efforts made by firms to make changes to their business model. It thus acknowledges the dynamic nature of business model transformation by linking business models to sustainable innovation, as emphasized by Bocken et al. (2014) and Lüdeke-Freund et al. (2013). It is also important to note that the concept is not only directed to spur transformations in existing organizations, but also to describe the inherently new models that are being pioneered by entrepreneurs (i.e. those that are inherently sustainable) (Schaltegger et al., 2016).

Some of the more recent work has diverted attention to *how* firms can embed a business model for sustainability by defining archetypes (Bocken et al., 2014) and developing tools for business modelling (Bocken et al., 2013). Nevertheless, this constitutes a novel field in need of more research. Little attention has been devoted to research on how the company actually will find the ways to capture economic value, while maintaining or regenerating the natural, social and economic capital beyond their organizational boundaries. For many companies this entails making changes to the current business model, and investing in measures for transition that involve either the value proposition or aspects of the value chain. In either case, such changes are bound to require financing from the company's current or potential investors. One important aspect in the process of attracting capital from investors, is how the company presents itself and has a dialogue with the investor community. From Schaltegger et al's (2016) definition, we find that one of the objectives of the business model is to communicate the value proposition, value creation and delivery and business model innovation. Today, companies often fail to realize the

necessary business model changes and communicate their accounts of value creation (Unruh et al, 2016). This will get increasingly important as investors progressively value ESG-performance. There is thus a need for more research to look into how firms can connect communication of their sustainability strategy to realize business model changes that in turn enhance profitability.

4.2 A stakeholder view of the firm

According to the definition by Schaltegger et al. (2016), the business model helps to communicate the value proposition not only to the firm's customers, but to all stakeholders. Similarly, Stubbs and Cocklin's (2008) conceptual and normative description of a sustainability business model is based on the key assumption to abandon neo-classical economic theory where shareholder primacy prevails. Stakeholder engagement and collaboration is required to consider needs of other than shareholders and facilitate networking for advancing sustainability on not only a firm-level, but on a system level (Stubbs & Cocklin, 2008). Hence, the stakeholder view of the firm is highly regarded as a core assumption within sustainability research, initially formulated by Freeman (1984). Stakeholder theory rests on the foundation that companies and society are interdependent, and that the company has a responsibility that exceeds its fiduciary duty to shareholders (Svendsen, 1998; Stout, 2012; Schaltegger et al., 2016). There is strong empirical evidence that the actions of sustainable companies is shown to be accompanied by clear and consistent messages to stakeholders (Eccles, Perkins & Serafeim, 2012; Stubbs & Cocklin, 2008; Slawinski & Bansal, 2012).

Despite being abandoned by academics, the social norm of shareholder primacy is the greatest barrier that prevents progress and limits sustainability measures to voluntary action by companies and investors (Sjåfjell, 2013). Recent work has deconstructed the myth that shareholder primacy has a legal basis, and examination of country laws show that the board of directors' primary duty is to the corporation itself as a separate legal person (Eccles & Youmans, 2015). The corporation then has a moral and civic duty to not only be profit oriented, but also to consider the good of the society which has granted them the privilege to exist (Eccles & Youmans, 2015; Scherer & Palazzo, 2011). From this, reporting of environmental, social and governance factors are required beyond the traditional financial reports (Eccles & Youmans, 2015). In a broad sense, the stakeholder approach can be divided in the three steps of stakeholder mapping, stakeholder management and stakeholder engagement (Manetti, 2011). Here, stakeholder management should be seen as a collaborative approach to build relationships that are reciprocal, evolving and mutually defined, rather than a one-way communication by firms to defend themselves from the demands of stakeholders (Svendsen, 1998).

4.3 Recognizing tensions in the literature

The business model view on sustainability promotes an instrumentalist view, and does not address tensions described in other parts of the corporate sustainability literature. In the following, we present terminology and relevant tensions that can shed light on how companies

capture economic value, and how they communicate this to the financial community. By doing this, we seek to build on and extend the current business model and tensions literature by connecting the two fields of research.

4.3.1 From instrumentalist to integrative view

When seeking to investigate the process of getting funds for business model transformations, we move beyond the conceptual discussion of what constitutes a business model for sustainability. As mentioned, extant literature has started to meet the demands of more pragmatic approaches by pinpointing concrete examples of innovation and archetypes to guide firms in their efforts to transform their business model (Bocken et al., 2014). Another branch of corporate sustainability research is devoted to the tensions that arise when corporate goals within the three sustainability dimensions are diverging. This area is not treated either by the normative or more pragmatic oriented business model literature, and which therefore seems to take an instrumental view. Inherent in the instrumentalist logic is the win-win tactic of aligning economic, social and environmental performance. Disparate goals are not addressed when issues cannot be aligned with financial performance, and the tension is thus ignored (Hahn et al., 2015). When putting the economic dimension over the two others to create a business case, critics argue that trade-offs might arise (Van der Byl & Slawinski, 2015). Promoting social and environmental gain can be detrimental to economic performance, and contrary to the win-win approach, this is a win-lose proposition. As a consequence, the tension is dealt with by choosing between goals, often putting the financial goals at the front row (Van der Byl & Slawinski, 2015). The concept of shared value creation by Porter and Kramer (2011) attempts to move beyond these trade-offs, but have been criticized for not going into the feasibility and practicability of realizing such a move. We seek to address the lack of attention to tensions in the business model literature by identifying tensions that relate to the financial characteristics of business models for sustainability.

As an alternative to the business case approach (i.e. triple-bottom-line logic), is the emerging integrative view which does not favour any aspects of sustainability to the advantage of a balanced approach. It questions the approach where the TBL juxtaposes the three sustainability dimensions, instead of systematically addressing the relationship between them (Hahn et al., 2015). As an extensions of the integrative view, the paradox approach is more rigorous in terms of understanding the tensions at hand, because it allows for complexity and does not force a choice of selection due to trade-offs. This means that the contradictory changes are not dealt with only through juxtaposing the opposing sides, but embracing and considering them simultaneously (Hahn et al., 2015; Van der Byl and Slawinski, 2015). Instead of polarizing the tensions, the paradoxical approach gives way for opportunities for creative solutions (Slawinski & Bansal, 2015). The paradoxical perspective is seen as the most promising avenue to find ways of how managers can address complex, challenging sustainability issues (Van der Byl & Slawinski, 2015; Scherer, Palazzo & Seidl, 2013). In particular, there is a lack of recommendations on how to equitably integrate the sustainability elements (Van der Byl and Slawinski, 2015).

4.3.2 Characterizing and responding to tensions

Based on frameworks presented in current literature, tensions can be categorized after several dimensions (Hahn et al., 2015; Van der Byl & Slawinski, 2015). Serving as the backbone we find the tension acting between the social, economic and environmental sustainability dimensions. Furthermore, sustainability is a multi-level concept, and tensions can occur between the organizational and systemic level. Typically, systemic-requirements arising from the notion of sustainable development affect the corporate decision-making when it comes to organizational level considerations (Hahn et al., 2015). Another tension is found to exist between various levels of analysis in time and space. Examples are long-term considerations opposing short-term performance, geographical tensions between developed and developing countries, or between a local or global scale. Lastly, we have tensions concerning organizational change processes, and that can be related to innovation, technological and structural change. Examples are formation and change of corporate sustainability strategies, supply chain management, quality, innovation, stakeholder management and regulatory uncertainty (Van der Byl & Slawinski, 2015; Hahn et al., 2015). Besides characterizing the tensions, firms can respond with different strategies to either accept or resolve the tension.

4.3.3 Corporate short-term versus long-term orientation

The “corporate short-term versus long-term orientation” can also be termed “intertemporal tension”. It describes the corporate short-termism conflicting with the long-term social and environmental objectives inherent in sustainable development (Hahn et al., 2015; Slawinski & Bansal, 2015; Slawinski & Bansal, 2012). The tension is found not only when considering decision-making for short-term or long-term objectives on an overall level, but is especially evident when looking at the different time orientations between the economic, social and environmental dimensions (Hahn et al., 2015). Here, the economic dimension follows the short-term orientation of the financial system. The financial model of firms is built on temporal principles where the distribution of costs and benefits is periodized over time. Consequently, most firms strategize and communicate with investors on a quarterly, semiannual or annual basis. They use analytical tools such as discounted cash flow analysis (DCF) to value and assess investment decisions and financial performance. While using DCF analysis and net present value (NPV) calculations is one way of dealing with this periodization, their use rests on normative assumptions related to desired discount rate and short-term forecasts, which in turn amplifies the economic short-termism (Slawinski & Bansal, 2015).

There is a need for more research on how firms can meet this intertemporal tension using the paradoxical view (Slawinski & Bansal, 2015). Current findings have focused on the temporal challenge of addressing climate change, a complex issue that requires understanding of the past, present and future as connected (Slawinski & Bansal, 2012). Firms that displayed such a cyclical time view showed a broader range of responses including investments in alternative energy sources, multi-stakeholder dialogue and energy efficiency. They also used scenario generation and especially worked with governments to shape the future regulatory environment to reduce uncertainty. Juxtaposing is used as a mechanism through qualitative and quantitative

planning, two-way stakeholder engagement and extensive cross-sector collaboration (Slawinski & Bansal, 2015). According to Slawinski & Bansal (2012), these firms are better positioned to learn and shift their decision bias than those with a linearized time view. The downfall is a slower response that might be at odds with the urgency of the issues at hand (Slawinski & Bansal, 2012). A way to accept and live with the tension can be done by incentivising short- and long-term objectives using financial and non-financial metrics respectively. Another resolution spatially separates the long-term focus to the top management and short-term operational issues to lower-level management (Hahn et al., 2015). A synthesis resolution is to embed a short and long-term mission of sustainability in the corporate governance structure and actively choosing investors with mutual long-term perspective (Hahn et al., 2015).

4.3.4 Isomorphism versus structural and technological change

The second tension relevant for developing business models for sustainability is termed “isomorphism versus structural and technological change” by Hahn et al. (2015). It can also be termed organizational change as a shorter version. In order to transform the business to comply with the notion of sustainable development, businesses have to change their current practices in terms of structural configurations and technological innovations. This requirement of change meets the institutional pressure to comply with the established societal and industry norms in order to preserve firm legitimacy. In other words, the organizational change processes designed to meet demands for fundamentally changed products and business models for sustainability conflicts with well-established practices and institutional disapproval (Hahn et al., 2015). This is the case for firms embedded in an external environment where financial community is institutionalized on risk reduction, financial returns and averse of changes that are not evident to support economic returns. Hence, firms experience conflicting expectations of their role as innovators for more sustainable practices on the one hand, and legitimate actors behaving within the institutionalized structures on the other hand (Hahn et al., 2015). When dealing with this tension, firms can accept the tension and devote resources to maintain a conventional path based on well-established practices while they are also exploring new and alternative offerings outside the institutional approval. Finally, firms looking to resolve the tension by attending to the two sides simultaneously has to engage with their stakeholders and the marketplace to catalyze institutional change (Hahn et al., 2015).

4.4 Summary

From the presented theoretical context, we summarize some of the key points that will be further treated in the empirical study. The business model concept of sustainability emerged to bridge the gap between a pure ethical and business case for sustainability. Even though no unified definition exists, there is sound evidence that firms that are able to combine the three dimensions of sustainability into a business case show superior financial performance. We find that little research has looked into the tensions that characterize firms’ economic value capture, which is a vital building block of the business model. Being founded on the triple bottom line, the business model view does not address the trade-offs that arise when the economic dimension

is prioritized to create a business case (i.e. instrumentalist view). In this case, the tensions literature offers valuable considerations that can help to describe the relationship between business and financiers in the joint efforts to transform current business models in a more sustainable direction. The intertemporal tension problematizes the short time frames associated with financial practices, which is not easily unified with objectives of long-term sustainable value creation. Furthermore, the tension of organizational change describes the challenge to retain legitimacy when firms seek to make changes to established business models. The use of short-term metrics and deep-rooted practices that embrace risk-reduction and dismiss non-financial parameters, are all evidence of an inertia when it comes to change financial evaluation methods. Together, the two tensions give way for discussing how stakeholder communication between the investment and business community can address the challenges that prevent business model transformations. We now move on to the case study. In order to answer the research questions, the integrative view is helpful to explore how a Green Investment Bank can contribute. Central questions are how a GIB can address and attempt to resolve the tensions described above, as well as what impact that can be attributed to means of communication.

5 Case study: Establishing a green investment bank

This section introduces the case study of the establishment of a Green Investment Bank in a Norwegian context. We also present an overview of the national public funding system, and how relevant political processes relate to the GIB.

5.1 Introduction to the case study

5.1.1 Historic development of sustainability in Norway

Historically, Norway has been a global sustainability leader. The Brundtland Commission put sustainable development on the agenda, and Norway has since been recognized as a role model for sound governance of environmental, social and economic issues. The Norwegian industrialization process and economic development is founded on socio-democratic principles, supported by strong labour unions and progressive policies that have imposed strict environmental regulations on all industry activity. Coinciding objectives of industry policy and energy policy has been key drivers to exploit the country's extensive pool of hydropower and to build an oil industry on which the welfare economy is based. The development of the oil and gas industry has relied largely on subsidies to build national competence and ensure growth as part of the industry policy. In 1990, the Sovereign Wealth Fund was established as a pension fund to secure long-term management of the revenues from the petroleum sector. After the Paris Agreement it became clear that poor countries will receive USD 100 billion from rich countries to address climate change. Norway has signed the agreement and committed to contribute to the expanded stream of aid grants from established markets to developing countries.

5.1.2 Case: Financing the transition to a green economy

The Norwegian economy faces several challenges, of which the most severe has been the rapid fall in oil prices. Mitigation of climate change requires a transition to a low-carbon economy, thus challenging the trilemma of oil dependence, cost level and pressure for decarbonization. To reclaim the position as a sustainability leader, and to evolve important industry sectors, Norway is now set for a transition from a resource-based economy to a knowledge-based economy. Backed by a strong economic foundation and resource disposition, Norway posits the demonstrative commitment it takes to pursue a leading role in implementation of the SDGs and simultaneously sustaining green competitiveness. There is broad acknowledgement that the transition should be driven by industry policy, enhance job creation and develop advanced technology for export. As part of a national transition, new policies will determine the financial instruments used to catalyze the necessary investments. This case study will investigate how barriers stemming from sustainability-related tensions can be overcome through the establishment of a new financial institution in the form of a Green Investment Bank. The thesis will explore how the GIB can speed up the financing of the green transition and drive the development of more sustainable business models.

5.2 The Norwegian public funding system

To set the context of the case study, the public funding system needs to be presented. There is already a broad range of governmental agencies and other forms of state involvement that support the development of green technologies. This section gives a brief description of the current public funding system, including the newly established fund for investments in green technologies, Fornybar AS. The information presented is based on publically available sources and findings from the empirical analysis.

5.2.1 Fornybar AS

In December 2015, the government established a new agency named Fornybar AS; a fund set to invest in companies developing technologies that reduce greenhouse gas emissions. The mandate, organizational configuration and budget will be made public with the National Budget of 2017, but over time the fund is given a frame of 20 billion NOK in total asset management (Regjeringen - Prop. 122 S, 2016). The exploration of how a Green Investment Bank can contribute to sustainable development of Norwegian businesses is therefore assessed in connection with Fornybar AS. With that being said, either referring specifically to Fornybar AS or not, the findings unveiled during the interviews refer to a financial institution initiated by the government with the objective to invest in companies that are considered “green”. Furthermore, regardless of what mandate and organizational set up the new initiative will get, a new financial institution has to supplement the existing public funding schemes in order to create additional value.

5.2.2 Overview of main actors in the current system

Figure 8 illustrates how the agencies and their support schemes can be placed in different categories based on the type of capital they provide and what phase of development they contribute to. Some agencies are directly aimed at advancing renewable and environmental technologies, while others are more general schemes that also have available capital for green technologies. The first meeting innovators get with the Norwegian funding agencies are usually the *Research Council of Norway* and *Innovation Norway*. The former provides grants for early stage research, research based innovation and commercialization, while the latter awards both grants and loans to companies in the startup phase. Subsidies are also granted by *Enova*, to projects that promote efficient energy consumption and increased production of “new” renewable energy in the phase of demonstration and deployment.

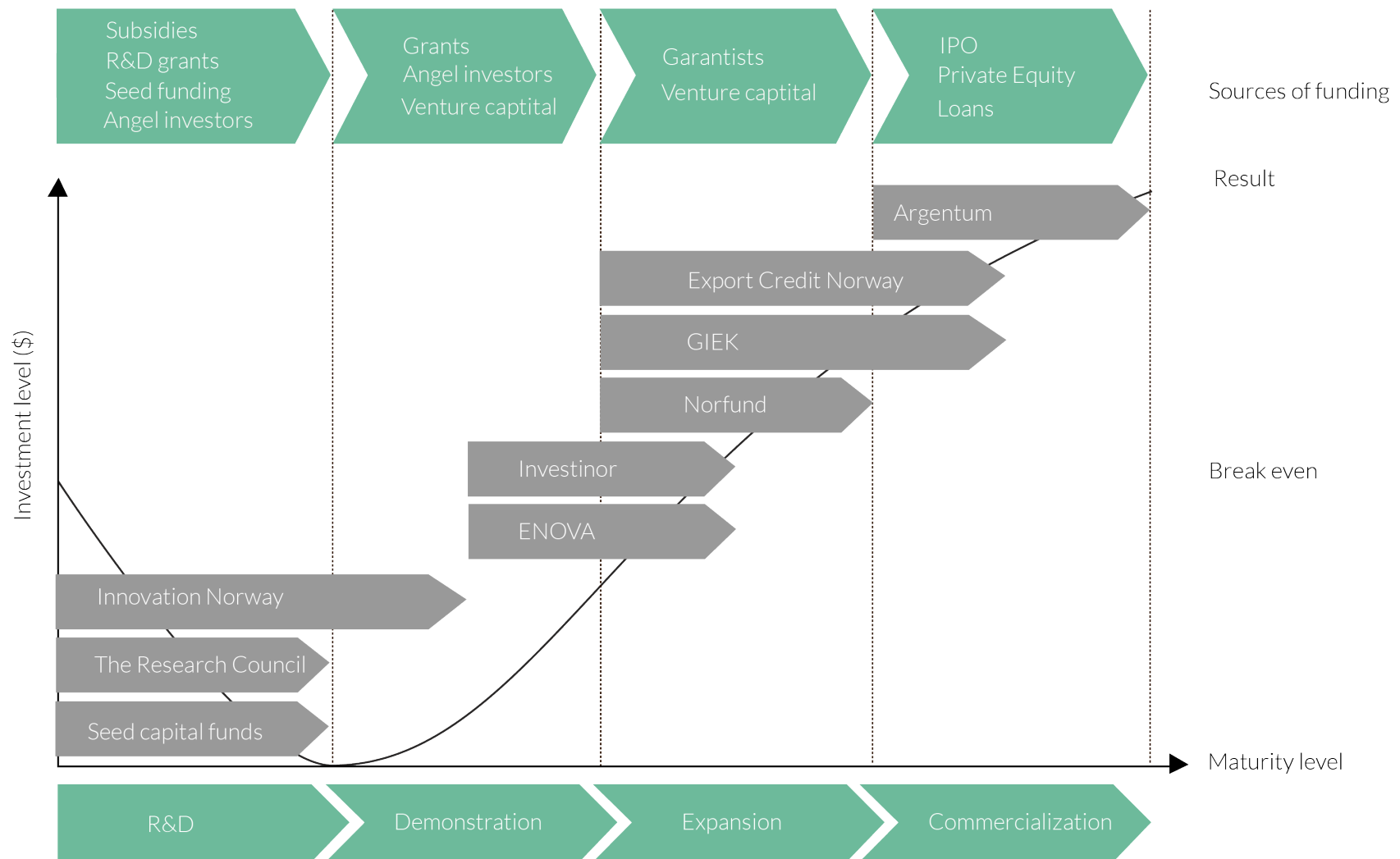


Figure 8. Overview of the current public funding system.

Looking from the investor side, *Investinor* is a provider of venture capital to invest in promising unlisted companies that aim for international growth and expansion, and have a clear exit strategy for all investments. Investinor may also invest in companies in the expansion phase, and is thus found in both categories together with *The Norwegian Investment Fund for Developing Countries (Norfund)*. This is the government's main instrument for combating poverty through private sector development. It serves as an instrument for Public Private Partnerships internationally and provides risk capital through equity, loans and private equity funds. Companies that seek to internationalize can receive loans from *Export Credit Norway*, supported by guarantees on behalf of the Norwegian government issued by *The Norwegian Export Credit Guarantee Agency (GIEK)*. Finally, *Argentum* is an asset manager that specializes in investments limited to Northern Europe and energy focused private equity funds.

Complementary to the mentioned public agencies, there are other programmes and schemes that either directly or indirectly facilitate development of green technologies from the supply and demand side. As a supportive institution to the innovation system we find *SIVA*, which functions as a facilitator by developing, owning and developing infrastructure for innovation. Through a common market with Sweden, the electricity certificates system is a market-based support scheme to promote new electricity production based on renewable energy sources. In order to meet national climate obligations and strengthen green competitiveness for Norwegian industries, the government has initiated a number of relevant processes to review the need for change of the current system. Some initiatives in the pipeline include the evaluation of the efficiency in public funding agencies, expansion of current mandates and consolidation of public organizations to align the interests of the renewable and petroleum industry.

6 Empirical analysis

The empirical analysis was conducted with two objectives. Firstly, to provide insight into how the financial characteristics of business model innovation, communication and financial evaluation methods could help firms to achieve a more sustainable business model, as formulated in research question one. The findings that are presented to these topics form the basis for describing tensions related to corporate short-termism and organizational change, which is further synthesized in chapter 7.0. The second key objective was to unveil how the financial community and business actors would benefit from a Green Investment Bank. The findings here give way to answer research question two.

Structure and use of references

As shown in Figure 9, the chapter is structured into the three main sections of business model innovation, communication and financial evaluation methods, found in chapter 6.1-6.3. Findings related to the configuration of a Green Investment Bank is then introduced in chapter 6.4. Each part is in turn organized in subcategories derived directly from the coding process of grouping and synthesizing the extensive interview data. The extent of which a finding is supported with evidence from the interview data is indicated with numbers assigned to interviewees from the structured and unstructured interviews, as well as speakers at relevant conferences and seminars. A full list of interviewees and speakers with their respective number is found in Appendix B.2.

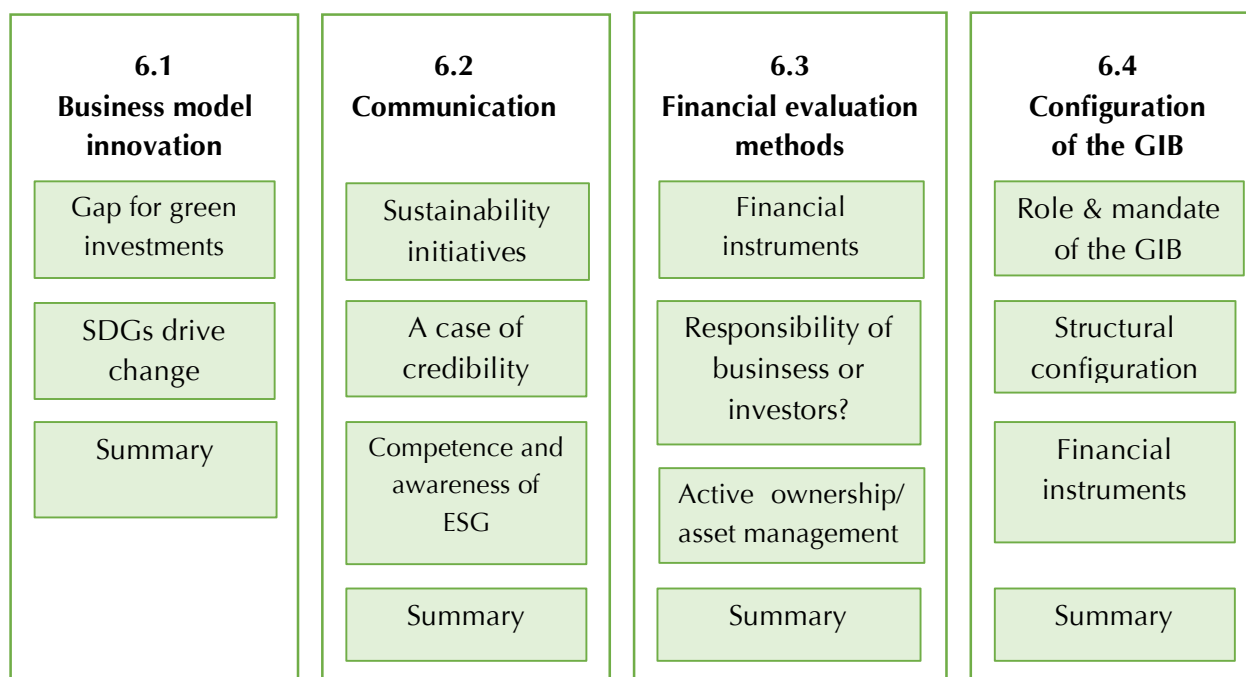


Figure 9. Overview of the chapter structure for presentation of empirical findings.

6.1 Business model innovation

In the following section, we present the findings that provide the interviewees' reflections connected with business model innovation and the associated economic value capture. The transition of firms' business models requires additional funding, which has paved the way for novel use of financial instruments. Still, the gap is too large between the required changes in companies' operations and the financing available in the critical phases of project maturity. Therefore we start this section by introducing a gap for green investments, followed by an introduction of the implications of UN's Sustainable Development Goals on business models innovation.

6.1.1 Identified gap for green investments

To realize green innovations, companies are generally in the need of external funding. Findings prove that there is not enough public funding available to meet this demand. Consequently, companies will need to attract private investors to finance business model innovations that are necessary to adapt to the green transition of the industry. The analysis of empirical evidence shows that the need for a green investment bank is rationalized across the various stakeholder groups. Therefore, private actors need to be involved to reallocate larger revenue streams that connect the financing of business model innovation with economic value capture.

We need an investment partner with expertise within areas like technology and environmental issues.

(Jon Daniel Nesje, CEO Wonderland)

Arguments in favour of a GIB was built on reflections on the effectiveness of the public funding system as it is operationalized today, and the need for capital in what is termed the "valley of death". One of the central questions that were posed during the interviews was if there is a gap for green investments in the capital market. From a high-level perspective, some believe there is not necessarily a lack of capital, but rather a lack of bankable projects that meet the criteria for sustainable investments (35, 1, 3, 13, 8, 15, 16, 5, 6). A contradictory view is taken by others, who state that there is an abundance of viable ideas and projects, but a need for timely allocated capital with associated models for risk sharing and cash flow (27, 14, 49). Moving from the global marketplace to the Norwegian system, the findings show that there is a massive focus on early stage development (11, 13, 3, 35). However, there is a clear lack of capital in the expansion and commercialization phase, namely the valley of death (11, 17, 20, 21, 24, 13, 49, 37, 4, 2, 33, 17, 27, 11, 3, 15, 12). Norway needs pioneers who take responsibility and dare to aim high, which includes daring to fail; right now the development is too slow to foster such innovations (27, 1, 25, 17, 49, 48).

I am sometimes missing a drive within the Norwegian entrepreneurial community to go for something big. There are many good entrepreneurs that are able to build a company with 40 employees, but a lot fewer who take the next step to reach 400 employees. There are also fewer instruments that support later growth in the public funding system today. To boost renewable growth in Norway we need the type of capital that can support development at a later stage in addition to early phase. It is not the number of companies that matter, but the growth potential in those that succeed. We need more companies that can become new industry locomotives.

(Ingunn Svegård, Statoil)

The gap is visualized in Figure 10, and represents the interval from the entrepreneurial stage of concept development to large scale pilots and demonstration projects, where the project is still not bankable in the market (11). The valley of death can also be viewed as a sorting mechanism that screens viable projects with the capabilities to survive in the long term (11, 13). However, the valley of death might not be so extensive that it cannot be covered by re-organizing the mandates and focus areas of the existing funding agencies (21, 16, 20). In addition to the gap identified for entrepreneurial firms, we found that there are not that many initiatives for the major incumbent actors that need risk capital to transition their business in a more sustainable direction (27). Business model innovation is deemed necessary for industries that are expected to undergo disruptive change, like for example utilities are with the trends of distributed energy and decarbonization (24, 35, 18). Additionally, one should bear in mind that transitioning to a sustainable business model is not necessarily profitable at first, and should benefit from applying a long-term perspective (27).

For many companies within new renewable technology, access to private capital represents a bottleneck. Many entrepreneurs, especially within renewables, lack capital for heavy pilot and demonstration projects. The Research Council of Norway and Innovation Norway offer funding for R&D, demonstration and testing, but without private capital, public funds cannot be triggered. It is difficult to pinpoint exactly the extent of private funding discrepancies, but projects involving early phase development and demonstration certainly experience considerable challenges.

(Inger Solberg, Innovation Norway)

Moreover, several actors argued that there is a need for a better connection between private and public funding (4) and that public policies is not sufficient alone to drive the required changes at the right pace (51, 58, 46).

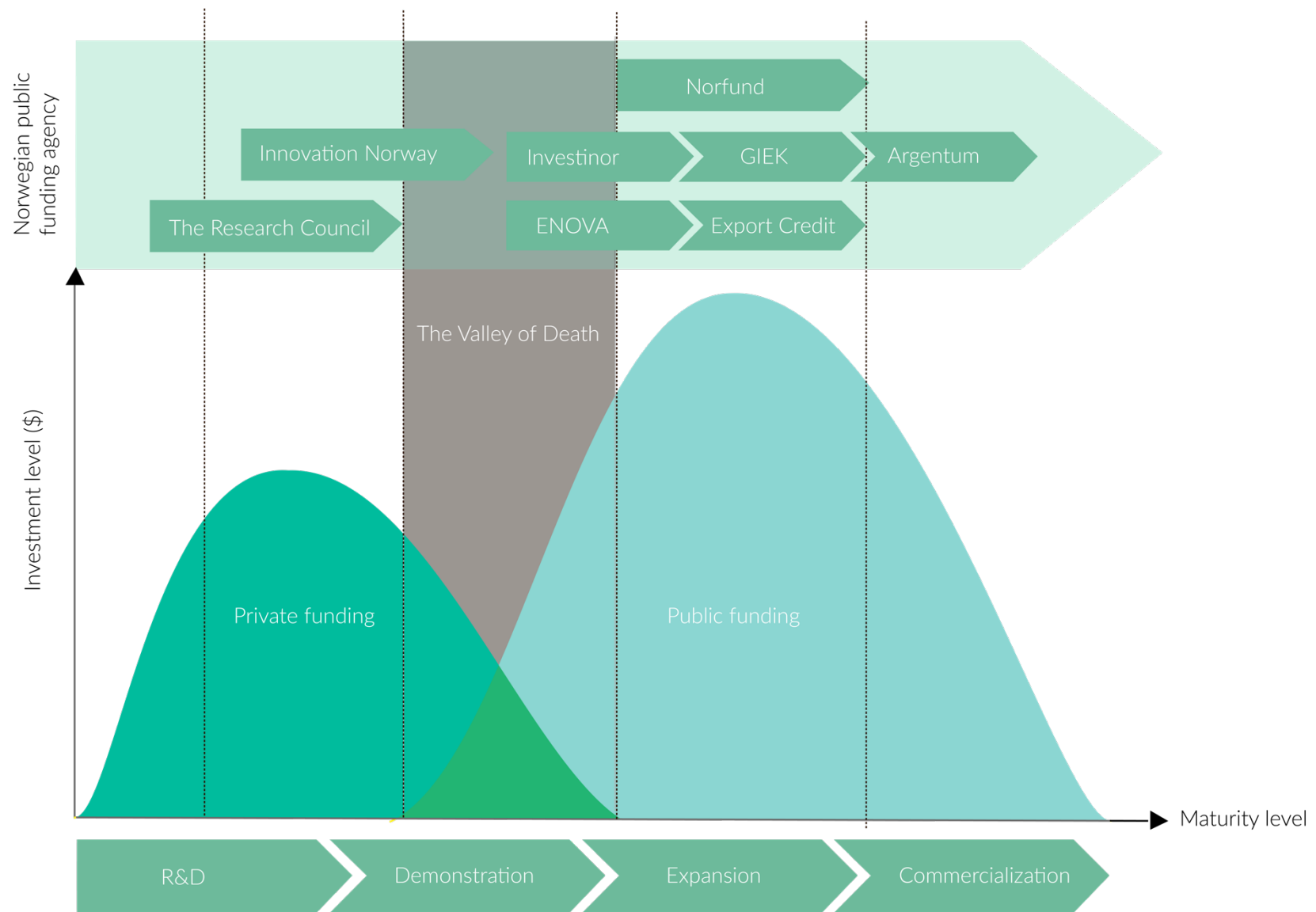


Figure 10. Gap for green investments mapped along the technology and readiness level and type of public and private funding.

Based on this need, one of the objectives for a new GIB should be to catalyze new markets for investments by leveraging private capital at competitive terms and contribute to additionality (5, 6, 14, 16, 7, 30, 28, 11, 8). An example of this is when investment institutions like Norfund provide a quality stamp on projects which attracts private investors. Public capital can thereby reduce risks for private actors, so projects that would not have been realized otherwise can be followed through (1, 14). Getting private capital through investors and equity is regarded as the largest bottleneck for bringing business model innovations to the market (11, 17).

6.1.2 Sustainable development goals drive change

The UN's Sustainable Development Goals (SDGs) were mentioned frequently as a tool firms could use to shape their business and policy development (3, 26, 22, 27, 5, 13, 33, 30, 37, 56). The goals can function as guidelines and provide a rationale for business model innovation. The Board of Directors are essentially responsible for ensuring a long-term strategy for firms, and could thereby use the SDGs actively in business model development.

It is the fiduciary duty of the board to ensure that its company is responding to the Sustainable Development Goals in a way that makes sense of its sector and strategy, therefore protecting both the short and long-term interests of the corporation.

(Robert Eccles, professor Harvard Business School)

The SDGs also matter to customers of pension funds, who increasingly demand their fulfillment (25). For others, they are perceived to be very high-level and to represent a top-down approach to sustainability, while the mission of firms is to contribute with a more operationalized bottom up-approach (14). On the other hand, this does not mean they don't represent business opportunities and cannot be implemented in the firm's operational strategy, or innovative products and services. Some firms have already started the work to integrate the SDGs in their long-term strategies. An example is the investment bank SEB, that has done an initial analysis of the 17 goals and mapped them towards their priorities. This work is planned to continue until it culminates in full integration of the SDGs into the bank's operations, with actions associated to the respective goals (SEB, 2015).

6.1.3 Summary

Below in Table 3 is a summary of the empirical findings related to business model innovation:

Key takeaways

- 1 In the Norwegian market for public and private funding, there is a gap in what is termed the “valley of death” where companies need high-risk capital to scale up innovative solutions and technologies for commercialization.
 - 2 There is a need for improved financial incentives to encourage and excel more radical changes through market-creating innovations.
 - 3 There is also a need for more effective instruments that incentivize large and established market actors to change their business model to become more sustainable.
 - 4 Calls for change of the public funding system involve re-evaluation of the given mandates to adapt to a changing marketplace where renewable projects demand other requirements.
 - 5 The Sustainable Development Goals can be implemented in firms’ operational strategies. This implementation is perceived to be a valuable tool to shape long-term company strategy.
-

Table 3. Business model innovation: summary of key findings.

6.2 Communication

In the following section, we present findings related to the financial characteristics of communication. In chapter 2.4.2 we gave an overview of selected, commonly used initiatives that companies can engage in to include sustainability in internal and external communications. To elaborate on this analysis, we start this section by presenting the sustainability initiatives derived from the empirical analysis. Following this, the effect of communication on firms’ credibility is elaborated along with the importance of competence and awareness around ESG factor inclusion.

6.2.1 Sustainability initiatives

As an extension of the analysis in section 2.4.2, we wanted to assess what initiatives that are used most frequently in order to comment on their effectiveness. In turn, this give way for recommending which initiatives a GIB could engage in to answer research question two. Therefore, we compared findings from the background

analysis of global sustainability initiatives found in section 2.4.3 with initiatives that firms in the empirical analysis participated in. Several of the industry actors and financial institutions are considered to be among the leaders within their sectors when it comes to sustainability communications. Hence, their experiences and opinions with the use of different initiatives are of great value to complement the analysis. Through a combination of annual reports and information given during interviews, the various initiatives were mapped and presented in Table 4.

Like the table displays, the large companies are usually part of several initiatives, while the SMEs generally participate in few or none. One reason why some firms did not engage in any initiatives was explained by several reasons. The firms were more focused on realizing sustainability through daily operations and did not prioritize communication; reporting was perceived to be decoupled from value creation and at risk of being interpreted as greenwashing (27, 28, 14), or the time and resource intensiveness following the large set of requirements to participate in such initiatives acted as a barrier (1, 2, 19, 29). This will be further described in section 6.3.2.

Like a few of the respondents mentioned, the majority of firms use voluntary, soft initiatives because they are most effective (5, 4). As seen in the table, the most utilized initiatives were the Global Reporting Initiative (GRI) and UN Global Compact, with seven and eight members respectively. This could be interpreted as a natural consequence of sustainability ambition and presence in the initiative's target group, since GRI is intended for large companies and UN GC for international companies. Some believed that GRI was best used for a separate sustainability report (24, 10), while others stated that using a global standard like GRI on the side of the annual report is too comprehensive (26, 2). The Carbon Disclosure Project (CDP) was also well represented with five members. CDP is believed to disclose the carbon footprint of investor's portfolios, and is considered useful in order to reach the two degree target (12, 1), and should ideally be used complementary to other initiatives that together make up the firm's sustainability communication. Another finding is that although being used by only two actors, integrated reporting is seen as a promising trend, as it contributes to clarity for the user and investors while creating a good track record and trustworthiness (35, 13, 26, 11, 11, 25). An integrated report has to contain all significant issues that affect the value creation of a firm on a short and more long-term basis. KLP is an institutional investor that supports this perception and has worked to include data and non-financial information on CSR and sustainability in their annual and quarterly reports (KLP, 2016).

Firm	CDP	GRI	Equator Principles	<IR>	SASB	UN GC	UN PRI	ISO 14001	CDSB	OECD guidelines	N/A	Custom/other	Source (2015)
DNB	•		•					•					AR
GIEK										•			AR
Innovasjon Norge						•				•		SDGs, UN guidelines	AR
KLP	•	•		•		•						UN guidelines	CSR
NEFCO												EU guidelines	
Næringsdepartementet		•				•				•		UNGP, ILO	E
PBES											•		
Powel											•		
Scatec Solar			•									IFC performance standards	SR
SEB	•	•	•			•	•			•		UNEP FI, UNGP, Montreal Carbon Pledge, ICC Business Charter on Sustainable Development	SR
Siemens	•	•				•						WEF Climate CEO Statement	SR
Statkraft		•				•						IFC performance standards, UNGP	CSR
Statoil		•				•		•				IPIECA Oil and gas industry guidance on voluntary sustainability reporting	SR
Storebrand	•	•				•	•					ILO, UN PSI, UNG, UN convention on corruption, UNEP FI, PRI Montreal Pledge	
The Crown Estate				•									IR
UMOE											•		
Wonderland											•		
Zaptec											•		
Count	5	7	3	2	0	8	2	2	0	4	5		

AR – Annual Report

SR – Sustainability Report

CSR – Corporate Social Responsibility report

IR – Integrated Report

E – Eierskapsmeldingen

Table 4. Sustainability initiatives used by the interviewed companies.

In general, the financial institutions can be credited for being part of several sustainability initiatives, which confirms their leading roles. Here, the Equator Principles which is intended for financial institutions, were reported used by three entities. It was also found that different frameworks are viewed useful for different degrees of disclosure, or that a combination of complementary frameworks constitutes a holistic approach. A proposal made during the interviews is to use SASB together with integrated reporting and CDP for carbon emissions in the cases deemed material. Lastly, the empirical analysis revealed a broad consensus that firms should increasingly use the internet and company websites to disclose sustainability information tailored to different stakeholder groups to reduce reporting efforts and improve flow of information (10, 12, 29).

Materiality

The concept of materiality was largely perceived as a promising track to follow by representatives from the government, academia and entrepreneurial and established ventures (15, 13, 19, 28, 10, 22). Before reporting on materiality, the company should perform proper groundwork in order to assess their own organizational abilities, position in the market, and the most important stakeholders that influence the prevailing directions for the company (i.e. internal and external forces) (13). One of the incumbent actors had materiality assessment as a key part of the company's sustainability report, and had been requested by its shareholders to disclose its exposure to climate risk as a material issue to the long-term prospects (24). One proposition made by the university researcher Robert Eccles is to include a Statement of Significant Audiences as half a page in the firm's annual report. The Statement outlines what stakeholders the board of directors believe is essential to the firm's survival and is the foundation for corporate reporting. This form of communication shows that the board has taken an active stand on future strategies and address selected stakeholders, which in turn may provide the foundation for an enhanced sustainability focus on material issues (13, 10).

The Statement is important from a governance and resource allocation point of view since it helps to set the context for the long-term corporate strategy.

(Robert Eccles, Harvard Business School)

6.2.2 A case of credibility

Solid and transparent sustainability communication is perceived to strengthen the legitimacy of the firm (1, 2, 13, 21, 35), to improve corporate culture and employee engagement (6, 25 26, 28, 19) and raise awareness of environmental issues (5). Some of the firms view their efforts in sustainability communication to be associated with a transition to become more knowledge oriented and pursue thought leadership to take a position of market leadership (19, 26, 28, 25, 12). However, the lack of detailed metrics in the reporting weakens the legitimacy of the company, and may be taken as "greenwashing" (2, 28, 26, 12). Greenwashing usually occurs when firms

communicate on matters of sustainability, but do not act accordingly (13, 19). As such, how companies respond to and act on the contents of their disclosure is very important.

One sustainability analyst stated that there is less focus on the triple bottom line today than before (25). What is considered most important is that firms in all sectors understand their environmental impact through efficient operation and increased production using less energy and materials (13, 25). The most important thing is not necessarily how companies report, but the analytical foundation before reporting that determines how they understand their key stakeholders and external environment (13, 10). Furthermore, the highest value of sustainability communication can be found as a tool to help businesses solve their identified sustainability issues (13, 28). This view stems from the advantages of building metrics into the decision making to incentivize action and build long term resilience, whereas what is not reported may not be dealt with (20, 26, KLP WP). One of the financial institutions question the role of reporting as a driving force for sustainability, but acknowledge that communication for the effect of sustainability investments should be a goal in order to show the impact on risk exposure for investors (22). However, transparency is not just about preventing corruption, but to highlight best practice and to prove that a firm has performed its due diligence when entering a new market (25, 1). Some of the interviewees put forward examples of social or environmental trade-offs that make it difficult to promote legitimacy through choosing holistically perfect solutions.

Static disclosure is a necessary first step. There are two ways its impact could be amplified. First, governments, potentially sparked by COP21, could complement disclosure by giving guidance on possible carbon price paths. Second, stress testing could be used to profile the size of the skews from climate change to the returns of various businesses.

(Mark Carney, Chair of the Financial Stability Board)

6.2.3 Competence and awareness of ESG factor inclusion

Many of the interviewees identified a general lack of competence and awareness of ESG in the market, and thus a need for increased collaboration and competence exchange (6, 15, 1, 13, 49, 52, 13, 16). This is also true for the customers who do not have access to information necessary to take holistic decisions, and often base decision-making solely on price considerations. Several actors share the view that if the company demonstrates extraordinary value, it doesn't matter how much it costs, because the project will generate much larger returns both in monetary terms and societal value over time (19, 23, 16). On an organizational level, many interviewees devoted attention to the need for skilled human resources. More specifically, the need for teams consisting of people with various competencies to maximize leverage, drive innovation and ensure that ESG values are implemented correctly within the firms (11, 25, 15, 9, 28).

A reinforced competence level internally is a prerequisite to realize more radical changes that address sustainability. A part of this task will be to educate current employees, but we also need to recruit new people with different backgrounds and expertise.

(Jon Daniel Nesje, CEO Wonderland)

This level of competence is also considered vital for the relationship between the firm and the capital provider in order to offer market advisory and excel promising projects to success (11). Several stakeholders highlighted the task of attracting the right competence as a challenge for a new GIB. This is founded on the demands related to sound management and active ownership of funds in novel technology areas and with unpredictable market developments (16, 7), provision of local market knowledge to other potential investors (23, 14), and management of aggregated smaller projects (6, 49). As an example of the resource intensity, Norfund employs around 60 people to manage 7 billion NOK, whereas KLP has about the same number of people managing 430 billion NOK (12). The interviews revealed that only a fraction of the employees at the established commercial banks and pension funds are working with renewables, green funds or sustainability asset management, and that their function usually is limited to a specialized unit of the company (2, 12, 6). Finally, not all saw competence requirements as a constraint for the new GIB by stating that more than enough expertise is available (35).

6.2.4 Summary

Below in Table 5 is a summary of the empirical findings related to communication:

Key takeaway

- 1 In general, the large firms participate in several initiatives and have a sound knowledge of the available initiatives to engage in. While SMEs show awareness and practice of incorporating sustainability values in daily operations, they do not prioritize sustainability initiatives and reporting.
- 2 Companies could benefit from better communication of how they are positioned in a long-term perspective in order to attract the right investors.
- 3 Many interviewees applauded the idea of materiality to save resources associated with communication of sustainability efforts.
- 4 If the sustainability communication is conducted through transparent disclosure of ESG metrics, it strengthens the legitimacy of the firm.

5 In some cases, companies' efforts to communicate sustainability could appear as greenwashing. The true value for investors lies in the actions taken to address the contents and impact of the disclosure.

6 There is an inadequate level of knowledge and awareness of ESG-factors in the marketplace today, involving the whole range of actors from firms and investors to customers.

Table 5. Communication: summary of key findings.

6.3 Financial evaluation methods

To give an overview of the interviewee's opinions on financial evaluation methods, this part firstly introduces the financial instruments that were highlighted during the interviews. Thereby the role of standardized Key Performance Indicators (KPIs) is presented, followed by findings related to the importance of active ownership and asset management is presented.

6.3.1 Financial instruments

There is a multitude of traditional and recently invented financial instruments and tools available to drive change in the market. All together, they are means to realize business model innovations by reduced cost of capital and with customized and favourable terms and conditions bound to the capital. The green transition of finance is not necessarily about doing anything radically new, but to tailor the investment approach according to the features of the different markets (6, 1). Out of the tools available, the following financial instruments have been found to be especially important for green competitiveness.

When we as an investor evaluate investment opportunity, we have to think holistically: What is to become of the small companies, what is the market potential? How scalable is the business model? We also have to understand if they are positioned in an ecosystem with access to additional investors and potential exit partners.

(Ingunn Svegård, New Energy Solutions, Statoil)

Green Bonds

Green bonds was frequently highlighted as one of the financial instruments that brings business closer to reaching the two degree target. A green bond is a relative new financial instrument with the advantages of making borrowing cheaper and facilitating products attractive to investors while also benefiting the developer (30, 1, 25, 22). Green bonds also mitigate climate risks in an asset portfolio (22). Or put simply:

Green bonds work. They lower the costs of borrowing.

(Gareth Miller, consultant of project finance and policies, Cornwall Energy)

Infrastructure is a classical example of projects that can be financed with green bonds (1). DNB issued its first green bonds in 2015 as the first Nordic commercial bank, which has allowed them to attract new and different sources of capital (DNB AR). The green bond market is growing rapidly and will by forecasts keep increasing (1, 2, 12, 22, 30, 59), but green bonds only represent a fraction of the bonds issued globally (1, 22). Green bonds get sold out very quickly and keep getting oversubscribed, so there is a much larger interest than supply (1). The mechanisms that govern the bond issuance has been subject to criticism, although not being the case for the questioned respondents. The critique of green bonds as “greenwashing” is largely perceived as unwarranted, as there is every reason to trust the reports and certification of the entities who provide second opinions (2, 25, 11, 12). Certification by an acknowledged third party like CICERO or DNV GL prevents greenwashing and gives a premium quality stamp that makes green bonds attractive (12, 21). A barrier for green bonds has been that they require a certain volume (usually above USD 10 million) to be worthwhile due to transaction costs, financial infrastructure and juridical support (1, 2). This requires a long term perspective, at least 5-10 years. An important fact to be aware of is the question of additionality when financing projects with green bonds:

It is important to have the question of additionality in mind when discussing green bonds. They certainly contribute to reducing CO₂ emissions and take business in the right direction. But how big steps are we really taking, and what alternative funding sources are available? If a project is funded simply because it's a profitable investment, it could easily be financed using ordinary bonds and common investment tools.

(Asbjørn Torvanger, Senior Researcher, Climate Finance, CICERO)

Grants and loans

The need for loans to recycle capital into new projects and bring technology to the market has proved to be one of the most evident capital needs. In such projects loans are not necessarily directly relevant for the firms themselves, but they rely on their customers to get funding (20, 19, 29, 23). “There has been a high and increasing demand for most types of financing in 2015. At the same time, the focus has shifted from developing technology to applying it. In the work to develop future capital measures, we see a potential for increased use of loans in the growth and scale-up phase both for entrepreneurs and growth companies.” (Innovation Norway, 2015).

One of the entrepreneurial firms proposed that the bank could require lower return rates than conventional venture capital if the objective is to realize renewable energy (29). In terms of being a debt provider, there was support for a financial institution that offers long-term investments and venture capital. The GIB could get the mandate to function partly as a financial, long-term *investment partner* operating with a market

price, and partly as a long-term *venture capital investor* to spark sustainability innovation (16). However, venture capital investments are risky, and a too large share of such investments might give an unacceptable risk profile if the GIB is required to deliver market returns (17).

Maybe the new GIB could be organized as a venture capital fund seeking to invest private equity on commercial terms in new technologies at the pre-commercialization stage? Public funding systems have well-functioning schemes and programmes. Risk capital from a private institution can release these funds. Here, entities like Fornybar AS and Statoil's New Energy Ventures fund could potentially play an important role.

(Andreas Thon Aasheim, Special Advisor NORWEA)

Securitization

Securitization, or bundling of projects, makes it easier to tackle risks related to sustainability investments. It is easier to manage risks when handling large projects than small, because you can deploy large amounts of capital and harvest a favourable return profile (5, 26). Bundling of small projects might yield better effectiveness than large projects (11, 14), and large investments are bound to a high risk level and corresponding risk analysis (14). When it costs as much to borrow a big amount as a small one, an acceptable risk award would yield more carbon savings per pound invested, and contribute to spread best practice (7). An interesting question is what gives the most significant sustainability impact of large or small projects (3, 12, 15, 16). Bundling of small projects could be a solution to keep the benefit of both versions (11, 14, 6, 7, 16). For instance, the amount Enova granted Hydro's aluminum project for energy efficiency could perhaps have given a larger effect if given to one hundred SMEs and start-ups (1, 3, 15). The GIB was recommended to not only target large projects, since it would be difficult to spread the risks; by channeling a large share of its investments to smaller projects, it could diversify risks and share the funding on more projects (7, 14).

One of the main questions is how to manage risk. Risk analysis is a comprehensive and time consuming task when financing large projects set in a dynamic market. Another approach is to handle risk through project diversification, with the sum of many smaller projects. This enables faster navigation in the market, and allows for project development adjusted to the risk level. The new GIB should thus avoid the pitfalls of large projects by allocating parts of the funds to smaller projects in order to diversify the risk.

(Harald Rensvik, NEFCO)

Innovative financial instruments

To cover the new needs of a rapidly evolving market, other instruments may need to be developed or existing instruments combined. Many of the established GIBs have

reinvented available instruments to get funding with cheaper finance for renewables, usually through increased debt or equity finance added into the project. For instance to meet the increasing interest of sustainability investing, *sustainable bonds* have emerged from both investors and issuers. Nasdaq Stockholm recently launched a new list for sustainable corporate bonds. The innovations in the financial sector have been time consuming, but effective. A key finding is the broad acknowledgement of the need to deploy long-term perspectives in investment decisions (28, 6, 7, 4, 35, 11, 27, 13, 1, 17, 25, 12, 16, 19), which requires long term engagement related to carbon footprint, sustainability communication and project evaluation (28, 6, 4, 35, 11, 27, 13, 1, 17, 25, 12, 16, 45). With the long term commitment of capital through a GIB, uncertainty and risk related to implementation of novel solutions is reduced, while firms get the opportunity to plan in a longer time frame without the risks attached to political fluctuations in policy regimes.

Large companies are considerable drivers in the green transition. These corporations may provide incentives for their subcontractors to develop new and green technology. We already find cluster initiatives related to sustainability. However, we do not have the right mechanisms to exploit this network sufficiently in order to encourage the transition. We need additional instruments to support individual companies in the supply chain.

(Inger Solberg, Innovation Norway)

6.3.2 Constructing real value through standardized KPIs

There is a general consensus among the various stakeholder groups that ESG disclosure as part of sustainability communication is too resource intensive and time consuming, also termed “death by reporting” (2, 28, 14, 29, 16, 15, 20, 35, 19). This has led to the need for more effective communication on achieved ESG performance, without comprehensive, alien indicators, which is easy to understand on a micro level (16, 29, 19, 14, 26, 2).

We need shorter, less glossy corporate reporting with better KPI's. This would increase trustability, reliability and the track record of management.

(Jeanett Bergan, KLP)

A more pragmatic approach is frequently emphasized through the use of the term “materiality”. Companies should communicate their prioritizations of what is considered material, and when linked to actual value creation, this approach is by many perceived as the right way forward (13, 25, 26, 24, 15, 28, 11, 10). The real value lies in targeted communication through globally accepted standards that rely on the construction of commonly desired KPIs (2, 25, 16, 15, 18, 35). Standardization and inclusion of ESG-factors in accounting gives increased knowledge and clarity for investors and users of the accounts (28, 29, 35, 12, 27, 5). As an example, carbon

pricing is highlighted as the one measure that will make a real impact to direct more private investments to climate projects because it will allow for projects to be evaluated directly on their emissions as a cost factor (1, 24, 35, 2, 13, 42). Disclosure of ESG factors concerning climate impact such as carbon footprint is more commonly used and makes it easy to perform comparative analysis (28, 29, 35, 12, 27, 22). This is largely connected to the fact that many measures that reduce CO₂ emissions also reduce costs, and it would make sense for firms to implement this from a financial perspective (12, 3, 25). From the firm's perspective, the financial rhetoric is missing when it comes to incorporating sustainability in the business model (11). Even though sustainability is believed to give a competitive advantage, the customer value is often the center of company communications by measuring investment value compared to payback time, improvements in energy efficiency or user friendliness (19, 29, 28). The value of common KPIs is formulated by the CEO of Norges Bank, which manages the Norwegian Pension Fund Global (SPU):

We must make firms go from words to numbers! If SPU has access to metrics, we can start working. Sooner or later non-financial metrics will become relevant for investors, meaning we could increasingly include positive externalities and not just exclude negative externalities. It would also give more suitable risk management.

(Yngve Slyngstad, CEO Norges Bank)

The general consensus of the need for global standards does not come without barriers (4). One of the interviewed academics underlines the absence of a global authority that can mandate the use of specific standards, accompanied by the challenge of a marketplace that is currently characterized by a wide range of not-for profit initiatives opposing consolidation (10). Another observation is the generational shift in perception of sustainability. People under 30 are more concerned with sustainability and has a more integrated way of thinking (19), exemplified by the majority of green bond owners being under 30 (DNB, 2015).

6.3.3 Active ownership and asset management

Another topic that emerged from the interviews was to what extent investors use ESG-data in their asset management. Some see sustainable asset management as a natural part of all decisions, integrated as added value (25, DNB, 2015). In most cases, ESG-consideration is evaluated separately and decoupled from the financial analysis, and the financial institutions have varying practices of passive and active ownership based on this data. One reason for ESG being treated separately is the encountered trade-offs that make it difficult to administer the funds. One of the pension funds directed attention to the different perceptions of sustainability in the financial community, where it seems like it has become common to talk about sustainability in terms of excluding companies from the portfolio (25).

Sustainability investments may give the best risk ratios, which would eventually shift capital flows to sustainable projects. However, large scale divestment or active inclusion of firms would accelerate the development.

(Geir Nysetvold, Powel)

When funds like Storebrand and KLP divested from coal, it had significant signal effects, and a decisive impact that led SPU to divest from coal (17, 1). Furthermore, some say that divesting completely from fossil fuels too quickly would be counterproductive for a holistic sustainability perspective, instead investors should be patient and allow committed firms to readjust (20, 25). This is a form of active ownership, that unlike exclusion, entails dialogue and follow-up of companies focused on long-term performance. Based on the growing evidence that sustainable investments have been proven to give better returns than market based investments over time, requirements to divest from fossil fuels and practise active inclusion of best-ranked sustainability firms would undoubtedly speed up the shift towards sustainability (1, 25, 20, DNB AR). Storebrand is the only Norwegian financial institution that uses ESG-analysis to perform active inclusion (25). The pension fund uses two main approaches: Sustainability rating of companies and divestment from high risk sectors.

While ESG factors serve as the foundation for evaluation, top ratings are derived from a financial perspective. Firms that hold the highest rank incorporate sustainability in their strategies with a long-term perspective. The analysis has to be forward-looking, not backward-looking. We want the companies that are set for the future.”

(Philip Ripman, Sustainability analyst in Storebrand)

There is little doubt among the various stakeholder groups that we are witnessing a shift towards funding of sustainable projects in investment communities, but that the progress varies with each financial institution. Financial institutions and private investors are important drivers to change business into a more sustainable direction as they have the ability to channel expertise and capital into new projects (49, 1, 28).

The trend is that companies will have to report on everything and be transparent of their value chains. Financial institutions setting their own requirements of what is to be disclosed is a positive and strong driving force.

(Anders Bjartnes, Managing Director of *Energi og klima*, Norsk Klimastiftelse)

There is a paradox associated with the huge amount of data being generated (25, 57, 44), and the challenges related to data availability (1, 12, 25, 38, 41, 43, 44, 57). Better flow of information and sound systems to separate reliable data from bad data is essential for sustainability investments (25, 1, 37). The investment community has a central role to push for increased access for ESG information.

Investors could go to companies saying what they want data on, for example the material issues according to the standards set by the Sustainability Accounting Standards Board. Then companies will be responsive.

(Robert Eccles, Harvard Business School)

The discussion about ownership responsibility for investors can also be viewed in terms of directing efforts to where the impact is greatest.

There is a difference between targeting Siemens for having traces of coal in their value chain and targeting investors that have coal companies in their portfolio.

(Andreas Thon Aasheim, Special Advisor NORWEA)

6.3.5 Summary

Below in Table 6 is a summary of the empirical findings related to financial evaluation methods:

Key takeaway

1 There is a need to improve and extend financial metrics to incorporate ESG factors that account for a long-term perspective.

2 Today's requirements of sustainability reporting and disclosure are too resource intensive and time consuming. Death by reporting is counterproductive because it wastes resources and does not contribute significantly to promote real world sustainability impact.

3 There is consensus among companies and investors of the need for globally accepted standards with KPIs of what is material to report on.

4 The financial community plays an important role in driving businesses to become more sustainable. They would benefit from encouraging firms to disclose ESG factors that are relevant for their risk exposure.

5 The firm has a responsibility through its board of directors to implement ESG metrics in the firm's communication to stakeholders, and seek to report on what is material to investors.

7 ESG factors should be integrated in the decision-making processes of asset management. When being addressed in asset management practices, sustainability is evaluated separately or primarily addressed by exclusion of companies, rather than active inclusion.

Table 6. Financial evaluation methods: summary of key findings.

6.4 Configuration of the Green Investment Bank

To give an impression of the opinions on the GIB's configuration, we firstly introduce findings related to its role and mandate. This is followed by its structural configuration and the potential financial instruments it could use to mobilize private capital.

6.4.1 Role and mandate of the GIB

In general, the Norwegian public funding agencies are evaluated to offer a broad range of instruments to fulfill their purpose, given the current system boundaries and regulatory frameworks (11, 17, 20, 21, 24, 13, 37). However, they are restricted by EU regulations and sometimes have mandates that does not cover all fields of sustainability. These limitations can potentially prevent realization of promising projects in the demonstration and commercialization phase due to market risk and difficulties in raising equity capital from private investors (3, 11).

From experience, we see that the ability to realize projects is greater for larger industrial actors where technology development has a high priority. Thus, their success is not only reliant on the financing. For smaller projects set up with the sole purpose to host an innovation project, there might be more difficulties in raising the full capital requirement and seeing the project through to commercialization.

(Nils Kristian Nakstad, CEO Enova)

Overall, changes to the current mandates and programmes are welcomed by the agencies themselves as well as industry actors that would benefit from these structural changes. This is based on the assumption that new or modified instruments serve a complementary purpose and do not become counter-productive (3, 13). The identified weaknesses and gap for investments in the current system provide a rationale for the establishment of a new financial institution as a way to address the apparent chasm. The interviewees were asked about their view of such an establishment and what mandate the bank should have. One rationale for introducing a *new* institution is because the marketplace is not yet mature enough to scale up investments to reach the required critical mass of green projects (1, 12, 33).

A green investment bank is part of a Plan B. Plan A would be a crystal clear signal of an effective carbon price. There is a need for much clearer and more powerful climate policies. Since tool A has not proven to be good enough, we must launch plan B.

(Asbjørn Torvanger, Senior Researcher of climate finance at CICERO)

Industry oriented and sector specific GIB

Another key finding refers to the principle of being technology neutral or sector specific. Innovation Norway is in the process to move from a disposition of neutrality to prioritize six key areas for sustainable development. While GIEK is technology neutral, 87% of their portfolio is in oil and gas, with only 5% in renewables and the rest in shipping (GIEK AR). This is largely attributed to the size of the renewables projects often being too small for GIEK, difficulties to attract private investors, and the stringent risk analysis required for single venture projects due to limited capital contributions from owners and non-course responsibility with creditors (8). Furthermore, the findings reveal a nearly unison consensus that the institution should promote industry policy (3, 16, 28, 35, 8, 11, 15, 17, 25, 23, 19, 29) over energy policy. With that being said, a target should be to invest in projects that promote both the industry and energy perspective. Over time, the GIB will consequently be able to recycle capital from loans or buy-outs into new projects (7, 23, OECD, 2015, Connecticut Green Bank, 2015). Investments made through a GIB can contribute on the supply side by creating a technology push, while also contributing on the demand side by supporting development of home markets:

A green investment bank could be central for catalyzing the establishment of innovative projects or new infrastructure that phases out fossil fuels and contributes to build low-carbon solutions and renewables. As such, a GIB could be important for us as a technology supplier, through the direct relevance for our customers.

(Christian Jahr, Head of Business Development, Siemens)

Substantial and specialized expertise is required to maintain active ownership and manage venture capital projects in high-tech sectors (1, 6, 7, 13, 15). The selected sectors would thereby be determinative for which human resources and financial instruments are necessary to fulfil the GIB's mission (6, 7).

International scope

In addition to have the power to invest in a home market, there is strong support that the GIB should be mandated to promote Norwegian technology and know-how for sustainability projects internationally (3, 20, 21, 16, 14, 1, 8). Projects in developing countries with high political risk are not always backed by public actors (21), and even though Norfund has sound experience and competence that makes them a strong partner for investments in such countries (2, 12, 21), their mandate is limited to reduce poverty, not to invest in sustainability. Norway thus lacks a strong financial actor that can co-invest with leading Norwegian firms and green technology projects abroad (21, 14, 16). The potential for emission reductions and societal value improvement in Norway is minor compared to what the GIB could achieve abroad (8, 17, 14). The structure could build on NEFCO's business model of co-financing sustainability projects abroad (21), which would shape a GIB specialized in renewables that can co-fund sustainability projects (12, 21). When it comes to large scale investments in

developing countries, the markets and mechanisms are not well enough developed to meet the high risks, and is seen as unrealistic (12). On the other side, these projects could provide significant cash flows with committed stewardship and competence:

Many projects in developing countries have a significant cash flow potential, but lack the will, knowledge and financial muscles to innovate business models to commercialize the projects.

(Harald Rensvik, Norwegian Board member in NEFCO)

6.4.2 Structural configuration of the GIB

The structural configuration results from the overall mandate and which financial instruments that need to be implemented in the market (3, 16). A central question is then if the bank's activities are controlled through a governmental or private ownership structure. As a publically mandated initiative, the GIB should have some degree of public affiliation to secure that the democratic foundation is not questioned (4). However, the GIB should avoid too many political interventions that could affect the long-term asset management (4, 7, 22, 24, 35, 16, 21, 12). Hence, arguments for a private institution arises from the need of financial flexibility and political detachment, as was the recommendation from many of the interviewed corporations and financial actors (6, 16, 35, 24, 22, 12). The private sector and established market are also considered better at following a rapidly changing marketplace, and is thus better positioned to pick the winner projects (13, 5, 8, 58, 46, 49), and contribute to market driven innovation (8). The GIB could also have a hybrid structure to facilitate the public/private partnership (3). As an example, the UK GIB transitioned from an initial public entity to become a private institution, but with an independent board ensure that the GIB's strategic and operational activity comply with the given mandate from the bank's foundation (7). Regardless of the form, the GIB could be structured as a company:

The new GIB should be a set up in such a way that private actors can invest in it. This makes the institution eligible to attract private capital.

(Jeanett Bergan, KLP)

A structure opening for a flexible and pragmatic GIB was found to be on top of the SME- sized sustainability innovators' wish list. They are often situated in markets with great uncertainty, and need an actor that is deeply involved in the firm's business. SMEs and entrepreneurs call for an investor that does not require rigorous performance parameters, and has the capacity to offer very short application and evaluation processes (29, 21, 19, 28). To spark innovation, the firms need to have a mutual understanding with the investor and a partnership in terms of evolving the business model to the changes in the marketplace (29, 21, 19, 28). It is important to keep in mind that approaches that are beneficial for SMEs can also advantageous for large utilities, but it's not always the case the other way around (58). Large firms also

need active participation and would benefit from a long-term investment partner that is willing to enter long-term partnerships built on mutual trust to reduce risks (35, 21, 23).

6.4.3 Financial instruments

When being publically mandated, the financial configuration of the GIB can consist of the means to award grants and loans, either independently or through partnerships. Firms need a combination of loans and grants throughout the innovation value chain (3, 11, 14). Grants are especially important in an early phase (14) to reduce the risk and attract additional financing through a bank (11). The closer the development process comes to commercialization, the larger share of private capital (3). Loans anchor decisions and commitments in the management, so it is usually best for both firms and the State that there is a well balanced combination of grants and loans (3, 11). The relationship between being a grant and debt provider is illustrated by the example of the Nordic Development Fund (NDF), which manages funds for grant purposes. Without targeted leveraging, the largest potential to attract private capital is lost. With 10% financing instead of full grants, NDF could have developed ten times larger projects (14). Most interviewees agreed that with the needs of the current market, the GIB should be able to provide applicable projects with both debt and equity in a long-term perspective (20, 7, 35, 26, 23, 19, 21). With that said, many of the respondents highlighted that it should be a professional entity that does not subsidize equity and operates on commercial terms (22, 3, 20, 16, 7, 37).

A new financial institution should be decoupled from having any subsidy component or political interference. We cannot portray the green sector like it needs crutches, because it does not, and it should not. It has to be economically viable on its own.

(Anders Bjartnes, Norsk Klimastiftelse)

6.4.4 Summary

Below in Table 7 is a summary of the empirical findings specifically related to a green investment bank:

Key takeaway

- 1** The GIB's mandate should be to attract private capital to scale up investments in projects that promote sustainable development.
- 2** The GIB needs to complement current public funding agencies.

The GIB should be industry oriented and prioritize selected sectors that fit Norway's businesses and ambition to scale up sustainability solutions internationally.
- 3**
- 4** The establishment of a new GIB relies on the level of internal competence as a factor for success. Substantial and specialized expertise is required to maintain active ownership and manage venture capital projects.

The GIB should mainly focus on international investments, while national investments should be allocated with the objective to create a home market or large scale emission reductions in Norway.
- 5**
- 6** The GIB should have financial flexibility and the pragmatic approach required to meet the needs of both SMEs and well-established firms.
- 7** The GIB can use financial instruments such as green bonds, securitization, grants, loans as well as novel combinations of these established instruments.

Table 7. Configuration of the GIB: summary of key findings.

7 Synthesis

In this chapter, we address research question one by illustrating how tensions can be used to describe the financial characteristics associated with business models for sustainability. This is done by coupling key findings from the empirical analysis with the previously presented theoretical concepts of tensions. The synthesis is structured by first identifying how the intertemporal and organizational change related tensions can be used to explain some of the issues that ensued from the interviews. Following this, neither of the two tensions were found to be explanatory of issues relating to communication. We thus propose a new tension to complement the framework by Hahn et al. (2015, p. 304), namely “Significance of addressing all versus key stakeholders”, in short called “stakeholder significance”. The financial characteristics of business model innovation, communication and financial evaluation methods are used to guide the analysis. The synthesis is concluded by illustrating connections between the tensions and how they together can be used to describe our main findings.

7.1 Intertemporal tension

As explained in section 3.2.3, the intertemporal tension describes the conflict between long-term and short-term decision making. Like described in literature by Hahn et al. (2015), the economic dimension follows the short-term orientation of the financial system, whereas social equity and environmental protection require attention in a longer time frame. When faced with the intertemporal choice, decision-makers prioritize short-term results.

7.1.1 Business model innovation

Key finding: *There is a need for improved financial incentives to encourage and excel more radical changes through market-creating innovations.*

Some of the identified issues related to business model innovation can be attributed to the intertemporal tension. Findings indicate that in the context of the Norwegian capital market, there is a lack of funding that encourages business model innovations founded on long-term environmental and social considerations. In other words, there is a lack of targeted programs and schemes with the objective to push the type of innovations that not necessarily expand existing markets, but create new ones. One example is the absence of arrangements that reward ideas based on the concept of a circular economy, where traditional short-term revenue streams are not a part of the business model design for economic value capture. Instead, the short-termism inherent with the investor community diverts focus to innovations that merely improves efficiency or other incremental performance improvements. These innovations have immediate and certain (i.e. less exposed to risks) impact on the company balance sheet, and thus make a good investment case for investors. The

short-term capital is also evident through venture capitalists, who invest in firms that have a potential to be sold off to incumbent actors or to quickly realize profits. This short-term orientation of financiers was found to discourage business model innovations for sustainability.

7.1.2 Communication

Key finding: *Companies could benefit from better communication of how they are positioned in a long-term perspective in order to attract the right investors.*

The empirical evidence reveals that the intertemporal tension is manifested through how companies choose to communicate with the external environment. Due to the short-termism of the financial system, investor relations is driven by periodical reports on financial performance. Still, what owners such as the government or pension funds really want to know, is how the company is positioned for the long-term. Hence, the tension is clearly evident between the expectations set by investors, and the corresponding methods used to evaluate them. In this case, it becomes clear that the intertemporal tension is dependent on what type of investors the company seeks to address, as equity and debt usually comes with opposing time-frames.

One of the approaches from literature to embed a short and long-term mission of sustainability in the corporate governance structure, is to actively choose investors with a mutual long-term perspective. Hence, the finding implies that there is a significant potential for companies to increasingly tailor their communication to fit the various time orientations of investors.

7.1.3 Financial evaluation methods

Key finding: *There is a need to improve and extend financial metrics to incorporate ESG factors that account for a long-term perspective.*

One of the most material findings related to the intertemporal tension is the financial metrics that form the basis of most evaluation methods today. The toolbox of investors are largely made up of financial and non-financial metrics. Today, the majority of investors only measure performance through pure financial metrics, while ESG are often excluded from the financial models. This coincides with theoretical findings, where short-term business goals can be merged with long-term societal goals if the economic models are expanded to include ESG metrics. The consequence of not addressing the tension is that the long-term value creation, or viewed differently, long-term costs, are not properly accounted for. Here, supportive empirical findings strongly indicate that investors systematically underestimate the climate-related risks in their portfolios with the use of current evaluation methods. To conclude, the empirical analysis showed a broad acknowledgement of the need to address temporal

tensions by integrating a long-term perspective in investment decisions through the use of ESG.

7.2 Isomorphism versus structural and technological change

As described in chapter 3.4.2, the second tension relevant to financial characteristics treats the subject of organizational change through structural or technological innovations. By the means of our empirical analysis, we sought to find answers to how this tension can describe the process of making changes to the business model to address sustainability. Or more importantly, how tensions related to the nature of change affects the relationship between the firm and its investors. In the literature, the tension of organizational change is evident in cases where firms experience that their intention and desire to change current practices does not comply with the norms and practices in the environment they operate in, or when new practices are made to comply with expectations of the marketplace. This is true for all businesses, including SMEs, corporations and financial institutions. The empirical findings that are characterized by this tension are presented below.

7.2.1 Business model innovation

Key finding: *There is a need for improved financial incentives to encourage and excel more radical changes through market-creating innovations.*

The financial characteristics of business model innovation is closely tied to the tensions of structural and technological change. The key finding stated above is the same as in section 7.1.1 on the intertemporal tension. Besides the short-term focus of many investors, current public and private institutions were found to be poorly positioned to facilitate structural and technological change for companies with novel technologies. This is an example of how the institutional environment where the firm is embedded in has an impact on the innovations that emerge and gain hold in the market. Furthermore, the current system lacks financial programs and schemes that are tailored to finance business model changes of the larger and more established firms, and not only start-ups and entrepreneurial ventures. One example is business model innovation in the energy sector, which in turn will lead to transformation of the petroleum sector and completely change the dynamics within the industry. In this process, some of the old corporations will die while others survive. One of the interviewees expressed that the most substantial societal and environmental impact will be realized with the turnaround of big dinosaurs like the large European utility companies. Moreover, business model transformations in the segment of large companies is equally important in order to meet the SDGs, but they are currently left to attract capital in the private capital markets subject to the prevailing benchmarks of risk, uncertainty and cost of capital. As an implied resolution, targeted sustainability

investing provided by specialized private or public actors were found to cause institutional change and simultaneously drive radical changes.

7.2.2 Communication

Key finding: *In some cases, companies' efforts to communicate sustainability could appear as greenwashing. The true value for investors lies in the actions taken to address the contents and impact of the disclosure.*

Overall, firms' efforts to include sustainability in internal and external communication is a comprehensive subject, with different opinions regarding best practice and the true value of devoting company resources to excessive reporting. In this regard, the phenomenon of greenwashing was several times highlighted as a problem. Sustainability as a part of communication, either integrated or in separate reports, have for many companies only been a priority due to the intensified focus in media and the market, and not rationalized by ethical arguments. In this case, sustainability is addressed to comply with industry norms and preserve legitimacy, manifested through means of communication that is meant to enhance credibility. Through this attempt to meet institutional expectations, greenwashing emerges. The consequence is that alternative to enhance legitimacy, there is a rebound effect. Instead, the isomorphism that can be traced in this behaviour should be replaced by actions. The empirical evidence shows that the real value lies in display of how the firm takes action to address the sustainability issues vital for their future existence. Hence, the responsibility of business goes beyond communication and manifests into a track-record for improvements that can catalyze desired acceptance and institutional change. As outlined in the theoretical context, one of the resolution strategies to resolve the tension is to attend to the two sides simultaneously in order to legitimate the pursuit of new technologies and business models. The firm can do this by engaging with their stakeholders and the marketplace. The objective with this engagement should be to catalyze institutional change. This resolution strategy highlights the responsibility of business to be a key driver for implementation of ESG-metrics and to approach investors with the intention to engage in a dialogue of what is material for them to report on.

7.2.3 Financial evaluation methods

Key finding: *When being addressed in asset management practices, sustainability is evaluated separately or primarily addressed by exclusion of companies, rather than active inclusion.*

The reluctance to move outside the periphery of the institutional system is illustrated by how financiers approach sustainability in their asset management. Today, our findings suggest that sustainability in asset management is largely practiced by

excluding companies that are regarded unsustainable. Only a minority use ESG-data to conduct active inclusion. While financial institutions have internal structures to account for ESG-performance, it is commonly evaluated separately and decoupled from the financial analysis. An explanation is offered by the tension of organizational changes in a financial system founded on instrumental logic. The complex nature of a globalized marketplace is one reason that managers today prefer an instrumental frame that can outline the financial benefits of sustainability investments. Some would thus characterize the system as strongly institutionalized with established financial norms not being subject to change, as stated by several of the people interviewed. The norm of maximizing return on capital is here underlined as the financial parameter that determines investment decisions, and being the prioritized focus of companies. This view is in line with the business model perspective on sustainability, where the value creating activities or business case is what investors ultimately search for.

Still, there is evidence of financial institutions that increasingly seek to address the tension of organizational changes. While maintaining their conventional path, they are simultaneously exploring new practices that have not yet fully been institutionalized. However, only a minority have taken one step further to actively integrate ESG into decision-making by creating new assessment tools and methodologies to quantify ESG into their investment strategies. Another key finding was that in order to address an uneducated marketplace, the associated risks and uncertainty with adoption of new methods for company disclosure and evaluation can be reduced through the establishment of standardized KPIs. This call from the marketplace is one attempt to resolve the tension. The introduction of universal KPIs would be a way to convene the responsibility of business and financiers, and a resolution to bridge the gap between the companies that reside to isomorphism in their ESG evaluation and the ones that are pioneering new models and investment practices.

7.3 Significance of addressing all versus key stakeholders

As previously mentioned, there is a research gap into how firms can connect communication of their sustainability strategy to realize business models for sustainability. Corporate sustainability communication is a key subject to explore in terms of characterizing tensions that can shed light on how firms can attract the necessary capital for a transition towards sustainability. Therefore, we propose to expand the selected tensions outlined by Hahn et al. (2015) to also include the tension termed stakeholder significance, outlined in Table 8. First, we present the description and underlying logic of our contribution to existing tensions, before we connect it to our key findings. The proposed expansion is marked in green in the bottom row, whereas the unmarked rows are the two original tensions deemed relevant for sustainability investments.

Proposed expansion of tension framework					
Tension	Identification: positioning in the framework	Characterization: underlying logic	Strategies		
			Acceptance strategies	Resolution strategies	
				Separation strategies	Synthesis strategies
Corporate short-term versus long-term orientation <i>(Intertemporal tension)</i>	Short-term orientation of an organization's financial objectives versus need for long-term orientation for environmental protection and social equity. Tension refers to the different temporal foci of economic, environmental and social aspects and is situated within the temporal dimension of context	Due to an intertemporal choice problem, corporate decision-makers make choices that are best for the short term but might have detrimental impacts for the long term	Implement compensation packages that combine short- and long-term objectives by integrating financial and non- financial performance criteria	Make long-term orientation a core responsibility of top management to create room for manoeuvre at a lower level	Implement an alternative corporate governance structure that is more forgiving of not meeting short-term financial objectives
Isomorphism versus structural and technological change <i>(Organizational change)</i>	Need for change for sustainability versus isomorphic pressures that stabilize extant practices. Tension acts between environmental and social aspects in change processes and operates between organizational and systemic levels	Demands for fundamentally changed products and business models for more sustainability jar with well-established and institutionalized practices so that change comes at the risk of institutional disapproval and loss of legitimacy	Combine products and services based on well-established practices to maintain legitimacy with experimental practices to launch alternative offerings despite institutional disapproval	Concentrate established business in markets where traditional institutional prevail while launching innovative solutions and novel business models in market segments where institutional change has already taken place	Engage in institutional change and actively seek to shape institutional expectations in favor of more sustainable business practices
Significance of addressing all versus key stakeholders <i>(Stakeholder significance)</i>	Corporate disclosure addressed to all stakeholders versus prioritizing only key stakeholders relevant for sustainable value creation. Tension acts between the organizational and systemic levels, has a spatial and temporal component. Also concerns social and environmental aspects in prioritizing material issues.	Firms have limited human and financial resources that are not aligned with the substantial resources required by communicating to a broad specter of stakeholders. Attempt to address all stakeholders can be detrimental to credibility at the expense of real impact.	Retain practice of addressing the whole continuum of stakeholders while devoting resources to selected groups.	Make stakeholder prioritization a core responsibility of the board through incorporation of materiality. Issue a Statement of Significant Audiences and materiality in the annual report. Report on the material issues, and publish a separate sustainability report for other audiences.	Assess and incorporate materiality. Issue an integrated report of how the firm address sustainability, intended for significant audiences. Utilize a digital platform to save resources by continuously updating key communications to various stakeholder groups.

Table 8. Stakeholder significance. Expanded after Hahn et al. (2015, p. 304).

7.3.1 Description and underlying logic

The stakeholder significance tension describes the relationship between the company and its stakeholders, and acts between the organizational and systemic level. The underlying logic is characterized by the pressure from the public society to be transparent and address issues that might be detrimental for the whole continuum of stakeholders. Such a holistic approach conflicts with the more pragmatic approach to address only a significant audience and devote the company's limited pool of resources to the issues deemed material to key stakeholders and the company itself. Stakeholder theory makes the case for a responsibility that exceeds fiduciary duty to shareholders. We build on this, but problematize the need to make prioritizations of how the various stakeholders are managed. The tension is closely connected to death by reporting, which in turn explains the fatigue associated with sustainability communication in many firms. An excessive amount of time and energy is spent on sustainability communication that does not lead to any change or impact in the firms' daily operations. The empirical analysis shows that this logic undermines the very intention of addressing sustainability. Looking to the academic and globally accepted definitions of sustainability, a holistic approach to stakeholders is implied. Similarly, it is found in the definition of a business model for sustainability as the configuration of maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries. There is no mention of how to prioritize the external environment outside of these boundaries.

7.3.2 Communication

Key finding: *In some cases, companies' efforts to communicate sustainability could appear as greenwashing. The true value for investors lies in the actions taken to address the contents and impact of the disclosure.*

The same key finding is discussed in section 7.2.2 with regards to the tension of organizational change. By using the new tension of stakeholder significance, greenwashing can also be explained by the push from society to satisfy *all* stakeholders. When addressing the societal and environmental dimensions of sustainability, firms have a large potential pool of stakeholders that are somehow impacted by the firm's operations. The consequence of not recognizing what stakeholders are truly significant for the company's strategic focus thus results in communication that is not sufficient to satisfy neither direct nor indirect stakeholders. One resolution strategy to address the tension became apparent through the empirical analysis. Concepts such as materiality and integrated reporting have emerged to address death by reporting and to drive action beyond disclosure. The concept of materiality was found to reduce the need for excess sustainability communication and greenwashing, and was embraced by both large corporations and SMEs. In short, the

adoption of materiality and addressal of key stakeholders could be a tool for businesses to identify important issues that might prompt changes to the company's business model. This will be further discussed in the next chapter.

7.4 Summary

Figure 11 summarize how the selected key findings can be characterized by multiple tensions. We see that the call for ESG metrics as standardized KPIs are one of the most important findings. Despite being placed under the intemporal tension, the use of ESG metrics was mentioned in relation to the other key findings elaborated in the sections above. This can imply that by implementing a global standard into the practices of firms and investors through governance, disclosure and evaluation methods, the effect of the other tensions can be mitigated or resolved.



Figure 11. Summary of synthesis.

8 Discussion

We previously pointed to the absence of research that explicitly treat financial tensions coupled with sustainability. In this section, we discuss our contribution to the corporate sustainability literature and reflect on the importance of finance for development of more sustainable business. The discussion builds on the connections that were made in the previous chapter, where the empirical results from the case study were connected to the theoretical concept of tensions. We start with some reflections on the use of tensions to extend and critique the business model view, before discussing the different financial characteristics separately. All together the chapter summarize and discuss the initial research questions and shed light on topics relevant for examination in greater detail through further research.

8.1 Looking through a tensions lense

The purpose of RQ1 was to explore what tensions from the corporate sustainability literature can supplement the business model view and unravel connections to financial aspects subject for further research. Our critique of the business model concept as it has been presented so far has mainly pointed to the weakness of the triple bottom line approach. In the tensions theory, business models that fall in this category are win-win solutions that offer positive outcomes in all three dimensions of sustainability. There is no doubt that firms should strive for solutions that can benefit an array of stakeholders and simultaneously contribute to strengthen the business case. The controversy lies in the business models that today do not offer these solutions, but instead appear to yield trade-offs between economic returns and social and environmental concerns relevant for some of the company's stakeholders. This is where the value of applying a tensions lense comes to display. Looking through this lense, we are able to address trade-offs by means of different resolution strategies. Other streams of literature, such as shared value creation, have been questioned for the feasibility to move beyond trade-offs (Sætre et al., 2016). By taking a paradoxical approach to resolve identified tensions, the business model view can be reconstructed so that it does not ignore apparent tensions, but rather seeks to resolve them.

The tensions perspective provided several insights. First of all, the synthesis showed that by using a tensions lense, several of the key takeaways from the empirical analysis can be characterized by more than one tension. This illustrates that the topics and issues that were discussed during the interviews are complex in nature and can be seen to have inherent tensions viewed from several dimensions. From this, we can say that the terminology offered by the tension literature within corporate sustainability has been useful to describe the challenges of implementing business models for sustainability. However, limitations to the current tension literature became evident through our suggestion of the new tension of stakeholder significance which will be further discussed.

8.2 Business model innovation

When asked about their idea of a business model for sustainability, our interviewed stakeholder groups offered great diversity in their perception and knowledge of the concept. Few of them were familiar with the term business model for sustainability, implying that it is largely an academic term that is not explicitly applied in everyday operation. With that being said, several of the stakeholders interviewed had practised what is embedded in the term of sustainable business models for decades. Others were in the middle of innovating their business model to meet the green transition. From this, one can draw that the terminology is less important, but rather firms' perception of what truly makes a business model sustainable, and what actions it takes to get there.

The synthesis put focus on business model transformation that results from market-creating innovations, where the intertemporal and organizational change tensions proved to be strongly connected. This was evident through the effectiveness of the financial metrics that are used to measure business model innovation and the evaluation of ESG in decision-making and consequently communication with existing and potential investors. The financial metrics used in evaluations both on the company and investor side measure the sole economic performance through parameters that yield measures for efficiency and short-term performance. The use of these metrics will, as argued by Christensen and van Bever (2014), only promote incremental innovations over market-creating innovations. If we apply this to firms that want to change their business model, they can make minor alterations that lead to improvements in efficiency. Or they can reshape the entire model to create a *new* configurations intended for *new* markets. Regardless, the company projects will be valued by public and institutional investors on the usual metrics, which in turn might discourage and discredit the real value of the innovations in a long-term perspective. Thus, the current institutionalized financial norms can be said to encourage firms to isomorphous innovation in preference to disruption.

Despite having identified a gap in the Norwegian funding system, the impact of this gap on the unrealized potential for business to make more radical changes should be contested. Other conditions beyond the firms' financial resources and dialogue with owners influence the ability to make disruptive changes to the business model, such as the human and social and capital and dynamic organizational capabilities. A part of the gap was absence of suitable incentives for established firms. One might also argue that a lack of business model innovations in this segment is not only attributable to the tensions of attracting finance, but rather the risks associated with exploration of new markets and technologies. Given that these companies have substantial equity on their own balance sheet, innovations rests on the capacity and will to change.

8.3 Communication

Besides reforming internal evaluation methods, ESG inclusion is important also to the external communication by companies and the financial institutions. Accounts in the empirical data illustrate that there is a communication gap between firms and investors. But they also suggest how company disclosure can provide investors with information that can widen their analytical foundation and be translated into long-term fiscal value. It is also of importance for firms looking to acquire new sources of capital, which can then put sustainability at the center of their investor relations to attract the right investors.

8.3.1 The need for a global standard

One clear finding was the repeated desires for ESG metrics that can be used by firms and investors alike to secure comparable grounds based on sustainability. A true global impact is implied from the changed dynamics following financially comparable disclosures regarding ESG.

Still, there is little clarity concerning exactly *which* metrics would be useful and in what format, and it is thus necessary to question the practical realization of this in the near future. Nevertheless, some answers may be given by the world leading experts who are working on this through the Financial Stability Board's Task Force on Climate-related Financial Disclosures. It will be of great interest to see if their efforts to recommend and clarify the use of standards will have an impact on how firms and investors use ESG in their communications. In short, a change of metrics is needed through integration of ESG into decision-making. The relation to finance is twofold: firstly ESG has to be integrated internally in the performance evaluation of conventional firms and investors. Secondly, it has to be externally communicated to ensure legitimacy towards stakeholders and as a means to channel capital to business models that are sustainable.

8.3.2 The economic case for legitimacy

Corporate disclosure has been subject for much debate among scholars, both in terms of the principles and frameworks to guide the range of disclosure, and the effectiveness and value of the disclosed information to various stakeholders. Findings indicate that firms that take a stand for transparency and ESG disclosure could impact investment decisions in favor of sustainability. This correlates with the findings that transparent sustainability communication and disclosure of ESG metrics strengthens the competitiveness of the firm. Moreover, reporting on sustainability has been accused of being insufficient as a legitimization tool as it does not properly deploy stakeholder engagement. This is partly true when the disclosure leads to negative publicity. According to Jeucken (2004), share value decline by 2% for banks during the period of dispute. Still, an honest approach to transparency will have a preventive

effect on collaborative action against the company, but will never entirely prevent damaging activities. The empirical evidence suggests that when done correctly, sustainability communication is a tool to enhance company legitimacy for all companies. Moreover, in the case of financial institutions, it plays an important role in driving the necessary behavioural and organizational change.

8.3.3 Stakeholder significance and materiality

We propose a contribution to the integrative perspective offered by the tensions literature. The synthesis in chapter 7.0 revealed another key tension that we suggest amended to the framework presented by Hahn et al. (2014). We have thus responded to the authors' proposal for further research that "could use the framework to further identify and investigate other tensions that firms face when dealing with sustainability" (Hahn et al., 2014). The expansion of "significance of all stakeholders versus key stakeholders" builds on the key findings of the associated workload and limited resources of corporations to address all stakeholders simultaneously. This is an impossible task that in certain cases instead appear as attempts of greenwashing.

A strategy to resolve this tension can be offered by the concept of materiality. By first identifying who are the key stakeholders (i.e. significant audience), the company can subsequently map the material issues it should commit resources to address. As a concept, materiality is not subject to standardization, and thus have the flexibility to be adapted to each firm's significant audience by the chosen frameworks used to address sustainability communication. According to Eccles and Krzus (2015), the ultimate responsibility to assess materiality lies with the Board of Directors. The board carries the duty to set long-term strategies for the firm, and by not integrating ESG they are not fulfilling their mission. Providers of financial capital, i.e. investors, is the direct audience, while the indirect audience also exerts pressure on the firm because they in turn have an influence on the providers of capital. Materiality can also address the intertemporal tension that exists between the time perspectives of the various stakeholders, by identifying material issues relevant for the company's audience in the short, medium and long-term. Furthermore, the deployment of materiality can protect the company of accusations of greenwashing because it clearly outlines to whom the company is to commit resources. The stakeholders that are not given attention through the identified and selected material issues can be addressed in a separate sustainability report. Another synthesis strategy is integrated reporting, which was found in the empirical analysis as a tool that significantly reduced time and resources spent on sustainability communication.

8.4 Financial evaluation methods

8.4.1 A shared responsibility

Today, investment decisions are largely based on financial models that estimate return on capital. The findings show that both financiers and firms call for a change of these financial models. One proposal from the financial institutions is that sustainable asset management should be a natural part of all decisions, integrated as added value for all investments. When being asked who has the ultimate responsibility to promote ESG inclusion in disclosure, the answers vary. Some assign the full responsibility to businesses alone, while others call for increased involvement from investors. Looking from a company perspective, it is the firm's owners that should be drivers to make sure transparency and ESG metrics are implemented properly. On the other hand, investors are perceived to be inexperienced in the field of communications, they have various practices of what to report on and some do not set any requirements at all. A consequence of this is that companies can be better at informing investors of what they should pay attention to, and ask what investors value in their analysis. Similarly, investors can approach companies with requirements for what they deem material to report on. These views show that the importance of exerting a pressure on what is to be disclosed goes both ways.

8.4.2 ESG metrics change the rules of the game

The empirical analysis proved that a step to resolve the temporal tension tied to financial evaluation methods is to integrate ESG into the decision-making. Financial evaluation methods were found to be the financial characteristics that has the largest impact on the dynamics of the interaction between investors and firms positioned for the long-term. ESG integration is a two-fold resolution that concerns the financial aspects of financial evaluation methods and communication. Current metrics are left to promote short-termism. Metrics such as return on investments (ROI), Internal rate of Return (IRR) etc. favour efficiency innovations, which makes market creating investments unattractive. The problem is not the ratios themselves, but how they are interpreted and used. The market itself works perfectly well, but financial flows are channeled on the wrong premises. To correct this, the financial community needs to develop and start using new metrics that measure the long-term benefits of market-creating innovations and ESG values in addition to financial metrics. Some metrics are in the process of being developed, so the turnaround operation has begun. Other suggestions could be the introduction of new metrics like Return on Environmental Impact, Return on Social investments, Return on R&D Investments, Return on Demonstration Investments and the like.

When it comes to deploy ESG into investment analysis, only a few financial institutions have started to do so, by integrating it into their code of conduct, internal

governance structure and active ownership dialogue with the companies in their portfolio. One of the reasons why this is an essential criteria to achieve business models for sustainability is the power inherent in the financial institutions to impose change with their clients' business models. It then becomes relevant to ask why practices such as active inclusion have not gained momentum, despite evidence of superior performance of sustainable companies. One reason found was the commitment of resources connected to perform a more comprehensive evaluation. With that being said, large institutions are already evaluating ESG decoupled from the financial analysis, which means that more active integration can be done without having to require additional resources. In the synthesis, we found that isomorphism could be an obstacle for sustainability because of the rebound effect associated with greenwashing. In addition to active inclusion, we would like to highlight that deficient information and disclosure of ESG metrics slows down the green transition of the economy. We therefore argue that increased transparency, disclosure of ESG factors and inclusion of ESG metrics in financial analysis would accelerate the transition.

8.5 Can a GIB resolve the identified tensions?

To answer the second research question, a more pragmatic approach to the financial aspects discussed in the previous section will be taken. We now discuss strategies for how to resolve the characterized tensions by answering the question of “How can the financial community and business together address these tensions through the establishment of a Green Investment Bank?” (RQ2). The section starts with discussions around the gap to be filled by the GIB, how it could contribute to the reinforcement of the long-term perspective and how it can accelerate business model innovation.

8.5.1 Gap to be filled by the GIB - *raison d'être*

First of all, the analysis proved that current institutions are not adequately positioned to facilitate structural and technological change for companies with novel technologies in certain phases of their technology maturity scale. This is also the case for large and established businesses that seek to undergo more radical changes. In addition to the conclusion that there are gaps to be filled in the public funding system, the tension of isomorphism vs structural and technological change helps to explain the significance and consequences of the gap. One of the realizations was that the lack of suitable schemes to encourage new technologies, the legitimacy of the institutionalized system can prevent these actors to act as innovators for more sustainable practices. This leads to the discussion of questions such as “should the public funding system be responsible for catalyzing change for incumbent actors or should they be left to the private capital market?” or “Is it too challenging for public agencies to keep up with rapid technological and disruptive changes in the market?” In general, when there is no adequate support for new business models, it sends signals

to market that the risk involved might be detrimental for success. This is confusing for entrepreneurs and established actors when there is much talk on a high level that business has to make radical changes, but in practice it is hard to comply when the institutionalized schemes support incremental changes and known technologies. A GIB could fill the gap, but should complement the existing schemes that serve their purpose efficiently today.

8.5.2 Reinforcing a long-term perspective

Another key function to be addressed by a GIB is the task to pursue a resolution strategy to the intertemporal tension. The GIB will be a specialized investment bank, and in that sense act as an intermediary institution. Based on the power that comes with such a position, one of the clear recommendations stemming from the interviews is that the bank will deploy a long-term perspective in investment decisions. The practical implementation then relies on the financial evaluation methods and stakeholder engagement and communication used or developed by the new institution. While a unified stakeholder group calls for global, standardized KPIs, this is not a reality yet. Rather, as pictured in chapter 5.6, there is a jungle of initiatives to engage in, and the GIB would have to comply with one or several of these, or develop a customized framework. Our findings suggest that the most frequently used initiatives are those that involve compliance to international declarations and guidelines made by the UN, UNEP, OECD or the EU. The action of signing an international declaration can be an important communication device, but previous research has not been able to point to a difference in activities of the signatories and non-signatories (Jeucken, 2004). Having found that it is the actual *action* taken in the aftermath of disclosure, we believe other initiatives to have a greater impact. With that being said, participation in global networks such as the UN GC is instrumental in communicating and learning (Jeucken, 2004).

By including a long-term perspective in its investment decisions, the GIB could provide the financial flexibility, know-how and pragmatic approach necessary to remove uncertainty from sustainability projects. As a long term investment partner, the GIB creates financial stability both through co-investing and providing venture capital for suitable projects. This reduces the risks for both private investors and firms that are willing to innovate or change their business models to fit a sustainable development. The GIB's role as an investor that provides capital coupled with market knowledge will give firms the opportunity to perform long term planning, without the risks connected to changes in policy regimes. Findings indicate that by implementing a long term evaluation horizon, the GIB can avoid too much weighted risks and still deliver required returns. It should however be mentioned that the goal to build an institution to resolve the temporal tension might affect prospects of market returns in the beginning, and will depend on the terms associated with the types of capital that is to be provided.

Furthermore, different financial instruments are necessary at different stages on the technology maturity scale. The GIB therefore needs to tailor capital to fit the project size, internal competence, technology and geographic location. Regardless of the initiatives that are used for external communication, the basis for reporting should be the format of ESG disclosure from the projects the GIB invests in. Here, the banks should set firm requirements of ESG disclosure. As we have seen, such requirements are in danger of being too resource intensive for smaller firms, and thus have to be met in another way if the GIB is going to yield the desired effectiveness.

8.5.3 Accelerating business model innovation

A third key function for the GIB is to deploy a toolbox of financial instruments and requirements for funding that can catalyze business model innovations in key sectors for the transition to a green economy. By tailoring financial instruments to fit the project type, the GIB can attract private investors and thereby avoid exhausting public funds. By using loans, the recycling of capital for new projects improves the availability of capital for firms that seek to innovate their business models. Bundling of projects could mitigate risks related to sustainability investments, and measures like green bonds can help to reduce the cost of borrowing. The configuration should largely amplify efforts to boost market creating innovations. Through its mandate to assist both SMEs and large companies, the GIB could get a major impact for the transition of business models in the Norwegian industry. The long-term approach could change the business model innovation rate that instead of merely improving performance and efficiency actually contributes to the market creating innovation necessary to drive sustainable development. As an addition to the institutional system, the role and mandate of the bank can contribute to institutional change and compete with current financial actors. A pitfall with this market competition is that potential green projects are lost to other institutions that set other requirements of ESG performance. On the other hand, one might argue that the projects that ultimately receive funding will have a quality stamp that can serve as a competitive edge in the market.

As with many other situations where change is necessary, human behavior needs to be taken into consideration. Nobody appreciates being ordered to do something, especially when it comes to innovating core value creating activities. However, if interaction with the GIB entails positive impact, higher value creation and less wasted resources, both emotional and rational arguments can nudge actors to increasingly include ESG values in their operations. Especially if the requirements connected with financial assistance are not too comprehensive and the utilized tools are understandable. If the tools are additionally implemented by a large share of institutions globally, new practices with integrated sustainability factors are more likely to become attractive for both businesses and investors.

9 Conclusion

The objective of this Master's thesis was to explore the interaction between the state of the current financial system and sustainable value creation of companies in the context of Norwegian industry development. With this objective we sought to fill the gap in research of tensions that describe the financial characteristics in companies' quest to become truly sustainable. We have contributed directly to the tensions literature by exploring how finance is coupled to the business model view of sustainability. As explained in the introduction, the scope was limited to specific tensions relevant from a financial perspective. Through our chosen scope, we have shown how the intertemporal tension of long-term versus short-term strategies and the tension of organizational change to develop new business models are related to sustainability.

As a part of our results, we propose to add a new tension to the integrative tensions framework presented by Hahn et al., (2015). The tension is termed "Significance of addressing all versus key stakeholders", and describes the dilemma of stakeholder engagement and efforts to improve sustainability when considering the firm's limited resources. We have also put attention on how to realize the necessary transformations to fulfill the responsibility of both the financial community and business. The first research question was formulated as "What are the tensions, related to financial characteristics, when developing business models for sustainability?" To answer this, we defined the financial characteristics of business model innovation, communication and financial evaluation methods to be explored in greater depth.

The inherent short-termism of the financial evaluation methods were found to have a significant influence on the other key findings that can be described by the tensions of short-termism vs long-termism and organizational change. The use of current financial metrics thus affect the rate of business model innovation and the means of communication, as enlightened from the perspective of the intertemporal tension and the tension related to organizational change. Overall, the two tensions from the framework of Hahn et al., (2015), complemented by our addition of stakeholder significance, proved useful to identify the issues that make up the largest challenges for how firms can finance business model innovations. In turn, these identified challenges can then be resolved through different approaches to address the tensions. Globally accepted standardized KPIs for use in firms' ESG disclosure and financial evaluation methods is an example of a resolution that can address several tensions. Thus, ESG inclusion in company communication and as part of investors' decision-making is one of the main conclusions. We also found that more focused communication and interaction can bridge the gap between the financial community and business. Here, materiality and The Statement are two methods to help firms achieve this without exhausting limited resources. Active ownership becomes increasingly important for investors to reduce climate-related risks, for instance by

the inclusion of firms that score high in sustainability rankings and divesting from firms that lag behind.

The second research question was formulated as “How can the financial community and business together address these tensions through the establishment of a Green Investment Bank?” The findings show that a GIB can fill the identified gap to facilitate change for companies with novel technologies in a critical phase of their maturity process. The GIB could be configured to provide a resolution strategy to the intertemporal tension by reinforcing a long-term perspective in investment decisions. It can also respond to the tension related to change, by offering risk mitigating financial instruments as a venture capital investor. Lastly, the GIB could address the new tension, Stakeholder Significance, by implementing state of the art communication tools and sustainability initiatives like materiality, The Statement and integrated reporting. A more thorough discussion of research question two can be found in the separate report *Establishing a Green Investment Bank*, found in Appendix A.

10 Implications and further research

Based on the results from the empirical analysis and the subsequent discussion, some implications are derived from this case study. This section introduces implications for business, followed by implications for a Norwegian Green Investment Bank. The implications are based on the financial characteristics of a business model for sustainability. In the wake of the qualitative research in this Master's thesis, a logical next step for further research could be to quantify the connections between the financial system and business that promotes sustainability. More specifically, the quantification of sustainability communication's effect on the financing of business models for sustainability. More quantitative research is called for to map the effects of large scale implementation of these measures. Also, further research on Stakeholder Significance is called for to confirm the viability of the proposed new tension.

10.1 Implications for business

Business actors can benefit by adapting to the quickly developing markets, whether the motivation is to ensure growth or to implement changes necessary to survive the green transition. By addressing these changes through sustainability communication, firms can innovate their business models and attract investors through increased credibility following financial and ESG performance measurement. The following factors could be helpful to consider when making climate-resilient strategies.

10.1.1 Business model innovation

Firms could benefit from changing measurement of both firm and employee performance according to financial and ESG factors over time. This incentivizes long-term planning in everyday operations and encourages business model innovation. ESG disclosure could be the first step of transformation. Gradual steps are necessary, especially if actions to the mapped ESG impact of the firm implies changes in the firm's core value creation. Established firms can use sustainability communication to disclose their impact along with long-term strategies to adapt their business models, which gives a natural understanding of the fact that change takes time. Here, firms should also engage in calls for institutional change, and not be afraid to explore new markets and technologies either as a central part of current strategy, or alternatively as a separate part of the business. Either way, a GIB could be a useful partner, and should not be discouraged by firms or investors. In parallel, more disruptive change is called for through business model innovation in the sectors of special importance for the green transition of the Norwegian industry. Through the empirical analysis, data was gathered on what sectors that have the greatest potential, shown in Table 9 and elaborated in Appendix C.

Implications for further research

- How will radical structural and technological changes to the firm's business model affect the characteristics of financing?
- What is the effect of business model innovation in targeted sectors for the green transition of Norwegian industry? Suggested sectors are summarized in table 4 and more thoroughly discussed in Appendix C.
- How can firms address tensions to make their business model more sustainable, and how do they interact with investors when resolutions are not imminent?

10.1.2 Communication

What actions the firm take as a consequence of their ESG disclosure and sustainability communication is central for the green transition. Using a resolution strategy from the new tension Stakeholder Significance, selected stakeholders could be addressed to prevent excess use of resources. The freed capacity needs to be spent on continuous improvements, both to ensure credibility and increased interaction with investors.

Implications for further research

- Which tools within sustainability communication are most efficient for changing companies' actions for more sustainable value creation?
- What resources are required to change communication practices to materiality and integrated reporting?

10.1.3 Financial evaluation methods

Firms have a responsibility to contribute to disclosure of ESG data. They could be motivated by the presence of investors and financial institutions that specifically ask for such information. A conscious approach around how ESG disclosure affects investment decisions is valuable for long-term strategies. Furthermore, when a firm's performance is measured in both financial and ESG metrics, it should be appropriately reflected in the firm's incentive systems to ensure long-term planning in evaluation of operations and new investments.

Implications for further research

- Large institutions are already evaluating ESG metrics, but usually decoupled from the financial analysis. Does this mean that more active integration can be done without the use of additional resources?

10.2 Implications for establishing a Norwegian Green Investment Bank

Many considerations need to be taken for a Norwegian Green Investment Bank. Key areas are the mandate of the GIB, its geographic scope, public affiliation and financial instruments. These areas will be treated in further detail in a political context through the report in Appendix A. Some implications in this context are suggested below:

10.2.1 Business model innovation

In the Norwegian market for public and private funding, there is a gap in the valley of death, where companies need high-risk capital to scale up technologies for commercialization. The GIB should therefore complement the existing schemes to help firms that align their core value creation with sustainability targets over the valley of death. The GIB could be structured as a private institution designed to fulfil the mandate given by the Norwegian government. To ensure green competitiveness in Norwegian industry, both companies that restructure their business model and firms that create new business models could be supported by the GIB. The GIB is recommended to have an international scope to promote Norwegian technology and know-how abroad, but should also invest nationally to stimulate the development of home markets.

10.2.2 Communication

The GIB is recommended to be a driver for best practice sustainability communication, both for its own operations and through firms in its portfolio and network. ESG values should consequently be central in all communication, both internally and externally. Such communication could help attracting specialized expertise, co-investors and relevant projects that fit the scope of the GIB. Active ownership and co-investments require a substantial amount of interaction with various actors, and is especially important to successfully manage venture capital projects.

10.2.3 Financial evaluation methods

The GIB could set the premises to amplify the international efforts to make ESG metrics a part of the new economy, and should therefore be a driver for the disclosure and implementation of ESG metrics in its investment decisions. Findings show that this would accelerate the reallocation of capital flows from high carbon to low carbon solutions through the improved availability of capital for projects in prioritized sectors. To avoid exhausting public funds, the GIB is recommended to function as a means to leverage private capital in markets where public funding alone is insufficient to make the desired transition. To further amplify the impact of its investments, the GIB should aim for mitigating risks associated with sustainability investments with the intention to make projects more attractive for other institutional investors.

Thereby, institutional investors that are increasingly interested in incorporating sustainability in their portfolios could co-invest with the GIB or take over after the project is completed and the income is stabilized. As an example, SPU could fill such a role with a changed mandate to include investments in infrastructure.

Company	Clean production technologies				Life sciences		Zero emission transport		ICT and digitization	Energy efficiency
	Offshore wind	Solar power	Electrification of process industry	CCS	Bio economy	Aquaculture	Battery technology &	Green shipping/ maritime		
CICERO							•		•	•
DNB							•			•
Enova			•			•	•	•		•
Espen Moe			•							
GIEK	•	•					•			
Innovasjon Norge	•	•	•		•	•	•	•	•	
KLP		•					•			
NEFCO	•	•	•							•
Norsk Klimastiftelse	•	•	•		•		•	•	•	•
NORWEA	•		•							
NSV		•					•	•		
PBES							•	•		
Powel									•	•
Scatec Solar		•	•				•	•		
SEB			•							
Siemens			•				•	•		•
Statkraft	•						•		•	
Statoil	•	•		•			•		•	
Storebrand							•			•
UMOE		•			•			•		
Wonderland									•	
Zaptec	•		•				•		•	
Count	8	9	10	1	3	2	15	8	8	8
Total	28				5		22		8	8

Table 9. Relevant sectors for the green transition of Norwegian industry.

11 Limitations

Some limitations are present in this study. First of all, the choice of theoretical lens limits the study to the assumptions and arguments in the chosen frameworks and conceptual models that have guided the study. We have treated an interdisciplinary topic that relates the areas of strategic management and finance through the business model view, and with the financial system as background. The scope and context provided in chapter 2.0 are covered by a background study of extant literature concerning climate finance and sustainability investing, but we have not sought to fully review the research that treats the topic directly from a finance perspective. This may have shifted the focus too much towards one part of relevant research. For future research, the challenges related to finance business models for sustainability can be examined from the view of finance through economic and financial theory. The contributions of a GIB can for instance be estimated and measured through the use of quantitative studies using financial models. Additionally, there is a limitation tied to the choice of research method. In our exploratory study of the transition to a green economy, temporal events change fast, and only give a snapshot of current issues and causalities. Further research should thus evaluate if the questions and conclusions of this thesis are still relevant when seeking to go more in depth on the challenges outlined here.

Bibliography

- Adams, W. M. (2006), "The Future of Sustainability", IUCN - The World Conservation Union, available at http://cmsdata.iucn.org/downloads/iucn_future_of_sustainability.pdf, accessed 25.05.16
- Arabesque (2016), "Sustainable Performance", available at <http://www.arabesque.com/en/approach.php>, accessed 18.05.16
- Barton, D. and Wiseman, M. (2014), "Focusing capital on the long term", *Harvard Business Review*, Vol. 92 No. 1-2, pp. 44-.
- Barbier, E.B. (2009). "Rethinking the Economic Recovery: A Global Green New Deal". United Nations Environment Programme, report prepared for the Economics and Trade Branch, Division of Technology, Industry and Economics. Available at http://www.sustainableinnovations.org/GE/UNEP_%5B2009%5D_A_global_green_new_deal.pdf, accessed 06.05.16
- Biermann, F. and Gupta, A. (2011), "Accountability and legitimacy in earth system governance: A research framework", *Ecological Economics*, Vol. 70 No. 11, pp. 1856-1864.
- Bocken, N., Short, S., Rana, P. and Evans, S. (2013), "A value mapping tool for sustainable business modelling", *Corporate Governance*, Vol. 13 No. 5, pp. 482-497.
- Bocken, N., Short, S., Rana, P. and Evans, S. (2014), "A literature and practice review to develop sustainable business model archetypes", *Journal of Cleaner Production*, Vol. 65, pp. 42-56.
- Boons, F. and Luedeke-Freund, F. (2013), "Business models for sustainable innovation: state-of-the-art and steps towards a research agenda", *Journal of Cleaner Production*, Vol. 45, pp. 9-19.
- Christensen, C. M. and van Bever, D. (2014), "The Capitalist's Dilemma", *Harvard Business Review*, Vol. 92 No. 6, pp. 60-+.
- Dahlsrud, A. (2008), "How Corporate Social Responsibility is Defined: an Analysis of 37 Definitions", *Corporate Social Responsibility and Environmental Management*, Vol. 15 No. 1, pp. 1-13.
- DNB (2015), Annual Report 2015, available at <https://www.dnb.no/portalfont/nedlast/no/om-oss/resultater/2015/annual-report-dnb-group-2015.pdf>, accessed 01.05.16
- DNV GL (2016), "Global Opportunity Report", available at <http://globalopportunitynetwork.org/the-2016-global-opportunity-report.pdf>, accessed 01.02.16
- Dyllick, T., Hockerts, K. (2002), "Beyond the business case for corporate sustainability", *Business Strategy and the Environment*, Vol.11 (2), pp.130-141.
- Eccles, R. G., Ioannis I. and Serafim G. (2014), "The Impact of Corporate Sustainability on Organizational Processes and Performance", Vol. 60 No. 11, pp. 2835-2857.
- Eccles, R. G., and Youmans, T. "Materiality in Corporate Governance: The Statement of Significant Audiences and Materiality." Harvard Business School Working Paper, No. 16-023, September 2015.

- Eccles, R. G., Ioannou, I. and Serafeim, G. (2014), "The Impact of Corporate Sustainability on Organizational Processes and Performance", *Management Science*, Vol. 60 No. 11, pp. 2835-2857.
- Eccles, R. G., and Krzus, M. P. (2014), "The integrated reporting movement: Meaning, momentum, motives, and materiality". John Wiley & Sons.
- Ehrenfeld, J. R. (2005). "The roots of sustainability". *MIT Sloan Management Review*, Vol. 46 (2), 23. Available at <http://search.proquest.com/docview/224969836?accountid=12870>, accessed 06.01.16
- Elkington, J. (1997), "Cannibals with Forks: the Triple Bottom Line of 21st Century Business", *Capstone*
- EU Commission (2011), "A renewed EU strategy 2011-14 for Corporate Social Responsibility", available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52011DC0681>, accessed 04.04.16
- Freeman, R. E. (1984), "Strategic management: a stakeholder approach", *Pitman*, Boston.
- GIEK (2015), Annual Report 2015, available at http://www.giek.no/resources/rapporter/GIEK_12953_Annual-Report_ENGELSK_WEB.pdf, accessed 05.04.16
- Global Commission on the Economy and Climate (2014), "Better Growth, Better Climate", The New Climate Economy, available at <http://2014.newclimateeconomy.report/>, accessed 10.05.16
- Griggs, D., Smith, M. S., Rockstrom, J., Ohman, M. C., Gaffney, O., Glaser, G., Kanie, N., Noble, I., Steffen, W. and Shyamsundar, P. (2013), "An integrated framework for sustainable development goals", *Ecology and Society*, Vol. 19 No. 4.
- Hahn, T., Pinkse, J., Preuss, L. and Figge, F. (2015), "Tensions in Corporate Sustainability: Towards an Integrative Framework", *Journal of Business Ethics*, Vol. 127 No. 2, pp. 297-316.
- IEA (2015), "Energy Technology Perspectives 2015 - Mobilising Innovation to Accelerate Climate Action", p. 4, available at <https://www.iea.org/publications/freepublications/publication/EnergyTechnologyPerspectives2015ExecutiveSummaryEnglishversion.pdf>, accessed 19.05.16
- Innovation Norway (2014), Annual Report 2014, available at http://www.nsd.uib.no/polsys/data/filer/aarsmeldinger/AN_2014_28804.pdf, accessed 03.04.16
- Innovation Norway (2015), "The Dream Commitment 2.0", available at <http://www.xn--drmmelftet-1cbe.no/the-dream-commitment-2-0/>, accessed 12.05.16
- Jeucken, M. (2004), "Sustainability in Finance: Banking on the Planet", *Eburon Academic Publishers*, Delft.
- KLP (2016), "Samfunnsansvar og rapportering", available at <https://www.klp.no/om-klp/samfunnsansvar/samfunn-og-milj/b-rekraftsrapportering#https://www.klp.no/om-klp/samfunnsansvar/samfunn-og-milj/ansvarlig-forretningsdrift>, accessed 15.05.16
- Lesser, K., Rossle, F. and Walkshausl, C. (2016), "Socially responsible, green, and faith-based investment strategies: Screening activity matters!", *Finance Research Letters*, Vol. 16, pp. 171-178.
- Lüdeke-Freund, F. (2010). "Towards a Conceptual Framework of 'Business Models

- for Sustainability'. " *Knowledge collaboration and learning for sustainable innovation*
- Lüdeke-Freund, F. (2013). "Business models for sustainability innovation: Conceptual foundations and the case of solar energy".
- Manetti, G. (2011), "The quality of stakeholder engagement in sustainability reporting: empirical evidence and critical points", *Corporate social responsibility and environmental management*, Vol. 18 No. 2, pp. 110-122.
- Margolis, J. D. and Walsh, J. P. (2003), "Misery loves companies: Rethinking social initiatives by business", *Administrative Science Quarterly*, Vol. 48 No. 2, pp. 268-305.
- Martin, R. L. (2011), "Fixing the Game: Bubbles, crashes and what capitalism can learn from the NFL", *Harvard Business Review*, ISBN 1422171647
- Nasdaq (2016), "Sustainable Bonds", available at <http://business.nasdaq.com/list/listing-options/European-Markets/nordic-fixed-income/sustainable-bonds>, accessed 14.05.16
- Porter, M. E. and Kramer, M. R. (2006), "Strategy and society: The link between competitive advantage and corporate social responsibility - Response", *Harvard Business Review*, Vol. 84 No. 12, pp. 78-+.
- Porter, M. E. and Kramer, M. R. (2011), "Creating shared value", *Harvard Business Review*, Vol. 89 No. 1-2, pp. 62-77.
- Richardson, B. J. (2009), "Climate finance and its governance: Moving to a low carbon economy through socially responsible financing?", *International & Comparative Law Quarterly*, Vol. 58 No. 3, pp. 597-626.
- Robeco-Sam (2016), "Sustainability Investing", available at <http://www.sustainability-indices.com/sustainability-assessment/sustainability-investing.jsp>, accessed 15.05.16
- Regjeringen ved Finansdepartementet (2016), "Prop. 122 S (2015–2016) Proposisjon til Stortinget (forslag til stortingsvedtak: Tilleggsbevilgninger og omprioriteringer i statsbudsjettet 2016", p 179-183, 3.1 «Fornybar AS», available at <https://www.regjeringen.no/contentassets/03be56dc813846fba4aef590170eb3ea/no/pdfs/prp201520160122000dddpdfs.pdf>, accessed 11.05.16
- Regjeringen (2016), "Tilleggsbevilgninger og omprioriteringer i statsbudsjettet 2016", Prop. 122 S (2015–2016), available at <https://www.regjeringen.no/contentassets/03be56dc813846fba4aef590170eb3ea/no/pdfs/prp201520160122000dddpdfs.pdf>, accessed 10.05.16
- Sahlman, William A., and Howard H. Stevenson (1985), "Capital Market Myopia." *Journal of Business Venturing* 1, Vol no. 1: pp. 7–30. (Reprinted as Chap. 3 in *The Entrepreneurial Venture*, edited by William A. Sahlman, Howard H. Stevenson, Michael J. Roberts and Amar Bhide, 35-64. Boston: Harvard Business School Press, 1999.)
- Schaltegger, S., Hansen, E. G. and Luedeke-Freund, F. (2016), "Business Models for Sustainability: Origins, Present Research, and Future Avenues", *Organization & Environment*, Vol. 29 No. 1, pp. 3-10.
- SEB (2015), Corporate sustainability report, available at http://sebgroup.com/siteassets/about_seb1/sustainability/reporting_package/2015/corporate_sustainability_report_2015.pdf, accessed 21.05.16
- Slawinski, Natalie, and Pratima Bansal (2012). "A matter of time: The temporal perspectives of organizational responses to climate change." *Organization Studies* 33.11 (2012): 1537-1563.

- Slawinski, N. and Bansal, P. (2015), "Short on Time: Intertemporal Tensions in Business Sustainability", *Organization Science*, Vol. 26 No. 2, pp. 531-549.
- Stout, L. A. (2012), "The shareholder value myth how putting shareholders first harms investors, corporations, and the public", San Franiso, Calif. : Berrett-Koehler Publishers, San Francisco, Calif.
- Stubbs, W. and Cocklin, C. (2008), "Conceptualizing a "sustainability business model"", *Organization & Environment*, Vol. 21 No. 2, pp. 103-127.
- Sullivan et al. (2015), "Fiduciary duty in the 21st century", available at http://www.unepfi.org/fileadmin/documents/fiduciary_duty_21st_century.pdf, accessed 04.04.16
- Stanghellini et al. (2008), "Climate Change, Sustainability and Corporate Social Responsibility: the Role of Financial Institutions", available at https://www.researchgate.net/publication/224000475_Climate_Change_Sustainability_and_Corporate_Social_Responsibility_the_Role_of_Financial_Institutions, accessed 29.05.16
- Stortinget (2016), "Innstilling fra energi- og miljøkomiteen", available at <https://www.stortinget.no/no/Saker-og-publikasjoner/Publikasjoner/Innstillinger/Stortinget/2015-2016/inns-201516-078/?lvl=0>, accessed 09.05.16
- Svensden, A. (1998), "Stakeholder Strategy : Profiting from Collaborative Business Relationships", Williston, VT, USA: Berrett-Koehler Publishers, Williston.
- Sjøfjell, Beate, Sustainable Companies: Possibilities and Barriers in Norwegian Company Law (August 16, 2013). *International and Comparative Corporate Law Journal*, vol. 11, issue 1, pp. 1-58; University of Oslo Faculty of Law Research Paper No. 2013-20; Nordic & European Company Law Working Paper No. 10-42. Available at SSRN: <http://ssrn.com/abstract=2311433> or <http://dx.doi.org/10.2139/ssrn.2311433>, accessed 17.05.16
- Sætre et al. (2016), "Innovation and shared value creation: Balancing the tensions between short term exploitation and long-term sustainability", Working Paper, available at <https://sisvi.files.wordpress.com/2016/05/sisvi-report-2016-03.pdf>, accessed 26.05.16
- Task Force on Climate-related Financial Disclosures - TCFD (2016), "Phase I Report of the Task Force on Climate-Related Financial Disclosures, Report to the Financial Stability Board March 31st 2016, available at https://www.fsb-tcfd.org/wp-content/uploads/2016/03/Phase_I_Report_v15.pdf, accessed 01.04.16
- Thomas, D. R., (2003), "A general inductive approach for qualitative data analysis", *Sage journals*, pp. 2 - 10
- Thompson Reuters (2016), "Arabesque: A Tesla of finance", <http://reports.thomsonreuters.com/susty7/investors/quantifying-sustainable-investment>, accessed 18.05.16
- Thomson Reuters (2016), "Sustainable investments can meet, and sometimes beat, the market over the long term", available at <http://reports.thomsonreuters.com/susty7/investors/esg-financial-performance>, accessed 18.05.16
- U.S. Department of Energy (2015), "Energy Investment Partnerships: How State and Local Governments Are Engaging Private Capital to Drive Clean Energy Investment", available at <http://energy.gov/sites/prod/files/2016/01/f28/Energy%20Investment%20Partnerships.pdf>, accessed 27.05.16

- UK Green Investment Bank (2015),
[http://www.greeninvestmentbank.com/media/44799/gib annual report 2015 aw web.pdf](http://www.greeninvestmentbank.com/media/44799/gib_annual_report_2015_aw_web.pdf), accessed 27.05.16
- UNEP (2011), "Finance Supporting the transition to a global green economy", available at
http://www.unep.org/french/greeneconomy/Portals/88/documents/ger/15.0_Finance.pdf, accessed 02.05.16
- UNEP FI (2011), "Universal Ownership: Why environmental externalities matter to institutional investors",
http://www.unepfi.org/fileadmin/documents/universal_ownership_full.pdf, accessed 29.05.16
- United Nations (2015), General Assembly resolution 70/1, Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1 (21 October 2015), available at
www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1, accessed 01.04.16
- Unruh et al. (2016), "Investing for a sustainable future", MIT Sloan Management Review and The Boston Consulting Group (BCG), available at
<http://sloanreview.mit.edu/projects/investing-for-a-sustainable-future/>, accessed 17.05.16
- Van der Byl, C. A. and Slawinski, N. (2015), "Embracing Tensions in Corporate Sustainability: A Review of Research From Win-Wins and Trade-Offs to Paradoxes and Beyond", *Organization & Environment*, Vol. 28 No. 1, pp. 54-79.
- Welford, R. (1997), "Hijacking environmentalism: corporate responses to sustainable development", in, pp. 312-312.
- Yin, R. K. (2014), "Case study research: Design and methods", 5th edition, Sage publications, ISBN 987-1-4522-4256-9
- Zuckerman, J., Frejova, J., Granoff, I., and Nelson, D., (2016). "Investing at Least a Trillion Dollars a Year in Clean Energy. Contributing paper for Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate". *New Climate Economy*, London and Washington, DC. Available at:
<http://newclimateeconomy.report/misc/working-papers>, accessed 17.05.16.

Appendix A: Report to the Expert Committee

The implications and recommendations stemming from the Master's thesis is included in a separate report that takes a closer look at possible considerations and configurations of a green investment bank. The report is attached at the end of the document.

Appendix B: Interview data

Appendix B.1 Structured interviews

Structured interviews

Number in empirical analysis	Firm	Interviewee	Position	Method ¹
1	CICERO	Asbjørn Torvanger	Senior Researcher, Climate Finance	P
2	DNB	Einar Kilde Evensen	Head of Department, Power & Renewables Customer Analysis	P
3	Enova	Nils Krisitan Nakstad	CEO	P
4	EU Commission	Pierre Dechamps	Policy officer	P
5	EU Delegation of Norway	Jonas Fjeldheim	Counsellor for Environment	P
6	European Investment Bank (EIB), European Fund for Strategic Investments (EFSI)	Gregor Paterson-Jones ²	Investment Committee Member, Special advisor, UNCDF	T
7	Frontier Markets Fund Managers (FMFM)	Anthony Marsh ³	CEO	P
8	GIEK	Ute Borghardt-Fosså	Senior Vice President	P
9	Global Facility for Disaster Reduction and Recovery (GFDRR)	Laurence McLean	Consultant, International Trade and Development	P
10	Harvard Business School	Robert G. Eccles ⁴	Expert on integrated reporting and sustainability strategies.	S
11	Innovation Norway	Inger Solberg	Director, Sustainability Norway 2030	P
		Sigrid Gåseidnes	Special Advisor	
12	KLP	Jeanett Bergan	Leader, responsible investments	P
13	Ministry of Trade, Industry and Fisheries	Hege Sjø	Head of Department, Ownership	P
		Bjørn Eggen Hermansen	Senior Advisor, Research & Innovation	T

14	NEFCO	Jan-Torjus Thompson	Deputy NEFCO's board	T
		Harald Rensvik	Norway's member of NEFCO's board	
15	Nordic Sustainable Ventures	Pål Brun	CEO	P
16	Norsk Klimastiftelse	Anders Bjartnes	Managing Director of <i>Energi og klima</i>	P
17	NORWEA	Andreas Thon Aasheim	Special Advisor, wind, wave, tidal energy	P
18	NTNU	Espen Moe	Associate Professor Department of Sociology	P
19	Plan B Energy Storage (PBES)	Brent Perry	CEO	P
20	Powel	Geir Nysetvold	Vice President, Strategy and R&D	P
21	Scatec Solar	Terje Osmundsen	Senior VP, Business Development	T
22	SEB	Peter Knutzen	Head of Clean Energy	T
23	Siemens	Christian Jahr	Head of Business Development	T
24	Statoil	Arne Eik	Leading Climate Consultant	p
		Ingunn Svegården	New Energy Solutions (NES)	
25	Storebrand	Philip Ripman	Senior Analyst for sustainability investments	P
26	The Crown Estate	Claudine Blamey	Head of Sustainability	P
27	UMOE	Rasmus C. Evrin	Director of Finance	P
28	Wonderland	Jon Daniel Nesje	CEO	T
29	Zaptec	Brage Johansen	CEO	S
	Total interviewees, structured	33	Total structured interviews	30

1) Interview method.

P – Personal meeting

T – Telephone interview

S – Skype interview

2) Former Managing Director of the UK GIB and current Special Advisor for Energy Access Financing for UNCDF

3) Former [Chair of the Investment Committee](#) in the UK GIB

4) Also Founding Chairman of the Sustainability Accounting Standards Board (SASB), Chairman of Arabesque Partners and one of the founders of the International Integrated Reporting Council (IIRC)

Table 10. Appendix B1. Structured interviews.

Appendix B.2 Unstructured interviews

Unstructured interviews				
	Firm	Interviewee	Position	Method
30	Cornwall Energy	Gareth Miller	Consultant, project finance and policies	O, S
		Tom Edwards	Consultant, energy market price movements and hedging strategies	P
31	Department of Energy and Climate Change (DECC)	Trevor Raggatt	Head of Large Scale Renewables, Clean Electricity Directorate	P
32	EU delegation	Bjarne Stakkestad	Counsellor for finance	P
33	MHP Communications	Tom Wadsworth	Director at MHP Communications	P
34	RWE	Jacob Hain	Strategy director, Triton Knoll	P
35	Statkraft	Gavin Clark	Asset manager, Statkraft UK	
		David Curran	Senior advisor, strategy and business development	P
		Knut Dyrstad	Regulatory Affairs Manager, Wind Power and Technologies	P
		Jon Vatnaland	Managing Director Statkraft UK	P
		Gavin Clark	Asset manager	P
		David Rumble	Head of Finance	P
		Duncan Dale	Markets, Düsseldorf	P
		Günther Puffer	Batteries	P
		Wood Aram	Head of Strategy	P
Christopher Nunn	Project manager consenting offshore wind	P		
Total interviewees, unstructured		16	Total unstructured interviews	15

P – Personal meeting
O – Observatory meeting
S – Skype

Table 11. Appendix B2: Unstructured interviews.

Appendix B.3 Conferences and seminars

Numbers for reference in empirical analysis: Conferences and seminars

Number	Firm	Speaker, title
36	CLEAN Innovation Centre	Simon Baagøe Andersen
37	DNV GL	Bjørn Haugland, CSO
38	Dow Jones & Co	John O' Donovan, CTO
39	Energy Norway	Oluf Ulseth, CEO
40	Financial Stability Board	Mark Carney, Chair
41	Future in our hands Norway	Arild Hermstad, leader
42	Global e-Sustainability (GeSi)	Luis Neves, Chairman
43	Greenpeace Norway	Truls Gulowsen, leader
44	IBM Global Technology Services	Martin Jetter, Senior Vice President
45	Lyse	Toril Nag, CEO
46	Ministry of Climate and the Environment	Vidar Helgesen, Minister
47	Ministry of Local Government and Modernization	Jan Tore Sanner, Minister
48	NEL Hydrogen	Øystein Spetalen, investor
49	NHO	Kristin Skogen Lund, CEO
50	Norges Bank	Yngve Slyngstad, CEO
51	OECD	Andrew Wyckoff
52	Research Council of Norway	Arvid Hallén, CEO
53	Sitra, Finnish Innovation Fund	Mari Pantsar, Director
54	Solar Impulse, solar airplane	Bertrand Piccard, pioneer
55	Task Force on Climate-related Financial Disclosures	Michael R. Bloomberg, Chair
56	Technical University of Denmark	Henrik O. Madsen ¹
57	The Fraud Academy	Nigel Iyer, anti-corruption consultant
58	Venstre, the Liberal Party	Trine Skei Grande, leader
59	Bloomberg New Energy Finance	Angus McCrone Chief Editor

Total amount of speaker references: 24

1) Former group president and CEO, DNV GL

Table 12. Appendix B3: Conferences and seminars.

Appendix B.4 Conferences and seminars expanded

Conferences and seminars

Conference	Speakers	Organizer	Date	Method ¹
Zero conference	Bertrand Piccard, Solar Impulse	Zero	Oct 27, 2015	P
Breaking the tragedy of the horizon – climate change and financial stability	Mark Carney, Governor for Bank of England and Chairman of the G20's Financial Stability Board	Lloyds Bank	Sept 29, 2015	S
Paris COP21 Climate Change Conference	Mark Carney, Financial Stability Board/ Michael R. Bloomberg, CEO and founder of Bloomberg L.P.	UNFCCC, The Financial Stability Board	Dec 4, 2015	S
Could SPU be a tool to catalyze the green shift?	Jonas Gahr Støre, leader of the labour party Arbeiderpartiet	Norsk Klimastiftelse	Jan 12, 2016	S
Hyperloop	Dirk Ahlborn, CEO Hyperloop Transportation Technologies	Revolve NTNU	Mar 2, 2016	P
UN's SDGs solved through innovation	Henrik O. Madsen, former group president and CEO, DNV GL. DTU (Denmark).	DNV GL/ NTNU	Mar 29, 2016	P
Increasing the sustainability focus in global supply chains	Nigel Iyer, anti corruption consultant	NTNU Sustainability	Apr 6, 2016	P
NEFCOs 25th anniversary seminar	Kjell Roland, CEO Norfund/ Simon Baagøe Andersen, Project Manager, Environment and Smart City - CLEAN (Denmark)/ Dr. Mari Pantsar, Director Finnish Innovation Fund Sitra (Finland), Helena Mueller, Senior Manager, KPMG (Sweden), Idar Kreutzer, CEO, Finance Norway	NEFCO	Apr 12, 2016	P
Green transition: Future transport solutions	Øystein Stray Spetalen, investor NEL Hydrogen	The Norwegian government/ Ministries of Transport & Communications and Climate & Environment	Apr 21, 2016	S
Carbon Track and Trace 2.0	Jette Vindum, Development Consultant, Finance and Analysis, Vejle (Denmark)/ Atle Vesterkjær, Numascale/ Per Järnebrink, EWF/Big Belly (Sweden)/ Chang Deng-Beck, Bonn Low Carbon Cities/ Nuria Castell, Norwegian Institute for Air Research	EU Climate KIC	Apr 25, 2016	P

The pension fund in service of the climate?	Yngve Slyngstad, CEO Norges Bank/ Kristin Halvorsen, director CICERO/ Angus McCrone, Bloomberg News (via Skype)/ Truls Gulowsen, leader Greenpeace Norway/ Arild Hermstad, leader Future in our hands Norway	Fremtiden i våre hender, Greenpeace	May 3, 2016	P
“Roadmap to the green shift” and launch of ISO 140003	Kjersti Larsen, Green Culture and Standards Norway	Standards Norway	May 3, 2016	P
Green transition: The future of digitalization	Kristin Skogen Lund, CEO, NHO/ Bjørn Haugeland, CSO DNV GL/ Martin Jetter, Senior Vice President, IBM Global Technology Services/ Andrew Wyckoff, OECD/ Jan Tore Sanner, Minister of Local Government and Modernization/ John O’ Donovan, CTO for Global Platforms, Dow Jones & Co/ Hege Skryseth, President Kongsberg Digital, Kongsberg gruppen/ Arvid Hallén, CEO Research Council of Norway/ Trine Skei Grande, leader of the Liberal Party Venstre/ Toril Nag, CEO Lyse/ Luis Neves, Chairman Global e-Sustainability (GeSi)/ Sofie Wiik, CEO Too Good to Go/ Oluf Ulseth, CEO Energy Norway	The Norwegian government/ Ministries of Local Government & Modernization and Climate & Environment	May 10, 2016	S

Total attended conferences: 13

1) Method

P – Present

S – Streamed

Table 13. Appendix B4: Conferences and seminars expanded.

ESTABLISHING A GREEN INVESTMENT BANK

Climate finance for green competitiveness

ACKNOWLEDGEMENTS

We would like to extend our thanks to Finance Norway and SINTEF for financial support to cover our expenses associated with preparing this report. A special thanks to the interviewees who provided valuable insights to the empirical analysis in our Master's thesis. The findings from this analysis have greatly contributed to make the report. Lastly, we thank NTNU Sustainability for their support.

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KEY MESSAGES

Recommended scenario

We recommend to establish a Norwegian Green Investment Bank that realizes high-potential innovations internationally. Its mandate is intended to spark and facilitate promising innovations and to scale up proven technological solutions. The approach is to maximize the attraction of private capital and mitigate risks for sustainability investments. Even though the affiliation may be Norwegian, the GIB is recommended to initiate strong Nordic collaboration through partnerships on a city, company and project level.

Communication toolbox

The GIB is recommended to use state of the art initiatives for implementation of ESG factors in investment decisions. The following toolbox could be helpful:

- The Statement of Significant Audiences and Materiality
- Sustainability Accounting Standards Board (SASB)
- Sustainable Value Matrix
- Integrated Reporting
- Climate-related Financial Disclosures framework, to be launched by the end of 2016
- CICERO's frameworks on climate-related investments in developing countries and climate adaption, to be launched by the end of 2016

The GIB could also consider using sustainability initiatives like UN Global Compact, UN PRI, CDP, the Equator Principles and GRI to be present in more established initiatives.

Sectors

The GIB is recommended to prioritize three strategic focus areas:

1. Zero emission transport
2. The transition of the petroleum sector
3. Clean production technologies

To meet these strategic areas, the GIB can invest in multi-target focus areas, for instance:

- Battery technology and energy storage
- Electrification of the process industry
- Distributed energy systems



PART 1

INTRODUCTION

REPORT TO THE EXPERT COMMITTEE ON GREEN COMPETITIVENESS

This report is intended as a support document for the government's expert committee for green competitiveness, led by Idar Kreutzer and Connie Hedegaard. The committee will deliver a strategy to the Norwegian government in October 2016 to meet the barriers, challenges and opportunities for industry on the path to a low emission society. Sectors with the highest potential to create innovations for green competitiveness in Norway on the pathway to 2030 and 2050 will be prioritized. This report will outline a strategy on how the establishment of a Green Investment Bank (GIB) can amplify the efforts to create green competitiveness in Norwegian industry.

ESTABLISHING A GREEN INVESTMENT BANK

In recent years, a number of Green Investment Banks have been established globally to mobilize private investments into green technologies and businesses. These banks are publicly initiated entities that use public capital to facilitate private investments into low-carbon, climate-resilient (LCR) infrastructure. Investments made by the GIBs are made through innovative transaction structures, risk-reduction evaluation and management methods and sound market expertise. While GIBs vary in name, size and approach, they usually have a specific and limited mandate to fund cost-effective sustainability solutions. The performance of the invested funds is often measured by non-financial metrics focused on emissions reductions, job creation, leverage ratios (i.e. private investment mobilized per unit of public spending) as well as rate of return as a traditional financial metric. Through their specified mandate and governmental affiliation, GIBs can create attractive opportunities for institutional investors. They have set examples of best practice in their operations in terms of including ESG evaluation in asset management and external sustainability communication.

THE EXPERT COMMITTEE WILL ADDRESS THE FOLLOWING QUESTIONS:

Regulatory framework

What are the most important global and regional processes that drive or create barriers for the transition towards a low emission society?

Consequences

Which challenges and opportunities will the transition impose on Norwegian businesses, and which sectors within society and industry will be most affected?

Competitive advantage

Where does Norway have the best prerequisites and what are the biggest challenges related to the transition?

Priorities

What should be the overarching priorities and means to develop innovation and green competitiveness for Norway?

IMPLICATIONS OF THE MASTER THESIS

The report is based on key takeaways from the Master's thesis titled "Financing the transition to a green economy: an empirical investigation of how firms can achieve business models for sustainability" submitted in June 2016. Some of the main implications drawn from the thesis are further elaborated in this report. One of the main findings from the empirical investigation was the need for additional capital to address gaps in the current public funding system and the private capital market. Secondly, business and financiers have a common responsibility to integrate sustainability into the core of their business model. This entails the adoption of a long-term view, and changes to existing practices of economic value capture and financial evaluation methods. More specifically, improved sustainability communication and novel use of financial instruments need to be implemented to overcome market barriers that currently prevent innovation of more sustainable business models. Finally, the thesis unveiled what underpins the mandate of the expert committee: the objective of industry development should be the key driver for investments made by the GIB. Several industry sectors have been identified as multi-target areas for investments, and have potential for value creation from an industry, energy and climate policy perspective. In addition to data from the empirical analysis, recent public accounts and documents, annual reports and industry insights on the topic have been sourced to complement and validate the findings. Combined, these sources serve as a foundation to outline implications of how a green investment bank can finance the green transition of Norwegian industry.

STRUCTURE OF THE REPORT

The report is divided into five parts. Following this introductory chapter, the second part will give a brief overview of current policies and ongoing political processes. Reflections on the identified gap for investments in the public funding system is then offered together with relevant sectors for investments. Part three will introduce the role of Green Investment Banks globally, and discuss key considerations for establishing a GIB in a Norwegian context. Following this, part four introduces three scenarios that outline alternative configurations for the GIBs. Lastly, a final recommendation will be made with implications for both industry and policy makers.



CURRENT POLICY AND PRACTICE

PART 2

ONGOING POLITICAL PROCESSES

The transition of Norwegian industry and business requires changes in public policies, funding schemes and management practices. The government has initiated a number of processes to map the state of current political systems, market conditions and the need for new initiatives. One of these processes is the work of the Expert Committee for Green Competitiveness. Other processes are set to evaluate the efficiency and effectiveness of the public funding agencies and corresponding needs to expand or change the current mandates. In addition, there is a new law for public procurement and the release of several public documents that are relevant for the green transition: *Industrimeldingen*, *Energimeldingen*, *Bioøkonomi-meldingen*, *Grønt skatteski* and *Perspektivmeldingen 2017*. One process of particular interest is the decision to set up a fund for investments in green technology, a fund that shares similar objectives and features with a new GIB. Key facts of Fornybar AS is presented in Spotlight 1. With the many mentioned processes in the pipeline, there is no time to waste. Fulfillment of UN's Sustainable Development Goals (SDGs) and the Paris Agreement are urgent matters which call for decision-making that can be turned into action as soon as possible.

INDUSTRY AND ENERGY POLICY - A TALE OF STRONG COMPANIONSHIP

Historically, key political events in the development of Norwegian industry have been driven by unified objectives with energy policy. The industrialization processes of the maritime, petroleum and process industry have been founded on the need for access to clean and cost effective energy to enhance a competitive industry. Today, the access to hydropower has given Norway an abundance of cheap and clean power. The rationale for new investments in infrastructure and new energy solutions is thus largely found in the need for industrial development over energy policy, which sharply contrasts the situation of most other countries. Representing a broad range of stakeholders, our findings show that a new Green Investment Bank should promote industry policy through its investment areas and priorities. This can be done by increasingly looking to unify industry and energy policy in the areas of green technologies.

SPOTLIGHT: FORNYBAR AS

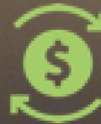
The Norwegian Government is to establish a new fund intended to co-invest with private actors in green technology. The mandate, organizational structure and budget will be made public in 2017.

KEY FACTS

Fund name: Fornybar AS (Greenfund)

Total assets: 20 billion NOK

Location: TBD



CAN FORNYBAR AS BE NORWAY'S NEW GREEN INVESTMENT BANK?

In the public sphere, most of the debate concerning a new publicly initiated fund has revolved around where the organization is to have its main offices. What is more interesting, is how the fund will actually be structured, and what mandate it is to fill. Depending on how the fund will be configured, it can fulfill much of the same role as outlined for a new green investment bank. The exact organization and financial toolbox of the fund is yet to be decided, and will not be made public until the national budget is released in 2017. While the politicians examine these aspects in greater detail, we discuss the very same topics in the case of a green investment bank.

This is what we know about the plans for Fornybar AS:

- The fund will invest in green technology that directly or indirectly contributes to reduction of GHG emissions and to reach the national climate targets.
- The fund will not be the majority owner and will co-invest with private actors.
- The fund will complement existing initiatives and seek to create additional value.
- The fund should not have any subsidy elements.
- The fund will invest in new technology projects in the transition between the development and commercialization phase.
- The fund is with time expected to match market returns, but is acknowledged to take on higher risks than market-based financial actors to fulfill its mission.
- The fund can take a broad approach regarding the type of investments and geographic scope to maximize returns. Regardless, the fund will be anchored in a national context.

NEED FOR A GREEN INVESTMENT BANK

The Norwegian government owns a broad range of public funding agencies, of which some are especially relevant for green competitiveness. As mentioned, there is an ongoing process to map the state of the current public funding system and what measures that can be taken to improve collaboration across the various agencies. The establishment of a new GIB should complement and amplify the competencies and resources provided by these agencies. In this part, we will look at what gaps the GIB can fill and how synergies with the current system could lead to increased value creation.

OVERVIEW OF CURRENT PUBLIC FUNDING SERVICES

There is a number of different funding agencies which are set up to support firms with the abilities to innovate for sustainability. Findings from the empirical analysis show that the system to a large extent covers the needs of the current market, but that there is a gap for existing schemes and incentive programs to channel investments in business model innovation for sustainability. Central for many governmental agencies is the principle of being technology neutral in order to avoid interference with market mechanisms. The projects are evaluated on equal terms through set criteria. Thus, the market will be responsible for picking the “winners” among the technologies that have received governmental support. Other agencies are more specialized, with mandates to support specific technologies. The GIB will join the latter group and seek to invest in selected sectors. Figure 1 shows the agencies deemed most central for enhancing green competitiveness for Norwegian industry, along with the funding gap in the valley of death.

THE VALLEY OF DEATH

The valley of death is a common term to describe the gap in the transition from the early development phase into large-scale pilot testing and demonstration. As illustrated in figure 1, the valley of death shows the gap of funding on the technology maturity scale, but also displays the gap between public and private funding.

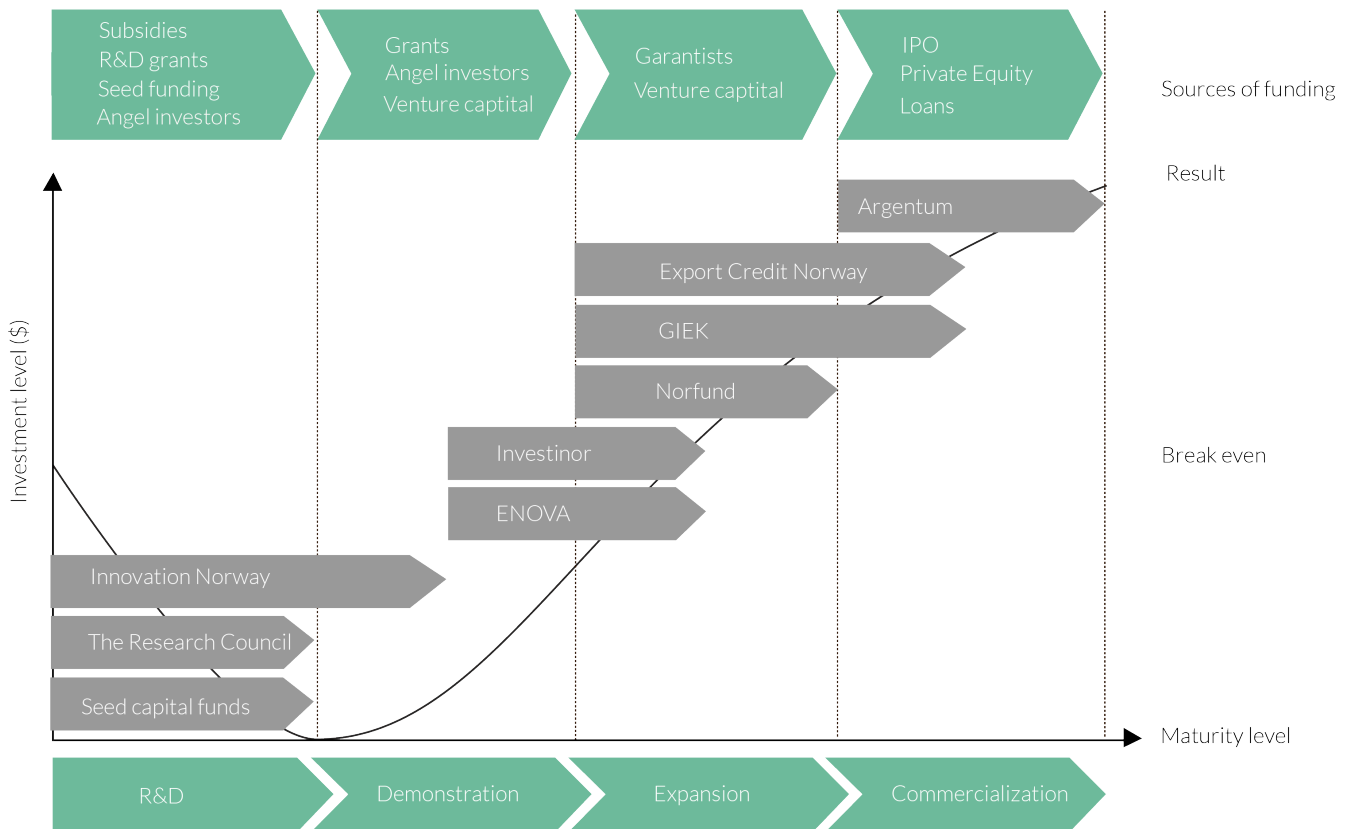


Figure 1: Norwegian public funding agencies

As seen in the figure, The Research Council of Norway, Innovation Norway, Enova, The Norwegian Export Credit Guarantee Agency (GIEK), Export Credit Norway, Investinor and Argentum all together provide funds in different stages of the technology maturity scale. In addition, SIVA and the interest organizations Intsok and Intpow complement the innovation system. All the mentioned public agents have important roles to fill in the transition to a low carbon society. Some have already started, and others are on the verge to expand their mandate to increase collaboration and make the process for sustainability innovators easier. However, none of the funding agencies are specialized to mobilize a sufficient amount of private capital to sustainability projects in the most critical phase, the valley of death. Norwegian industry thus needs a new tool to bring up the pace without exhausting current public funding pools.

STATE OF THE CURRENT SYSTEM: TOO LITTLE EFFECT TOO SLOWLY

Evidence from our empirical analysis highlighted some weaknesses in the current system:

1. The leverage ratio of private capital to the level of public funding is too low.
2. The time frame from idea to market introduction of relevant technologies and business models is too long.
3. The commercialization rate of research projects that make it from concept to proven technology is too low.

To reach Norway's climate targets, but also to benefit from innovations commercially, there is a substantial need to increase the amount of private capital per public funds invested. Private capital is crucial to upscale the right solutions at a faster pace. The Norwegian market lacks an influential institution that can coordinate efforts, and align the flows of public and private capital into prioritized target areas for green technologies. To create green competitiveness, sustainable business needs to enter the marketplace faster. It is therefore crucial to reduce the time necessary to drive forward innovations for commercialization. Norwegian funding agencies are strongly positioned when it comes to the research and development phase, but the valley of death kills too many of the pilot projects derived from the research efforts. To some extent, this can be considered a beneficial effect since only the projects that are proved viable by the market will survive. However, innovations with a massive business potential are often stranded

or sold to foreign companies to be developed further internationally. The consequence is that the cost-intensive nature of Norwegian business environment drives many actors abroad before they get a chance to create value and jobs in Norway. Investments made by public funding agencies become a sunk cost without generating neither jobs nor returns over time. This largely undermines the intention of the grants provided for research projects. Commercialization of pilot projects on a national arena is therefore crucial to secure and benefit from the resulting value creation. A GIB can here adopt a different approach from that of many grant-making public institutions, and instead follow strict mandates to mobilize private capital. A GIB tailored for sustainability investments will thus realize the full potential of public investments and help prioritized projects over the valley of death. An example of a company that is currently in the valley is Zaptec. A snapshot of the company is given in Spotlight 2.

SPOTLIGHT: ZAPTEC

Being at the verge to take their next giant leap towards commercialization, Zaptec and their electronic transformer technology is one of Norway's most interesting green technology companies.

KEY FACTS

Company name: Zaptec

Year established: 2012

Industry: Power electronics

Location: Stavanger

"At this stage, we are deep down in the valley of death."

– Brage Johansen, CEO

THE NEXT BIG STEP: FROM DEMONSTRATION TO COMMERCIALIZATION

Zaptec is in the business of democratizing energy by enabling new forms of distribution and consumption. Thanks to the flourishing market for electric vehicles, the company has had a home market to develop and test their solutions. The technology is a result of over ten years of research and development, and has now reached the dramatic phase when focus is diverted away from product development to sales and marketing.

By making this move, Zaptec is getting into the feared valley of death.

As a company with a promising outlook, Zaptec has benefited from angel investors, an investor group which is rather rare in the Norwegian capital market. Angel investors are important to lift technology that is not yet mature enough for venture capital. Zaptec has experience with several of the public funding agencies, and has received support from Innovation Norway and Enova (previously Transnova). The application and documentation process to the Research Council proved too difficult and resource intensive in the absence of specialized competence with application submission.

Zaptec is positioned for growth, and looks to expand into new, international markets. In this phase, the company will seek venture capital from a new investor community compared with previous rounds. When asked about the need for a green investment bank, a long-term loan facility is highlighted as a valuable mechanism for an entrepreneurial company destined for growth. Ideally, such a bank would consist of a small group of specialized employees to execute efficient project management, and serve as a useful partner for maturing companies.

"I am very positive to a specialized, green institution. This would be capital with a purpose. There has to be a purpose with what you do. If profit is the main driver, you might as well get into the drug business".

– Brage Johansen, CEO

SECTORS FOR GREEN COMPETITIVENESS

Exporting green high-tech

Looking from a geographic and natural resource perspective, Norway has unique advantages through abundant access to hydropower and marine resources like aquaculture and petroleum. Historically, these advantages have been the basis for the creation of a strong welfare-economy, and now serves as a great starting point for the transition to a low carbon society. We have the financial muscles to make the necessary investments in industry development and infrastructure, abundant access to clean energy, and world-class expertise within selected sectors. The electricity prices are low compared to the rest of the world, giving process industry a competitive advantage through their low carbon footprint. In the task to enhance green competitiveness, some sectors are better positioned to effectively contribute to national climate targets, job creation and boost economic growth. Moving forward, these sectors should be prioritized. The choice of sectors could be seen in connection with the possibilities to export technology and expertise internationally. A green economy is dependent on a shift towards increased export of high-tech solutions in renewable technologies and advanced low carbon systems and products.

Multi-target focus areas

Norwegian industry has already invested billions in key sectors as a part of the green transition. One of the main objectives of the GIB should be to optimize the use of public funds. This is done by targeting investments in sectors that fulfil multiple focus areas for green competitiveness. The multi-target areas can guide innovation efforts, and

thus the concentration of both public and private investments. The multi-target areas satisfy industry development in Norway and has the potential to contribute to large-scale emission reductions both nationally and internationally. The most important areas should address three key issues that characterize the current marketplace and political challenges:

1. Climate policy:

Fulfillment of national climate obligations require largescale investments. Especially within the four largest sources of GHG emissions: transport, oil & gas, process industry and agriculture.

2. Innovation:

In addition to incremental performance and efficiency improvements, there is a need to introduce disruptive technologies which make radical changes to current practices.

3. Decline of oil and gas:

Plunging oil prices have shaken both Norwegian industry and economy, and a highly skilled workforce has gone from lucrative industry jobs to be numbers on the rising statistics of unemployment.

Consequently, the following criteria were found to be central to identify the most promising sectors:

- They address the largest emission sectors both in Norway and globally.
- They utilize highly skilled human resources and industry insight.
- The geographical advantages and natural resources are exploited sustainably.

Relevant sectors for reducing CO2-emissions

IEA has mapped the necessary reductions in CO2-emissions to reach the two-degree target for the sectors of power, industry, transport and buildings (see appendix A). The reduction targets in the analysis are accompanied by the most promising technologies to realize these reductions. The largest potential is found using clean production technologies, with over twice as big potential as the industry sector. Zero emission transport is the sector with the third largest potential. When it comes to CO2-reducing technologies, renewable energy in power production is superior to other options. Energy efficiency gives a substantial potential for reductions in both the industry and transport sector. Furthermore, energy efficiency needs to be prioritized so that it can complement and reinforce the effectiveness of other solutions. The importance is neatly summarized by the pioneer behind the first solar airplane, Bertrand Piccard:

“There is no logic in filling a bathtub without plugging the drain first. Electrification and clean energy production therefore needs to be implemented in parallel with energy efficiency measures.”

- Bertrand Piccard, Solar Impulse pioneer

Identifying promising sectors for green competitiveness

In addition to address the largest emissions sectors, multi-target areas also focus on the aspects of exploiting industry expertise and resource-based geographical advantages.

Together, they characterize areas where Norway has a competitive advantage. In our empirical analysis, the respondents were asked which sectors were considered to be most promising on the path to achieve green competitiveness. Figure 2 shows the most central target areas and sectors derived from the analysis.

Technology areas:

Promising areas for technology development that will strengthen the green competitiveness of Norwegian firms nationally and internationally.

Industry sectors:

Domestic industries that build on one or several technology areas. As an example, green shipping include the use of battery and charging technology, new ICT solutions and clean energy production.

Strategic areas:

Based on the identified technology areas and industry sectors, the areas show where Norway has the opportunity to reduce carbon emissions while enhancing industrial competitiveness. By targeting these strategic areas, core competence and industry experience will be used to create new innovations for a home market and international export.

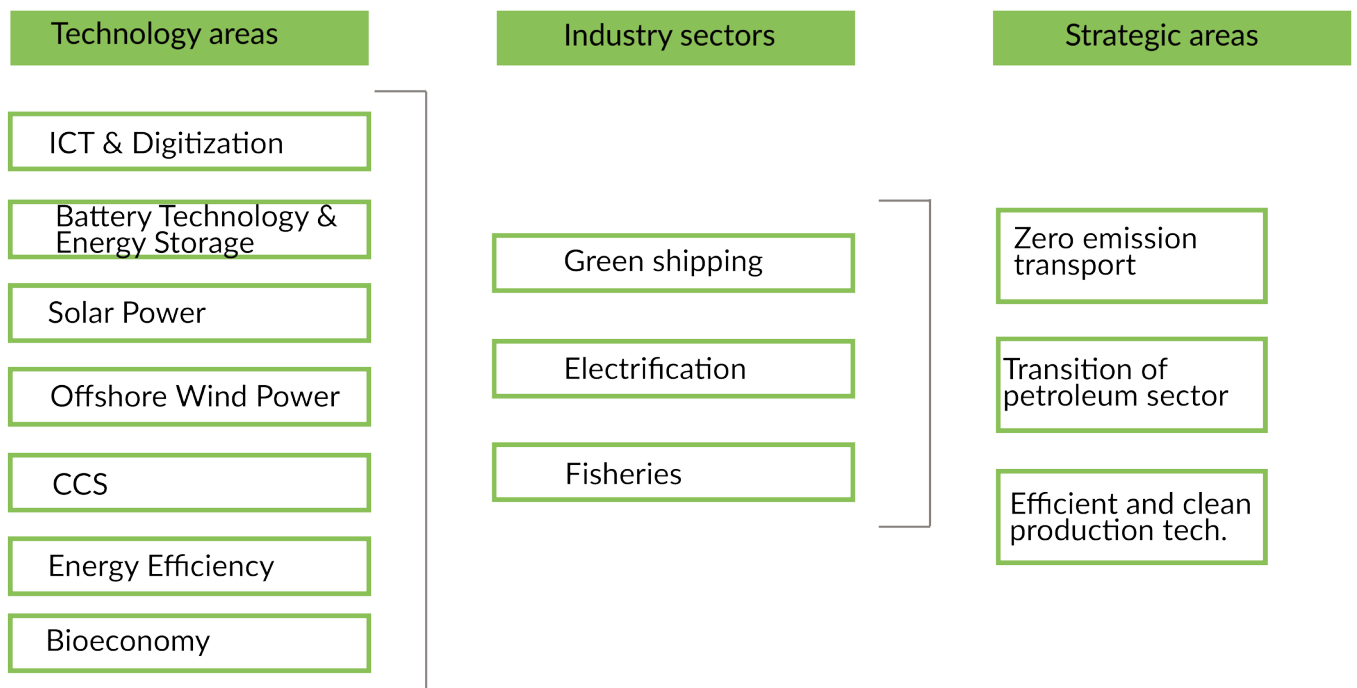


Figure 2: Strategic areas derived from the most promising technology areas in the empirical analysis.

As seen in figure 2, battery technology and energy storage was the most frequently mentioned focus area. Secondly comes electrification of the process industry, followed by solar power. To summarize, these sectors can all be said to constitute high-potential sectors positioned to create a competitive advantage for Norwegian industries. Based on empirical findings, three strategic areas are presented in figure 2. Building on this, we identify the following multi-target areas: distributed energy and storage systems, low carbon process industry, hydrogen production, electrification and energy efficiency, floating offshore wind, green shipping, greening of cities, aquaculture, digitalization and IT solutions. A closer description of these areas can be found in the appendix A. Targeted investments and innovation efforts in these sectors could give a large impact on global CO₂ reductions, and also entails major business opportunities.

TECHNOLOGY AREAS

Bioeconomy: production and processing of biologically renewable resources.

CCS: Technology development related to the value chain of carbon capture and storage.

Solar power: technology development of the core technology, raw materials, or the development of large-scale facilities.

Offshore wind power: technology development in supplier industry and operating responsibility of utilities. Conventional or floating technology.

ICT & digitization: enabling technologies such as smart grid technology and big data.

Battery technology: entire value chain related to development, production and infrastructure of energy storage, charging and transmission technologies.

Energy efficiency: Energy efficiency includes enabling technologies that help reduce energy use among consumers, business and industry.



PART 3

CONSIDERATIONS FOR A NEW GIB



MAIN CONSIDERATIONS

There are many factors to consider when deciding which configuration would be most suitable for the establishment of a Green Investment Bank. Main considerations will be introduced in this section, including the following:

- Nordic versus Norwegian GIB
- Private or public entity
- International versus national scope
- Building the right competence
- Project size
- Financial instruments
- Sustainability communication

“Going forward, we will seek to build on this progress as well as focus our efforts on combining our public resources with smart policies to mobilize much larger flows of private investment in low-emissions and climate resilient infrastructure.”

- US President Barack Obama

GLOBAL ROLE OF GREEN INVESTMENT BANKS

Before introducing the main considerations for a GIB in Norway, this section will describe the global role of these investment institutions. The emerging movement of specialized Green Investment Banks aims for public-private collaboration to excel investments in clean energy markets. Some GIBs are also termed Energy Investment Partnerships or Development Financial Institutions (DFIs). These entities have the potential of “convening stakeholders, mitigating risk, supporting the development of more projects ready for investment, and supporting effective policy that reduces risk for clean energy investments”. Major forces worldwide are working to shift the focus of the financial sector towards a greener economy. In the climate action plan from 2013, President Barack Obama emphasized how mobilizing climate finance would be an important tool in the US’ efforts to promote sustainable development.

Since 2013, a large number of GIBs have been established or are in the process of being established. With UK Green Investment Bank as a pioneer, the diverse range of GIBs have mainly been established to facilitate private investments into low-carbon, climate-resilient (LCR) infrastructure. While GIBs have different approaches, they usually share the following characteristics:

- A narrow mandate focusing mainly on mobilizing private LCR investment by using interventions to mitigate risks and enable transactions.
- Independent authority and a degree of latitude to design and implement interventions.
- A focus on cost-effectiveness and performance reporting.

The potential impact of GIBs extend across environmental, fiscal, social, and physical boundaries. “Through forming partnerships and addressing the diverse needs of stakeholders, GIBs contribute to valuable direction towards reducing the need for public capital in the transition to a clean energy economy. ” With the authority to raise capital through a variety of means, GIBs can align clean energy finance initiatives with traditional development financing tools. This maximizes the impact of public funds to accelerate the implementation of clean energy technology and economic development. Table 1 shows an overview of the largest Green Investment Banks currently established.

“The majority of the GIBs that have been established are not actually banks. They don’t hold the banking rights, as they don’t allocate capital according to a banking model. The banks are just fund structures, with a slightly different capital structure. They get funding from the central government, but are essentially funds structured as companies.”

- Gregor Paterson-Jones, former Managing Director of UK GIB

Since 2013, a large number of GIBs have been established or are in the process of being established. With UK Green Investment Bank as a pioneer, the diverse range of GIBs have mainly been established to facilitate private investments into low-carbon, climate-resilient (LCR) infrastructure. While GIBs have different approaches, they usually share the following characteristics:

- A narrow mandate focusing mainly on mobilizing private LCR investment by using interventions to mitigate risks and enable transactions.
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- A focus on cost-effectiveness and performance reporting.

Green Investment Banks worldwide						
GIB or GIB-like entity	Origin	Leverage factor ¹ Accomplished / targeted	Toolbox: Financial instrument			Initiator
			Loans ²	Grants	Other	
UK Green Investment Bank	UK	1 : 3/ 1:10-1:20	●			UK Government, Department for Business, Innovation and Skills.
Swiss Technology Fund ⁸	Switzerland	1:1			Guarantees	Swiss Confederation
The Clean Energy Finance Corporation (CEFC)	Australia	1:2/ 1:10	●		Venture capital ³	Australian Government
The Green Finance Organization	Japan	N/A	●			Japanese government, Ministry of Environment
Malaysian Green Technology Corporation	Malaysia	N/A	●	●		Ministry of Energy, Green Technology and Water
South African Green Fund	South Africa	N/A	●	●	Equity	South African government, Department of Environmental Affairs
Connecticut Green Bank	Connecticut	1:10	●		Securitization, leasing	Governor and Connecticut's General Assembly
NY Green Bank	New York	1:5	●		Credit enhancement	New York State Energy Research and Development Authority, (NYSERDA)
Green Energy Market Securitization (GEMS)	Hawaii	N/A	●			State of Hawaii, Department of Business, Economic Development and Tourism and the Hawaii Green Infrastructure Authority
New Jersey Energy Resilience Bank	New Jersey	N/A	●	●		State of New Jersey
California Lending for Energy and Environmental Needs (CLEEN)	California	N/A	●		Tax-exempt bonds	The California Infrastructure and Economic Development Bank (iBank)
Rhode Island Infrastructure Bank	Rhode Island	N/A	●			Rhode Island General Assembly
Montgomery County Green Bank	Montgomery County	N/A / 1:20			N/A	Department of Environmental Protection (DEP)
Masdar ⁵	Masdar City	N/A	●		Venture capital	City of Masdar
Total	14 GIBs	8 countries	12	3		6 governmental, 6 state, 1 county, 1 city
Other initiatives and proposed GIBs						
US Department of Energy Loan Guarantees	US	1:10				Operative
Low Carbon Australia	Australia	1:13				Operative, now transferred to CEFC
State GIBs	Vermont, Delaware, Maryland, Ohio, Nevada, Minnesota	-				In establishment
US Green Bank	US	1:10				Proposed by Clean Energy Deployment Administration
National Green Development Fund	China	-				Proposed by the China Council for International Cooperation on Environment and Development (CCICED)

1) Leverage factor indicates the public:private ratio, or how much private capital is attracted per public investments. N/A implies that the information is unavailable, usually since the GIB is too new for a track record. Sources from OECD (2015), ACF (2015, p. 5) and email correspondence with Montgomery County Green Bank and the Swiss Technology Fund.

2) All loans are generally market loans on commercial terms and rates, except a few that also utilize concessional loans.

3) Clean Energy Innovation Fund (CEIF), planned operative on July 1st 2016 (CEFC, 2016).

4) Grants and forgivable loans will be offered to address up to 40 percent of unmet funding needs, while low-interest, amortizing loans will be available for the remaining 60 percent of unmet funding needs (NJ ERB, 2014.)

5) Masdar Capital manages two investment funds: Masdar Clean Tech Fund and DB Masdar Clean Tech Fund (Masdar, 2016).

As seen in table 1, there is a broad range of investment banks established already. The “Leverage factor” column shows the ratio which measures how much private funding is unleashed per public investments. GIBs are still in a very early development stage, but the scarce track record available shows a significant effect of mobilized private capital. Connecticut Green Bank currently has the largest leverage ratio with ten times higher private than public capital. As the columns shows, the targeted leverage ratio is much higher than current levels. Also worth mentioning is the fact that some GIB-like entities (e.g. GreenTech Malaysia) make extensive use of concessional loans. Other GIBs like CEFC and Connecticut Green Bank give market loans, and only use the more generous loans on a limited basis. An observation is that none of the GIBs have been established across national borders, but have been founded on a national level, state level, county level or city level. Examples of GIB’s efficiency can be found in appendix B.

The Green Bank Network is a global network of green banks that collaborate with the objective to exchange experiences and scale up private financing that meets the challenges related to climate change . The currently largest gathering of GIBs happened during the GIB workshop at COP21 in Paris.

GIBs are not the only institutions that can mobilize investments in domestic LCR infrastructure. Alternatives to GIBs are usually found in entities like National Development Banks (NDBs), public investment banks, infrastructure banks or industrial development banks that focus

on domestic investment. Usually, NDBs are less focused on mobilizing green investments than GIBs, but some NDBs have financed low-carbon projects for many years. Some NDBs, such as Germany’s KfW, as well as multi-lateral Development Banks like the European Investment Bank and others, increasingly innovative tools to scale up private finance from multiple investor classes. As an example, KfW has invested in environmental protection domestically and internationally since the 1980s, and invested approximately US\$ 58 billion in domestic low-carbon projects in 2010-12 . Other initiatives like The South Pole Group also make significant contributions, for instance by screening over \$1 trillion investments and assets regarding their climate impact .

PARTNER FOR INSTITUTIONAL INVESTORS

GIBs can create attractive opportunities for institutional investors such as insurance companies, pension funds, investment funds, public pension reserve funds, foundations and endowments. Only in OECD countries, these investors held US\$ 93 trillion of assets in 2013. While these investment actors typically seek long-term and low risk investments, they are hesitant to be the first mover into new markets or take construction risk. However, if co-investing with a GIB, they could benefit from the attractive market opportunities created by public-private collaboration for sustainable and climate resilient infrastructure.

NORDIC VERSUS NORWEGIAN GIB

The Nordic countries can benefit from joining forces for a Nordic Green Investment Bank, but also face substantial challenges. Advantages and dis-advantages need to be thoroughly explored to get a better insight into the complex nature of collaboration across borders. Considerations related to this will be discussed in part 4: Scenarios. An optional approach that emerged from the empirical analysis, was to move the scope from nations to cities (see fact box). Collaboration on a city level has proven to provide larger agility and quicker implementation of low carbon solutions, and many nations actually have more ambitious climate targets than the nation as a whole has committed to.

COLLABORATION BETWEEN CITIES

Another option deviated from the empirical analysis was to look beyond the scope of nations to collaborations between cities. This could open up for the potential to exploit the Nordic comparative advantages in management knowledge and environmental competence. The flexibility to make large investment decisions quickly makes them more suitable drivers to catalyze change. An example is the initiative Cities for climate sparked during COP21. The network gathers local leaders unites 1000 cities that pledged to long term climate goals such as becoming 100% renewable or reducing CO2 emissions by 80% within 2050. Collaboration between cities has also been a driver for EU's main climate innovation initiative, Climate-KIC. Collaboration and exchange of experiences across city borders will speed up the green transition for smart cities.

Sources: Zaptec, Cities for climate (2015)

INTERNATIONAL VERSUS NATIONAL SCOPE

The GIB could focus on a national or an international scope. However, they do not have to be mutually exclusive, so a weighted combination of both is possible. The empirical analysis revealed the significant value of a home market when firms internationalize. Three examples are the incentives for electric vehicles, the drive to electrify ferries and the advanced fleet of supply vessels developed in the wake of the petroleum industry. They are all examples of investments conceived in Norway, that have sparked global curiosity and international business development. The opportunity to develop marine electrification brought the Canadian company PBES to Trondheim, as seen in Spotlight 3. By having a proof of concept at home, both established and new firms get the credibility necessary to win contracts abroad. To deliver stable returns over time, a potential business model for the GIB emerged during the empirical analysis: It could invest in and coordinate a cluster of Norwegian firms in international operations to cover the demand of renewable energy that occurs from some of the most influential companies worldwide. An example is collaboration with RE100 (see fact box). The main focus of the GIB would then be to invest for the successful expansion of Norwegian industry abroad.

COLLABORATION BETWEEN COMPANIES

The private sector accounts for around half of the world's electricity consumption. To shift companies' energy consumption to renewables, RE100 is an initiative by The Climate Group and CDP for companies that have committed to implement 100% renewable power supply for their operations by 2020. The network seeks partners to address barriers and develop transparent reporting mechanisms, while showcasing business action. When all the firms in RE100 demand solutions for renewable energy production, there will be a massive pull for renewables locally, with associated holistic solutions for distributed energy. This could be linked to securitization, and bundling of both projects to finance distributed energy. Firms from the empirical analysis like Powel, Scatec, Statkraft, Statoil, Zaptec and PBES are all eligible to pilot business opportunities with customers that seek to become clean power producers. Additionally, institutional investors like KLP and Storebrand have implied that they could consider to invest in such an entity.

Sources: KLP, RE100 (2016)

NORDIC VERSUS NORWEGIAN GIB

Findings revealed broad consensus that the private sector needs to collaborate closer with governments and regulators to accelerate financing for sustainable development. Such public-private partnerships will “scale up the use of finance and industry models that lower financing costs for low-carbon energy and energy efficiency investments, particularly for institutional investors”. The GIB could therefore become an intermediary to bridge the gap with a configuration that fits the needs of both the public and the private sector. The importance of independency becomes clear when discussing the GIB’s affiliation, since it needs to be able to operate on commercial terms without political interventions.

GREENING EXISTING INSTITUTIONS OR CREATE A NEW ENTITY?

The “Greening” of existing institutions may be preferable to creating a new institution when the necessary institutional and political support exists. Some factors to consider when evaluating the need for a new GIB include:

- Costs and time required to establish a new institution is likely to exceed the equivalent of greening an existing institution. It could also be perceived as expanding bureaucracy or creating duplicative government services.
- The independent status of a new GIB can provide flexibility to experiment, innovate and adapt to market development. Independence shields the institution from political interference, which could be vital to attract long-term capital from institutional investors.
- “Mainstreaming” sustainability investment objectives in existing institutions could be considered. In Norway, potential resources are Investinor, Argentum or Norfund. In the Nordics, NIB and NEFCO are candidates. Resources would probably be saved in structure and human resource availability, but internal resistance could be strong against changes that may conflict with current procedures and expertise.
- Organizational culture and mandate: Current agencies lack a clear mandate to promote sustainability, climate change adaptation and mitigation. GIBs usually have crystal clear mandates and thereby attract human resources with the mindset fit for the purpose. It might be easier to build the right organizational culture from inception rather than changing an existing one.

Source: OECD (2015)

SPOTLIGHT: PBES

With Canadian technology manufactured in Trondheim, PBES is an excellent example of how a foreign business is looking to Norway to realize the energy storage solutions of tomorrow.

KEY FACTS

Company name: PBES

Year established: 2015

Industry: Energy storage

Location: Trondheim/Vancouver

“Norway has the demonstrative commitments that few others can match”.

– Brent Perry, CEO

JOINING EFFORTS: AN INTERNATIONAL TAKE ON THE ENERGY STORAGE REVOLUTION

Norway's pledge to achieve zero emissions from the transport sector is sparking interest not only on a national arena, but has also attracted international business to set foot in the Norwegian market. One of these is the Canadian Company Plan B Energy Storage. While initially being developed in Canada, their solutions are now manufactured to Norwegian standards. The move over the Atlantic Ocean was based on the presence of related industry and a network of potential customers and large technology actors to excel the developments in marine electrification.

Making champions of their customers:

At the core of the business model is quality and long-term customer relationships. The technology is openly shared with integrators, and end-users educated and supported throughout the product life-time. The goal is to give customers an advantage in the market place. This is PBES' philosophy of a business that is in it for the long-haul.

The energy industry is changing at a rapid pace, and can appear chaotic for both incumbent and outside observers. This is one of the reasons why PBES has looked to secure private capital over public funding, which is sometimes too slow to follow the market developments. The process of getting funding in Norway has proven difficult, as high-risk projects needs support of larger actors like Siemens to account for the viability. Hence, for a company like PBES, non-dilutive growth capital in the form of a loan or convertible debt from a green investment bank would have a great impact.

“We need the committed support of a financial institution that can participate in the evolution of the market and be flexible in their demands. There has to be room for adaption of the business plan along the way, and no stringent requirements of return.”

– Brent Perry, CEO

BUILDING THE RIGHT COMPETENCE

The GIB needs to attract world-class competence to succeed. It is of crucial importance to develop and maintain institutional knowledge to match the market requirements for the swift and large scale implementation of sustainable solutions. Candidates need to fit the GIB's profile as a driver for sustainability. As a whole, the employee base should cover all the relevant fields and have the capacity to overlap knowledge loss due to turnover rates. The number of staff could with advantage be limited, to allow the corporate culture of a dynamic and future minded team to prosper. Highly skilled in their respective fields and with a deep understanding of market mechanisms, the team should be given complete autonomy and responsibility to manage the GIB's portfolio under the requirements set by government. Flexibility to respond to market trends is a must, as well as the capability to be actively engaged in the respective projects.

PROJECT SIZE

Apart from determining which sectors that will be targeted by the GIB, another question is what criteria is to be set for projects to invest in. Large infrastructure projects are often capital intensive and require substantial internal resources to manage. If the GIB is to be heavily exposed in infrastructure, resources can easily be tied up, thus offering less flexibility to take on smaller projects. If choosing a model with many small projects, they can be bundled to achieve the desired rate of return, and will in turn offer a portfolio with diversified risk. Today, NEFCO has sound experience with bundling and management of small and medium projects. Their investments are based on transferring both knowledge and technological solutions in the areas of environmental and climate technology to local foreign markets. A similar model is possible for a GIB and would enable support to a high number of projects.

FINANCIAL INSTRUMENTS

GIBs are often tailored to become specialists with the necessary tools to scale up low emission solutions or spark sustainable innovation. The first case requires expertise in co-financing, the second lies closer to venture capital investing. There is a large difference in risks between the two approaches. In both cases, financial instruments can be tailored to reduce costs and risks to make the risk-return profile of the projects a better fit for investors. The GIB could become a specialist in the necessary tools to spark sustainable innovation and scale up low emission solutions. By either offering the instruments directly or through collaboration with other agencies, the GIB should be able to deliver a combination of grants, loans, venture capital, bonds, guarantees, know-how or necessary infrastructure to fit the prioritized sectors and projects. Tailored use of financial instruments will provide the necessary capital at the right project stage, which reduces the time necessary to commercialize sustainability innovations. Financial fit combined with market insight and active participation lowers the risks of failure and increases the systematic recycling of capital for new projects. Table 2 displays a list of financial instruments the GIB could use to reduce the costs of capital of sustainability investments and to maximize the attraction of private capital. The table is adapted from a New Climate Economy report by Zuckerman et al (2016).

Type of instrument	Instrument	Reduces financing costs by:
Financing vehicle	Listed equity investment vehicle (e.g. infrastructure fund) Tradable instrument providing an ownership stake in a group of clean energy projects	Reduces liquidity risk for investors
	Bond (e.g. bond fund, corporate bond, project bond, green bond) Investment that yields a stream of payments backed by a project's revenues, without ownership stake	Reduces liquidity risk for investors; investors are not exposed to risks that become relevant after the term of the bond (e.g. value of the project after initial useful life is over)
	Concessional loan Direct loan at below-market rate	Lowers cost of capital directly
Risk mitigation instruments	Insurance Offers protection against specific risks; can include policy/political risk	Shields investors from specified risks
	Performance contract Protects against risk of technology failure or underperformance; often offered by equipment manufacturers	Shields investors from performance risk
	Currency swap Agreement on a specified exchange of currencies in the future; counterparty assumes the risk that the exchange rate will fluctuate	Shields investors from currency risk by transferring it to the counterparty
	Loan/credit guarantee Agreement to cover some or all of an obligation to a borrower in the case of default	Reduces the potential losses that investors may face; can cover all types of risk
	First-loss protection Specialised insurance or cash reserve used to shield investors from a predetermined amount of loss	Decreases the likelihood that investors will be exposed to losses; can cover all types of risk
	Co-financing Can describe a range of financial arrangements where DFIs invest alongside private investors	Participation of DFI may lower private investors' perceptions of the riskiness of a project, including policy/political risk
	Securitisation Pooling multiple projects into a single vehicle for investment	Reduces investors' exposure to performance risk, which is lower for a pool of similar projects than for any single one
Revenue sources	Power purchase agreement (PPA) Long-term contract to sell power at a fixed price (or with a minimum price or price collar)	Provides revenue certainty; avoids exposing renewables to fossil fuel price risk
	Feed-in tariff Long-term revenue support from government, at a fixed level	Provides revenue certainty; avoids exposing renewables to fossil fuel price risk
Capital cost subsidy	Credit enhancement Upfront subsidy to lower the interest rate paid by the borrower	Lowers cost of capital directly

Table 2: Potential instruments the GIB could use to reduce financing costs for sustainability projects. Modified after Zuckerman et al. (2016).

The green fields in table 2 indicate potential instruments the GIB could specialize in, provide knowledge of or coordinate with partners to reduce financing costs of clean energy projects. In addition to existing instrument, new guidelines could be utilized to combine these instruments in new ways. An example is CICERO's reports on climate-related investments in developing countries and climate adaption. The first will present guidelines for how to maximize leverage of public:private investments using financial instruments available today. The second will clarify how climate change impacts investment decisions .

SUSTAINABILITY COMMUNICATION

Disclosure of the financial costs of environmental impact would make it easier for fund managers and analysts to assess and manage the materiality of companies' environmental impacts. Therefore, the GIB could be a driver for disclosure and implementation of ESG metrics in financial analysis. To address the firms' limited resources and prevent the phenomenon "death by reporting", the following tools for sustainability communication could be utilized.

"With better information as a foundation, we can build a virtuous circle of better understanding of tomorrow's risks, better pricing for investors, better decisions by policymakers, and a smoother transition to a lower-carbon economy."

- Mark Carney, Chairman of G20's Financial Stability Board

Integrated Reporting

Integrated reporting is when firms disclose their sustainability impact by incorporating ESG factors in their communication, usually in the annual report or more frequently on the company website. It is a hybrid between the traditional, financially oriented annual report and the material parts of a corporation's sustainability report. Integrated reporting thereby gives a complete overview of the different dimensions of success: Financial, environmental, social and governance performance.

Materiality and The Statement

Materiality is a fairly new sustainability concept which acknowledges firms' limited resources while simultaneously disclosing necessary sustainability issues. Materiality is often explained as focus areas of the highest importance for the company's sustainable value creation. The firm's significant audiences should guide which issues are "material" for the company to be sustainable.

A new movement promoted by Harvard professor Robert Eccles is The Statement of Significant Audiences and Materiality, which has been described through the empirical analysis. As part of their stakeholder mapping, companies should not only identify significant audiences, but also address trade-offs between stakeholders and the weighting assigned to each stakeholder. The Statement aims to prevent shareholder primacy, referring to the misperception that firms exist to maximize shareholder value, and that shareholder primacy is founded in the juridical duty of the Board. Contradictory to this, "a Board's duty is to the interests of the corporation itself rather than the particular audience of shareholders. The board must decide which audiences are most significant for the ability of the corporation to create value over the short, medium, and long term."

Disclosure of which countries firms operate in

During the empirical analysis, transparency was found to promote sustainability investments. Participation will help gathering data necessary to perform extensive sustainability rating and gradually decarbonize asset portfolios. Related to this, another important finding from the empirical analysis, is the value of firms' disclosure of the geographic locations of its holdings, operations and employees. This simple piece of information would make it much easier for investors and fund managers to perform sustainability investing. We therefore propose that this information is included in The Statement, and updated on a quarterly basis.

"The lack of transparency is the main barrier for achieving sustainability in business."

- Nigel Iyer, investigator of fraud and corruption through 20 years

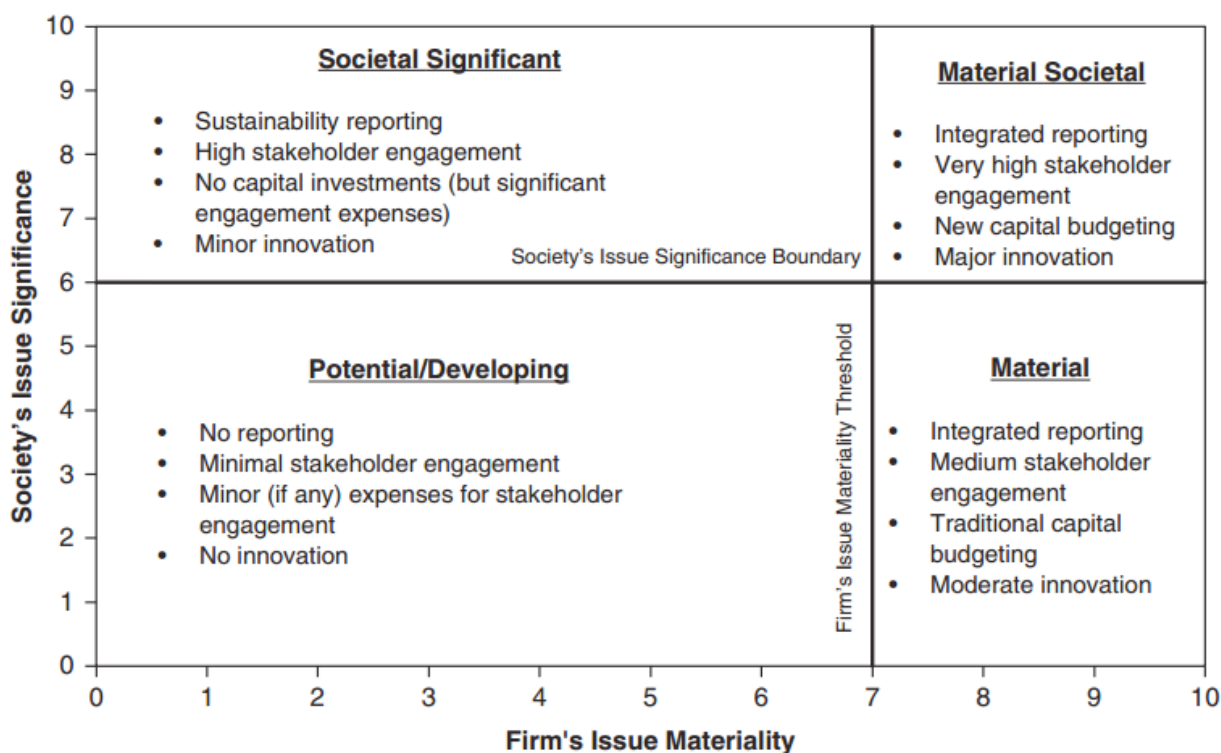
Therefore, increased transparency and ESG disclosure on a voluntarily basis could shift the trend from fighting corruption to preventing it. If high levels of transparency means good business, there will be a shift towards more transparent businesses.

Sustainable Value Matrix

Another proposed management tool to build on materiality is the Sustainable Value Matrix proposed by Eccles and Krzus, as shown in figure 3.

The Y-axis contains the aggregated views of the firm’s chosen stakeholders, reflecting “society”. This is grounded in the Statement of Significant Audiences, as described in the previous paragraph. The X-axis represents what is deemed material to the firm. The matrix is divided in four cells by the “society’s issue significance boundary” and the “firm’s issue materiality threshold”

The most relevant issues for both stakeholders and the firm are found in the upper right cell, “material social”. Issues found within this box is to be included in the integrated report, and are in major need of innovation to resolve trade-offs between the needs of investors and other stakeholders. These are typically high-risk, long-term and capital intensive. Issues in the “material” cell are also subject for inclusion, while the “societal significant” issues can be placed in a separate sustainability report. The “potential/developing” issues can be ignored.



Task Force on Climate-related Financial Disclosures

There are currently more than 400 sustainability initiatives, which makes it hard to implement and compare sustainability performance. The Financial Stability Board's Task Force on Climate-related Disclosures (TCFD) will launch recommendations to navigate the jungle of initiatives in December 2016.

"The work of the Task Force on Climate-related Financial Disclosures will help to accelerate global investments in technological innovation and clean energy by increasing transparency. And, in doing so, it will help make markets more efficient, and economies more stable and resilient. "

– Michael R. Bloomberg, chair of TCFD

The quote by Bloomberg, chair of the Task Force, summarizes what nations all over the world should strive for at this point of urgency. Norway needs to be a driver for change, and should therefore consider to commit one hundred per cent to the new indicators when they are launched. It will be one of the most efficient ways to achieve the targets from the Paris Agreement and UN's climate related Sustainable Development Goals. However, these indicators may only cover climate-related disclosure. All ESG values should be incorporated in businesses to secure true sustainable development.

INTRODUCING THE MISSION OF THE TASK FORCE

The Task Force will develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders. The Task Force will consider the physical, liability and transition risks associated with climate change and what constitutes effective financial disclosures across industries. The work and recommendations of the Task Force will help firms understand what financial markets want from disclosure in order to measure and respond to climate change risks, and encourage firms to align their disclosures with investors' needs.

Source: TCFD (2016)



PART 4

SCENARIOS

NORWEGIAN CO-INVESTMENT PARTNER

In this scenario, the GIB is a committed co-investment partner, often through joint ventures with other companies. Solid market expertise and understanding of local conditions offer support for a holistic approach to upscale technology abroad and drives the commercialization of infrastructure projects. The bank is perceived as a trusted investment partner with valuable sector insights, and gains recognition for reducing risks for private investors in challenging markets. The chosen investments coincide with and reinforce the objectives of Norwegian climate policies. In this scenario, Fornybar AS could be transformed to become a specialized GIB to amplify the efforts of Norwegian public funding agencies.

A public-private partnership

In this scenario, the GIB is set up as a private entity with state affiliation through a steering committee and reporting requirements to the government. The configuration decouples the bank from political changes and is given the flexibility to fulfil the specified mission to invest in green technologies. The task of the government officials is to oversee the board and ensure that the given mandate guides the core business and daily operations. The GIB is anchored nationally, with the Norwegian state as a majority owner. Part ownership and collaboration is open to other institutions. With this model, the bank is positioned to co-invest with a wide range of partners on a national and international arena. Other green investment banks, funds and development banks are potential partners, along with large industry actors which look to invest in new infrastructure projects and other low-carbon technologies. For example, the Sovereign Wealth fund could become a resourceful partner for investments abroad.

Promoting the Norwegian brand

The main advantages of a Norwegian GIB are the rapid establishment and tailored fit to promote Norwegian industry development. Norway has a head start in selected areas that few other nations can compete with. We also have the financial muscles to provide sufficient momentum for the GIB from inception. In close collaboration

with public agencies like Investinor, Argentum and NBIM, the Norwegian GIB can quickly become a driver for green competitiveness for Norwegian business. International expertise could also assist a Norwegian GIB to get an ideal blend of competence from inception. One of the drawbacks as opposed to a Nordic affiliation is that the GIB could not use the Nordic brand, which might be stronger positioned internationally than the Norwegian brand alone.

Internationalization: Unifying industry and climate policy

Within this scenario, the role of the GIB is to follow Norwegian companies abroad as a trusted investment partner. This will benefit Norwegian export by upscaling technology and creating jobs at home and in the host country. The GIB offers sound expertise and is industrially oriented through its partnership and network collaborations. With the assistance of the GIB, Norwegian firms can overcome project and political risks. Through dialogue with foreign governments, it can seek to realize projects that would otherwise not be seen through. In this way, the GIB contributes to true additionally. Another benefit with foreign investments is the opportunity to combine the areas of industry policy with climate policy. The national targets of emission reductions that were pledged to the Paris Agreement can be met by investing in projects certified to yield carbon

by conventional financial institutions.

“What we need are financing mechanisms that take projects that are blocked today and make them happen. This is true additionality - or enhanced climate action - as the Paris agreement envisages. There are many examples where developing countries want to do much more, but face project implementation barriers. Norwegian companies, with the assistance of our national financing institutions and funding dedicated to climate finance, can work with countries to overcome risk and make these projects go ahead. This would not only benefit host countries, but Norway could simultaneously discharge part of its national commitments under the Paris agreement.”

- Terje Osmundsen, SVP Business Development Scatec Solar

credits. Development of new technology, new employment and international expansion are then coupled with climate policy objectives.

Leveraging private capital through long-term loans

The role as a long-term investment partner is executed through the ability to provide capital loans, credit lines or act as a co-investor. With this toolbox at hand, the GIB will invest in proven technologies that can give high rates of success and decent, stable returns over time. Thus, the institution dismisses any subsidy element, and focuses on the development of promising industrial actors that is able to repay the debt within an acceptable time frame. This enables the GIB to recycle capital for new investments. It should however be noted that such a model might not give market returns after traditional requirements, and that the risks associated with the projects can be higher than the level accepted

REALIZING HIGH-POTENTIAL INNOVATIONS

The second scenario for the establishment of a green investment bank is an extension of the first scenario. The bank is still anchored as a Norwegian institution, but with an extended toolbox of financial instruments that sets ambitious requirements for organizational capabilities. The GIB has two main objectives: sparking and facilitating promising new innovations, and scaling up proven technological solutions. As a Northern newcomer in the family of GIBs, the entity will introduce and manage a novel financing concept compared to similar entities of this size. In this scenario, Fornybar AS could become a part co-financer and part venture capital investor inspired by the new innovation fund of CEFC and the Swiss technology Fund's guarantees for sustainable innovation.

Building on scenario one

The structural configuration is largely the same as outlined in scenario one. The focus is still put on promotion of Norwegian technology through capital loans and export to foreign markets, with no form of grants. In addition to being an investment partner for companies that are in the expansion phase with proven technologies, the GIB is in this scenario also a development partner for entrepreneurial ventures that is yet to demonstrate large-scale commercialization opportunities.

A hybrid entity

Essentially, the GIB will be able to cover functions that are usually limited to specialized entities. Of the existing public agencies, Innovation Norway has the financial means to support innovation in the form of both grants and loans. Investinor is positioned with venture capital for early phase developments, while Argentum targets mature companies. The new GIB is mainly set to distinguish itself from these actors in two ways:

- Scope of investments: The objective to invest in green technologies in targeted sectors.
- Financial means: The ability to combine venture capital and loans to assist at different stages on the technology maturity scale.

Bridging the valley of death

Empirical findings suggested that there is a gap for funding in the phase from demonstration to

commercialization, the valley of death. The GIB's ability to offer venture capital in this transition phase will contribute to bridge the gap. If Norway is going to build new capabilities and competitive advantage in key sectors, new and promising technologies in these areas have to be supported to make it across the valley.

Need for specialized competence

A hybrid model sets comprehensive organizational demands through the combination of venture capital investments and management of larger, international projects. Compared to scenario one, the organization has to be strengthened with skilled people experienced in venture capital investments. This calls for a specialized and effective institution with a limited number of employees to ensure agility. Furthermore, the exact structural configuration is dependent on the financial toolbox. The venture capital activities could for instance be put in a separate division, but with possibilities to disperse competence across the organization. Another keyword is sector knowledge, since this is crucial to pick the right projects for further development. Since several of the sectors highlighted in Figure 2 are emerging areas in rapid development, new competence needs to be developed continuously and institutional knowledge should be maintained over time. Even though there might be a limited resource pool in Norway, necessary competence could be found internationally.

A NORDIC GREEN INVESTMENT BANK

The third scenario looks outside Norway's national borders to join forces with the Nordic countries of Sweden, Denmark, Finland and Iceland. There is a clear technological and economical pathway for the Nordic region to push for carbon-neutrality in 2050. Together, the region can send a strong signal to the global community that the ambitious aims of the Paris Climate Agreement are achievable .

Establishment of a Nordic Green Investment Bank has some major advantages, but also entails obvious challenges. Assessments of the possibilities for such an entity have already been made, for instance through contributions by the Swedish Expert Group on Green Transformation and Competitiveness. The Nordic countries are minions in a global scale, so the nations will most likely be able to achieve more through joint rather than separate efforts. A strong, Nordic brand could benefit from experiences within business development and innovation. For Norway, valuable insights can be learned through entities like the Finnish innovation fund Sitra, the Danish CLEAN center and Swedish innovation pioneers. Between the Nordics, expertise in areas like wind, hydro, shipping, bioenergy, hydrogen, solar, geothermal energy and cold climate broadens the potential focus areas of the Nordic GIB. Collaboration and mutual knowledge exchange could make it easier to reach demanding targets and solve joint challenges.

“Norway has a lot to gain from increased collaboration with the Nordics. Especially Copenhagen and Stockholm have been pioneers in creating hubs for innovation. It's not certain that Norway would benefit the most in such a relationship, but we clearly need increased knowledge exchange ”

- Kristin Skogen Lund, CEO NHO

Building on existing ones or making a new configuration?

In practice, recommendations for a structural configuration vary from restructuring the Nordic Investment Bank to creating a joint entity through existing Nordic banks. In the case of a new Nordic GIB, the proposed Fornybar AS could become Norway's financial contribution in the form of seed funding for the new or restructured entity. “From a Nordic perspective, the lack of both venture capital and funding for early stage project development has made it difficult to commercialize and establish reference projects for new technological innovations, domestically and in international markets”. Resources and expertise could be obtained from a broad range of banks like Nordea, DNB, Swedbank and SEB, as well as entities like the Nordic pension funds and green funds. A major advantage is the fact that the Nordics have already operated joint green finance institutions for decades. Experienced greeninvestment institutions like NIB and NEFCO would probably be central for the GIB, either directly or indirectly.

“Nordic investors like the Norwegian Pension Fund (NBIM), the Nordic Development Fund, Nordic Investment Bank and the Danish Green Investment Fund all acknowledge climate change and to various extent co-invests in projects with positive environmental impact.”

- Claudine Blamey,
Head of Sustainability, The Crown Estate

Disadvantages of a Nordic GIB mainly concerns the challenges related to align all the countries' national priorities. With different motivations for commitment and deviating prerequisites, reaching an agreement might be difficult. Furthermore, comprehensive political processes might delay the launch and operation of the GIB. Delayed establishment is questionable in itself due to the urgent nature of climate change. A potential pitfall of a joint Nordic GIB are the cultural differences between the Nordic nations. Especially when financing is involved, even the best relations get tested if disagreements occur. The bold, action-driven business culture of Sweden and Denmark could potentially crash with the cautious approach of Norwegians.

“Nordic collaboration is a minefield. There are much larger structural differences between countries like Norway, Sweden and Denmark than Norway and Australia or Norway and Canada.”

- Brage Johansen, CEO Zaptec

To summarize, a beneficial relationship between the Nordics rests on mutual commitment for the promotion of Nordic technology. The success of a Nordic GIB would depend on the ability of the nations to make internal differences a strength instead of a weakness, which would make cultural variations the strongest card in the deck. If the result is broad expertise and accelerated thoroughness in the upscaling of sustainability technology, a Nordic GIB could provide a winning recipe. The alternatives for mandate and financial instruments available to a Nordic institution are the same as outlined in scenario one and two for the Norwegian GIB.

ADVANTAGES

1. All the Nordic nations have committed to ambitious climate targets.
2. A Nordic brand would have a larger recognition effect internationally, since “Nordic technology” and “Nordic know-how” have a wide reach.
3. Internationalization of climate technology and knowhow is critical to reach climate targets.
4. Combined, the Nordics have deeper knowledge within a broader specter than any of the nations hold individually.
5. Norway’s neighbors have know-ledge and strong track records within business development and innovation.
6. The Nordic countries face many of the same challenges related to raising private capital in the valley of death.
7. The combined population of nearly 27 million people increases the chances that relevant expertise and innovative projects are available in the GIB’s immediate network.
8. Nordic investment institutions already have significant experience in international communities.

DISADVANTAGES

1. Challenges related to tailoring NGIB to national priorities and ambitions.
2. Different motivations for commitment and various degrees of dedication may occur.
3. The time frame before the GIB could be established might take too long due to extended political processes.
4. Tensions might arise when attempting to split returns and benefits fairly. Which country should get how much of the weight divided on economic returns, jobs, domestic projects or participation of national industry clusters in international contracts?
5. The Nordic Banks could perceive the new GIB as a competitor.

PART 5

RECOMMENDATION



CHOSEN SCENARIO

Due to the urgency of climate change and the pressing need to shift Norwegian economy and industry towards sustainability, the recommended scenario is number two: A Norwegian Green Investment Bank that realizes high-potential innovations internationally. The approach is recommended to be a combined mandate to spark and facilitate promising innovations, and to scale up proven technological solutions. Even though the affiliation may be Norwegian, the GIB is recommended to initiate strong Nordic collaboration through partnerships on a city, company and project level. In this way, the speed of establishment and implementation of sustainability investments will probably be faster. The GIB would be flexible to ensure that Norwegian interests are maintained, but stands freely to drive for Nordic collaboration through a more pragmatic approach than the formalities of a joint financial institution.

Communication toolbox

The GIB is recommended to consider using the following toolbox for communication to include ESG factors in its investment decisions:

- The Statement of Significant Audiences and Materiality
- Sustainability Accounting Standards Board (SASB)
- Sustainable Value Matrix
- Integrated Reporting
- Climate-related Financial Disclosures framework, to be launched by the end of 2016
- CICERO's frameworks on climate-related investments in developing countries and climate adaptation, to be launched by the end of 2016

These initiatives cover the necessary communication both internally and externally. However, the GIB could also consider using sustainability initiatives like UN Global Compact, UN PRI, CDP, the Equator Principles and GRI to be present in more established initiatives as well. An overview of these initiatives is provided in the Master's thesis.

Sectors

Based on Norway's resource foundation, economic turnaround and political challenges, the GIB is recommended to prioritize three strategic focus areas:

1. Zero emission transport
2. The transition of the petroleum sector
3. Clean production technologies

To meet these strategic areas, the GIB is recommended to invest in multi-target focus areas. Selected multi-target areas are the following:

- Battery technology and energy storage
- Electrification of the process industry
- Distributed energy systems
- Green shipping
- Floating offshore wind

Additionally, greening of cities and buildings is a very reasonable and advantageous multi-target area. Vegetation reduces the peaks of flooding following heavy precipitation, improves air quality, regulates temperature and promotes social and environmental values. Floating offshore wind is a multi-target area that could be coupled with green shipping and the transition of the petroleum sector, but the opportunity cost of this needs to be thoroughly assessed due to the capital intensive nature of these investments. Technology areas that facilitate multi-target areas are digitization, IT solutions and energy efficiency.

IMPLICATIONS FOR POLICY MAKERS

Policy changes that promote sustainability

A broad range of stakeholders have expressed their impatience for sustainability solutions, both in the Norwegian society and internationally. Norwegian policy makers deserve recognition for the thorough assessments to find pathways for green competitiveness. Now the time has come to act. At the moment, we are no longer the first mover. But, as we learned in England: “The second mouse gets the cheese”. Norwegian politicians hold both the power and the responsibility to provide the necessary instruments to secure the competitiveness of Norwegian industry also in the future. The most efficient means to do this was found to be the following:

- Change governmental mandates and requirements to improve transparency and disclosure of ESG information.
- In the ongoing and future political processes, a unified political community should have the courage to think big, set a firm direction and take decisive steps to finance the green transition.

The government has every reason to do so, whether the arguments are founded in moral, ethical, climate-related or financial perspectives.

Changed mandate of The Sovereign Wealth Fund

The Norwegian Ministry of Finance, acting as principal for the sovereign wealth fund SPU, should be acknowledged for a conservative approach to ensure the continuous growth of the Norwegian economy. However, the Norwegian industry currently faces challenges that demand carefully calculated boldness and the ability to drive the economy towards sustainability. SPU is already a pioneer among global Sovereign Wealth Funds (SWFs) in sustainability in asset

management (see fact box). This means that the fund’s actions and alternatively the lack of actions is followed closely by institutional investors worldwide.

SPU: AN INTERNATIONAL SUSTAINABILITY PIONEER

In the report Finance Supporting the transition to a global green economy, UNEP identified the need for more support to help SWFs to incorporate climate risk considerations directly and systematically into their actual stock selection and portfolio construction processes. SPU was highlighted in UNEP’s report as a stellar example in this field: “The fund is a universal owner with a long investment horizon, and inherently has a clear financial interest in companies taking good corporate governance and environmental and social issues duly into account. Fiduciary responsibility for the fund also includes safeguarding widely shared ethical values. In the area of environmental issues, including climate change mitigation and adaptation, the fund employs the following tools: Research, an environmental investment programme and dialogue with companies.”

Source: UNEP (2011, p. 620)

Policy changes that promote sustainability

A broad range of stakeholders have expressed their Norges Bank, through its asset management department Norges Bank Investment Management (NBIM), has become increasingly active to address sustainability issues. However, there is only so much the fund managers can do if the performance measurement is only financially grounded.

“Active ownership considering climate risk, transition risk and unsustainable business models is not currently within our mandate. Politicians need to give us a new mandate if we should include this in our operations. The society needs to make this decision, not us.”

- Yngve Slyngstad, CEO Norges Bank

Consequences of a changed mandate could entail permission to open up for investments in renewables through unlisted infrastructure, making ESG metrics an integrative part of investment decisions and promote active inclusion of sustainable projects or companies in the asset portfolio. Both Norges Bank and an independent expert panel selected by the Ministry of Finance recommended that SPU should be allowed to invest in unlisted infrastructure. The GIB could mitigate the regulatory and political risks associated with such investments, while SPU could provide the long-term financial muscles required to make a large impact on sustainability investments globally. Such partnerships have worked well for SPU before, for instance through collaboration with The Crown Estate when making investments in property like Regent Street in London. As investment partners, the GIB and SPU could become important drivers for green competitiveness in Norwegian industry. Another approach could be to expand the transparency index for Sovereign Wealth Funds to also include ESG values (see appendix C).

Active ownership in state companies

As a majority owner in many large companies and entities, the Norwegian government could set more specific requirements that contribute to disclosure of ESG data. Transparency and ESG disclosure based on materiality is a recommended approach, since this will avoid waste of both financial and human resources. For institutional investors this could entail active ownership through clear expectations related to ESG metrics, divestment from carbon intensive firms and

REFLECTIONS AROUND SPU'S MANDATE

The current mandate of SPU is the following:

SPU safeguards and develops financial values for future generations.

With this formulation of the mandate, the social and environmental considerations are not explicitly incorporated. To truly account for sustainability in their investment practise, we propose that ESG is more explicitly articulated in an alternative mandate. The following suggestion builds on current definitions of sustainable development:

SPU safeguards and develops financial values for future generations within the planetary boundaries.

active inclusion of best-ranked sustainability firms. Sufficiently large scale and systematic inclusion of firms with the best financial and ESG performance will contribute to catalyze the green transition of industry. For firms, simple communication tools like The Statement of Significant Audiences and Materiality or a Sustainable Value Matrix could make a huge difference for sustainability investors. All relevant entities could also be encouraged to implement state of the art frameworks for ESG inclusion, both referring to tools available today and the soon-to-arrive Climate-related Financial Disclosures and CICERO's two guidelines. When both investors, firms and intermediaries adopt sustainability integrated in business, the shift towards sustainability will undoubtedly speed up.-

SPOTLIGHT: STOREBRAND

The Norwegian pension fund is a global sustainability leader. With their practice to include ESG evaluation in asset management, sustainability has simply become a natural part of decision-making.

KEY FACTS

Company name: Storebrand
Year established: 1767
Industry: Pension fund
Location: Oslo

“Why do financiers only talk about sustainability as exclusion of companies?”

- Philip Ripman, Sustainability Analyst

BEST PRACTICE: A UNIQUE APPROACH TO SUSTAINABILITY INVESTING

Storebrand is the second largest asset manager in Norway, second to the State Pension Fund, and has 570 billion NOK in its portfolios. For Storebrand, ESG is not something to be evaluated in a separate analysis – rather it is an integral part of everything they do. Storebrand's approach covers three main activities:

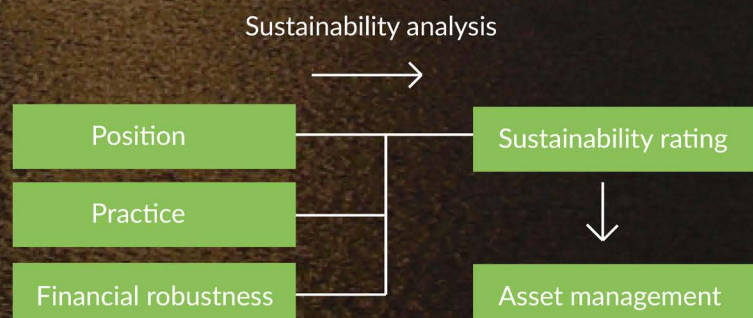
Exclusion: In 2013, Storebrand was one of the first financial institutions to reduce their exposure in coal. But exclusion is not new to Storebrand, as the company has actively been doing this for over eight years. Up until now, 35 companies have been excluded on the basis of having a poor sustainability ranking.

Active inclusion: In order to be able to invest in the best companies, three main criteria is used to evaluate the companies. A lot of time is spent to evaluate how companies are positioned for the challenges of tomorrow. How will the company meet global megatrends such as climate change and new policy regimes? Together with KPIs for internal practice and financial performance, all 2500+ companies are given “snapshots” of their overall sustainability in the context of their sector.

Sustainability ratings: Based on the methods to assess and make sustainability snapshot, Storebrand rate all companies within given sectors. All funds are then ranked accordingly, on a scale from 1 to 10 where 10 is the highest rank.

“Firms that hold the highest rank incorporate sustainability in their strategies with a long-term perspective. The analysis has to be forward-looking, not backward-looking. We want the companies that are set for the future.”

- Philip Ripman, Sustainability Analyst



IMPLICATIONS FOR INDUSTRY

Industrial actors need to take a lead in material transparency and disclosure of ESG metrics. For firms, simple communication tools like The Statement of Significant Audiences and Materiality or a Sustainable Value Matrix could make a huge difference for sustainability investors. This could of course be beneficial from a financial point of view, given that investors also adopt the habit of valuing financial and ESG performance. More importantly, it is only industry that has the means to scale up and innovate the necessary solutions that are needed to create a sustainable future. Private investors have to take responsibility and integrate ESG metrics in investment decisions, as a natural part of financial analysis. Moreover, with the financial support of a GIB, companies need to aim for business model transformations and market creating innovations for sustainability.

CONCLUDING REMARKS

Norway has the opportunity to embark on a new business adventure that may only occur once every millennium. We have the chance to make a significant positive impact and reinforce economic growth in the process. Through innovative business models and sound governance, Norwegian business could contribute to transform societies worldwide for the better, both financially, socially and environmentally. A Norwegian Green Investment Bank could become a pragmatic game-changer for green competitiveness. We have the chance to re-think business. Not because we have to, but because it's the right thing to do.

“Norway should reclaim the position as a sustainability pioneer. Small countries can make a huge difference, all we need is a prudent strategy”

- Asbjørn Torvanger, Senior
researcher within climate finance, CICERO

REFERENCES

Argentum, Argentum in brief, <http://www.argentum.no/en/argentum/>, accessed 26.04.16

Australian Conservation Foundation, THE CLEAN ENERGY FINANCE CORPORATION - HELPING AUSTRALIA COMPETE IN THE RENEWABLE ENERGY RACE, available at https://www.acfonline.org.au/sites/default/files/resources/ACF_CEFC_HelpingAustraliaCompete.pdf

Clean Energy Finance Corporation - CEFC (2015), Annual Report 2015, p 67 http://annualreport2015.cleanenergyfinancecorp.com.au/media/1100/cefc-annual_report_2014-15.pdf, accessed 27.05.16

CEFC (2016), Clean Energy Innovation Fund - CEIF, available at <https://www.cleanenergyfinancecorp.com.au/investments/major-programs/clean-energy-innovation-fund-ceif.aspx>, accessed 27.05.16

CICERO (2016), CICERO Climate Finance, available at <http://cicero.uio.no/en/cicero-climate-finance>, accessed 20.05.16

Cities for the Climate (2015), The Climate Summit for Local Leaders is a Historic Convening of Local Leaders Fighting Climate Change, available at <http://climatesummitlocalleaders.paris/>, accessed 12.05.16

Clean Energy Finance Forum (2016), Green Bank Network Aims for Global Clean Energy Investment, available at <http://cleanenergyfinanceforum.com/2016/01/04/green-bank-network-aims-for-global-clean-energy-investment>, accessed 08.05.16

Coalition of Green Capital (2015), Creating State Financing Tools to Make Clean Energy Markets Grow Quickly, presentation by CEO Reed Hundt, p. 16, http://www.coalitionforgreencapital.com/uploads/2/5/3/6/2536821/cgc_-_summary_presentation_may_2015.pdf, accessed 10.05.16

Connecticut Green Bank (2016), Sparking a green movement, <http://ctgreenbank.com/about-us/sparking-green-energy-movement/>, accessed 27.05.16

Energi og klima (2016), Mye godt om Norden, <http://energiogklima.no/blogg/bjartnes/mye-godt-om-norden/>, accessed 27.05.16

Enova, Our history and mission, <http://www.enova.no/about-enova/about-enova/259/0/>, accessed 26.04.16

Environmental Finance (2016), Norges Bank gives boost to Exxon and Chevron climate change resolutions, available at <https://www.environmental-finance.com/content/news/norges-bank-gives-boost-to-exxon-and-chevron-climate-change-resolutions.html>, accessed 07.05.16

Financial Stability Board (2016), FSB Chair launches the Task Force on Climate-related Financial Disclosures at the time of the Paris COP21 Climate Change Conference, <http://www.fsb.org/multimedia/fsb-chair-launches-the-task-force-on-climate-related-financial-disclosures-at-the-paris-cop21-climate-change-conference/>, accessed 06.03.16

GIEK, Om GIEK, http://www.giek.no/om_giek, accessed 26.04.16

GreenTech Malaysia (2015), Annual report 2014, available at <http://oursphere.greentech-malaysia.my/wp-content/uploads/2015/09/MGTC-AR.2014-single-2015.06.08.pdf>, accessed 27.05.16

Executive Office of the President (2013), The President's Climate Action Plan, available at <https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>, accessed 06.05.16

Innovasjon Norge (2015), #Drømmeløftet, <http://www.xn--drmmelftet-1cbe.no/wp-content/uploads/2015/05/Dr%C3%B8mmel%C3%B8ftet-hovedrapport-f%C3%B8rsteutgaven.pdf>, accessed 26.04.16

Innovasjon Norge (2016), Skaper effekter i grønt gründerår, <http://www.innovasjonnorge.no/no/Nyheter/skaper-effekter-i-gront-grunderar/#.Vx9SQNSL-SUk>, accessed 26.04.16

Innovasjon Norge, New Innovation Norway program can open urban billion market, <http://www.innovasjonnorge.no/en/start-page/our-services/sustainability/new-innovation-norway-program-can-open-urban-billion-market/>, accessed 26.04.16

International Maritime Organization - IMO (2014): Third IMO GHG Study 2014, available at <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx>, accessed 28.05.16

Intpow, About us, <http://www.intpow.no/?id=19>, accessed 26.04.16

Intsok (2016), Who we are and what we do, file:///C:/Users/synnemp/Downloads/WhoWeAre_201603b.pdf, accessed 26.04.16
Investinor, Om oss, <http://www.investinor.no/om-oss/>, accessed 26.04.16

Investinor (2015), Investeringer er ikke støtte, <http://www.investinor.no/investeringer-er-ikke-stotte/>, accessed 26.04.16

Lov <https://siva.no/om-oss/data> (2015), Kongeriket Norges Grunnlov, https://lov-data.no/dokument/NL/lov/1814-05-17/KAPITTEL_6#KAPITTEL_6, accessed 23.04.16

Ministry of trade, industries and fisheries (2015), Gode ideer – fremtidens arbeidsplasser, Regjeringens gründerplan, https://www.regjeringen.no/contentassets/05f1305cb2a94a379ff48c2f2c60d688/grunderplan_2015.pdf, accessed 26.04.16

Menon Business Economics (2016), Utredning om insentiver/ordninger for risikoavlastning for innovative offentlige anskaffelser, available at <https://www.regjeringen.no/contentassets/88e84da4dfaa4b1489efdf6452647100/rapport---utredning-om-insentiverordninger-for-risikoavlastning-for-innovative-offentlige-anskaffelser-22-feb-2016.pdf>, accessed 08.05.16

Masdar (2016), About Masdar Capital, available at <http://www.masdar.ae/en/investment/detail/masdar-capital1>, accessed 27.05.16

NEFCO (2016), Building bridges to the future

Climate financing for a low carbon tomorrow, available at http://www.nefco.org/sites/nefco.org/files/pdf-files/nefco2016_climatereport_lo-res.pdf.pdf, accessed 28.05.16

NEFCO (2016), A Nordic perspective on Green growth - Nordic solutions as catalysts for global change, available at http://www.nefco.org/sites/nefco.org/files/pdf-files/nefco2016_green-growth_lores.pdf.pdf, accessed 28.05.16

NHO & LO (2015), Konkurranseskraft i lavutslippssamfunnet, http://www.lo.no/Documents/Klima_og_energi/LavutslippWEB1.pdf, accessed 19.04.16

NHO & LO (2015), Klimapolitikk for utslippsreduksjoner og næringsutvikling, <https://www.nho.no/siteassets/nhos-filer-og-bilder/klimapolitikk-for-utslippsreduksjoner-og-naringsutvikling---innspill-fra-lo-og-nho.pdf>, accessed 19.04.16

Norad, About Norad, <https://www.norad.no/en/front/about-norad/>, accessed 26.04.16

Nordic Energy Research and IEA (2016), Nordic Energy Technology Perspectives 2016, available at <http://www.nordicenergy.org/wp-content/uploads/2016/04/Nordic-Energy-Technology-Perspectives-2016.pdf>

Norfund, About Norfund, <http://www.norfund.no/about-norfund/category296.html>, accessed 26.04.16

New Jersey ERB (2014), NJ Energy Resilience Bank Now Accepting Applications, http://www.state.nj.us/bpu/newsroom/announcements/pdf/20141020_erb_press.pdf

NY Green Bank (2016), Investment strategy, <http://greenbank.ny.gov/Approach/Investment-Strategy>, accessed 27.05.16

OECD (2015), OECD Green Investment Bank Workshop, available at <http://www.oecd.org/environment/cc/2015-oecd-green-investment-bank-workshop.htm>, accessed 10.05.16

OECD (2015), Green Investment Banks - Policy Perspectives, available at <https://issuu.com/oecd.publishing/docs/green-investment-banks-policy-persp?e=3055080/31715374>, accessed 10.05.16

RE100 (2016), The world's most influential companies, committed to 100% renewable power, available at <http://there100.org/re100>, accessed 28.05.16

Regjeringen (2016), virkemiddelapparatet, <https://www.regjeringen.no/no/tema/utenriks-saker/naringslivssamarbeid-i-utlandet/innsikt/virkemiddelapparatet/id2076241/>, accessed 26.04.16

Rhode Island Infrastructure Bank (2016), About, available at <http://www.ricwfa.com/about/about-ricwfa/>, accessed 27.05.16

Regjeringen (2016), Evaluering av virkemiddelapparatet for kommersialisering av offentlig finansiert forskning, <https://www.regjeringen.no/no/dokumenter/evaluering-av-virkemiddelapparatet-for-kommersialisering-av-offentlig-finansiert-forskning/id2481571/>, accessed 19.04.16

Regjeringen (2016), Mandat for et utvalg som skal utrede en strategi for grønn konkurransekraft, https://www.regjeringen.no/contentassets/6adb905ccac94bf6a5997f01101bf22f/mandat_ekspertutvalg_gronn_konkurransekraft.pdf, accessed 01.02.16

Regjeringen (2016), Utfasing av petroleumssubsidier, <https://www.regjeringen.no/no/aktuelt/dokument-821-s-2015-2016-utfasing-av-petroleumssubsidier/id2471785/>

Regjeringen ved Finansdepartementet (2016), Prop. 122 S (2015–2016) Proposisjon til Stortinget (forslag til stortingsvedtak: Tilleggsbevillinger og omprioriteringer i statsbudsjettet 2016, p 179-183, 3.1 «Fornybar AS», available at <https://www.regjeringen.no/contentassets/03be56dc813846fba4aef590170eb3ea/no/pdfs/prp201520160122000dddpdfs.pdf>, accessed 11.05.16

Rodríguez et al. (2015), Renewable Energy Policies and Private Sector Investment: Evidence from Financial Microdata,

Ruter, Jernbaneverket and Statens vegvesen (2015), KVVU Oslo-Navet: Fra NAV til Nettverk, Konseptvalgutredning for økt transportkapasitet inn mot og gjennom Oslo

Kortversjon, available at <http://www.jernbaneverket.no/kvuoslonavet>, sccessed 08.05.16

South African Green Fund (2016), Types of funding, <http://www.sagreenfund.org.za/wordpress/types-of-funding/>, accessed 27.05.16

Task Force on Climate-related Financial Disclosures - TCFD (2016), Phase I Report of the Task Force on Climate-Related Financial Disclosures, available at https://www.fsb-tcf.org/wp-content/uploads/2016/03/Phase_I_Report_v15.pdf, accessed 07.05.16

Technology Fund (2016), Advantages, <http://www.technologyfund.ch/loan-guarantees/advantages/>, accessed 27.05.16

The Crown Estate, How we work, <http://www.thecrownestate.co.uk/who-we-are/how-we-work/>, accessed 09.05.16

The Green Finance Organization (2016), available at <http://greenfinance.jp/green/>, accessed 27.05.16

Task Force on Climate-related Financial Disclosures - TCFD (2016), Mission, available at

<https://www.fsb-tcfd.org/>, accessed 07.05.16

The South Pole Group, Our Impacts by the Numbers, available at <http://www.thesouthpolegroup.com/why-spg>, accessed 02.06.16

Thompson Reuters (2016), Arabesque: A Tesla of finance, <http://reports.thomsonreuters.com/susty7/investors/quantifying-sustainable-investment>, accessed 18.05.16

Thompson Reuters (2016), Sustainable investments can meet, and sometimes beat, the market over the long term, available at <http://reports.thomsonreuters.com/susty7/investors/esg-financial-performance>, accessed 18.05.16

UNEP FI (2011), Universal Ownership: Why environmental externalities matter to institutional investors, http://www.unepfi.org/fileadmin/documents/universal_ownership_full.pdf, accessed 29.05.16

UNEP (2011), Finance Supporting the transition to a global green economy, available at http://www.unep.org/french/greeneconomy/Portals/88/documents/ger/15.0_Finance.pdf, accessed 02.05.16

Siva, Om oss, <https://siva.no/om-oss/>, accessed 26.04.16

Sovereign Wealth Fund Institute - SWFI (2016), Sovereign Wealth Fund Rankings, available at <http://www.swfinstitute.org/sovereign-wealth-fund-rankings/>, 07.05.12

Sovereign Wealth Fund Institute - SWFI (2016), Linaburg-Maduell Transparency Index, <http://www.swfinstitute.org/statistics-research/linaburg-maduell-transparency-index/>, accessed 07.05.16

Storebrand (2016), Alle våre fond, <https://www.storebrand.no/privat/sparing/fondsliste-alle->

[vare-fond](https://www.storebrand.no/privat/sparing/fondsliste-alle-vare-fond), accessed 07.05.16

Technology Fund (2016), Advantages, <http://www.technologyfund.ch/loan-guarantees/advantages/>, accessed 27.05.16

The Research Council of Norway (2015), Research for Innovation and Sustainability: Strategy for the Research Council of Norway 2015-2020, Edition 300.

Telemarksavisa (2014), Herøya-magnesium avhengig av Hydro, <http://www.ta.no/nyheter/heroya-magnesium-avhengig-av-hydro/s/1-111-7546699>, accessed 19.04.16

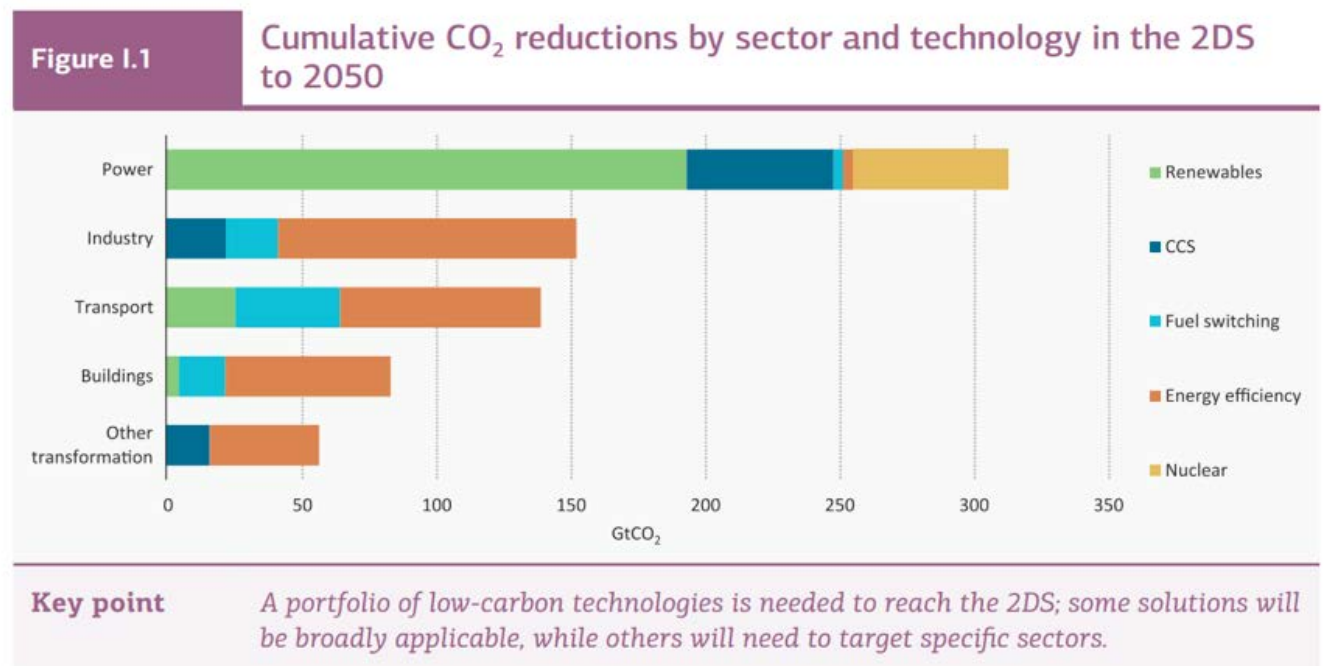
U.S. Department of Energy (2015), Energy Investment Partnerships: How State and Local Governments Are Engaging Private Capital to Drive Clean Energy Investment, available at <http://energy.gov/sites/prod/files/2016/01/f28/Energy%20Investment%20Partnerships.pdf>, accessed 27.05.16

Zuckerman, J., Frejova, J., Granoff, I., and Nelson, D., (2016). Investing at Least a Trillion Dollars a Year in Clean Energy. Contributing paper for Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate. New Climate Economy, London and Washington, DC. Available at: <http://newclimateeconomy.report/misc/working-papers>.

APPENDIX A

GLOBAL NEED FOR CO₂ REDUCTIONS TO MEET TWO-DEGREE TARGET

IEA's assessment of CO₂ emissions reduction by key sectors and technologies.



Potential multi-target areas

The common denominator for all these sectors are major business opportunities, a large international market and a potential for comprehensive emission reductions both nationally and internationally. To establish business activity and value creation connected to the described sectors, investments slightly higher than the “base case” requirements need to be made. However, these investments do not have to detail direct public subsidies or grants, but adjustments in public procurement and regulations that facilitate the attraction of private capital.

Distributed energy and storage systems

Norway’s geographically scattered population, beautiful nature and strong resistance towards “Monster power masts” makes the country an ideal test lab for distributed energy. According to the empirical analysis, most research on the low carbon society is actually based on the assumption of a centralized energy system like we have today. This needs to change if innovations are to be developed. Silicon solar cells perform best at low temperatures, and creating a home market for solar energy would benefit the Norwegian solar industry. Connecting this with smart grid systems, ICT products and energy storage, Norway has the potential to build an industry tai-

lored for immense global market opportunities. A financing mechanism coupled with distributed energy technology from Norway could rapidly lower financial barriers and achieve technology transfer to communities without energy access.

- Synergies with IT solutions, clean energy production, smart grid, transport.

EXAMPLE: BATTERY STORAGE SYSTEM BY STATKRAFT

Energy storage is considered a main barrier for the transition to a low carbon society. With an increased mix of renewables, two things happen: Unpredictable energy supply and frequency variations. To maintain stable energy delivery, the grid needs to be balanced correctly through energy storage. Norway covers the base load with clean hydro power, so few countries have better prerequisites for experimenting with distributed energy storage coupled with renewables. This has been a major problem in Germany, which has been forced to cover the base load with coal. Bloomberg New Energy Finance estimated need for mid and long term energy storage to be 858 GW by 2040. The currently dominating technology is lithium ion batteries, but solutions such as hydrogen also hold potential.

Location: Dörverden, Niedersachsen, Germany
Invested: 37 mill NOK for 3 MW balance capacity
Potential market: Global and national
Reduced GHG emissions: Globally and nationally

Source: http://syslagronn.no/2016/05/02/syslagronn/sterkt-vekst-for-batterilagring-av-energi_85350/

oped pilot projects ready to be commercialized. Investments in the Ocean Space Centre, Norwegian Centres of Excellence and the green shipping program Grønt kystfartsprogram (GKP) are examples of major investments already made. Specific examples of project in need of large scale financing is the hybrid/ battery cargo ship developed through NCE Maritime Clean Tech, the five pilot projects developed through Grønt Kystfartsprogram.

- Synergies with: The petroleum sector, aquaculture, international trade.

Green shipping

Findings indicate that Norway should electrify the shipping fleet and ferries, build on the existing competence and internationalize the industry. Significant efforts have already devel-

ZERO MARITIME RESEARCH CENTRE

36 companies and ten research institutions constitute the research cluster of the proposed Zero Maritime Research Centre, which will develop low and zero emission maritime transport solutions. Zero Maritime applied to become one of the Research Council's research centres for renewable energy (FME) this year, but the 180 million NOK application did not get funding. There is unison consensus of the business potential and emission savings this industry cluster could provide, and the involved actors now look for other sources of funding.

The GIB could provide the capital and long term perspective necessary to realize the centre. 36 bedrifter og 10 forskningsinstitusjoner har gått sammen om initiativet Zero Maritime. An example of a concept that is part of the centre is Short Sea Pioneer:

Short Sea Pioneer (maritime) by NCE Maritime Clean Tech

A hybrid mother cargo ship with an electric module based daughter vessel reduces the need of large ports and optimizes transport of goods at sea. The innovative solution will move a substantial amount of heavy transport off the roads and reduce emissions in the transport sector. Examples of national customers are the Norwegian towns with an export driven industry and too small ports, such as Svelgen, Førde, Kalvåg, Ullensvang, Odda, Sauda, Ålvik and Ekornes. Location: Haugesund
Potential market: Global and national
Reduced GHG emissions: Globally and nationally
Economical savings for shipping firms: 15%
Largest challenge: Financing of the pilot
Work places: Unknown, but involves ship building and supply industries.
Central firms: Elkem, NCL

Sources TU, Sysla Grønn

Floating offshore wind

The immense investments required to bring down emissions in the petroleum sector could, as pointed out by DNV GL, be combined with floating offshore wind turbines. The price of electricity offshore is extremely much larger than onshore, also on the Norwegian shelf. Instead of electrifying offshore installations with land based electricity, the business policy perspective argues that floating offshore wind parks could create larger societal value, especially if connected with Norwegian green supply ships. Statoil and Statkraft have already invested in large scale offshore wind. The government's withdrawal of funds from Statkraft in 2015 ended the firm's involvement in Dudgeon, but Statoil has had the flexibility to invest further in offshore wind and has tested the business case for floating offshore wind through Hywind. To emphasize the need to be clear on system boundaries, the regulations on offshore wind in Norway has largely been performed on an energy policy basis, not an industry policy basis. Floating offshore wind is a fairly unexplored field, but Statoil has taken major steps forward to make the projects become a reality.

- Synergies with: Transition of the petroleum sector, green shipping, international technology export

WIN-WIN: WIND POWERED WATER INJECTION BY DNV GL

Wind and petroleum engineers have modeled a system for the use of wind energy to drive water injection on the Norwegian shelf. This will lead to increased income through enhanced oil recovery, while developing and reducing the price of cutting edge renewable technologies and simultaneously cut GHG emissions.

Investment costs: 690 mill NOK, annual operation and maintenance costs 40 mill NOK

Potential work places: Substantial. Petroleum, supply vessel and wind industries

Lifetime: 20 years

Savings for oil companies: 30-40% over 20 years

Potential market: Global and national

Reduced GHG emissions: Globally and nationally

Building on already dedicated investments:

Statoil, Statkraft and DNV GL have track records in offshore wind

Source: <https://www.dnvgl.com/energy/feature-articles/win-win-wind-powered-water-injection.html>
<http://www.tu.no/artikler/snart-kan-oljeselskapene-fa-strom-fra-flytende-havvind-kan-spare-3-dollar-fatet/34695>

Electrification and energy efficiency

Electrification of the society could become a key to reduce emissions quickly, especially within the target sectors petroleum, transport and process industry. To tailor the society to future needs, large scale investments in smart grids, energy storage, distributed energy and necessary grid capacity are necessary. Innovations and new business models are necessary to commercialize electrification.

- Synergies with offshore wind, low emission transport, clean production, smart grid, distributed energy

CHARGEABLE HYBRID BUSES IN OSLO, VOLVO/ SIEMENS/ RUTER

The necessary investments in public transport in Oslo and Akershus is estimated by Jernbaneverket, Ruter and Statens Vegvesen to 70-80 billion NOK (KVV Oslo-Navet, 2015)

Lifetime of buses: 10-20 years

Emission reduction, compared to 2014: 264 tonnes NOx, 1,9 tonnes PM10

Increased energy efficiency: 3-4 times

Savings over 10 years, compared to diesel: 750 million NOK

Proof of concept: Hamburg, Stockholm and Göteborg

Time frame: 51/64 bus lines are suitable for immediate electrification

Source: Best økonomi og luftkvalitet med elbuss - en studie om miljøvennlige og lønnsomme bussløsninger for Oslo (2016)

Hydrogen production

“Hvordan kan vi subsidiere norske arbeidsplasser? Hvordan kan Norge tjene på det grønne skiftet? Vi har en prosessindustri, Hydro, Aker, Kværner og Elkem. De burde gått sammen og satset på hydrogenproduksjon” (Øystein Spetalen - C). “Instead of electrification of the trains on Nordlandsbanen, we could replace diesel with hydrogen and set up a hydrogen station in each end? It won't be electricity, but hydrogen that becomes the business that drives green jobs and value creation” (Oluf Ulseth - C).

Low carbon process industry

Many of the great locomotives in Norwegian economy operate in the process industry. Instead of using energy abundance for export, it could be used to electrify energy intensive industry and strengthen the competitive advantage of high tech production. Cheap and renewable electricity is a major competitive advantage for Norwegian firms. In this regard, larger focus should be put on the low carbon footprint in Norwegian products. Smart clean production systems could

be developed and tailored to fit the needs of both established and new businesses.

EXAMPLE: SERENITY CAPITAL/ SILMAG MAGNESIUM PRODUCTION

16 years ago, Norsk Hydro closed magnesium production at Herøya. Scottish investor Allan MacDonald wishes to reopen it. The site could potentially offer magnesium with the world's lowest carbon footprint. Comparatively, China completely dominates the world's magnesium production, with 4000 of the world's 5960 thousand tonnes (<http://minerals.usgs.gov/minerals/pubs/commodity/magnesium/mcs-2014-mgcom.pdf>).

Location: Herøya industrial park

Total costs: 4,9 billion NOK

Already committed resources: German authorities provided 3 billion NOK in loan guarantees, private investments, Enova commitment

Potential work places: 300 direct and 700 indirect

Investment needs: Loan guarantees. Has not proceeded due to lack of the last equity capital.

Potential market: Global and national

Reduced GHG emissions: Globally and nationally

- Synergies with circular economy, clean energy production, distributed energy

Aquaculture

The currently second most profitable Norwegian export industry is important for value creation. Large investments have already been made to solve the environmental issues related to "lakselus", and conceptual offshore fish farms have been established. When planning new sites for fish farming, necessary research and development could be executed with green supply vessels and clean energy from floating offshore wind farms.

- Synergies with green shipping/ supply vessels, offshore wind.

Digitalization and IT solutions

Norwegian citizens are known for being early adopters of new technology. Implementation of new apps, smartphone sensors, electricity monitoring devices and energy storage solutions could therefore be tested and validated rapidly before commercializing and scaling the solutions internationally. Big data analysis coupled with sensors, tracking and monitoring could provide valuable information on consumer needs and behavior. Visualization of the most sustainable choices would be a valuable opportunity to understand consumer behavior.

- Synergies with smart grids, distributed energy, new consumer behavior

Greening of cities

Integrating nature in urban areas is one of the cheapest and most efficient climate mitigation measures. Abundance of vegetation in and around cities reduces the peaks of heavy rainfall, which reduces flooding due to under dimensioned wastewater treatment capacity. In addition to the health and wellbeing of citizens, greening of cities also provide natural carbon sinks and reduces the particulate matter. Greening of Regent Street, which happens to be owned by the Norwegian state through Norges Bank, is according to property manager The Crown Estate one of the first projects to be realized. The Crown Estate works "to make sure that the land and property we invest in and manage are sustainably worked, developed and enjoyed to deliver the best value over the long term" (TCE, 2016). With the new mandate of SPU to invest in property, an integrated greening and sustainability plan could perhaps be associated to the responsibility of ownership?

- Synergies with: Climate adaption, wastewater, air pollution

EXAMPLE: THE “WILD WEST END” GREENING PLAN

State owned firms could be drivers for greening of cities in collaboration with private property owners. In the UK, an initiative called the “Wild West End” targets greening of streets, buildings and public squares through public/ private collaboration. The plan will secure climate change mitigation and adaptation in urban areas. “Although the existing parks and green-space network has functioned well for the purposes of amenity and recreation, in future it should be better planned, designed and managed to deliver a range of additional benefits, including mitigating flooding, improving air quality, cooling the urban environment and enhancing biodiversity and ecological resilience.” Mayor of London, London infrastructure plan 2050 (p 41).

Location: London, UK

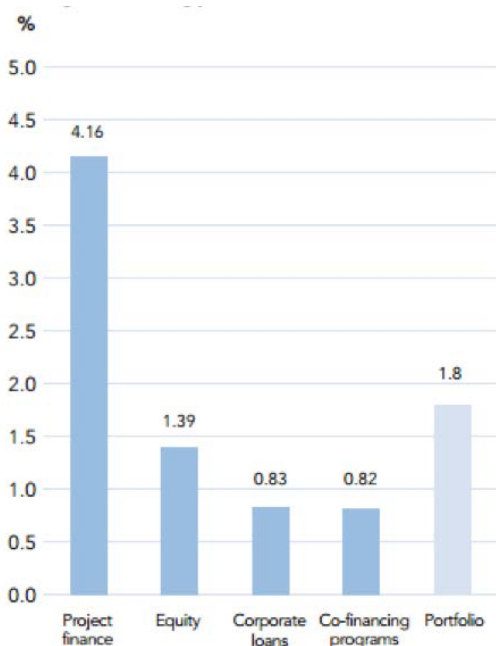
Potential market: National

Reduced GHG emissions: Nationally

Source: London infrastructure plan 2050 - A consultation, Mayor of London
The Crown Estate, <http://www.thecrownestate.co.uk/who-we-are/how-we-work/>

APPENDIX B

Leverage ratios vary depending on the utilized financial instrument. An example from Australia’s Clean Energy Finance Corporation (CEFC) illustrates this in figure X1, where the leverage ratio means the \$ of private sector investment for each \$1 of CEFC investment.



At 30 June 2015 (\$ of private sector investment for each \$1 of CEFC investment)

Figure A1: Leverage by finance type, exemplified by

CEFC at June 30 2015 (CEFC, 2015)

After the CGB launched leasing arrangements and loans to reduce investment costs of solar energy, there was a sharp increase in installed capacity. The amount of subsidies was drastically reduced, while the cost to consumer stabilized. Lower prices of solar panels might have impacted the results somewhat.

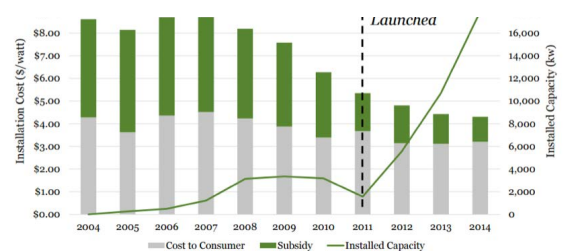


Figure A2: Connecticut Green Bank (CGB) changes grants to loans and expands the solar energy market (Coalition of Green Capital, 2015)

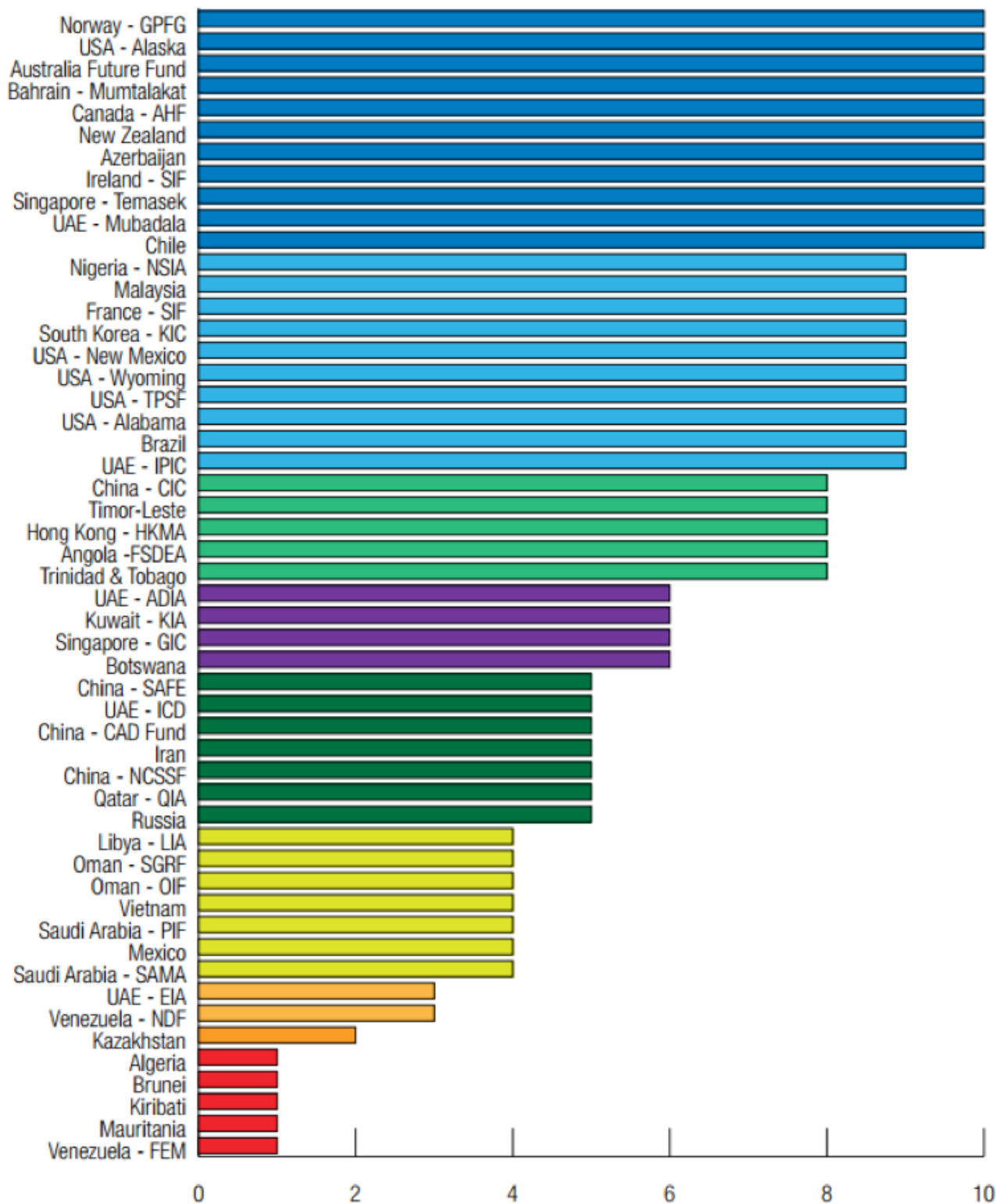
APPENDIX C

Proposal to expand the Transparency Index

The Norwegian Sovereign Wealth Fund rates the top score of 10 on the Linaburg-Maduell Transparency Index, the worldwide method for rating sovereign wealth fund's transparency (SWFI, 2016). The next nine largest pension funds (owned by the UAE, China, Saudi Arabia, Qatar, Singapore and Kuwait) obtain a poor average of 5.8, until the second top rated fund from Singapore is found in place 11. Transparency levels among the largest pension funds could, in other words be significantly improved. To reach the UN's Sustainable Development Goals, we suggest expanding the current Linaburg-Maduell Transparency Index to also incorporate ESG values. Pension funds hold a huge influence on the global economy, and should in principle be drivers for the wellbeing and security of future generations. By increased transparency on ESG values along with financial transparency, pension funds could contribute to finance sustainable development.

Type	Point	Principles of the Linaburg-Maduell Transparency Index
Original	+1	Fund provides history of including reason for creation, origins of wealth and government ownership structure
	+1	Fund provides up-to-date independently audited annual reports
	+1	Fund provides ownership percentage of company holdings, and geographic locations of holdings
	+1	Fund provides total portfolio market value, returns and management compensation
	+1	Fund provides guidelines in reference to ethical standards, investment policies and enforcer of guidelines
	+1	Fund provides clear strategies and objectives
	+1	If applicable, the fund clearly identifies subsidiaries and contact information
	+1	If applicable, the fund identifies external managers
	+1	Fund manages its own website
	+1	Fund provides main office location address and contact information such as telephone and fax
		Top score: 10
Proposed expansion	+1	Fund requires firms in portfolio to disclose ESG metrics
	+1	Fund discloses environmental impact of holdings
	+1	Fund discloses social impact of holdings
	+1	Fund discloses governance issues and suggested improvements
	+1	Fund requires portfolio firms to provide a Statement or Sustainable Value Matrix
		Top score: 15

The principles are originally developed by Carl Linaburg and Michael Maduell for the Sovereign Wealth Fund Institute (2016).



The LMTI transparency rating of the world's largest Sovereign Wealth Funds at 1st quarter in 2016, retrieved from the Sovereign Wealth Fund Institute (2016).

