



**Politecnico  
di Torino**

# Master's Thesis

Literature Review On

**Performance and effect of green bonds on profitability, advancing sustainability  
and quality project financing**

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## ABSTRACT

An altogether new type of financial instrument known as "green bonds" is the focus of this research. The Green Bond market has grown at an exponential rate in the last few years, bolstered even further by the 21<sup>st</sup> conference of the parties (COP 21). Green Bonds and the battle against climate change have a strong argument in this, thus it's necessary to note it. Investing in these long-term debt capital products shows that institutional investors are not violating their fiduciary commitments, at the same time.

I started with the background and characteristics of green bonds, further discussed about the performance of these green bonds with some other debt instruments, moreover, I also mention about the potential and demand of the green bonds and its benefits and advantages over other instruments.

In the corporate sector, green bonds are also facing a lot of challenges and competitions which I highlight and discussed, also proposed some scenarios with which these bonds can keep their direction upward.

As we mentioned, in the last ten years, green bonds have emerged as one of the most significant breakthroughs in the field of sustainable finance. But unfortunately only a very less or you can say very few educational/academic studies on green bonds have been conducted thus far and they have focused on the impact of green labels on bond yields. In the section of this thesis where we discuss role of green bonds in sustainability advancement, to better understand why investors/buyers and issuers/sellers are drawn to the green bond market, how green bonds help to shift or divert their capital to more sustainable economic activity, and how green bonds affect the way organizations approach sustainability, we use empirical research to answer these and other related questions. We examined and explore the quick/rapid growth and expansion of the green bond market and the impact of green bonds on market actors and participants' and their engagement with sustainability, which are readily overlooked if ones concentration and focus is exclusively on the marketing of green bonds.

## Chapter – 01: Introduction

### 1.1. Introduction to Green Bond

What are bonds???

Bonds are financial instrument which can be of different types for example bonds can be municipal bonds, federal bonds, corporate bonds. Bonds can also be classified according to their functionality like environmental bonds, social and governance bonds or green bonds.

The basic intent to issue bonds is to raise capital to finance or refinance any project, any business activity or creation of any asset for an organization. It has been notice that it is a norm in the corporate world that the ethical values and principals are a threat to profit, but we observed that this norm is changed during past decade and the actors involve in the corporate world starting from the stakeholder to the consumer or from the issuers to the investor are now discourage the previous norms and demanding standard (both ethical and financial) and a higher level of transparency in all aspect of the corporate sectors specially with the labelled ones (Glomsrød & Taoyuan, 2016).

Now, any actor of corporate world when make their corporate decision and strategy they give more importance to Environmental, Social and Governance criteria (ESG). Also ESG and other sustainable criteria's got more importance after heavily criticized by the unethical behavior during last financial crisis. Now, unethical behavior is punished and ethical behavior is appreciated by the shareholder of the corporate world.

Moreover, if we can observed recent intervention or any actions to change the behavior of companies, stakeholders or investors traditionally it has been done by either imposing some regulations, sanctions or some taxes, However, recent intervention created more opportunities as compare to barriers.

Similarly, it has been seen that global climate change is not included in the priorities of any actor of the corporate world. However, today the corporate world is accepting this agenda and stakeholders are including sustainable and responsible business models in their organizations. In today's world the corporate sector start its efforts to make our planet clean and green and corporate world is proposing different types of solutions to funds environmental friendly projects.

Among all the solution Green bonds appears to be a very prominent innovation. Green bonds not only create funds for the green investments and green projects but also attracts all the developed and developing countries, multinational companies and corporations and global institutions to invest in these environment friendly green projects and play their role in making our planet green.

To make our planet low or even neutral carbon United Nations also play it roles so that the requirement to adopt green solutions. United Nations Framework Convention on Climate Change

(UNFCCC) and also the Kyoto Protocol, the first treaty in the Paris agreement in 2015 brings all the nations together including United States of America, China, Russia, India and Europe for the collective action against the climate change and also provide platform to by an international public agreement to play their role against climate change. Another objective of this agreement is to divert the financial flow from the fossil fuels towards the clean and green form of fuel and energy.

With the international community, the United Nations Framework Convention on Climate Change (UNFCCC) and the 21st Conference of the Parties (COP21) to the 1992 framework convention on climate change (UNFCCC) affirm their commitment to limit greenhouse gas emissions and keep global warming below 2 degrees Celsius (3.6 Fahrenheit) above pre-industrial levels. The United Nations include the challenge of climate change in its 17 sustainable development goals. So we can observed that there is a huge demand for the institutional investors which will not only fulfill their needs for their short term portfolio risk but also at the same time decrease the risk of long term climate change (Climate bonds initiative, 2016).

After that a new term introduced in the corporate world which very quickly start circulating in the market i.e. "Green Bonds". This new financial tool not only fight against the challenges of climate change but also it has all the characteristics to fulfill the requirement of short term portfolio risks.

In the financial world Green bonds are the bonds which are considered a debt instrument which are issued to finance or refinance green investment and sustainable activity by default. These funds are raised by the public institutions or investors, also it is a tax-free bond which can be issued by an organization/institutions or investor to finance a green project which should be climate and environment friendly. These green project can be of renewable energy, low-carbon transport system will low or zero pollution. Green bonds are equivalent to climate bonds as it is fixed-income instrument which give climate change solutions.

#### 1.1.1. How World Bank define "Green Bonds"?

What is the World Bank's definition of Green Bonds? "Green bonds are regarded as a financial instrument having a fixed rate of return and liquid financial instrument which is used to raised funds specifically for the climate mitigation, adaption and other environment friendly and low-carbon project (World Bank, 2021)."

Green bonds not only provide suitable risk-manage tool for public investors but also give same opportunities to private investors. Therefore, green bonds fulfill its promise about the key Nationally Determined Contributions (NDCs) to the Paris Climate Agreement of 2015 are being implemented, and finance is being raised to support them.



The first climate awareness bond issued by the European Investment Bank (EIB) in 2007 is considered to be the beginning of the history of green bonds. Following that, the World Bank immediately adopted the Green bond that was established in 2008 (EY, 2016). There is also an internationally recognized Nongovernmental organization (NGO) named as Climate bond initiative, their goal is to initiate debt capital market for climate finance.

Generally, any institutional or body that can any conventional bonds can also issue Green bonds. This mean that it's also an opportunity for the "Brown companies" i.e. those companies working with or investing in fossil resources are also able to issue green bonds with respecting all the standards and principles of Green bonds. To promote the green investment and to cater the requirements of climate change worldwide multinational companies and large institutions like Bank of America, Norwegian government pension fund global, Rockefeller brother fund and many other institutions and organizations ate taking divestment initiatives for those project which are exposed to coal or any other type nonrenewable and less sustainable resources (Glomsrød & Taoyuan, 2016).

After the green bond was issued the year 2013 was the prominent year after which the green bond market expands quite rapidly. In year 2014 the market of green bond comprise of one third of total corporate bonds issuance, which is almost equivalent to 15 billion USD (NECP, 2016).

In year 2016, the green bond market make a new record with the total issuance of about 81 billion USD with the outstanding volume of about 180 billion USD (Climate bond initiative, 2017). Today, we will see the in overall green bond market the major issuers and investors are European countries and North America, while mostly project which are financed by green bonds are located in developing countries.

With the above point of view, to stay in the limits of 2 degrees of the climate change an estimated 93 trillion USD of investment is needed globally which definitely responsible for the growth of green bonds.

## Chapter – 02: Performance of Green bond among the other debt instrument in the market

### a. Characteristic of Green bonds

Green bonds are a type of bond that has a specific purpose and hence differs they are different in characteristics from the vanilla bonds (DHIR, 2021). As a result, the benefits associated with these bonds are unique, and we will explore how acquiring or issuing green bonds might be beneficial.

As we all know a green bond is still a bond, but it retains certain distinguishing characteristics, and defining exactly what a green bond is has become extremely hard in the modern day due to the variety of categories from which green bonds are composed or made. Consequently, the many parties involved in the issuing of green bonds, each play a significant role in ensuring the transparency and credibility of green bonds.

#### I. Categories and functionality of Green bond in the market

##### i. A bond with a specific and define purpose

Long-term investments, such as stocks, can be made with bonds, which are a sort of debt security. Bonds like “Sovereign bonds” are issued by governments, and they have a term of several years, whereas, bonds like “Corporate bonds” are issued by several firms, institutions and companies. After investing in these bonds there are mainly two methods in which you can get your investment back or it's better to say how to you get your returns. Most of the time the principle of the investment is repaid at bond maturity if the bond is kept to maturity, considering the fixed-interest income as the return, this is the first method to get your return. The second method involves profit given that bonds are originally offered for sale at face value, along with a market price that is often thought to be volatile, the effective interest rate will change to keep pace. So, by selling the bond for more than its face value, you're guaranteed a return on your investment.

Green bonds are regular bonds that have a special "green" element added to them (Climate bonds initiative). When comparing green bonds to conventional bonds, the most significant contrast is the use of the capital that have been raised. “PARI PASSU” (which are Latin words) meaning “equal footing” applies here because there are no additional fees, in general, with the basic pricing. A distinct advantage for green bond issuers, however, comes from their dedication to environmental stewardship.

##### ii. Green bond itself in the green category

Green bonds are merely a fraction of the overall amount of bonds issued across the world with only 1% to 2% representation. All the bonds in the bond market can be divided into two types, which are “labelled bonds” and “Unlabeled bonds”. If we take a look on these two category we notice that there is also sub-categories which exist inside the labeled bonds. Green bonds issued by companies and states alike are included in these two categories, as are hybrids of the two. Consequently, when discussing green bonds, we must take into consideration that, depending on the subdivision we are discussing, different regulations, advantages, and drawbacks may be

derived from that subdivision. Addressing the statistics gathered to demonstrate the expansion of green bonds, the primary issue seems to be whether all categories are taken into account but if not, then the question arises why not?

Labelled Green bonds and unlabeled bonds are both included in Climate Bonds initiative for 2016: "the whole climate-aligned bond universe" (Climate bonds initiative, 2016). However, the method by which the unlabeled bonds were discovered and included in the data is described. Bloomberg data and an assessment of more than 1,700 issuers enabled us to determine companies with more than 95% of their revenue coming from climate-aligned assets. The data from CBI will be the primary source for this study's discussion on green bond issuance.

### iii. Labeled vs. un-labeled green bond

The term "labeled green bonds" refers to securities whose revenues have been designated towards environmental initiatives and hence have been given a special designation by the issuing company. According to the CBI's 2016 report which we also discuss in the previous point states that, designated green bonds (118 billion USD on a total of 694 billion USD) accounted for 17 percent of the climate-aligned bond market in 2015.

The unlabeled bonds enable investors to reinvest their current capital in "climate-aligned initiatives." To put it another way, the bonds will be put to good use in environmentally sound endeavors. This is the most significant subset of the green bond market, accounting for 83 percent of sales revenue (576 billion USD).

There is a lot of variation in the statistics across those categories. Most green bonds in the transportation industry are unlabeled which make 68 percentage of the total unlabeled bonds, while in the energy sector, labeled bonds are more common which make around 28 percentage of the total labeled bonds. There seems to be a noticeable discrepancy in investment-grade issuance. Bonds are rated BBB- and up, or better. Green bonds that aren't labeled have a high rating of 37 % in the AA- category, while those that are labeled have a rating of 43 % in the AAA category. Of course, this distinction is attributable to the labeling, which gives investors more confidence, as well as the fact that banks issued these labeled bonds. This group of banks includes the European Investment Bank, the World Bank, and the International Finance Corporation. Green bonds have been issued by the World Bank, the International Finance Corporation, and the European Investment Bank. As we proceed further we describe that climate bonds initiative split green bonds in further more categories. This division help the buyers or investors to give more information of these bonds about the most specific category.

### iv. Description of green bond division by CBI

Climate bond initiative categorizes the labelled green bonds based on their use. "Green use of proceeds" bonds, commonly known as "asset-linked" bonds are the very first class, since in this class the issuer's credit rating is the same as that of conventional bonds. As a result, the issuer's recourse is fundamental. The bond's earnings are allocated to environmentally sustainable

initiatives aka green projects that follow the Climate bond initiative taxonomy (Climate bonds initiative).

The "green use of proceeds revenue" bond is the second class. In this case, recourse to the issuer is essentially unnecessary, as the income stream is mostly created via taxes. The money from this type of bond is used for green projects, including refinancing these projects too.

The (3<sup>rd</sup>) third class includes "Green project" bonds which are used for green projects. The unique thing about this type of bond is that the investor is directly exposed to the risk of the project itself. To use the bond, you must pay for the project's assets and balance sheet.

You can't use it to pay for any other things. The term "green securitized" refers to the last bond in the class. Bonds that are backed by specific projects, such as covered bonds, ABSs, and other structures, are referred to as "endorsed bonds." Since revenues from the assets will be used to pay off the debt, this sort of bond can be used to support asset-backed securitizations. These green bonds all have one thing in common: they're used to fund environmental initiatives. Companies, banks, and most recently, the government have all been able to issue them.

#### v. [Sovereign green bond](#)

A sovereign green bond issued by Poland in December 2016 was the first of its kind in the world at the time (BFM Business, 2016). Poland's support for coal, which is often believed to be extremely polluting, does not help its standing as a climate and environmental leader.

But, this step demonstrated a willingness to change to more environmentally friendly sources of energy. Other countries such as France began raising funds after that period and considered themselves to be leaders in this subject. It doesn't really matter whether France came in second, given Poland sold 750 million euro in five-year bonds, whereas France issued 7.5 billion euro in 22 years (Climate bonds initiative, 2017).

First and foremost was France's mandate for its institutional investors to incorporate and report plans for environmental sustainability investments in their portfolios. As a matter of fact, this requirement was included in France's "Act Écologique et Énergétique (TEE)", which took effect in 2015 (Ecological and Energy transition, 2016). According to an EU directive, certain significant firms and groups are required to divulge non-financial and diversity information 2014/95/EU. In this regard, more than a thousand investors are obligated to publicly display their "green" investments and support for the battle against global warming.

Sovereign green bonds have been issued in a growing number of nations, including Fiji, Nigeria, and Belgium, "an increasing number of nations have either showed interest or begun inquiries for a green sovereign issue". Depending on their sovereign status, or if they are linked to other green bonds issued by banks and enterprises, we shall discuss the advantages of these specific green bonds in more detail later.

Green bonds, as we've seen, are a very diverse market because of the many different terms and types of bonds that exist. A market's size can be increased or decreased based on the interactions between the various players.

## II. Actors of Green bonds market their involvement and role

In the case of vanilla bonds, there are several key players. Nonetheless, the issue of green bonds relies heavily on the participation of traditional players, such as independent reviewers. To ensure that each player is cited, and each role is explained, this section will be separated into sections that correspond to cycle through which green bonds are issued. This cycle is not chronological, and some characters may interact at many steps rather than just one.

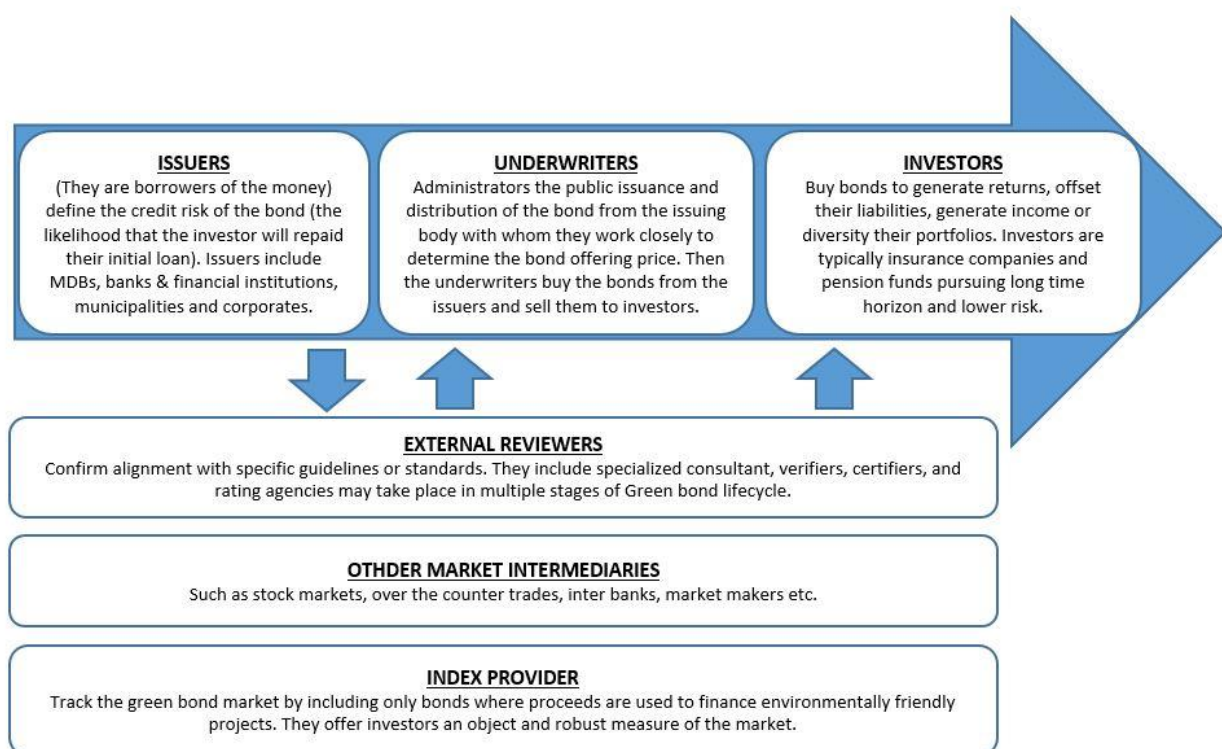


Figure 1 Different Actors of Green bond market

### i. Issuer of green bonds

Those who have issued green bonds to raise funding for environmental projects are referred to as green bond issuers. Obviously, this individual will oversee the entire bond's formation, from development to registration and also responsible for selling these bonds. The bond's issuer needs to recognize that all revenues are invested in environmentally friendly initiatives and that the green standards are adhered to once it has been issued. An international development bank, an organization, a company, a government, or a municipality can serve as an issuer of the bond. The Green Bond Principles (GBP) are a crucial framework that gives guidelines to issuers on the core

aspects of establishing a reliable green bond (Cochu, et al., 2016). Nevertheless, the bond issue is normally handled by an underwriter, such as a financial institution.

#### ii. Underwriter of green bonds

The underwriter's major responsibility is to settle the bond's issue on the market by defining the bond's conditions, such as the offering price, before the bond is issued. Because the underwriter collaborates with the issuer, the qualification and quality of both the issuer and the underwriter are critical since it also determines the bond's risk. Certain French organizations, such as Crédit Agricole and BNP Paribas, may be found on the CBI's "Green Bond Underwrites Annual League Table (Climate bonds initiative) which was created by the CBI.

#### iii. Reviewer of green bonds

For a bond to be issued, external reviewers play an important role. They "check the green bond's conformance with particular rules or criteria by providing an impartial judgment." In their report, they provide the green bond certification and a promise that the bond would be utilized for a sustainable project. The GBP suggests that the issuers publish an external review that can demonstrate the consultation of the reviewer who acknowledges the green feature of the bond and other remarks. This external review can be disclosed by the issuers. As a follow-up to the prior audit, the review will indeed concentrate further on the issuer's internal standards and procedures. However, the reviewer can also issue a certification instead of only verifying. As a result, the bond's "green" designation is evaluated by the certification. Consequently, nowadays only the CBS criterion requirements are used by certifiers. Among other things, a third-party reviewer looks at the bond requirements, project evaluation and selection, internal processes for monitoring proceeds, non-financial data on environmental impacts, and methods for generating progress reports. The CBI has compiled a list of recognized verifiers under the CBS for the purpose of certification (Climate bonds initiative).

#### iv. Agencies which rates green bonds

When a green bond is issued, rating it becomes necessary. Green bond ratings are being separated from ESG ratings by several credit rating firms. It is true that Standard & Poor's (S&P) and Moody's are the top rating agencies which have developed several tools. An evaluation tool for green bonds is one of the many resources available to help investors better understand and measure the environmental impact of projects or programs financed by these bonds, corporate issuers will also benefit from an ESG Evaluation Framework and methodology that incorporates these new assessment tools. There are several green bond indexes, although each index provider has a unique benchmark for green bonds (Cision PR Newswire, 2016).

#### v. Investors of green bonds

There are several types of private investors, including people and corporations. Institutional investors, include hedge funds, insurance companies, mutual funds, and other investment firms. The goal is to get a profit on their investment. Investors may now assess the environmental effect of their green bond investments courtesy to the GBP.

vi. Other market intermediaries

Regulators evaluate the qualifications and certifications of green bonds, as well as the issue itself, as additional middlemen. Stock exchanges throughout the world also sustain the green economy by maintaining listings of green bonds.

b. Potential of green bond in the expanding market

The tenth anniversary of the first green bond issue occurred in 2017. Since then, the market for green bonds has grown because of the advantages that this sort of bond issue provides. In this study, we will largely focus on the primary advantages of green bonds from both the issuers and the investor's perspectives.

I. Benefits or primary advantages of issuing green bonds

i. Advantages which are shared for all issuers (The green attribute virtue)

The "green" attribute of the issue of a green bond potentially gives advantages. The issue of a green bond may result in a number of benefits associated with the "green" designation. The labelled green bonds are distinguished from the unlabeled ones by the presence of a certification as only labelled bonds get the certification. In this way, we shall see how green bonds, comprising both categories, appeal to issuers, and why certification is a benefit that all issuers should take into consideration, respectively.

ii. What green means is involvement in environment sustainability

Environmentally concerned investors "or those who desire to change their investment strategy are the target audience for green bonds. As a result, the investor base is widened as a direct consequence of the use of a bond that must be linked to a green project, but does not restrict investors to a certain kind, but rather allows for any sort of investor to participate. Moreover, many investors will choose green bonds solely based on their environmental friendliness. Any other type of bond, be it corporate or governmental, is unlikely to attract their attention. To be viewed as environmentally friendly by investors, green bonds are generally required to meet a variety of disclosure standards. Other rules exist and are employed by the issuers, which widens the range of green bonds and makes it more difficult for investors to assess the environmental effect of their investments. Later, we'll talk about this issue. In order to demonstrate to investors, the project's environmental sustainability and its intended use of the revenues from the green bonds, it is required to disclose it in accordance with the principles or another procedure. A second opinion or certification completes this indication.

iii. Certification or second party opinion (A plus to labeled green bonds)

For the purposes of verifying whether the green requirements have been met, the GBP advise issuers to consult with outside reviewers. Second-party reviewers can check the "sustainability activities that will be sponsored by the green bond and how that performance will be measured" or third-party certifications that are certified and grant a green label can be used for this consultation (Climate bond initiative). Is there a process for obtaining certification? Yes, CBI's certification procedure has been divided into two sections.



The pre-issuance phase begins with the formulation, confirmation, launching, registering, pricing, and marketing of the bond (Climate bond initiative). If the bond is listed as "certified" and investors are interested, the certification will be issued within that time period. As a result of the certification of green bonds, investors now have an easier time finding a trustworthy green bond.

Post-issuance, when the proceeds of the approved bond are used to fund the eligible green project and assets, is the second part of the process. Furthermore, an assurance must be performed after the issuance to maintain the certification, and though it may not be necessary, the issuer can appoint a validator to check if the bond is still conforming to the CBS.

A green bond's worth and reliability are unquestionably enhanced by certification. Furthermore, according to CBI, issuing green bonds with certification is cheaper than getting a second opinion (Climate bond initiative).

Yet, some authors argue that the third-party who verifies that the funds are being used to support environmental initiatives, resulting in additional administrative and compliance expenses, is more important than the environmental benefits generated by the projects themselves (Flammer, 2018). As a result, even if the "Climate Bond Certified" seal of approval is not issued, a second-party view is more lucrative than a certified verifier. Other options include the issuance of conventional bonds and the subsequent reinvestment of proceeds into environmentally friendly initiatives if they are deemed more financially viable than other initiatives, according to the same author. However, because there is no single standard that provides a single form of green bond, one of the most difficult decisions is whether to go for certification or merely verification. This is one of the most difficult decisions to make. This topic will be discussed in greater depth later on in this chapter.

#### iv. Enhancement of reputation

Green bond issuance, regardless of whether the bonds are labeled or unlabeled, helps enterprises and states create a desire to engage in the essential change to a more environmentally friendly economy. One of the most important advantages of green bonds is that the issuer's efforts to preserve the environment for future generations can be clearly seen by the public. Issuing green bonds can also signal to investors that a firm is passionate about environmental sustainability or indeed wants to take the lead in the subject. Publicity may also help raise awareness about the importance of environmental concerns inside corporations or governments. Investors, as well as potential clients or other stakeholders, benefit from the issuer's behavior and strategy. For example, a company's commitment to corporate social responsibilities may help explain the requirement for a funding strategy that is environmentally friendly and readily apparent. Consequently, the firm's issuers will do so by initiating a large-scale project to demonstrate their importance.

At first look, it's easy to see that firms like oil and gas corporations, which aren't traditionally associated with environmental concerns, are able to issue green bonds. Those who would be called "brown" (oil & gas companies) would show that they want to be part of the change in the



environment. The issuer's green credentials don't matter as much as the green project the bond is used to finance in the green bonds. The CBI research, commissioned by HSBC, also noted that major companies are needed to meet the market's urgency. We may not have the time to wait for smaller, pure play green enterprises to gradually replace fossil fuels with green capital.

v. [Adversarial advantage \(The green washing\)](#)

When a company uses marketing to depict the products, operations, or regulations appear environmentally friendly when they are not, it is called green washing (Investopedia). New forms of green washing may arise because of firms and States issuing green bonds that promise to utilize earnings for environmental purposes, but do not really do so. According to the skeptics, green bonds may be nothing more than another kind of green washing, and they wonder if this invention is worth the effort (Financial Times). Because of the wide range of definitions that might be applied to green bonds, there is currently no one legal enforceability for green bonds. When green washing is found out, no sanctions will be applied, notwithstanding the fact that a certification and/or CBS or a second-party opinion might provide the issuer with higher value and confidence. Thus, if green washing is the initial motivating factor, not only does environmental effect decrease, but so does the issuer's reputation as well.

vi. [Sovereign green bonds \(A new advantage for state\)](#)

Since the issuing of the first sovereign green bond in 2016, state governments have begun to take this specific category into consideration more and more often. The issuance of this bond demonstrates the country issuer's commitment to complying with the Paris Climate Change Agreement and displaying its leadership in green finance, regardless of whether the project is domestic or worldwide in scope. As a result, this will have a spillover effect on both the government and the private sector's internal coordination. The sovereign green bonds, in addition to their common advantages, will allow the genuine green bonds market to grow. Stakeholders and investors alike use the issuing of government bonds on the domestic debt markets as a model. Securing a position as a "green hub" through the issue of sovereign green bonds is another way to assist national financial centers grow.

vii. [Other substantial advantage](#)

Oversubscription of the bonds would occur if the green criterion attracted certain investors and demand for the bonds has been increasing recently. We are not aware of any additional benefits to investing in them over other types of bonds at this time, but we are also not aware of any bad aspects of doing so, aside from the possibility of diminished secondary market liquidity. A well-balanced portfolio can benefit from their inclusion. Investors that follow the "buy and hold" approach will see a reduction in bond volatility because of this. This allows us to determine whether investing in green bonds is a worthy investment (OECD, 2016).

## II. Rationale of buying green bonds

### i. Demand is increasing for investors

Investors are increasingly interested in green bonds because of their distinctiveness. This heightened awareness of environmental issues has emerged as a critical turning point. For both the bond issuer and the investor, it's a major competitive advantage, as they can both contribute toward a more sustainable future and show that they are a responsible corporation, organization, or individual at the same time. As a result, investors may now put their money to work in environmentally friendly endeavors that they otherwise wouldn't be able to. They may protect themselves from climate change by investing in and using green bonds. In particular, Bloomberg claims that green is the new gold (Bloomberg, 2017). Why? Since environmental risks are typically not reflected in the balance sheet of regular bonds, which might lead to considerable losses, green bonds have environmental consequences already incorporated in the balance sheet. In labelled green bonds, this environmental problem is addressed. If the bonds in question are advantageous to the issuers, then investors should get the benefits as well.

### ii. Safety of labeled green bond for investors

Investing in green bonds requires understanding the distinction between labelled and unlabeled securities. Labelled Green Bonds are those that are transparent, strong, and reputable, and that's exactly what the GBP's four components define as 1. Use of the money 2 (Sutkowski, Gargaro, & Hussain, 2017). Project Selection and Evaluation 3. Management of the money 4. Reporting. Because of the rapid expansion of the market for labelled green bonds, these three pillars are very necessary for each investor.

Investors will be able to tell a difference between this and other climate change investments with little resources for due diligence thanks to the labeling. Because of the evaluation and risk assessment provided, the market friction is decreased. Investors want Climate Bond Certification because it lowers transaction costs, increases transparency and uniformity, and enables them to interact with the issuer more deeply, according to CBI (Climate bonds initiative, 2017). As a result, green labeling becomes a crucial aspect of an investor's confidence. The examination of low-carbon credentials of investments enables investors to save time and money, but it must be mentioned that certification does not offer certainty regarding credit return and risk.

### iii. Transparency and reporting prominence

Transparency and reporting of information supplied by companies to investors fulfills the GBP requirement of accuracy. The controversial advantage for issuers, green washing, is really at odds with this. Investors have faith in the standards since they are in line with GBP criteria and offer a scientific basis and clear evidence on what constitutes "green." In a competitive fixed-income market, updates provided after the bond's issue and about the usage of the proceeds assist risk assessment. In addition, reporting offers a substantial benefit in terms of delivering information that wouldn't otherwise be accessible, such as the project's characteristics or its influential factors. Improved internal control and a positive evaluation system resulting from tracking and reporting on proceeds enhance the issuer's financial strength ultimately.

The HSBC research, on the other hand, found that just 43% of issuers (particularly firms) convey their plan, while investors want greater information about the dangers of global warming. The present degree of transparency is deemed inadequate by around 56% of investors, even if corporations increase their efforts to meet this need. To keep the green bond market expanding, however, to be successful, investors' intents to grow their green market investments in order to participate in the energy transition and demonstrate that financial resources such as green bonds can be scaled up in order to limit global warming impact must be fulfilled (LAFOND, 2017) .

## Chapter – 03: Challenges Green bonds market facing today

The green bonds market facing a lot of challenges and issues in the corporate bond market. In this chapter we will discuss these problems and highlight some solution which will be helpful for the green bonds to put their direction upward in the future. The biggest challenge that the green bond market is now dealing with is a lack of regulation and a lack of industry standards. Although we have seen in the recent green bond market that market participants are attempting to develop green bond principles (GBP) and draft standards, they have been unable to put them into effect throughout the whole market. Inequality about the information is quite prominent regarding the green bonds and till now not only we don't have very clear definition of green bonds but also there is lack of common practices in the market.

Another prominent challenge green bonds are facing today is financial benefit and lack of legal enforcement mechanism.

### A. Prominent challenges of today's green bond market

We have notice that in recent years green bonds market expands a lot and it give advantages and benefits to both its issuers and investor, but still green bond market represent only the portion of the total bond market. This is alarming point for green bonds and it's also raise a question about why there is such a small proportion of green bonds in the overall bond market? The answer of this question is discussable but the main challenges and problems responsible for such a low proportion is that there is lack of legislation and lack of legal enforcement mechanism to ensure the environmental integrity and to give its investors the true and clear information. The second issue is also related to the previous one that financial contribution of green bonds is low which should be increase so that the bond market can expands.

#### 1. Faced with the lack of a common "green" concept

##### a. *There are a plethora of green bond definitions in a self-regulated market*

As we he discuss earlier that till date we are unable to see the coherent and clear definition about the green criteria which is responsible for the misunderstanding among different actors of green bond market. It will not be wrong to say that actors of the green bond market themselves make different set of rules to regulate the market.

Another thing is we can see there are voluntary information flow in the market by the third certified party and these information about labelled vs. unlabeled green bond causing asymmetry among green bond market. Also the issue of labeled vs. unlabeled categories is not the only issue which is creating different definition for green bonds. Every actors is taking definition of green bonds according to its own perception. If we talk about the issuer's point of view, one's perception is to use the investment in the green and environment friendly projects to minimize the climate shift. On the same hand other want to refinance an already in progress project to add environmental aspect in its project but without the goal of minimizing the climate shift.

Green bonds scope is deteriorate with this lack of transparency, also it reduces informational efficiency when put his time to distinguishes all these definitions and regimes. This variation and fragmentation in the definition should be tackled otherwise it will lessen the legal depth of green bonds.

- b. *Due to the market's current knowledge asymmetry, an adverse selection is occurring and the market's efficiency is being reduced*

Whenever there is asymmetry among the issuers and investors there is always inefficiency in the market (ARMOUR, et al., 2016) . This can be easily understandable by a simple example by imagining a market where buyer knows less about the selling products. When it comes to green bonds, this example holds true as well. The issuer of a green bond is fully aware of the purpose, quality, and other characteristics of that green bond, whereas the investor or buyer of that green bond is unaware of the issuer's intentions because he is unclear about the green criteria, which differs from one green bond to the next.

As we know green bonds market is a self-regulated market, in these type of market we see it is difficult to prevent the asymmetric information fully. Regulation like Green bond principles (GBP) allow issuers of the green bonds to disclose the information voluntarily, as this is not compulsory it's very difficult to know the issuers personal intentions which may result in market failure. As a result, given the possibility of revelation of commercially sensitive information, it is doubtful that investors will draw negative conclusions from the issuer's reticence (Ross, 2018).

The economist George A. Akerlof used the analogy "The market for lemons" to demonstrate how the quality of the product declined when there was unequal knowledge among both customers and suppliers (Akerlof). The same analogy goes for the green bond market in which there is asymmetric information between the issuer and investor of the green bonds causing market failure.

Therefore, this market behavior will ultimately affects those issuers who are issuing high quality green bond with actual green characteristic, as these issuer will not get suitable price for their bonds in the market. Moreover, when the high quality green bonds not get fair prices in the market they eliminate and low quality green bonds remain in the market, but because of the possible risk factor investors are not attract by these bonds.

- c. *Among the consequences of information asymmetry in the green bond market are the following: the need for information disclosure throughout the process*

The information exchanged between green bond issuers and investors must be clear and transparent in order to reduce the misleading perception of green bonds held by investors of green bonds. A procedure for information disclosure is necessary for this purpose. Certification and reporting by the third-parties are also a way to mitigate this information gap but certification required additional cost and for this reason there should be a second option or procedure for the reporting with less cost as compared to certification. There is currently no harmonized set of impact reporting for comparability and relevance information, despite the fact that third parties are accepted for certification and reporting.

A critical challenge for green bonds at this point regardless of certification or verification is that this develop a disparity if we compare green bond with traditional bonds where no such transparency is required as this stage. This disadvantage of green bonds for providing transparency tend them to keep the rate similar to traditional bonds. So, we can say that green

bonds are tackling multiple challenges which is a reason that till date why it represent small proportion of the bond market.

*d. The greater the disparity between the two, the greater the risk: washing with a green tint*

As the market of the green bond is emerging and the causes of green washing is increasing there is also various definitions of green bonds which help issuers to define themselves about what is green. In simple words we can say that issuer on the basis of their commitment with their clients, issues or name the bond green regardless of its actual purpose which causes green washing.

As we already define before that 'Green washing is an act of displaying false information and spreading false information about company product that it is environmentally sound' (Ludvigsen, 2015). Moreover, lack or uncertainty of green criteria can lead green washing of different types. Green bond use of proceed can be used in different ways to funds those projects which are not actually green, the four most prominent ways are: the use of proceeds themselves are not monitored or tracked tight enough to be used for that specific project also issuers are not able to defend that the project actually benefit the environment, the core activities of business are not sustainable, by false representation of green bond on its environmental benefits issuers receive lower cost of capital as there is negative premium on green bond and some issuers use it as incentive to green wash their bonds. Its obviously result in misleading investors as if they invest their money in some other bond to get their desire output in term on environmental and financial returns. By information disclosure and transparency of green bonds the efficiency of green bond market can be increased.

As an example here I want to discuss a very well-known case about the green washing. In 2014 a company named Engie which is formally called GDF Suez issued green bond of worth 2.5 billion euros. Afterward, it was disclosed that the fund raised has to be used for a large hydropower dam which is in Brazil. From environmental and ecological point of view this can be debatable and questionable that this project can affect the local ecosystem. So how can this company issue these type of green bonds? But as we know there is no legal rules and regulation for such this and this the reason that the same company issued again new green bond worth 1.25 billion euros in 2017. This is one of the example which shows that there should be a framework to stop these types of cases again.

*e. Difficulties that investors have in seeking remedies*

As the case discuss in point d, we can easily notice and understand that the investors or buyers of the green bonds are investing in these bonds because of their characteristics i.e. environmental objectives and world's sustainability goals, but the issuers are failing in proving these green objects of these bonds. This case actually expose green washing as an example. So, the thing is what is defined as green object is the main key on which whole thing revolve.

According to theory, 'If the buyer or investors are trapped by the issuers on buying a bond because of its green characteristics than straightforward it is an act of misleading and promoting false information and it constitute a legal case' (Shishlov, Morel, & Cochran, Beyond

transparency, 2016). In this situation the first thing investors has to do as to obtain remedy is to prove that the issuers of that green bonds are liable and breached the antifraud securities provision. This can be accomplished either through a civil investment or through a criminal action, depending on the applicable domestic framework. But with deep grief because of lack of enforcement mechanism and also definition disparity till now specifically for green bonds these type of litigation are very difficult to deal with and till date no investor able to obtain its damages.

Furthermore, we can assert that the self-regulation observed in the market for green bonds may also be a contributing factor to non-compliance failures. This can be defend on this way that the only dependence and reliance of self-disclosure or voluntarily sharing information cause the problem, this informational reduction which is cause by lack of standards for information disclosure and lack of comparability indicators for green bonds increase in the due diligence time and cost.

By the damage image and reputation of issuers because of green washing, potential investors or buyers will no more attract to the issuers. The lack of standards and one common green definition leads different approaches for this financial instrument.

#### *f. Green bonds vs. sustainability bonds*

Challenges for green bonds other than one common green definition, standards and common framework is the emergence of a new bond called 'sustainability bonds'. These bonds are actually a combination of green and social characteristics. So, here again question raised on the future of green bonds that will green bonds are replaces by this new type of sustainability bonds?

The first example of sustainable bonds, which were initially green bonds but have now evolved into sustainable bonds, was issued by a coffee chain corporation. It was the world's first sustainable bond. The organization believes that it is equally vital to combine social qualities and impact with environmental characteristics and impact. As a result, in May 2016, 'Starbucks' issued a sustainable bond worth 495.6 million USD to fund the management of the coffee supply chain. Then in June 2016, New York City housing development corporation (HDC) issued sustainable neighborhood bonds of worth 590 million USD, which allows customer to invest in the social beneficial project finance by HDC. After that in July 2016, BNG which is a Dutch bank issued 1 billion USD of sustainable bonds which they lend to sustainable housing associations (avery, 2016).

According to theory and definition, the primary goal of green bonds is to reduce environmental effect. However, this is not sufficient in the sense that there are social issues that are also part of the ESG requirements that corporations and institutions must meet. As a result, in the context of sustainability bonds, a hybrid bond emerges, which, as previously discussed, is a combination of both green and social features, and it appears that this bond will ultimately triumph over green bonds. As we also saw the statement of "Navindu Katugampola", who is the head of green and sustainability bond organization said at Morgan Stanley that "because of the flexibility that

sustainability bonds provide, it appears that they are capturing a significant portion of the market.” (avery, 2016).

## 2. The financial counterpart to green bonds: the absence of price benefits

What is missing in green bond market? This is a question now raising after the green bond market is expanding. We know that green bond current benefits both for its issuer and for its investors are straightforwardly not enough especially if we talk about financial benefits. The only different between vanilla bonds and green bonds from the financial view are just their use of proceed. Therefore, it is necessary for the green bond market to expand their benefits especially financial ones. In fact, it can be said that green bonds are an additional source for financing the investments (Berensmann & Lindenberg, 2016). Our query of what is lacking in the green bond market is first and foremost that demand from investors is extremely high, thus it's time to accept or request a green premium. A study related to the green bond premium concludes that the reason for the negative green premium is actually green bonds demand as compare to its supply, which is very bigger than those of conventional bonds.

On the topic of green premium we can have two conflicting reports, one report is from “ (Preclaw & Bakshi, 2015) and “ (Bloomberg, 2017)”, the other is from “ (Karpf & Mandel, 2017)”. One report from the “ (Preclaw & Bakshi, 2015)” and “ (Bloomberg, 2017)” finds a negative premium for green bonds of -17bp and -25bp respectively and the other report which is from the “ (Karpf & Mandel, 2017)” reports that there is a positive premium for green bonds which is 7.8bp as compare to non-green bonds (Karpf & Mandel, 2017). Here, at this point we can question that whether it is all about the law of demand and supply?

Moreover, as we have already pointed out that investor mostly rely on certifiers and external reviewers due to lack of uniform framework in the green bonds market. Also according to a European union study said that, green bond become less attractive as compared to the conventional bonds because of an additional cost for issuing green bonds (Sun, Andreas, Schäfer, & Wulandari, 2018).

## B. Changes in the future are needed to maintain the market for green bonds moving upwards

Carbon dioxide is anticipated to grow to 2 percent in 2017, putting "the Paris climate agreement goals in jeopardy," according to the report (Jing, 2017). Given that green funding has already contributed to and is likely to contribute even more to the reduction of climate change and global warming, it is imperative that it be further developed. As has been indicated throughout this inquiry, the green bond market has the potential to make a significant contribution to this ambitious transition; but, it must be improved in order to have a larger impact. So, the climate bonds initiative has identified "seven super themes" in the year 2018, including international standards and definitions of green bonds, as well as "regulators will continue to innovate by putting in place a wide range of new rules, regulations and incentives", (Whiley, 2018). "250-300 billion USD which represents at least 60 percent or more growth on 2017 estimates" is the climate bonds initiative (CBI) forecast for the year 2018.



Those trends are the most important improvements that need to be implemented since they are the solution to the problems that we have already aimed at investigating. Firstly, a uniform legal framework would encourage the market in reaching a consensus on a common definition at long last. Secondly, with the legal framework a financial incentives could be included in this guideline to help grow the market. In the last, in order to improve the green bond market, it should also take into consideration new technological instruments.

#### 1. Arrangement of green bonds market on a unified or common legal framework

To maintain a free market, all three of the following questions must be answered: what things and services should be produced, determining how many of those goods and services should be produced and at what price (Investopedia).

Self-regulation, or the absence of government regulation or involvement in a given market, is possible, but only when the market's functioning and efficiency require it. In order for a market to be efficient, it must be clearly visible that it is working. Rules and regulations of given market can be articulated as a method of "consistently and purposefully influencing the conduct of others in order to achieve a clearly defined objective or outcomes (BLACK). There can be no justification for State regulation in an efficient market without a clearly identified or expected failure of that market. Furthermore, government regulation is required to improve market failures that have already occurred. In the past few years, green bonds have been mostly self-regulated, and we've seen a variety of non-government regulatory systems coexist. However, private governance is often more responsive to market actors' needs than state regulation, it can suffer from lack of legitimacy, accountability, and consistency and be prone to green washing (Park, 2018).

Among other current concerns, there is a lack of agreement on what constitutes "green," information asymmetry, and the avoidance of "green washing. Green washing will not be deterred by the fines and penalties issued to those who commit the crime. As a result, government authorities can justify requiring environmental disclosures as a condition of doing business.

To begin, the market must harmonize the definitions and procedures for green bonds, which is a necessary first step. Diverse green methods have muddled the industry and may have harmed its growth in recent years. As a result, all market participants should agree on a single point of reference.

##### *a. Common and uniform definition*

Unlabeled and labeled green bonds should no longer be distinguishable. If the market standardizes, the criteria required for the issuers to name the bond "green" can be evaluated. Because the bond must be used to finance or refinance a project or task, the selection criteria will revolve around those projects that qualify. It is also necessary to clearly define the use of the proceeds from the outset in order to be able to compile reports later on. Definitions of green

should be based on the specific objectives of each green project. This should be the end goal of all present definitions. The concept of green bonds has been broadened as a consequence of the work of a few key players.

*b. It is necessary to gather and unify the scope of current standards.*

Approaches and methodologies for defining green bonds exist, and lessons can already be drawn from the green bonds market, as this study has already shown. Green bonds have been given a taxonomy, criteria for disclosure, and reports in order to make it easier for the market participants to intervene. As a result of the standards' certification award, the market has been called "green bonds" inside this market. Since 2016, the GBP, or general business principles, have been a part of the CBS.

The majority of the time, these kinds of norms and rules are relied upon to provide reliable information. When it comes to green bonds, Moody's96 and other second opinion providers, including CICERO, use the "shades of green" approach, whereby bonds are classified "dark, medium, and light" green based on their alignment with the low-carbon transition, were examples of such developments." Because of this, a green bond certified by CICERO but not by CBS may not be considered green, the differences between the two organizations' standards are evident.

No state has thus far accepted or adopted the standards as national guideline. Despite the fact that it lacks overall equality, it is seen as private government. A public legal enforcement mechanism and a unified market definition are other notable absences. To make it easier for governments to incorporate them into their legislation and ensure compliance, markets may either agree on a single reference or combine them to produce a new but still the only one.

In order to develop a strong Green Bond market, the undersigned investors feel that adhering to the GBP is a key step in this approach," says CERES's Investor Expectations for the Green Bond Market statement (CERES).

Consequently, the GBP might become the only benchmark on a global basis. Is it possible for players to embrace a single document (such as the GBP) and include it into the regulation?

*c. Towards a green bond legislation?*

The market's growth will be severely impacted by ongoing diversification. Legitimacy disputes concerning green bonds center on a governance question: how should the environmental impact of a green bond best be assessed? As a result, a green bond bill drafted by public institutions has mainstream economics. It's true that if green bond law is created, "self-regulation" will no longer be relevant due to the proliferation of green definitions. Public actors and government backing are implicitly included in this definition. Public actors have begun to provide some direction on the green market as the Paris Climate Agreement and its Nationally Determined Contributions (NDCs) have already begun to have an impact on the market (NDC) (Nationally Determined Contributions (NDCs)).

Let's suppose, an investment that is compliant with the Nationally Determined Contribution (NDC) could be regarded as green. The EU's Energy-Climate Package (ECP) and France's National Low-Carbon Strategy (SNBC) can both benefit from wider national decarbonization and resilience plans. Investors should be able to identify which projects are compatible with long-term low-carbon approaches if a framework is established by the government". Investors would be able to quickly identify the environmental impact of a bond if the government implemented a policy. Furthermore, other researchers argue that the benefits of these public interventions are overstated. Green bonds would need strict regulation and oversight in order to be considered green in one jurisdiction, but this might also lead to a "Balkanization effect, with bonds qualifying as green in one jurisdiction but not another," if public players become involved (Morreale, 2017)".

As a result of the enormous range of green bonds and markets, "in practice, it is practically impossible to come up with a description that applies to all green bonds and all local markets." By building a market structure that all participants can refer to, transparency may be strengthened.

*d. Environmental impact evaluations and reporting for greater transparency*

Disclosing information as a matter of course is essential to ensuring transparency. But, this has a direct impact on the reporting and evaluation of green bonds. Today, a variety of methods make it possible to provide this level of openness. Therefore, there needs to be a clear definition of "green" and a consistent approach to evaluation and reporting. Since there are so many different indicators, it's not viable to conduct a comparative analysis of the bonds. This would lead to conflicts of interest in the selection of impact assessment indicators and mandatory and optional reporting requirements (SHISHLOV, NICOL, & COCHRAN, 2018). As a result, all green bonds should be subject to binding evaluations. Pre-issuance and post-issuance evaluations could be implemented based on what is currently being used in the market. Government agencies should learn from the successes and failures of existing market-based regulatory processes, according to proponents of private governance (Light, 2015).

As a result, CBI's certification procedure should be incorporated into the pre-issuance evaluation. Starting with environmental standards and "clarifying at product conception" the activity and policy purpose combinations for which proceeds are intended to be used as a starting point, it would be necessary to adhere to, as well as "their target value for each major indicator". Independent third-party audits (certification) over second opinions should be the preferred method of government oversight. Because the current market demonstrates that certification led by certifiers verifies standard compliance (CBP), Certification, on the other hand, is subjected to a more thorough examination process. There should be mandatory certification for all market issuers in France following the implementation of the "Transition Écologique et Énergétique Act" (TEE).

Check consistency is thought to be the purpose of the post-issuance review, which is to say reporting the actual use of profits after a specified period of time and sort. It might be done every

year, like with CBP, or even every three months, if necessary. When a bond's purpose is to fund environmentally-friendly green initiatives, reporting on how that money is spent should be mandatory. As a result, the common framework should specify what kinds of information need to be provided and how they should be reported.

Additionally, "impact reporting" may be taken into account. To help investors and others keep track of the environmental impact of their green bond holdings, impact reporting is used. In addition, ratings will support this post-issue evaluation. Moody's and S&P Global are already active in the green bond market, as we have previously stated.

As a result, a public regulation and framework for green bonds might help to increase transparency on the market and would not be a barrier for investors to accessing the market. When companies are forced to disclose all of their relevant financial data, it makes it more difficult to deceive investors about the company's predicted profits (Seligman, 1983). Because investors would be less concerned about being defrauded or treated unfairly if more information was made available through the evaluating and reporting process, more corporate securities sales would be possible (Justification For Mandatory Corporate Disclosures).

*e. Benefits of regulation due to asymmetry of information*

Moreover, government regulation could help to alleviate the information asymmetry that now exists in the green bond market, since all issuers would be required to provide the same information in order to be classified as green. So the regulation is beneficial to investors since it reduces information asymmetry. The reduction of information asymmetry is expected to occur naturally as a result of agreement on a shared framework.

In addition, this change in government control has some effects on the people who live there. Politically motivated risk assessment, the shifting of risks from private investors, and fragmentation are the main reasons why the government doesn't work. There are currently multiple subsidy schemes, funds, and tax arrangements in place to encourage sustainable investment, which makes fragmentation a risk.

*f. Transparency security increases expenses*

Transparency will be improved and additional costs would be eliminated if a consistent framework is established. These mandatory criteria are essential. Because no single definition exists, today's information on green bonds and their relative returns is critical. However, as we've just seen, this information is frequently requested of reviewers or certifiers in order to improve the trustworthiness of the bonds. Traditional bond issuers, on the other hand, often don't charge additional fees for providing more information to the public. Additional costs would only be incurred in the short run.

In fact, the expenses will be reduced since all actors will use them equally if such an assessment is made mandatory for everyone. Consequently, it not only boosts investor trust but also clarifies and attracts the green market. As a result, public officials must be careful in how they implement this new transparency policy without negatively affecting the economy.

It has been demonstrated that there is a trade-off between stringency and the cost of monitoring, which, if not addressed correctly, could provide a significant barrier to the adoption of offset programs in some sectors (Shishlov & Bellassen, Review of the experience with monitoring uncertainty requirements in the Clean Development Mechanism, 2015). If you're going to go green, you're going to have to be open and honest about it. If any issuers manage to slip between the cracks, a market-wide legal framework will ensure compliance and allow legal action it is possible that such laws will be broken, but this is not the case at this time.

*g. Compliance with applicable laws and acceptable legal measures*

Both governmental and non - governmental governing models rely heavily on their own perceptions of legitimacy in order to secure compliance. As with green bonds, there isn't a uniform set of rules that everyone must follow, making compliance difficult. There are no authoritative third parties that can screen or guarantee compliance, as stated in the article (DRUM, 2018).

Having a clear prescriptive standard on the market could help remove the multiple standards and definitions that lead to green washing. "Using New Zealand's natural resource management as an example, Cameron Holley and Neil Gunningham discovered that fines default legislation for non-compliance motivated parties to collaborate rather than take a free ride." Investors may be able to sue issuers according to this declaration, any reports concerning green bonds indicate a likely misallocation of money, the monies will be returned. If the goals of green bonds are not met, legal action may finally become the norm.

*2. Strengthen the financial instruments for green bonds*

Additional fees for certification and approval are likely to be eliminated or at least incorporated into all green bond pricing, so there will be no differential in the cost of the bonds. Considering the lack of a green bond premiums that we've witnessed, a rule may be the answer. Accordingly, "liquidity" means "the ease with which a security can be traded" (Amihud, Mendelson, & Pedersen, 2005).

Illiquidity can be caused by a variety of factors. Cost of trading or imbalance in information. Because informed traders demand a higher bid-ask spread in a market that includes both informed and uninformed participants, the uninformed traders lose. Illiquidity is linked to a wider difference between the asking and bid prices. Information asymmetry is linked to an increased risk of liquidity problems (Lin, You, & Huang, 2012).

As a result, investors are willing to pay a premium for green bonds because the liquidity risk is reduced as a result of standardizing the standards. This will reduce information asymmetry. As a final point, this research looks at how many markets have invested in new technologies in the hopes that they can improve their products.

### 3. Promoting the green bond market's expansion using modern technology

#### a. *Green Stock Exchange*

Since the introduction of green bonds to the financial markets, many exchanges have been established to facilitate the trading of these products. In the meantime, a worldwide green trading platform can be implemented as a common foundation. Luxembourg Green Exchange (LGX) launched in September 2016 first global trading platform for environmentally friendly securities that complies with well accepted international norms (Corke, 2018) .

In order to be listed on the LGX, a green bond must meet the CBP and CBS requirements, according to the protocol. Since it was expanded to include social and sustainable bonds, a specialist meeting area for issuers and investors of green bonds appears to have been established in Luxembourg.

Thus, "LGX's status since both market and mediator as well as custodian of information and expertise may be understood, through its participation in the exchange, (a) requiring further disclosure as a condition of employment, (b) impeding on the issuer's self-labelling or poor internal frameworks by means of an external evaluation and (c) post-issuance reporting is monitored" (CAPRIOLI, 2018).

LGX will, of course, have to change if a single framework is accepted in the future. Other green stock exchanges may or may not exist. Exchanges may play a pivotal role in the development of the green bonds market, according to the CBI (Climate bonds initiative, 2017).

In addition to the stock exchange innovation, new technologies are also being used in the process. In fact, LGX has been utilizing block chain technology since October of last year. For this reason, "In order to run our firm in a more secure, faster, and less expensive manner, we implemented distributed ledger technology (DLT) into our financial reporting channels," said the CEO (FP INSIDER ACCESS). It is possible that block chain might be employed in the green bond market as well.

To gather data on previously issued green bonds, the Swedish bank SBE "has put up a central database" in the same spirit, and as a result others have adopted technology solutions to promote the issue of green bonds. However, it doesn't appear to be a widespread practice in the industry, and the block chain technology indicated above could be a viable alternative.

#### b. *Regulation-technology as a potential answer to green bond issues?*

We've already established that increasing openness is an effective way to protect the current rise of the market. A framework will lead to a broader framework, but emerging technologies like block chain and smart contracts could have a significant impact. Block chain technologies, or decentralized databases in general, have recently appeared on a market, and some entities are considering utilizing them. This new approach, in fact, allows businesses and institutions to use data in a new way.

Block chain can be used to mitigate risks, but only if "the necessary legal and sociocultural boundaries are put in place". As a result, the following block chain-based scheme will only operate if a standard framework for green bonds is established. It can be summarized as follows: Each node in the network operating it (at least theoretically) has a complete copy of the entire database, allowing it to be "spread throughout all nodes in the network executing it." It is compatible with the block chain (Dupont & Maurer, 2015).

An open and public record of the data's history can be created by building on and comparing previous hash fingerprints. Co-founder of the Life Climate Foundation Liechtenstein, Sven Braden, is a member of the CLI, noted that this feature is what gives block chain its immutability, security, and trust. One of the advantages of this new technology is the increased trust in clearing and settlement as a result of this sort of storage. Because we have the owner's name, a single share can be transferred from one person to another.

A "distributed network of core depositaries holding together the various securities" can be achieved with DLT, can replace the centralized ledger that records all transactions (Zetzsche, Buckley, & Arner, 2017).

Leaving aside the Swedish achievements, "there's no centralizes database that seems to be issued bonds, so that specialist/analysts must search through data from multiple different sources" in order to have a comprehensive picture of the bond market (Pugsley, 2016).

Consequently, the technology i.e. block chain is not only able to provide a solution and verification among/between the issuer and the investor of the green bonds to verify and cross check about whether the green criteria have been verified but, ultimately, it help to track the use of proceeds, providing greater clarity on the impact of the green bond, but they could also provide all information of the market about the bonds that have been issued.

Certainly, the public and private uses of block chain will differ based on the purpose. For example, the simultaneous access problem for various devices will be solved with the public use of block chains. With DLT, everyone has equal access to the data.

This means that a DLT system might allow all businesses to keep all customer data simultaneously, which could lead to significant cost savings as a result of economies of scale. Sectors and subsectors would be more easily distinguished by the participants due to the organization of information and bonds into a distinct chain.

Few publications and studies have looked at how new technology can be incorporated into green bonds, although this is a growing trend in the market today. According to Cohen, " Although the green bond market accounts for less than one percent of the total global bond market, this technology has the potential to completely revolutionize the financial industry in the future." (Climate-KIC, 2018).

FinTech4Good President Xiaochen Zhang has outlined the reasons why block chain should be used in the green bond market. To put it another way, the information stored on the block chain

can only be accessed by those involved in the green bond. Smart contracts between investors and issuers, for example, "requirements must be met before an action can be taken, which not only saves time but also prevents human error", are kept in the block chain (Zhang).

To put it another way, the issuers will attach conditions to the bond based on the appropriate green criteria established by the market's regulatory framework. After that, the relative rating would be assigned by the block chain technology, allowing investors to readily compare the various bonds. Bonds can be monitored by regulators and market participants at the same time.

The transactions will be validated automatically. For many stakeholders, as a "more trustworthy method of recording impact and guaranteeing the delivery on environmental duties," this approach would be ideal." In addition, the inability to remove or change data recorded in a block chain is a unique feature of this technology. As a result, the integrity and openness of the process are assured.

Financial institutions, on the other hand, are going to want the most secure technology on the market. Governance and storage trust issues could be addressed simultaneously using DLT. The connectivity in a block would, in fact, create a permanent storage space. Because of this, you know who you're dealing with when it comes to finance. For financial law, this is essential to avoid doing business with the wrong persons, which could prohibit actors from engaging in green washing. Because it is required to execute a transaction, block chain technology might be seen as a license to undertake financial activities.

There are a number of advantages to using the block chain technology that would improve transparency and speed in the way it is now done. The block chain technology could be an additional approach to eliminate market asymmetries and, as a result, optimize transaction costs and delays by simplifying and strengthening information flows between issuers and investors. However, this can only function if all market participants utilize a single framework, as a result, the block chain must be configured so that the common framework may access the necessary criteria. It is also imperative that a consensus be reached on the legal framework for small-scale bonds.



## Chapter – 04: Performance and effect of green bonds on advancing sustainability

This chapter is dedicated to the 2<sup>nd</sup> part of this master's thesis in which we will extend our discussion of green bonds in the area of sustainability. As we progress in this chapter we will discuss and try to understand the role of green bonds in sustainable finance.

As we already discussed in the previous chapters that green bonds are wonderful and most noticeable development during the past 10 to 15 years, but unfortunately, if we look on the research area on green bonds we see very less academic studies as still has to be mature and make its place in the financial market. So with limited data available online sources and from different journals we will try to understand and make a prediction for future of green bonds in advancing sustainability and projects related to climate changes such as clean energy etc. During the past 10 to 15 years the progress of green bonds as well as other 'labelled' bonds for example sustainability and social bonds are very prominent and wonderful.

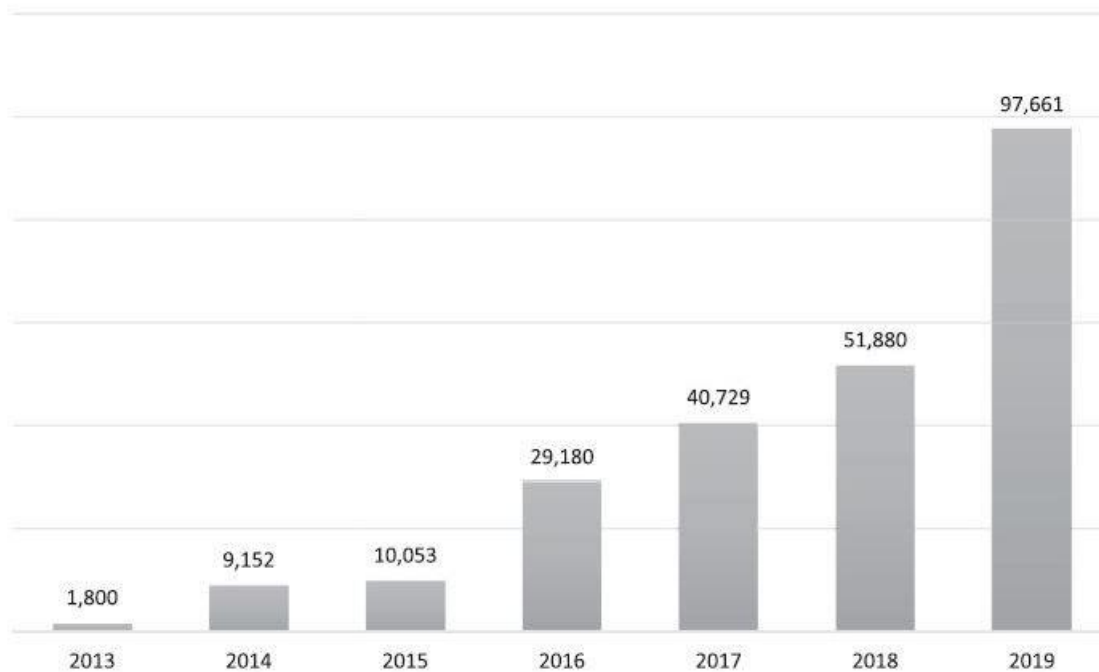
As we already know that the difference between green bond and 'vanilla' bonds are that green bond are characterized in such a way that they can be only used for the purpose of investments which are climate and environment friendly and these investments are so called green investment. On the other hand if we look on the vanilla bonds they can be used for general financing of any project. So we can say that green bonds have 'use of proceed' clause which will allow green bonds to finance or refinance only in the green projects. Moreover, the investor or buyer of green bond is also avoided by the financial risks because investor or buyer of green bond are allowed to recourse the entire balance sheet of issuer of green bonds (Climate bonds initiative).

In late 2007, a Swedish pension funds group called the World Bank, requesting investment in climate change projects, according to an online World Bank source. It was only in the year of 2008 that they had issued their first green bond, with the help of the World Bank and Sweden's SEB bank, that they began working on green bond issuance (World bank, 2019). This led to a significant increase in the amount of green bonds that had been issued over the next several years of tenure, with over eleven (11) billion USD of green bonds had being issued only in the year 2013 and around/approximately thirty-six (36) billion USD only in the year of 2014. When adjusted for inflation, this number is expected to reach 167 billion dollars in 2018 (OECD, 2016). It's easy to see that in 2018, the total amount of green bonds issued was roughly one percent of the global bond market, which is plainly little, but has grown fast in the previous year from 2013 to 2018 (chansan, 2019). In 2018, 521 billion dollars' worth of green bonds were issued. (Climate bond initiative, 2019).

What are some of the questions we'll be addressing in this chapter in order to gain a better understanding of the part or role that green bonds play in advancing or achieving sustainability? There are a number of reasons why people or organizations might choose to put money into this new financial innovation, and it's important to know why? How effective is this new technology in encouraging investors or issuers to rethink their investment strategy?

For a variety of reasons, we will mostly use Sweden as a case study in order to answer the questions raised above. The first and most important point to mention is that Sweden was a pioneer and earliest adopter of green bonds, and its green bond market is thriving. Data about

Sweden's green bond market issuance up to 2019 may be found in a free online resource from a journal publication.



Source: <https://www.tandfonline.com/action/journalInformation?journalCode=tsfi20>

*Figure 2 Green bond market cap in Sweden (million SEK).*

As previously discussed, academic research into the Swedish green bond market is scarce. Nevertheless, we were able to locate publications and journals that do address this issue. It's also worth noting that the green bond market in Sweden is well-established, so we can learn from its experience about the advantages and disadvantages of green bonds in other regions.

#### 4.1. Green bond as a tool for advancing sustainability

Global financial institutions have jumped into sustainable investment during the past few years, and now play an important role in it. This is due in large part to the financial industry, which plays a key role in capital allocation. Firstly and most importantly, financial institutions must adhere to the Sustainable Development Goals (SDGs) of the United Nations (UN) and to the Paris Agreement on Climate Change (COP15). It is therefore possible to use a large quantity of private funds as the best alternative (McKinsey&Company, 2016).

If we look on the actions taken by European commission regarding their actions on sustainable finance, we can see they include in their actions the development of legislation which will help to move the capital in sustainable investments. Also major plans in the actions includes the development of taxonomy of sustainable economics, procedure of transparency on how bonds proceeds assigned through detailed documentation and developing standards for the sustainable products including the EU green bond (European green bond standard, 2019).

In the financial sector, Green bond is crucial development which aimed to facilitate the sustainable infrastructure especially for financial institution also indicated by World Bank like pension funds, mutual funds, and insurance companies and so on. In addition, the sale of infrastructure assets through the issuance of green bonds may encourage institutional investment in sustainable infrastructure. (OECD, 2016).

For green bonds, it's commonly seen for the regulation of green bond (except countries like China and India) that its use of proceed clause is align with the Green bond principles (GBP) for establishing the greenness of the capital raised by Green bond or sometimes other types of similar standards are used for this purpose. Green bond principle is actually a standard which is develop and appreciated by financial actors and these principle allow projects like water and waste management, pollution reduction, renewable energy and other project related to world environment to be funded by green bonds (ICMA, 2021).

Mostly green bond is consider to analyze the effect of non-financial motives, particularly pro-environment preferences on the bond market price. A recent research by (Zerbib, 2019) finds that from 2013 to 2017, the yield on green bonds was two basis points lower than the yield on conventional bonds. To explain this problem of yield difference another study by (Arora & Raj, 2020) says that a paucity of supply and high demand for green bonds are responsible for this discrepancy in pricing. Empirical research, on the other hand, continue to debate the existence of this price disparity. With or without any of the debate, it's apparent that a huge number of green bonds were issued with very little difference in the issuer's ability to raise capital at their advantageous rates as conventional bonds were.

This will generate a slew of issues about the green bond structure, such as why issuers of green bonds place such a high value on the labeling, verification, and reporting of green bonds when they perform similarly to other conventional bonds? Another important point is: why are green bonds so popular among investors if their financial characteristics are so similar to those of conventional bonds? In addition, what are the advantages and disadvantages of green bonds for both the issuer and the investors? For a full understanding of these issues, it is necessary to understand the role and functionality of green bonds in directing investment toward sustainable development, and the way in which green bonds have evolved into a financial and economical innovation in the process.

#### 4.2. Financial incentives of Green bonds

Green bonds' direct financial incentives are easy to spot. Investors in green bonds benefit from lower risk, higher returns, and greater diversification than those who invest in other labelled bonds or in any other type of investment. If we talk about the issuers, then for issuers green bond also provide direct incentives to its issuer in term of reducing capital risk and improving its issuer access to capital.

Other direct incentives of green bonds belongs to the institutional investors. Institutional investors, who are substantial and have the ability to have a broad impact on the economy, can

ensure that the economy is sustainable for the foreseeable future while also correcting for externalities which are bad and negative for the bonds market and improving protracted economic efficiency (Hawley & Williams, 2002).

#### 4.3. Green bond incentives with a non-financial and non-economical business case

The term "non-financial or non-economical business case advantages and incentives" refers to rewards that aren't tied to how well green bonds perform financially. The following are some examples of non-financial business case motivations for green bonds, including: brand building, risk reduction, operational efficiencies, and new market creation.

##### a. Branding:

This non-financial case is exclusively for the issuers of green bonds. In this case institutions can retain old customers or attract new customers to engage themselves in sustainable finance. Moreover, on this basis they can charge an extra amount for the products or services which they are providing (Green Marketing, 2017).

##### b. Operational efficiency:

If you are the issuer of green bond then your institutional operational efficiency can be increased. For example, you can attract your customers or clients by showing them high quality employees. Moreover, your employees by themselves motivated because of the cause of sustainability in that way you can achieve more operational efficiency gain (Corporate Social Responsibility, 2010).

##### c. Creating new markets:

This non-financial incentive can make new products for customers who are interested in investing for sustainable products. This help in making new sustainable products as well as it attracts new customer and create investment for new products (RIEDL & SMEETS, 2017).

##### d. Reduce risks:

With this incentive of green bond institutions can also able to manage or reduces risks which are not financial. For example risk associated with the reputation of that institution. Other risks which can be reduce are future regulations by the government regarding the sustainability.

#### 4.4. Green bond legitimacy and institutional oriented drivers

Research study on the engagement of green bond in sustainability shows that there are a lot of incentives as well as pressure on the organization and these incentives and pressure are not directly define in any of the business strategies. The validity of the organization is frequently referred to as "license to operate" among the social circles where the group operates. (Brammer, Jackson, & Matten, 2012).

(Fernando & Lawrence, 2014) Put forward a framework which includes grouping legitimacy. Moreover this framework also caters stakeholder, and furthermore institutional theory around each other, in which each is seen as an amalgam of theories which even anticipate the very same motivating factors for attempting to engage in social and environmental responsibility as each other, or draw conclusions that really are majorly coherent to each other.

To comply for the norms and expectation which are imposed by pressure which are external to organization mandate, organization usually use legitimacy, stakeholder and institutional theory incentive. Both internal and external stakeholders can exert pressure on a company. Furthermore, social conditions and conventions, as well as organizations and stakeholders, can exert pressure on individuals. (Fernando & Lawrence, 2014).

Engagement of organization with sustainable finance can be understand by organizations effort to secure legitimacy in front of social pressures to show their practices with sustainable business. Moreover, organization will comply with sustainable practices of other organization of same institutional pressure to get themselves engage in sustainability.

Organizations which are facing the same institutional conditions and problems are most likely to adopt the same strategies and policies which is also called isomorphism. This isomorphism is due to attend and respond the same types of stakeholders for both of the organizations.

Our summary of all three types of reasons why issuers are driven to participate in the green bond market can be found in the table to the right.

Financial case	Business case	Legitimacy/institutional oriented drivers
Its gives good financial results	It reduce business risks	It gives license to operate
It reduces financial risks	Help in branding	Help in catering institutional pressure
It lower cost of capital	Increases operational efficiencies	
It gives better access to capital	Create new markers for products or services	

*Table 1 Three motivational categories for issuer to involve in green bond market*

#### 4.5. Incentives to invest and to issue Green bonds

In this section, we will analyze the factors Identifying the variables that attract investors/buyers and issuers/sellers to engage with in green bond market, as well as the nature of those elements will also try to understand the function of green bonds in the transfer of capital from low/less sustainable to more sustainable financial and economic activities, as well as how green bonds are affecting the strategies and policies of organizations when it comes to dealing with environmental sustainability.

First and foremost, we will explain the benefits and incentives associated with investing in green bonds. The most obvious and compelling advantage or motivation to invest in green bonds is that your investment is validated for use in the specific green project for which you are investing, and you do not need to take any additional steps to ensure that your investment will be put to good use. As also discuss earlier because of ‘use of clause’ of green bonds it’s now very easier for the investors to communicate to their client and stakeholder that how their investment is contributing to the sustainability. So that’s why green bond attracts very strongly to its investor to invest in green investment.

To look on the non-financial advantages and incentives of green bonds we can notice that green bonds also help there investor organization to attract their customers on the basis of specific sustainable products such as electric cars or other similar kind of products, which will also show the intentions and engagement of that organization with sustainability. In this way green bonds are not only helping its investor organization in branding but also create their customers for their sustainable products (RIEDL & SMEETS, 2017).

For the issuer point of view we can see the three very prominent advantages and incentives for issuing green bonds. We also notice that among issuers the financial incentives are more prominent then non-financial ones. Green bonds help there issuers in broadening their investor base, furthermore it helps in meeting the investor demand regarding sustainability and lower the capital risk as well.

It is also worth noting that the rebate associated with issuance of green bonds has had no substantial effect decision to make an investment among issuers. Also it is expected that preferential yield rate would not be increase as compare to current one. So for financial point of view we can say that securing access to capital is the dominant incentive of issuing green bonds.

There are also non-financial advantages or incentives of issuing green bonds. By issuing a green bond organization can also communicate their work on sustainability which is undergoing internally in the organization to the external stakeholders and their clients. Green bonds can also serve as quality assurance stamp for a firm, allowing it to meet customer demand while also ensuring client loyalty by demonstrating their commitment to environmental sustainability in their business operations.

This is called the branding incentives for issuing green bonds but this branding incentive has a bit difference as compare to the branding incentive of investing in green bonds. In the case of a real estate agency advertising its rental space building as environmentally friendly, it is possible that the reason for this is that the building has been financed or refinanced through the use of environmentally friendly bonds. Customers will be more concerned with the green certification and building rating than with this information from the perspective of the rental company. This branding will be satisfactory for the financier of the building which could be an institutional investor or bank.

#### 4.6. Perspectives on Green Bonds and Capital Shifting from Investors and Issuers

As is customary, we'll begin by exploring the perspective of investors who are looking to move their money from less sustainable to more sustainable investment opportunities. According to investors in green bonds, the advantages they gain from investing in green bonds make them more likely to adopt a greener business strategy. Due to the growth of green bond market sustainability demands are raised largely in capital market. To create awareness and develop a link between their customer investors think green bonds are very important tool for it.

Green bonds are viewed by issuers and investors alike as a means of spurring a company's green objectives across various initiatives and the organization as a whole. As a result, issuers of green bonds say that by issuing green bonds, they are enhancing their efforts to promote environmental sustainability. Also issuance of green bonds gives an organization a governance impact that any asset which will be financed by the green bonds will remain in certification.

Thus, green bonds become a signaling function which highlights the green investment over other non-green investment and show the demand for green investment. This allows issuers to relate their investment to a specific and validated project, which is advantageous.

#### 4.7. Engagement in green bonds and advancing sustainability

We all know that green bond is a financial instrument which finances or re-finances the projects, but there is an important debating question that what else or what added value does green bond deliver. We can see that green bonds are structured in a similar way to traditional and typical investment grade bonds also they are also similar to municipal bonds and further similarities with corporate bonds, except the main difference is for the 'use of proceeds' clause in these bonds as we already know. However, this clause does not have the ability to significantly alter how capital is allocated, which makes the debate over whether green bonds add value understandable.

This raises the key question of whether green bonds are truly beneficial to sustainability or if they are simply other bonds that have a green label on them. According to this investigation, it appears reasonable that green bonds offer the false impression that they have a greater impact than other corporate bonds in terms of environmental sustainability.

We would infer, as previously indicated, that the benefits and performance and expectations with participation in green bonds, particularly in Sweden, are influenced by comprehensive business considerations instead of financial advantages/incentives. Although there are some direct financial incentives for issuers, such as the ability to access capital, the majority of those involved in green bond transactions are more concerned with benefits such as customer and employee attraction, mainstreaming sustainability into internal organization operations, and broadening the signaling effect than they are with financial incentives.

Taking a look at the financial sector in Sweden, it is clear that the engagement with sustainability has become the standard rather than the exception. According to the findings, when participants interact with the green bond market, they seek proof of legitimacy along with benefits and perks from stakeholders and beneficiaries groups and institutions, as well as possibilities to benefit from the market. Furthermore, from the perspective of investors, we have observed that they are happy with little or weak returns from green bonds as compared to non-labeled bonds. For issuers, issuing green bonds entails some additional effort, but it allows them to have access to money more quickly.

The good matching of benefits and incentives between the issuers and investors in the green bond market can be attributed to the general bottom-up expansion of the green bond market. Green bonds are financial instruments that are designed and constructed in such a way that they can contribute to sustainability at a minimal cost. They are also well-known among issuers and investors as a low-risk financial vehicle. Investors in the green bond market do not consider green bonds to be inferior since they divert capital from less environmentally friendly projects and investments to more environmentally friendly ones. Green bonds, on the other hand, allow their issuers to raise funds for their green initiatives by promoting their "green goals."



## Chapter – 05: Result and Discussion

We all heard about different warnings related to climate change. The world started paying more attention to this severe issue of climate change and a goal of keeping global carbon emission to below 2 percent after the United Nations (UN) sustainable goals and especially in follow up of COP21 conference in Paris. To fight against climate change the need for the world financial sector is compulsory, this allow all institutional investors to explore this new field of sustainable finance. So in this thesis we investigate about one of the tool which could help this earth to fight against these climate changes i.e. “Green Bonds”. This new tool is considered as an innovation sustainable finance.

After the first issuance of green bond by World Bank, green bond market get its real attention from the year 2014 and the green bond market expands exponentially and achieve its \$1 trillion cumulative green bond issuance in December 2020.



Figure 3 Performance of Green bonds till year 2020

Green bonds are different form conventional bonds because of their green features and ‘use of proceeds’. Green bonds offers “Flat pricing” which means no additional cost, offers same recourse to its investors as the conventional bonds, moreover, the add bonus green feature which have a positive impact on environment.

We can typically divide green bond lifecycle into four different stages. Starting from defining the green criteria issuer defines several standards to use in reporting green bonds. Then it comes

second level or stage of the green bond lifecycle in which it is issued and the issuer determines its characteristics like the tenure of these bonds, the number of bond issued, and etc.

The third stage of the green bond lifecycle is related to its performance monitoring in which the performance is monitored the firm start following the use of proceed of that bond to start sustainable operations. The last stage is actually on the reporting of these bonds, the performance of the company is evaluated and documented and the investors of these bond judge the promises they made on sustainable developments. At this point, the transparency is the main key.

As we can easily observed that the green bond market is tremendously expanding but with this expansion green bonds market is also facing some challenges regarding its transparency, a common framework and regulation. We can also observed that there is information asymmetry in the green bond market and issuers take advantage of this information asymmetry and use it for green washing.

We also discuss finance role in the advancement of sustainability in which we discuss different advantages and incentives when getting engaged specifically with green bond market. We concluded that business case incentives of green bonds are dominated by the financial case incentives. We find that the growth of green bonds and their rapid expansion is due to the strong interlink incentives for both issuers and investors of green bond because this new innovative instrument allow both of the green bond actors to take part in sustainability advancement with very small cost.

We concluded that with some mature tuning in the green bonds frame work and with the implementation of common regulation green bond with no doubts an interesting tool to overcome the world challenges of climate change and advancing sustainability, although it is the fact that still green bond market show just a very small percentage of total bond issuance as there is a lot of work which has to be done in this sector.

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