

THE GREEN BOND MARKET

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ABSTRACT

Green Bonds are a new and expanding area of finance. It is included in green financing. For projects that protect the environment, green bonds are issued. By making investments in green infrastructure, renewable energy, energy efficiency, and water improvement, they represent socially responsible investing (SRI). Earth's temperature is rising due to global warming. Everybody in the world is working hard in a variety of industries, including the financial one. One strategy for stabilising the current environmental situation is to issue green bonds. The study will examine green bonds from a wide-ranging perspective. The most up-to-date analysis of present patterns, projected developments, and the state of the green bond markets will be provided by this study. The study determines many themes such as sustainable development, sustainability finance, green bonds, sustainability investment.

1. INTRODUCTION

A Green Bonds is a type of debt security made for funding and investing on projects contributing positively to the environment or ecosystem. Between green bonds and regular bonds there is only difference is that the funds raised from investors are only used to have a good influence on the environment like green construction and renewable energy and threes have a huge contribution to the planet and sustainability.

A project is labeled as 'green' based on four fundamental principles, which involve

- Promoting energy efficiency in resource usage,
- Minimizing carbon emissions and greenhouse gases,
- Fostering climate resilience, and
- Enhancing natural ecosystems and biodiversity, particularly in alignment with the Sustainable Development Goals (SDGs).

History

- Based on BIS (Bank of International Settlement) index, SGB (Sovereign Green Bonds) is a part of green, Social and Sustainability (GSS) Bonds.
- The European Investment Bank made history in 2007 by issuing the world's first green bond, known as the Climate Awareness Bond.
- In November 2008, the World Bank introduced its inaugural green bond, which was the first of its kind to establish criteria for project eligibility and ensure that eligible projects would effectively address climate change. This was accomplished through the involvement of a second party opinion provider, providing assurance for the bond's environmental objectives.

- Poland and France became pioneers in the issuance of sovereign green bonds, marking a significant development in early 2017..

Types of Green Bonds

Green use of proceeds bond- It is a standard recourse debt obligation where the proceeds are transferred to the account for the use in the project. If there are pending proceeds of the investor than the issuer needs to inform the investor regarding the appropriate use of the unused proceeds. Green use of proceeds revenue bonds- It is a non-recourse debt obligation bond where the proceeds can go to related or unrelated green project. Again the proceeds will be credited to the project account. Green project bond- Here the investor has a direct risk and the proceeds will be used for one or multiple green project.

1. *Corporate bond*: A "use of proceeds" bond issued by a corporation that entitles the issuer to recourse in the event that the bond's interest or repayment obligations are not met of primary Bonds issued by "YieldCo" vehicles to fund the purchase of assets fall under this category.

2. *A project bond*: is a bond that is backed by one or more projects, and for which the investor is directly exposed to project risk, either with or without recourse to the bond issuer.

3. *Asset-backed security (ABS)*: A bond backed by one or more particular projects that typically offers recourse only to the assets, with the exception of sheltered bonds (included in this category). In the case of the issuer's default, holders of covered bonds have secondary recourse to an asset pool that serves as the underlying cover.

4. *Supranational, sub-sovereign and agency (SSA) bonds*: Bonds issued by international financial organisations (IFIs), such as the World Bank and the European Investment Bank (i.e., "supranational issuers"), are classified as supranational, sub-sovereign, and agency (SSA) bonds. Similar characteristics to corporate bonds exist in SSA bonds with regard to "use of proceeds" and recourse to the issuer. This category includes agency bonds, such as those issued by export-import banks and sub-sovereign national development banks.

5. *Municipal bond*: A city, region, or municipal authority may issue bonds. Although there haven't yet been any green sovereign bonds issued, a national government body may potentially also issue a "sovereign" bond.

6. *Financial sector bond*: A type of corporate bond issued by a financial institution expressly to raise money to finance "on-balance sheet lending" (i.e., to give loans) to green endeavours (examples: ABN AMRO or Agricultural Bank of China). For the purposes of OECD scenario modelling, this form of bond is taken into account separately in order to maintain a distinction between financial sector bond issuances that directly support green investments and those that finance lending.

Objective of Green Bond

The primary objective of a green bond is to raise funds to finance environmentally sustainable projects that address climate change and other environmental challenges. Green bonds provide an avenue for companies, municipalities, and governments to raise capital while also promoting sustainability and reducing carbon emissions.

- Financing environmental projects
- Addressing climate change
- Mobilizing Capital
- Improve transparency

- Certification criteria approved by Climate Bonds Initiative (CBI)
- Criteria under development by CBI
- CBI due to commence criteria development

Energy

Solar	Geothermal	Bioenergy	Energy distribution & management
Wind	Hydropower	Wave and tidal	Dedicated transmission

Transport

Rail	Vehicles	Mass transit	Water-bourne transport
Bus rapid transport	Alternative fuel infrastructure		

Water

Built (grey) infrastructure	Green and hybrid infrastructure
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Low carbon buildings

Residential	Commercial	Retrofit	Products for building carbon efficiency
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Information technology & communications

Power management	Broadband	Resource efficiency	Teleconferencing
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Waste & pollution control

Recycling	Other recovery	Disposal	Prevention
Reuse	Pollution control		

Nature based assets

Agricultural land	Forests (managed and unmanaged)	Wetlands	Degraded lands
Other land uses (managed and unmanaged)	Fisheries and aquaculture	Coastal infrastructure	Land remediation

Industry & energy-intensive commercial

Manufacturing	Energy efficiency processes	Energy efficiency products	Retail and wholesale
Data centres	Process & fugitive emissions	Energy efficient appliances	Combined heat & power

Barriers to scaling up Green Bond market

Numerous green projects with medium- to long-term timelines and consistent revenue flows make excellent candidates for bond market funding. However, the bond market, which currently accounts for around one-third of all corporate financing globally, has not yet had an equal impact on green financing.

The findings of a GFSG poll on "barriers to scaling up the green bond market" justify the choice of these issues. 24 significant investors, issuers, and intermediaries in the green bond market responded to this GFSG survey. The survey's findings revealed that 74% of respondents agreed that there was a lack of awareness of the advantages of green bonds, 43% that there was a lack of a local definition of green bonds, 41% that meeting green bond requirements was expensive, 56% that there was a lack of ratings, indices, and listings, 55% that there was a the absence of specific incentives tailored for green bond issuers, 67% that there was a lack of domestic green investors, and 59% that there was a lack of international investors.

- *General Obstacles in the development of the green bond market.*

The lack of benchmark yield curves, the underdevelopment of the credit rating system, the absence of risk-hedging tools, and a lack of market liquidity are some of the underlying problems. Many of these fundamental issues can help the growth of local currency green bond markets right away if they are resolved in a coordinated manner.

- *Lack of knowledge of existing international regulations and standards, as well as the advantages of using green bonds.*

Lack of awareness of current international standards is a significant impediment for several nations. Additionally, policymakers, regulators, potential bond issuers, and investors in some nations do not fully comprehend the advantages of the green bond market.

It's possible that some financial experts have never heard of green bonds.

- *Lack of regional green bond regulations*

Some nations may need to build their own green bond markets for a variety of reasons. Other nations prioritize addressing their environmental problems differently than other nations that concentrate on reducing greenhouse gas emissions, as is the case with China when it comes to air pollution, with air and water pollution being the top concerns. In such nations, the local green bond market may be supported by policy incentives. There may be more definitions and disclosure needed in some of these markets than what the Green Bond Principles call for in specific categories.

- *Costs of green bond requirements*

The verification of the "green bond" designation and the monitoring of issuers' use of proceeds for environmentally friendly objectives are typically handled by various entities such as accountancy firms and specialized research organizations, which serve as second opinion or third-party assurance providers. Many potential issuers still don't understand how such a verification procedure might operate, though. A barrier for some small issuers in particular markets is the comparatively high cost of obtaining a second opinion or third party assurance, which can range from USD 10 to \$100k. Issuers have also expressed dissatisfaction with the significant expenses associated with monitoring disclosure requirements.

- *Lack of green bond ratings, indices and listings.*

Green credit ratings play a crucial role in evaluating the alignment of green bonds with international standards and guidelines such as GBP and the CBI Standard. By incorporating environmental information into bond ratings, these ratings assist the market in assessing the extent to which green bonds adhere to established sustainability criteria. They may also aid investors in understanding how environmental factors affect an

issuer's overall risk profile. Bond investors can use green bond indices to help them choose green bonds that fit their criteria. Increased capital flows as a result of this may lower the funding costs for green issuers.

- *Lack of supply of labeled green bond.*

Recent issuances have seen considerable oversubscriptions, which is proof that investor demand of green bond is rather high in various markets. The scarcity of "labelled" green bonds is a significant barrier for these markets. This reflects, on a larger scale, the dearth of green projects in various markets that may be financed or refinanced using green bonds. This draws attention to the requirement for strong enabling policy frameworks so that pipelines of large-scale green initiatives can form.

Challenges with green bonds

Although a fantastic substitute for oil bonds, green bonds have several drawbacks. First off, India needs to boost its credit rating if the government wishes to raise money abroad because the credit rating of the country issuing the bonds directly affects all bonds issued globally. This can include a detailed examination of domestic policy, which the government should be open to and clear about. In order to achieve greater completion rates, such green projects need to be closely monitored. Such fund recipients must comply, and if a deadline is missed, a penalty component may be applied.

Last but not least, it is difficult to predict the coupon rates for a green bond because there are ongoing discussions over whether to price them higher or cheaper than standard bonds, with equal weight given to each side of the debate.

2. OBJECTIVES OF THE STUDY

The goals of the field being studied are clarified by the study's objectives. The goals were developed to present a vivid picture of green bonds in India. SWOC analysis will be used to do this. Depending on the particular study and the research issues being addressed, the goal of research on green bonds may change. However, the following are some typical goals of the research:

- *To understand the Green bond market and its growth:* In order to comprehend the general market dynamics and potential, research attempts to analyse the size, growth rate, and trends of the green bond market.
- *To assessing environmental impact:* Researchers assess the social and environmental effects of projects supported by green bonds. They evaluate how well these projects perform in accomplishing their stated goals and support sustainable development.
- *Investigating investor behavior:* Understanding investors' motivations, preferences, and decision-making procedures with regard to green bond investments may be the subject of future research. Examining the variables affecting investment decisions, risk perceptions, and prospective financial rewards are part of this.
- *To identify opportunities and barriers under green bond market.*

The goal of research on green bonds is to better understand this developing industry and evaluate its potential effects on financial performance and environmental sustainability.

3. LITERATURE REVIEW

The connection between green bonds (GB) and the sustainable economy can be traced back to 2011, when the GB showcased its pivotal role in transitioning the fossil fuel-driven economy towards a more environmentally friendly one, aiming to halt the trend of "desatiation." The GB, also referred to as a climate bond or sustainable bond, has

emerged as a new financing mechanism that promotes investment in green projects. These bonds actively encourage the participation of private entities and banking institutions in supporting environmentally friendly initiatives (Bracking, Citation 2015; Mathews & Kidney, Citation 2012). In light of the burgeoning prose on GB (Pham, Citation 2016) and the idea of GB volatility, we conducted as a first empirical analysis on market volatility. As a result, this piece of work helped this market get off to a good start and set the stage for subsequent research. Since then, several scholars have researched market volatility in greater detail and added to this body of knowledge by deducing that the GB functions as a risk-reduction mechanism (Bilgin et al., Citation(2018), Gatti & Florio, Citation(2018), Jiang & Jia, Citation(2022), Jin et al., Citation(2020), M. Liu, Citation(2022), Mensi et al., Citation(2022), Ortolano & Nissi, Citation(2022), Ren et al., Citation(2002), Uddin et al., Citation(2022), Wulandari et al., Citation(2002), and Yaya et al, Citation(2022)).

4. RESEARCH GAP

Although the amount of research has been increase dramatically of green bond market in recent years, more study is still required in a number of areas in order to completely comprehend the market and its possible effects. The following are some significant green bond market research gaps:

- *Impact measurement*: Despite the fact that numerous studies have demonstrated that green bonds can have a positive environmental impact, more exacting and consistent approaches are still required for determining this impact. The development of more reliable effect measuring frameworks that enable more precise comparisons between green bonds and conventional investments could be the main focus of future study.
- *Investor behavior*: Although there has been some research on investor demand for green bonds, more thorough studies that look at the factors influencing investor behaviour in the green bond market are still needed. This might entail researching the tastes and driving forces of various investor types as well as the effects of market dynamics and legal frameworks on investor conduct.
- *Standardization*: The absence of standardization in the green bond market continues to be a significant issue, necessitating new standards that can increase openness and accountability as well as further research on the efficacy of current standards and guidelines.
- *Developing country context*: Although the green bond market has grown significantly in industrialized nations, little is known about the market in developing nations. Future studies can concentrate on comprehending the prospects and constraints for the issuance of green bonds in underdeveloped nations as well as the potential influence of green bonds on sustainable development.
- *Cross country comparison*: While several studies have compared the green bond markets in various nations and regions, more thorough and systematic cross-country comparisons are still required. Informing the creation of international standards and guidelines for the green bond market, this could assist in identifying best practices and chances for international cooperation.

All things considered, there is still a lot we don't know about the green bond market. Filling in these research gaps will be essential to improving our comprehension of the market's potential impact and to encourage more sustainable investment practices.

5. RESEARCH METHODOLOGY

Depending on the study questions and objectives, different research methodologies on the green bond market might be used. The following steps could be included in a research methodology for the market for green bonds:

- Describe the research issue
- Create a hypothesis that can be put to the test through data analysis based on the research topic. The claim might go something like this
- Determine the data sources
- Examine the data
- Make inferences

Lastly, talk about the study's constraints and possible directions for further research. For instance, the study might have been constrained by the size of the research issue or the accessibility of the data.

6. DATA ANALYSIS AND INTERPRETATION

SWOC ANALYSIS

STRENGTH	WEAKNESS	OPPORTUNITY	CONCERN
<ul style="list-style-type: none"> • Risk reduction • Favourable company image • Diversification in portfolio • Reducing carbon footprint • Energy efficient project 	<ul style="list-style-type: none"> • Choice of disclosure • Distrust in the allocation of funds generated. • Lack of awareness • Issues in measuring • Vital rules and regulations 	<ul style="list-style-type: none"> • Ethical requirements of people • People tolerant of additional costs • Over subscription 	<ul style="list-style-type: none"> • Green wash activities • Hedging costs is high • Sovereign credit rating is low

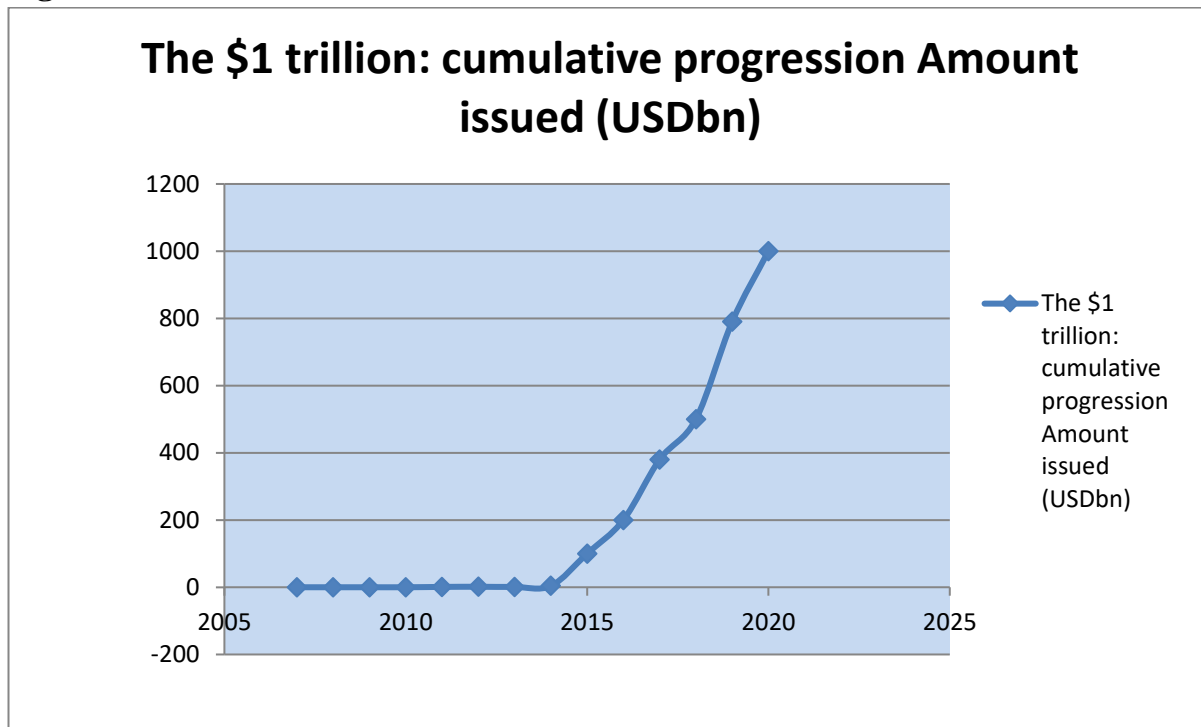
The SWOC study presented here discusses linking possibilities and strengths to areas of worry and weakness. The greatest chance is the requirement of USD 2.3 trillion by 2030 to achieve the SDGs. Also, the requirement for people to pay more money to satisfy their ethical obligations results in an over-subscription to green bonds. Yet, there is still a need to address the principal issues. Greenwashing practises are like termites; they can destroy the idea of green growth.

Rapid growth of the green bond market

The green bond market has expanded rapidly. With USD 1 trillion in cumulative issuance since the market's launch in 2007, it surpassed its biggest milestone yet. Early in December 2020, the benchmark was reached. On our market widget on the homepage, you can view the most recent cumulative totals for the green bond market.

Our calculations place the average yearly growth rate for the 13 years since the market's establishment at almost 95%.

Figure 1



Source: Climate bond initiative 2018

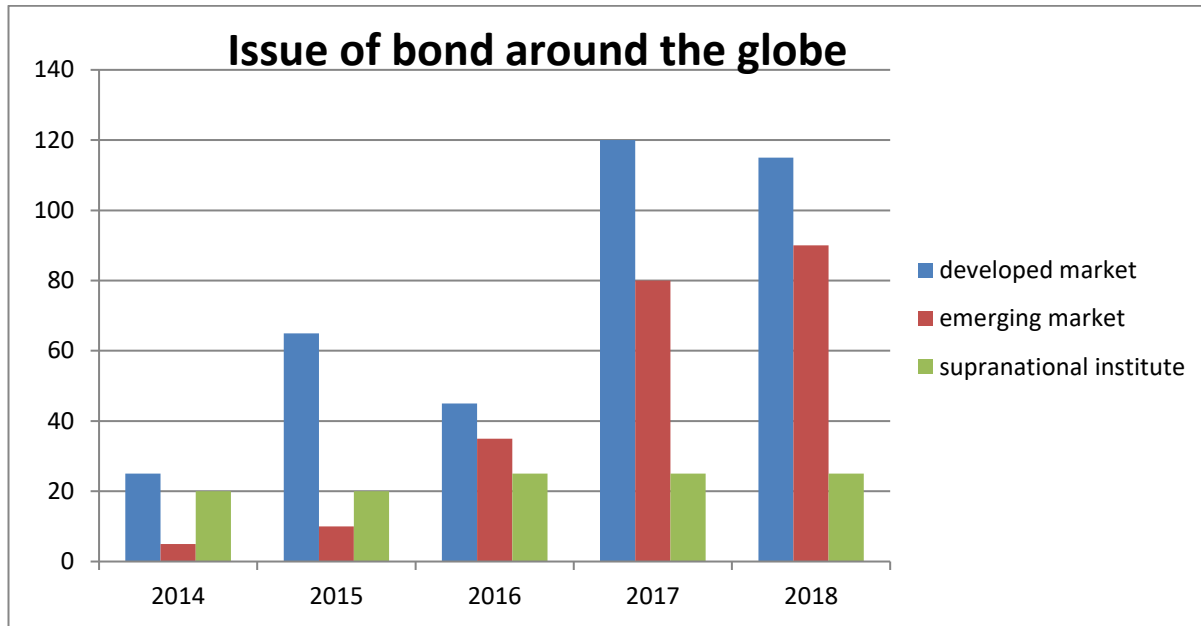
Table 1: The \$1 trillion: cumulative progression

year	Amount issued (USD bn)
2007	0
2008	0
2009	0
2010	0
2011	1
2012	1.5
2013	1
2014	4
2015	100
2016	200
2017	380
2018	500
2019	790
2020	1000

World Bank and European Investment Bank jointly issued the first green bond in 2007, which was assigned a AAA rating. After the first USD 1 billion green bond issued by IFC in March 2013 sold out within an hour of its release, the larger bond market began to respond. States in the US are the main issuers of green bonds, while other issuers include Argentina's Province of La Rioja, the City of Johannesburg, and the Province of Ontario. Local government green bonds are still increasing. Fannie Mae is the largest issuer of ABS. ABS comprises receivables ABS, auto ABS, PACE ABS, green MBS, green RMBS, and green CMBS. The cumulative USD100 billion mark had been reached by the end of 2015, and growth has since accelerated in the five years leading up to that point. During COP23 in Bonn in November 2017, the milestone of USD100 billion in yearly issuance was reached, boosting market opinion that green

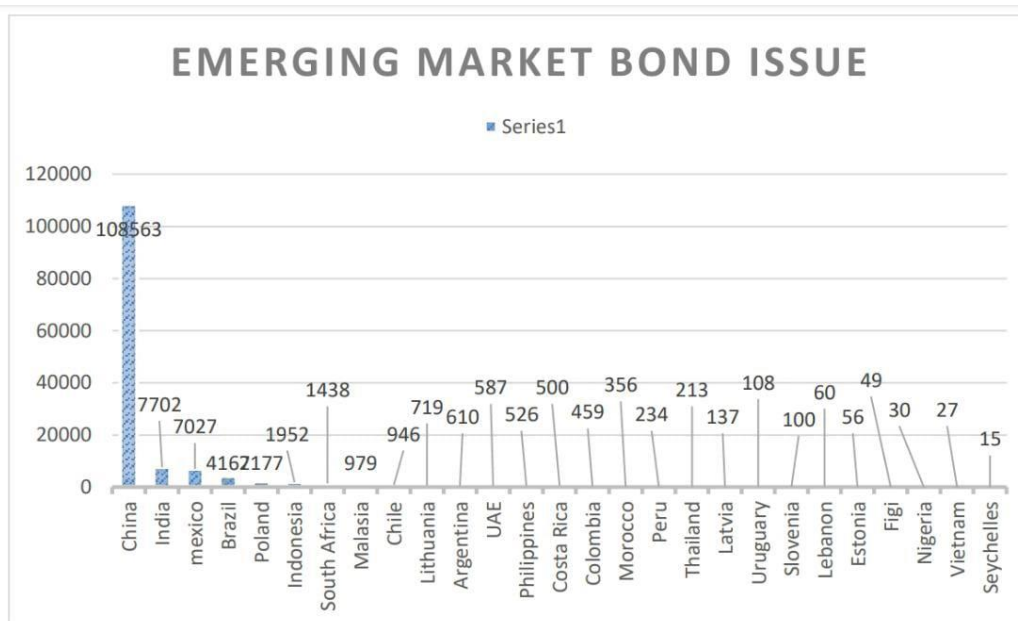
bonds were evolving into a mainstream product and an essential component of achieving the goals of the Paris Accord and climate finance. The impressive expansion of green debt products, such as green loans and sukuk, has been a positive trend in the green finance market. A record number of sixty-seven countries and other transnational agencies have produced green instruments.

Figure 2: Issue of green bonds around the globe



The graph displays the cumulative value of green bonds issued throughout time in USD. Developed Markets have been in the lead since 2014. Also, emerging markets are making an effort to meet bond demand. They are constantly rising. They received a significant push in 2016 when China released their the green bonds. Supranational Institutions continue to provide nearly the same amount. It is also very clear that the developed countries are contributing less, mostly as a result of the United States' decision to lower its overall contribution.

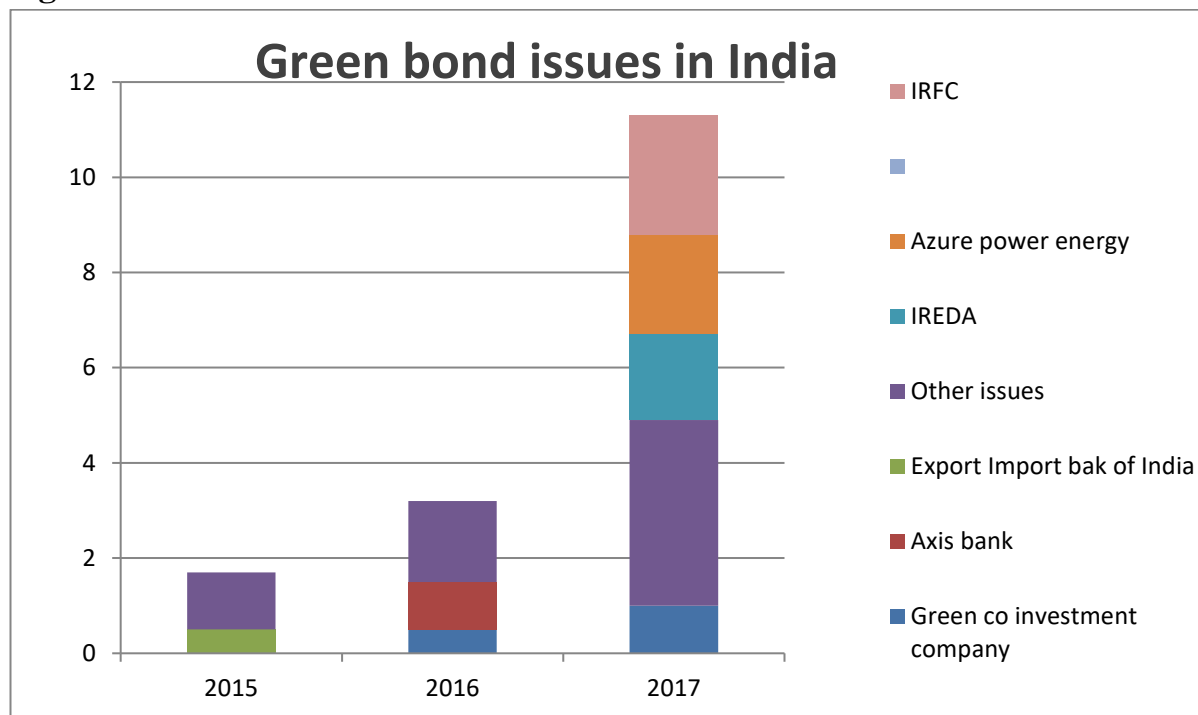
Figure 3: EMERGING MARKET BOND ISSUE



Source: Climate bond initiative 2018 : IOP conf. series 2022

The graph shows the USD million that emerging nations contributed to the issuance of green bonds from 2012 to 2018. In the category of Developing Markets, China's contribution is the highest, followed by that of India and Mexico. Because they are the largest, emerging markets require special attention. potential to achieve future environmental goals.

Figure 3: GREEN BOND ISSUE IN INDIA

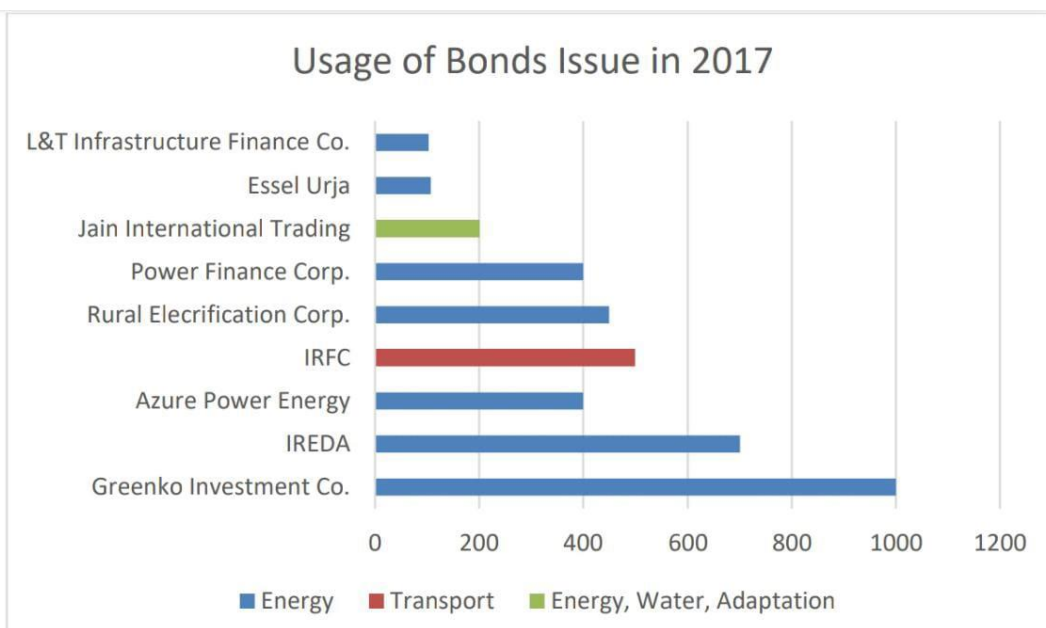


Source: climate bonds initiative 2018 : IOP conf. series

The graph displays data in US dollars billions. It accounts for 63% of all green bonds issued by various organizations in India. It is clear that Green Investment Corporation, which has been investing

continually since 2016, was the largest issuer of USD 1 billion in 2017. The total amount invested in green Bond prices have been rising. In addition, IREDA demonstrated impressive financing by contributing USD 700 million. Also, it is evident that Axis Bank's ownership decreased in 2017.

Figure 4



Source: Climate bonds initiative2018: IOP conf. series 2018

The use of bonds issued in 2017 is displayed in the above graph in USD million. In this instance, Jain International Trade utilises bonds for the water business for the first time. The graph clearly shows that Green Investment Corporation issued the most bonds, with the Energy Sector receiving the greatest share of the bond revenues.

Figure 5: Top country green bond upto date

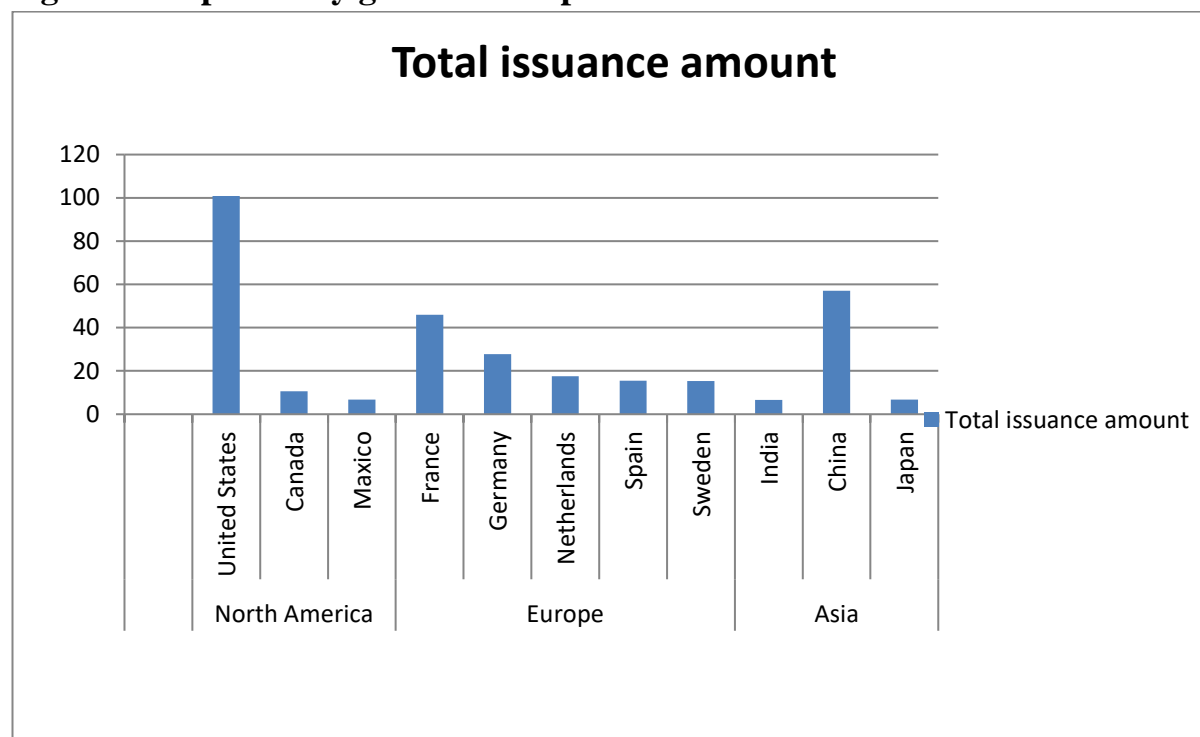


Figure 5- Top country green bond issuance up to date

Source: Climate bond initiative's 2018

Table 2 : Amount has been given below through the chart:

continent	Country	Total issuance amount
		USD\$billion
North America	United States	100.9
	Canada	10.6
	Maxico	6.7
Europe	France	45.9
	Germany	27.7
	Netherlands	17.6
	Spain	15.5
	Sweden	15.4
Asia	India	6.6
	China	57.1
	Japan	6.8

China and the United States have dominated this market in terms of top issuing countries up to this point, as shown further in Figure 5. The large issuances in the United States can be linked to that country's thriving municipal green bond market. But as a developing economy, Regarding the volume of green bonds issued across various industries and issuer types, China has been the clear leader. Green bonds are in demand across all six continents, **as shown in Figure**

5, with an increase in demand occurring in rising markets like Mexico, India, and 20 China. According to the most recent data, there are already 47 countries that issue "green bonds" (Climate Bonds Initiative, 2018a).

7. CONCLUSION

Never before has investing in a green future been so popular. If India doesn't act immediately, its admirable goal of generating 175 GW of electricity from renewable sources by 2022 would remain a pipe dream. Green bonds serve as the primary, cost-effective, and long-term funding source for developers of green projects. Encouragement is given to the issuance and investment in green bonds through clear definitions of what qualifies as green and by promoting transparency. Ignorance poses a significant obstacle to this connection, hence the government should conduct campaigns and expert lectures to educate the public about their role in safeguarding their environment.

The question of whether or not green bonds are exhibiting the necessary environmental transformation will always remain. Green bonds can go a long way with the standardisation of the issuance process and some tailored guidelines.

8. LIMITATIONS

Certainly! Researchers should be mindful of a number of constraints in the research on green bonds. Some of the common limitations are listed below:

- *Lack of standardization:* The absence of market standardization is one the most important constraints on green bond research. It is challenging to compare several studies and come to consistent conclusions because different issuers and nations have varying definitions of what constitutes a green bond.
- *Limited data availability:* Conducting in-depth research on green bonds is difficult because there is frequently a lack of available data. For instance, some issuers may not reveal specific information regarding the usage of green bond proceeds.
- *Short term horizon:* Since green bond markets are still somewhat young, many studies only look at the present. As a result, figuring out if green bonds are succeeding in their intended objectives and having a long-term effect on the environment can be difficult.
- *Lack of control groups:* It is challenging to link any observed changes in environmental outcomes to the green bond issue itself because many studies on green bonds lack control groups. Due to this restriction, it may be difficult to separate the effects of green ties from other potential influences on environmental consequences.
- *Selection biases:* Finally, because issuers that choose to issue green bonds may differ consistently from those that do not, there may be selection bias in research on green bonds. Because of this bias, it may be challenging to extrapolate results to a larger market.

Finally, there may be selection bias in research on green bonds because issuers that choose to issue green bonds may differ systematically from those that do not. It could be difficult to extend results to a bigger market because of this bias.

9. FUTURE DIRECTIONS

Future study on the green bond market has a number of intriguing directions. Here are few:

- *Impact measurement:* There will be a greater need to gauge the environmental impact of these investments as the green bond market expands. Future studies might concentrate on creating more

reliable ways to assess the environmental effects of green bonds and contrast them with conventional investments.

- *Investor demand*: Research might also look into what motivates investors to purchase green bonds. This could involve researching the tastes and driving forces of various investor categories, including institutional, retail, and impact investors.
- *Standards and regulations*: Future study could concentrate on the making of norms and rules of green bonds given the market's lack of standardization. This could entail evaluating the efficacy of current standards, such as green bond assumptions, and putting forth new standards and guidelines to boost accountability and transparency.
- *Issuers characteristics*: The features of issuers that are more inclined to issue green bonds, such as their size, sector, and environmental performance, could potentially be the subject of research. Having a better understanding of the factors influencing green bond issuance and potential to encourage more widespread acceptance of green bonds could result from this for investors and policymakers.
- *Cross-country comparisons*: The green bond markets in various nations and areas could also be compared through study. In addition to highlighting best practises and chances for international cooperation, this could assist in identifying the variables influencing variations in the allocation of green bond and environmental outcomes.

Altogether, analysis of the green bond market may help guide investment and policy choices and aid in the shift to a more sustainable economy.

10. SUGGESTIONS

The government needs to enhance its support for the private sector in issuing and investing in bonds with greater enthusiasm. So, a tax benefit guidelines for issuers and investors can aid in addressing the current lack of funding for environmental initiatives. It is possible to design a tax credit system where the issuers don't be sent to the bond holders' account as a tax credit rather than having to pay interest payments. Tax exemption on bondholders' interest payments is another option.

Establishing progress money, a fund that would aid in priority sector financing of renewable energy can be of tremendous help to raise finance for green needs, much like the Rural Infrastructure Development Fund. A clearer understanding of what is green and what is not would be possible thanks to standardization and comparability. Credit rating of green bonds: In 2016, the international rating firm Moody's introduced its system for rating green bonds. As a result, such credit rating evaluation should take into account not just how proceeds are used or reported, but also if the money is going towards reliable green projects. The banks may greatly contribute in promoting green projects by eliminating the cap of 15 cr per borrower under priority sector loans. This is mostly due to the fact that the ceiling of 15 crores is too low for investments in large-scale projects.

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