A study of the dynamics of the Swedish Green Bond Market

From a niched to a mainstream tool for sustainable development

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Master of Science Thesis TRITA-ITM-EX-2019:228
KTH Industrial Engineering and Management
Industrial Management
SE-100 44 STOCKHOLM
En studie om utvecklingen av den Svenska Gröna Obligationsmarknaden
Ett standardverktyg för hållbarhetsutveckling

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Abstract

The phenomenon of climate change is widely recognized and declared as the single most threatening issue of the 21st century (UN Environment, 2018). In this context, the presented study is aligned with scientific research on the domain of sustainable development and sustainability transitions aiming to counterbalance climate change and its impact on this planet as much as possible. This research focuses on Green Bonds as a financial tool to promote this kind of climate-resilient transition. Professionals from the financial sectors of the Swedish Green Bond market were interviewed, reflecting current opinions and strategies of one of the most developed and progressive nations in the world. The goal is to understand the dynamics behind the development of the Green Bond market using the Multi-Level Perspective framework and to find out to what extent these experts view Green Bonds as a tool in the process of sustainability transitions.

The findings firstly point out the role of the different actors of the Green Bond market, describing the interactions between investors, issuers banks, politics and advisors. In addition, the results show that the opinions on drivers and barriers amongst the interviewees and between the interviewees and literature differ somewhat. In particular, greenwashing, lacking transparency and missing standardization are seen by some of the different interviewed stakeholders to be less barriers but rather as opportunities.

In conclusion, this study points out the particular influence that politics, as representant of the strongly environmentally aware people of Sweden, occupy in steering the market’s development and describes its importance as regulatory drivers of Green Bonds as a tool for sustainability transitions and sustainable development.

Keywords

Climate change, green bonds, sustainable development, sustainability transitions, multi-level perspective
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<tr>
<td>12.06.2019</td>
<td>Dr. Kristina Nyström</td>
<td>Dr. Frauke Urban</td>
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**Sammanfattning**

Mänskligheten står inför en global utmaning; att kollektivt bekämpa den mänskligt orsakade klimatförändringen (UN Environment, 2018). Det är från detta sammanhang som denna studie ursprungar, där teorier inom vetenskaplig forskning för området hållbarhetsutveckling och hållbarhet förändringar används för att bekämpa klimatförändringens inverkan. Denna forskning fokuserar särskilt på gröna obligationens roll för en hållbar klimatrelaterad utveckling i det svenska samhället.


Sammanfattningsvis understryker undersökningen politikernas inflytande för att kunna omvandla gröna obligationer från en nisch till en standardprodukt i samhället. Detta påvisar effektiviteten inom den svenska gröna obligationsmarknaden, där hög grad av miljömedvetenhet hos befolkningen blivit representerad i politiken.

**Nyckelord**

Klimatförändring, Gröna obligationer, Hållbarhetsutveckling, Hållbarhetsförändring, Multi-Level Perspective
Acknowledgements

First of all, a particular gratitude is addressed to the thesis supervisor Dr. Frauke Urban from the KTH Royal Institute of Technology of Stockholm, Sweden, who has greatly supported this project with her proficiency and knowledge on the subject of management of sustainability, climate change policies, green finance, and sustainable development. She displayed a great interest in this research topic and has been available for highly appreciated and constructive feedback. She has contributed greatly to the outcome of this study and its overall academic quality as an MSc. degree thesis project.

A great amount of recognition is addressed to all the experts that have participated for interviews for this thesis project. Without their participation, this study could not have been successfully conducted.

Furthermore, a significant gratitude is expressed towards Dr. Mana Farshid, Dr. Terrence Brown and Mr. Gregg Vanourek from the KTH Royal Institute of Technology and the Stockholm School of Entrepreneurship for accompanying us through this Master program of “Entrepreneurship and Innovation Management”.

And eventually, an honest credit is communicated towards the thesis examiner Dr. Kristina Nyström and the discussants for their presence, attention and constructive feedback on this study.
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1. Introduction

1.1 Context

The phenomenon of climate change is widely recognized and declared as the single most threatening issue of the 21st century (UN Environment, 2018). It is the result of high rates of industrial and private carbon dioxide emissions accumulated in the atmosphere, and its impact has already been proven to affect the animal species and plants as well as the environment which will consequently have an impact on humans as well (IPCC, 2014). Rising percentages of greenhouse gases as well as the destruction of natural GHG-sinks by economic activities such as deforestation, play a key role in accelerating climate change and can be correlated to the observed temperature increase from 0.8 to 1.2 degrees Celsius between 1880 and 2017. This anthropogenically induced warming is likely to persist during centuries or millennia (IPCC, 2018). It has come to such a critical point where a sustainable future is unsure if the emission rates remain (Solomon et al., 2009) (Appendix 1). Therefore, a fundamental restructuring of human production and consumption behavior is necessary (Farla et al., 2012). Modern societies lack perspective, instruments, and policies for sustainable and durable development (Hoogma, Kemp, Schot, & Truffer, 2005), especially in key domains such as energy and food production, transportation systems and other prominent industries (Farla et al., 2012). Failure to implement an effective action plan to reverse the current carbon emissions trend will disrupt the planet’s equilibrium and change the life of every species living in the global ecosystem (Parmesan & Yohe, 2003) (Appendix 1).

In order to better assess and mitigate climate change, one fraction of the environmentally centered academic community has directed their focus towards the concept and frameworks of sustainability transitions (Markard, Raven & Truffer, 2012). This domain further analyzes the dynamics between actors in the systems (Farla et al., 2012), as well as factors influencing the transitions, and the role of governance (Smith, Stirling & Berkhout, 2005). The premise takes root in bridging the mismatch of sustainable production and the global consumption infrastructure and has received growing attention from both policymakers and the academic community (Markard, Raven & Truffer, 2012). The significance of scientific understanding of global warming and climate change can best be displayed by the great number of scientific publications that result from the search of those two key terms in major research engines for scientific literature.

To this day, in most countries, the development of the local economy has received far greater focus from policymakers than the protection of the environment. The inconsistency in political incentives can be best illustrated by the United States of America resigning from the Paris Agreement in 2015, announced by the current U.S. President only two years after its implementation (Zhang et al., 2017).

The Paris Agreement in 2015, signed by the member states of the UNFCCC at the 21st Conference of the Parties (COP21) is the latest international cooperation to face climate change since the Kyoto protocol, adopted in 1997. Composed of 195 signing countries, the Paris Agreement constitutes the first legally binding climate compliance agreement carrying the main motive to take collective and immediate actions to halt global warming by reducing the impact of human emissions, more specifically, taking collective action to prevent that the
global mean temperature rises above 2 degrees Celsius in correlation to the pre-industrial temperatures.

Additionally, it aims to achieve a balance between anthropogenic (i.e. human-made) greenhouse gases and natural GHG-sinks to further reduce the net emissions by the second half of the 21st century (UNFCCC, 2019) (Christopher, 2016). Nevertheless, it is estimated that the CO2 goals set for the Paris Agreement do not fulfil the required impact to fully achieve this goal (IPCC, 2018).

Political initiatives such as the Paris Agreement and its externalities are essential drivers for a transition towards a more sustainable future. And while societies are ultimately choosing the transitions, governments can steer these by managing dynamics and regularly adjusting the balance between long-term ambitions and short-term concerns (Rotmans, Kem & van Asselt, 2001). It has been made clear that the financial system has a central role in the major challenge of reducing greenhouse gas emissions globally and can be seen as the proactive catalyst for sustainable development (Millar et al., 2017). Therefore, it is crucial to set new financial frameworks that will lever consistent monetary flow towards environmentally sustainable investments. This kind of funding targets innovation in various technological areas that contribute to the transitions toward more environmentally sustainable developments (UNFCCC, 2019).

There has been a great focus on improving the existential bond market to pivot the financial system in line with the established goals. In tandem with the increased global political attention, the interest in green investments has grown proportionally from all types of investors. This overall interest can be seen by the fellow countries that signed the UN Principles for Responsible Investments, the world’s largest coalition that incentivizes sustainable investments. The number of users has grown at a remarkable pace since the UN PRI started collecting data (UNPRI, 2018). The rising trend in green investments is correlated to the competitive changes in technology, economics and public demand for higher sustainability. Let alone between 2000 and 2010 green investments into renewable energies have increased 20-fold (Eyraud, Clements & Wane, 2013). Despite this attraction, a commonly acknowledged definition of what green exactly represents is missing. Without clearly defined standards, investors of all kinds will face time-consuming impediments and increased transaction costs during the process, which indirectly damages the integrity of green markets, resulting in disinterest among investors (Chatterjee, Fabian & Feller, 2016). As a result, there is a central need for banks and governments to develop standardized ways for investors to productively place investments into certified green projects.

As a result, in 2008, the World Bank issued its first Climate Bond Initiative also referred to as Green Bonds, a financial instrument with a purpose to address this requisite. This incentive intended to provide transparency and issuance verification processes to guarantee that only environmentally sustainable projects take part of this financial product. It is intended to be a tool that helps investors select and effectively allocate funds towards green projects. Green Bonds have shown exponential growth since first launched in 2008. Sweden has further shown to be the leading actor in displaying the Green Bonds’ true potential in most sectors of the European countries (Filkova, Frandon-Martinez, Meng & Rado, 2018). Subsequently, the country is playing a pivotal role in shaping the best practice of this financial instrument. For example, the second largest city of Sweden, Gothenburg, has been awarded for being the most environmentally sustainable city in the world by Brut for the fourth year in a row (Leaper, 2017). This is largely thanks to green investment incentives, like Green Bonds, that ultimately make green projects competitive in its financial market.
Nevertheless, a clear definition of what is to be considered green, in addition to a standardized legal binding political framework needs to be set in the near future. The efficiency and growth of Green Bonds as financial tools against climate change may depend on it.

This paper can be situated as part of the research community centred in sustainable development and sustainability transitions, which will become increasingly vital as humanity restructures its current behaviours to face global challenges. The aim of this research is to evaluate Green Bonds and its growth drivers, barriers, key actors to eventually conclude on its efficiency as a tool for sustainability transitions. This study, therefore, contributes to the understanding of financial tools as drivers for sustainable and climate-resilient development. It can be situated as part of the academic body of knowledge between socio-economics, climate research, and innovation management studies.

For this purpose, expert interviews are conducted with the key stakeholders of the Swedish Green Bond market. Insights from the expert interviews in addition to the conceptual framework and information presented in the literature review are used to evaluate this financial instrument from a socio-psychological point of view, e.g. to determine possible drivers and barriers for growth of the Swedish Green Bond market. This makes it possible to analyse the use of Green Bonds in the context of sustainable development by adopting the Multi-Level Perspective framework presented by Geels (2002), adapted to sustainability transition processes. Eventually, this project is concluded by suggestions for further academic research in this domain derived from the findings of this study.

This study follows one main research question to which two sub-questions are tied.

The research objective of this study is as follows:

“How do key stakeholders perceive the Swedish Green Bonds as a tool for sustainability transitions?”

a. “What are the drivers and barriers to the development of the Green Bond market in Sweden?”

b. “Who are key actors and how do they interact?”

1.2 Research ethics

This study has been established with regards to the ten principles of ethical considerations according to Bryman & Bell (2007).

1.3 Study outline

In section 2 (Conceptual Framework), the conceptual frameworks on which this study is based are introduced and described in detail. These frameworks have been established using relevant scientific and academic literature on the subject of transition processes and are adapted to the area of sustainability transitions in order to be aligned with this research topic.

Section 3 (Literature Review) outlines the academic context of this study. Starting with a quick outline on the threat of climate change, which is further detailed in the Appendix, this section focuses on the evolution of climate-relevant investments since the Kyoto Protocols from 1997
until the implementation of Green Bonds as part of the Climate Bonds Initiative in 2008. Furthermore, it contains a resume of the broader global Green Bond markets development and is concluded with a focus on the Nordic, and more precisely the Swedish Green Bond market.

In section 4 (Methodology), the reasoning behind the methodology for the expert interviews is presented in detail. In order to certify the validity of the procedure for the context of this study, the reasoning is backed with academic literature.

Section 5 (Results) contains the synthesized results from the expert interviews and exposes gained key findings and insights regarding Green Bonds, their market evolution and actors as well as their place in the context of sustainability transitions.

In section 6 (Discussion), the previously presented results are put in the context of this study’s scope, objective and the established academic framework on sustainability transitions. The focus of this section is to analyze the implications of the findings in relation to the stated research questions.

Lastly, in section 7 (Conclusion), a short conclusion for this study is drawn, followed by indications on its limitations. This paper ends with recommendations for policymakers with regard to the findings as well as propositions for a future research project to build upon this work.

1.4 Delimitations

The study focuses on the Nordic, and more precisely the Swedish Green Bond market. The research objective is to receive a high-resolution insight into this particular branch of the market. Therefore, we only interviewed stakeholders and experts within this particular region and market. Nevertheless, an appreciative evaluation of this financial tool cannot be regarded as isolated in one specific area of the global market, which is why this study further provides general information on its development, evolution, market share, etc.

While Green Bonds as a financial tool stand in the center of this study, the intrinsic financial nature of this instrument is not the focus. Its characteristics such as its face value, describing the amount of money issued at maturity, its yield, interest rate, as well as its maturity date, or the date at which the borrowed amount must be repaid to the lenders are not going to be analyzed in depth. In order to comprehensively understand the current state of the green finance and green bond market, their respective evolution is compiled in the literature review section. Nevertheless, there is no further detailed description of other types of green investment tools.

There are numerous studies articulating around different approaches regarding sustainability transitions. This study of Green Bonds in the context of sustainability transitions is mainly centered around the frameworks presented in this report. All results, findings, and conclusions do not aim to be generalized but must, therefore, be considered as isolated and rather specific to the Nordic Green Bond market in 2019.


2. Conceptual framework

In the following section, the conceptual frameworks and definitions that are used during this study are described. Firstly, a short definition of Green Bonds is given, followed by a definition of what Green constitutes according to CICERO. Afterward, the concept of sustainability transitions in the context of sustainable development is defined. Next, the Multi-Level Perspective framework and its associated key concepts are outlined. Subsequently, the relevance of this framework for Green Bonds as a tool for sustainability transition in the respective market is declared.

2.1 Green Bonds

As part of the conceptual framework of this study, the following section aims to in detail examine the definition of Green Bonds. This is essential in order to understand the potential of this financial tool, but also to realize its state of maturity in terms of characteristics, regulations and possible issues that may represent a threat for potential growth.

The definition of green and environmentally friendly varies around the world. In order for an applying project to be qualified as green, it must meet certain parameters that are set by the World Bank to determine the sustainable identity of the project. The definition of what Green Bonds is exactly can be summarized as a “financial investment with environmental and climate-related benefits” (Ehlers & Pecker, 2017). This means that Green Bonds are essentially equal to conventional bonds, but that they are used for investments that promote green development (Bhatia, 2019). A more detailed definition can be extracted for a set of Green Bond guidelines, which are referred to as the Green Bond Principles (GBP) established by the World Bank in 2015. These define Green Bonds as following: “Green Bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or refinance in part or in full new and/or existing eligible Green Projects and which are aligned with the four core components of the GBP”. The four core components used to qualify and establish a project's contribution to reducing global warming as well as ensuring the project’s economic sustainability comprise Use of proceeds, Project Evaluation and Selection, Management of Proceeds and Reporting (ICMA, 2018). Furthermore, in order to be eligible to issue a Green Bond, every green project is examined by the World Bank according to the following criteria: “Eligible Projects may include projects that target (a) mitigation of climate change including investments in low-carbon and clean technology programs, such as energy efficiency and renewable energy programs and projects, i.e. Mitigation Project, or (b) adaptation to climate change, including investments in climate-resilient growth, i.e. Adaptation Projects” (ICMA, 2015). Only once these aspects are fulfilled, the World Bank verifies the Green Bond labeling (The World Bank, 2019).

2.2 Shades of Green

Based on the previously described process that the World Bank follows to evaluate projects that are subject to Green Bond funding, it might appear that the notion of green is strictly binary, i.e. either a project is green, or it is not. Nevertheless, for this study, this notion is seen more as a spectrum following the Shades of Green established by CICERO in 2015 (Lund & Clapp, 2015).

In order to ease the understanding of this spectrum, the different degrees included in the Shapes of the Green methodology are shortly resumed in table 1 hereafter.
Table 1: CICERO Shapes of Green (Lund & Clapp, 2015)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark Green</td>
<td>Projects with a long-term vision for a low carbon and climate-resilient future.</td>
</tr>
<tr>
<td>Medium Green</td>
<td>Projects that aim towards a long-term vision of a carbon and climate-resilient future but needs improvement.</td>
</tr>
<tr>
<td>Light Green</td>
<td>Projects that are environmentally friendly but do not directly align with a long-term vision of a low carbon and climate-resilient future.</td>
</tr>
<tr>
<td>Brown</td>
<td>Projects that do not align at all with a long-term vision of a low carbon and climate-resilient future.</td>
</tr>
</tbody>
</table>

2.3 Sustainable development

The most common definition of sustainable development originates from the 1987 Brundtland Report, also commonly referred to as “Our common future”. This report defines sustainable development as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, Khalid, Agnelli & Al-Athel, 1987). Sustainability is the key behind 2015, the United Nations adopted, 2030 Agenda for Sustainable Development and its universally applying 17 Sustainable Development Goals (SDGs) (United Nations, 2015). Sustainable development covers three different dimensions: ecological, social and economic (Pawłowski, 2008). Transition processes are not dissociable from sustainable development. Therefore, the concept of sustainability transitions has to be taken into account before further elaboration on the linkage between MLP and Green Bonds can be made.

2.3.1 Sustainability transitions

In this paper, sustainability transitions are referred to as processes in which society undergoes fundamental changes in response to social challenges. These transition processes are associated to the recognition of problems resulting from the lock-in between most common practices and system structures that demand and overhaul and long-term change of the latter (Avelino, Grin, Pel & Jhagroe, 2016). Transition processes, in general, are associated with a vast network of different actors, institutions, resources and knowledge management (Markard, Raven & Truffer, 2012), and while politics are seen as an important factor in this kind of transition (Meadowcroft, 2011), there is a particular imbalance between democratic governance and the demand for radical changes associated with sustainability transitions (Avelino, Grin, Pel & Jhagroe, 2016).

2.4 The multi-level perspective

For this study, a framework based on the work from Rip & Kemp (1998) on transition processes in systems is used. This framework called the Multi-Level Perspective (MLP) has been described by Geels in his study entitled “A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies” (2012). The following section outlines a detailed description of the MLP.
Numerous studies have validated the usage of the MLP in the analysis of transition processes in domains such as sustainable housing (Smith et al., 2007), mobility (Nykvist & Whitmarsh, 2008), sanitation, water, and electricity supply (Verbong & Geels, 2007). Based on that, it can be evaluated as an appropriate framework for the analysis of sustainability transitions in correlation to Green Bonds and their market.

The multi-level perspective has been developed in the field of innovation studies such as evolutionary economics, sociology of technology and the so-called neo-institutional theory. Due to this diversity of inputs, the MLP addresses various topics of the previously mentioned domains, such as the concept of technological trajectories, the connection between different actors, such as engineers, policymakers, and consumers as well as their constraints due to beliefs, norms or regulations in the processes of innovation. Thus, it can be used to analyze the interactions between the two core components of transition which are dynamic stability and radical change. The dynamic stability of an existing system is often related to lock-ins, path dependencies, consumer behaviour, and regulations. While change is more commonly incremental and predictable, radical change, generally guided by entrepreneurs, social movements, pioneers and other outsiders to the existing regime, faces numerous struggles. The latter are often related to factors such as mismatches with existing regulations, an important demand of change in the consumer behaviour and lastly price, as their profitability has often not been positively impacted by economics of scale or societal learning curves.

The different levels of the MLP, represented in figure 1 below, grow in intrinsic stability from niches, being the most unstable, to socio-technical landscapes, being the most stable. The hierarchy of this framework can be described as regimes being part of the landscape and niches that can either be found in or outside of the regimes.

![Figure 1: Multiple levels as a nested hierarchy (Geels, 2002, p. 1261)](image)

2.4.1 The levels of MLP

The MLP is based upon three distinct but interacting levels which are niches, socio-technical regimes, and socio-technical landscapes. These three dimensions are described in this section.
2.4.1.1 Niches

Within the framework of the MLP, niches are the spaces in which novelties are seen to emerge. These spaces are for example R&D departments and laboratories, specific projects or niche markets that aim to respond to a certain demand. In these niches, radical innovation is created by actors that deviate from the current regimes aiming to either find a place for their innovation inside the existing regime or trigger a complete change. Thus, niches are representing the least stable level of the MLP and are the key drivers for transition processes as they represent the space where radical innovation is brought up.

2.4.1.2 Socio-technical regimes

In order to be able to have an impact on a socio-technical regime, the novelties emerging from a niche level have to compete with the standards of a well-developed system. These systems are the result of the adaptation of regulations, technologies, user behaviors and other cultural factors which are influenced by the various actors of the system. The socio-technical regime is the space in which these actors interact, bound to structural rules. This kind of limitation, lock-ins and establish paths of their actions and perception results in the fact that innovation on the level of socio-technical regimes is mainly incremental and make this level of the MLP more stable to change compared to niches.

2.4.1.3 Socio-technical landscapes

Socio-technical landscapes are the most stable and structured level of the MLP framework and directly influence the dynamics of the regimes and niches that it is built upon. It can be seen as a space that does not only include tangible entities such as physical structures but also intangible parts such as political and social beliefs, ideologies and concerns as well as media and economic trends. The broad aspect of the stability of the socio-technical landscapes makes it virtually insensitive to the actions of individual actors.

2.4.2 MLP and transition processes

The core notion behind the development and usage of the MLP for the analysis of transition processes in human culture is justified by pointing out that this kind of process is not to be seen as linear but as an interaction on different levels. Its approach is co-evolutionary and systematic as it points out that transition processes are not driven by a single actor but necessitate interaction between multiple different dimensions. An ideal-typical representation of the interaction between the different levels is represented in figure 2 below. While each transition process follows its unique path, the global dynamic results from the interaction between the niche level, where innovations build their internal momentum and changes, at the landscape level resulting in pressure and destabilization at the regime level thus opening opportunities for niche innovations to emerging. This approach is based on the concept of complex dynamics by avoiding the linear, single driver causality effect but rather focusing on multi-dimensional interactions between all respective actors.
The MLP as a framework for the study of transition processes is one of the results of the evolution of innovation studies expressing a need for broader analytical frameworks. A framework that aims to explain the ensemble of considerations that have to be regarded to assess the emergence and success of innovations, such as the transition from the interest in cleaner technology towards a paradigm shift in overall consumption behaviour. While the MLP is considered to satisfy these two aspects and gives the possibility to analyse complex transition processes via a simplified framework, the abstract nature of the MLP should not become a pitfall for counter-productive over-simplification (Smith, Voß & Grin, 2010). It thus has to be pointed out that the MLP approach must not be seen as free of error and does not automatically lead to an adequate response. Nevertheless, it is very well suited to analyze uncertain and complex processes such as transitions.
2.5 MLP, sustainability transitions and Green Bonds

It can be argued that sustainability transitions as an intrinsic part of sustainable development display the three different levels that are explained by the MLP-framework. New innovations that aim to produce and consume in a sustainable way now appear in many different domains such as transport, sustainable housing, and renewable energy. These can be considered as niche level innovations that seek to induce some form of disruption on the regime level. The latter faces pressure from the landscape, meaning new policy guidelines and regulations such as the Paris Agreement and other low-carbon conventions, as well as changing mindsets from consumers looking for a more sustainable and durable way of consumption. These changes, therefore, oblige the actors on the regime level to either adapt through innovation or to give up their place for the entrepreneurs that present the radical innovation to move upwards from the niche level. With regard to the position on Green Bonds within this framework, it is important to point out that these financial instruments represent less than 1% of the global bond market in 2017. This qualifies them, on a global scale, as niche products that are yet considered to be unable to meet the current climate-financing needs (Clapp, 2018). Nevertheless, growing demand and interest in green financing options from investors and issuers sites, who are to this day mainly exposed to conventional bonds that are well anchored at the regime level, in tandem with pressure from policymakers and society, could eventually make Green Bonds shift out of the niche level and therefore have a greater impact on the sustainability transitions.
3. Literature review

This section of the report focuses on contextual information extracted from various sources of literature. The purpose is to provide significant information about the relevant surroundings of this study and further outline why it may be an important contribution to the academic body of knowledge in sustainability transitions.

While the threat of climate change is undeniable and will affect human life (Parry et al., 2001), biodiversity (Thuiller et al., 2005) and many other parameters (Lin, Emanuel, Oppenheimer & Vanmarcke, 2012), if climate-relevant development does not become a priority, a detailed review on the scenarios of climate change is not included in this part of the study. Nevertheless, a short insight on the impact of climate change based on indicators such as the impact on food and water production, rising sea level as well as impacts on biodiversity is presented in the Appendix to emphasize the context.

The literature review mainly focuses on three financial aspects. Firstly, the evolution of green finance, and their evolution in the context of evolving political treaties and agreements. Afterward, a growth assessment of the Green Bond market on a global level followed by a focus on the Swedish market, as this study is limited to this particular market. And eventually a review on the commonly cited disadvantages of this financial tool.

3.1 Finance as a tool for sustainable development

In this section, the background of climate change and its association with the evolution of green finance as a measurement is outlined. Furthermore, a focus lies on the function of governmental and private incentives to catalyze green investments.

The numbers represented in the following section have been extracted from reports mandated by the Climate Bond Initiative (CBI). CBI is a non-profit organization funded by various funds comprised of governmental as well as other non-profit sources. As CBI is an initiative of the World Bank, the numbers can be seen as highly reliable but must, nevertheless, be regarded with caution. Comparisons with other financial assessment lists, provided by widely recognized and used financial databases such as Bloomberg, in the context of academic studies, show variations in the investment volumes (Ehlers & Packer, 2017).

Regardless of these differences, CBI and Bloomberg are among the most reliable sources of information regarding financial metrics and market evolution. Therefore, for this study, the differences are evaluated as being subtle enough to not completely falsify the reliability of the market development assessment.

3.2 The Development of Green Finance

The modern age of green financing started in the United States and Australia as an incentive by the governments to catalyze responsible investments, mainly for water resources (Joskow & Schmalensee, 1998). This was accomplished through pricing strategies such as water permits that could be traded among institutions within the respective country. The most prominent governmental framework that set the stage for successful trading of green permits was the American Acid Rain Program (Title IV of the 1990 Clean Air Act Amendments). A mechanism that aimed to combat air pollution in specific regions in the US by the usage of tradable permits, with an objective to cap the emissions of sulfur dioxide (SO2) and nitrogen oxides (NOx) from power plants in the United States (Chestnut & D. M. Mills, 2005).
This incentive has shown to be out of significance and work as a model for future regulatory
measurements to combat local carbon emissions, by assigning costs to emissions through
taxation by a permit trading mechanism (Nordhaus & William D, 2007). In 1997, the
Conference of the Parties also referred to as the COP3 was held in Kyoto, Japan, where 39 of
the Annex 1 countries for the first time agreed on legally binding GHG emission reductions,
addressing all sectors, with a total reduction size of 5.2 percent to the first commitment period
of 2008 to 2012 (Baumert, Herzog, and Pershing 2005). By using a carbon emission trading
cap framework where every signatory country has the responsibility to live up to their specific
requirements (Nordhaus & William D, 2007). The ambitious efforts got a slow start due to the
United States of America and Australia opting out of the protocol agreement, demonstrating
the impact of politics. Until it finally got brought into action when Russia decided to ratify
the agreement in February 2005. As a result, the negotiations for a second period got into force in
2005 at the COP11 in Montreal, Canada, which is referred to as the reference point of action
in the Kyoto protocol timeline.

The Kyoto protocol is built on three flexible mechanisms that the signatory countries can use
to meet their pledged carbon reduction goals: International Emissions Trading (IET), the Clean
Development Mechanism (CDM), and the Joint Implementation (JI). The framework is meant
for national governments. There are no designated roles for subnational actors in the protocol.
This simplifies the framework by allocating all responsibility to each respective national
government to meet their individual carbon reduction goal, or simply purchase carbon credits
to make up for exceeding the cap (Sandor, 2005).

These set emission limits for each Annex 1 country, make up the rules for the cap and trade
market. Henceforth, each Annex 1 country has been assigned a respective emissions cap
allowance. If this cap is exceeded, the respective country has to acquire carbon credit
allowances from Annex 1 countries with an excess.

The International ETS (IET), the central aim is the cap and trade mechanism. The cap
component’s purpose is to meet the set environmental objectives for each respective signatory
entity. The latter seeks to achieve the emission reduction goals with the highest possible
margin, in order to use the remaining unused portion of the emissions cap as trade credits or to
sell them. If emissions exceed the cap, signatory operators have to either use or purchase credit
from a different actor or pay a fine. This mechanism allows Annex 1 countries to trade their
achieved emissions budget with each other (Dodwell, 2005).

The Joint Implementation (JI) is a project-based framework where developed countries can
further invest in another developed country’s emission reduction project in order to receive
emission reduction units (ERUs) for the respective emission reduction achievement (Dodwell,
2005).

The Clean Development Mechanism (CDM) is a mechanism that allows developed countries
to invest in projects in developing countries to reduce GHG emissions, for this work the
respective country yield Certified Emissions Reductions credits (CERs) to use for their own
offset carbon emissions cap (World Bank 2006, FAQ). The CDM is especially useful to bridge
the asymmetry between nations of unequal development states, making sure that emissions
reduction projects in poorer countries also meet their need for sustainable development (Lecocq
& Ambrosi, 2006).
The first implementation of such a system was launched by the EU in January 2005. Known as the largest multi-country, multi-sector trading scheme existing, covering over 11,000 operations in 25 countries (Lecocq & Ambrosi, 2006). This is due to the ambitious commitment by agreeing to reduce GHG emissions by 8 percent under the Kyoto agreement. The EU members’ corresponding strategy was to impose a carbon emissions cap on industrial activities. EU therefore set up a mutual carbon fund to help catalyse the incentive to purchase carbon credits from companies to help them meet their emissions target while transitioning their existing systems (Baumert, Herzog, and Pershing 2005). This program has grown to be the first of its kind, therefore seen as an opportunity to assess the ramifications and efficiency for the sustainable market and technological development, and competitiveness between green and brown market (Soleille, 2006).

The UN Principles of Responsible Investments (UN PRI) incentive was created in late 2006. It is known to be the leading proponent for environmentally sustainable investments in the world. It serves to act for environmentally conscious investments and long-term interests for its 1800 signatories. The ambition is to achieve this by operating on the financial markets and economies to affect the infrastructure of the society as a whole (UNPRI, 2018). In late 2015, the Sustainable Development Goals (SGDs) were established as an updated expansion of the previous Millennium Development Goals (MDGs) that was first established in 2000 (IASS, 2018). The primary objective of these is climate resilient actions with microfinance as the instrument. Complementary to this, incentives like these jointly amounted to the first international and legally binding climate agreement known as the Paris Climate Accord.

The Paris agreement, also referred to as the COP21 is the most extensive international cooperation in the face of climate change since 1997 adopted Kyoto protocol. The Paris Agreement, composed of 195 signing countries, is the first legally binding climate compliance agreement. Carrying the main motive of taking collective and immediate actions to halt global warming and reduce the impact of human activity on the climate and environment. More specifically, taking action to avoid that the global mean temperature rises above 2 degrees Celsius in correlation to pre-industrial temperatures (UNFCCC, 2019) (Christopher, 2016).

Political initiatives such as the COP21 and its externalities are essential drivers of a transition towards a more sustainable future. It has been made clear that the financial system has a central role in facing the major challenges of reducing greenhouse emissions globally and acting as a catalyst for sustainable development by reinforcing current climate pledges (Millar et al., 2017). It is therefore important to set new financial frameworks that will lever consistent monetary cash flow towards environmentally sustainable investments (UNFCCC, 2019).

3.2.1 The Development of the Green Bond Market

In the following section, the evolution of the Green Bond market in terms of investment size is presented. Starting, at a global scale, followed by a zoom into the Swedish market. This is essential in order to understand the potential of this financial tool, but also to fully realize its state of maturity in terms of characteristics, regulations and possible issues that may represent a threat for its growth. This section ends with an assessment of the possible leverage Green Bonds may have on climate change and their importance for a more sustainable future.
The first conventional bond issued with a climate awareness incentive was issued in 2007 by the European Investment Bank (EIB). The incentive by EIB aimed to channel investments towards environmental sustainability (Kreivi, 2016). A milestone step for climate awareness bonds was when this particular bond was first reported on the Luxembourg Stock Exchange. Inspired by this incentive, the World Bank constructed a green use of proceeds bond in 2008, a framework for bonds where the investments are allocated towards projects with certified green purposes. This marks the birth for Green Bonds and the green bond market respectively (World Bank, 2018).

Even though the green bond market was first initiated during the financial crisis of 2007-2008, it did not start growing substantially until 2013-2014, as can be seen in figure 3.

On a global scale, the green bond market has evolved from below 40 billion USD to nearly 160 billion USD between 2014 and 2017. This is a 400 percent growth in 3 years. Regardless of this important growth, in 2016, the green bond market still made up only around 1.6% of the global debt issuance (e.g. conventional bond) market, which can be seen as a great growth indicator (GlobalCapital, 2015). The issuance is mainly done in Euro and USD, but issuers from emerging economies such as China often tend to provide financing using their local currencies (Ehlers & Pecker, 2017).

The proportions of the market growth are represented in figure 3 below, where both the growing tendency of the green bond market and the equivalence of the different components (e.g. the origin of the green bond issuance) are highlighted. As can be seen, the pioneers in green bond issuance have been the supranational issuers, but corporations and municipalities in Europe have shown to be fast followers.

![Figure 3: Illustration of the growing green bond market and its components (Filkova & Frandon-Martinez, 2018, p. 2)](image-url)

In order to give an idea of the global market growth potential, the international short-term goal of green bond issuance settles at the amount of 1 trillion USD by 2020. This goal is in alignment with the Nationally Determined Contributions (NDCs) in tandem with the Paris Agreement, as well as with the implementations of country-specific climate plans. This is an effort to make the green bond financial instrument a key factor in the reduction of greenhouse gases (GHG) to prevent global warming exceeding the 2-degree boundary (Filkova et al., 2018). Certain
sources evaluate the long-term need for investment going up to around 40 trillion USD until 2030 (Kaminke & Stewart, 2012). A more recent estimation of the long-term projection regarding the necessary infrastructure investment to cope with this goal is estimated at around 7 trillion USD per year over the next 15 years (OECD, 2016).

It has been shown that the demand is still far greater than the supply of Green Bonds. This can be seen when comparing green bonds to the primary conventional bond market. Green bonds are in most cases oversubscribed (Harrison, Filkova & Boulle, 2018). Concluding that there is a need for a higher amount of green bond issuance to create a more sustainable market for Green Bonds (Morel & Cochran, 2015). The highest portion of demand derives today from institutional ESG-mandate investors from the governmental sector, more specifically pension funds (VanEck, 2017). This implicates the immaturity of the market, but also the potential rate of increase in supply due to governmental support. The rate of the growth of the market also determines the tact of regulatory frameworks supporting the market. This will be discussed further in the following sections.

Following the global development trend, investments in the Nordic green bond market grew from around 1 billion euro in 2013 to nearly 8 billion in 2017 (Filkova et al., 2018).

3.2.2 The Green Bond market in Sweden

Sweden issued the first city bond in collaboration with the World Bank and the city of Gothenburg in 2013 (CBI, 2018). Shortly after, the first ever corporate green bond was issued by the Swedish real estate company Vasakronan (CBI, 2018). Today, the main green bond investments in Sweden are towards the sectors; renewable energy, energy efficient buildings, waste and water management, transportation and biodiversity (Boulle et al., 2017).

With 36 issuers and over 10 billion euro that are to be invested in green projects, Sweden ranks in 6th place on the global ranking regarding labeled green bond issuance. It is the largest and most diverse green bond market in the Nordic countries. The evolution of the latter is displayed in figure 4 below. It can be seen that Sweden is the proponent of the Nordic countries by the strongest issuance volume.

![Figure 4: The evolution of the Nordic green bond market (Filkova & Frandon-Martinez, 2018, p. 6)](image-url)
Between 2010 and the end of 2017, more than 115 Green Bonds have been issued in Sweden, which made up of a total of over 10 billion euros. In terms of bond issued directly from the government, Sweden is making up 41% of the green bond amounts in Europe, ranking them in second place after France.

In Sweden, local government funding agencies (LGFA) such as Kommuninvest provide around 50% of the financing of Green Bonds issued by the public sector. Most of those bonds are delivered towards renewable energy, reduced carbon transportation, and buildings as well as overall energy efficiency in domains such as waste and water treatment.

Other financial institutions also play an important role in the issuance volume of Green Bonds in the Nordic countries. Development banks such as the supranational Nordic Investment Bank (NIB), which is the largest Nordic issuer with an approximate amount of 3 billion euros are important drivers for this growth. Even if the amounts issued are smaller, commercial and mortgage banks are non-neglectable actors on the Nordic green bond market. The latter made up of 28% of the outstanding bonds in Sweden as of the 31st October 2017 (Filкова & Frandon-Martinez, 2018). By the end of 2018, Green Bonds made up around 10% of the Swedish bond market volume (Mac Key, 2019).

As for the rest of the EU and the Nordics, the sector of renewable energy is the overall top funded domain by Green Bonds. While the mean second and third place are transport and water centered projects (Filкова, Frandon-Martinez, Meng & Rado, 2018). The second most funded area in the Nordics is low-carbon housing, which may be related to the climate conditions of the region (Filкова & Frandon-Martinez, 2018). The energy market is one of the main interest areas as conventional resources such as fossil fuel not only represent the major energy source on the planet but are also highly associable with climate change itself (McMichael et al., 2004). The renewable energy sector is of major interest for the Green Bond market, especially as the future of these conventional resources is uncertain and predictions on their longevity are not precise (Shafiee & Topal, 2009).

3.2.3 Market stakeholders

In order to understand the dynamics of the Green Bond market and the implications of society affected, it is important to understand who the various stakeholder are associated and interact. The following section presents numerous general stakeholders identified from the literature (Morel & Cochran, 2016) and publications from the United Nations Development Program (UNDP, 2019).

Overall, the key actors in the market can be separated into three different categories. Firstly, there are the purely financial actors which are various types of investment banks, underwriters, investors and issuers who all are in direct contact with the Green Bonds’ monetary value. The second group is articulated around the regulators, which are a policymaker, local governments and governmental unions such as the European Union. Last, there are advisor parties such as non-governmental organizations (NGOs) and second opinion providers which can be for profit or not for profit organizations.

3.3 Green Bonds commonly cited disadvantages

Just like other bond markets, the Green Bond market is characterized by a set of disadvantages of different prominence. In the following sections, a few of the more commonly cited disadvantages are selected and addressed in order to understand the impact that they might have on the market’s development and this research scope. These characteristics will be used as indicators during the discussion in section 6.
3.3.1 Transparency

On the Green Bond market, transparency mainly refers to the reliability of information regarding the green bond project, by having ongoing access to the relevant information (Morel & Cochran, 2016). The issue that results from the lack of transparency is mainly associated with inadequate public information and disclosure on the exact usage of the funds. While Green Bonds, just like other bonds are bound to reveal information on their financing accessible, it remains not fully transparent as to how exactly the funds are used in the way they were intended. Once injected into the assets of the issuer, it is close to impossible to trace its exact allocation. This lack of transparency is criticized by many financial experts who accuse banks of issuing bonds without ensuring the sustainable fundamentals (Razzouk, 2018). This aspect is addressed in the GBP and is considered crucial to the integrity of the bond, although no mandatory regulations have been established today (ICMA, 2018).

3.3.2 Greenwashing

Greenwashing occurs when a project claims to be environmentally sustainable, but in reality, not fulfilling the prerequisites of the definition. It is the intentional misleading of consumers regarding environmental practices and performances of a firm or a product/service (Delmas & Burbano, 2011) (Laufer, 2003). The motivation for greenwashing project is to take advantage of the privileges that come with the green stamp, such as a broader investor base and positive public relations efforts. This could be a threat to the integrity and credibility of the market, leading to distrust among investors who specifically seek to invest in green projects. If seen as not trustworthy, investors might retract from this financial tool (Delmas & Burbano, 2011).

3.3.3 Liquidity

Liquidity refers to the capacity of unlocking cash to meet short term payments. In the context of the Green Bond market, liquidity is mainly a concern for investors who might face the need to quickly sell their holdings of bonds if they face short term payment obligations elsewhere. A lack of liquid capacity might discourage certain investors from getting involved in the first place due to the immature state of this financial market (Moskowitz, 2015).

3.3.4 Supply & Demand

The Green bond market at this point has shown a large mismatch of supply and demand globally, where the supply outmatches the demand (The U.N., 2015). This means that there is a disproportionate number of investors relative to the amount of Green Bond projects in the market. This is an outcome of the current framework, that does not necessarily facilitate the process of supplying Green Bonds for projects. Theoretically, if more bonds where to be issued, then they would be financed (Kenny, 2016). As a result, oversubscription of Green Bonds can lead to a positive impact, as this availability of funding could stimulate the growth of green projects (Morel & Cochran, 2016).

3.3.5 Standardization of Green Bonds

There is still great unclarity regarding the definition and standards of the instrument. This can be seen in the international inconsistency. While the GBP is serving as the guideline in many markets, there are countries that have established their own framework. For example, India and China have published their own, individual standardization frameworks regarding the issuance and reporting activity for the green project (OECD, 2016). By having various actors diverting
from a common standard protocol, and creating their own guidelines, a global standardization for the Green Bond market seems far from happening.

3.3.6 Other disadvantages
Additional argued disadvantages that result from the previously stated ones, is whether Green Bonds are proving more to the issuing project. Would the issuing green bond project get funded in any circumstance? The argument is that a profitable project with solid financial structure will get funded regardless of the Green Bonds existence (Hayat, 2015). Therefore, the labelling asset of the definition Green Bonds needs to increase in value in order for less financially solid projects to have Green Bonds as the sole option.
Furthermore, there is a hindering aspect of individual investors in the green bond market, because there's no easy way for individuals to invest in Green Bonds. There are today a few existing funds with the sole purpose of Green Bond investments (Kenny, 2016). This short-sightedness could cost the market large capital potential because a large number of individuals can make a significant difference in developing the market.

3.4 Green Bonds and climate change
In order to evaluate the impact of Green Bonds on climate change, as well as the implications on modern human behaviour, the international finance corporation (IFC), part of the World Bank Group, is measuring the impact of Green Bonds on four core impact indicators. These are the annual energy savings, the annual Greenhouse Gas (GHG) emissions reduced or avoided, the annual renewable energy produced, and the capacity of renewable energy plant(s) constructed or rehabilitated (Kezheneva et al., 2018).
According to this institution, the expected amount of GHG-emission reduction due to projects financed by Green Bonds was of 6,3 million metric tons in CO2 equivalent in one year, corresponding to the emission of about 1,3 million passenger cars driven during the same time span. But the reduction of GHG-emissions is not the only component to which the green bond efficiency can be measured. Just as important is the contribution to renewable energy generation. It was estimated that the one-year contribution of green bond-funded projects would lead to 8,2 million megawatt hours (MWh) of renewable energy during the year 2018. As a comparative, this is equivalent to the energy consumption of 700,000 U.S. homes in cities like San Francisco and Washington D.C. Both values have been estimated to increase by 2,2 million metric tons and MWh, respectively, showing a strong growth tendency (Kezheneva et al., 2018). Overall, Green Bonds have proven to be effective in assisting companies to reduce their environmental footprint, contributing to economic growth and attracting investors (Flammer, 2018). Green Bonds, therefore, are therefore well suited to the concept of sustainability transition processes as they are directly relatable to technological and industrial change. By that, Green Bonds can be seen as being a potential lever towards a greener economy (Gianfrate & Peri, 2019).
4. Methodology

The central theme of this thesis is to evaluate the green bond market’s impact on sustainability transitions and further its drivers and barriers. These are not well defined in the academic community, as can be seen in the inconsistent fundamental theories of the subject. Hence, concluding the qualitative and explorative nature of this paper, as this paper examines a financial instrument that is in a preliminary phase.

Subsequently, this thesis uses qualitative methods to investigate insider opinions by interviewing stakeholders within the Swedish green bond market. This strategy is selected based on the characteristics of this research, which is both descriptive and exploratory. By interviewing expert participants, there is potential to identify alternative drivers and barriers associated with the research question. Further, the extracted key points from the interviews are categorized and compared to the literature review to bridge the theoretical and practical realities. To answer this, the interview framework is structured based on the academical communities commonly cited advantages and disadvantages of the green bond market.

4.1 Qualitative Research Strategy

The empirical study is conducted with qualitative expert interviews according to Thomases (2006) “General inductive approach for qualitative studies”. This approach aims to condense extensive and intricate qualitative data sets into key points to further relate to the established research objectives of this paper.

A semi-structured interview approach is used to provide informants the freedom to express their experiences and opinions in their own terms, as a result of producing reliable and qualitative data. Open-ended interviews with expert participants offer a nuanced wholesome picture based on individual opinions and experiences on the respective topics that are studied. Due to the inquisitive structure of the research objective, a more structured survey format could have an inhibiting effect on the interviewee to explore important aspects of the scope.

In order to ensure that all interviews are in alignment with the research purpose, a red thread was established. Leaving enough freedom for the interviewee to fully express his or her statement without having the risk of losing the scope. Once a topic is discussed in sufficient depth, or if the interviewee distances to much from the researched subject, the interviewer could per protocol steer the interview back in the demanded direction.

Each interview is recorded into sound files for further examination. The sound files are later organized and transcribed accordingly. As mentioned earlier, the transcribed interview data is analysed by the “General inductive strategy for qualitative analysis” by Thomas (2006). The method suggests that large qualitative data should be condensed by extracting the key points of each approached topic. The extracted key points are jointly summarized and further compared to the particular research objectives.

The initial stage of the data analysis is to thoroughly read the raw data, to further segment and rank the data into specific categories based on relevance for the research objective. In this step, a big portion of the raw data is eliminated due to a lack of relevance. The next step is to further condense the data by eliminating overlaps between topics and segment the remaining data into overarching categories as information from different interviews could directly be merged.

The findings of the interviews were later compared to the literature review to gain higher resolution and direct the study towards building a framework for the way forward. The full process resulted in the four categories that are presented in section 5.
4.2 Qualitative expert interviews

The interview participants were selected according to two central objectives. Firstly, to get first-hand insight into the green bond market and the issuance process. Secondly, understanding the experience of the specific stakeholder when issuing the particular green bond. The informants are categorized into the following groups; issuers, banks, investors, and others. By interviewing market participants, there is great opportunity to gain first-hand insight into the participant's own experiences. This is accomplished by exploring the drivers and barriers associated with issuing Green Bonds, and Green Bonds’ role as a tool for sustainability transitions. The experts, i.e. interviewees, are therefore chosen with regards to their professional relationship with Green Bonds, their market and sustainability. They have to be identified as being part of one of the four previously mentioned Green Bond market stakeholder groups.

After establishing a clear prospecting map, the participants are approached through LinkedIn, the institution's website or from networks such as KTH and beyond. The initial step of contact with the prospective participants is through email. A pre-organized introductory template is used for each initial contact that states the mission, institution, and purpose of this thesis. Further explaining why the candidate’s insight and participation will be helpful in the context of this research. For prospects that do not answer, an additional email is sent to increase the chances of a reply.

A total number of 67 prospects were contacted. Out of these 6 agreed to participate and gave consent to the usage of the information shared during the interview. At any moment in time, all participants had the right to refuse participation or usage of the information obtained during their interview. All information resulting from the interviews is treated in a confidential and anonymous way. Therefore, no further information on their person or the company or organization they work for is given.

The interviews were conducted over a three-month period, starting in March 2019, and ending in May 2019. Every interview was audio recorded to later be transcribed to extract the relevant information according to the approach from Silverman (2011) “Interpreting qualitative data: A guide to the principles of qualitative research”. Half of the interviews were conducted in English, and the other half conducted in Swedish. A great effort was done to avoid the loss of nuances during translations.

The full process resulted in the four categories that are presented in section 5

4.3 List of interview participants

The following table 2 displays the generalized profession and domain of employment of the interview participants. On their demand, there are no further references such as citations, that are connected to their names.
Table 2: Anonymized indication of interview participants

<table>
<thead>
<tr>
<th>Count</th>
<th>Domain</th>
<th>Profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bank</td>
<td>Sustainable finance manager</td>
</tr>
<tr>
<td>2</td>
<td>Municipal investor</td>
<td>Sustainability manager</td>
</tr>
<tr>
<td>3</td>
<td>Climate research institute/NGO/second opinion provider</td>
<td>Advisor</td>
</tr>
<tr>
<td>4</td>
<td>Bank</td>
<td>Sustainability finance manager</td>
</tr>
<tr>
<td>5</td>
<td>Company issuer</td>
<td>Board of management</td>
</tr>
<tr>
<td>6</td>
<td>Municipal issuer</td>
<td>Portfolio manager</td>
</tr>
</tbody>
</table>

4.4 Data verification and limitations of the approach

When analysing and assessing the harvested data from the interviews, the grounded theory from Silverman’s “Interpreting qualitative data: A guide to the principles of qualitative research” (2011) is used. This method is articulated around three indicators, which are reliability, validity, and confirmability.

Reliability questions whether the same data collection method, implemented by different or the same users at another point would lead to the same results (Silverman, 2011). This is especially difficult in qualitative studies based on expert interviews as the data collected is a reflection of the circumstances and situation of the interviewee and are subjected to change. A different temporal context could, therefore, lead to a different outcome. In addition to that, the semi-structured approach challenges reliability as the freedom of the interview participants can lead to improvised follow-up questions which depend entirely on the evolution of the interview. Efforts are made to increase the reliability of the method by describing the interview procedure thoroughly as well as saving the recordings of the interviews. As previously mentioned, no citations will be made during the result presentation and discussion as certain participants insisted on the anonymous use of the data.

Validity is another important indicator to be taken into consideration in qualitative studies. It refers to the integrity of the results and conclusions that are generated and whether the intended research purpose is measured accurately (Silverman, 2011). It is crucial that the observations made during the study fit with the conclusions that are drawn and further developed from them. In order to ensure the validity of this study, the literature review is used to provide an extensive contextual body of publicly available information to which the results from the qualitative approach are compared. This makes it possible to confirm convergent, and further investigate divergent information.
Confirmability refers to the quality of the obtained results with regard to possible biases and personal perspectives brought into the study by the authors. It expresses the degree to which the results could be supported by others either via references in the literature review or other people involved in the study (Silverman, 2011). In order to enhance the confirmability, the results obtained by each of the two authors were reviewed in an unbiased way by one another. In addition to that, drafts were regularly shared with the study supervisor in order to avoid misunderstandings and interpretation errors during the analysis procedure. Nevertheless, a certain bias is always present during the interviews as a certain formulation of questions can affect the received answer.
5. Results

In this section, the key findings from the transcribed expert interviews are outlined. Each subtopic is divided into different subjects. For each subject, the key information is resumed followed by presented paraphrased citations to support the previously mentioned key information.

As most interviewees requested not to be associated with direct citations, paraphrasing by summarizing the key takeaways from each interview is used to preserve the reliability of these findings with respect to their demand. These paraphrases are outlined in italic font during the result section.

5.1 Swedish Green Bond Market

5.1.1 Current and future development

Out of all the participants that had a direct affiliation with the green bond market in Sweden, 6/6 of them had experienced a quick growth in the amount and variety of green projects. The rapid growth has attracted a lot of attention from various sectors which has led to its important diversification in the number of domains but also investors. Associated learning phases were named as a potential reason for the slight underachievement in issuance for the year 2018. Nevertheless, the majority of interviewees agreed on the great potential of the market, especially as the demand is bigger than the supply.

The market has attracted a lot of attention which has led to gradual diversification. This may have contributed to the experienced levelled volumes in 2018. Still, the previously experienced growth rates are expected to return, especially as political and regulatory incentives are made to stimulate investments to the market.

Municipal Investor

The Green Bond market has great potential even if the year 2018 has not reached the forecasted levels. The latter must be taken in account as the market undergoes constant development.

Bank

The market is evolving into different categories by a high rate of diversification, which always requires a certain learning phase. While Green Bonds as a financial entity only has existed since 2008, the real market only appeared about five to six years ago due to the limited demand in the previous years. Therefore, the market is still relatively immature, and a number of issuers might wait until a clear taxonomy is established. Especially, with regards to an established definition of what green is.

Bank

As the demand is bigger than the supply, it is important to persuade investors to allocate their money to fund green development projects instead of brown alternatives.

Municipal issuer
5.1.2 Market size

Green Bonds are still seen as an immature financial tool as they represent merely 0.5% of the global bond market. In Sweden, the Green Bond market share was about twenty times higher in 2018 and are therefore no longer considered a niche product. The Swedish Green Bond market, with an emphasis on the proactive role of politics and society, may represent a good diffusion model for other countries.

Sweden, where Green Bonds have reached a market share of an estimated 10% in 2018. Green Bonds have become increasingly more mainstream and demanded. The eventuality should be that Green Bonds become the major component of the global bond market.

NGO

I agree that Sweden has had ambitious climate policies that have been influencing the culture and psychology of Swedish businesses and societies. That is a big reason why Sweden has shown to be such a good model for other entities.

Bank

5.2 Drivers and barriers

5.2.1 Regulations and standardization

All 6/6 participants agreed that a common definition and taxonomy framework needs to be in place to protect the green stamp and its integrity, but the participants disagreed as to the extent. While some actors fear the loss of flexibility which can be seen as an element of strength, others see them as necessary to drive the market towards its real potential, especially regarding the political incentives and regulations to limit attempts of greenwashing.

NGO

Overall, a clearer taxonomy and definition of the kind of projects that are eligible to green investments will have positive impact on the Green Bond market’s development. Especially as this could counterbalance attempts of greenwashing which could become more numerous with growing financial market stimulation from the political site. The latter are inevitable as to this day, the transition processes towards a more sustainable future are not fast enough with regard to the EU-benchmark goals.

Municipal investor

All components are related in the green financial market. In order for it to have a lucrative future, their needs to be measurements taken on not eligible projects. By having a common definition of green, and from that being able to set tax on high carbon emissions and biodiversity projects, subsequently making green projects indirectly more competitive.

Corporate Issuer
5.2.2 Greenwashing and transparency

Neither greenwashing nor transparency issues have been mentioned by any of the interviewees as being a major disadvantage to the Green Bond market. Greenwashing was described as rarely occurring. Most issued Green Bonds seem to be in alignment with the GBP, as it provides a high degree of transparency and therefore a high degree of reliability. Nevertheless, a mindful approach, especially from policymakers, is in the future required to counterbalance upcoming attempts of greenwashing.

Greenwashing and insufficient transparency must not be seen as a total threat, but merely opportunities to steer the market development at this stage. Mindfulness about these issues’ forces, for example, the discussion of corporate strategic alignment with green transformation processes of companies issuing such bonds. This can improve the development of the market, and climate-relevant impacts by avoiding issuance to companies that do not present a coherent strategic alignment with the purpose of Green Bonds.

Bank

Greenwashing is not seen as a threat to the market development as to this day, 95% of the issued Green Bonds are in alignment with the GBP. This requires making use of a third-party opinion provider to further verify the sustainability degree of the project that is to be funded.

NGO

Greenwashing is a minor incident but might increase with growing market stimulation. But in the process of issuing Green Bonds, issuers are required to reveal to investors where exactly they allocate the funds. This improves transparency and makes greenwashing less of a concern. Nevertheless, additional policy steps must be taken as the instrument is maturing.

Municipal investor

5.2.3 Financial characteristics

None of the issuers had experienced significant pricing or tax advantages. Regarding the pricing aspect, stakeholders coming from the financial sector agreed that Green Bonds and conventional bonds cannot be compared at that level. Other interviewees describe that the market has a divided opinion regarding this aspect.

Nevertheless, Green Bonds have been described as more stable as they are less traded than other bond products. This makes them also more attractive to certain investors.

Overall the issuances of Green Bonds have a positive impact on the potential investor base, as non-climate and climate engaged investors might make use of them, whereas conventional bonds may attract mainly non-climate engaged users.

In terms of pricing, Green Bonds cannot be compared to other types of bonds in a meaningful way. Thus, the rise or fall of the market is not to be seen in relation to the pricing but rather to the stability and attractiveness of green projects compared to non-green projects. Especially as the issuance of Green Bonds from corporate sites is seen to mainly rely on its financial attractiveness in order to achieve the most optimised funding mix.

Bank
Especially regarding the pricing, the debate is very bilateral as some insist on the comparability between Green Bonds and conventional bonds, while others say that no relevant comparison can be made.

NGO

Green Bonds are described as being more stable and less traded. Plus, they open the issuers to a broader investor base and present a good communication tool to present climate-relevant initiatives. Using these bonds to promote green transitions, issuers are given the possibility to mitigate the risk associated with climate change. They are thus a key to a low carbon future.

NGO

5.2.4 PR and marketing
Another takeaway from the interviews regarding the drivers and barriers for market growth concerns the PR or marketing purpose of Green Bonds. Proper communication about the usage of Green Bonds from issuers sides is seen as necessary to exploit this financial tool to its full potential.

As communication on issuance is seen as an important aspect of the Green Bond market, the positive impact on marketing and PR have been mentioned as one of the most impactful motivational factors.

Bank

5.3 Key actors

5.3.1 Stakeholders
All stakeholder participants that were interviewed agreed that the investors and issuers are the key driver behind the issuance volume of the market. Banks are cited as being of nearly equal importance, especially regarding the voting power in the context of the GBP. They further emphasized that NGO and second opinion providers may not have a voting power regarding the GBP but are considered as highly influential on the market. The role of policymakers was mentioned as being highly important to the development of the markets but on a different level than the financial actors. Their responsibility is to steer the development of the market via the means of guidelines and regulations.

The main actors of the Green Bond market are investors and issuers as they are the direct key behind the issuance volume and thus the market size. Banks are nearly equal importance, especially regarding their role as underwriters, connecting investors and issuers as well as their voting power in the context of the GBP.

Bank

Regulators have the highest influence as they decide on the rules the market has to obey. Their cooperation with the CBI is especially impactful for the market taxonomy that is being developed. Nevertheless, the driving power is in the hands of investors and issuers as their interaction influences the traded bond volume. Their interaction is made possible mainly due to the presence of underwriters such as banks, of which SEB is mentioned as biggest and thus
The influence of second opinion providers is often proportional to their market share and recognized quality. Thus, not for profit research institutes such as CICERO, who is one of the market leaders and have been awarded numerous times for the quality and scientific accuracy of their assessments can steer the market to a certain degree. Especially as they work closely with investors, informing them about the opportunities of green investments.

NGO

The core of the Green Bond market is articulated around banks, investors and issuers. These three are forming the instrumental part of the market and their representatives are part of the effective committee around the GBP. The political role becomes more and more important not only as regulators of the market but also as financial actors. Sovereign, i.e. governmental issuance has been increasing which provides the Green Bonds and their market with more credibility and understanding among investors.

Municipal investor

5.3.2 Growth Actors

Out of all the stakeholders, (5/6) have a stated that politics at the MLP landscape level are the highest level of influence to catalyse the supply and demand ratio. The remaining (1/6) argues that the key driver is the issuers themselves, due to fundamental short-sighted profit drivers.

The role of politics becomes more and more important not only as regulators of the market but also as financial actors. Sovereign, i.e. governmental issuance has been increasing which provides the Green Bonds and their market with more credibility and understanding among investors.

Municipal investor

The issuing companies of green projects are the key growth players. Because the municipal incentives have come a long way to pave the way for promoting green bonds. The question is if the companies can follow in the same rate because they have company owners that want the highest profit margins.

Municipal Issuer

The green bond market today, should be seen as mature and no longer a niche product in Scandinavia. This is not due to the efforts of politics, but strictly due to banks and the financial sector. For the supply and demand ratio to balance further, the role of politics is crucial. Especially, on a global scale.

Bank

5.3.3 Collaboration

An emphasis is placed upon the important interaction between all different stakeholders and the great flexibility that issuers and investors have with regard to the usage of Green Bonds. Banks as underwriters assure that their customers, who are both issuers and investors do profitable business in the long term.
The Green Bond market has shown to be a great example of flexible collaboration between banks, investors and issuers, especially regarding the application of the voluntary GBP. As sustainable finance becomes more and more important, it is imperative to understand what role Green Bonds are supposed to take and to steer their development respectively.

Bank

The markets flexibility and the freedom that investors and issuers have at the current state are some of the great drivers for the positive development.

NGO

A simplified stakeholder map was established from the gained insights and is presented in figure 5 below. It outlines the financial core, formed by issuers, investors and banks, as well as the interaction between the second opinion providers and investors. An overarching influence on the entire financial core is attributed to policymakers, who are representing the public.

![Stakeholder map of the Green Bond market](image)

**Figure 5: Stakeholder map of the Green Bond market**

5.4 Green Bonds and Sustainability Transitions

5.4.1 Impact

6/6 participants agree that Green Bonds are among the most impactful catalysts of a transition towards sustainable finance today. Nevertheless, a certain mismatch between available fundings and existing, green technology alternatives are reported. Green Bonds are cited to be capable to translate climate issues into financial issues, forming the bridge between these two sectors. As part of the financial core, where the interest of issuers and investors lies upon profitability. The allocation of funds towards greener options is described as going hand in hand with sustainability while turning away from brown options.
Green Bonds are an efficient tool to translate climate issues into financial issues as they can be used as a bridge between these two domains. Without financial means, no transition would be possible especially as nowadays, human society disposes of numerous green technology alternatives in domains such as energy and housing. The sole problem that has made the global implementation of green technology usage not as rapid as it could have been the lacking allocation of financial means. Thus, there is a mismatch between the available capital and climate-relevant technologies and development processes.

Bank

Still today, a lot of money is invested into brown technologies, as these are well known and proved their profitability over the past decades and the investment into major green projects is often more risk-bearing as these are generally associated to emerging i.e. less well-known technologies. Plus, investors are often not entirely informed about the availability and characteristics of green investments. But what is important to realize is that the risk emerging from climate change is enormous for big companies. Changes in regulations, infrastructure, and consumer behaviour might catch up to companies that were not willing to take certain risks by developing more sustainable functioning.

NGO

Banks have to act after fiduciary duty, i.e. in the best interest of someone else. In correlation with profitability and investment placement, this goes hand in hand with a vision of long-term sustainability. Especially with regard to the growing fragility of the fossil heavy markets, it becomes more and more important for investors to allocate money towards greener options to avoid sudden fluctuations and prone from regulations.

Bank

5.4.2 Catalysers

In contradiction, the participants had different views on sustainability transition catalysers. Both banks and municipal investors (3/6) had the experience that Green Bonds and other green finance tools are created to stimulate green projects, while both green project issuers (2/6) argue that green projects would still be active one way or another without such incentives. The issuers (2/6) argue that there is a paradigm shift where companies and CEOs are the catalysing components that hold the infrastructure accountable.

The most wishful scenario is a bottom-up perspective, where green projects arise independently to seek green investment options, thus having an organic increase in supply to further outgrow the demand. Today there is a lack of green projects due to company owners having pressure to present high ROI quickly.

Municipal Investor

Banks are cited as having to act after fiduciary duty, i.e. in the best interest of someone else. In correlation with profitability and investment placement, this goes hand in hand with a vision of long-term sustainability. Especially with regard to the growing fragility of the fossil heavy markets, it becomes more and more important for investors to allocate money towards greener options to avoid sudden fluctuations and prone from regulations.

Bank
This paradigm shift is on a global scale, and companies see now that they need to act within time. Soon every component in the supply chain will be thoroughly assessed to further define what is truly green or not.

Corporate Issuer
6. Discussion

In the following section, the results from the expert interviews are discussed in relation to the information presented in the literature review, the conceptual framework as well as the stated research purpose. Before starting, it is imperative to understand that these findings only provide limited insight into the Swedish Green Bond market, due to the narrow scope of this study. While the interviews covered all stakeholder groups aimed for this study, only 6 interviews could be conducted. The results are therefore not to be generalized on a global scale but must also not be limited to one of the actor groups. It remains regrettable that no interview could be conducted with NGOs such as WWF or Greenpeace, which could have given additional depth to the findings.

As mentioned previously, possible biases in relation to reliability, validity, and confirmability have been excluded as much as possible. Nevertheless, broader insight into the market requires a more extensive interview phase in order to obtain statistically relevant data.

This study was conducted with the purpose of gaining an advanced insight on the Swedish Green Bond market, analyse the local drivers and barriers and to further evaluate its development and impact in the context of sustainable development.

6.1 Green Bond market dynamics

Firstly, the discussion is articulated around the state of the market and analyses the specific drivers and barriers that have been mentioned during the interview process. The information is evaluated in comparison with the data presented in the literature review.

6.1.1 Market development

The findings show that Nordic stakeholders have an overall positive vision of the Green Bonds market development. Regardless of its relatively marginal volume on a global scale, it attracts a lot of attention from various stakeholder groups which have led to its important diversification and growth. While data from the literature review confirms this, it also shows slower growth than expected, especially for the issuance level presented in 2018. This slowdown is mainly to be attributed to learning phases associated with the important diversification and the relative immaturity of the market. Very few doubts regarding future growth have been expressed. In addition to that, while Green Bonds as a financial entity have existed since 2008, the lucrative market only appeared in 2013 due to the limited demand in the previous years. It therefore remains as a relatively immature market which contributes to the fact that certain investors and issuers might restrain their activity while waiting for a clearer taxonomy. Especially with regard to a more universally recognized definition of greenness.

6.1.2 Market drivers

Regarding the various driving factors that may have and will promote the usage of Green Bonds the findings result in the following. Aspects such as Corporate Social Responsibility and other ethical motivators are seen as being neglectable in the decision process. From a financial point of view, the issuance of Green Bonds from corporate sites is seen to the main dependant on its financial attractiveness. The goal is the achievement of the most optimized funding mix.

While other studies have concluded that pricing is an important driving factor for a number of local stakeholders (Drage & Sundt, 2018), no clear conclusion have been made in this study.
regarding this aspect. While Green Bonds have been evaluated as a cheaper investment option compared to conventional bonds, it has been stated that from a financial point of view, no meaningful comparison regarding pricing can be made due to the vast difference in the nature of different bond types. Regardless of that, the extra costs associated with the review from an external opinion provider as well as the regular reporting on the usage of proceeds are indicated as a financial barrier. In addition to that, there has not been evidence from the interviews that Green Bonds present any relevant tax benefits.

The stakeholder’s opinions regarding the comparability of Green and conventional bonds stands in contrast with what is stated in the literature. In the latter, the sole difference that is expressed between the two types of bonds is that fact that Green Bonds are must be directed towards climate-relevant investment projects. On a financial level they are described as being the same (Bhatia, 2019). Further investigations regarding this could not be made during this study.

Nevertheless, Green Bonds are described by advisor actors as being a more stable and less traded financial instrument. More importantly, they expose the issuing project to a broader investor base, as not only conventional but also climate-aware investors may make usage of this financial tool.

In addition to that, the issuance of Green Bonds is proven to be a good communication tool outward to present the climate-relevant initiatives from the issuer. This aspect, which has also been found in the literature (CBI, 2014) can have a positive impact on the issuing projects public image and opinion. Therefore, using these bonds to promote green transitions, issuers are given the possibility to actively mitigate the risk associated with climate change. Efficient communication on issuance and reports on externalities can therefore be important drivers for market growth, especially in the Nordic markets where the populations displays growing environmental awareness.

6.1.3 Market barriers

Regarding the possible barriers or commonly cited disadvantages of the Green Bond market development, aspects such as greenwashing, lack of transparency and standardization have been previously cited in this study. The findings from the expert interviews are found to contradict with certain aspects of these previously cited disadvantages.

Especially barriers regarding the lack of transparency or greenwashing. These seem to be strongly opposed by the fact that approximately 95 percent of the Green Bonds issued to this day are in alignment with the GBP. The intrinsic nature of the GBP principles enhances transparency due to the reporting activity demanded from issuer sites, therefore preventing major greenwashing activity efficiently. Rather than being a threat, a mindful approach of these aspects could present opportunities to steer the markets development and further improve the overall strategic alignment of issuance. In that way making Green Bonds more efficient for climate-relevant finance and green development by increasing its diversification.

A missing standardization and consensus also appeared to be a disadvantageous aspect of the Green Bond market during the literature review. The findings reveal that the opinions regarding this subject diverge among the interviewed stakeholders. On the one hand, too extensive and strict set of regulations could contribute to a loss of flexibility, and as a result lead to the exclusion of certain projects that are not seen as favourable to sustainability transition processes. These polarized findings did not only come from with the interviews from the financial sector, but also from the representatives of the not-for-profit research institute. The argument is that the current flexible and free collaboration between banks, issuers and investors regarding the issuance process are some of the great drivers for the positive development of the
market. While too stringent standardizations are likely to take away a part this flexibility, therefore influencing the market’s environmental capacities negatively. Nevertheless, regulations such as the upcoming European Green Bond Standards are cited by representatives of the investor and banking actors as having an important role to increase the market transparency and the overarching reliability. These standards are relatively more complete and binding than the current GBP. A clearer taxonomy and definition of what is green and what kind of projects are eligible to investments via Green Bonds are said to have a positive impact on the market integrity and attractiveness for investors, banks and issuers, eventually accelerating its development.

While challenging standards might be discouraging for certain issuance processes, a growing pressure from various stakeholders as well as the Taskforce of Climate-related Financial Disclosure (TCFD), which incites companies to uncover their financial engagement into a more climate-relevant future, are likely to outweigh and promote the overall usage of Green Bonds. Nevertheless, a certain degree of overarchingly accepted and enforced standardization appears to be an unavoidable measure to promote and maintain the positive impact of Green Bonds as a financial tool for sustainable development. A certain degree of standardization is therefore especially important as it aims counterbalance future attempts of greenwashing.

It is to be mentioned that no clear statement pattern on standardization could be established with regard to the interviewee’s current profession, employer or professional career.

6.2 Green Bonds actors

In the following section, the roles of banks, investors, issuers and second opinion providers, i.e. advisors are described. As the collected data points out a rather specific role of the policy makers in the Green Bond market, which is presented in a separate section of the discussion.

6.2.1 Financial actors and advisors

Regarding the role of investors, issuers, and banks, an adaptation of the “Multiple levels as nested hierarchy” (Geels, 2002) is used to present their interactions in an expansive way. This adaptation, represented in figure 6 below, has been established using the Green Bond stakeholder map (see section 5) as well as the data acquired during the interviews.

The findings reveal that in terms of direct market volume, the financial actors (issuers, investors and banks) are to be considered as instrumental drivers behind the direct traded volumes, as all issuance processes are the result of their interaction and collaboration. The fact that the voting committee responsible for the Green Bond Principles is exclusively formed by members from these three stakeholder groups grants them additional steering power over the market. The key role these three stakeholders constitutes in the green bond market places them at the regime level of the MLP framework, where they interplay in the currently established financial sphere which is bound to regulations and lock-ins. As a result, they are in influence from the GBP, situated at the landscape level.

While not seen as a direct driving force behind the issuance volume, the influence of actors from advisor parties is non-neglectable. Their degree of influence is often proportional to their market share and recognized quality. As presented in figure 6, they have to be considered as part of the regime level, exercising influence on the investors they work with. As advisors such as CICERO are not part of the GBP committee, they have no direct steering power over the landscape level. Nevertheless, while working with investors on the analysis of investment opportunities, actors from the advisor group take these guidelines into consideration.
6.2.2 The role of Policy makers

While the character and the degree of influence of the financial actors appear relatively clear, the position of policy makers are not entirely convergent. While financial actors consider their influence as equal to second opinion providers such as CICERO as directly promoting market development, non-financial actors see themselves as having the highest amount of influence due to the degree of steering power. Therefore, having the highest influence to the development of the green finance sector, here the US withdrawal from the Paris Agreement was cited in this particular section of the interview.

As the current amount of green investments is seen as not sufficient enough to promote the transition processes towards a more sustainable future with regard to the EU-benchmark goals, a shift and improvement in emissions and innovation policies as well as legislation seems to be required to provide an efficient response to the climate problem (Newell, 2010). This is in alignment with the certain findings in the literature where active policy-driven actions are described as highly important. Especially as certain researches express doubts on the feasibility of the climate goals projected by the Paris Agreement (Fawcett et al., 2015). The political enhancement by reaching the current greenhouse gas pledges through implementation of renewable energy, low emissions technology and the development and protection of CO2 sinks are seen as necessary to classify this goal as achievable (Millar et al., 2017).

Growing awareness and access to capital are cited as key factors in the process of building a climate resilient future (Więckowski, 2013), the driving influence of political actors as representatives of the people therefore becomes important not only as regulators of the market but also as financial actors. These findings on the role of policy makers are in correlation with the literature (Meadowcroft, 2011). In this context, the political stakeholders hold the responsibility of stimulating and further balancing the supply and demand ratio of the Green Bond market. This sort of stimulation can be achieved with beneficial regulations, direct injection of financial means, tax benefits for the issuers and investors by actively issuing...
sovereign, i.e. governmental, Green Bonds which can provide the market with more credibility and understanding among investors which can further push the rate of markets growth.

In order to clearly expose the impact of policy makers in the Swedish Green Bond market, it is important to highlight that Sweden has one of the most evolved green finance markets, where the share of green investments is the highest in the world. Specifically, Green Bonds represent about 10 percent of the Swedish bond market, which is more than ten times higher than the shares of the global market.

Sweden is a relatively small country with a population that have been displaying a high environmental awareness, as a result sustainable development has been a high priority on the political agenda. Political actors, by their intrinsic nature as regulators, are to be placed at the landscape level, as presented in figure 7 below. While not directly responsible for the implementation of political decisions, the local population has an important influence and lever on the policy makers as the latter function as representatives for the people by being elected in a democratically. Therefore, directly responding to the pressure of the local population. By displaying environmental awareness and concern, the population indirectly affluence political actions such as regulations, laws, and incentives that pressure financial stakeholder at the regime level. This allows tools that create sustainable and profitable investments to cope with these political pressures more lucrative, helping emerging niched products to become established at the regime level. As a result, opening the regime level to previously unexplored opportunities, technologies, and tools, as represented in a simplified way in figure 7 below.

![Multi-level interactions between financial, advisory and political actors in Sweden](adapted from Geels, 2002)

The hypothesis is that this political involvement in combination with the characteristics of the Swedish nation can be seen as a driving force behind the advanced shift from a niche to an established regime level financial tool. This can be seen as Green Bonds are comprising more than 10 percent of the total bond market.
6.3 Green Bonds and sustainable development

What is highlighted in both the interviews and the literature review is that Green Bonds are considered as being a highly efficient tool to promote climate-relevant development. Green Bonds are mentioned to create opportunities to translate modern-day climate issues into financial issues, as they are embedded in the intrinsic financial core of transition processes which cannot take place without funding. For issuers, the usage of green bonds could prevent future negative impacts of climate-related regulations, changes in infrastructure and consumer behaviour. For investors, Green Bonds offer the possibility to allocate funds into certified sustainable investments, which are less prone to future regulatory impacts.

Emphasis is on the numerous green technology alternatives that are available in carbon-heavy sectors such as energy production and housing that lacks the means of sufficient financial allocation. Reasons for this mismatch is mainly because investments are still steered towards brown technologies as these have proven to be highly profitable over the last decades. Subsequently, investments into emerging, i.e. lesser known technologies are often related to a certain risk for investors, that might prevent them from investment in these projects. Green Bonds could potentially function as the bridge between the global financial sector and sustainable development by counterbalancing the current mismatch between available capital and climate-relevant technologies.

Nevertheless, while the presence and availability of funding is a key factor to a successful development, the latter also require a great deal of ingenuity, expertise and entrepreneurship on the regime and niche level to create new instruments and tools and to use them in an efficient way in tandem with political guidance and structure from the landscape level. A great emphasis is to be set upon the multi-level corporation between all stakeholders, meaning banks, investors, issuers, politics, advisors, private individuals and the general population, i.e. consumers, clients, and users. The interplay of these relations displays the emergence of a niche level product to a more established regime level product. This interplay is presented in the following model of sustainability transitions, represented in the figure 8 below, which has been created using Geels “Multi-level perspective on transitions” (2002) in combination with the insights from the literature and the interviews.
While highly simplified, there is a clear multi-level interaction that happens between the niche, regime and landscape level as well as the specific interactions between different actors that find themselves at these respective levels. The chosen representation displays these levels as intrinsic to sustainability transition processes as part of the pursuit of sustainable development. The pressure and influence from the landscape level translate to both inferior levels causing disability for the financial, regime level incumbents and opening opportunities for niche products to emerge. Regarding the Swedish market, Green Bonds are represented as having already shifted out of the niche level and becoming a mainstream product at the total bond market in Sweden, which is a part of the Swedish ambition to reach its sustainable development goals.
7. Conclusion

7.1 A tool for a sustainable future

This study focuses on the usage of Green Bonds as financial tools to achieve an environmentally sustainable development. This study contributes to the body of knowledge articulated around understanding on the dynamics of the Swedish Green Bond market, its actors and its perception as a tool for sustainable development. This research can further be situated in the global opposition of climate change, the latter being suspected to be one of the major threats that humanity is facing during the 21st century.

Subordinate to the previously stated, overarching research purpose, a focus is further laid upon the drivers and barriers of the market development as well as identifying the key actors and their interactions.

To remind the exact formulation of the guiding research question and its subordinates, these are highlighted below.

“How do key stakeholders perceive the Swedish Green Bonds as a tool for sustainability transitions?”

a. “What are the drivers and barriers to the development of the Green Bond market in Sweden?”

b. “Who are key actors and how do they interact?”

Regarding the analysis of the drivers and barriers of the Green Bond market in Sweden, the findings show that numerous of the barriers mentioned in the literature do not correlate with the Swedish market. While the opinions are not overall convergent, various stakeholders from different actor groups indicated that aspects such as greenwashing, lacking transparency as well as a currently missing overarching politically enforced regulations are not seen as barriers to the development of the market, but rather as opportunities to steer the market into a more efficient, climate-relevant direction by increasing its diversification.

While no clear conclusion could be made regarding whether or not the Green Bond pricing might be a driver, factors such as positive public appearance and access to a broader investor base have a positive impact on the issuance volume of the market.

An original stakeholder map was created, representing a simplified version of the interactions between the three key stakeholder groups, which are the financial, regulatory and advisory actors. The financial sector, represented by banks, investors and issuers constitutes the core of the Green Bond market and have a major influence due to their role as the committee of the Green Bond Principles. Advisor groups such as CICERO do not participate in this committee but have a strong influence due to their scientific neutrality and not-for-profit motivations while collaborating with the investors. These findings allowed us to create a diagram adapted from previous studies, representing their interactions as part of the Multi-Level Perspective framework.

While these two actor groups seem to have great influence over issuance volume of the market, the major steering power to further catalyse the market is with the policy makers as representants of the people. Political regulations, goals, and incentives are to be considered as very influential on the Green Bonds market’s development and its efficiency as a financial instrument in the process of sustainability transitions. Sweden is to be seen as a positive template market as the government, situated at the landscape level, represents a population that
expresses high awareness for the environment and the threat of climate change. In Sweden, Green Bonds have long shifted out of the niche level and become a mainstream product as financial actors at the regime level respond to the pressure exercised by the political landscape. Using the multi-level hierarchy perspective on transition processes, originally created by Geels, an original, simplified representation on the emergence of Green Bonds in the Swedish market is developed. As a result from the multi-level interactions framework between the three key stakeholder groups, Green Bonds have shifted from the niche level and are progressively becoming a part of the regime level to integrate into transition processes by catalysing sustainable development.

Having understood important aspects regarding the Swedish Green Bond market dynamics, its actors and their interactions, it is eventually possible to answer the overarching research question that guides this study. While the insight achieved in this study is limited to the Swedish Green Bond market and experts interviewed, it is clear that Green Bonds may be viewed as an opportunity to translate climate issues into financial issues. By helping to close the existential gap between green technology innovations and financial allocations.

7.2 Policy recommendations

In order to cope with the undeniable threat of climate change, it is not only recommended that extensive national political incentives, such as Greenium or taxation benefits, are used to accelerate climate-relevant and sustainable development but also an international collaboration and enforcement of regulations and standards.

Insight of the differences between countries not only on a social, demographical, geographical and economic level, but countries with more extensive access to resources must also assist lesser fortunate nations as climate change cannot efficiently be opposed with nation-centric politics that focus essentially on short-sighted competitiveness neglecting long-term preservation of the environment. Regardless of the availability of resources or current state of development, environmental protection and sustainable development must become a priority for all governments, especially those leading nations of major size. Extensive global collaboration can only be achieved on a governmental level, making the country leaders key levers behind the achievement of sustainable development goals.

Nevertheless, the Green Bond market cannot be the only driver behind a more climate resilient future. Additional regulations such as CO2-taxations, protection of carbon sinks such as major forests as well as the overall limitation of GHG-emissions must become part of the top priorities for the world's governments.

7.3 Limitations and further research

As this study remains very exploratory and limited, follow-up research efforts can focus on the psychological motivations of the Green Bond issuance articulate more extensively around the exact interactions between the three Green Bond stakeholder groups. Understanding the opinions of professionals of each group, their motivations and concerns can be highly valuable for an extensive comprehension of the market, making it possible to steer Green Bonds towards their most impactful form. Especially interviews with environmental organizations such as the WWF or Greenpeace could provide an insight on this subject, that could not be explored during this study, as no interviews with such organizations could be conducted.
In addition to that, research concerning the specific role and influence of each of the stakeholder groups can improve the understanding of their interactions and the diffusion of this kind of financial tool. This can eventually lead to the development of a better framework for political stimulation of the Green Bond market development.

Another field of study could focus on the particular role of governments and their influence on the Green Bond market. This kind of research could also integrate the comparison of governmental investment into the market between countries with a high and a low overall environmental awareness. This could help to understand the correlation between these aspects.
8. References


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https://www.tandfonline.com/doi/full/10.1080/09537320701403334?scroll=top&needAccess=true


Appendix

9.1 The threat of climate change

The phenomenon of accelerated climate change in relation to global warming is widely recognized and one of the major threats that humanity faces during the 21st century. It is the result of a high rates of industrial and private carbon dioxide emissions accumulated in the stratosphere, and its impact has already been shown to affect the animal species and plants as well as the global environment. The resulting consequences will eventually have an impact on humans as well (IPCC, 2014). Global warming and Climate change, their drivers, impacts and externalities have been in the focus of a part of the scientific community for a long time as can be seen by the, respectively, more than 1.7 million and 3.5 million academic papers that appear on the platform Google Scholar using these two key terms. This number of articles is representative of the importance attributed to the understanding of these events on a scientific level.

Recent findings regarding the show that the atmospheric concentration of CO2, CH4 and NO2 are the highest since the last 800.000 years and that CO2 concentrations have increased by more than 40% since the pre-industrial era (IPCC, 2014). Main drivers for these increasing concentrations are the combustion of fossil fuel as well as land use changes (such as agriculture and industry) as well as deforestation. These factors play a key role in climate change and can be correlated to the observed temperature increase of 0.8 to 1.2 degrees Celsius between 1880 and 2017. Global warming is likely to reach the set limitation of 1.5 degrees Celsius between 2030 and 2052 if no changes are made to break the current tendency (IPCC, 2018). It has come to such a critical point where a sustainable future is unsure if the emission rates stay the same (Solomon et al., 2009) and thus, a fundamental restructuring of the human production and consumption behaviour is needed (Farla et al., 2012). The modern society displays an important lack of sustainable and durable practices in various key domains such as energy and food production, transportation systems and other industries (Farla et al., 2012). Failure to implement an effective action plan to reverse the current carbon emission trend, will upset the planet and change the life for every species living in the global ecosystem (Parmesan & Yohe, 2003).

9.1.1 The SRES scenarios

In order to be able to establish forecasts regarding the impacts of climate change and the development of the human population on the planet, the Intergovernmental Panel on Climate Change (IPCC) commissioned the establishment of four major emission and effect scenarios that are often used as the framework of reference for scientific studies on the effect of climate change. These Special Reports on Emission Scenarios (SRES) are respectively categorized in four overarching scenarios: A1, A2, B1 and B2. Extracted from the official IPCC “Special report on emissions scenarios (SRES), a special report of Working Group III of the intergovernmental panel on climate change” (Nakicenovic et al., 2000), these scenarios can be shortly resumed as follows:
Table 3: Summary of the SRES scenarios (Nakicenovic et al., 2000)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>This scenario displays an important and rapid economic growth, the world population reaches 9 billion by the mid-21st century, declining successively from that point onwards. New and efficient technologies are developed and spread rapidly as the world population becomes more convergent and extensive social and economic interactions develop.</td>
</tr>
<tr>
<td>A2</td>
<td>The focus lays on a more divided and nation-focused development. The increase in population is continuous but emission levels are rather low compared to A1.</td>
</tr>
<tr>
<td>B1</td>
<td>This scenario is comparable to A1 in terms of economic and population growth but differentiates itself by its less resource intensive way of life with an emphasis on clean and efficient technologies. Solutions to economic, social and environmental problems are taken in account on a global level.</td>
</tr>
<tr>
<td>B2</td>
<td>This last of the four scenarios represents a more divided but also more ecologically friendly world. Local, instead of global, solutions to economic, social and environmental stability are investigated leading to less overall growth and technological diffusion.</td>
</tr>
</tbody>
</table>

More broadly said, the augmentation in global temperature is estimated to be the strongest in the A1 and A2 and lowest in the B1 and B2-scenario, making them, respectively, the least and the most climate-resilient scenarios.

While these scenarios have been published more than a decade ago and multiple parameters have changed since then (e.g. important economic and population growth in China, Brazil), they must not be seen as entirely accurate but rather as an academic reference used to analyze climate impacts in the following section.

9.1.2 Impacts of climate change

Regardless if they are situated on land or in the oceans, human and other natural systems have already been proven to have changed due to anthropogenically induced climate change. While some of these changes remain reversible to some extent, other such as the loss of species and ecosystems are most likely permanent (ICPP, 2018).

In the following section, various studies integrating among other all, or a selection of the previously presented SRES scenarios are presented in order to give an insight on the threat attached to climate change and global warming. The selected academic literature treats key subjects such as food production and water, the rise of the sea-level as well as the extinction rates of marine and terrestrial species.

9.1.2.1 Food and water

One of the most important factors, especially with regard to the continuous and strong increase of human population is the production and distribution of food. A study by Parry et al. (2014),
analysing the impact of rising CO2 levels in the atmosphere on crop yield in connection to world hunger has shown that in all of the four SRES scenarios, crop production decreases in developing and increases in developed countries. Following one sub-scenario of the A1 family, A1F1, exposing the most important increase in global temperature, crop yield drops of up to -30% might occur in Africa and Asia by 2080. Contrary to continents such as Europe or North America, the projected raise in temperature by 8°C and a drop-in precipitation by 90% to which these continents are exposed compared to last half of the 20th century overcomes the fertilizing effect of higher atmospheric CO2. In comparison to that, in the best-case scenario, B2, related to the least important increase in temperature, the global yield production could still drop by up to -10%. The overall observed effect of regional production differences resulting from these four scenarios lead all to the substantial increase of famine relate suffering in poor countries. The authors thus point out that climate change, independent of the scenario they analyse, will induce considerable continental differences regarding the access to food which may eventually lead to a great number of famine-induced deaths. Mitigation of climate change is thus essential to avoid a humanitarian crisis considering this factor.

Closely related to the topic of food production are studies around the domain of the global water resource. In a study from 2004, Arnell, describes the variations regarding the global water resource in correlation with the SRES scenarios. He points out that greenhouse gas-induced climate change will most likely affect the volume, quality and timing of river flows and groundwater recharges, leading to scarcity and thus impacting the human population. He explains that by 2050, following the A2 scenario, between 1 and 2.7 billion people will face an increasing water stress level due to the decrease in river flows and runoffs. For the B2 scenario this number varies between 600 million and 1.5 billion people, thus around half of what is projected in the A2 scenario. The zones that will be the most affected by rising water stress are situated around the Mediterranean, in central and southern Africa, Europe as well as central and southern America. Arnell concludes by indicating that no matter the SRES scenario chosen, the humanitarian crisis linked to climate change induced water scarcity requires more thoughtful water resource management.

9.1.2.2 Rising sea-level
While sea-level is projected to be rising no matter the climate-relevant interventions implemented in the future, a lower risk is associated to a global mean temperature rise of 1.5 instead of 2 degrees Celsius (IPCC, 2018).

Regarding this other important factor induced by climate change that could massively influence human life on earth, Nicholls & Tol (2006), studied the potential sea-level rise according to the four SRES scenarios. Their calculations expose that all of these scenarios lead to a rise of the sea-level from 22 cm at the lowest (B1) to 34 cm at the highest (A1) by 2080 in comparison to values from 1990. The authors stress out the fact that no matter which of the four SRES scenarios they analysed, rising sea-level will most likely affect millions of people every year, especially in vulnerable island areas such as the Caribbean islands, the Indian and the Pacific Ocean. By 2080, in the best-case scenario of this study (B1) about 400 million people and in the worst-case scenario (A2) over 900 million people could live in hazard zones according to the A2 scenario. Adaptation and protection against the increasing flood risk will be required but the loss of habitable land on small islands, due to feasibility problems regarding the implementation of protection solutions might not be possible to avoid. The authors conclude by pointing out that climate mitigation could reduce drastically the number of people impacted by floods every year but that this alone is not not going to resolve the impacts that the densely
populated coastal areas of the world will face. They indicate that the results of their calculations must be seen in an integrated context on a global scale and that the emphasis of this study is not focused on the exact numbers but on the magnitude of the potential impact of the rising sea-level.

9.1.2.3 Biodiversity

Other than the previously analysed studies that focus on the direct impact of climate change on human life, other studies articulate around the possible threat for the environment and biodiversity. Nevertheless, a decrease in biodiversity would eventually impact human life as well. In a study conducted by Cheung et al. (2009), regarding the impact of climate change on the global marine biodiversity, predicts and important species shift, also called invasion, of the polar regions and massive extinctions of indigenous species in the polar and tropical latitudes as well as semi-enclosed seas such as the Mediterranean and the Persian gulf. Throughout the three considered scenarios, SRES A1 and B1 as well as another IPCC-external scenario, the species invasion intensity of 2040-2060 compared to 2001-2005 increased by 55% compared to the initial species richness of the considered areas. Predicted extinction rates levelled at a maximum of 7% compared to the initial state. Overall, this study exposes the vulnerability of species at the high- and low-end temperature sensitivity spectrum regarding climate change. These species face a high risk of extinction for species close to the polar and equatorial latitudes, while less temperature-sensitive species invade their habitats. The authors consider the percentage of extinction of marine species due to global warming as fairly low but non-less alarming compared to terrestrial organisms, where studies predict rates ranging between 18 and 35% (Thomas et al., 2004).

Another article, written by Donner et al. (2005), treats the threat of global warming for one of the most biodiverse but also most sensitive ecosystems known in the marine environment and on this planet in general: coral reefs. Often temperature augmentations of only 1°C can be enough to cause so called, coral bleaching, which can in the worst cases lead to a diminution of the reproductive capacity and the death of the reef and most of the organisms associated to it. Even in the lower emission scenarios SRES A2 and B2, a rise in annual thermal stress exposure is predicted with a minimum bleaching turnover of one event every two years. The study points out that a lack of thermal adaptation of even 0.5 to 1°C among key organisms of the reefs could lead to a dangerous frequency in bleaching but that this adaptation might be accompanied by a loss of diversity. The authors conclude by explaining that it is impossible to predict if coral reefs are actually capable of adapting to moderate estimates of warming (around 2°C) by the second half of the 21st century and that failure in adaptation would most likely cause extinction.

Even if some of these articles point out that the climate and population forecast their study is based upon come with a certain degree of uncertainty, they still point out clear evidence for the threat that climate change and global warming represent not only for human life but for all living beings on this planet.