

# Scope and Progress of Green Finance in India

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**Abstract:-** The world is witnessing unprecedented times in terms of environmental concerns which prompts the need for global action to mitigate the severity of its effect for the welfare of the future generation. In regards to this, green investments are a key tool in finance which has the ability to influence long-term sustainable outcomes and thus has acquired tremendous attention over the past few years. The aim of this study is to understand the current scope of green finance as a market in India and the overall progress of the nation in terms global issuances and projects undertaken, creation of individual investor awareness and dispersion of green finance ideas across the country. Using sample primary data, variety of test analysis have been performed to highlight the relationship between different variables such as demographics of individuals, willingness as well as their understanding to invest in green securities as opposed to traditional forms of investments so as to gauge their level of awareness about the same. In addition to this it also reviews the progress of public policy and need for scaling up green investments in the country. The data overall provides proof of the possible growth outcomes and ventures that green finance can take in India, to create better options for sustainable growth and steadily move towards a more environmentally and socially aware economy as long as proper procedures and policies are mounted.

**Keywords:-** Green finance, awareness, green bonds, ESG.

## I. INTRODUCTION

Funding is required by different sets of entities like businesses, individuals as well as governments for a variety of activities such as operational and investment purposes, entrepreneurial pursuit, research and project funding and to meet working capital needs to name a few. Sources of funding may be classified based on tenure of requirement, ownership and sources of generation. The most conventional sources are considered to be equity shares, debentures, commercial papers, lease financing, trade credit etc. In addition to these traditional sources, there is Angel investment, Personal investments, government subsidies/grants and business incubators are few other upcoming categories of funding sources.

However, the world is witnessing unprecedented times in terms of environmental concerns which prompts the need for global action to mitigate the severity of its effect for the welfare of the future generations. It is believed that finance, as a sector, is a key lever to influence sustainable outcomes. Hence it is in a unique position to incentivise the transition through only agreeing to lend to, invest in and ensure businesses that manage their nature risks and impacts. A sustainable financial system is the one which creates, values and helps transact financial assets in ways that can shape the

real wealth which can serve the long-term needs of an environmentally sustainable economy.

Green Finance broadly refers to those financial arrangements which are specifically used to fund projects that focus on sustainable development. It comprises investment into environmental products and initiatives, mitigating and managing environmental risks, investment sectors and policy instruments, organisational strategies, financing green public policies as well as inclusion of environmental, social and governance (ESG) considerations in investment decisions. The term essentially means directing investment towards the 'Green' sectors and hence the term green finance is often used interchangeably with green investment. Although there aren't any standardised 'Green' sectors, the following are universally accepted-clean renewable energy, climate change, pollution, energy efficiency, low carbon infrastructure and sustainable waste management which can be further classified into subcategories of their own.

## II. LITERATURE REVIEW

(Jena, 2020) The author talks about with 2.5 percent of India's GDP at danger each year, it is the sixth most vulnerable country to the consequences of climate change. As a result, India has committed to reducing the carbon intensity of its GDP by 33-35 percent by 2030 compared to 2005 levels, but to do so, it will need to raise \$2.5 trillion between 2016 and 2030. Climate-related investments, both governmental and private, are, nonetheless, restricted.

The lack of a common definition of green finance in India is a key impediment to this attempt. While there are a few worldwide initiatives aimed at standardizing definitions, disclosure, and reporting methods, India's financial sector is not entirely committed to accelerating green lending and investment. The necessity and benefits of Green Finance are becoming increasingly apparent in India's financial sector. This can be accomplished by long-term, market-driven collaborative initiatives that increase green capital flows, starting with a common understanding of green finance.

These advantages would have an immediate impact on green finance. Adopting international practices, defining a set of principles for green economic activity, and soliciting stakeholder feedback could all help to shape India's Green Finance definition. According to our findings, a hybrid of these approaches may be the greatest fit for India, with a finance sector taxonomy serving as the foundation for green economic activity.

(Jha, 2019) The author states that, given India's worrisome rise in pollution levels, it's more important than ever to take use of green finance's untapped potential to fund green projects and investments. Blended financing is required to lower the overall cost of capital for private

capital investors. The Indian government should develop a clear green investment policy that focuses on the long term and the entire economy. The regulatory policy should be more transparent and welcoming to investors to foster trust and confidence. India should concentrate not only on domestic but also on international investors. Green finance instruments should be created in such a way that they appeal to both domestic and foreign investors.

**(B.S, 2013)** The author conveys that India's energy supply cannot keep up with demand. The country's economy is growing at a rapid pace. This has the effect of frequent power outages and ongoing power shortages. In order to reduce reliance on imports in the traditional the Indian government is actively investing in the energy sector and concentrating on measures to improve energy efficiency and using renewable energy sources. Here, the focus is primarily on MSMEs which are extremely important to the Indian economy. GIZ is leveraging these opportunities on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) by providing industrial MSMEs in chosen Indian regions with advisory services, training, and funding programs to help them adopt energy saving measures. This allows businesses to improve their competitiveness while also reducing their negative environmental impact. The project takes an integrated approach to scaling up energy efficiency measures in the sector by working with the Small Industries Development Bank of India (SIDBI) and the State Bank of India (SBI) to develop and implement a specific energy efficiency loan concept, which is complemented by training on sustainability measures for MSMEs.

**(Unnikrishnan, 2019)** The author states that according to the report, there is a lot of room to raise youth knowledge about green finance because it is currently inadequate. In comparison to the 17-19 age group, the 20-23 age group is more aware of the notion of green financing. We can deduce that an individual's consciousness is proportional to their age. For overseas investors, green finance is in strong demand. The development and promotion of the expanding demand is in India's best interests. Students are interested in opting for green financing products, according to the poll, even if the market is still in its early stages of development.

**(Chitra, 2020)** The author suggest that the awareness level is correct in all three categories of top performing banks: public, private, and foreign; nevertheless, knowledge is good in foreign banks, moderate in private banks, and low in public banks. Other banks, on the other hand, must raise their Green Banking awareness and knowledge levels. Despite the fact that the government and banks have taken numerous initiatives to establish a green environment through Green Banking, there is still a need to raise awareness about green banking and its various services. This banking system will benefit all parties concerned, including the country as a whole. The government correctly recognized the significance of the banking sector and how it might affect the entire country.

**(Sharma)** The author deduces that the banking industry has implemented sustainable methods in all sectors of life, according to the Go Green slogan. To achieve the goal, banks must collaborate closely with the government, NGOs, IFIs/IGOs, the Central Bank, consumers, and business communities. According to the findings of the study, green initiatives such as press communication, bank environmental policies, energy savings incentives, and solar ATMs are not well-known among bank green initiatives. Green banking is still a hot topic in India, and it has the potential to play a significant role in the country's development. India's banks and financial institutions have begun to take action, though not at a high level.

**(Ghosh, 2021)** The article express that every economy relies on two sources of energy: energy and finance. India's commitment to an energy transition will be impossible to achieve without massive financial inflows at an unprecedented rate. To make investments in new energy sectors appealing, changes will be needed in the financial ecosystem, how projects are appraised, how green financing is accredited, and in the policy framework. According to the latest study from CEEW's Centre for Energy Finance and the International Energy Agency, India's solar and wind costs have plummeted by over 80% and 60%, respectively, since 2014, with solar PV tariffs expected to reach Rs 1.99/kWh by December 2020. As a result of aggressive bidding by central public sector organizations and overseas power providers, equity returns have been squeezed even more: In the first half of 2021, equity IRR projections declined to 13.3 percent, down from 14.9 percent in the first half of 2020. Market maturity is important to equity investors because it allows them to underwrite the alpha generated by investments. Investors are currently interested in ESG compliant firms, however many of these initiatives do not prove to be legitimate. A redesigned taxonomy should also provide a better framework for equity investors to assess the impact of other industries including agriculture, construction, and mobility. Third, to speed the phase-out of fossil fuel infrastructure in emerging markets, transition funding is required.

**(S, 2021)** The paper emphasizes the urgency of sustainable development and notes that green financing is gaining momentum as an effective means to achieve it in today's context. Investors are shifting their focus from solely considering risks and profits to becoming more socially conscious. This heightened awareness of the importance of environmental protection has led to a multitude of green finance options. It is essential for policymakers, researchers, environmentalists, government officials, investors, and financial institutions to establish a clear definition of green finance and put in place a regulatory framework to assess green projects, ensuring that investors are not misled by superficial "green" claims. With the support of green financing, a growing country like India should prioritize activities such as renewable energy generation, safeguarding natural resources, improving energy efficiency, addressing climate change challenges, and tackling other environmental issues. Consequently, it can be argued that when properly managed, green finance can serve as a valuable tool for long-term growth.

**(Sarangi, 2021)** This paper outlines the surge in awareness and changes in investment motives from a more traditional approach to recognizing the demand for investments to exceed basic monetary purposes. This involves incorporating essential social, environmental and governance factors into investment agendas as well as revolve decision making, initiatives and reporting around it. The paper mentions the increase in recognition towards ESG investments and the benefits it provides to investors based on their risks and returns and increasing the legal frameworks and imperatives for these investments. There has been large growth towards these investments in recent years, with an annual growth rate of 24%, arising mainly from the US and Europe, but not specific to it, as there has been newfound awareness in Asian countries like Japan. Sectors like IT, health care and finance seem to be the front runners in ESG growth with more private investments in substantial amounts to be expected soon, stemming also from the recent.

Paris agreement and the United Nation's efforts to impose principles behind climate change actions. Though still at a very premature stage, the ESG is developing quickly in India, as it is integrating it into its policies with lie in collaboration to its sustainable development goals and global commitments. The country aims to involve ESG into as many of its sectors as possible – with participation in initiatives such as the RE100 which saw backing from corporate powerhouses like Infosys and Tata Motors. Other companies such as Axis mutual fund and ICICI prudential have also launched ESG integrates schemes. A study into 50 Indian listed companies conveyed the importance provided to specific ESG factors and saw a greater importance towards policy disclosures and governance and a low priority in social involvement. The government aims to boost these initiatives mainly through the aid of the ministry of corporate affairs and involving SEBI and the impact investors council into its agenda. In conclusion there has been in increased appetite for the triple bottom line approach and ESG investments all around the world, including India.

**(Ranjan, 2021)** The author in this paper aims to discuss the financial arrangements required for projects attributed towards sustainable economic growth and the challenges faced during. The paper discusses certain public policies initiated for the same. Such as programmes focusing on harmful emissions like the United Nations environment programme and the sustainable stock exchange for indexes with companies leading in ESG. The regulatory framework required for ESG can be divided into four areas- sustainable disclosures by companies, directed and concessional lending, the micro and macro prudential regulations, and establishing green financial institutions. India has been steadily making its contributions toward ESG through action plan committees, and guidelines enforced by SEBI.

Other incentives lying under the Paris agreement have also been installed, to reduce greenhouse gas emissions, and the RBI is also raising awareness. India has also started green bonds since 2015, with a value of over \$17 billion, used for environmentally sustainable projects. However there have been certain challenges that have come such as the

higher relative cost of issuing green bonds, high borrowing costs and asymmetric information which aim to be solved using market infrastructure development and other public policies like green buildings.

**(Jain, 2020)** This paper talks about the different opportunities and steps India have and must take in order to prevent its extreme climate conditions and achieve its sustainable goals. The first step is expanding its incentive mechanisms and incorporating green elements into its laws and policies such as monetary and taxation. Next is strengthening its framework by establishing institutions to coordinate climate finance and operate on a wider scale by raising awareness. It is also imperative for India to measure the finances it deploys and monitor it, create domestic frameworks for environmental risks, establishing green banks and recalibrating the financial sector towards green finance. Apart from green bonds, credit enhancement schemes, ESG investments and funds, real estate investment trusts and The UN's concept of blended finance are big opportunities towards a sustainable goal. Green buildings and green vehicles to reduce emissions and environmental impacts can also be implemented to meet its climate goals and create a unified approach towards it.

**(Jayathilake, 2019)** This paper focuses mainly on the impact of green finance on corporate governance. The paper emphasizes on the recent climate and environmental disruptions and the necessity to switch to sustainable development, highlighting the use of green finance by the public and private sectors as a possible solution. The paper defines terms such as green finance and governance and mentions the important role of banks to collaborate with the economy. The study utilised different journal articles and papers to understand the relationship of green finance with corporate governance. The author identified the thesis as being true and urged on the need to implement green finance across all banks to achieve long term economic sustainability.

**(Zhihan, 2020)** This paper deduces the importance and relationship of green finance, fintech and smart cities in long term sustainability. For this, the author selects data for 6 years and uses a distributed lag model to showcase it. He identifies green finance to include green bonds, green insurance, green stocks, and construction of smart cities and concludes on its positive influence and effectiveness. The author however also mentions that fintech may have an adverse effect on the construction on smart cities and may delay it to a certain extent due to the high cost of fintech research and marketization. The author stresses on the requirement to raise awareness particularly towards financial intermediaries which can lay out the foundation towards green finance, and the government to aid in this through publicity work to organize a unified approach.

**(Muralidharan, 2021)** The paper suggests that though the bond market is at an infant stage the government can access climate finance for renewable energy projects and for the sake of agriculture as well. The author mentions the need for domestic funds to create self-sustainable avenues rather than relying on external funds. The author uses life

insurance corporations and pension funds as examples for usage of green finance due to their long-term horizons. He offers a unique solution post covid 19 to suggest that recovery of jobs and industry could be done in a “green” way with a sustainable method to enact change in our regular approach. However, lots of efforts are required to build a capacity for these blended finances to work and improve on climateprogrammes.

(Sushma, 2021) The author describes the growing awareness towards sustainable development and those investors are now focusing on other aspects rather than just risk and return. He specifies that this awareness needs to be present across a wide array of stakeholders like the policy makers, the government, investors, etc.- as it provides an opportunity to enact change through a united approach. He mentions the need for a proper legal framework and India’s focus to revolve around efficient energy management, renewable energy generation, climate adoption, etc.- if it expects green finance to work in a fruitful manner.

#### A. India Vs Global Scenario

Table 1: Green Bonds Issuance since January 1, 2018

Country	Amount issued (\$Mn)	Number of bond issued	Amount issued as per cent of all bond issuance (per cent)	Number of bonds issued as per cent of all bond issuance (per cent)
Euro Area <sup>1</sup>	1,96,854	594	1.7	0.4
China	63,023	183	0.3	0.2
USA	35,421	71	0.2	0.2
Japan	11,815	88	0.1	1.1
South Korea	11,781	44	1.0	0.4
Central and Southern America <sup>3</sup>	8,869	53	0.5	1.0
<b>India</b>	<b>7,992</b>	<b>22</b>	<b>0.7</b>	<b>0.3</b>
South-east Asia <sup>2</sup>	7,208	86	0.6	1.4
Australia and New Zealand	5,878	15	1.1	0.8
UK	5,311	17	0.4	0.5
Hong Kong	4,781	19	0.5	1.0
Singapore	496	9	0.05	1.2

Green bonds are issued by any sovereign organisation, inter-governmental groups or alliances, or corporations with the intention of using the bond profits to fund ecologically sustainable projects. We used Bloomberg to get thorough information on green bonds issued by corporations and governments in India and other nations. For India, we first removed all corporate and government bonds issued since January 21, 2015, regardless of whether they were green bonds or not. In this regard, irrespective of the issuers' country of incorporation, we have taken those bonds with India as the country of risk.

Since 2015, India has begun to issue green bonds. Green bonds in India were worth \$16.3 billion as of February 12, 2020. Since January 1, 2018, India has issued green bonds worth approximately \$8 billion, accounting for

### III. RESEARCH OBJECTIVES

- oTo understand the level of awareness regarding green finance as an investment avenue in India
- oTo measure and analyse the quantum of investments in green funds and surge of green bond issuances
- oTo study Indian Green Finance market in context of the Global Scenario

### IV. DATA COLLECTION AND METHODOLOGY

A survey has been conducted with a sample size of 45 respondents in order to collect primary data to gauge the level of understanding and awareness they have in terms of green securities. In addition to this, the questionnaire, based on a Likert scale, was designed with the aim of measuring the willingness and ability of individuals to allocate a proportion of their portfolio to green securities. The data collected was spread across respondents from a variety of occupations, income classes and age groups that would help render a generalized view of green investments among individuals from different walks of life. Moreover, secondary data has been employed to compare the position and scope of the Indian green investment market in context of the global scenario.

roughly 0.7% of all bonds issued in the Indian financial market. Despite the fact that green bond issuance in India has accounted for a modest percentage of total bond issuance in recent years, India has maintained a competitive position in comparison to numerous advanced and emerging economies.

Since 2015, around 76% of green bonds issued in India have been denominated in US dollars. Aside from businesses and the government, the outstanding amount of Green Bond proceeds allocated to support the financing of such projects in India is anticipated to be US\$640 million as of June 30, 2019, according to the World Bank's Green Bond Impact report (2019).

To summarise, green finance in India is still in its infancy. As of March 2020, green bonds accounted for only 0.7% of all bonds issued in India since 2018, and bank lending to non- conventional energy accounted for about

7.9% of all outstanding bank credit to the power sector. In the next part, we'll go over some of the significant issues that the green bond market in India is facing.

*B. Leading Green Bond underwriters globally:*

Manager	Rank	Vol (MM USD)	Table Share(%)	Issues	Rank Rev (MM USD)	Wallet \$
BNP Paribas	1	4,165.61	4.56	35/41	2	24.87
BoFA Securities	2	4,011.36	4.40	35/37	4	21.79
JP Morgan	3	3,863.58	4.23	40/43	6	17.10
HSBC	4	3,720.15	4.08	37/40	3	24.44
Deutsche Bank	5	3,461.90	3.79	16/20	16	10.71
Citi	6	3,217.25	3.53	32/32	10	14.85
Credit Agricole CIB	7	2,999.28	3.29	30/33	8	15.19
Bank of China	8	2,995.32	3.28	26/25	1	26.38
Natixis	9	2,085.29	2.29	11/13	15	11.89
Morgan Stanley	10	1,972.24	2.16	22/23	33	6.04
Agricultural Bank of China	11	1,952.68	2.14	19/19	7	15.80
Landesbank Hessen-Thuri...	12	1,812.75	1.99	16/17	5	17.77
Industrial & Comm Bank ...	13	1,769.70	1.94	17/15	12	12.45
SEB	14	1,765.43	1.93	15/16	27	6.58
Societe Generale	15	1,654.57	1.81	12/13	25	7.39
NatWest Markets	16	1,595.06	1.75	10/10	13	12.35
Danske Bank	17	1,540.35	1.69	25/25	31	6.20
CITIC Securities	18	1,518.18	1.66	18/17	9	14.98
Barclays	19	1,510.37	1.66	14/18	17	9.90
Credited - 179 Managers		91,254.70		301/297		584.44
Total		89,815.19		312		589.93

Image 1: Leading Green Bond underwriters globally Source: Bloomberg

In 2021, JPMorgan led the way as the top underwriter for green bonds, aligning with its commitment to allocate \$2.5 trillion over the next decade for climate action, with \$1 trillion specifically designated for green projects, including those related to renewable energy. European banks like BNP Paribas, Credit Agricole, and HSBC collectively accounted for half of the top 15 underwriters. U.S. banks, including JPMorgan, Citigroup, Bank of America, Morgan Stanley, and Goldman Sachs, were involved in approximately 20% of corporate and governmental green bond deals this year, a significant increase from the 2% they represented in 2019.

and Japan emerged as major sovereign green bond issuers in the past year.

In the above table as per the 2022 data, we can see the market lead managers (underwriters) for the global green bond issuance, the leader of the global green bond market is BNP Paribas as per 2022, with a 4.56% of the global issuances which are made by BNP Paribas USD denominated and has earned a revenue of \$24.87 mm. Out of 179 top performing global managers top 10 lead managers contribute to almost 36% of the global issuances. BNP Paribas has outperformed and is the leader since a year, but as we see BoFA Securities, it has raised its rank from 4<sup>th</sup> to 2<sup>nd</sup> for the green bond issuance volume. From the above table, we can understand every company's earning visa vi the volume rendered as issuance.

Canada's TD also entered the top 10 list with a European Union green bond that concluded in October 2021. The sectors that issued the most corporate green bonds were utilities, infrastructure, and real estate. Additionally, France

*C. Green Bond Index Declines Vs Global Agg Index:*

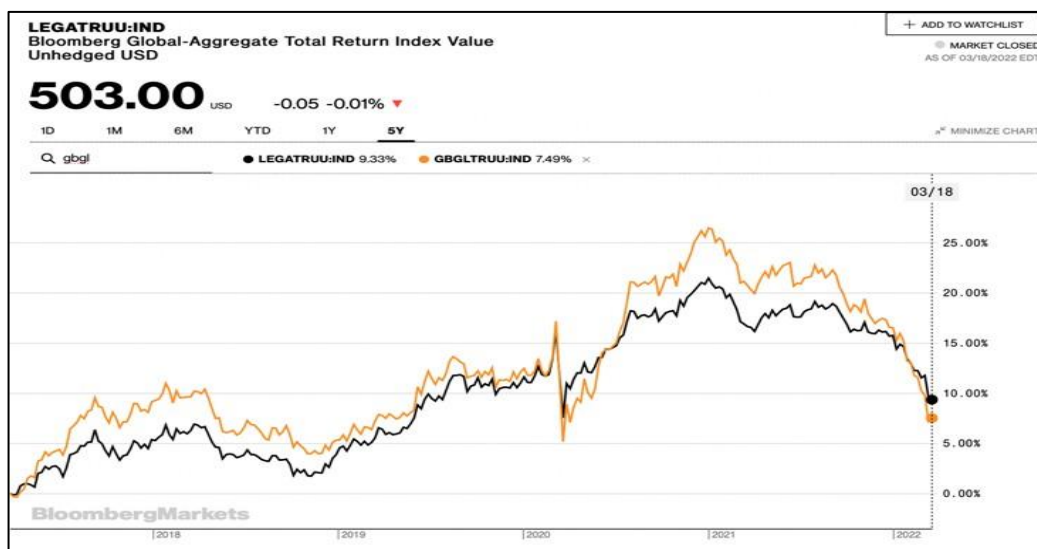


Image 2: Bloomberg Global - Aggregate total Return Index Value

Despite the strong outperformance of green bonds during the second half of 2020, as they gained value rapidly due to the economic recovery after the crisis, declining spreads, and aggressive interest rate cuts by central banks, the Bloomberg MSCI Global Green Bond Index (GBGL) faced a decline in 2021 when compared to the Bloomberg Global Aggregate Index (LEGA). This decline was attributed to increasing interest rates, relatively modest returns, and a stronger U.S. dollar. While this macroeconomic environment may continue, we anticipate that green bonds will remain an attractive investment option. This attractiveness will be driven by a higher quality of issuers, the exclusion of non-core sectors as the momentum for green recovery gains traction, and the participation of a diverse group of issuers in the market. The GBGL index now has a greater emphasis on bonds denominated in European currencies, while LEGA is more focused on the U.S. market. Both indices comprise 80% corporate and 40% government issuers.

In 2022, the global green bond unhedged index was not outperforming the global aggregate index mainly due to various macro factors, though the awareness of green bonds and their yield are gaining momentum, there is also an increase in the interest rates which is causing the underperformance of the bond index. In 2017, the green bond index gained a high momentum and eventually the global aggregate index started pulling off the trend, as the market played off the global aggregate index outperformed the global green bond index.

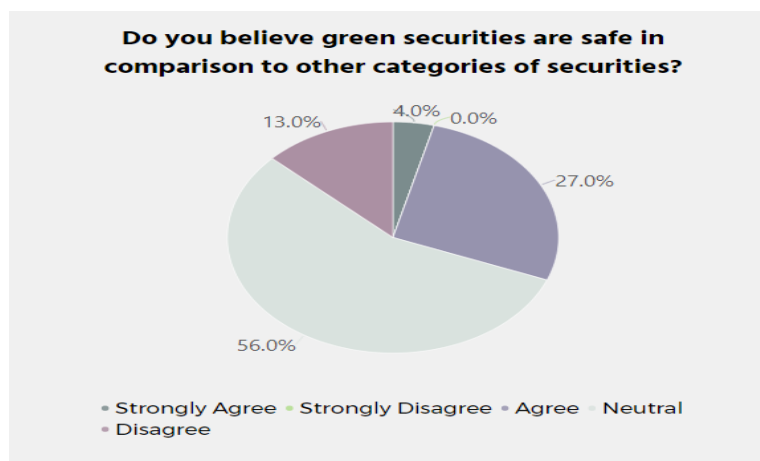
#### D. Data Analysis

When we sore into the leaps which sustainable development and initiatives have taken globally, we can

picture a wide array of new avenues for innovations in this field and in creating an eco- friendly future. Green finance lies at the heart of this solution and hence provides newer opportunities for advancement in the same. Still, despite other countries having made strides in this area, India still lacks behind. It still places far back in terms of its green value when compared to other developed countries and faces a myriad of issues. Hence, we must use the data we have collected and accordingly dwell deeper into the factors and conditions which are causing the problems and to identify possible prospects and possibilities to optimize our knowledge and best yield the solutions.

This will involve many specific areas which we must focus on; The creation of awareness and dispersion of green finance ideas across the country, the levels of investments which have been made and the possible future investments, the profile and criteria of a prospective investor and the need to cater accordingly and the most important factor, which is – the public perception. This covers how potential investors view the securities and the benefits that they feel it possess. This revolves around its accessibility, security and long-term advantages and how capturing these specific points and improving upon it could aid in improving green finance opportunities and the sustainable ecosystem as a whole. Therefore, we perform tests and analyse data to get a better understanding of these criteria's and make utilize it to make improvements.

We questioned our respondents on the following parameters to gauge the level of understanding and awareness they have in terms of green securities, and these were the results we obtained: -

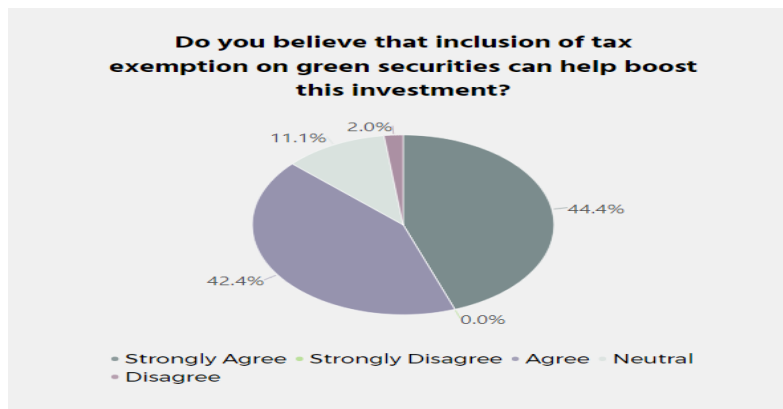


Graph 1: Pie chart illustrating if green securities are safe in comparison to other categories of securities.

Green bonds and securities usually carry lower risk than other forms of securities primarily because although these investments are raised for green projects, the onus of the repayments and interest lies with the issuing company and not the performance of the project. As a part of our survey, we questioned our respondents regarding the safety of these securities to understand how they feel about its riskiness. (Saravanan, 2021).

As per our findings, a little over half (56%) of the respondents were observed to have a neutral opinion towards the safety of green securities in comparison with the other categories of investments as mentioned in the above graph. This gives us the impression that a significant proportion of the individuals either are not aware of green securities or their characteristics in comparison to other traditional securities. From amongst those who are aware of the features of these securities, majority of the individuals consider it to be a relatively less risky form of investment

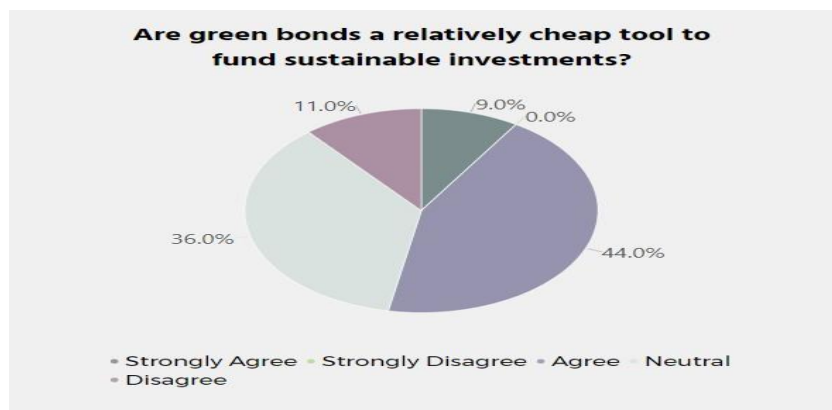
which is almost double of those who disagree with the same.



Graph 2: Pie Chart illustrating if green bonds are relatively cheap tool to fund sustainable investments or not.

Surging Demand for eco-friendly green investments is leading to a reduction in the borrowing costs for environmental projects, potentially influencing the behaviour of governments and corporations. With larger number of investments pouring in globally for green projects, the bond prices are on a rise pushing down yields on the bonds, making borrowing slightly cheaper. In reference to this, we questioned our respondents whether they believe green bonds can act as a cheap tool to fund sustainable investments. (Wirz, 2020).

According to our findings, we observed that 53% of the respondents believed that these investments could act as an economical tool for funding green projects suggesting that they are aware of its benefits and there might be a possibility that they consider it to be a potential investment or have already invested into it. On the other hand, 36% of the respondents were observed to have a neutral opinion while 11% disagreed with it indicating that they believe green bonds are an expensive investment that trade at a premium in comparison to other types of bonds and securities.



Graph 3: Pie Chart illustrating if tax exemption on green securities can help boost green bond investment.

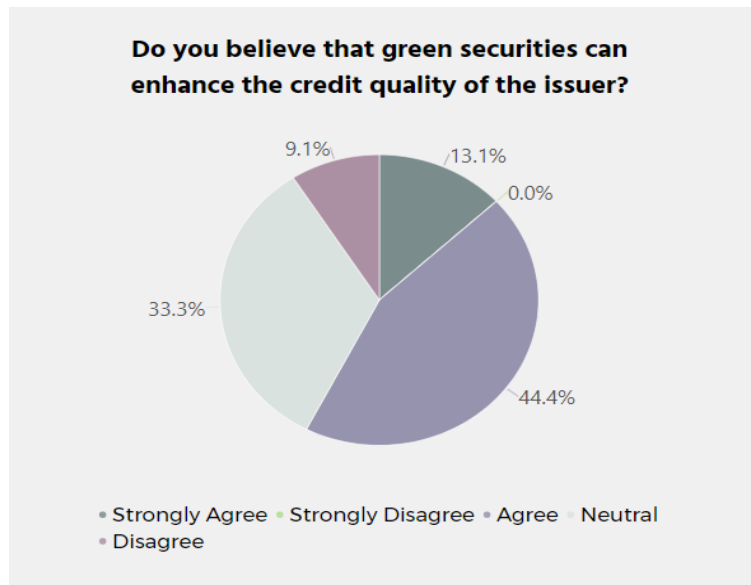
Studies have proven that issuing not only green bonds but also other types of ESG investments can have a statistically significant impact on credit ratings published by agencies. Environmental activity has an influence on the moral capital as well as helps generating financial benefits which is essential for companies that issue these bonds. It not only enhances their reputation but also increases the transparency of the company’s operations resulting in improved stakeholder relations.

Thus, from an investor perspective this means less default risk leading to reduction in the cost debt, superior credit ratings as well as better accessibility to credit. This is also one of the reasons why companies associated with a higher risk premium try to reduce it by introducing such securities. We questioned our respondents about the same to

assess whether or not they believe that green securities enhance the credit quality of issuers. (Chodnicka-Jaworska, 2021).

As per our findings, we observed that approximately 58% of the individuals believe that issuing green securities improves the credit quality of the issuers which suggests that this could act as an incentive for both issuers as well as investors to expand their investments into green securities as it provides them protection of capital as well as a promise of returns.

However, 33.3% of the respondents gave a neutral opinion indicating that issuing green securities neither enhance nor degrade the credit quality of issuers.



Graph 4: Pie chart illustrating if green securities can enhance the credit quality of the issuer.

Typically, green bonds are taxable like other corporate and government bonds but there is a small proportion of municipal green bonds as well the interest and capital gains of which is tax exempt. This appeal to investors and is more valuable for investors in higher tax brackets which in turn acts as an incentive for investors to purchase these. In addition to this, there are tax credit as well as direct subsidy bonds that exist in the US as well. In reference to this, we questioned our respondents if they believe that inclusion of tax exemption on green securities in the Indian market would help accelerate green investments. (**Climate Bonds Initiative, 2021**).

As per our findings, a whopping 86.8% of the respondents agreed with this, with 44.4% of the individuals strongly agreeing while 42.4% agreeing with the same. This suggests that if the current offerings in terms on green securities are modified to be tax - exempt it would significantly impact the quantum of investments in green bonds and securities, increase awareness and give an overall boost to the industry. A small proportion of the respondents

were also observed to give a neutral opinion about the same indicating that they might be indifferent to these securities even if they were tax-exempt.

**V. CHI-SQUARE TEST OF DEPENDENCE**

Three Chi-Square test of independence was undertaken between three group variables to assess the demographics situation of Indians relating to green finance.

The first group variable was between occupation and awareness about green finance where objective was to draw conclusion about some sort of dependence between them.

Applicants to the survey were given to choose between occupation as a first variable and their awareness about green finance as second.

The data received was as follows:

Table 2: Results post performing the primary research

<b>Observed(O)</b>			
<b>Occupation</b>	<b>Aware about green finance</b>	<b>Not aware about green finance</b>	<b>Sum Total</b>
Student	15	6	21
Working Professional	13	6	19
Self Employed	3	2	5
<b>Sum Total</b>	<b>31</b>	<b>14</b>	<b>45</b>

Looking at the data, we can see that among three occupations i.e., student, working professional, and self-employed, almost 68% of these respondents said that they are aware about green finance.

Relating these two variables to check a meaningful dependence and relationship of awareness of green finance on occupation, the first chi-square test was performed.

In this test, the hypothesis was defined that there exists a relationship between two variables whereas, null hypothesis was defined that there is no relationship between these two variables.

The first result obtained was as follows:



Table 3: Results post performing Chi-square test.

<b>X<sup>2</sup></b>	<b>0.249471605</b>
<b>Df</b>	<b>2</b>
<b>p-value</b>	<b>0.882730087</b>

There is null hypothesis as p- value is greater than 0.05. Hence, there is no association between occupation and awareness about green finance.

Despite the progress in public awareness and available financing choices in India, significant obstacles have emerged. These include elevated interest rates for borrowing, deceptive assertions of environmental adherence, a multitude of differing green loan definitions, and mismatches in the maturity between long-term green investments and investors' shorter-term occupational interests. These challenges may be contributing to the

situation of relative independence or lack of complete alignment in the context.

The second group variable was between age and preference of green bonds over green equity where again the objective was to draw conclusion about some sort of dependence between them. Applicants to the survey were given to choose between age as a first variable and their preference of green bonds over green equity as second.

The data received was as follows:

Table 4: Age and preference of green bonds over green equity

<b>Observed(O)</b>			
<b>Age</b>	<b>Prefer green bonds over green equity</b>	<b>Doesn't prefer green bonds over green equity</b>	<b>Sum Total</b>
10 to 20	6	4	10
20 to 30	13	15	28
30 to 40	0	5	5
40 to 50	1	1	2
<b>Sum Total</b>	<b>20</b>	<b>25</b>	<b>45</b>

Looking at the data, we can see that among four age categories i.e., 10 to 20, 20 to 30, 30 to 40, and 40 to 50, almost 80% of these respondents said that they prefer green bonds over green equity. Relating these two variables to check a meaningful dependence and relationship of preference of green bonds over green equity on age,

the second chi-square test was performed. In this test, the hypothesis was defined that there exist a relationship between two variables whereas, null hypothesis was defined that there is no relationship between these two variables.

The second result obtained was as follows:

Table 5: Results post performing Chi-square test

<b>X<sup>2</sup></b>	<b>5.049642857</b>
<b>df</b>	<b>3</b>
<b>p-value</b>	<b>0.168197933</b>

There is null hypothesis as p- value is greater than 0.05. Hence, there is no association between age and preference of green bonds over green equity.

Green bonds have a higher average oversubscription than their traditional green equities counterparts, according to statistics. Green bonds are attracting more capital market investment in order to accomplish climate targets and protect the environment.

Furthermore, while there is no common definition of a green investor's age, there is convincing evidence that the quantity of green bonds distributed to investors who declare themselves to be green is steadily increasing across all age groups. The popularity of these instruments underscores the

reality that investors of all ages are becoming increasingly aware of the environmental ramifications of corporate and government policies and are willing to trade financial performance for the certainty of a more sustainable future which is the reason for this independence between these two variables.

The third group variable was between income and percentage of their portfolio which they are willing to invest in the next five years where again the objective was to draw conclusion about some sort of dependence between them.

Applicants to the survey were given to choose between Income as a first variable and their investment percentage as second.

The data received was as follows:

Table 6: Income Vs Investment bifurcations

Observed(O)							
Income	<5%	5%-10%	10%-15%	15%-20%	20%-25%	>25%	Sum Total
<Rs. 2,50,000	3	7	3	2	1	1	17
Rs. 2,50,000- Rs. 5,00,000	1	3	0	2	1	1	8
Rs. 5,00,000 - Rs. 7,50,000	0	0	1	1	0	0	2
Rs. 7,50,000 - Rs. 10,00,000	1	2	1	0	1	0	5
Rs. 10,00,000 - Rs. 12,50,000	0	3	1	0	0	0	4
Rs. 12,50,000 - Rs. 15,00,000	0	1	0	0	0	0	1
> Rs. 15,00,000	2	4	1	0	1	0	8
<b>Sum Total</b>	<b>7</b>	<b>20</b>	<b>7</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>45</b>

Looking at the data, we can see that among seven income categories, ranging from less than 2.5 lakhs to more than 15 lakhs, almost 45% respondents invested in 5 to 10 percentage investment bracket and just 4.5% respondents invested in more than 25 percentage investment brackets. Relating these two variables to check a meaningful dependence and relationship of preference of green bonds over green equity on age, the second chi-square test was

performed.

In this test, the hypothesis was defined that there exists a relationship between two variables whereas, null hypothesis was defined that there is no relationship between these two variables.

The third result obtained was as follows:

Table 7: Results post performing Chi-square test

<b>X<sup>2</sup></b>	<b>17.6279937</b>
<b>df</b>	<b>30</b>
<b>p-value</b>	<b>0.9642509</b>

There is null hypothesis as p- value is greater than 0.05. Hence, there is no association between Income and investment in these securities in the next 5 years.

## VI. CORRELATION MATRIX

When analysing the importance of green finance and its overall awareness around the nation, a critical part of it revolves around an individual's actual portfolio and his investments towards green securities. Understanding this helps us dwell into the willingness of an individual to

actually takepart in the initiative towards a sustainable future and see concrete evidence of its existence. On the same note, we observed the data of the survey, in particular the question titled "What percentage of your portfolio have you contributed to investment in these securities?". Applicants to the survey were given various ranges and asked to choose as to where their own portfolio's criteria were met.

The data received was as follows:

Table 8: Current Investment percentage in green bonds

<b>NIL</b>	<b>19</b>
<b>&lt;5%</b>	<b>19</b>
<b>5%-10%</b>	<b>4</b>
<b>10%-15%</b>	<b>1</b>
<b>15%-20%</b>	<b>1</b>
<b>20%-25%</b>	<b>1</b>
<b>&gt;25%</b>	<b>0</b>

Looking at the data, we can notice that at the current standstill, there exists little contribution towards green securities in the country – with a majority of the people (84.4%) investing either less than 5%, or nothing towards green securities. Only 4 applicants out of the 45 samples, invested between 5-10% of their portfolio for the same and 3 applicants on more than 10% of their portfolio. Not only does

this speak to the awareness of green finance in India, but also the accessibility and security revolving green finance along with the perspective of individuals on the topic as to whether they find it beneficial. Considering 31 out of the 45 samples are aware of green finance, but yet many choose to invest very small amounts towards it may signal that a majority of the population are yet to understand or believe

the advantages that green securities possess in the longterm.

However, it is also important to know whether these same applicants are willing to invest in these green securities in the near future, to get a better idea on this same hypothesis. To understand this, we use the question “What

percentage of your portfolio will you be willing to contribute to investment in these securities in the next 5 years?” as it speaks to the aspirations of said individuals and the possible future of green investments in the nation.

The data received was as follows:

Table 9: Percentage of portfolio will people be willing to contribute to investment in these securities in the next 5 years

<b>NIL</b>	<b>1</b>
<b>&lt;5%</b>	<b>7</b>
<b>5%-10%</b>	<b>19</b>
<b>10%-15%</b>	<b>7</b>
<b>15%-20%</b>	<b>5</b>
<b>20%-25%</b>	<b>4</b>
<b>&gt;25%</b>	<b>2</b>

Here we can notice a change in tone. Only one applicant refrained from the idea of investing in green securities at all, and the majority, were dense around the mid-range of a 5-10% portfolio investment. We also see 18 applicants willing to invest more than 10% of their portfolio towards green finance, as opposed to the 3 applicants earlier. This data, though circumstantial in nature, projects a clear increase in the idea of investments towards green finance. Yet, it is still essential to graph an overall relation between the applicants investing in green finance currently and the

extent of their change expected in the next 5 years, to best understand the impact of current government initiatives towards a sustainable economy and its effectiveness.

To understand this correlation, we drafted a correlation matrix between the two data entries of the current investment percentage in the portfolio as opposed to the future investment percentage. Using the 45 samples as a whole, we quantified the data by using the mid-range value for each option and performed the test on that.

The data for the same is as follows:

Table 10: Current investment percentage Vs Future Investment percentage

<b>NIL</b>	<b>0</b>
<b>&lt;5%</b>	<b>2.5</b>
<b>5%-10%</b>	<b>7.5</b>
<b>10%-15%</b>	<b>12.5</b>
<b>15%-20%</b>	<b>17.5</b>
<b>20%-25%</b>	<b>22.5</b>
<b>&gt;25%</b>	<b>27.5</b>

We then gathered the data for each of the 45 samples and then assigned values to each. The correlation matrix to calculate the hypothesis of the relation between current portfolio investments vs future portfolio investments was then carried out on the Jamovi software, using a 95% confidence interval.

- **Hypothesis:** There exists significant correlation between the portfolio percentage invested currently as opposed to the future, by an individual.

The results obtained was as follows:

Table 11: Correlation Matrix results

Correlation Matrix		
	Percentage of portfolio invested currently	
Percentage of portfolio invested currently	Pearson's r	—
	p-value	—
Percentage of portfolio invested in the next 5 years	Pearson's r	0.23370
	p-value	0.12232

The information of importance here is the p value. If the p value obtained is less than 0.05, it signals significant correlation between the current and future investments, and if the value is more than 0.05, it does not signal significant correlation. In this scenario, the p value obtained is 0.12232 and hence does not signal significant correlation.

The understanding we can derive from this is that an individual that is investing a certain amount from his portfolio at present date, may have widely different prospects for future investments. This points to the potential of green finance in the India for the next 5 years and the need to yield this sample population through proper education, simpler investment procedures and recognition of an urgent need, to properly extract finance towards green projects.

Not only does this speak to the need of maintaining current investors in the frame but also catalyses the benefits of introducing newer and wary potential investors into green finance to encapsulate the population towards building a sustainable future.

*A. Green bonds in the current scenario*

Investors and companies seeking debt financing options are increasingly viewing Green Bonds as an attractive opportunity. It is projected that the total issuance of

sustainable bonds will reach a record high of \$650 billion, with an estimated \$350 billion of that coming from green bonds.

India is the second-largest emerging green bond market after China, although its figures pale in comparison to those of China and the USA. To bridge this gap, there is a continuous need to provide incentives for Green Bonds in India.

In 2022, Indian green bond issuance is expected to reach a new record high, following a particularly strong year in 2021. Corporations and banks in India, as the world's third-largest emitter of carbon dioxide, are expected to become more active in tapping into the climate-related debt market. India will require up to \$10 trillion to achieve carbon neutrality by 2070. Consequently, an increasing number of issuers will turn to the offshore market, which offers a larger and more diverse pool of environmentally conscious investors.

According to the latest reports from the Climate Bonds Initiative, a UK-based tracking agency, India issued \$6.11 billion in green bonds during the first 11 months of 2021. This marked the strongest year for green bond issuance in the country since they were first introduced in 2015.

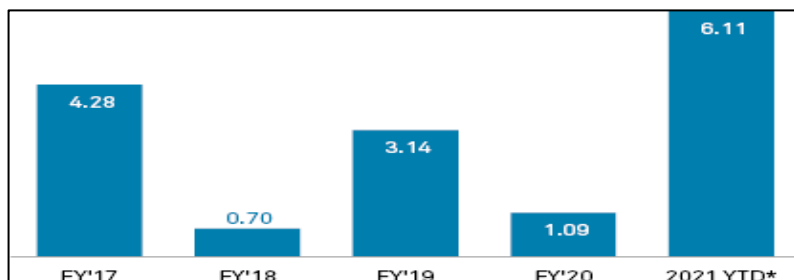


Image 3: Volume of Indian Green Bond Issuance (US \$B)  
Source: Climate Bonds Initiative

Based on statistics from 2021, it is anticipated that 2022 will witness another outstanding year for the issuance of such bonds, driven by a growing awareness among Indian companies regarding their environmental impact. Banks might also increase the issuance of green debt to support their lending initiatives aimed at expediting India's transition

to cleaner energy sources.

In line with Image 4, during the initial 11 months of 2021, non-financial corporations accounted for 94% of the green bond issuances, as reported by the Climate Bonds Initiative.

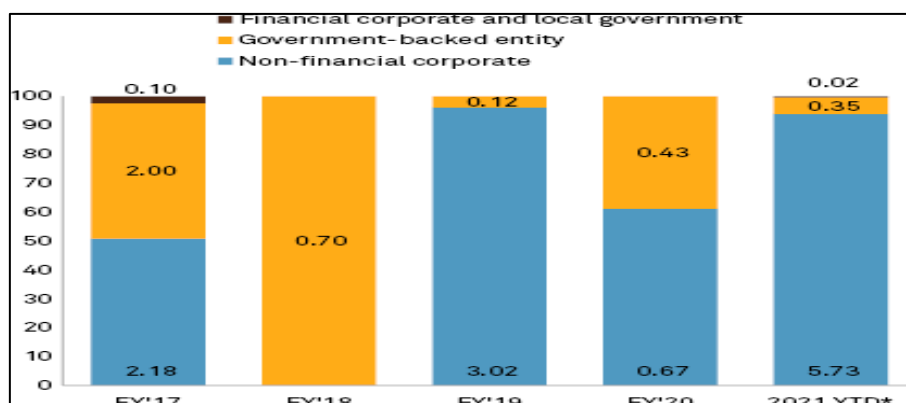


Image 4: Indian Green Bonds Issuer Type (%)  
Source: Climate Bonds Initiative

*B. Environmental, Social and Governance (ESG) Integration in Indian context*

ESG-Environmental, Social governance considerations are those central factors or non-financial indicators of performance of an organization that measure the long term sustainability, ethical environment as well as overall societal impact of a company or business in terms of the investments made by them. Globally, ESG assets have become increasingly popular among a large number of investors worldwide and according to *Bloomberg* is estimated to reach \$53 trillion by 2025 (1/3 of global AUM) and has become a key criteria for steering investment decisions.

In terms of the Indian context, although structured ESG reporting and analysis is relatively new it has existed for long in a rather disorganized manner. In fact, few companies with large market capitalisations have been voluntarily providing consolidated sustainability reports and investment in ESG schemes jumped to a whopping 3800 crore by end of January 2021 (compared to 2100 crore in the previous fiscal year) which was partly reinforced by the pandemic.

However, this rate of adoption of ESG investing is still slow-moving as compared to The USA and Europe which comprise 50 percent of the total AUM. This can be attributed to the fact that there is a lack of dedicated ESG fund house options for Indian investors in addition to other barriers.

For the purpose of ESG evaluation, ESG Risk ratings have been established by ESG Risks- Assessments and Insights (ESG Risks AI), India's first ESG rating company that yield an impartial and independent opinion on the ability of companies to anticipate and mitigate emerging risks relating to ESG factors.

It uses a transparent risk assessment model that computes performance across three categories, 38 key issues and 25 themes and accordingly renders ratings such as AAA, AA, BBB etc each of which have different implications on performance. Currently, India's AUM in terms global ESG focused investments is estimated to be 7% and is expected to reach approximately 30% by 2030.

Table 12: Green bonds Issuer in India along with amount of investment.

Issuer	Amount	Interest Rate (p.a.)	Tenure	Stock Exchange	Sector
Ghaziabad Nagar Nigam (2021)	INR 1.5 billion	8.10%	10 years	BSE	Sustainable water management
Yarrow Infrastructure Pvt. Ltd. (2021)	INR 5.81 billion	6.49%	3 years	BSE	Solar energy
JSW Hydro Energy Ltd. (2021)	USD 707 million	4.13%	10 years	Singapore Exchange	Hydro-energy projects
Renew Wind Energy Delhi Pvt. Ltd. (along with nine group companies) (2021)	USD 585 million	4.50%	7 years	India INX	Wind and solar energy generating assets
State Bank of India (2019)	650 million	4.50%	5 years	India INX	Renewable energy, low carbon buildings, waste and pollution control transactions, sustainable transportation and industry and energy-intensive commercial transactions
Adani Green Energy UP Ltd., Adani Green Energy (UP) Limited, Parampujya Solar Energy Pvt.	500 million	6.25%	5 Years	Singapore Exchange and India INX	Solar projects

*C. Quantum of Investments in ESG Funds in India*

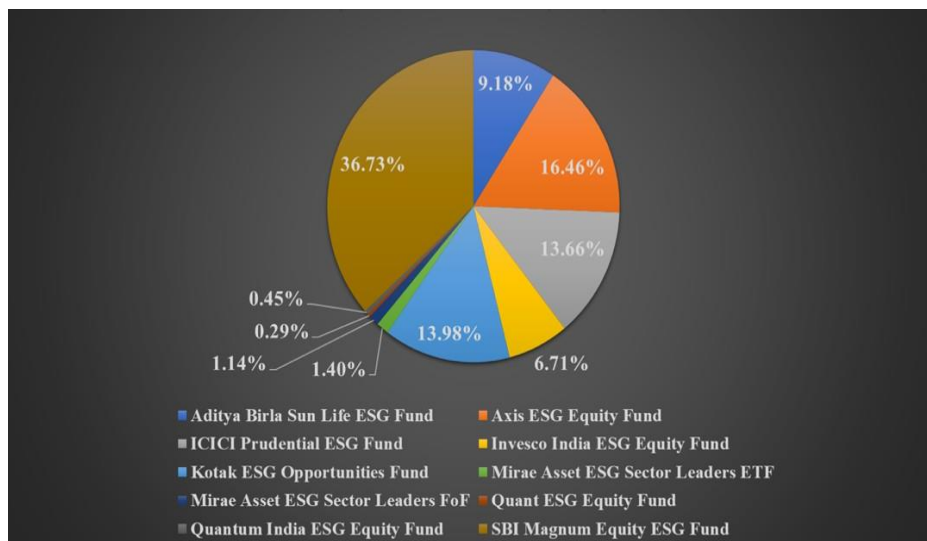
The Global Institutional Investor survey conducted by MSCI in 2021 suggested that about 79 percent of investors in Asia raised investments in ESG focused funds to the tune of more than \$5 billion in the latter half of 2020. This amounted to a total investment of \$25.4 billion which was a 131 percent increase from the 2019 levels.

Although the Assets under management(AUM) of ESG investments in India are currently negligible in terms of a global sustainability perspective, they have substantially risen by 4.7x in the past two years from Rs 2630 crore in November 2019 to Rs 12,300 crore. There has been a 22percent rise each year in the ESG assets ever since their launch in 2006 when the PRI (Principles of Responsible Investing) was accepted. In addition to this the Nifty 100 ESG Index, launched in 2017 was specifically designed to measure the performance of the Nifty 100 companies based on their ESG scores which factors in various elements relating to a companies’ ESG actions and their exposure to risks regarding ESG complications. On

multiple timeframes this index has succeeded in outperforming its parent, Nifty 100. This signified the rising attractiveness of the ESG themed funds.

The Indian Mutual Fund industry saw this surging interest in ESG investments as an opportunity and to capitalise on this trend, several new ESG based offerings were initiated. Until 2019 there were only a few ESG focused mutual funds in India but as of 2020 six new funds were launched, some of them being from largest companies like ICICI Prudential , Axis Mutual Fund and Aditya Birla Sun Life. The net inflows in March 2021 were reported to be a whopping ₹678 crore from amere ₹68 crore in the previous year. Another factor that caused momentum in this investment avenue was the announcement of green plans by giants like Adani, Tata and Reliance.

The following is a depiction of the proportion of investments by the ten major domestic ESG funds in India which totalled to an AUM of close to ₹12,500 crore.



Graph 5: Net Assets Under Management (%)

Source: Authors’ calculation based on Value research data

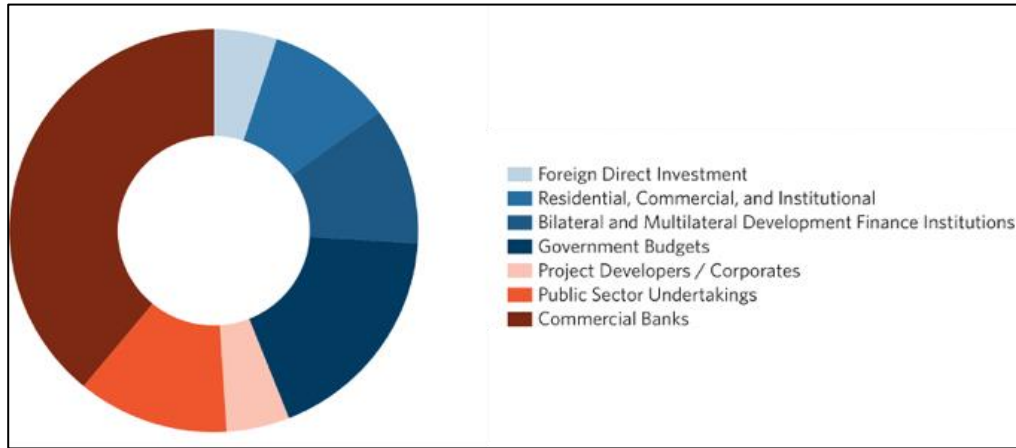
Out of the aforementioned funds, eight of them were launched within the past two years. SBI Magnum equity ESG fund is the oldest amongst all the funds which had a reported AUM of ₹4607 crore in December 2021 and accounts for almost 37% of the overall AUM of these domestic funds. Axis ESG Equity Fund was launched in February 2021 with an AUM of ₹1900 crore. This was followed by two additional funds that were launched in March 2021 namely, HSBC Global Equity Climate Change FoF as well as the Invesco India ESG Equity Fund.

*D. Green Finance Projects In India.*

"The Landscape of Green Finance in India" is a unique research study carried out by the Climate Policy Initiative. It provides a comprehensive analysis of green investment flows in India for the fiscal years 2017-2018. The study meticulously traces the sources of both public and private capital and establishes a framework for monitoring the movement of funds from their origins to their ultimate beneficiaries. This paper addresses the methodological

challenges and data gaps encountered in conducting a robust tracking endeavor and sheds light on the volume and nature of green financial flows in the country.

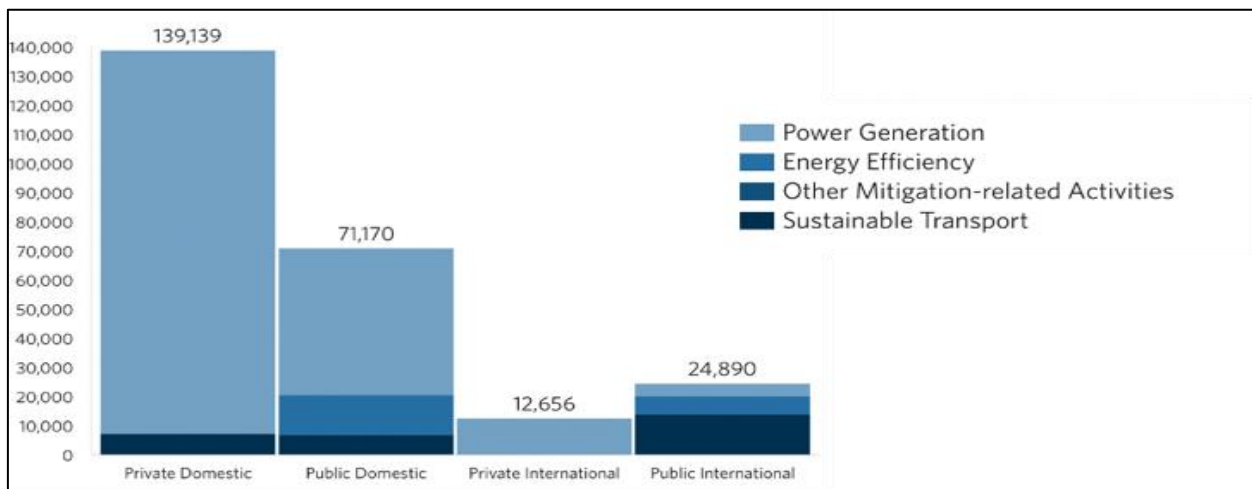
During the fiscal year 2017, India witnessed green finance flows of INR 111,000 crores (equivalent to USD 17 billion), which increased to INR 137,000 crores (USD 21 billion) in the fiscal year 2018. On average, there was INR 124,000 crores (USD 19 billion) in green finance each year, resulting in a total of INR 248,000 crores in tracked green funding for the years 2016-2018, equivalent to USD 38 billion.



Graph 6: Breakdown of Investment  
Source: climatepolicyinitiative.org

In the past two years, investments in various aspects of energy efficiency and power transmission, encompassing new infrastructure, retrofits, renovation and modernization (R&M), smart grids, and green energy corridors, have reached a total of INR 20,000 crores. Among these investments, green energy corridor projects represented approximately 47%, with smart grids under the NSGM mission making up 14%. These initiatives were primarily funded by public support,

sourced from both domestic and international channels. Public sector undertakings (PSUs), including entities like Energy Efficiency Services Limited (EESL), the Bureau of Energy Efficiency (BEE), and the National Thermal Power Corporation (NTPC) Limited, accounted for 34% of the overall monitored funding, while federal and state budget investments constituted the second-largest share at 33%.



Graph 7: Breakdown of source of finance by sector.  
Source: climatepolicyinitiative.org

The specialized "Green Finance" sector in India is still in its early stages of development. According to a recent analysis conducted by the Climate Policy Initiative (CPI), India managed to secure only \$18 billion in climate investments in 2018, despite a yearly demand of \$160 billion. In other words, India needs to increase its current investments nearly ninefold to meet its pre-Glasgow commitments, and the commitments are expected to grow significantly to meet post-Glasgow goals.

Green bonds, which are debt instruments designed to finance low-carbon and climate-resilient projects, have played a significant role in funding green initiatives in India thus far. Starting with Yes Bank's inaugural green bond issuance in 2015, various non-financial corporations like

JSW Hydro Energy, Adani Green Energy, Greenko, and public sector-supported institutions such as State Bank of India, IREDA, and the Indian Railway Finance Corporation have issued green bonds in India. While the Indian green bond market has made a promising start, there is a pressing need to substantially increase the issuance of such bonds.

However, the costs associated with issuing these bonds, including interest rates of 5 to 6% plus hedging costs of 3 to 4%, make them less cost-effective. As a result, these corporations opt to issue masala bonds, which are rupee-denominated bonds with a coupon rate of approximately 7.5 percent.

Foreign Direct Investment (FDI) in the form of equity involvement is the most common source. In the same way, Indian corporations raised Green Bonds on international markets. Green funds were also accessible in the shape of Aids from internationally renowned philanthropic organisations.

According to the Climate Policy Initiative (CPI), a policy analysis and consulting group, green financing flows in India totalled \$1.11 trillion in **2016-17** and \$1.37 trillion in **2017-18**. This amounts to around 10% of India's total yearly demand. According to India's ministry of environment, forests, and climate change, the country would require 162.5 trillion (USD 2.5 trillion) in climate action from 2015 to 2030, or around 11 trillion each year.

According to the CPI data, the power generating industry received around 80% of overall green money from **2016 to 2018**. This is consistent with current worldwide trends. Solar power projects garnered roughly 41% of all subsidies throughout the two-year period, followed by wind energy generating, which received 23%.

Approximately 8% of this money was allocated to MRTS developments, such as the Metro train. While the two fiscal years studied were not major in terms of transportation projects, the CPI research adds that there is an upward trend in capital expenditure on MRTS systems by the federal and state governments, and that more investment is projected in this sector in the future.

In **2018**, foreign direct investment (FDI) in the renewable energy sector surpassed \$1 billion. Due to the availability of sophisticated markets, they are mostly involved in solar and wind energy projects. FDI inflows into the clean energy industry have been rising in absolute terms, although they still account for 1% of overall FDI inflows.

Another common way to raise green money is through green bonds. According to a January **2018** report in the RBI's monthly bulletin, India has witnessed around \$8 billion worth of such bonds since January 2018. However, this only accounts for 0.7 percent of all bonds issued in India. Green bonds are more expensive, according to the RBI analysis, due to a higher risk perception and the higher upfront expenses of green investments.

In **2019**, the Reserve Bank implemented proactive policy measures to boost and support green finance activities. Starting in **2015**, it expanded its Priority Industry Lending (PSL) program to encompass the small renewable energy sector. Under this program, companies in the renewable energy sector became eligible for loans of up to 30 crore (increased from 15 crore since September 4, 2020), while families could access loans of up to 10 lakh for renewable energy investments.

India made an ambitious announcement in **September 2019**, stating its goal to achieve a renewable energy generation capacity of 450 GW by 2030. This target is one of the most ambitious in the world. According to India's Nationally Determined Contribution (NDC), the government will require **INR 162.5 lakh crores (USD 2.5 trillion)** for

climate action from 2015 to 2030, which averages around INR 11 lakh crores (USD 170 billion) annually. While India's energy sector has experienced rapid growth and attracted substantial investment, the country's climate objectives will demand similar and transformative increases in investment at the sectoral level.

The Indian government has been a driving force behind the expansion of the renewable energy sector by providing substantial financial support and suitable policy initiatives. Nevertheless, given the current adoption rates, overall sector health, and the setbacks caused by the **COVID-19** pandemic, the government must explore new and alternative funding methods and incentives for private sector involvement to scale up long-term and transformational investments. International funding is likely to come with environmentally-conscious conditions. Therefore, it becomes crucial to identify and evaluate the primary sources of funding, the mechanisms used for mobilizing and disbursing funds, and their ultimate beneficiaries for diagnosing, planning, and monitoring green investments in the country.

In **2015**, the Reserve Bank included the small renewable energy industry in its Priority Sector Lending (PSL) program as part of its green financing strategy. As of the end of March 2020, the total outstanding bank credit to the non-conventional energy sector was approximately 736,543 crore, accounting for 7.9% of the total outstanding bank credit to power generation, up from 5.4% in March 2015. The participation of commercial banks in the non-conventional energy sector varied among different bank groups and India's primary states.

As of **February 12, 2020**, India had outstanding green bonds worth \$16.3 billion. Since January 1, 2018, India has issued green bonds totaling approximately \$8 billion, constituting about 0.7% of all bonds issued in the Indian financial market. Although the percentage of green bond issuance in India has been relatively modest compared to overall bond issuance since 2018, India has maintained a favorable position compared to numerous advanced and emerging nations.

Green financing pledges totalled **\$185 billion** reported by IDFC members. This reflects a **6% reduction from 2019**, owing mostly to the COVID-19 pandemic's impact. Climate finance was **\$178 billion in 2020**, accounting for **96 percent** of total green finance, while support for biodiversity-focused programmes totalled **\$5.4 billion (3 percent)**. Projects with biodiversity co-benefits received \$8.6 billion in climate financing. As a result, overall biodiversity financing in 2020 was expected to exceed **\$14 billion**.

In India, the cost of issuing green bonds has remained higher than that of conventional bonds. It should be noted that the majority of green bonds issued in India are issued by government entities or companies with strong financial positions. The fact that private sector issuers of green bonds reported lower debt-to-assets ratios on average than non-issuers of green bonds demonstrates this.



Table 13: Debt as a percentage of Total Assets for Corporates  
(Average between January 1, 2015 and February 12, 2020)

Sector	Issuer	Non-issuer
All	63.8	72.9
Power	67.6	77.7
Renewable/non-conventional energy	69.4	96.6

Source: Authors' calculations based on Bloomberg Data.

As of January 14, 2022, Reliance Industries (RIL) has pledged to spend Rs 5.95 lakh crore in Gujarat for the development of renewable energy infrastructure as well as other industries such as telecommunications and retail. The money will be used to help build 100 GW of renewable energy power plants and a green hydrogen environment over the next 10 to 15 years.

As part of an MoU signed with the Gujarat government during the Vibrant Gujarat Summit 2022, RIL plans to spend Rs 60,000 crore in green energy production capacity and developing an ecosystem for small and medium businesses. The expected investments, according to RIL, are expected to generate over 10 lakh direct and indirect job opportunities in the state.

RIL has begun the process of exploring land in Kutch, Banaskantha, and Dholera for a 100 GW renewable energy generating plant. Solar PV modules (production of polysilicon, wafers, cells, and modules), electrolyzers, energy-storage batteries, and fuel cells are among the new energy manufacturing facilities that have been invested in.

Over the next 3-5 years, the business expects to invest Rs 25,000 crore in existing projects and new enterprises. Reliance Industries said in 2021 that it will invest Rs 75,000 crore in green energy infrastructure in Gujarat as part of its goal to attain net zero emissions by 2035. RIL's new energy business has already made investments in six worldwide technology start-ups in the previous year to this end.

On January 20, 2022, At the 11th India-UK Economic and Financial Dialogue between Finance Minister Nirmala Sitharaman and her British counterpart Rishi Sunak, the two countries agreed to invest USD 1.2 billion in green projects and renewable energy to support India's green growth ambitions, advancing the bilateral agenda of an Enhanced Trade Partnership.

Sitharaman and Sunak signed off on a USD 1.2 billion package of public and private investment in green projects and renewable energy in India while meeting digitally for the annual summit. This includes a USD 1 billion investment in green projects in India by the CDC, the UK's development finance institution, joint investments by both governments to support companies developing innovative green tech solutions, and a new USD 200 million private and multilateral investment in the joint Green Growth Equity Fund, which invests in Indian renewable energy.

A new Climate Finance Leadership Initiative (CFLI) India collaboration has also been agreed upon to mobilise private financing into sustainable infrastructure in India,

including clean energy technologies such as wind and solar power, as well as other environmentally friendly technologies. The London Stock Exchange (LSE) has raised GBP 13.41 billion in Masala, dollar, and green bonds, with the LSE being branded the "biggest worldwide centre for Masala Bonds."

#### E. Progress of Public Policy and The Need for Scaling up Green Finance in India

India has been emphasising on the need for green finance as early as 2007 by issuing the 'Corporate Social Responsibility, Sustainable Development and Non-financial Reporting-Role of Banks' and subsequently introducing the National Action Plan on Climate Change in 2008 which primarily aimed at mitigating the impact of climate change which is one of the most pressing environmental concerns. Integrating green finance in India's economy can help make it resilient to the climatic changes by reducing the overarching climate change risks by diverting capital from the carbon emitting sectors to the carbon mitigating sectors.

By allowing the financial sector to increase capital allocation and adoption of measures that can achieve environmental, social and economic benefits.

Over the years several fiscal as well as financial initiatives are at play which are aligned with India's commitments under the 2015 Paris Agreement for attaining 40 percent of installed electric power capacity from non-fossil sources by 2030 and reducing the intensity of greenhouse gas emissions. In terms of green financial institutions, The Indian Renewable Energy Development Agency (IREDA) became India's first Green bank in May 2016 for promoting clean energy investments. In addition to this, the India Infrastructure Finance Corporation Limited (IIFCL) launched a credit enhancement scheme for funding feasible infrastructure projects with bond tenors exceeding five years.

The green finance investment growth rate of 24% between 2016-17 and 2017-18 was mainly contributed by the domestic private sector (over \$18 billion) through debt as well as equity funding as opposed to the investment made by the public sector through a variety of instruments. This outpaced the GDP growth rate of 7.2% indicating potential for propelling economic growth. The government's initiatives including expenditure taken up by Public sector undertakings on climate related activities doubled from 2016-17 to 2017-18 while budgetary allocations increased by 36 percent.

According to the Climate Policy Initiative report released in August 2020, India announced a highly ambitious target of reaching 450 GW of renewable energy production capacity by 2030. For promoting this initiative, The Reserve Bank introduced the Priority Sector Lending (PSL) scheme in 2015 wherein the renewable energy sector firms as well as households were eligible for loans up to 30 crore and 10 lakhs respectively for investing into renewable energy.

While India's energy sector is one of the fastest growing in the world which has been receiving some considerable investment, achieving a goal of INR 12 thousand crores (USD 170 billion) per year for climate action estimated by the country's Nationally Determined contribution (NDC) requires significant financial support at sectoral levels, regular policy intervention by the government as well as alternate and innovative ways to incentivise the participation of the private sector for scaling up investments especially in the post covid 19 pandemic which has not only caused economic but also sectoral downturn.

#### *F. Green Financing in the Private Sector and tracking of green finance.*

The power generation sector is the primary recipient of the tracked green finance over the last few years showing nearly 80% of the annual flows. Substantial efforts have been taken by the private sector and has improved data coverage and comprehensive reporting structure for renewables and thus reducing such data gaps and use of proxies.

The guidance and the focus on data tracking in the realm of green finance are essential for gaining insights into the extent of green finance investments in India. Although there are indications of a general upward trajectory, India's monitored green investments primarily concentrate on three sectors: 1) power generation, 2) energy efficiency, and 3) power transmission and sustainable transportation. However, these sectors fall significantly short of the benchmarks set by national and international studies.

Merely following the business-as-usual approach to investments will likely be insufficient in closing the ever-expanding financial gap in these low-carbon sectors. Even with the most conservative estimates, the present tracked financial activity in India accounts for just 10% of the overall funding required across various sectors.

India requires a unified domestic system for measuring, reporting, and verifying green finance characteristics. This system would streamline green finance attributes, identify financial constraints, and enhance transparency. Furthermore, there is a need to establish a comprehensive climate budget tagging framework that can track climate-related expenditures within the national budget systems. This would enable the integration of climate action into policy formulation and further promote mainstreaming in this area.

## VII. CONCLUSION

Green finance as a whole is an area where India is yet to achieve its full potential. There exists many unanswered questions in this field which we must explore and figure out the true scale it possesses in creating a sustainable future.

In order to understand this we begin by understanding the creation of awareness as well as the dispersion of green finance ideas across the country. To evaluate this we questioned our respondents regarding its characteristics such as safety and cheapness relative to other traditional securities as well as its benefits such as enhancement of credit quality for the issuer and its possible tax exemption properties. After analysing these four factors collectively, we conclude that although a modest amount of individuals have given a positive response with respect to its ability to enhance credit quality and being an economical tool for funding investments, which is, in fact in line with its actual properties, a significant portion of the respondents do not consider it to be a safe avenue for investment.

This tells us that even though, for the country as a whole we're setting new records for green securities' issuances we still have a long way to go when it comes to awareness on an individual investor basis and providing tax exemption on certain classes of green bonds could accelerate this task by acting as an incentive for investment and consequently further adding to the process of creating more and more awareness. We then must identify the profile of the candidates which deem green finance as a viable option and hence make improvements and changes to initiatives based on it. For this, Three Chi-Square tests of independence were undertaken between three group variables to assess the demographics situation of Indians relating to green finance.

The first group variable was between occupation and awareness about green finance where the objective was to draw conclusions about some sort of dependence between them. High borrowing costs, false claims of environmental compliance, and maturity mismatches between long-term green investment and investors' relatively short-term interests in occupations have posed major challenges which could be the reason for this independence.

Green bonds have a higher average oversubscription than their traditional green equities counterparts, according to statistics. Green bonds are attracting more capital market investment in order to accomplish climate targets and protect the environment. There is convincing evidence that the quantity of green bonds distributed to investors who declare themselves to be green is steadily increasing across all age groups.

Now despite analysing the awareness and education of green finance as well as its demographic market, we must also understand its viability. To understand the quantum of investments we carry out a correlation matrix. This correlation matrix addresses the profile of the candidate by comparing their current investments in green finance to possible future prospects. This supplies us with the data required to make possible policy changes, as it shows that a high proportion of the population which, though lacking in

investments currently, have the potential to create a growing market if they feel the security option is beneficial to them. After analysing our data we can conclude that a large proportion of the population still remains to be poached in terms of green finance yet India has still significantly progressed in terms of awareness and in the green bond market. The Indian green bond market has grown substantially since 2015 and at present ranks 2nd in the issuance of green bonds in the Emerging markets.

When we compare it to the global scenario, we can understand major issuances are Euro and USDdenominated. Approximately 48% of the issuances are made solely in Euro worldwide. According to sources the green bond market is to reach approximately \$1 Trillion mark by 2023 globally. Since 2018, the number of bond issuances have been approximately 22 in India which amounts to almost \$8000 Mn and totally accounts for 0.7% of the global bond issuances. One of the leading Underwriters for global green bonds is BNP Paribas as per 2022 statistics and accounts for nearly 4.56% of the global issuances. One of the most crucial analyses is that if the Green bond market keeps growth at an increasing rate with number of issuances, awareness and yield achieved from these investments, then in the near future the green bond unhedged index can gain momentum and outperform the global aggregate unhedged index.

The data overall provides proof of the possible growth outcomes and ventures that green finance can take in India, to create better options for sustainable growth and steadily move towards a more environmentally and socially aware economy as long as proper procedures and policies are mounted.

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