UNIVERSIDADE FEDERAL DO RIO DE JANEIRO INSTITUTO COPPEAD DE ADMINISTRAÇÃO

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CORPORATE GREEN BONDS: MARKET ANALYSIS AND EVALUATION OF THE EFFICIENCY OF THIS FINANCIAL TOOL FOR PROMOTING SUSTAINABLE DEVELOPMENT

RIO DE JANEIRO

2020

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Dissertação de Mestrado apresentada ao Instituto COPPEAD de Administração, da Universidade Federal do Rio de Janeiro, como parte dos requisitos necessários à obtenção do título de Mestre em Administração.

Orientador: Celso Funcia Lemme

Rio de Janeiro 2020

CIP - Catalogação na Publicação

Santiago, Lucas Carneiro Corporate green bonds: market analysis and evaluation of the efficiency of this financial tool for promoting sustainable development / Lucas Carneiro Santiago. -- Rio de Janeiro, 2020. 175 f. Orientador: Celso Funcia Lemme. Dissertação (mestrado) - Universidade Federal do Rio de Janeiro, Instituto COPPEAD de Administração, Programa de Pós-Graduação em Administração, 2020. 1. Green bonds. 2. Corporate bonds. 3. Green finance. 4. Sustainable development. 5. SDG. I. Lemme, Celso Funcia, orient. II. Título.

Elaborado pelo Sistema de Geração Automática da UFRJ com os dados fornecidos pelo(a) autor(a), sob a responsabilidade de Miguel Romeu Amorim Neto - CRB-7/6283.

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Lucas Carneiro Santiago

DISSERTAÇÃO DE MESTRADO APRESENTADA AO INSTITUTO COPPEAD DE ADMINISTRAÇÃO, DA UNIVERSIDADE FEDERAL DO RIO DE JANEIRO COMO PARTE DOS REQUISITOS NECESSÁRIOS PARA OBTENÇÃO DO TÍTULO DE MESTRE EM ADMINISTRAÇÃO.

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RIO DE JANEIRO, RJ – BRASIL

JANEIRO de 2020

Agradecimentos

Agradeço à Jessica por todo o apoio e compreensão nos momentos mais difíceis ao longo dessa trajetória. Obrigado pela paciência e por estar sempre ao meu lado.

À família, meus pais e irmãos pela criação, presença e incentivo durante toda minha formação na vida.

Ao corpo docente do COPPEAD, pela sabedoria compartilhada ao longo desses dois anos. Em especial ao prof. Celso Lemme, referência em finanças e sustentabilidade corporativa, por quem tive o privilégio de ser orientado e aconselhado na elaboração deste trabalho.

ABSTRACT

SANTIAGO, Lucas. **Corporate green bonds: market analysis and evaluation of the efficiency of this financial tool for promoting sustainable development.** Rio de Janeiro, 2020. 148p Master Thesis (Master of Business Administration) - COPPEAD Institute of Business, Federal University of Rio de Janeiro. Rio de Janeiro, 2020.

> Lucas Carneiro Santiago January/2020

This study aims to present an analysis of the corporate green bonds market as a financial tool that can collaborate in funding sustainable development activities and green projects, and to identify and explore some particularities about the issues that make up the corporate green bonds market. The analysis was conducted on a sample of 468 corporate green bond issuances from 2014 until 2017, using secondary sources from Bloomberg, the Climate Bonds Initiative (CBI) and the Intenational Capital Markets Association (ICMA). The findings indicate that there is not yet adequate transparency within the corporate green bond market, in which less than half of issuers actually disclose clear information on their funded activities, as determined by the Green Bond Princples (GBP). It was verified a strong predominance of Europe and China issuers in the corporate green bond market, as well as predominance of the Financials and Utilities & Energy sectors, and a larger allocation of financial resources into Energy and Buildings activities and assets. Results also suggest that activities and projects that meet the GBP eligibility criteria for receiving green bond financing strongly promote up to 11 of the 17 Sustainable Development Goals. In addition, the analysis suggest a need for metrics so that companies can understand, evaluate and monitor their financial behavior with respect to sustainable initiatives, almost no green bond issuer report on financial benefits of the funded activities for the company. This research sought to contribute by investigating the efficiency of green bonds in promoting sustainable development and creating environmental, social and financial value for the corporations and society.

Keywords: Green bonds; Corporate bonds; Green finance; Sustainable development; SDG.

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1 Introduction

1.1 Context and Relevance

Sustainable development and sustainability are well-recognized concepts since at least 1987 within the Brundtland Report, and in recent decades it's increasingly drawing more attention globally. In 2015, 193 countries agreed on the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDG). These goals address some global environmental challenges faced by humanity, including those related to environmental degradation, water and sanitation needs, and the well-known climate change challenge¹.

Regarding the need for climate action, world leaders have found a general consensus on the issue, as stated in the Paris Agreement within the United Nations Framework Convention on Climate Change (UNFCC). Also in 2015, the Paris Agreement was approved and sealed by 195 countries. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels. IPCC (2018) points out that "rapid, far-reaching and unprecedented changes in all aspects of society" need to happen to ensure this goal can be achieved. The changes required to address and mitigate all those issues will require profound transitions in land, energy, industry, buildings, transport, and cities (Gianfrate & Peri, 2019).

While member countries of both pacts have agreed to work cooperatively on achieving the 17 goals, with special attention on mitigating the problem of greenhouse gas (GHG) emissions (the 13th goal), one of the major challenges is regarding the financing of mitigation and adaption action to sustainability and climate change (Zhang, Zhang, & Managi, 2019). The transition to a resilient, sustainable and lower-carbon economy requires significant investment from both the public and private sectors. The OECD's Group of Twenty's (G20) forecast that investment of some US\$ 90 trillion is needed up to 2035 to achieve global sustainable development and climate objectives (GFSG, 2016). Organizations such as the International Energy Agency (IEA), the World Bank, and the World Resource Institute (WRI) estimate that investments required for maintaining the 2°C

¹ The 17 goals can be found at UN website: https://www.un.org/sustainabledevelopment/sustainabledevelopment-goals/

temperature threshold of the Paris Agreement could reach US\$ 5 trillion per year. This volume of resources is far greater than the minimum US\$ 100 billion per year provided for in the Paris Agreement to be mobilized by developed countries for climate financing before 2025 (FEBRABAN, 2016).

The financial system will be crucial to support and accelerate the needed investments to foster sustainable development. Among the financial instruments available to fill this gap and mobilize resources for funding activities with positive environmental and climate characteristics towards advancing on the SDG and achieving the temperature goal of the Paris Agreement, there are the so-called green bonds. They are a recent phenomenon: the first green bond made its appearance in 2007 with the issuance of a so-called "climate awareness bond" worth US\$ 1 billion, from the European Investment Bank (EIB). Green bonds possess the same standard financial characteristics of any other regular bond – a face value, yield, maturity date, and issuer, but they differ from regular bonds as they are labeled as "green" by the issuer.

Broadly speaking, green bonds are fixed income securities issued by capital raising entities to fund (finance or refinance) their eligible environmentally friendly projects, such as renewable energy, sustainable water management, pollution prevention, climate change adaptation and so on (Tang & Zhang, 2018). This financial instrument provides an opportunity for long-term and sustainable infrastructure financing. Previously carried out by multilateral development banks (MDBs), such as the World Bank and the European Investment Bank, green bond issuance has promptly spread to other traditional investors, like institutional investors, commercial banks, municipalities, and some of the world's largest companies (Banga, 2019). A few key players in the green bond market are the International Capital Markets Association (ICMA), responsible for the development of the Green Bond Principles (GBP); the World Bank; the International Finance Corporation (IFC); and the Climate Bonds Initiative (CBI), responsible for the Climate Bonds Standard, a globally recognizable green bond labeling scheme.

The evolution of the market over the last years confirms the potential of this financial instrument. Since the EIB issued the first green bond in 2007, the market has kept growing and becoming more sophisticated. According to the CBI, green bond issuance has grown drastically from US\$ 1 billion in 2007 to over US\$ 1.2 trillion by 2018, of which there is a total of US\$ 389 billion labeled green bond volume, and an amount of US\$ 811 billion climate aligned bonds volume (excluding fully-aligned US Municipal issuers) in the market. Climate aligned bonds are bonds that promote low carbon economy but are not self-labeled as green by their issuers (CBI, 2018a). In contrast, labeled green bonds refer to bonds that followed the GBP guidelines, complying with its requirements to receive the green label, which means that all their proceeds have to be used to finance the green projects² for which they have been issued (Banga, 2019).

Since 2014, there have been significant efforts aimed at making green bond standards more popular to investors (Ceres, 2014). Yet, the size and scope of the green bond market remain negligible compared to the global fixed-income market (Franklin, 2016). Furthermore, the relevant development of the green bond market is only perceptible in some developed and emerging countries³. Although green bonds have the potential to attract significant private green finance for developing countries, in many of these countries the market remains incipient, and their adoption is still plagued with several barriers (Banga, 2019). These obstacles range from institutional to market barriers and are deemed to be the most challenging for the development of the market. Among these market barriers, there is the issue of minimum size, the currency of issuance, and high transaction costs associated with green bond issuance. Finally, another known obstacle, for both developed and developing countries, is the possibility of greenwashing⁴ behaviors.

1.2 Objectives

Being aware of the investments needs and the challenge to raise funds for transitioning to a resilient, sustainable economy, the objective of this work is to analyze corporate green bonds as

² Projects that are environmentally "friendly" by virtue of their ability to reduce pollution, reduce fossil fuel consumption, or have some other positive effect on the environment and/or society.

³ Emerging countries are defined here as countries with high levels of economic development and potential for rapid industrialization. They include but are not limited to the top 20 emerging markets ranked by Bloomberg Market Magazine in 2013 (Banga, 2019). Available here: https://www.bloomberg.com/news/photo-essays/2013-01-31/thetop-20-emerging-markets.

⁴ Greenwashing occurs when an issuer promotes green-based projects in order to raise funds in the green bond market, but actually operates in a way that doesn't impact positively the environment.

a financial tool that can collaborate in funding sustainable development activities and green projects. A secondary objective is to identify and explore some particularities about the issues that make up the corporate green bonds market.

Initially, the corporate green bonds market is reviewed, by exploring the issuances according to the Green Bond Principles (GBP) guidelines. A financial and environmental value creation analysis is performed by associating the issuances to the support of the SDG and investigating the business case for the bonds' sustainability initiatives. Then, its proposed suggestions to refine the use of this financial instrument for promoting sustainable development. The present work is an exploratory research executed in a combination of quantitative and qualitative analysis.

The remaining of the paper is structured as follows: Section 2 reviews the literature on green financing, with a focus on green bonds. Also in section 2, it's expressed the need for redirecting financial flows to initiatives that promote sustainable development and a faster transition to a low carbon economy. Section 3 explains the methodology for analyzing the efficiency of the green bond instrument over the past five years. Section 4 discusses the findings and provides counseling to foster usage of the green bonds mechanism. Section 5 concludes and suggests future researches that could complement the present work, further developing the green bonds literature.

2 Literature Review

The literature review was divided into three topics. The first topic evidences the financial gap regarding the resources required to achieve the objectives within the SDG and Paris Agreement agendas, covering the issues for transitioning to a lower-carbon economy. The second topic embraces green finance, a recent phenomenon that connects financial performance and sustainable development actions. The literature review finishes by going deeper into a particular financial instrument inside green finance, the green bonds.

2.1 Transition to a sustainable economy

Climate change has been on the political agenda for decades but not been prominent among the ethical concerns and responsible investments in society. This carelessness occurs partly because of a lack of confidence in scientific documentation, partly because of the strong economic position and political influence industrial and energy sectors (Glomsrød & Wei, 2018). However, this situation seems to be changing: increasingly, people around the globe recognize that the climate is changing and fiercely affecting different parts of the planet. The challenge to mitigate climate change and pollution effects, combined with the call for promoting sustainable development has reached the minds of both investors and consumers.

Global warming and further need for sustainable development is amongst the biggest challenges facing humanity in the 21st century. It is a threat of a magnitude that might disrupt the global economy and political stability (TCFD, 2017), exposing business as well as society to transition and physical risk (Glomsrød & Wei, 2018). Transition risk is associated with structural changes required to achieve a low-carbon economy, whereas physical risk relates to exposure to costs of global warming and extreme weather events⁵ (Roson & Sartori, 2016). So, the urging question of our time is how to prosper economically without impacting the ecological systems beyond irrevocable changes (Pham, 2016). Effective action in limiting the extent and effects of climate change will have to include changes in businesses and massive investment by the private sector

⁵ https://g1.globo.com/mundo/noticia/2019/03/22/passa-de-500-o-numero-de-mortos-pelo-ciclone-emmocambique-zimbabue-e-malawi.ghtml

for promoting sustainable development, making the energy transition from fossil fuel to cleaner energy as an example, all which are within green financing agenda (Andersson, Bolton, & Samama, 2016).

In 2015, the COP21 in Paris managed to reunite essentially all nations to work together in the search for solutions related to climate change mitigation. The Paris Climate Agreement set at the COP21 defined ambitious objectives to orient countries and society towards a climate-neutral global economy before the end of the 21st century. For achieving this goal, *Article 2.1. (c)* of the agreement calls for "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development". Andersson *et al.*(2016) ads that it is a process that includes all economic actors, not just governments, inviting complementary action and leadership from civil society and the business community.

Another relevant event that happened recently was the creation of the 2030 Agenda for Sustainable Development, during the 2015 United Nations General Assembly. The 17 Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all, addressing global challenges related to climate change, environmental degradation, and social causes (UN, 2015). The goals are all interconnected, and have a list of 169 targets that are measured with indicators and can be used as a basis for evaluating the sustainability of any developed activity or project.

A great obstacle lies within the significant financing gap for supporting the sustainable development demanded promptly. Although interest in investing on sustainable activities is growing, the sustainability transition in the financial system is not happening at the required scale (UN, 2019). Many policymakers are concerned that investment for the large-scale deployment of low-carbon technologies won't materialize quickly enough. The International Energy Agency (IEA) estimates annual global investments in low-carbon technologies will need to total US\$ 730 billion yearly by 2030, more than doubling the 2015 figures of US\$ 290 billion. It will then be necessary to invest around US\$ 1.6 trillion a year from 2030 to 2050 for meeting global targets from the Paris Agreement (IEA, 2016). The funding required for adaptation is currently dwarfed by the US\$ 6.2 trillion annual investment (including transport, energy, water systems, and cities) needed for new infrastructure (NCE, 2014). Despite the pressing demand to build climate-resilient

infrastructure suitable for a sustainable low-carbon economy, the investment requirements are not met. Global infrastructure funding is currently around US\$ 5 trillion yearly (NCE, 2014), leaving an annual gap higher than US\$ 1 trillion. Moreover, only 7-13% of the projects are estimated to be actually designed to deal with the negative impacts of a changing climate (Canfin & Grandjean, 2015).

The financial system is crucial to support and accelerate investments for sustainable development and decarbonizing the economy. Reinforcing the call for urgent sustainability investing, there is the concept that the world's climate faces the risk of a series of systemic "tipping points". This means that increasing emissions trigger feedback loops that lead to unavoidable and rapid increases in temperature (CBI, 2015b). Following this line, Gouldson *et al.* (2015) argue that as the years pass, decisions are made that will lock the world in to high carbon development paths for years to come, whilst at the same time, long-lived emissions continue to accumulate in the atmosphere and the opportunity to make investments that will help to avoid dangerous climate change diminishes. The International Energy Association (IEA) reports that "almost four-fifths of the CO₂ emissions allowable by 2035 are already locked-in by existing power plants, factories, buildings, etc. If action to reduce emissions is not taken in time, all the allowable CO₂ emissions would be locked-in by energy infrastructure existing at that time" (IEA, 2013).

Nevertheless, it is not a straightforward decision for investors to decide on investing at green projects. While, due to innovation, the cost of cleaner technologies has fallen in recent years, many environmental or society friendly projects still are perceived as risky by investors. As reported by Schmidt (2014), when the perceived investment risk is high, the increase in financing costs deteriorates the competitiveness of low-carbon projects in comparison to fossil fuel-based projects. In the other hand, the CBI (2015b) argues that arranging the global economy for the SDG and Paris Agreement challenges can be noted as a major investment opportunity in all asset classes, sectors, industries and countries. Opportunities range within the energy, transport (railways, urban metros, electric vehicles), sustainable land and water management, and buildings (both new constructions and retrofitting existing buildings) sectors.

Favoring investments rise on clean technologies, Geddes *et al.* (2018) argues that State Investment Banks (SIBs) can play a key role in closing the finance gap and leveraging additional private finance. Geddes *et al.* (2018) state that SIBs are important actors in addressing the sustainability financing gap in Australia, Germany, and the UK. Among their operations, SIBs:

- Provide capital and perform de-risking;
- Take an educational role, building and developing their own capabilities in order to better identify, assess and mitigate risk;
- Perform an early mover role by supporting risky innovative projects to create a track record which indirectly crowds-in private finance to future projects;
- By drawing on their reputation for expertise, SIBs take a trust signaling role where their decision to support a project has a labeling effect and their presence directly crowds-in additional finance.

Similarly, a recent work by the OECD reported that SIBs leverage private investment into green infrastructure (OECD, 2017a). Mazzucato & Penna (2015) remarked that both KfW and the Banco Nacional do Desenvolvimento (BNDES)⁶ play a "mission-oriented" role, making key investments in new sectors to address grand societal challenges, such as attaining the SDGs. SIBs "shape and create" markets, rather than solely fix their failures.

Yuan & Gallagher (2018) analyzed the greening development lending of 11 public development banks to Latin America between 2007 and 2016. These banks define green finance as investing for climate change mitigation or adaptation, as well as environmental protection and remediation at the project level. Latin America faces a US\$ 110 billion annual gap in finance for climate change mitigation and adaptation (IADB, 2012). Additionally, according to a joint study by the Inter-American Development Bank (IADB), the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), and the World Wildlife Fund (WWF), the annual economic costs of climate change⁷ in Latin America will reach US\$ 100 billion by 2050 (IADB, 2012).

⁶ Brazilian Development Bank

⁷ Although Latin America is only responsible for approximately 12.5% of global greenhouse gas (GHG) emissions, it is disproportionately impacted by climate change as many areas in the region are seriously affected by droughts, flooding, cyclones and the El Nino-Southern Oscillation (ENSO) phenomenon. Damages resulting from extreme

Yuan & Gallagher (2018) argue that Development Finance Institutions (DFI) have a unique role in closing financing gaps for the sustainable development of Latin America. DFI, at their best, seek to correct key market and government failures and crowd in private sector economic activity into areas such as clean energy technologies, as well as into policy formation and anti-poverty programs. It's estimated that green finance accounts for 17% of development banks total investments in LAC, amounting US\$ 7 billion per year since 2007. These values fall far short of closing the green finance gap in the region, as high as US\$ 100 billion annually (IADB, 2012).

Schwerhoff & Sy (2017) investigated the challenges in financing renewable energy in Africa. Increasing the production of renewable energy in Africa could contribute on achieving many of the United Nations (UN) Sustainable Development Goals (SDG), including improving health and education, promoting access to clean energy, economic growth and climate action (UN, 2015). Schwerhoff & Sy (2017) indicate that one of the big challenges for promoting renewable energy projects in Africa is that they have an investment profile different from fossil fuel-based energy sources. Renewables require large initial funding and have lower running costs afterwards, which impose higher costs and higher risk for private investors. Adding to that, bond markets in Africa are small and capital markets are embryonic, so that domestic sources cannot stem the required investments volume. Foreign capital markets cannot be easily tapped either, as the sovereign credit ratings of most African governments are poor. So, when financing costs increase, renewable energy projects become much more expensive, while costs for fossil fuel energy projects become only moderately more expensive (Schmidt, 2014). Consequently, renewables investors are thus exposed to higher risk when the project fails early on.

It's estimated that US\$ 40.8 billion a year is demanded in the power sector in Africa, while current investments are calculated to be at US\$ 11.6 billion (Schwerhoff & Sy, 2017). Evidencing a more negative scenario, The Africa Progress Report 2015 estimates investments needs of US\$55 billion annually until 2030, with only US\$ 8 billion current expenditure level (Panel, 2015). As of existing efforts, resources from taxes and utility charges account for 80% of total spending on energy

weather related to climate change have not only jeopardized socioeconomic activities but also eroded wealth accumulated from previous episodes of economic growth (Yuan & Gallagher, 2018).

infrastructure in the continent (Panel, 2015), with the remainder financed mainly by development finance institutions (DFI) and Climate Funds (which in turn are financed by DFI, multilateral donors or bilateral donors).

Schwerhoff & Sy (2017) suggest that the bulk of implementing large-scale renewables projects will have to be supported through debt financing. They conclude that the most promising financing instruments are subsidized forms of borrowing, with an option coming from soft or concessional loans funded by regional development banks. Due to guarantees by state members, regional development banks have access to very low-interest rates, which they can pass on to investors. A second subsidized form of raising capital by debt is through green bonds. The World Bank and the African Development Bank (AfDB) started to issue green bonds in 2008 and 2010, respectively, which in part financed sustainability projects in Africa.

Gouldson *et al.* (2015) indicate that levels of investment in the world fall a long way short of those required if dangerous climate change and unsustainability hazards are to be avoided. The general, long term, social case for action on climate change does not always translate into a specific, short term, private case for investment. Adding to that, the availability of public funds is frequently constrained in contexts of austerity. After the 2009 financial crisis, a period of instability, uncertainty, recession, and austerity began in many countries. As a direct consequence, more emphasis has been placed on these economic and financial issues than on supporting sustainable development and tackling climate change. When market instability and policy uncertainty limit private investment, and budget deficits and austerity limit public investment, it seems appropriate to explore the potential of innovative financing arrangements that stimulate flows of capital into green financing.

Gouldson *et al.* (2015) propose the creation of a financing mechanism – the revolving fund – in which the savings from investments in energy efficiency and other forms of low-carbon development are captured and reinvested to either reduce the stress for new finance or to boost levels of investments in sustainable development projects. Building a business case, they have proposed a generic model of a revolving fund to finance improvements in energy performance of

the buildings sector⁸ in the UK. Gouldson *et al.* (2015) findings show that a revolving fund could reduce the cost of an extensive retrofit program by 26%.

Hainaut & Cochran (2018) tracked the sustainability investment and finance flows contributing to the transition to a low-carbon economy in France. In 2016, up to \leq 31.7 billion investments contributed to climate mitigation in France: \leq 14.6 billion has been invested in energy efficiency projects; \leq 5.9 billion in renewable energy production; and \leq 9.2 billion in sustainable transport and network infrastructures (Hainaut & Cochran, 2018). They also tracked that commercial debt (\leq 11.3 billion, or 38% of total) was the most common instrument used to finance investment expenditures. This commercial debt is further separated into bank debt and bond debt, with the proportion of bonds rising from 27% in 2011 to 37% in 2016 (Hainaut & Cochran, 2018).

Clean technologies necessitate significant investment in companies, projects, and infrastructure, and these investments far surpass government-funding possibilities. Institutional investors such as insurance companies, pension funds, and even banks have invested and lent extensively to fossil fuel-based endeavors, building high-carbon portfolios that now pose a "value at risk". Given the Paris Climate Agreement goals, these investments are going to lose at least part of their value by 2050, creating a "carbon bubble" (Dietz, Bowen, Dixon, & Gradwell, 2016). To have credible portfolios in the future and prevent financial system instability, investors and lenders should transit into growing low-carbon markets, and divest from high-carbon technologies to avoid stranded assets⁹ (Polzin, 2017).

For Banga (2019), investors and policymakers have already become aware of the potential risks climate change poses to businesses and the financial sector as a whole. Indeed, this climate-awareness has led to the implementation of preventive measures, such as climate risk stress tests for assessing the exposure of financial institutions to climate change risks (Battiston, Mandel,

⁸ The IEA estimated that globally, until 2050, US\$ 31 trillion is required to promote energy efficiency in buildings at a rate that gives the world a chance of limiting the temperature increases associated with climate change to 2 °C (IEA, 2013).

⁹ Assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities (Polzin, 2017).

Monasterolo, Schütze, & Visentin, 2017). Such tests try to ensure that the whole financial system is resilient to climate change impacts, reducing investors' exposure to risks, thereby limiting their potential capital loss due to stranded assets resulted from climate change impacts (Banga, 2019).

Polzin (2017) indicates that one of the most salient barriers to low-carbon innovation is the financing environment. Investments into low-carbon power generation need to triple from US\$ 255 billion in 2013 to US\$ 730 billion in 2035, while energy efficiency investments need to rise 8 times from US\$ 130 billion to US\$ 1100 billion (OECD, 2016). Policymakers need to take a systemic approach to enable the redirection of diverse private financial sources. This can be done by making use of instruments that range from cutting "dirty" (R&D) subsidies and increasing support for clean technology innovation and diffusion, to leveling the institutional playing field and making risks of high-carbon and low-carbon technologies transparent to provide a consistent but adaptive long-term transition strategy (Polzin, 2017). With these initiatives, financiers would gradually shift their investments away from high-carbon mainstream markets and scale low-carbon technology niche-markets, promoting green financing.

Lastly, with an interest research focus, Glomsrød & Wei (2018) explored how dedicated green finance (with a focus on green bonds dissemination) and divestment in fossil industries might impact the economy, the financial flows, energy trends, and CO₂ emissions. Using multiple regions, multiple industry computable general equilibrium (CGE) model GRACE, their results suggest that in a green finance scenario reflecting a reasonable upscaling of the current level of pledges towards 2030, green finance efforts benefit society as a whole. It increases GDP in all regions, with global GDP rising 1.6% above business-as-usual (BAU) scenario in 2030, potentially increasing welfare. The highest income growth is seen in the European Union, India, and China. Although effects differ among regions, green finance efforts lead to a reduction in global coal consumption to 2.5% below BAU scenario in 2030, while raising the share of non-fossil electricity from 42 to 46% at the global level. They also observe that green bonds and divestment along reasonable trajectories towards 2030 avoids 4.7Gt CO₂ emissions, which corresponds to total emissions of the European Union and Japan in a recent year.

2.2 Green Finance

Sustainability in business refers to the integration of social and environmental considerations, such as resource scarcity, climate change and income inequality, into business strategy and practices. Defined in this way, sustainability is a subject of growing interest to investors and companies alike, who are asking themselves if this business approach is finance-worthy—that is, capable of earning high enough rates of return to continue to attract capital from private investors (Kotsantonis, Pinney, & Serafeim, 2016). Although they are different concepts, sustainability, ESG, and green finance are mentioned in the present work within a similar point of view.

Significant amount of research has been carried out to better understand the economic effects of integrating ESG issues into corporate financial decision-making, from both a company and an investor perspective. At least for some kinds of companies in some industries, such stakeholder investment can prove to be a source of competitive advantage and value that is increasingly being recognized by investors (Kotsantonis et al., 2016). A recent report by Calvert¹⁰ provides a framework to help companies and their investors understand the ways in which corporate social and environmental activities can and have led to value creation (Serafeim, 2015). It is described that companies often cite cost savings achieved by reducing waste and improving energy efficiency as some benefits of environmental initiatives. To the extent that investors view a company's efficient use of natural capital resources as a reliable proxy for management's efficiency in using other resources, particularly investor capital, such savings can translate into a significant increase in corporate values.

Another frequently mentioned benefit of sustainable business practices is more effective risk management, which in turn can help protect a company's reputation and brand value. And trough their effects on corporate reputation and brand values, sustainability practices can also increase companies' long-run values by helping them attract more talented and engaged workforce, as well as satisfied and loyal customers (Serafeim, 2015). Another positive impact of corporate sustainability programs is the raises in revenue as a consequence of satisfying new customer

¹⁰ https://www.calvert.com/

needs and serving previously underserved parts of the population. Along with this evidence of the effects of sustainability on corporate operating performance, the report also presents new research findings that attest to the market's recognition of the value of such programs. More specifically, the valuations of companies with above-average ESG performance are shown to reflect higher expected growth and a lower cost of capital. In addition, such companies tend to trade at higher valuation multiples in equity markets and to have lower credit default swap spreads (Serafeim, 2015).

Epstein & Roy (2003) state that to integrate sustainability principles into business strategies and to aid resource allocation decisions, managers should quantify the link between social and environmental actions and financial performance. In order to gain greater insight into whether companies have been making a clear business case for sustainability initiatives, they examined 20 external corporate reports dealing with sustainability issues, assessing whether sustainability actions were integrated into business strategies through a clear connection to financial performance. They evaluated each report according to four possible levels of integration:

- Level 1: descriptive information not linked to financial performance only of a description of the company's activities related to sustainability actions, sustainability performance or stakeholder reactions;
- Level 2: quantified information not linked to financial performance provision of specific quantitative metrics to describe sustainability actions, such as emission reduction metrics;
- Level 3: monetized information on expenditure, partially linked to financial performance
 offers some monetary information (i.e. expenditure);
- Level 4: monetized information on the benefits of expenditure (i.e. measures of benefits in addition to measures of costs), fully linked to financial performance – evaluation of the effectiveness of social and environmental expenditures, accounting both for costs and for benefits associated with sustainability actions, showing a more complete integration of sustainability matters into corporate financial performance.

Results suggest that companies are increasingly attempting to link environmental initiatives to financial performance. However, companies are not typically making a clear business case for broader issues of sustainability (Epstein & Roy, 2003).

Looking for evidence that maintaining good corporate ESG performance payoff, Serafeim (2015) found out that organizations that do a good job of managing their most "material"¹¹ ESG risks (and opportunities)—as defined using criteria and guidelines provided by the Sustainable Accounting Standards Board (SASB)—¹²outperform their competitors by as much as 600 basis points (6%) per year. The main takeaway from this research is that the effectiveness with which companies emphasize material sustainability concerns and engage with the stakeholders most affected by those concerns is a reliable indicator of management's ability to identify and focus on dealing with those critical ESG factors. By so doing, management increases the long-run viability and value of the firm. It's also possible to think about materiality in the sustainability context by viewing it as providing a guide to a company's understanding of its core "strategic priority areas" (Roselle, 2016).

The search for a relation between ESG criteria and Corporate Financial Performance (CFP) can be traced back to the beginning of the 1970s. Scholars and investors have published more than 2000 empirical studies and several review studies focusing on this relationship since then (Friede, Busch, & Bassen, 2015). Studies of the last three decades of the 20th century have reported that what was then known as Socially Responsible Investing (SRI)—an investment approach that worked mainly by screening out the companies with the lowest ESG scores or entire industries such as tobacco and alcohol—produced shareholder returns that were often below market averages. These findings have, in turn, contributed to the widespread perception that corporate efforts to address environmental and social issues end up reducing shareholder value (Kotsantonis et al., 2016).

¹¹ "Material" here can mean information about those stakeholder issues that, when managed effectively, represent a significant contribution to company value or that, if mismanaged, could lead to a significant loss of value and opportunities to create or preserve future value (Eccles & Youmans, 2016).

¹² https://www.sasb.org/

But according to the conclusions of a large and growing body of studies conducted in the past ten years, companies with above-average ESG scores have actually outperformed their competitors, both in terms of standard measures of operating performance and stock market returns. Recently, Friede *et al.* (2015) conducted an extensive research, examining 60 review studies about the ESG–CFP relation at first, and then performing a second-level review of these studies, which resulted in more than 2200 unique analyses. They concluded that more than 50% of the studies pointed out a positive ESG-CFP correlation, while less than 8% presented a negative correlation. As a matter of fact, when we add information about environmental and social factors to a decision, we help inform the choices that we as both investors and citizens need to make.

A survey with high net worth investors performed in 2014 by the Institute for Sustainable Investment of Morgan Stanley, shown that sustainable investing is becoming more popular among investors. Over 70% of the investors who responded expressed interest in sustainable investing and 65% of the respondents said they believed that sustainable investing would become even stronger during the next five years. Providing support for that belief, the strongest expressions of interest came from younger investors, suggesting a long-term growth trajectory for sustainable investing (A. Choi, 2016). But regardless of the growing interest about sustainable investing, it still exists a large funding gap for green projects (especially low-carbon ones) that need to be financed and developed in the present time, which cannot be supported by public sources alone (Bank, 2015). There is a chance of shortening this gap as more initiatives that aim into transferring the flow of funding capital and investments for "greener" projects are continuously promoted.

Green financing is a recent phenomenon, related to redirecting resources to finance initiatives that instigate sustainable development. The term started becoming more acknowledged in 2010 when the 194 countries that were present in the United Nations Framework Convention on Climate Change (UNFCCC) set up the Green Climate Fund (GCF). The GCF is a global fund that aids developing countries to mitigate their greenhouse gas (GHG) emissions, supporting their efforts to respond to the climate change challenge. Since then, the term "green finance" has frequently appeared in reports of international organizations and national governments, while also attracting attention from academics. Green finance, however, remains vaguely defined and is often mixed with climate finance, hampering the distinction between both terms (Zhang et al., 2019). According to the International Financing Corporation (IFC, 2016), green finance is defined as *"financing of investments that provide environmental benefits*¹³ *in the broader context of sustainable development, involving efforts to internalize externalities and adjust risk tolerance in order to boost environmental friendly investments and reduce environmentally damaging ones"*. A bit differently, climate finance is proposed by the UNFCCC as *"local, national or transnational financing-drawn from the public, private and alternative sources of financing that seeks to support mitigation and adaption actions that will address climate change"*. In the end, both terms refer to financing tools for promoting sustainability and sustainable development, which includes coping with the climate change issue.

Green finance has eminent policy importance, reflected by the intensive discussions among international organizations and national governments since its emergence. It has also led to increasing interest among academic researchers, as proved by Zhang *et al.* (2019) bibliometric analysis, that tracked publications related to the theme from 2001 until 2018. In total, 381 papers have been included in the sample, and as opposed to the slow and steady growth of the trend before 2015, the number of relevant publications has increased sharply since 2015 (244 published works from 2015 until 2018). This fact implies an increased interest from academics on green finance since the 2015 Paris Agreement event (Zhang et al., 2019). It's noticeable that the volume of investments in green projects has increased substantially, maintaining a growth momentum in recent years. In 2017, global green bond issuance had a historical record of US\$155.5 billion, creating high demand for academic research in this area.

As a negative point, Zhang *et al.* (2019) state that although finance is defined as a key element of green finance, papers in the area turn out to be mainly published by journals focusing on environmental and climate change matters or policy journals. Green finance researches are scarcely seen in mainstream economics or finance journals. Not even one finance journal had more than four relevant papers about the topic. This is aligned with Diaz-Rainey, Robertson, &

¹³ These environmental benefits include, for example, reductions in air, water and land pollution, improved energy efficiency as well as mitigation of and adaption to climate change.

Wilson (2017) conclusion¹⁴: impactful finance journals are still silent on sustainable development questions or the climate change issue. Much remains to be done to bring this fast developing topic into the spotlight of the mainstream economic and finance research, and also to fill the existent gap in the literature. Topics such as green bonds, or studies on green finance issues from developing countries' perspectives, for example, should be of more interest in mainstream finance journals.

Chiesa & Barua (2019) state that the nexus between finance and environmental sustainability has recently attracted attention from both researchers and practitioners. According to them, although corporate activity has well-known benefits for society, there is an increasing demand for more sustainable management of companies' operations. The authors define green finance as a broad term that can refer to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. For the banking sector, for example, green finance is reflected in financial products and services that take environmental factors into consideration throughout the lending decision making, ex-post monitoring, and risk management processes.

Being a bit more specific, the public development banks members of the International Development Finance Club (IDFC)¹⁵ defined green finance as financing for climate change mitigation or adaptation, as well as environmental protection and remediation at the project level. Drawing from this approach, Yuan & Gallagher (2018) grouped green finance into three categories that are in line with the UN SDGs:

- 1) Clean energy and mitigation of greenhouse gas emissions
- 2) Adaptation to climate change impacts and
- 3) Water, sanitation, and other environmental objectives.

The G20 Green Finance Study Group similarly explain that "green finance" can be understood as financing of investments that provide environmental benefits in the broader context of

¹⁴ From 20,725 articles published in the leading 21 finance journals between January 1998 and June 2015, they've found that only 12 articles (0.06%) are related in some way to climate finance.

¹⁵ https://www.idfc.org/

environmentally sustainable development (GFSG, 2016). Some of these benefits include reductions in air, water and land pollution, reductions in greenhouse gas (GHG) emissions, improved energy efficiency while utilizing existing natural resources, as well as mitigation and adaptation to climate change and their co-benefits. Green finance involves efforts to internalize environmental externalities and adjust risk perceptions in order to boost environmental friendly investments and reduce environmentally harmful ones. Financially speaking, the Group of Twenty's (G20) forecast that investment of some US\$ 90 trillion is needed up to 2035 to achieve global sustainable development and climate objectives (GFSG, 2016). For means of comparison, the global GDP for 2017 was around US\$ 80 trillion¹⁶.

In an attempt to provide more guidance to managers, some indices, such as the Dow Jones Sustainability Index, have operationalized the sustainability concept as a business approach that creates long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments (Epstein & Roy, 2003). In recent years, there has been some research on the financial performance of sustainability and climate-related funds and indices. These studies evaluate the impact on companies and sectors that are related to green or climate investing and the potential payoffs for investors. Since the 2015 United Nations Climate Change Conference, this area of green finance has taken off (Bender, Bridges, & Shah, 2019).

Some authors urge investors to shift from focusing only on profit maximization, and aim on creating not only financial, but also social and environmental value (Schoenmaker, 2017). It is therefore appropriate that investors include ESG¹⁷ criteria into their investment decision-making evaluations. The incorporation of such criteria within financial markets' structures is becoming apparent as rating agencies such as Moody's, S&P, and Barclay's MSCI have started to establish green bond standards and indexes aimed at assessing the environmental impacts of their clients' portfolios (Banga, 2019).

¹⁶ https://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/

¹⁷ Stands for Environmental, Social and Governance.

Roselle (2016) examined components that were relevant to attracting investors and portfolio managers to add ESG Factor Integration to their investing strategies. Some responsible investment strategies include:

- Integrating ESG: e.g. factoring flooding/drought models into valuation methodologies;
- Screening (negative/positive): e.g. sector exclusions, best-in-class investing;
- Thematic investing: e.g. renewables, green bonds, social infrastructure;
- Engagement: investor stewardship through direct (shareholder) engagement and through director appointments to the board (UN, 2019).

In the past, SRI proponents have experienced resistance from "mainstream" investment community peers because early versions of the discipline appeared to underperform benchmarks and violate the basic tenets of a broadly-accepted portfolio construction framework known as Modern Portfolio Theory (MPT). As a consequence of the general acceptance of MPT, diversification across multiple asset classes and regions has become the rule for portfolio managers (Roselle, 2016). Until recently, the MPT advocates have remained largely unconvinced that SRI could be made compatible with maximizing risk-adjusted returns. To break this stalemate and still satisfy the diversification requirements of MPT, Roselle (2016) supports a strategy designed to identify and choose the "best in class ESG" public companies representatives of different sectors. The "best-in-class" approach shows promise in helping to solve the tension between the MPT and sustainable fields.

A second major contributor to the rapid growth of ESG integration in portfolio construction is the improved quality and quantity of academic and sell-side ESG research. Asset managers and owners are now paying a premium for a new kind of research that measures the value of both the tangible and intangible assets (and aspects) of public corporations. Finally, the third relevant component for attracting retail investors to ESG investing strategies derives from the accuracy, transparency, and materiality of the ESG data voluntarily provided by publicly traded companies. In response to higher investor and stakeholder demand for ESG information, companies have developed "Corporate Social Responsibility" (CSR) departments that, among their other responsibilities, are charged with providing voluntary disclosure of ESG data.

Herz & Rogers (2016) claim that companies and investors are already exposed to a variety of significant risks regarding climate-related impacts, ranging from its physical effects to the shifting regulatory landscape to the challenge of navigating the transition to a resilient, low-carbon economy. Each industry has its own distinct sustainability profile and so, investors need specific information (industry-specific disclosure) to understand their exposure to climate risk. This information is also crucial to check how well companies are positioned to manage each type of climate risk: physical effects, the transition to a low-carbon economy, climate regulation (Herz & Rogers, 2016). Recognizing what is material and relevant is the filter that can provide a clearer picture of the risks and opportunities going forward (A. Choi, 2016). Therefore, evaluating performance on material sustainability factors requires specialized information¹⁸ that captures the industry specific challenges and opportunities faced by each company (Herz & Rogers, 2016).

Gianfrate & Peri (2019) claim that increasingly more institutional investors are decarbonizing their portfolios and redirecting resources towards environment-friendly investments as they consider climate change a growing threat to long-term economic growth. In some cases the changes in capital flow have been also sustained by national regulations: a French law¹⁹ requires all French asset managers and pension funds to disclose information on exposure from the assets in their portfolios to climate-related risks (Andersson *et al.*, 2016). According to the CBI (2015b), the investor demand for green bonds indicates that, over time, the market can be a significant contributor to closing the investment gap for climate-friendly infrastructure in both developed economies and emerging markets. Green bonds can offer a fiscally efficient way of financing

¹⁸ A few examples are: for apparel companies, analysts want to know the ability to source cotton, a crop that is vulnerable to shifting weather patterns; for commercial banks, analysts want to know about financed emissions— loans to oil and gas companies, and to industrials and utilities; for software and IT companies, analysts want to know the energy-intensity of data centers, which carries regulatory and reputational risks along with innovation opportunities; and for real estate companies, analysts want to know about the energy efficiency of buildings and the vulnerability of building stock due to geographic location.

¹⁹ Article 173 of *Projet de loi relative à la transition énergétique pour la croissance verte*: "The information relative to the consideration of environmental objectives includes: the exposure to climate-related risks, including the GHG emissions associated with assets owned, and the contribution to the international goal of limiting global warming and to the achievement of the objectives of the energy and ecological transition."

measures that cooperate with reaching climate change and sustainable development targets without sacrificing general development. It is likely and desirable that in the coming years an increasing number of nations will apply actions such as offering tax advantages for green investors to sustain and promote the development of the green bonds market (Gianfrate & Peri, 2019).

Zerbib (2019) argues that in response to environmental crises, financial investors have taken up the challenge and become central actors of the environmental and energy transition. According to him, this pivotal role is notably due to their ability to mobilize a considerable amount of funds: the global stock of manageable assets²⁰, amounted at US\$ 160 trillion in 2016 (FSB, 2018), can be matched with the infrastructure investment needs of US\$ 6.9 trillion over the next 15 years for meeting Paris Agreement objectives (OECD, 2017b). Several initiatives were recently launched to redirect assets toward green investments: by signing the Montreal Carbon Pledge²¹, more than 120 investors with assets under management worth more than US\$10 trillion, committed to supporting the development of the green bonds market, and to measuring and publishing the carbon footprint of their investments (Zerbib, 2019). Moreover, in 2016, over 1.400 institutional investors with some US\$60 trillion in assets under management had signed the UN Principles for Responsible Investment (PRI). It's a document that, at least in theory, commits its signers to consider corporate ESG performance and data when allocating available capital (Kotsantonis et al., 2016).

Andersson *et al.* (2016) presented a successful private sector climate change mitigation initiative that has led to the establishment of the "Portfolio Decarbonization Coalition" (PDC), under the attention of the United Nations²². The PDC was created in 2014, with the mission of promoting awareness of carbon risk among investors. Upon its launch at the UN climate summit in New York, the PDC immediately set an ambitious goal of, by the COP21 (2015), allocating at least US\$ 100 billion of assets under management to decarbonized portfolios—this at a time when it had only

²⁰ This amount corresponds to the Monitoring Universe of Non-bank Financial Intermediation, including all non-bank financial intermediation: insurance corporations, pension funds, other financial intermediaries and financial auxiliaries (Zerbib, 2019).

²¹ http://montrealpledge.org/

²² http://unepf.org/pdc/

around US\$ 20 billion of assets in such portfolios. The PDC also committed to disclose the carbon footprint of at least US\$ 500 billion of assets under management of its coalition members. By COP21, the coalition announced it had secured US\$ 600 billion of commitments for decarbonized investments—and thus nearly 20% of the US\$ 3.2 trillion of global assets under management by coalition members.

The PDC's emergence substantially raised the profile of a number of financial sector initiatives on green financing. It contributed to deepening the eco-system around portfolio decarbonization, involving institutional investors, academics, policymakers, and bringing the recognition of the socially responsible investor community²³. Due to this interest arousing from different associations, high-quality company's data about emissions and other ESG criteria started being produced, and even being increasing demand each year for these data²⁴. And, according to Andersson *et al.* (2016), the measurement of GHG emissions for any company's activities is a prerequisite for effective investor actions on carbon risk. Concurrent, the measurement of changes in a company's GHG carbon impact is necessary for any meaningful engagement actions by investors. The fact that accurate measurements of GHG emissions of publicly traded companies are now available increasingly allows investors to make relative comparisons and gauge where their companies rank in terms of their carbon intensity relative to peers.

According to Glomsrød & Wei (2018), the trend among investors towards responsible finance targeting sustainable development has surfaced as pledges to invest in green projects or to abstain from investments in fossil industries, in particular coal. Whereas financial disclosure of carbon-related risk is in its early phase, businesses already influence the financial market through selective lending and investment. Two parallel pathways to climate friendly investments are

²³ Mats Andersson, one of the coalition leaders, was awarded the 2014 Personality of the Year distinction of Environmental Finance, and the 2014 Outstanding Industry Contributor prize of Investment & Pensions Europe Magazine (Andersson *et al.*, 2016).

²⁴ The leading data providers, such as Carbon Disclosure Project (CDP) and Trucost, started on a shoe-string, and to become sustainable high-quality data providers they eventually needed to have a sufficiently large demand base for their data and other services. The creation of an eco-system that relies on these data and pays for it to be generated it is vital, a thing that was made possible with the PDC establishment (Andersson *et al.*, 2016).

dominating: divestment in fossil industries and finance earmarked for low carbon projects, e.g. labeled green bonds (CBI, 2018a). Fossil divestment restricts finance from entering projects that extract, transform or refine fossil energy, with coal divestment being the dominating target (Glomsrød & Wei, 2018).

An undeniable trend is that research on the relationship between sustainable development, climate change, economic risks, and financial performance has grown significantly over the last decade. Delmas & Nairn-Birch (2011) is among the first comprehensive studies that demonstrate a direct connection between company-level climate related performance and financial performance. Companies with higher environmental standards outperform dirtier firms, indicating the existence of a "win-win" relationship between business and the environment. The ones that mitigate their environmental liabilities may be less likely to face headwinds to sales or brand value originating from consumer boycotts, litigation or regulatory costs when compared to companies judged as poor stewards of the environment (Delmas & Nairn-Birch, 2011). Adding to that, global challenges such as climate change, water stress, weather-related natural catastrophes, and unhealthy pollution levels may create revenue opportunities for firms providing solutions to make more efficient use of energy, water and any other natural capital (Bender et al., 2019).

Ibikunle & Steffen (2017) conducted a comparative analysis of the financial performance of green mutual funds versus conventional mutual funds and black mutual funds²⁵ in Europe. The investigation contrasts the financial performance of the three dissimilar investment orientations over the 1991–2014 period. Their results suggest that green funds have no significant performance difference from the black funds on a risk-adjusted basis during the sample period evaluated. As an additional point, historical time-series performance reveals that the risk-adjusted returns of green funds improve significantly relative to conventional mutual funds, and exceed that of the black funds over recent time periods (especially over the 2012-2014 investment window). As shown in topic 2.2, it's expected that green finance efforts are magnified,

²⁵ Funds with investments in fossil fuels and natural resources.
increasingly influencing in investment decision-making processes and aiding in directing financial resources to activities that promote the SDG targets.

2.3 Green Bonds

In 2008, two years before the Green Climate Fund initiative prompted the diffusion of the "green finance" topic, the world economy faced its most dangerous financial crisis since the 1930's Great Depression. In the post-financial crisis environment, the financial challenge of building green infrastructure cannot be met with the public sector funding alone, as the balance sheets get stretched and bank capital becomes increasingly constrained (CBI, 2015b). With this in mind, Heike (2010) argued that for achieving success in channeling larger sums of capital (both public and private) into green initiatives, investment products should appeal to investors with large volumes of assets under management. These are the pension funds, endowments, asset managers and sovereign wealth funds.

Recently, new financial instruments have been created to tap sustainability and green investing (UN, 2019). A remarkable and promising financial instrument of that kind are the green bonds, debt instruments with a bonus environmental feature (Pham, 2016). As pointed out by the Organization for Economic Co-operation and Development (OECD), with banks having restricted lending capabilities and public budgets under strain in many countries, private sector sources of capital need to be engaged and so, green bonds are considered among the key instruments to mobilize private financial resources towards the progressive decarbonization of the global economy (OECD, 2017c). Green bonds explicitly create a flow of funds toward projects that offer environmental benefits by combining the efforts of issuers and investors. They are expected to become a pathway by which financial market participants can fulfill their basic responsibilities toward the maintenance of a sustainable global environment while simultaneously pursuing investment opportunities (Japan, 2017).

Succinctly, a bond is a type of loan or IOU used by companies, governments, and banks to finance their activities. The issuer of the bond (the borrower) owes the holder (the creditor) a debt obligation and, depending on the terms they agree on, has to pay back the lent amount within a certain period of time and interest. The main difference between green bonds and conventional ones is that unlike the latter, the funds raised with green bonds issuance have to be entirely allocated to finance or refinance environmental-related projects, assets, or business activities that deliver environmental benefits (CBI, 2018a). Similar to traditional fixed income securities, firms can use this debt instrument to raise capital to finance their valuable investments. Banga (2019) points out that with a few exceptions, green bonds are also inherently similar to conventional bonds in terms of structure. Their deals carry the same risk/return profile like any bond issued in the fixed-income market, and the pricing and yield to maturity (YTM)²⁶ of green bonds are indeed akin to that of conventional ones.

There is still no universal definition for green bonds, though a growing consensus has emerged on what they are intended to do. The Carbon Bonds Initiative (CBI) describes green bonds as "bonds issued in order to raise finance for climate change solutions and labeled as green by its issuer" (CBI, 2018a). The *Federação Brasileira de Bancos* (FEBRABAN) defines green bonds as fixed income securities, used to raise funds in order to finance or refinance projects or assets that have positive environmental or climate-related attributes (FEBRABAN, 2016). Similarly, the International Capital Market Association (ICMA), within the Green Bond Principles (GBP) guidelines, describe green bonds as "any type of bond instrument where the proceeds will be exclusively applied to finance or refinance, in part or in full, new and/or existing eligible Green Projects and aligned with the four core components of the GBP" (ICMA, 2018b). These components are:

- Use of Proceeds: to be labeled green, bonds' proceeds must be used for environmentally beneficial capital expenditures, such as investments in alternative energy, energy efficiency, pollution prevention and control, sustainable water and wastewater management, green buildings, or clean transportation.
- 2) Process for Project Evaluation and Selection: the green bonds' documentation must include specific criteria and processes for determining eligible projects or investment.

²⁶ The Yield to Maturity is the internal rate of return of an investment in a bond if that bond is held until the end of its lifetime.

- Management of Proceeds: a formal process that regulates the use of net proceeds must be disclosed in the bond prospectus or supporting document.
- 4) Reporting: issuers of green bonds should report at least annually on the specific investments made from the green bond proceeds and document the environmental impacts of the specific investments. The information can be documented in specific Green Bonds Monitoring Reports, Financial Reports, Corporate Sustainability Reports or Integrated Reports²⁷.

So broadly speaking, green bonds are fixed income securities issued by capital raising entities to fund their environmentally friendly projects, such as renewable energy, sustainable water management, pollution prevention, climate change adaptation and so on (Tang & Zhang, 2018).

A green bond can either be labeled or unlabeled. Labeled green bonds are usually in alignment with the GBP guidelines and its components, being formally marketed as green by the issuers, who define the types of green projects they plan to support with the bond proceeds and report back to investors on a regular basis (Pham, 2016). In the other hand, unlabeled green bonds do not have a formal green tag but are issued by firms whose businesses are naturally aligned with environmental causes, like wind or solar energy companies (Chiesa & Barua, 2019). In general, there are two green bonds "standards": the Green Bond Principles (GBP), and the CBI Climate Bonds Standard and Certification. The identification and labeling of green bonds typically follow the GBP, a set of voluntary standards established in 2014 by industry participants (including major banks such as including Bank of America Merrill Lynch, Citi, JPMorgan, BNP Paribas, and HSBC) and non-profit organizations (ICMA, 2018b). The four green bond components presented in the GBP are widely accepted by the market, as following it leads to a process that evidences transparency from the issuer²⁸.

²⁷ Integrated report is defined as one that combines information from traditional, financially-oriented annual reports with the "material" parts of the corporate sustainability reports (Eccles & Youmans, 2016).

²⁸ For more detailed information about the Green Bond Principles, read the latest version of the GBP. Available at: https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/

The other most acknowledged way for identifying and labeling a green bond is via the Climate Bonds Standard and Certification procedure from the CBI. Conversely of the generality of GBP, the CBI provides some eligible criterion and a detailed green taxonomy by sector that third parties can apply to assess the qualification of a green bond. They also request an external review by an independent third party assurance provider or auditor that has been approved by the Climate Bonds Standard Board (CBI, 2018b). Labeled green bonds earmark 100% of the proceeds of the bond sale for projects or assets that fit within the Climate Bonds Taxonomy (CBI, 2015a). Passing through this process qualifies the issuer for getting a certification mark that is globally recognized by bond issuers, governments, investors and the financial markets to prioritize investments which genuinely contribute to addressing climate change. The certification confirms that the debt instrument is fully aligned with the GBP; is using best practices for internal controls, tracking, reporting, and verification; and is financing assets consistent with achieving the goals of the Paris Climate Agreement (CBI, 2019b)²⁹. Other ways for identifying and labeling a green bond exist with national definitions and guidelines for green bonds issuance, such as the green bonds endorsed catalog in China. Those usually follow the GBP, but with a few differences in the process of labeling.

Until right after the 2008 financial crisis, green bonds were a concept of limited interest to investors, since most environmental beneficial projects were deemed risky and non-profitable by traditional investors (Shishlov, Morel, & Cochran, 2016). Surprisingly, there has been an exponential growth in green bond issuance since then. This expansion is attributable to increased awareness from traditional investors about the benefits of green investments in one hand, and the potential impacts of climate change on financial assets, on the other hand (Schoenmaker, 2017). The evolution of the green bond market over the last years confirms the tremendous potential of this financial instrument, although it also remains a small portion of the bond market, at less than 1% (UN, 2019).

²⁹ For more detailed information about the Climate Bonds Standard and Certification, read the latest version of the Climate Bonds Standard. Available at: https://www.climatebonds.net/standard/download

This fixed-income investment mechanism made its first appearance in 2007 when the European Investment Bank (EIB) issued the first green bond (called "climate awareness" bond at that time). A year later, the World Bank issued the second green bond, to finance climate mitigation and adaptation projects in its countries of operations. Since then, the market has become more sophisticated and expanded at more than 50% compounded annual growth rate, providing an opportunity to fund environmental projects all over the world. Furthermore, issuer organization types are also enlarging meaningfully, including supranational organizations (i.e., World Bank and IFC), development banks (i.e., ADB and AfDB), commercial banks (i.e., Bank of America and HSBC), non-bank financial institutions (i.e., Real Estate Investment Trusts, such as Regency Centers Corporation and Link REIT) and corporations (i.e., Apple Inc., and Tesla) (Tang & Zhang, 2018). Indeed, from a market pioneered by large development banks, in 2014, two-thirds of all new green bonds issuance came from issuers different than multilateral development banks. As a consequence, an even broader group of investors started being attracted by green bonds, such as asset managers, pension funds, companies, foundations and religious organizations (Kochetygova, Arora, & Jauhari, 2014).

Between 2010 and 2014, US\$ 57.9 billion in labeled green bonds were issued globally, with U\$ 36.6 billion just in 2014 (CBI, 2015c). It was the first year with prominent corporate participation: they represented 33% of 2014's total issuance. Those values indicate the development and further consolidation of an innovative market whose aim is to finance projects that adopt socio-environmental criteria, thereby contributing to sustainable development (Monzoni & Vendramini, 2015). It was then, from 2014 on that the green bond market took off.

In 2015, the total issuance on labeled green bonds reached US\$ 41.8 billion, with 7 new countries joining the market this year: Brazil, Denmark, Estonia, Hong Kong, India, Latvia, and Mexico. They jointly added US\$3.2 billion in green bonds to the market (CBI, 2016). By half of 2015, the total universe of green bonds outstanding reached US\$ 597.7 billion, including both labeled green bonds and unlabeled climate-aligned bonds (CBI, 2015a). Climate-aligned issuers are entities which generate at least 75% of their revenues from green business lines. The CBI distinguishes between fully-aligned issuers (95% or more green revenues), and strongly-aligned issuers (75-95% green revenues) (CBI, 2019c).

In 2016, the market growth went as high as 108% in comparison to 2015, reaching a green bond issuance amount of approximately US\$ 87.2 billion (CBI, 2018c). The green debt raised by Chinese entities rose from less than US\$ 1 billion in 2015 to over US\$ 23 billion in 2016, which made China the leader issuer of the year, accounting for more than 25% 2016's global green bond issuance (CBI, 2017). This abrupt change in China's participation and influence in the green bond market was preceded by increased awareness of environmental issues in the country. This greater awareness has been followed through to changes in local policy and financial decision-making regarding China's development.

The 2017 global issuance reached US\$ 155.5 billion³⁰, showing a 78% growth in respect to 2016 values (CBI, 2018c). Following the trends from past years, the US, China, and France accounted for 56% of 2017's global issuance, with the France government emitting a record-breaking EUR 9.7 billion (US\$ 10.7 billion) green sovereign bond deal. In emerging markets (EM), India's issuers more than doubled volumes, reaching US\$ 4.3 billion. Mexico claimed the title of the sixth largest issuer of the year with a single deal from Mexico City Airport: a US\$ 4 billion green bond issuance that represented an 85% rise over 2016 volume (CBI, 2018c). Issuers came from 37 countries with ten new entrants, including Nigeria, Fiji, Malaysia, Argentina, UAE, Lithuania, and Switzerland. Investment in renewable energy continued to be the most common green projects financed by the utilization of the proceeds of the bond. However, their share has dropped while allocations to low carbon buildings and energy efficiency projects rose 2.4 times year-on-year and accounted for 29% of 2017's described Use of Proceeds. With a multitude of rail and urban metro deals, allocations to low carbon transport almost doubled in volume, worth US\$ 24 billion in 2017 (CBI, 2018c).

In 2018, the figures stayed around US\$ 167.3 billion green bonds issuance representing a 7,6% growth I comparison to 2017 volume (CBI, 2019c). The market's growth has slowed compared to the 78% year-on-year increase achieved in 2017. USA, China, and France topped country ranking

³⁰ These numbers account only bonds with at least 95% proceeds dedicated to green projects that are aligned with the Climate Bonds taxonomy, which features eight sectors: energy, buildings, transport, water, waste, nature-based assets, industry and the most recent one, ICT (CBI, 2019c).

once again, accounting for 47% of global issuance in 2018: US issuers contributed in US\$34.1 billion to the total; Chinese emitted US\$ 30.9 billion; French issued US\$ 14.2 billion in green bonds. Geographic diversification kept rising, involving 44 countries in the market, eight of them recording debut green bond issuance: Iceland, Indonesia, Lebanon, Namibia, Portugal, Seychelles, Thailand, and Uruguay (new issuers amounted to US\$ 3.3 billion volume) (CBI, 2019c). European issuance reached US\$ 66.6 billion (up 15% from 2017 volumes), while issuance from the Asia-Pacific region recorded the highest level of increase: 35% over 2017 to reach US\$ 48.5 billion in 2018. Supranational institutions issued US\$ 12.7 billion, with the Europe Investment Bank (EIB) (US\$ 5.6 billion) and the World Bank (US\$ 2.4 billion) contributing significantly to 2018's total green bond issuance.

With US\$ 115 billion, developed markets green bonds represent 69% of 2018 issuance, a slight fall compared to the 71% numbers from 2017. US issuance stood at 30% of the developed markets, a 10% drop in share compared to 2017. Emerging markets (EM) accounted for US\$ 40 billion of green bond volume in 2018, or around a fifth of total issuance. The inclusion of deals from supranational development banks, whose mandate is to support EM's development, takes EM's contribution share to 31% of global issuance, versus 29% in 2017. China retained a leading role with US\$ 30.9 billion in green bonds, or 78% of 2018 EM issuance volumes and 18% of global volumes, up from 14% in 2017 (CBI, 2019a). That makes China the World's second-largest green bond market. Excluding China participation, EM issuers have allocated green bond proceeds to finance primarily renewable energy (52% of total proceeds); allocations to low-carbon buildings came at second (13%); transport ranks third (11%). Sustainable land use is a key sector with 10% of total allocations and has gained importance over the last two years due to issuance from the certified pulp & paper industry in Brazil (CBI, 2019c). Although currently much smaller than the energy sector, sustainable agriculture, forestry, and fisheries are considered fundamental sectors for many emerging markets.

Financial corporate fueled issuance of US\$ 49 billion, or 29% of the annual global total, up from 14% in 2017 when sector issuance was US\$ 23 billion. Industrial Bank Co (China), ING (Netherlands) and ICBC (China) accounted for almost a third of the segment's volumes. Non-financial corporate issuance came second with US\$ 29 billion or 17% of 2018's total. Iberdrola,

Enel, and Engie were the top three corporate issuers, with combined volumes of US\$ 4.5 billion (15.5% of the corporate segment). Public sector issuance, excluding sovereigns but including development bank deals, stayed at US\$ 42 billion, a significant fall if compared with 2017's US\$ 60 billion emissions in green bonds (CBI, 2019a).

Financial institutions are integral to the market, as their green bond issuance is only part of the story. Embracing the role of both structuring agents³¹ and underwriters³², they actively support issuers in coming to market. Asset managers and stock exchanges provide the means to raise funding from investors: stock exchanges with dedicated green or sustainability bond segments increase green bond visibility and their listing requirements promote transparency and market integrity (CBI, 2019c). Currently, 15 stock exchanges have dedicated green/sustainability bond segments, with the Luxembourg Stock Exchange and the Luxembourg Green Exchange being the largest green bond listing venues. Top 2018 green bond underwriters in primary issuance include Credit Agricole CIB; Bank of America Merrill Lynch; HSBC; BNP Paribas; Citi; JP Morgan; and Barclays. Mobilized by an increase of green bond issuance from China, seven Chinese banks and securities firms made their way into the top 25 global underwriters, with Bank of China achieving the highest spot among them, ranked at 11th (CBI, 2019a).

Another important feature of green bonds, external reviews from an independent party confirm alignment with the GBP and/or compliance with the Climate Bonds Standard. In 2018, approximately 90% of issued green bonds received at least one external review (CBI, 2019c). The most common accepted forms are:

• Assurance: confirmation of compliance with the GBP guidelines.

³¹ Structuring agents usually arranges the entire transaction, including the sale of the bonds, legal documentation and settlement procedures.

³² An underwriter is any party that evaluates and assumes another party's risk for a fee. They purchase debt securities, such as government bonds, corporate bonds, municipal bonds, or preferred stock, from the issuing body (usually a company or government agency) to market and resell them for a profit.

- Second party opinion: assessment of the issuer's green bond framework, confirming compliance with the GBP. The framework can be used as a basis for future green bond emissions.
- Green bond rating/evaluation: evaluation against a third-party rating methodology, which considers the environmental aspects of the investment (separately from credit ratings).
- Verification for Certified Climate Bonds: approved third-party verification, pre- and postissuance, which validates that assets adhere to the Climate Bonds Standard and Sectorspecific Criteria. The certification confirms that the bond is aligned to the Paris Agreement, i.e. to keeping global warming under 2°C.

Second party opinions remain the preferred option, followed by certification under the Climate Bonds Standard. Green bond ratings are also gaining ground and are now provided by global rating agencies Moody's and S&P, nine agencies in China, R&I and JCR in Japan, and RAM in Malaysia. CICERO was the leading provider of external reviews in 2018, representing 28% of deals by volume, and Sustainalytics was the second largest, helping 43 new issuers entering the market with US\$ 27 billion of deal volume (CBI, 2019c). In 2018, 14% of issued green bonds by volume were awarded the certification under the Climate Bonds Standard (46 deals totaling US\$ 23.3 billion). Sustainalytics was the top Approved Verifier under the Climate Bonds Standard, both in terms of deal count and volume (CBI, 2019c).

It's also important noting that by 2018, the labeled bond market has expanded beyond green bonds. Sustainability and social bonds have been around for a few years, but they really came into their own in 2018. Sustainability bonds allow proceeds to be allocated to both green and social projects. The 2018 sustainability bond issuance totaled US\$21 billion, according to CBI data (CBI, 2019a). If added to the CBI's green bond tally of US\$ 167.3 billion, the result is a US\$ 188.3 billion green and sustainability bonds market. Social bond issuance also increased in 2018, with US\$ 14.2 billion worth of deals coming to market in the year (CBI, 2019a). Adding social bonds to green and sustainability volumes would yield an annual total of US\$ 202.5 billion, which is 21% above the 2018 solely green bonds volume.

Finally, as stated by the CBI, 2018 has been a year of consolidation for the green bond market, with some progress made in the development of taxonomies and harmonization efforts. The

ICMA updated the GBP, incorporating Sustainable Development Goals (SDG) factors, and published the Social Bond Principles and Sustainability Bond Principles³³. The CBI updated its Taxonomy guide to version 2.1 in 2018 and expects to release the Standard Version 3.0 by the course of 2019, after a year-long development process to expand the science-based Standard and sector Criteria³⁴. In response to investor demand for disclosure on the impact of green bonds, the ICMA continued enhancing its suite of impact reporting guidelines in 2018, with suggested metrics and templates for Waste Management and Resource-Efficiency Projects and Clean Transportation Projects³⁵. Clearer definitions of what is sustainable/green and improved disclosure on the projects being financed and their environmental impact can help investors assess the market and individual bonds. The rising number of dedicated green bond funds and the increased focus on ESG across the investment community is beneficial to scaling up the green bond market (CBI, 2019c). For 2019, CBI's target for green bond issuance is US\$ 250 billion, an ambitious target, demanded to slow down the negative impacts of unsustainable development and climate change. Issuers, investors and governments are increasingly aware of the urgency to scale up green finance (CBI, 2019c).

The cumulative labeled green bond issuance since 2007 reached numbers around US\$ 521 billion, led by the USA (US\$118.6 billion), followed by China (US\$ 77.5 billion) and France (US\$ 56.7 billion) (CBI, 2019c). By September 2018, there was currently about US\$ 1.2 trillion of climate aligned outstanding bonds: labeled green bonds outstanding were valued in U\$S 389 billion, while unlabeled ones represented US\$ 811 billion (CBI, 2018a). Table 1 present a summary of issuances (by use of proceeds) from 2015 until 2018, as mapped by the CBI.

	In US\$ billion			
	Amount -	Amount -	Amount -	Amount -
Use of Proceeds	2015	2016	2017	2018
Renewable Energy	19.14	33.14	51.32	51.86
Buildings & Industry Energy Efficiency	8.19	18.31	45.10	46.84
Low Carbon Transport	5.60	13.08	23.33	28.44

Table 1 – Labeled green bond issuance by use of proceeds: 2015 to 2018

³³ https://www.icmagroup.org/green-social-and-sustainabilitybonds/green-bond-principles-gbp/

³⁴ https://www.climatebonds.net/standard/download

³⁵ https://www.icmagroup.org/green-social-and-sustainabilitybonds/resource-centre/

Sustainable Water Management	3.89	12.21	20.22	21.75
Sustainable Waste Management & Pollution	2.34	4.80	6.22	5.86
Climate Adaptation	1.71	3.92	3.89	5.02
Agriculture and Forestry	0.92	1.74	5.44	7.53
Total	41.80	87.20	155.50	167.30

Source: (CBI, 2016, 2017, 2018c, 2019a)

With the right support in place, US\$1 trillion of labeled green bonds could be issued a year by 2020 (CBI, 2015b). A positive initiative occurred during the 2016 G20 summit held in Hangzhou, as the world's political leaders have agreed to "support the development of local green bond markets and promote international collaboration to facilitate cross-border investments in green bonds" (G20, 2016). This historic political support has sent positive signals to investors, thereby strengthening the green bond market development, especially in advanced and emerging countries (Banga, 2019). By creating a positive narrative around investing in profitable, environmentally friendly solutions, the green bond market could help develop broad momentum for environmental action amongst companies, investors and the public sector. As a consequence, seeing the private sector play a pivotal role could help propel politicians towards more effective international environmental agreements, granting confidence that the capital exists to fund the sustainable world they envisage.

Tang & Zhang (2018) argues that from the issuers' perspective, green bonds can expand the breadth of ownership, enlarge their investor base and potentially obtain a lower cost of capital and longer tenor compared with straight conventional bonds. For investors, green bonds may satisfy their green mandate and boost their ESG score. Institutional investors, including pension funds and insurance companies (who have US\$ 93 trillion of assets under management in OECD countries alone), can find in green bonds one straightforward way to leverage their capital for investment in "green assets" at the real economy (OECD, 2015). The green label makes it simple for institutional investors who increasingly have made climate change commitments, to identify green investments. Bonds are also appropriate vehicles to tap into their large capital holdings at scale. As an example, green bonds, especially to finance infrastructure, can offer long-term maturities, being a good fit with institutional investors' long-term liabilities, while also allowing asset-liability matching (CBI, 2015b). Finally, at the same time, bond returns are relatively stable

and predictable when compared to equity, which is an important feature for investors looking after beneficiaries' assets such as retirees' savings.

According to Banga (2019), the development of the green bond market arguably stems from the consequences of 'unconventional monetary policies' implemented by the world's major central banks in the aftermath of the 2008 financial crisis. The failure of monetary authorities to achieve economic recovery through accommodative monetary policies has resulted in low interest rates and hungry for yield, especially in advanced economies (King, 2017). Consequently, institutional investors, such as pension funds and insurance companies are coming under pressure to find ways of making their savings products more attractive and reduce the rising costs of pension provision in the face of falling real interest rates (King, 2017). Such pressure has led many institutional investors who hold nearly US\$ 100 trillion in assets (Rabah, Patrick, Sanjay, Frederic, & Joseph, 2016), to look for new investment opportunities such as those of green financing and the lowcarbon transition, that also match their investment horizons. As one of the major market players in the fixed-income markets, institutional investors have realized that sustainable investing can preserve wealth and provide reliable streams of revenue while reducing volatility in the equity markets (Banga, 2019). This increased sustainability call and climate awareness, matched with the low-interest rate environment prevailing in most developed countries have led institutional investors to recognize green bonds as an appealing portfolio diversification instrument.

Another benefit of issuing green bonds is that it may help to attract people who have not been interested in investing in conventional bonds (Japan, 2017). For example, if a local government or company issues a green bond for a project in the local community, it may create a new flow of capital that circulate within the community, gaining investors from this community while also promoting a sustainable development of the community. For issuers, the benefits of issuing green bonds include obtainment of public acceptance by demonstrating a willingness to promote green projects; reinforcement of its funding base by developing relationships with new investors; and the possibility of raising funds on relatively favorable terms³⁶. The benefits for investors range from serving as ESG investments or direct investments in Green Projects, to risk hedging³⁷ via alternative investments (Japan, 2017).

However, issuing green bonds also has its downsides. Green bond issuers suffer from more information disclosures, upfront costs for certification and personnel, and reputation risk (Tang & Zhang, 2018). Banga (2019) identified a set of institutional and market barriers that currently prevent more mature development of the green bond market. One of these barriers is the lack of knowledge about how this green debt instrument works. Green bonds require technical skills for monitoring and assessing their use of proceeds throughout the project's lifecycle. However, in developing countries, there is a shortage of such skills, essential to guarantee that projects are implemented in accordance with the GBP (Banga, 2019). Adding to that exists a lack of knowledge regarding existing international practices in green bond transactions (GFSG, 2016). This knowledge gap could be exacerbated by the fact that the benefits of green bonds have not yet caught policy-makers' attention, as well as bond issuers and investors. The lack of commonly agreed standards for green bonds (OECD, 2017c) and their relative newness could justify this gap.

There are three important market barriers which damp the expansion of the green bond market in emerging countries: the issue of minimum size; high transaction costs associated with green bond issuance; and the currency of issuance (Banga, 2019). The issue of minimum size refers to the minimum value that a green bond should bear to be appealing to underwriters. For some of the world largest banks (Citi, HSBC, JP Morgan or Bank of America Merrill Lynch) as well as some institutional investors who manages trillions of dollars in assets, the size, tenure, and liquidity of green bonds are key elements to be considered before lending their money (Chiang, 2017). According to Franklin (2016), bond investors usually demand at least US\$ 200 million equivalent

³⁶ By issuing a Green Use of Proceeds Project Bond, companies may be able to raise funds on relatively favorable terms from investors who are well versed in assessing the feasibility of the sort of projects described in the Use of Proceeds report.

³⁷ When renewable energy and energy efficiency projects are the financing destinations of green bond proceeds, green bonds serve as a possible means to hedge risks involving social and economic shifts expected to occur within the global efforts for the long-term reduction in GHG emissions (based on the Paris Climate Agreement).

in liquidity before entrusting their money, while for the world's major rating agencies (Moody's, S&P), green bonds require a minimum size of US\$ 250 million for being eligible for index inclusion (Chiang, 2017). However, in many emerging countries, the low population density, coupled with high poverty rates usually makes standalone small projects (barely exceeding US\$ 10 billion on average) more cost-effective than large-scale projects, especially in rural areas (Banga, 2019). These figures suggest that the minimum size required by investors could stand as a relevant barrier to market entry for developing countries.

Transaction costs refer to costs incurred by the issuer to get at least a green label assurance from the independent reviewer and to produce regular documents showing the allocation of the green bond proceeds throughout the project's life cycle (Banga, 2019). According to Jun *et al.* (2016), the cost of obtaining a second opinion or third-party assurance could range from US\$ 10.000,00 to US\$ 100.000,00. These relatively high transaction costs from pre- to post-issuance could stand as an important barrier for small green bond issuers. Another acknowledged barrier for the spread of green bonds in developing countries is the currency of issuance. Emerging countries have to issue their bonds in international currencies, should they desire to raise large amounts of capital in international financial markets (Banga, 2019). Recurring to international markets, however, presents both the lenders and the borrowers with currency risks, as the revenue flows of the project to be financed typically relate to local currencies (S. Edwards, 1984). Banga (2019) suggests that the implementation of local currency-based green bond issuance could be beneficial for developing countries.

One more issue that harms green bonds market development is the suspicion of greenwashing behaviors. It occurs when an issuer promotes green-based projects in order to raise funds in the green bond market but actually operates in a way that is not beneficial to the environment (Banga, 2019). Greenwashing 'sins' could have, therefore, negative effects on investors' confidence on green bonds, thereby hampering market development. Lax and uncertain regulations, as well as monitoring failures throughout the project's lifespan, are the principal drivers of greenwashing behaviors (Delmas & Burbano, 2011). Tang & Zhang (2018) claim that due to no unified green bond standards to identify a green bond and limited enforcement of the

law for supervising green integrity, it is not a straightforward decision for corporations to issue green bonds.

Focusing on a singular emerging country, Monzoni & Vendramini (2015) investigated a few hurdles for the development of the green bonds market in Brazil. They identified 3 main structural challenges for this particular case: government bonds enjoy a different level of competitiveness over corporate bond; the low secondary market liquidity in Brazil limits the development of the corporate bond market; Brazil has a highly concentrated investor market, with low participation by private individuals and foreigners. They also identified barriers in common with other emerging countries, as the process for placing green bonds on the market is extensive and comes with an additional cost (necessity of external review); there is a lack of incentive for underwriters to structure a green bonds in case of project financing for new technologies. Apart from the downsides, as new business opportunities and infrastructure projects arise, more private sector funding will naturally be required. The private sector needs to find new means of funding and, green bonds represent a way of diversifying investments that provide society with shared socio-environmental benefits that are important for the transition to a sustainable economy (Monzoni & Vendramini, 2015).

As green bonds are a recent phenomenon with popularity increase across countries starting not earlier than 2013, the academic literature on the topic is limited. Ge & Liu (2015) examined how a firm's Corporate Social Responsibility (CSR) performance is associated with the cost of its new bond issues in the US market. They state that a higher CSR strength (concern) score is associated with lower (higher) yield spreads, with results indicating that firms with better CSR performance are able to issue bonds at a lower cost and that both CSR strengths and concerns are considered by bondholders.

Chiesa & Barua (2019) investigated the factors affecting the size of borrowing for the supply side, the green bond issuers. Using a sample of 614 bonds (135 emerging and 419 non-emerging market bonds) collected from Bloomberg data of corporate green bond issuance from 2010 to 2017, they explored the following determinants: (1) Bond characteristics: Coupon rate, Maturity, Bond rating, Pari passu, Security, Risk premium, Denomination currency; (2) Issuer characteristics: Firm size, Business growth, Capital structure, Issuer credit rating, Profitability, Alternative financing cost, Sector of issuer; and (3) Market characteristics: Market interest rate, Market type, Market of distribution.

Their findings suggest that, in general, issue size is positively correlated with coupon rate (issues with higher coupon rates are likely to be smaller in size), credit rating (bonds with a higher credit rating by either S&P or Moody's are likely to be more creditworthy and secured, and therefore the size of a bond issued is expected to be larger), collateral availability (having collateral makes the bonds secured, which increases the investors' acceptance of the bond in the market, helping the issuers to raise more funds), and issuer's sector and financial health: both debt-to-capital ratio (a proxy for a company's capital structure) and annual revenue growth rate (a proxy for business performance) have a significant and negative effect on the issue size. The negative influence of 'revenue growth' on bond issue size may indicate that issuers with a better business performance are likely to generate higher cash flows, thereby creating availability of higher internal funds and less appetite for external borrowing.

Moreover, results show that issuances in emerging markets with a more international orientation and denominated in EUR, have higher size. The logic is that bonds which are denominated in greater accepted international currencies (e.g. USD, EUR) are likely to have a bigger market with higher investor confidence globally. Statistical results partially confirm this hypothesis indicating that bonds denominated in EUR currency are more significant in issue size relative to other currencies that are excluded from the regression (e.g. AUD, BRL, SEK) (Chiesa & Barua, 2019). Arguably, these significant features make a bond more reliable, secured, and return-generating for investors, which facilitate higher issue size through greater investor demand.

Gianfrate & Peri (2019) believe green bonds have recently emerged as one of the best candidates to mobilize financial resources towards sustainable and clean investments. They examined how the financial market prices green bonds, and whether issuers can lower their financial costs by issuing a bond labeled as "green" rather than an equivalent non-green (conventional) bond. They reviewed 121 European green bonds issued between 2013 and 2017, demonstrating that green bonds are actually more convenient than conventional bonds. On average, ceteris paribus, they have to offer lower returns (quantifiable, on average, in lower interests paid annually to investors of 18 basis points³⁸) to investors, representing an effective way for achieving a lower cost of capital when financing green projects. Such an advantage is larger for corporate issuers and it persists in the secondary market: the private sector is better off financially when they issue bonds that are labeled as green. Even though green bonds have some additional transaction cost because issuers have to comply with the GBP, monitor, and report on the green use of proceeds, the findings suggest that the magnitude of the savings for issuers (in terms of interests paid) exceeds the costs to get the green label or rating. Hence, green bonds are potentially beneficial not only to society but also to the issuers as they can reduce the cost of debt financing.

Zerbib (2019) identified the impact of pro-environmental preferences on prices when using green bonds as an instrument: he compared each green bond with an otherwise identical counterfactual conventional bond, through a matching method for 110 green bonds on the secondary market between July 2013 and December 2017. The effect of pro-environmental preferences is identified through a green bond premium, defined as the yield differential between a green bond and an otherwise identical conventional bond (after controlling for their difference in liquidity). The results suggest a small significant negative green bond premium of, on average, -2 basis points. This green bond yield premium indicates the yield that investors are willing to give up to fund green investments rather than conventional investments with strictly equal risk. But although significant, it shows that the impact of pro-environmental motives on bond prices is still limited. The premium is still low enough not to demonstrate any substantial valuation discrepancy between green and conventional bonds or to dissuade investors from supporting the development of the green bond market. Finally, Zerbib (2019) also argues that the low negative green bond premium suggests that the lower cost of debt for companies with good environmental performances should be predominantly related to a lower level of financial risk (intangible asset³⁹ creation, or better risk management and mitigation), rather than investors' non-pecuniary preferences.

³⁸ 0.18% of the bond value.

³⁹ Intangible assets may refer to an improvement in the company's reputation, the attraction of new customers or a greater loyalty of employees towards the company.

Tang & Zhang (2018) analyzed the market's reaction to firms ESG activities. They investigated the announcement returns and real effects of green bond issuance by firms in 28 countries during 2007–2017. Results show that the issuers' stock prices increase significantly around the announcement of green bond issuance, with market reactions being stronger for first-time issuers than for repeated ones. Reactions are also stronger for corporate issuers than for financial institution ones. So, their findings suggest increased institutional ownership and improved stock liquidity after green bond issuance by a firm. Green bonds can help enlarge the investor base as its issuance can attract more media exposure and be used by impact investors to satisfy their investment mandates (Tang & Zhang, 2018).

3 Methodology

This work is an exploratory research that, despite the use of statistical treatment and quantitative analysis, is mostly a qualitative research. The methodology section is distributed as follows: at 3.1, it's presented how the corporate green bonds database was compiled; next, at 3.2 and 3.3 it's introduced the data collection and description, including the documents that were gathered for the analysis the efficiency of the green bond mechanism in respect to socioenvironmental value creation; 3.4 and 3.5 presents the data analysis procedures and treatment sections.

3.1 Data Sample

To compile a database of corporate green bonds, different bonds data providers were consulted. This green bond dataset has been built in April 17 2019, augmenting Bloomberg with the Climate Bond Initiative (CBI) and the International Capital Market Associations (ICMA) labeled green bonds data. It is important to note that both Bloomberg and CBI track green bonds issued since 2007 (the inception of the market), even though the specific green bonds database were created afterwards.

The first round of data extraction was performed consulting Bloomberg, which has created its green bonds database in 2014. Bloomberg defines green bonds as 'instruments for which the proceeds are exclusively applied (either by specifying Use of Proceeds, Direct Project Exposure, or Securitization) towards new and existing Green Projects, defined as projects and activities that promote climate or other environmental sustainability purposes' (Chiesa & Barua, 2019). Bloomberg has compliance with the Green Bonds Principles (GBP) on the use of proceeds only: 100% of use of proceeds needs to be aligned with the green activities, which are consistent with GBP activities. They tag bonds with the "green bond" label in the use of proceeds field when an issuer self-labels its bond as "green" or identifies it as an environmental sustainability-oriented bond issue with clear additional statements about the commitment to deploy funds towards projects and activities in the GBP use of proceeds categories (ICMA, 2018c).

So, as a preliminary analysis, all corporate and government bonds (securities for which the Asset Classes are either "Corporates" or "Governments") in Bloomberg's fixed income database that are labeled as "green bonds" (more precisely, securities for which the field "use of proceeds" is "Green Bond/Loan" or "Sustainability Bond/Loan") were extracted. For each bond, Bloomberg contains a wealth of information including the amount, currency, date of issue and maturity, coupon, credit rating. The Bloomberg dataset cover the period from June 2007 until April 2019, with data being extracted on April 17 2019. A total of 2140 entries resulted from this preliminary search.

Next, the initial Bloomberg database was complemented with the labeled green bonds identified by the CBI, who has been tracking the green bonds market since 2009, launching their database in 2013. The CBI defines green bonds as instruments created to fund projects that have positive environmental and/or climate benefits. The CBI database lists all bonds that are aligned with the GBP and their Climate Bonds Taxonomy⁴⁰, that provides an overarching view on what is considered eligible use of proceeds for green bonds. Saying so, the database only include selflabeled green bonds with at least 95% use of proceeds financing or refinancing green/environmental projects that are broadly aligned with their taxonomy guidance (ICMA, 2018c). Inside this group of labeled green bonds, there are also the Certified Climate Bonds that were registered and certified by the Climate Bonds Standard Board from the CBI.

The CBI provides a free public access through the internet browser⁴¹, and a partner's site access, which provides better tools to investigate the green bond market. Due to lack of funds for the research, the free public access using the internet browser was the way the database was accessed. Such as Bloomberg, the CBI dataset covers the period from June 2007 until April 2019.

A final consultancy was performed by checking the Green, Social and Sustainability bonds database from the ICMA, who has been tracking bonds issued since 2016. This database lists the issuers who have publicly disclosed their external review reports, or who have completed the relevant templates or forms, in accordance with the recommendations of the GBP. The database

⁴⁰ Available at: https://www.climatebonds.net/standard/taxonomy

⁴¹ Available at: https://www.climatebonds.net/cbi/pub/data/bonds

is freely accessed through the internet browser, with the option to download it in XSL format⁴². The ICMA dataset cover the period from 2016 until 2019.

Apart from Bloomberg, the CBI, and the ICMA, there are other green bond data providers, such as the Cbonds, Dealogic, and Environmental Finance. Cbonds have a field "green bond (yes/no)" in their database, and use the GBP standards to mark a new issue as a green bond. Dealogic currently flags green, social and sustainability bonds in its general database. They also try to confirm, whenever possible, a detailed description of the different uses of proceeds of the bond. Those bonds considered green or sustainable will get applied one or several Green Categories as per Dealogic's own classification, which are broadly in line with the use of proceeds categories of the GBP (ICMA, 2018c). The Green Bond Database from the Environmental Finance lists all bonds that are self-labeled as "Green". The majority of these bonds are aligned with one of the following: the GBP, Climate Bonds Certification issued by the CBI, or the Green Financial Bond Directive, issued by the People's Bank of China. The three mentioned database are available as subscription service, and due to lack of funds, none of them were consulted for the present work.

An advantage of using the Bloomberg database as an initial source to compile the green bonds dataset is that, for each issue, it uses it Bloomberg Industry Classification System (BICS) to classify the issuer's sector. The BICS is a proprietary hierarchical classification system, which classifies firms' general business activities. BICS for fixed-income security issuers contains 11 macro sectors, which represent the broadest classification of general business activities. Each sector is further broken down into a hierarchical system of industry groups (up to 8 levels of detail), which are classified into more narrowly defined business activities (Di Clemente, Chiarotti, Cristelli, Tacchella, & Pietronero, 2014). Table 2 shows the two levels of the BICS classification hierarchy for fixed-income security issuers: sectors and industry group. The BICS system is adopted throughout the rest of this work, to standardize the identification sectors and industry groups of green bond issuers.

⁴² Available at: https://www.icmagroup.org/green-social-and-sustainability-bonds/green-social-and-sustainability-bonds-database/#HomeContent

Table 2 – BICS classification hierarchy

Sectors (BICS Level 1)	Industry Group (Level 2)	
	Cable & Satellite	
	Entertainment	
Communications	Media Non-Cable	
	Wireless Telecom Services	
	Wireline Telecom Services	
	Airlines	
	Appearal & Textile Products	
	Automotive	
	Casinos & Gaming	
	Consumer Services	
	Distributors	
Consumer Discustioners	Educational Services	
Consumer Discretionary	Entertainment Resources	
	Home & Office Products	
	Home Builders	
	Home Improvements	
	Leisure Products	
	Restaurants	
	Travel & Lodging	
	Consumer Products	
	Food & Beverage	
Consumer Staples	Retail Staples Supermarkets	
	Tobacco	
	Exploration & Production	
	Integrated Oils	
En every	Oil & Gas Services	
Energy	Pipeline	
	Refining & Marketing	
	Renewable Energy	
	Banking	
Financials	Commercial Finance	
	Consumer Finance	
	Financial Services	
	Life Insurance	
	Property & Casualty	
	Real Estate	
	Health Care Facilities & Services	
Health Care	Managed Care	
	Medical Equipment & Devices	

	Pharmaceuticals	
	Aerospace & Defense	
	Electrical Equipment	
	Industrial Other	
	Machinery	
Industrials	Manufactured Goods	
	Railroad	
	Transporation & Logistics	
	Waste & Environment Services Equipment & Facilities	
Materials	Chemicals	
	Construction Materials	
	Construction & Packaging	
	Forest & Paper Products	
	Metals & Mining	
	Communications Equipment	
Technology	Hardware	
	Software & Services	
Utilities	Utilities	
	Sovereign	
Government	Government Agency	
	Government Regional / Local	
	Supranational	
	Development Bank	
	Winding Up Agency	

Source: (Bloomberg, 2015)

The first round of analysis resulted in 2140 entries from the Bloomberg database. From this total, the bonds whose issuer's sector (BICS Level 1) is identified as "Government" were excluded, leaving the dataset with 1262 entries. Those issuers include development banks and supranational entities (African Development Bank, European Investment Bank). While these entities qualify as "corporate" due to their private status, they are not "corporations" in a traditional sense. Inside this "Government" category there are also government agencies, and government (local, municipal, regional and sovereign). All these institutions play a big role in financing sustainable development, as they redirect risen proceeds to projects that are eligible in a Green Bond Portfolio. However, it is difficult to track where the investments are allocated, as they are spilled into a range of projects. In addition, the purpose of this work is to explore private participation regarding green financing and sustainable development initiatives.

The green bonds issuance data period that is covered in the analysis is from January 1st, 2014 until December 31st, 2017. The year of 2014 was the first complete year with corporate green bond issuances; when corporations entered the green bond market. The end of data collection was set in 2017 as, according to the GBP, issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation (ICMA, 2018b). In other words, to be in conformance with the GBP standards, the issuer has to publish an annual green bond impact report including a list of the projects to which green bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, evidencing expected impact. As some companies disclose this information in their Annual reports, it was left a gap of a full fiscal year period, so it is possible to check the conformance of the issuer with the Green Bond Principles reporting component. The period screening criteria reduced the dataset further to 743 entries.

Finally, multiple tranches from the same issuer on a single day were combined with the tranche with higher volume, forming one single green bond issue with cumulated amounts. After these final adjustments, 406 green bond issuances were identified in the period using the Bloomberg green bonds dataset.

Given the screening criteria, during the exploration of the CBI and ICMA databases, only green bond issues from 2014 until 2017 are considered and included in the augmented dataset. Green bonds from supranational institutions, development banks, government agencies, sovereigns, regional and municipal government weren't considered. The CBI database provided 53 new entries, while the ICMA shown 9 entries not identified before. These 62 issuances were added to the Bloomberg ones, forming a dataset with 468 corporate green bond issuances from 2014 until 2017. The whole process for building the database is described at Figure 1. APPENDIX 1 present all these 468 issuances.



Figure 1 - The process to build the green bonds dataset

3.2 Data Collection

Next is setting up the business case for evaluating the impact of each issuance from a value creation perspective. This was done by checking alignment with the GBP's management of proceeds and reporting steps; evaluating environmental and/or financial value creation to the corporation through the Green Bonds report; and analyzing collaboration in achieving the Sustainable Development Goals (SDGs) targets.

The data collected was of secondary origin and constitute of public information. These include the documents, reports, and second party opinions made available through the websites of the green bond issuers. The collection of information sources was executed between May and July 2019.

The conformance of the issuances with the GBP guidelines is an important step for evaluating the effectiveness of this fixed-income instrument in relation to environmental, social and financial value creation. To be labeled as a green bond, the issuance has to be aligned with the four core components of the GBP⁴³ (ICMA, 2018b):

- 1) Use of Proceeds.
- 2) Process for Project Evaluation and Selection.
- 3) Management of Proceeds.
- 4) Reporting.

Components 1 to 3 of the GBP are evidenced through either a Green Bond Framework or a Green Bond Issuance statement developed by the issuer, or through a Second Opinion on the green bond, published in an External Review report about the issuance. Some of the most frequent Second Opinion providers are the Center for International Climate Research (CICERO), DNV GL, Ernst & Young (EY), Oekom Research, and Sustainalytics. An example of a Green Bond Framework and of an External Review report are available at ANNEX A and ANNEX B, respectively.

In general, the search for this information followed four protocols: the first consisting in using direct links for these documents, available via the Bloomberg, CBI or ICMA page dedicated to each

⁴³ The components were earlier described at chapter 2.3 of the present work.

issuance; the second consisted of conducting an exploratory analysis on the issuer's website to verify if there was any specific area dealing with the green bonds or green financing; the third consisted of using the search tool of the issuer's own website (both Corporate and Investor Relations web addresses) with keywords and expressions such as "green bond", "green finance", "green framework", "ESG bond", "Sustainability Bond", among others in English, Spanish, and Portuguese; and the fourth, in order to reduce the likelihood of any information being lost, consisted of using the Google search tool to conduct a search with the same key expressions of the third protocol, adding the issuer's name within the keyword or expression. The searching protocol sequence of is summarized at Figure 2.

Figure 2 - The four steps for searching for a Green Bond Framework, a Green Bond Issuance statement, or an External Review report about the issuance

Step 1	Step 2	Step 3	Step 4
Document available directly from the Bloomberg, CBI or ICMA databases	Exploratory analysis on the green bond issuer's website to verify if there is any specific area dealing with the green bonds or green financing	Search tool of the issuer's own website using keywords and expressions such as "green bond", "green finance", "green framework", "ESG bond", "Sustainability Bond" in English, Spanish, and Portuguese	Google search tool to conduct a search using the same keywords and expressions of Step 3, adding the issuer's name within the keyword or expression

The 4th component of the GBP, the green bond impact and proceeds allocation reporting is evidenced through a series of possible documents emitted by each issuer: reporting information available in the issuers' dedicated Green Bond section at their own website; Green Bonds Letter to Investors; Green Bonds Reports (also named Green Bonds Impact Report or Green Bond Monitoring Report); Annual Integrated Reports; Sustainability or CSR Reports; or Financial Reports published after the green bond emission. Similarly to the searching process performed to evidence components 1 to 3, the search for Reporting information followed five protocols: first and second protocols are exactly the same; the third consisted of using the search tool of the issuer's own website with keywords and expressions such as "green bond report", "bond report", "impact report", "bond proceeds", "green bond", "ESG bond", "Sustainability Bond", among others in English, Spanish, and Portuguese; the fourth consisting in exploring the Annual Reports of fiscal years subsequent to the green bond issuance, searching for keywords or expressions like "green bond", "green finance", "use of proceeds", "bond impact", "proceed", "impact", "green" and "bond", in English, Spanish, and Portuguese; and the fifth, in order to reduce the likelihood of any information being lost, consisted of using the Google search tool to conduct a search with the same key expressions of the third protocol, adding the issuer's name within the keyword or expression. The searching protocol sequence of is summarized at Figure 3.

Figure 3 - The five steps for searching for reported information on the green bond: Green Bond section at the issuer's website; Green Bonds Letter to Investors; Green Bonds Reports; Annual Integrated Reports; Sustainability or CSR Reports; or Financial Reports

Step 1	Step 2	Step 3	Step 4	Step 5
Document available directly from the Bloomberg, CBI or ICMA databases	Exploratory analysis on the green bond issuer's website to verify if there is any specific area dealing with the green bonds or green financing	Search tool of the issuer's own website using keywords and expressions such as "green bond", "green finance", "green framework", "ESG bond", "Sustainability Bond" in English, Spanish, and Portuguese	Explore the Annual Reports of the green bond issuer, searching for keywords or expressions like "green bond", "green finance", "use of proceeds", "bond impact", "proceed", "impact", "green" and "bond", in English, Spanish, and Portuguese	Google search tool to conduct a search using the same keywords and expressions of Step 3, adding the issuer's name within the keyword or expression

Finally, with the Green Bond Monitoring Reports, it is also possible to qualify each issuance by the type of activities, assets & projects that the green bond proceeds were allocated to; identify the region in the planet that this financed activity or asset is located; and evaluate the business case for the sustainability of the issuance, as stated by the reported information.

3.3 Data Description

For each green bond, the following financial bond characteristics were collected to identify each issue:

- a) Issuer name: the company that issued the green bond.
- b) Debt term to maturity: the years from the green bond issuance until its final payment date. Adapted from Choi *et al* (2018), the corporate green bonds can fall into one of three different maturity buckets:

- I. 1-3 years: short-term debt
- II. 4-9 years: intermediate-term debt
- III. 10+ years: long-term debt
- c) Currency: the currency in which the bond was issued: USD, EUR, CNY or "Other"
- d) Issue size: total dollar amount of the issuance, classified as follows (A. K. Edwards, Harris, & Piwowar, 2007):
 - I. < US\$ 100M: small issuance size
 - II. Between US\$ 100M and US\$ 500M (including both values): medium issuance size
 - III. > US\$ 500M: large issuance size
- e) Rate at issue: the credit rating assigned to the green bond at it issuance, as evaluated by Fitch Ratings, Moody's, or Standard & Poor's (S&P), classified as follows (A. K. Edwards et al., 2007):
 - I. Superior:
 - i. Fitch: AAA, AA+, AA, AA-;
 - ii. Moody: AAa, Aa1, Aa2, Aa3;
 - iii. S&P: AAA, AA+, AA, AA-
 - II. All other investment grade:
 - i. Fitch: A+, A, BBB+, BBB, BBB-;
 - ii. Moody: A1, A2, Baa1, Baa2, Baa3;
 - iii. S&P: A+, A, BBB+, BBB, BBB-
 - III. Speculative grade or not rated:
 - i. Fitch: BB+, BB, BB-, B+, B, B-;
 - ii. Moody: Ba1, Ba2, Ba3, B1, B2, B3;
 - iii. S&P: BB+, BB, BB-, B+, B, B-;
 - iv. No rating: none of the three credit rating agencies assigned one of the grades above to the issuance

For qualifying the green bond issue, the world regions are separated as follows:

- 1) Europe
- 2) China (including Hong Kong and Taiwan)

- 3) North America (only USA & Canada)
- 4) Asia (excluding China, Hong Kong and Taiwan)
- 5) Oceania
- 6) Latin America
- 7) Africa

Both USA and China are the world top issuers (including all green bonds, government and corporate), representing respectively 22% and 15% of cumulative labeled green bond issuances from 2007 until the end of 2018 (CBI, 2019c). For this reason, they are analyzed separately as singular world regions.

The sector of the issuer is given in accordance to the BICS classification system (Level 1), shown in **Erro! Fonte de referência não encontrada.**.

With the green bond reporting information, it is possible to analyze each issuance by the kind of activities, assets & projects in which majority of proceeds were allocated, and identify the location of the financed activity or asset. The criteria adopted to classify the activities derives from the Climate Bonds Taxonomy, a guide developed by the CBI to identify the assets and projects needed for sustainable development and to deliver a low carbon economy (CBI, 2018b). The six possible categories for the use of proceeds are:

- Energy: include the subcategories solar, wind, hydro, geothermal, bioenergy, district heating/cooling, electricity grid and energy performance.
- Buildings: include the subcategories certified buildings, and resources efficiency (energy, water, materials).
- 3) Transport: include the subcategories low emission vehicles (electric and hybrid), urban rail, passenger trains, and transport logistics, such as freight rolling stock, ports.
- Water & wastewater: include the subcategories water treatment, wastewater treatment, resources efficiency and others such as flood protection, water distribution.
- 5) Waste management: include the subcategories recycling, waste prevention, pollution control, waste to energy, and resources efficiency.

 Sustainable land use & agriculture: include the subcategories FSC forestry/cellulose & paper, and afforestation/parks.

On the proceeds allocation analysis (assets & activities categories and regions), only the issuances that reported on the green bond resources allocation were considered. It's important noticing that although not presenting a report, there are some issuers who declare in the Green Bond Framework or at the External Review Report that the green bond proceeds are designated to a single specific project or portfolio of similar assets (for example, 2 wind farms in the USA). There are also some pure-play green issuers⁴⁴, who raise funds to allocate in their particular activity, such as developing wind farms or installing residential solar panels, for example. However, any issuer that did not present a report were not considered in the analysis.

Next, the business case for the sustainability of the issuance is performed, by checking the impact reporting information provided within each Green Bond report. Adapted from Epstein & Roy (2003), a reported issuance falls in one of the following situations, also presented at Figure 4:

- Level 1: information on expenditure the amount of the issuance spent with green eligible projects;
- Level 2: descriptive socio-environmental benefits information not linked to financial performance;
- Level 3: quantified socio-environmental benefits information not linked to financial performance;
- Level 4: monetized information on the benefits of expenditure (i.e. measures of benefits in addition to measures of costs), fully linked to financial performance;

⁴⁴ Pure-play companies derive all of their revenue from a particular source (CBI, 2018a).

Figure 4 – The four possible levels within the Business Case for the sustainability of the green bond issuance



Source: Adapted from Epstein & Roy (2003)

As a core principle of Green Bond Monitoring reports is providing information on the use of proceeds allocation, the monetary expenditure information is set at the lowest level on impact reporting evaluation, appearing in all reported issuances.

In addition, the information can be provided either on a portfolio basis (B), or on singular projects basis (A):

- Category B: the impact reporting refers to a poll of eligible green projects, without further investment details regarding each project.
- Category A: detailed data is provided about each funded project, indicating an even more transparent process.

Finally, the last step consists in evaluating the most financed assets & activities of a given Green or Sustainability Bond against the UN Sustainable Development Goals (SDG). The guide "Green and Social Bonds: a high-level mapping to the Sustainable Development Goals"⁴⁵, developed by the ICMA, is used as frame of reference. It has been created for public and private sector issuers and investors to review their green, social and sustainability bond issuances and investments against the SDG (ICMA, 2018a).

Since the SDG were launched in 2015, they have been increasingly accepted and applied in the financial markets, as ESG and impact investing is becoming mainstream. Large asset owners are starting to set targets for SDG-aligned investments. The mapping table, available at APPENDIX 2,

⁴⁵ Available at <u>https://www.icmagroup.org/green-social-and-sustainability-bonds/mapping-to-the-sustainable-</u> <u>development-goals/</u>

illustrates how the SDG may be considered by both the private and the public sectors as they identify eligible operations for Green and Sustainability bond use of proceeds. The table is a result of a high-level review of each of the 169 targets associated with the 17 goals in order to identify those that may be relevant to either the GBP project categories (ICMA, 2018a). Thus far, 12 of the SDG have been identified as being relevant to the GBP, with a total of 53 targets that have a closer connection to the GBP project categories. In the present work, the mapping table is used as a reference; with each green bond issuance that has reported information on the allocation of proceeds being individually reviewed for alignment with 11 of these 12 SDG. The 1st one, no poverty, was excluded from the analysis as every project falls into this category. Next, there is the correspondence of projects subcategories with the promoted SDG as identified by the (ICMA, 2018a).

- 1) SDG 2 Zero hunger: associated to afforestation/parks project subcategory.
- SDG 3 Good health and well-health: associated to recycling, waste prevention, pollution control, waste to energy, wastewater treatment, solar energy, wind energy, hydro, geothermal, and bioenergy projects subcategories.
- SDG 6 Clean water and sanitation: associated to water & wastewater project category, and afforestation/park and pollution control subcategories.
- 4) SDG 7 Affordable and clean energy: associated with energy projects category.
- 5) SDG 8 Decent work and economic growth: associated with energy projects category.
- SDG 9 Industry, innovation and infrastructure: associated with energy and buildings projects categories.
- 7) SDG 11 Sustainable cities and communities: associated with transport project category and solar energy, wind energy, hydro, geothermal, bioenergy, certified buildings, recycling, waste prevention, pollution control, waste to energy, and afforestation/parks projects subcategories.
- 8) SDG 12 Responsible consumption and production: associated with energy projects category and FSC forestry/cellulose & paper, waste prevention, waste to energy, recycling and resources efficiency (for waste management) projects subcategories.

- SDG 13 Climate action: associated to solar energy, wind energy, hydro, geothermal, and bioenergy projects subcategories.
- 10) SDG 14 Life bellow water: associated to waste management projects category, and to afforestation/parks project subcategory.
- 11) SDG 15 Life on land: associated to sustainable land use & agriculture and waste management projects categories.

Table 3 and Table 4 summarize all the information collected for each issuance. In adition, APPENDIX 1 illustrates the information collected for the sample of green bonds.

Variable	Outcome	Final Outcome	
Issuer	Issuer ID	Green Bond Issuer ID	
	1-3 years	Short term debt	
Term to maturity	4-9 years	Intermediate term debt	
	10+ years	Long term debt	
	USD	USD	
6	EUR	EUR	
Currency	CNY	CNY	
	Other	Other	
lssue size	< U\$ 100M	Small issue	
	Between US\$ 100M and US\$ 500M	Medium issue	
	> US\$ 500M	Large issue	
Rate at issue	Prime High grade	Superior	
	Upper medium grade	All other investment grade	
	Non-investment grade speculative		
	Highly speculative Not rated	Speculative grade or not rated	

Table 3 – Summary of the green bond issues identification variables

|--|

Variable	Outcome	Final Outcome
Issuer Country		Europe
	Region of the Issuer	China
		North America
		Asia

		Oceania
		Latin America
		Africa
	Communications	Communications
	Consumer Discretionary	Consumer Discretionary
	Consumer Staples	Consumer Staples
	Energy	Energy
Sector of the	Financials	Financials
issuer	Health Care	Health Care
	Industrials	Industrials
	Materials	Materials
	Technology	Technology
	Utilities	Utilities
	Project Category	Project Subcategory
		Solar
		Wind
		Hydro
	_	Geothermal
	Energy	Bioenergy
		District heating/cooling
		Electricity grid
		Energy performance
	Duildings	Certified buildings
	Buildings	Resources efficiency
		Low emission vehicles
Most Financed	Transport	Urban rail
Project Category	Transport	Passenger trains
		Transport logistics
		Water treatment
	Water & wastewater	Wastewater treatment
		Resources efficiency
		Others
		Recycling
		Waste prevention
	Waste management	Pollution control
		Waste to energy
		Resources efficiency
	Sustainable land use & agriculture	FSC Forestry/cellulose & paper
		Afforestation/parks
Business case for the sustainability	Level 1	Monetized information on expenditure

of the issuance (Epstein & Roy, 2003)	Level 2	Qualitative socio-environmental benefits information not linked to financial performance
	Level 3	Quantitative socio-environmental benefits information not linked to financial performance
	Level 4	Monetized information on the benefits of expenditure
Impact Report category of detail	Category B	Report on poll of eligible green projects
	Category A	Report individually on each financed activity or project

3.4 Data Analysis Procedure

The data analysis involved five stages:

- 1) Determination of relevant identification and qualification variables for analysis
- 2) Frequency distribution of the relevant events
- Data treatment, including contingency tables (when viable) and performance of statistical tests and inferences
- 4) Qualitative highlights

At first, it' investigated the conformity of green bond issuances with the Green Bond Principles (GBP), the most commonly recognized guidelines for green bond issuance. The relative frequency of green bond issuers that are in conformity with the GBP are identified by region of the issuer and sector of the issuer. It is checked whether the issuer made available the Green Bond Framework or an External Review Report (conformity with steps 1 to 3 of the GBP – pre-issuance conformity) and whether they reported information on the allocation of resources and impacts of the project (conformity with step 4 of the GBP – post-issuance conformity).

At a second moment, it's explored the financial and socioenvironmental value creation regarding the green bond issuances. On this analysis, it's only considered issuances that provided green bond reports containing information on the projects funded by the raised proceeds. The green bonds issuances are identified by region of the issuer, sector of the issuer, and most financed project category, and then confronted with the evaluation of the business case for the sustainability of the issuance, adapted from the methodology developed by Epstein & Roy (2003). The business case is the justification for developing the activity or project; what makes it interesting to invest in sustainable initiatives aiming in generating financial returns. To determine if there is perception of business justification, the authors established four possible levels of disclosing social and environmental information by companies, explained in Topic 3.3.

Continuing the socioenvironmental value creation analysis, it's investigated the impact of the green bond issuances in respect to the promotion of the SDGs. Here, the reported issuances are identified by the sector of the issuer and the most financed project category, and then confronted with the methodology developed by the (ICMA, 2018a). For each reported issuance, it's identified the subcategory of the most financed asset or activity (as shown in Topic 3.3), and measured the quantity of SGDs that this financed project or activity promotes. For example, a green bond that mostly finances a wind energy project (renewable energy generation) promotes the achievement of 7 SDGs: 3 (good health and well-health), 7 (affordable and clean energy), 8 (decent work and economic growth), 9 (industry, innovation and infrastructure), 11 (sustainable cities and communities), 12 (responsible consumption and production) and 13 (climate action). The most financed project category and subcategory of each issue is available at APPENDIX 1.

Next, some identification variables are confronted between them, aiming to provide information for a broader analysis of the corporate green bonds market. This information can be useful for fixed-income title structurers, issuers, investors and future researches on the green finance field.

3.5 Data Treatment

Initially, hypothesis tests of proportions were performed to assess whether some population proportion is significantly different from the hypothised value (0,01). For example, the test of proportions is executed to evaluate if the proportion of green bond issuers that made available the Green Bond Framework or an External Review Report (conformity with steps 1 to 3 from the GBP), and who reported the allocation of resources and impacts of the project correctly (conformity with step 4 from the GBP), is statistically different than 0,01.

The tests were based on the binomial distribution, since, for each group of issuers, there were only two alternatives: to display a Green Bond Framework or Second Opinion Report or not, and to have reported on the use of proceeds or not. Due to the size and profile of the sample, the approximation for the normal distribution, which would allow the use of the Z statistic for the
tests, was not considered. The critical values were extracted directly from the binomial distribution and the probability function followed the classical model of this distribution, as recorded in Equation 1.

$$P(x) = \frac{n!}{(n-x)!x!} p^{x} q^{n-x}$$
 (Equation 1)

For all hypothesis tests a significance level of 5% was considered. In this first moment, one-way hypothesis tests were performed to verify to what extent it was possible to state that there is a certain minimum proportion. For example, to verify to what extent it was possible to affirm that a certain minimum proportion of Chinese green bond issuers provide the Green Bond Monitoring Report for investors and the general public. The following hypotheses were formulated:

$$H_0: p = 0,01$$

 $H_1: p > 0,01$

In some cases where the initial null hypothesis was rejected, hypotheses were tested with increasing estimative ratios, with null hypotheses increasing at intervals of 5% (p = 5%; p = 10%; ...; p = 95%) until it was no longer rejected, obtaining additional indication of the statistical significance of the relative frequencies.

The second group of tests examined whether the difference among two or more sample proportions (in respect to the GBP conformity analysis; socioenvironmental value creation analysis; and other relevant analysis between identification variables) are significant, or whether they can be attributed to chance (Freund & Williams, 1972). It's tested the null hypothesis that probabilities of an event happening is independent of the green bond issuer's region, green bond issuer's sector or most financed project category that occurred from the issuance. For example, it' tested the null hypothesis of a reported green bond issuance presenting up to the Level 1, 2, 3 or 4 of disclosing social and environmental information is independent of its issuer being from Europe, North America, China, Asia, Oceania, or Latin America and Africa. So, the following hypothesis were formulated, considering a significance level of 5%:

$$H_0: p_1 = p_2 = p_3 = p_n$$

 $\mathit{H}_1: \mathit{p}_1 \, , \mathit{p}_2 \, , \mathit{p}_3 \, and \, \mathit{p}_n \, are \, not \, equal$

To test the null hypothesis that the p's are all equal, we compare the frequencies which were actually observed with the frequencies we would expect if the null hypothesis were true. Using the letter *O* for the observed frequencies and the letter *E* for the expected frequencies we base their comparison on their usual chi-square statistic (Freund & Williams, 1972):

$$\chi^2 = \sum \frac{(o-e)^2}{e}$$
 (Equation 2)

In words, χ^2 is the sum of the quantities obtained by dividing $(o - e)^2$ by *e* separately for each cell of the contingency table. We can find the expected frequency for any cell of a contingency table by multiplying the total of the column to which it belongs by the total of the row which it belongs and then dividing by the grand total for the whole table (Freund & Williams, 1972). On the present work, each cell on the contingency table is presented with the observed values, proportion within the observed values, and expected values.

We reject the null hypothesis of independence at the level of significance 5% if the value obtained for χ^2 exceeds the value of χ^2_{α} for (r-1)(k-1) degrees of freedom, where *r* is the number of rows and *k* is the number of columns in the contingency table (Freund & Williams, 1972). Since the χ^2 used has only approximately a chi-squared distribution, it should not be used in cases where any of the expected frequencies are less than 5. Whenever necessary, the tables were reorganized to perform the chi-square test: some cells are combined (when logically viable) or excluded from the analysis, 1 degree of freedom is subtracted from each eliminated row or column, and then the test is performed. The initial tables are available in the Appendixes, while the results discussion on Chapter 4 will only present the adapted contingency table appropriate for the chi-square statistic tests.

As a last stage of the analysis, a selection of qualitative highlights occurred, highlighting aspects of green bond issues that followed the GBP standards and presented, with good quality, relevant information for the connection of sustainable initiatives with value creation. These green bond issuances may serve as an example for corporations, investors and green fixed-income securities structures, contributing to the improvement of activities in the area.

3.6 Limitations

The research method adopted in the present work has limitations, and it is worth highlighting four points:

- 1) Despite the effort to map the relevant documents for this research, as the search for information was based on secondary data of the respective websites of the green bond issuers, it is quite difficult to guarantee the consultation in its entirety, so that some relevant document may not have been considered in the selection. There is also limitation when searching for information on the green bond issuances, as only English, Spanish and Portuguese languages were considered in the search protocol.
- Influence of the researcher's judgment on the examination of green bond reports and respective classification of information in the analysis for socioenvironmental value creation;
- The results of hypothesis tests of proportions should be viewed with caution, as they are based on convenient samples of green bond issuances provided by the consulted databases (Bloomgberg, CBI and ICMA);
- 4) Some categories or variables have a small number of green bond issuances.

4 **Results**

The presentation of the main results of this research was divided into five sections. The first one presented the descriptive statistics of the conformity of mapped green bond issuances in respect to the Green Bond Principles core components. It sought to explore whether the issuances follow the most internationally accepted best practice guidelines in the green bond market. It's also presented the application and results of relevant statistical tests for the analysis and findings of the section.

The second section presented the results on the socioenvironmental and financial value creation analysis in respect to the business case for the sustainability of each reported green bond issuance. It sought to explore whether companies report on green bond issuances as positive for their business, from a value creation perspective. It's also presented the application and results of relevant statistical tests for the analysis and findings of the section.

The third section presented the results on socioenvironmental value creation analysis in respect to the promotion of the Sustainable Development Goals for each reported green bond issuance. It sought to explore the impact of green bond issuances on promoting sustainable development from the perspective of the SDG. It's also presented the application and results of relevant statistical tests for the analysis and findings of the section.

The fourth section presented the results on other relevant analysis for mapping the corporate green bond market, matching different identified variables for the green bond issuances. It's also presented the application and results of relevant statistical tests for the analysis and findings of the section.

The last section presented the qualitative highlights encountered when researching and evaluating the corporate green bond issuances.

4.1 Corporate green bonds market and conformity with the Green Bond Principles

This section is divided in two parts: a descriptive analysis of the issuances separated by the region of the issuer and company sector of the issuer; and statistical tests regarding the descriptive analysis shown.

4.1.1 Descriptive Analysis

The initial analysis consists in checking if the green bond issuances are in alignment with the preissuance and post-issuance GBP core components. The pre-issuance components consist on having information on the use of proceeds, process for evaluation and selection of funded activities, and management of proceeds process transparency. These information are presented on Green Bond Frameworks or External Review reports about the issuance. The post-issuance component consists on reported information on the allocation of resources and socioenvironmental benefits originated by the funded activities. Green bond investors should be able to access the list of projects to which green bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, and their expected impact (ICMA, 2018b). These information are presented on Green Bond Reports, that should be developed within at maximum 1 year from the green bond issuance as also stated by the GBP.

Table 5 shows the conformity with the pre-issuance components from the GBP. The detailed original table can be observed at APPENDIX 3. Due to the low number of green bond issuances in Africa, those are grouped with Latin America issuances in the rest of analysis presented on this work, as both continents present least developed corporate bond markets. Each cell on the descriptive analysis tables are presented with the observed values and proportion within the observed values.

Table 5 – Results for issuances with and without Green Bond Framework criteria: all green bon
issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAm & Africa	Total
Issuance without	13	41	23	3	0	4	84
Framework	0,07	0,31	0,43	0,07	0,00	0,17	0,18
Issuance with	187	91	31	38	17	20	384
Framework	0,94	0,69	0,57	0,93	1,00	0,83	0,82

Total	200	132	54	41	17	24	468
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As it can be seen, Europe and China are responsible for more than 70% of the corporate green bonds market, amounting 332 issuances. From Table 5, it can be deducted that the conformity with the pre-issuance components from the GBP is diffused in a heterogeneous way among the different regions of green bond issuers. While North America shows values of aproximetely only 50% of issuances presenting Green Bond Framework, Europe, Asia and Oceania indicate positive results of more than 90% of issuances being in conformity with the GBP prior to the green bond issuance.

Next, the conformity with the post-issuance core component of the GBP, reporting, is investigated. The results demonstrated that there is still work to be done in this sense as shown in Table 6. Reporting is the fourth core component of the GBP, being relevant in terms of providing transparency regarding the issuance resources' allocation and achieved socioenvironmental and financial benefits with the funded activities.

	Europe	China	North America	Asia	Oceania	LatAm & Africa	Total
Issuance without	66	107	32	18	3	9	235
Report	0,33	0,81	0,59	0,44	0,18	0,38	0,50
Issuance with	134	25	22	23	14	15	233
Report	0,67	0,19	0,41	0,56	0,82	0,63	0,50
Total	200	132	54	41	17	24	468

Table 6 – Results for issuances with and without Green Bond Report criteria: all green bond issues by region of the issuer

A bit less than half of total green bond issuers display accessible annual reporting information on their issuances. Moreover, it is worth noting that some green bond reports do not display the minimum level of information recommended by the GBP. In some cases, just a few funded projects examples are given; in others, the issuer just declare a pool of projects compatible for funding with the raised proceeds, without more detailed information on allocation; and some reports lack on providing socioenvironmental performance measures. Overall, the results suggest lack of transparency by corporate issuers once the financial amounts are obtained through a green bond issuance. The information on majority of issuances are not updated, leaving stakeholders unaware of any socioenvironmental and financial benefits arising from the activities funded by the green bond issue raised proceeds. This lack of transparency allows stakeholders to raise suspicions about how the raised proceeds are being used by the company. Without up to date evident information, it can be inferred that majority of corporate green bonds might be being used as a greenwashing tool.

Table 5 and Table 6 indicate that Europe is leading the efforts on promoting the corporate green bond market. The issuances from the continent indicate better performance on full conformity with the GBP guidelines, respecting the four core components for this fixed-income instrument. In this aspect, European issuances' quality just lack behind Oceania issuances. It is worth noting that Oceania is represented by Australia and New Zealand, the only countries with corporate green bond issuers in the region.

The second most active corporate green bond market region, China, presented relative reporting levels lower than 20%. These low figures may be a consequence of many Chinese green bond issuers not publishing information in English, making it difficult to find the documents or any information on the issuances without common knowledge of the Chinese idiom. This also implies that majority of the countries' issuances aim for the domestic market and national investors, without bothering to provide information for the international community. These Chinese issuances can also be possibly following national green bond guidelines, with best practices that differ from the GBP.

North America (excluding Mexico), here represented by the most developed financial market and world leader in corporate bond issuances, the United States of America (USA), and Canada issuances, show the worst performance in respect to compliance with the GBP prior the green bond issuance. Not much information can be found on the activities or projects that the proceeds are to be allocated. After the issuance, less than half green bond issuers from the region bothered with reporting on public information for investors and stakeholders in general. During the search for documents about the USA green bond issuances, no information was found about some of the securities being declared as a green bond. This suggest that, although classified as a green bond by some data providers consulted to build the database on the present survey, the company

who issued the fixed-income security did not declare it as green, not following any of the steps instructed in the GBP guidelines.

Although Asia (excluding China) issuers presented performance levels higher than 90% in respect to providing Green Bond Framework prior to the green bond issuance, the figures drops significantly when analyzing the provision of reported information. These values suggest that, once Asian companies issue and raise funds with the debt instrument, they do not care on keeping up to date information on proceeds allocation and provide socioenvironmental performance data for investors and other stakeholders.

Latin America and Africa, although being least developed financial markets, are also taking part in the corporate green bond market. Even though representing just a bit more than 5% of the market, Table 6 suggest that the proportion of the regions' issuers that are in conformity with the reporting principle of the GBP is equivalent to the performance encountered in Europe, global corporate green bond leaders. Nevertheless, some of the Green Bond Frameworks and Reports were only encountered in Spanish or Portuguese. This fact points out a limitation for international investors and stakeholders when looking for information about these issuances if they do not have knowledge on the idioms.

At a second moment, a similar descriptive analysis was performed identifying the corporate green bond issuers by sector. Table 7 shows the conformity with the pre-issuance components from the GBP. The detailed original table can be observed at APPENDIX 4. A clustering was performed among sectors due to the low number of green bond issues in some of them. Energy sector issuers are grouped with Utilities, as majority of companies from our sample included in these categories are from power generation or electricity transmission. Industrials, Materials and Consumer Staples issuers are grouped together as they relate to heavier production sectors. And Consumer Discretionary, Technology, Communications and Health Care (identified as "Others") sectors are grouped together as they are less present in the corporate green bond market, totaling 9 issuances, and can are more related to services and possible Research and Development (R&D) activities. This same grouping logic is considered in every subsequent sector issuers' analysis presented on this work.

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Issuances without	26	42	14	2	84
Framework	0,12	0,24	0,27	0,07	0,18
Issuance with	192	130	37	25	384
Framework	0,88	0,76	0,73	0,93	0,82
Total	218	172	51	27	468

Table 7 - Results for issuances with and without Green Bond Framework criteria: all green bond issues by sector of the issuer

As Table 7 shows, the Financials and Utilities & Energy sector are responsible for vast majority of corporate green bond issues, representing more than 80% of market, amounting 390 issuances. It can be deducted that the conformity with the pre-issuance components from the GBP is proportionally similar between Financials and Others sectors, with around 90% of conformity, and within Utilities & Energy and Industrials, Materials & Consumer Staples sectors, suggesting around 75% of conformity.

Next, the alignment with the post-issuance core component of the GBP, reporting, is investigated. The results are presented on Table 8.

Table 8 - Results for issuances with and without Green Bond Report criteria: all green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Issuances without	83	108	35	9	235
Issuance with	135	64	16	18	233
Report	0,62	0,37	0,31	0,67	0,50
Total	218	172	51	27	468

As in the pre-issuance conformity results, Table 8 suggests that the conformity with the postissuance components from the GBP is proportionally similar between Financials and Others sectors, with around 65% of conformity, and within Utilities & Energy and Industrials, Materials & Consumer Staples sectors, indicating around only 35% of conformity.

The Financials sector is positively taking the lead on promoting the corporate green bonds market, in both number of issues and quality of its issuances in respect to following the GBP guidelines.

This suggests that financial institutions, such as banks, financial service providers, insurance and real estate companies demonstrate some expertise on providing relevant up to date financial and socioenvironmental information for stakeholders and investors.

Oppositely, a negative outcome accrued from the results found in the Utilities & Energy and Industrials, Materials & Consumer Staples sectors. Although being core sectors for global achievement of the Sustainable Development Goals and the Paris Agreement targets, corporations within these sectors lack on showing transparency regarding the use of proceeds and measurement of financial and socioenvironmental benefits from its activities. As sectors that directly make use of natural resources in the core of its activities, providing quantified environmental information such as the volume of greenhouse gas emission avoided, or tons of waste avoided, should be simple and almost mandatory for Utilities, Energy and Materials companies. This kind of information is relevant for investors evaluating the ESG and financial performance of these companies. Therefore, our results suggest that more transparency is required on relevant data openly provided by companies of these sectors to investors and stakeholders.

4.1.2 Statistical Tests

As a complementary procedure, given the descriptive statistics shown, tests of hypotheses of proportions were performed to verify the statistical significance of the proportions identified at a significance level of 5%. Initially the tests were performed to verify if it would be possible to infer on the proportions of the green bond issuances investigated, in each class, which complied with the GBP core principles prior and post-green bond issuance. The following hypothesis were considered:

 $H_0: p = estimative$ $H_1: p > estimative$

Due to the expected rejection of the initial null hypothesis (H0: p = 0,01) as a function of the relative frequencies observed, new tests were performed increasing null hypotheses at intervals of 5% (p = 5%; p = 10%; ...; p = 95%), until identified the lowest frequency for which the null hypothesis was not rejected. The detail of these tests can be seen in APPENDIX 5, APPENDIX 6,

APPENDIX 7, and APPENDIX 8. The summary tables with the values of the minimum proportions related to the alignment with the GBP prior to the green bond issuance, and to the alignment a year after the issuance that did not reject the null hypothesis are found in Table 9 & Table 11, and Table 10 & Table 12, respectively.

Table 9 – Minimum proportions that didn't reject the null hypothesis of issuing a Green Bond Framework: all green bond issues by region of issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Null Hypothesis (p =)	0,90	0,70	0,50	0,85	0,85	0,70	0,80
p-value	0,057	0,645	0,170	0,118	0,063	0,111	0,146

Table 10 - Minimum proportions that didn't reject the null hypothesis of issuing a Green Bond Report: all green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Null Hypothesis (p =)	0,65	0,15	0,30	0,45	0,65	0,45	0,50
p-value	0,304	0,127	0,061	0,102	0,103	0,065	0,555

Table 11 - Minimum proportions that didn't reject the null hypothesis of issuing a Green Bond Framework: all green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	CD, Tech., Com. & HC	Total
Null Hypothesis (p =)	0,85	0,70	0,65	0,80	0,80
p-value	0,118	0,063	0,163	0,072	0,146

Table 12 - Minimum proportions that didn't reject the null hypothesis of issuing a Green Bond Report: all green bond issues by sector of the issuer

Financials	Utilities & Energy	Industrials, Mat. & CS	CD, Tech., Com. & HC	Total
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Null Hypothesis (p =)	0,60	0,35	0,25	0,50	0,50
p-value	0,306	0,297	0,185	0,061	0,555

The differences observed between the minimum ratios of non-rejection in respect to issuances presenting Green Bond Framework and presenting Green Bond Reports reinforced the interest in the results of the differences of proportions tests, performed with the Chi-square statistics method considering a significance of 5%. The following hypotheses are considered:

$$H_0: p_1 = p_2 = p_n$$

 $H_1: p_1$, p_2 and p_n are not equal

The cells in the contingency tables are presented with the observed values, proportion within the observed values, and expected values. Table 13 present the contingency table for the Chi-square tests regarding the elaboration of Green Bond Framework among green bond issuances by region.

Table 13 – Contingency table for issuances	with and without	Green Bond Fra	mework: all green
bond issues by region			

	Europe	China	North America	Others	Total
locuanco without	13	41	23	7	84
Eramowork	0,07	0,31	0,57	0,09	0,18
Framework	35,90	(23,69)	(9,69)	(14,72)	(84)
locuanco with	187	91	31	75	384
Framowork	0,94	0,69	0,43	0,91	0,82
Framework	(164,10)	(108,31)	(44,31)	(67,28)	(384)
Total	200	132	54	82	468

With a resulting p-value of 0,000, the null hypothesis is rejected, implying that there is a dependence on the issuer's region and it's alignment with the GBP prior to the green bond issuance. The same test was performed to investigate the dependence on elaboration of Green Bond Report and the region of the green bond issuer, as shown in Table 14. The initial contigency table built for this analysis is available at APPENDIX 9. With a resulting p-value of 0,258, the null hypothesis is not reject, implying that alignment with the GBP post-issuance, or reporting post the green bond issuer, being from Europe, Asia, Oceania or Latin America & Africa.

	Europe	Asia	Oceania	LatAM & Africa	Total
Issuance	66 0,33	18 0,44	3 0,18	9 0,38	96
without Report	(68,09)	(13,96)	(5,79)	(8,17)	0,34
Issuance with Report	134	23	14	15	186
	0,67	0,56	0,82	0,63	0.66
	(131,91)	(27,04)	(11,21)	(15,83)	0,00
Total	200	41	17	24	282

Table 14 - Contingency table for issuances with and without Green Bond Report: all green bond issues by region of the issuer

Next, the same analysis using the same Chi-square statistics method was performed identifying green bond issuers by sector of the company. Table 15 present the contingency table for issuances with and without Green Bond Framework, while Table 16 present the contingency table for issuances with and without Green Bond Report (the initial contigency table constructed for this analysis is available at APPENDIX 10). In both cases the null hypothesis is rejected (p-values of 0,002 and 0,006, respectively), suggesting that there is a dependence between the sectors of the issuances and the alignment with the GBP pre- and post-green bond issuance.

Table 15 - Contingency table for issuances with and without Green Bond Framework: all gree	'n
bond issues by sector of the issuer	

	Financials	Utilities & Energy	Industrials, Mat. & CS	Total
Issuances without Framework	26 0,12 (40,54)	42 0,24 (31,98)	14 0,27 (9,48)	82 0,19
lssuance with Framework	192 0,88 (177,46)	130 0,76 (140,02)	37 0,73 (41,52)	359 0,81
Total	218	172	51	441

Table 16 - Contingency table for issuances with and without Green Bond Report: all green bond issues by sector of the issuer

	Utilities & Energy	Industrials, Mat. & CS	Others	Total
laguanaaa	108	35	9	150
without Report	0,63	0,69	0,33	152
	(104,58)	(31,01)	(16,42)	0,61

Issuance with Report	64 0,37 (67,42)	16 0,31 (19,99)	18 0,67 (10,58)	98 0,39
Total	172	51	27	250

4.2 Business case for sustainability of the issuance

This section is divided in two parts: a descriptive analysis for the socioenvironmental and financial value creation as demonstrated by the business case for sustainability of the issuances, separated by the region of the issuer, sector of the issuer, and main financed project category; and statistical tests regarding the descriptive analysis shown.

4.2.1 Descriptive Analysis

In this part of the work, only reported green bond issuances are considered in the analysis, as it is required to explore the Green Bond Reports to evaluate the issue in respect to the Epstein & Roy (2003) business case for sustainability-adapted methodology. The initial analysis is performed identifying issuers by region, as shown on Table 17.

Table 17 – Results for the business case for sustainability criteria: reported green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Up to Level 1: Monetary Expenditures	16 0,12	4 0,16	13 0,59	8 0,35	3 0,21	2 0,13	46 0,20
Up to Level 2: Qualitative Non- financial Impacts	22 0,16	3 0,12	2 0,09	3 0,13	1 0,07	1 0,07	32 0,14
Up to Level 3: Quantitative Non- financial Impacts	92 0,69	18 0,72	6 0,27	12 0,52	10 0,71	10 0,67	148 0,64
Up to Level 4: Quantitative Financial Impact	4 0,03	0 0,00	1 0,05	0 0,00	0 0,00	2 0,13	7 0,03
Total	134	25	22	23	14	15	233

The availability of monetized information on expenditures (hereafter Level 1) is present in all Green Bond Reports. This indicate that every green bond issuer that presented up to date report

on the issuance at least disclosed information on the use of proceeds. As an example for this case, Hitachi Capital Management (China) Limited issued its green bond update report in 2018, declaring that USD 30.000.000 was spent with Sustainable Water Use projects, USD 50.000.000 with Renewable Energy projects, and USD 35.000.000 with Circular Economy projects, without any further details. As shown on Table 17, approximately 20% of issuers presented just this basic level of information. Around 60% of green bond issuers from North America just disclosed information on proceeds allocation, without any mention to environmental or social value creation arising from the green bond issuance.

The 2nd level of information relate to the presentation of qualitative information regarding the socioenvironmental benefits of the activities financed by the green bond issue proceeds. Power Finance Corp Ltd issued its Green Bond Impact Report on their Green Bond Issuance from 2017, declaring that the proceeds were allocated in a portfolio of 23 solar projects and 4 wind projects. They then reported descriptive environmental benefits information, without further details: "these solar and wind projects have a significant impact on reduction in emissions of other pollutants as well as CO₂, SO₂, and NO_x". Although not enough to be in full alignment with the GBP recommendations on reporting, it is a step above than just informing on CAPEX (resources expenditure). Reporting only on qualitative information is not a common practice in the corporate green bond market, what indicate that when aiming for impact reporting, companies usually put some effort in providing quantitative information based on socioenvironmental performance metrics.

Information provided up to Level 3 consists on taking in consideration the presentation of nonfinancial quantitative information. In respect to best practices on the green bond market, this the minimum level of information required from green bond issuers, as recommended by the GBP. Issuers of green bonds should report at least annually on the specific investments made from the green bond proceeds (Level 1) and document the environmental impacts of the specific investments (Level 3) (ICMA, 2018b). In 2017, Landesbank Baden-Wuerttemberg issued its Green Bond Report, declaring the allocation of 100% of the green bonds issued amount to their Green Buildings portfolio. Additionally, they published quantified environmental benefits due to these investments on their Green Building's portfolio, such as 175.131 MWh in annual energy savings, and 30.555 tCO₂ in annual GHG emission avoidance.

Results suggest that more than 65% of green bond issuers' present socioenvironmental performance measures. The most common reported metrics are greenhouse gases (GHG) avoided and energy savings. Other identified metrics were number of people powered with renewable energy, tons of recycled waste, volume of pollution prevented, and natural conserved area. Table 17 indicates that apart from North America and Asia issuers, at least 70% of green bond issuers that provided Green Bond Reports in full compliance with the GBP recommendations' on reporting. These results suggest a positive attitude from majority of green bond issuers that reported on its funded activities, independent from the region of the issuer.

Level 4 is the ultimate business case for sustainability practice, in which corporate provide quantitative financial impacts on the issuance for their business. As one of the few examples, FS Italiane Green Bond Report declared the allocation of EUR 549.64 million to New High Speed Trains "ETR 1000", and EUR 49.78 million to New Electric Multiple Unit (EMU) Trains For Regional Passenger Transport. They also provided information on total energy savings (MWh) and total GHG emissions avoided (tCO₂) for each project. Finally, it's presented some financial highlights such as Revenues, EBITDA, Net Income, and competitive advantage information, like comparison with other transport companies on Fare/Km (EUR/km) and frequency of rides (which are suggested to increase with the investments made in higher-speed trains financed by this green bond issuance).

Table 17 suggest that there is still a long way to go in respect of corporations exposing the perception that sustainability can bring economic benefits to its business. Only 7 out of the 233 reported green bond issuances connect sustainability (socioenvironmental value creation) and economic performance (financial value creation). Although just present in less than 5% of bond issues, the perception that sustainability can bring economic benefits by at least a small number of players is an advance that can give rise to its practice and enable more detailed future green bond reporting. The connection between positive socioenvironmental impact and financial returns are the most advanced level on developing the business case for sustainability. It shows investors and stakeholders' overall that investing in activities that promote sustainable

development can result in returns on its investments, in terms of financial value creation, while also promoting the long-term success and sustainability of the business. Surprisingly, the results suggest that in Latin America & Africa, the least developed bond markets, about 10% of green bond issuers presented the most advanced kind of information in respect to the business case for sustainability criteria. However, it is important to notice that the sample for Latin America & Africa companies that reported on its issued green bond is small, totaling only 15 issues.

Next, Table 18 presents this same descriptive analysis identifying the issuances by sector of the issuer.

Table 18 - Results for the bus	iness case for sustainability criteria	a: reported green bond issues by
sector of the issuer		

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	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Up to Level 1: Monetary Expenditures	20 0,15	20 0,31	2 0,13	4 0,22	46 0,20
Up to Level 2: Qualitative Non- financial Impacts	24 0,18	2 0,03	5 0,31	1 0,06	32 0,14
Up to Level 3: Quantitative Non- financial Impacts	90 0,67	37 0,58	9 0,56	12 0,67	148 0,64
Up to Level 4: Quantitative Financial Impact	1 0,01	5 0,08	0 0,00	1 0,06	7 0,03
Total	135	64	16	18	233

From Table 18, one can infer that there is no relevant difference when investigating the issues when they provide only Level 1 (monetary expenditures) or Level 2 (gualitative non-financial impacts) of information, and when provided reported information is at least on Level 3 (quantitative non-financial impacts) of the business case for sustainability. A positive highlight can be given to the Utilities & Energy sector, leading the connection of socioenvironmental value creation to financial returns, with 5 out of the 7 reported green bond issuances that provided quantitative financial impact information for investors and stakeholders.

A last analysis on the business case for sustainability was performed considering each issuance in respect to the most financed project category reported by the issuance, as shown in Table 19. Due to the low number of reported green bond issuances that focused its investments in Waste Management, Water & Wastewater Treatment, or Sustainable Land Use & Agriculture, those are grouped as "Others" in the rest of analysis presented on this work. The detailed original table can be observed at APPENDIX 11.

Table 19 - Results for the business case for sustainability criteria: reported green bond issues by most financed project category

	Energy	Transport	Buildings	Others	Total
Up to Level 1: Monetary	33	4	8	1	46
Expenditures	0,29	0,16	0,10	0,06	0,20
Up to Level 2:	9	0	18	5	32
Qualitative Non- financial Impacts	0,08	0,00	0,23	0,29	0,14
Up to Level 3:	<u> </u>	20	г о	10	140
Quantitative Non-	00	20	52	10	148
financial Impacts	0,55	0,00	0,00	0,35	0,04
Up to Level 4:	4	1	1	1	7
Quantitative Financial Impact	0,04	0,04	0,01	0,06	0,03
Total	112	25	79	17	233

Table 19 suggests that almost half of reported green bond issues dedicated the proceeds to finance Energy projects: mostly renewable energy generation (solar, wind, hydro, geothermal, bioenergy) and smart electricity grid applications, resulting in improved energy performance. Energy projects are essential for the achieving Paris Agreement goals. In addition, they play a big role on boosting sustainable development and encouraging the progress for reaching the SDG's targets. It is good to see green bonds as a financial instrument that directs financial resources towards the expansion of a global cleaner energy matrix.

Table 19 also indicates a strong share of resources being dedicated for buildings projects, to know: certified buildings and resources (energy, water, materials) efficiency. During the exploration of Green Bond Reports, it was noticeable that many green bond issuances from companies in the financial sector (including real estate ones) dedicated its proceeds to fund activities in the buildings category. In fact, many LEED (Leadership in Energy and Environmental Design) certified buildings have been financed from resources raised by green bonds issues from the financial sector.

One last analysis implied from Table 19 is that green bond issuers who financed Transport projects are ahead in terms of reporting about the issuance. As recommended by the GBP, around 85% green bond issuers documented at least quantified environmental impacts of the specific investments on Transport projects, suggesting a high rate of full compliance with the GBP reporting activity.

4.2.2 Statistical Tests

As a complementary procedure, given the descriptive statistics shown, tests of hypotheses of proportions were performed to verify the statistical significance of the proportions identified at a significance level of 5%. The following hypotheses are considered:

$$H_0: p = 0,01$$

 $H_1: p > 0,01$

The results are summarized in Table 20, Table 21, and Table 22, with respective p-value tables available at APPENDIX 12, APPENDIX 13, and APPENDIX 14, respectively:

Table 20 - Results of the statistical tests of proportions for different levels of the business case for sustainability criteria: reported green bond issues by region

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Up to Level 1:							
Monetary	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Expenditures							
Up to Level 2:					Don't	Don't	
Qualitative Non-	Reject H0	Reject H0	Reject H0	Reject H0	Reject HO	Reject HO	Reject H0
financial Impacts						Rejectino	
Up to Level 3:							
Quantitative Non-	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
financial Impacts							
Up to Level 4: Quantitative Financial Impact	Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0	Reject H0	Reject H0

Table 21 - Results of the statistical tests of proportions for different levels of the business case for sustainability criteria: reported green bond issues by sector of the issuer

Financials	Utilities &	Industrials,	Othors	Total
	Energy	Mat. & CS	Others	Total

Up to Level 1: Monetary Expenditures	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Up to Level 2: Qualitative Non- financial Impacts	Reject H0	Don't Reject H0	Reject H0	Don't Reject H0	Reject H0
Up to Level 3: Quantitative Non- financial Impacts	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Up to Level 4: Quantitative Financial Impact	Don't Reject H0	Reject H0	Don't Reject H0	Don't Reject H0	Reject H0

Table 22 - Results of the statistical tests of proportions for different levels of the business case for sustainability criteria: reported green bond issues by most financed project category

	Energy	Transport	Buildings	Others	Total
Up to Level 1: Monetary Expenditures	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0
Up to Level 2: Qualitative Non- financial Impacts	Reject H0	Don't Reject H0	Reject H0	Reject H0	Reject H0
Up to Level 3: Quantitative Non- financial Impacts	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Up to Level 4: Quantitative Financial Impact	Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0	Reject H0

Next, after observing the test of proportions results, it shown to be interest to execute a differences of proportions tests, grouping Levels 1 and 2 (qualitative non-financial impact data at most), and Levels 3 and 4 (at least quantitative non-financial impact data) of reported information for the business case for sustainability. The tests were performed with the Chi-square statistics method based on the contingency tables presented in Table 23, Table 24, and Table 25, at a significance level of 5%. The initial contingency table in respect to issues by region is available at APPENDIX 15. The following hypotheses are considered:

 $H_0: p_1 = p_2 = p_n$ $H_1: p_1$, p_2 and p_n are not equal Table 23 - Contingency table for of the business case for sustainability criteria: reported green bond issues by region of the issuer

	Europe	China	Asia	Total
Up to Level 2 only	38 0,28 (41,23)	7 0,28 (7,69)	11 0,48 (7,08)	56 0,31
At least Level 3	96 0,72 (92,77)	18 0,72 (17,31)	12 0,52 (15,92)	126 0,69
Total	134	25	23	182

As we don't reject the null hypothesis (p-value = 0,166), results from the test of differences of proportions suggest that there is no dependence on the level for the business case for sustainability and the issuer being from Europe, China, or Asia.

Table 24 - Contingency table for of the business case for sustainability criteria: reported green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Up to Level 2 only	44 0,33 (45,19)	22 0,34 (21,42)	7 0,44 (5,36)	5 0,28 (6,03)	78 0,33
At least Level 3	91 0,67 (89,81)	42 0,66 (42,58)	9 0,56 (10,64)	13 0,72 (11,97)	155 0,67
Total	135	64	16	18	233

With a p-value of 0,779, we don't reject the null hypothesis. Therefore, results from the test of differences of proportions suggest that the level for the business case for sustainability is independent from the sector of the issuer.

Table 25 - Contingency table for of the business case for sustainability criteria: reported green bond issues by most financed project category

	Energy	Transport	Buildings	Other	Total
Up to Level 2 only	42 0,38 (37,49)	4 0,16 (8,37)	26 0,33 (26,45)	6 0,35 (5,69)	78 0,33
At least Level 3	70 0,63 (74,51)	21 0,84 (16,63)	53 0,67 (52,55)	11 0,65 (11,31)	155 0,67

Once again, the null hypothesis is not rejected, as p-value = 0,233. Results from the test of differences of proportions suggest that the level for the business case for sustainability shown on green bond reports is independent from the financed activity category.

4.3 Promotion of Sustainable Development Goals

This section is divided in two parts: a descriptive analysis for the socioenvironmental value creation of the issuances through the promotion of the SDG, separated by the sector of the issuer, and main financed project category; and statistical tests regarding the descriptive analysis shown.

4.3.1 Descriptive Analysis

In this part of the work, only reported green bond issuances are considered in the analysis, as it is required to explore the Green Bond Reports to evaluate the issue in respect to the quantity of promoted SDG. In respect to our methodology, adapted from (ICMA, 2018a), the maximum value of SDG that a green bond issue promotes is 10 SDG. The initial analysis is performed identifying green bond issuers by sector, as shown in Table 26. Results suggest that, when used correctly and transparently, green bonds show off as a good financial instrument to redirect investments to activities that enhance global sustainable development. In more than half of reported green bond issuers at least 4 SDG have been promoted. The Utilities & Energy sector features more than 85% of issuances promoting at least 6 SDG. The vast majority of green bond issuances from this sector use the proceeds to fund renewable energy projects, which are linked to the promotion of 7 SDG. In respect to the promotion of more than 7 SDG, just 5, or 2% of reported green bond issues reaches this category. These issues are related to funding Waste to Energy projects (the use of waste to produce clean energy), developed by companies within the Utilities or Industrials sectors.

Table 26 - Results for quantity of promoted SDG criteria: reported green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
1 to 3	84	1	11	17	113
SDGs	0,62	0,02	0,69	0,94	0,48

4 to 5	4	9	3	0	16
SDGs	0,03	0,14	0,19	0,00	0,07
6 to 7	47	50	1	1	99
SDGs	0,35	0,78	0,06	0,06	0,42
8 to 10	0	4	1	0	5
SDGs	0,00	0,06	0,06	0,00	0,02
Total	135	64	16	18	233

Next, the analysis is performed identifying green bond issuers by main financed project category, as presented in Table 27 bellow.

Table 27 - Results for quantity of promoted SDG criteria: reported green bond issues by most financed project category

	Energy	Transport	Buildings	Others	Total
1 to 3	0	25	79	9	113
SDGs	0,00	1,00	1,00	0,53	0,48
4 to 5	16	0	0	0	16
SDGs	0,14	0,00	0,00	0,00	0,07
6 to 7	96	0	0	3	99
SDGs	0,86	0,00	0,00	0,18	0,42
8 to 10	0	0	0	5	5
SDGs	0,00	0,00	0,00	0,29	0,02
Total	112	25	79	17	233

Results suggest that financing projects that fall into the energy category leads to the promotion of at least 4 SDG. Energy performance, electricity grid, and district heating/cooling kind of projects are connected to the promotion of 4 SDGs: affordable and clean energy (SDG 7); decent work and economic growth (SDG 8); industry, innovation and infrastructure (SDG 9); and responsible consumption and production (SDG 12). Adding to that, renewable energy generation projects are linked to the promotion of more 3 SDGs, totaling 7 SDG: good health and well-health (SDG 3); sustainable cities and communities (SDG 11); and climate action (SDG 13).

From Table 27 results, it's also inferred that both Transport and Buildings categories projects lead, in a 100% of cases, to the promotion of 1 to 3 SDGs. Transport projects (commonly urban rail and passenger trains) are directly connected to the promotion of 1 SDG: sustainable cities and

communities (SDG 11). In respect to Buildings projects, the most usually financed subcategory is Certified Buildings, linked to the promotion of 2 SDGs: industry, innovation and infrastructure (SDG 9); and sustainable cities and communities (SDG 11).

As Table 27 indicates, there is one kind of project within "Others" category that promote 10 out of the 17 SDGs. Those are Waste to Energy projects, which can be financed by green bonds issuers that redirect resources to Waste Management activities.

4.3.2 Statistical Tests

Once again, as a complementary procedure, given the descriptive statistics shown, tests of hypotheses of proportions were performed to verify the statistical significance of the proportions identified at a significance level of 5%. The following hypotheses are considered:

$$H_0: p = 0,01$$

 $H_1: p > 0,01$

The test results are summarized in Table 28 and Table 29, with p-values tables available respectively at APPENDIX 16 and APPENDIX 17.

Table 28 - Results of the statistical tests of proportions for quantity of promoted SDG criteria: reported green bond issues by sector

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
1 to 3 SDGs	Reject H0	Don't Reject H0	Reject H0	Reject H0	Reject H0
4 to 5 SDGs	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0
6 to 7 SDGs	Reject H0	Reject H0	Don't Reject H0	Don't Reject H0	Reject H0
8 to 10 SDGs	Don't Reject H0	Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0

Table 29 - Results of the statistical tests of proportions for quantity of promoted SDG criteria: reported green bond issues by most financed project category

Energy Transport Buildings Others Total

1 to 3 SDGs	Do not reject H0	Reject H0	Reject H0	Reject H0	Reject H0
4 to 5 SDGs	Reject H0	Do not reject H0	Do not reject H0	Do not reject H0	Reject H0
6 to 7 SDGs	Reject H0	Do not reject H0	Do not reject H0	Reject H0	Reject H0
8 to 10 SDGs	Do not reject H0	Do not reject H0	Do not reject H0		Do not reject H0

4.4 Other relevant analysis

The proposal of this section is to investigate some identification variables, providing relevant information regarding the corporate green bond market. This section is divided in two parts. The first one consists of descriptive analysis for:

- Bond rating, identifying the issue by region of the issuer (considering both all issues and only reported green bonds);
- Currency of the issue, identifying the green bond by region of the issuer (considering all issues);
- Green bond maturity, identifying the issue by sector of the issuer (considering all issues);
- Green bond maturity, identifying the issue by most financed project category (considering only reported green bonds);
- Most financed project category, identifying the green bond issue by sector of the issuer (considering only reported bonds)

The second part exhibit suitable statistical tests regarding the descriptive analysis presented at 4.4.1.

4.4.1 Descriptive Analysis

At first, it was analyzed the rating assigned to the corporate green bonds by the major private credit rating agencies: Standard & Poor's, Moody's Investors Service, and Fitch Ratings Inc. These companies evaluate a bond issuer's financial strength, or its ability to pay a bond's principal and interest, in a timely fashion. It's important to notice that the sovereign ceiling may impose a limit

to the corporate green bond rating, as the highest rating that a bond can have is generally dictated by the country rating where the issuer is situated

The proposal of this task is to investigate the credit quality that green bonds (by region of the issuer) signal to investors and to the international market, while also taking in consideration the green bond issues alignment to the GBP principles. Table 30 and Table 31 summarize the findings.

Table 30 - Results for bond assigned rating criteria: all green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade	125	110	28	26	3	18	310
or not rated	0,63	0,83	0,52	0,63	0,18	0,75	0,66
All other investment grade	55	15	15	12	5	6	108
	0,28	0,11	0,28	0,29	0,29	0,25	0,23
Superior	20	7	11	3	9	0	50
	0,10	0,05	0,20	0,07	0,53	0,00	0,11
Total	200	132	54	41	17	24	468

Table 31 -	 Results f 	or assigned	rating criteria	: reported	green bond	issues by	v region	of the issuer
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	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade	67	3	1	11	2	12	96
or not rated	0,50	0,12	0,05	0,48	0,14	0,80	0,41
All other investment grade	50	15	12	10	4	3	94
	0,37	0,60	0,55	0,43	0,29	0,20	0,40
Superior	17	7	9	2	8	0	43
	0,13	0,28	0,41	0,09	0,57	0,00	0,18
Total	134	25	22	23	14	15	233

An interest outcome suggested from Table 30 and Table 31 analysis is that, from the 158 green bonds that were assigned an investment grade by the time of the issuance, more than 85% stayed in conformity with the GBP and developed a Green Bond Report post-issuance. For investors that are looking for transparency and up to date information on the use of proceeds and socioenvironmental benefits of the financed activities, investing in well-rated fixed-income titles might may favor these circumstances. Results also point that in Oceania, more than 80% of issued green bonds from Australia and New Zealand receive an investment recommendation rate. Another observed fact is that in China, Asia and Latin America & Africa, green bonds are not commonly rated by the S&P, Moody's and or Fitch, or receive speculative grades by these agencies. At these regions, majority of bonds receive a local rating, indicating that the green bond issuers target investors who understand the domestic market. These findings are strengthened by results shown in Table 32, that indicate that more than 75% of Chinese green bond issues are made in local currency, while in Asia and Latin America & Africa, more than 50% of green bond are issued in currencies other than USD or EUR.

In addition, by observing Table 30Table 31, it's suggested that approximately half of Europe's green bond issues receive investment grades by the global rating agencies S&P, Moody's and or Fitch, showing a propensity to target international investors. The other half is not rated, receive speculative grades, or is rated by local agencies, providing credit quality information for local investors. Similarly, Table 32 indicates that half of Europe's green bonds are issued in EUR or USD, focusing on the international market, while other half are issued in local currencies, such as GBP, NOK, and SEK, targeting domestic markets such as Great Britain, Norway, or Sweden respectively.

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
USD	6	16	48	18	1	9	98
	0,03	0,12	0,89	0,44	0,06	0,38	0,21
EUR	104	5	2	2	3	1	117
	0,52	0,04	0,04	0,05	0,18	0,04	0,25
CNY	0	100	0	0	0	0	100
	0,00	0,76	0,00	0,00	0,00	0,00	0,21
Other	90	11	4	21	13	14	153
	0,45	0,08	0,07	0,51	0,76	0,58	0,33
Total	200	132	54	41	17	24	468

Table 32 - Results for currency of the issue criteria: all green bond issues by region of the	e issuer
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Next, it's investigated the term to maturity of green bonds, depending on the sector of the issuer (considering all green bond issues), and regarding the most financed project category (considering reported bonds). There are 3 broad categories depending on their terms to maturity: short term bonds of less than 4 years, medium term bonds of 4 to less than 10 years, and long term bonds

of equal or more than 10 years. Table 33 and Table 34 present the results for the term to maturity of the issues. Table 35 shows the most financed project category of reported green bonds, taking in consideration the sector of the issuer.

	Financials	Utilities & Energy	Industrials, Mat. & CS	Other	Total
Short Term	82 0,38	18 0,10	8 0,16	5 0,19	113 0,24
Intermediate Term	107 0,49	81 0,47	24 0,47	11 0,41	223 0,48
Long Term	29 0,13	73 0,42	19 0,37	11 0,41	132 0,28
Total	218	172	51	27	468

Table 33 - Results for term to maturity of the issue criteria: all green bond issues by sector of the issuer

Table 34 - Results for term to maturity of the issue criteria: reported green bond issues by most financed project category

	Energy	Transport	Buildings	Other	Total
Short Term	5	9	23	1	38
	0,04	0,36	0,29	0,06	0,16
Intermediate	64	9	47	8	128
Term	0,57	0,36	0,59	0,47	0,55
Long Term	43	7	9	8	67
	0,38	0,28	0,11	0,47	0,29
Total	112	25	79	17	233

Table 35 – Results for most financed project category criteria: reported green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Energy	50	58	3	1	112
	0,37	0,91	0,19	0,06	0,48
Transport	11	0	1	13	25
	0,08	0,00	0,06	0,72	0,11

Buildings	73	0	2	4	79
	0,54	0,00	0,13	0,22	0,34
Others	1	6	10	0	17
	0,01	0,09	0,63	0,00	0,07
Total	135	64	16	18	233

As Table 33 suggest, apart from the Financial sector, majority of green bond issues term to maturity stands in the intermediate or long term maturity ranges. This can be explained by the nature of investments related to the activities the green bond finances. For example, in general, Utilities & Energy sector issuers dedicate most of the raised proceeds for renewable energy projects, as expressed in Table 35. These projects fit with intermediate to long term bonds, as they have a profile of demanding high initial investments (CAPEX) and medium to long-term returns. Indeed, Table 34 indicates that over 95% of green bonds that finance Energy projects are structured with intermediate to long-term maturity.

In the other hand, the financial sector hardly issues long-term maturity green bonds, as suggested by Table 33. Companies in the sector use the proceeds to finance a range of different type projects, with some emphasis on certified buildings, as shown in Table 35. As suggested by Table 34, Buildings projects fits well with short to intermediate term maturity issued more frequently by financial sector companies.

4.4.2 Statistical Tests

Once again, as a complementary procedure, given the descriptive statistics shown, tests of hypotheses of proportions were initially performed to verify the statistical significance of the proportions identified at a significance level of 5%. The following hypotheses are considered:

$$H_0: p = 0,01$$

 $H_1: p > 0,01$

The test results are summarized in Table 36, Table 37, Table 38, Table 39, Table 40, and Table 41, with p-values tables available respectively at APPENDIX 18, APPENDIX 19, APPENDIX 20, APPENDIX 21, APPENDIX 22, APPENDIX 23.

Table 36 - Results of the statistical tests of proportions for bond assigned rating criteria: all green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
All other investment grade	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Superior	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0

Table 37 - Results of the statistical tests of proportions for bond assigned rating criteria: reported green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	Reject H0	Reject H0	Don't Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
All other investment grade	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Superior	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0

Table 38 - Results of the statistical tests of proportions for currency of the issue criteria: all green bond issues by region of the issuer

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
USD	Reject H0	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0	Reject H0
EUR	Reject H0	Reject H0	Don't Reject H0	Don't Reject H0	Reject H0	Don't Reject H0	Reject H0
CNY	Don't Reject H0	Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0	Don't Reject H0	Reject H0
Other	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0

Table 39 - Results of the statistical tests of proportions for term to maturity of the issue criteria: all green bond issues by most financed project category

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Short Term	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Intermediate Term	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Long Term	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0

Table 40 - Results of the statistical tests of proportions for term to maturity of the issue criteria: reported green bond issues by sector of the issuer

	Energy	Transport	Buildings	Others	Total
Short Term	Reject H0	Reject H0	Reject H0	Do not reject H0	Reject H0
Intermediate Term	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0
Long Term	Reject H0	Reject H0	Reject H0	Reject H0	Reject H0

Table 41 - Results of the statistical tests of proportions for most financed project category criteria: reported green bond issues by sector of the issuer

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Energy	Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0
Transport	Reject H0	Don't Reject H0	Don't Reject H0	Reject H0	Reject H0
Buildings	Reject H0	Don't Reject H0	Reject H0	Reject H0	Reject H0
Others	Don't Reject H0	Reject H0	Reject H0	Don't Reject H0	Reject H0

After observing the results for the test of proportions and identifying the similarities in proportions among some groups, it became interest to perform the differences of proportions

tests for bond ratings, currency of issue and term to maturity analysis. Proper grouping adjustments were done for constructing the contingency tables. The tests were performed with the Chi-square statistics method based on the contingency tables presented in Table 42, Table 43, Table 44, Table 45, and Table 46, at a significance level of 5%. Initial contingency tables are available, respectively, at APPENDIX 24, APPENDIX 25, APPENDIX 26 and APPENDIX 27. Table 46 is already the initial contingency table for the term to maturity of the issue criteria considering reported green bond issues by most financed project category. The following hypotheses are considered:

$$H_0: p_1 = p_2 = p_n$$

$$H_1: p_1$$
, p_2 and p_n are not equal

Table 42 - Contingency table for the bond assigned rating criteria: all green bond issues by region of the issuer

	Europe	North America	Asia	LatAM & Africa	Total
Speculative grade	125	28	26	18	197
or not rated	0,63 (123 51)	0,52 (33 35)	0,63 (25 32)	0,75 (14 82)	0,62
All	75	26	15	6	1 7 7
grade	0,38	0,48	0,37	0,25	0,38
-	(76,49)	(20,65)	(15,68)	(9,18)	-
Total	200	54	41	24	319

Table 43 - Contingency table for the bond assigned rating criteria: reported green bond issues by region of the issuer

	Europe	Asia	Total
Speculative grade or not rated	67 0,50 (66,57)	11 0,48 (11,43)	78 0,50
All investment grade	67 0,50 (67,43)	12 0,52 (11,57)	79 0,50
Total	134	23	157

With a p-value of 0,249 and rejection of the null hypothesis, results from the test of differences of proportions for all green bond issuers (Table 42) suggest that bond ratings (speculative or not

rated, or all investment grades) are independent from the issuer being from Europe, North America, Asia, or Latin America & Africa. However, when considering only reported green bonds, this relation of independence between bond ratings and region of the issuer just occur when the green bond issuance originates from a Europe or Asia region company. The test of difference of proportions from Table 43 indicated a p-value of 0,847, and consequently, the null hypothesis is not rejected.

Table 44 - Contingency table for the currency of the issue criteria: all green bond issues by region of the issuer

	Europe	Asia	LatAM & Africa	Total
USD / EUR	110 0,55 (105,66)	20 0,49 (21,66)	10 0,42 (12,68)	140 0,53
Other	90 0,45 (94,34)	21 0,51 (19,34)	14 0,58 (11,32)	125 0,47
Total	200	41	24	265

From Table 44 examination, we reject the null hypothesis, with a resulting p-value of 0,397. The results from the test of proportions in respect to the currency of issue suggest that the currency (USD or EUR, or Other) is independent from the issuer being from Europe, Asia, or Latin America & Africa. We reject the null hypothesis, with a resulting p-value of 0,397.

Table 45 - Contingency table for the term to maturity of the issue criteria: all green bond issues by sector of the issuer

	Utilities & Energy	Industrials, Mat. & CS	Total
Short Term	18 0,10 (20,05)	8 0,16 (5,95)	26 0,12
Intermediate Term	81 0,47 (80,99)	24 0,47 (24,01)	105 0,47
Long Term	73 0,42 (70,96)	19 0,37 (21,04)	92 0,41
Total	172	51	223

Result from the test of proportions from Table 45 indicate the rejection of the null hypothesis (p-value = 0,397). This suggests that the term to maturity is independent from the issuer's sector being Utilities & Energy or Industrials, Materials & Consumer Staples.

Table 46 - Contingency table for term to maturity of the issue criteria: reported green bond issues by most financed project category

	Transport	Buildings	Total
Short Term	9 0,36 (7,69)	23 0,29 (24,31)	32 0,31
Intermediate Term	9 0,36 (13,46)	47 0,59 (42,54)	56 0,54
Long Term	7 0,28 (3,85)	9 0,11 (12,15)	16 0,15
Total	25	79	104

Result from the test of proportions from Table 46 indicate the rejection of the null hypothesis (p-value = 0,059). This suggests that the term to maturity of reported green bonds is slightly independent from the issuers' financing a transport or building's category of activity.

4.5 Qualitative Highlights

This section was incorporated into the study to highlight green bond issuers that presented relevant and clear information about the allocation of proceeds, socioenvironmental benefits from the funded activities, and some connection between sustainability and corporate financial performance. These examples may inspire other companies to do so, or serve as a basis for those who are not yet complying at best with the GBP and being transparent enough for investors and stakeholders overall approach or even present such information.

Table 47 presents a selection of 3 companies that satisfactorily presented clear reported information on their green bond issues, giving investors' the perception between sustainability and value generation and protection.

Green Bond Issuer	Country	Region	Bond Rating	Report Reference	Reported Activities Detail	Reported Level of Information	Reported Metrics
MTR	нк	China	Prime	MTR Green Bond Report 2017	A - project by project	Quantitative Non- financial Information	GHG Avoided and Energy Savings
Electricite de France	FR	Europe	Upper Medium Grade	EDF Green Bonds Investor presentation 2018	B- project portfolio	Quantitative Financial Information	GHG Avoided
Suzano	BR	Latin America & Africa	Non- investment grade speculative	Relatório 2018 Suzano S.A.: Declaração de Uso de Recursos	A - project by project	Quantitative Non- financial Information	GHG Avoided, Energy Savings, Pollution Prevented, and Conserved Area

Table 47 – Green	bond issuers	qualitative	highlights
	50110 1550015	quantative	111611161103

1) MTR

MTR Corporation is a recurrent green bond issuer from Hong Kong, responsible for 6 corporate green bond issues from 2016 until 2017. It reports a summary of its full portfolio of projects funded by green bond proceeds, including:

- Name of project
- Project classification: low carbon transport, energy efficiency, or biodiversity preservation
- Total project amount, in HK\$
- Cost incurred up to the date of publication of the Green Bond Report, in HK\$
- Amount financed by the green bond proceeds, in HK\$

At the same page of the portfolio summary, the company discloses a table detailing on how each issued green bond proceeds were allocated to the different projects.

At their Green Bond Report Appendix, it's possible to find detailed information on each project, such as

- Total invested amount, in HK\$
- Investment amount funded by green bonds, in HK\$
- Category of eligible investment: low carbon transport, energy efficiency, or biodiversity preservation
- Description of the investment, with precise information on the project's benefits for the company and society

 Beneficial environmental impact estimate: qualitative socioenvironmental impact information, and quantitative socioenvironmental performance metrics, such as tones of CO₂ emissions avoided per year, and kWh of energy saved annually

Finally, they also disclose the methodologies for estimating environmental benefits for each project on their green bond portfolio. The 2017 MTR's Bond Report is available at ANNEX C.

2) Electricite de France

EDF, a French utilities company, has issued 3 corporate green bonds from 2014 until 2017. They provide information on the portfolio of projects funded by each green bond issue, but not detailing each of them separately.

Quantitative socioenvironmental performance indicative is provided, expressing avoided CO₂ emissions in Mt/year. More interestingly, EDF also disclose information on the company's financial performance:

- Sales
- Earnings before interest, taxes, depreciation and amortization (EBITDA)
- Net income excluding non-recurring items
- Net investments
- Net financial debt

They inform on the company's objectives for 2030, bridging a connection between the activities financed by green bonds and the financial returns. In addition, an interesting feature from the report disclosed in their investor's presentation is showing the evolution of the company's green bond reporting. EDF asks for feedback from investors' since their first green bond issuance. With that, they have been constantly improving on the quality of information provided in their Green Bond Reports.

3) Suzano

Suzano is a Brazilian Forest & Paper Products Manufacturing company, that has issued 3 green bonds from 2016 until 2017. On their Green Bond Report, Suzano let it clear that the issuance of
their green bonds followed the Green Bond Principles (GBP) created by the International Capital Markets Association (ICMA).

They also let available the eligibility criteria used for redirecting raised proceeds for a particular activity. Reinforcing the compliance to the GBP, they also inform that the investment decisions were made according to the eligibility criteria, and then analyzed and approved by an international consultancy firm.

Suzano provide detailed information on each funded project, such as CAPEX expenditure (in BRL), location, executed activities within the project, and many quantitative socioenvironmental performance data. A few indicatives are:

- Carbon stock in planted areas, in tCO₂
- Total area with restoration in progress, in hectares
- Treated water quality measured as Chemical Oxygen Demand Reduction, in mg/L
- Water saved, reduced or reused, in m³
- Reduced energy consumption, in kWh/year
- Avoided tCO₂ emission, in tCO₂

Finally, annexed to Suzano's Green Bond Report, is also provided a Report of External Auditors, granting more credibility to the information provided by the company regarding the use of resources and the socioenvironmental impact attributed to each project funded by the green bond issues.

4.6 Summary of Results

It was verified a strong predominance of corporate green bond issuers from Europe and China, while there is less participation from the rest of Asia, Latin America and Africa, regions in more urgent needs of investments for sustainable development. Another relevant verified fact is the predominance of the Financials and Utilities & Energy sectors in the corporate green bond market, as well as a larger allocation of financial resources into Energy and Buildings activities and assets.

The results showed that the analyzed green bond issuers that report on their issues certainly allocate resources to activities that promote global sustainable development, generating environmental and social benefits for society. On the other hand, it was found that there is not yet adequate transparency within the corporate green bond market. Attention is drawn to corporates' lack of commitment in reporting on their green bond issues. It is noteworthy that more than half of issuers do not disclose clear information on their funded activities. This leads to a suspicions feeling that the monetary amounts rose through green bond issuances are not being used as proposed by the mechanism: financing green activities. These resources may be financing activities that do not contribute to the creation of social and environmental value for society, neglecting the global sustainable development.

In addition, the fact that few companies have reached levels 4 of the business case criterion corroborates the perception of Epstein & Roy (2003) about the need for metrics so that companies can understand, evaluate and monitor their financial behavior with respect to sustainable initiatives. To move to Level 4 (providing quantitative financial metrics), it is sufficient for companies to assign financial savings, or new financial earnings or returns related to the activities funded by green bonds.

Results also suggest that activities and projects that meet the GBP eligibility criteria for receiving green bond financing strongly promote up to 11 of the 17 Sustainable Development Goals. This information is relevant for companies seeking to develop SDG-promoting activities, as well as for investors seeking to invest in activities directly connected to sustainable development. Using appropriate metrics, green bond issuers can easily match their activities with the promotion of the SDG.

5 Conclusion

This research aimed to analyze the competence of corporate green bonds as a financial tool that collaborate in funding sustainable development activities, green projects, and creating socioenvironmental value. A secondary objective of this research was to identify particularities regarding the corporate green bond market, providing relevant information for the business community and investors about the fixed-income securities that make up this market. From different perspectives, this research can be useful to the academy, the business community, bonds underwriters, investors, and government entities.

This research sought to contribute by investigating the efficiency of green bonds in promoting sustainable development and creating environmental, social and financial value for the corporations. Green bonds shows evidence of being an efficient financial tool for raising funds for green projects and activities that promote sustainable development. The 473 corporate green bond issuances analysed in this work raised a total of US\$ 188 billion between 2014 and 2017 aiding to shorten the financing gap for supporting the sustainable development.

However, the corporate green bond market still lacks on best practices and commitment from the business community, investors, financial institutions, and government entities in respect to demanding and providing transparency with the use and management of proceeds. Thus, our findings suggest that the corporate green bond market is not yet mature enough and well disseminated among the agents with relevant participation in the segment.

For the corporate market and financial institutions, the research results served as a guide for the advancement of the theme among green bond issuers and bond underwriters. It suggests the need for greater disclosure on the use of proceeds, with prioritization on providing clear individual detailed information on the financed activities, such as location, type of project, promoted SDG, disbursed amount, and quantified socioenvironmental and financial impact metrics. Another relevant outcome from this survey for the corporate market is evidencing the different categories of projects that fit well within the projects eligibility criteria for the green bond issuance, as well as the sectors that are taking the lead in the development of the market.

For financial institutions and bond underwriters, this survey provide relevant information on characteristics of the issued securities, such as ratings, term to maturity, currency of issue.

For the government, it is clear that there is still considerable room for participation in the debate and better formulation of international guidelines and public policies that encourage and foster green financing. For the academy, this work intended to contribute to the dissemination of knowledge, demonstrating the current stage in which the corporate green bond market is, and stimulate debate on a topic of fundamental importance for the development and sustainable growth of global economy. Finally, a suggestion for increased transparency on green bonds is concentrating pre- and post-issue information on a single platform open to all actors (issuers, external evaluation service providers, investors and underwriters) for the publication, verification and retrieval of information on the impact and use of resources from green bond issues.

Lastly, this work has identified some possibilities for future research in this field, namely:

- Redo this research considering new green bond issues that occurred in the last years, or using a universe bigger than the corporate green bond issuances.
- Explore with higher level of detail how the most relevant sectors (Financials and Utilities & Energy) or regions (Europe & China) are performing in the corporate green bond market.
 Mapping about the kind of projects companies are funding with the raised proceeds and whose countries are taking the lead in the development of the European market.
- Explore the challenges for further development of the corporate green bonds market in countries with less developed financial markets.
- Explore the creation and development of the green bonds market in Brazil.
- Execution of a similar work with additional statistical treatments such as correspondence analysis.
- Investigate the particularities and challenges existent within the green bonds market, by conducting field researches interviewing professionals involved in green bond issuance and investment: companies, bond underwritters, asset owners, investors, financial analysts.

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APPENDIX 1- MAPPED CORPORATE GREEN BOND ISSUANCES

	Issuer Name	Sector	Country of Risk	lssue Date	Currency	Framework	Report	Reference File	Project Category	Project Subcategory
1	PNB Merdeka Ventures Sdn Bhd	Financials	MY	Dec-17	MYR	Υ	Y	EVI Independent Assurance Statement to PNB Housing	Buildings	Certified Buildings
2	Hitachi Capital Management China Ltd	Financials	JP	Dec-17	USD	Y	Y	Update of Green Bond by Hitachi Capital Management (China) Limited in 2018	Energy	Solar
3	Landesbank Baden- Wuerttemberg	Financials	DE	Dec-17	EUR	Y	Y	LBBW Green Bond Reporting 2018	Buildings	Certified Buildings
4	Ferrovie dello Stato Italiane SpA	Consumer Discretionary	IT	Dec-17	EUR	Y	Y	Ferrovie dello Stato Italiane Green Bond Report related to the EMTN bond issuance Series 7	Transport	Passenger trains
5	Power Finance Corp Ltd	Financials	IN	Dec-17	USD	Y	Y	PFC 32nd Annual Report 2017-2018	Energy	Solar
6	Bazalgette Finance Plc	Utilities	GB	Nov-17	GBP	Y	Y	Tideway Green Bond Report 2018	Waste Management	Pollution control
7	Orsted A/S	Utilities	DK	Nov-17	EUR	Y	Y	Orsted Green Bonds Investor Letter 2018	Energy	Wind
8	HKCG Finance Ltd	Utilities	нк	Nov-17	JPY	Y	Y	Towngas Sustainability Report 2018	Waste Management	Waste to energy
9	Deutsche Hypothekenbank AG	Financials	DE	Nov-17	EUR	Y	Y	Deutsche Hypo Green Bond Reporting 2019	Buildings	Certified Buildings
10	Fingrid OYJ	Utilities	FI	Nov-17	EUR	Y	Y	Fringid Green Bond Investor Letter and Impact Report 2018	Energy	Electricity Grid
11	Westpac Banking Corp	Financials	AU	Nov-17	EUR	Y	Y	Westpac Climate Bond Impact Report 2019	Energy	Wind
12	Bank of China Ltd/Paris	Financials	CN	Nov-17	EUR	Y	Y	Annual Report on Bank of China's Sustainability Series Bonds (2018)	Transport	Urban rail
13	Bank of China Ltd/Paris	Financials	CN	Nov-17	USD	Y	Y	Annual Report on Bank of China's Sustainability Series Bonds (2018)	Transport	Urban rail
14	Bank of China Ltd/Paris	Financials	CN	Nov-17	CNY	Y	Y	Annual Report on Bank of China's Sustainability Series Bonds (2018)	Transport	Urban rail
15	Iberdrola International BV	Utilities	ES	Nov-17	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
16	HSBC Holdings PLC	Financials	GB	Nov-17	USD	Y	Y	HSBC Green Structured Bond Report November 2018	Buildings	Certified Buildings
17	Manulife Financial Corp	Financials	CA	Nov-17	SGD	Y	Y	Manulife Annual Green Bond – Use of Proceeds Report, November 2018	Energy	Solar
18	Avangrid Inc	Utilities	US	Nov-17	USD	Y	Y	KPMG Independent Accountant's Report to Avangrid	Energy	Wind

19	Toyota Motor Credit Corp	Consumer Discretionary	US	Nov-17	EUR	Y	Y	Green Bond Use of Proceeds Certificate for the month ending April 30, 2018 - EUR 600,000,000 0.000 per cent. Notes due 21 July 2021	Transport	Low emission vehicles
20	Svensk FastighetsFinansiering AB	Financials	SE	Nov-17	SEK	Y	Y	Annual report to investors in SFF's green bonds 2017	Buildings	Certified Buildings
21	HKCG Finance Ltd	Utilities	нк	Nov-17	HKD	Y	Y	Towngas Sustainability Report 2018	Waste Management	Waste to energy
22	Naturgy Finance BV	Utilities	ES	Nov-17	EUR	Y	Y	Naturgy 2018 Green Bond Report	Energy	Wind
23	Barclays PLC	Financials	GB	Nov-17	EUR	Y	Y	Barclays Green Bond Investor Report February 2018	Buildings	Resources Efficiency
24	Obos Forretningsbygg AS	Financials	NO	Nov-17	NOK	Y	Y	OBOS Forretningsbygg AS Green Bond Report 30.09.18	Buildings	Certified Buildings
25	Swedbank AB	Financials	SE	Nov-17	EUR	Y	Y	Swedbank Green Bond Impact Report 2018	Buildings	Certified Buildings
26	Agder Energi AS	Utilities	NO	Nov-17	NOK	Y	Y	Agder Energi Green Bonds Report 2017	Energy	Hydro
27	PEC Energia S.A.	Energy	BR	Nov-17	BRL	Y	Y	PEC Energia Post-Issuance Verification Report by Vigeo Eiris for Eólica Serra Das Vacas Holding II's 2017 first Green Bond issuance	Energy	Wind
28	Svensk FastighetsFinansiering AB	Financials	SE	Oct-17	SEK	Y	Y	Annual report to investors in SFF's green bonds 2017	Buildings	Certified Buildings
29	Atrium Ljungberg AB	Financials	SE	Oct-17	SEK	Y	Y	Atrium Ljungberg Green Bonds Investor Letter 2017	Buildings	Certified Buildings
30	Berlin Hyp AG	Financials	DE	Oct-17	EUR	Y	Y	Berlin Hyp AG Annual Reporting 2017/18 Green Bonds	Buildings	Resources Efficiency
31	Iren SpA	Utilities	IT	Oct-17	EUR	Y	Y	Iren Progetti Green Bond September 2018	Waste Management	Waste to energy
32	Vasakronan AB	Financials	SE	Oct-17	SEK	Y	Y	Vasakronan Annual Report 2018	Buildings	Certified Buildings
33	Rikshem AB	Financials	SE	Oct-17	SEK	Y	Y	Rikshem Annual Report 2017 with Sustainability Report	Buildings	Resources Efficiency
34	Mizuho Financial Group Inc	Financials	JP	Oct-17	EUR	Y	Y	Mizuho Financial Group, Inc. Use of Proceeds Statement (As of March 31, 2018)	Energy	Solar
35	Omega Energia Renovavel S/A	Energy	BR	Oct-17	BRL	Y	Y	Relatório Post-Issuance Green Bond OMNG12	Energy	Wind
36	Vasakronan AB	Financials	SE	Oct-17	SEK	Y	Y	Vasakronan Annual Report 2018	Buildings	Certified Buildings
37	Industrial & Commercial Bank of China Ltd/Luxembourg	Financials	CN	Oct-17	EUR	Y	Y	2018 IB Annual Green Bond Report	Transport	Passenger trains
38	Industrial & Commercial Bank of China Ltd/Luxembourg	Financials	CN	Oct-17	USD	Y	Y	2018 IB Annual Green Bond Report	Transport	Passenger trains

39	Sumitomo Mitsui Financial Group Inc	Financials	JP	Oct-17	EUR	Y	Y	Website - SMFG Green Bond Monitoring Report (As of March 31, 2018)	Energy	Wind
40	SBAB Bank AB	Financials	SE	Oct-17	SEK	Y	Y	SBAB Bank AB Green Bonds Impact Report 2018	Buildings	Certified Buildings
41	Indian Renewable Energy Development Agency Ltd	Energy	IN	Oct-17	INR	Y	Y	EVI Independent Assurance Statement to IREDA July 2018	Energy	Wind
42	Eidsiva Energi AS	Utilities	NO	Oct-17	NOK	Y	Y	Eidsiva Energi Statement of invested amount financed by green bonds as of 31.12.2018	Energy	Hydro
43	Engie SA	Utilities	FR	Sep-17	EUR	Y	Y	Engie 2018 Registration Document	Energy	Wind
44	MTR Corp CI Ltd	Consumer Discretionary	НК	Sep-17	HKD	Y	Y	MTR Green Bond Report 2017	Transport	Passenger trains
45	MTR Corp Ltd	Consumer Discretionary	НК	Sep-17	USD	Y	Y	MTR Green Bond Report 2017	Transport	Passenger trains
46	Deutsche Kreditbank AG	Financials	DE	Sep-17	EUR	Y	Y	DKB Green Bond Reporting 2017	Energy	Solar
47	Sveaskog AB	Materials	SE	Sep-17	SEK	Y	Y	Sveaskog's Green Bonds Post-Issuance Report 2018	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
48	MTR Corp CI Ltd	Consumer Discretionary	нк	Sep-17	HKD	Y	Y	MTR Green Bond Report 2017	Transport	Passenger trains
49	Iberdrola Finanzas SA	Utilities	ES	Sep-17	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
50	ICADE	Financials	FR	Sep-17	EUR	Y	Y	ICADE Green Bond Reporting at 31/12/2017	Buildings	Certified Buildings
51	Suzano Austria GmbH	Materials	BR	Sep-17	USD	Y	Y	Relatório 2018 Suzano S.A. referente ao Relatório de Green Bonds da antiga Suzano Papel e Celulose: Declaração de Uso de Recursos	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
52	Toronto-Dominion Bank/The	Financials	CA	Sep-17	USD	Y	Y	TD Green Bond 2017 Issuance – Use of Proceeds as at October 31, 2018	Buildings	Resources Efficiency
53	Huishang Bank Corp Ltd	Financials	CN	Sep-17	CNY	Y	Y	Huishang Bank Corporation Limited CSR Report 2017	Waste Management	Pollution control
54	SSE PLC	Utilities	GB	Sep-17	EUR	Y	Y	SSE's Green Bond Reporting 2018	Energy	Wind
55	Vasakronan AB	Financials	SE	Aug-17	SEK	Y	Y	Vasakronan Impact Report, Green Bonds 31 December 2017	Buildings	Certified Buildings
56	Anglian Water Services Financing PLC	Utilities	GB	Aug-17	GBP	Y	Y	Anglian Water Green Bond Annual Report 2017-2018	Water & Wastewater	Wastewater treatment
57	Contact Energy Ltd	Utilities	NZ	Aug-17	NZD	Y	Y	Contact 2018 Annual Report	Energy	Geothermal
58	Banco de Comercio Exterior de Colombia SA	Financials	CO	Aug-17	СОР	Y	Y	Bancoldex 1st Green Bond Report	Buildings	Resources Efficiency
59	Azure Power Energy Ltd	Utilities	IN	Aug-17	USD	Y	Y	EVI Independent Assurance Statement to Azure Power	Energy	Solar

60	MTR Corp Ltd	Consumer Discretionary	нк	Jul-17	HKD	Y	Y	MTR Green Bond Report 2017	Transport	Passenger trains
61	DBS Group Holdings Ltd	Financials	SG	Jul-17	USD	Y	Y	DBS Green Bond Report June 2018	Buildings	Certified Buildings
62	Lietuvos Energija UAB	Utilities	LT	Jul-17	EUR	Y	Y	Lietuvos Energija Green Bond Investor Letter 2018	Energy	Electricity Grid
63	Vasakronan AB	Financials	SE	Jul-17	SEK	Y	Y	Vasakronan Impact Report, Green Bonds 31 December 2017	Buildings	Certified Buildings
64	REC Ltd	Financials	IN	Jul-17	USD	Y	Y	REC 49th Annual Report 2017-18	Energy	Solar
65	Modern Land China Co Ltd	Financials	CN	Jul-17	USD	Y	Y	Modern Land (China) Co. Limited 2017 Annual Report	Buildings	Certified Buildings
66	Nordea Bank Abp	Financials	FI	Jun-17	EUR	Y	Y	Green Bond Impact Report Nordea Bank AB July 12, 2018	Energy	Wind
67	Regie Autonome des Transports Parisiens	Consumer Discretionary	FR	Jun-17	EUR	Y	Y	RATP group Green Bond allocation and impact report June 2018	Transport	Passenger trains
68	MTR Corp CI Ltd	Consumer Discretionary	НК	Jun-17	AUD	Y	Y	MTR Green Bond Report 2017	Transport	Passenger trains
69	Grupo Rotoplas SAB de CV	Industrials	MX	Jun-17	MXN	Y	Y	Rotoplas Annual Integrated Report 2018	Water & Wastewater	Wastewater treatment
70	Intesa Sanpaolo SpA	Financials	IT	Jun-17	EUR	Y	Y	Intesa SanPaolo Green Bond Report 2018	Energy	Solar
71	TenneT Holding BV	Utilities	NL	Jun-17	EUR	Y	Y	Tennet Green Finance Report 2017	Energy	Electricity Grid
72	Humlegarden Fastigheter AB	Financials	SE	Jun-17	SEK	Y	Y	Humlegarden Annual Report 2018	Buildings	Certified Buildings
73	Three Gorges Finance II Cayman Islands Ltd	Energy	CN	Jun-17	EUR	Y	Y	Annual Report on Nominated Projects & Assets associated with the China Three Gorges Corporation 2017 Euro Green Bond issued on 25 June 2017 by China Three Gorges Corporation	Energy	Wind
74	Caja Rural de Navarra SCC	Financials	ES	Jun-17	EUR	Y	Y	Caja Rural de Navarra Sustainability Report on the Loan Portfolio 2017	Energy	Energy Performance
75	Apple Inc	Technology	US	Jun-17	USD	Y	Y	Apple Annual Green Bond Impact Report 2018 Update	Buildings	Certified Buildings
76	Rio Energy SA	Energy	BR	Jun-17	BRL	Y	Y	Rio Energy Post-Issuance Verification Report by Vigeo Eiris for Rio Energy's holding 2017 Green Bond issuance	Energy	Wind
77	Berlin Hyp AG	Financials	DE	Jun-17	EUR	Y	Y	Berlin Hyp AG Annual Reporting 2017/18 Green Bonds	Buildings	Resources Efficiency
78	Vasakronan AB	Financials	SE	May-17	SEK	Y	Y	Vasakronan Impact Report, Green Bonds 31 December 2017	Buildings	Certified Buildings
79	Volvofinans Bank AB	Financials	SE	May-17	SEK	Y	Y	Green Bonds Investor Report Volvofinans Bank AB 2018	Transport	Low emission vehicles

B1 CDL Properties Ltd Financials SG Apr-17 SGD Y Chy Developments Limited Integrated Sustainability Report 2018 Buildings Resources Efficiency B2 Tennet Holding BV Utilities NL Apr-17 EUR Y Y Bono Verde CMPC 2017 Sustainability Sustainability Apriculture Financials AU Mar-17 EUR Y Y Bono Verde CMPC 2017 Sustainability Sustainability Apriculture Financials AU Mar-17 USD Y Y Bono Verde CMPC 2017 Sustainability Sustainability Apriculture Sustainability Sustainability Sustainability Australia Financials AU Mar-17 USD Y Y CAB 2022 Climate Bond Annual Impact Report 2018 Bondings Certified Buildings 68 Development Agency Ltd Energy IN Mar-17 USD Y Y Financials Financials R Mar-17 USD Y Y Financials Bond Marcaines Energy Solar 68 Development Agency Ltd Financials Financials Mar-17	80	Lyse AS	Communications	NO	Apr-17	NOK	Y	Y	Lyse Green Bond Report 2017	Energy	Hydro
B2 Femer Holding BV Utilities NL Apr-17 EUR Y Y Tennet Green Finance Report 2017 Energy Electricity Grid B3 Inversiones CMPC SA Materials LL Apr-17 USD Y Y Bono Verde CMPC 2017 Soutianable Agriculture Soutianable	81	CDL Properties Ltd	Financials	SG	Apr-17	SGD	Y	Y	City Developments Limited Integrated Sustainability Report 2018	Buildings	Resources Efficiency
Bits Process CMPC SA Materials CL Apr-17 USD Y Biono Verde CMPC 2017 Sustainable Land Use & Agriculture FSC Forestry/cellulose & Agriculture 83 Commonwealth Bank of Australia Financials AU Mar-17 AUD Y Y CBA 2022 Climate Bond Annual Impact Report 2018 Transport Solar 84 First Abu Dhabi Bank of Development Agency Ltd Financials AE Mar-17 IVD Y Y FAB Green Bond Report June 2018 Buildings Certified Buildings 84 Development Agency Ltd Energy IN Mar-17 USD Y Y FAB Green Bond Report June 2018 Buildings Certified Buildings 85 Financials TR Mar-17 USD Y Y TSK Green Bond Report June 2018 Buildings Certified Buildings 86 HSBC France SA Financials FR Mar-17 EUR Y Y HSBC Green Bond Report October 2017 Energy Wind 90 Atrium Lingberg AB Financials SE Mar-17	82	TenneT Holding BV	Utilities	NL	Apr-17	EUR	Y	Y	Tennet Green Finance Report 2017	Energy	Electricity Grid
B4Commonwealth Bank of AustraliaFinancialsAUMar-17AUDYYCBA 2022 Climate Bond Annual Impact Report 2018TransportSolarB5First Abu Dhabi Bank PJSCFinancialsAEMar-17USDYYFAB Green Bond Report June 2018BuildingsCertified BuildingsB6Indian Renewable Energy evelopment Agency LtdEnergyEnergyINMar-17INRYYEV Independent Assurance Statement to IREDA June EnergyEnergyWindB7KASFinancialsTRMar-17EURYYHSBC Green Bond Report October 2017EnergyWindB8HSBC France SAFinancialsFRMar-17EURYYHSBC Green Bond Report October 2017EnergyWindB9Engle SAUtilitiesFRMar-17EURYYEngle Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bond Sinvestor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsNOMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings92Intra ASAFinancialsNOMar-17NOKYYAtrium Ljungberg Green Bond Sinvestor Letter 2017BuildingsCertified Buildings93Omega Energia Renovael S/AEnergyBRMar-17NOKYY </td <td>83</td> <td>Inversiones CMPC SA</td> <td>Materials</td> <td>CL</td> <td>Apr-17</td> <td>USD</td> <td>Y</td> <td>Y</td> <td>Bono Verde CMPC 2017</td> <td>Sustainable Land Use & Agriculture</td> <td>FSC Forestry/cellulose & paper</td>	83	Inversiones CMPC SA	Materials	CL	Apr-17	USD	Y	Y	Bono Verde CMPC 2017	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
BSFirst Abu Dhabi Bank PISCFinancialsAEMar-17USDVYFAB Green Bond Report June 2018BuildingsCertified BuildingsIndian Renewable Energy Development Agency LineEnergyEnergyINMar-17INRVY2018EnergyEnergySolar7Turkive Sinai Kalkinma Bankasi ASFinancialsTRMar-17USDYYTSKB Green/Sustainable Bond Allocation & Impact Reporting 2018EnergyWind88HSSC France SAFinancialsFRMar-17EURYHSBC Green Bond Report October 2017EnergyDistrict heatIng/cooling89Engle SAUtilitiesFRMar-17EURYYEngle Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsNOMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17NOKYYRelation Post-Issuance Green Bond PI Mil11EnergyWind93Omega Energia Renovael S/AEnergyBRMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYY<	84	Commonwealth Bank of Australia	Financials	AU	Mar-17	AUD	Y	Y	CBA 2022 Climate Bond Annual Impact Report 2018	Transport	Solar
86Indian Renewable Energy Development Agency LtdEnergyINMar-17INRYYEVI Independent Assurance Statement to IREDA June 2018EnergySolar87TxKye Sinai Kalkinam Bankai TxKFinancialsTRMar-17USDYYTSKB Green/Sustainable Bond Allocation & Impact Reporting 2018EnergyWind88HSBC France SAFinancialsFRMar-17EURYYHSBC Green Bond Report October 2017EnergyMind98Engie SAUtilitiesFRMar-17EURYYEngie Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsSEMar-17SEKYYEntra Green Bond Report 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17BRLYYRelatório Post-Issuance Green Bond PTM111EnergyWind93Omega Energia Renovavel S/AEnergyBRMar-17EURYYNaB Annual Green Bond Report 2017BenergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNaB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYContact Calls	85	First Abu Dhabi Bank PJSC	Financials	AE	Mar-17	USD	Y	Y	FAB Green Bond Report June 2018	Buildings	Certified Buildings
87AsTurkiye Sinai Kalkinma BankaiFinancialsTRMar-17USDYTSKB Green/Sustainable Bond Allocation & ImpactEnergyWind88HSBC France SAFinancialsFRMar-17EURYYHSBC Green Bond Report October 2017EnergyDistrict heating/cooling89Engle SAUtilitiesFRMar-17EURYYEngle Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsSEMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17NOKYYRelatório Post-Issuance Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovael S/AEnergyBRMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitesNZFeb-17NZDYYContact 2018 Annual ReportEnergyGeothermal96Iberdrola Finanzas SAUtilitesNZFeb-17RUDYYFlexigroup UTD Green Securitistion 2017 DNV GLPo	86	Indian Renewable Energy Development Agency Ltd	Energy	IN	Mar-17	INR	Y	Y	EVI Independent Assurance Statement to IREDA June 2018	Energy	Solar
88HSBC France SAFinancialsFRMar-17EURYHSBC Green Bond Report October 2017EnergyDistrict heating/cooling89Engle SAUtilitiesFRMar-17EURYYEngle Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovavel S/AEnergyBRMar-17BRLYYRelatório Post-Issuance Green Bond PTMI11EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesNZFeb-17NZDYYContact 2018 Annual Report 2017EnergyGeothermal96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual Report 2018EnergySolar97FlexiGroup LimitedFinancialsAUFeb-17AUDYYFlexiGroup Limitego 2017 DNV GL PostEnergySolar <td>87</td> <td>Turkiye Sinai Kalkinma Bankasi AS</td> <td>Financials</td> <td>TR</td> <td>Mar-17</td> <td>USD</td> <td>Y</td> <td>Y</td> <td>TSKB Green/Sustainable Bond Allocation & Impact Reporting 2018</td> <td>Energy</td> <td>Wind</td>	87	Turkiye Sinai Kalkinma Bankasi AS	Financials	TR	Mar-17	USD	Y	Y	TSKB Green/Sustainable Bond Allocation & Impact Reporting 2018	Energy	Wind
Begie SAUtilitiesFRMar-17EURYEngie Registration Document 2017EnergyWind90Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings92Intra ASAFinancialsNOMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovavel S/AEnergyBRMar-17EURYYRelatório Post-Issuance Green Bond PTM111EnergyWind94Natoral Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYDedrafola Statianability Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYDeterdrola Statianability Report 2018EnergyWind97FlexiGroup LimitedFinancialsAUFeb-17AUDYYElergroup LTD Green Securitisation 2017 DNV GL PostEnergyWind98Iberdrola Finanzas SAUtilitiesESFeb-17AUDYYIberdrola Statianability Report 2018EnergyWind<	88	HSBC France SA	Financials	FR	Mar-17	EUR	Y	Y	HSBC Green Bond Report October 2017	Energy	District heating/cooling
90Atrium Ljungberg ABFinancialsSEMar-17SEKYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings91Atrium Ljungberg ABFinancialsSEMar-17SEKYYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovavel S/AEnergyBRMar-17BRLYYRelatório Post-Issuance Green Bond PTMI11EnergyWind94Natonal Australia Bank LtdFinancialsAUMar-17EURYNaB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYNaB Annual Green Bond Report 2017EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual Report 2018EnergySolar97FlexiGroup LimitedFinancialsAUFeb-17NZDYYContact 2018 Annual Report 2018EnergyWind98Iberdrola Finanzas SAUtilitiesESFeb-17NZDYYDetrola Sustainability Report 2018EnergySolar99Iberdrola Finanzas SAUtilitiesESFeb-17SEKYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified B	89	Engie SA	Utilities	FR	Mar-17	EUR	Y	Y	Engie Registration Document 2017	Energy	Wind
91Atrium Ljungberg ABFinancialsSEMar-17SEKYAtrium Ljungberg Green Bonds Investor Letter 2017BuildingsCertified Buildings92Entra ASAFinancialsNOMar-17NOKYYEntra Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovavel S/AEnergyBRMar-17BRLYYRelatório Post-Issuance Green Bond PTM111EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYIberdrola Sustainability Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual ReportEnergySolar97FlexiGroup LimitedFinancialsAUFeb-17AUDYYIberdrola Sustainability Report 2018EnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Svensk FastighetsFinansiering BFinancialsSEFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investors in SFF's green bonds 2017Buildings	90	Atrium Ljungberg AB	Financials	SE	Mar-17	SEK	Y	Y	Atrium Ljungberg Green Bonds Investor Letter 2017	Buildings	Certified Buildings
92Entra ASAFinancialsNOMar-17NOKYPEntra Green Bond Report 2017BuildingsCertified Buildings93Omega Energia Renovavel S/AEnergyBRMar-17BRLYYRelatório Post-Issuance Green Bond PTM111EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYIberdrola Sustainability Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual ReportEnergyGeothermal97FlexiGroup LimitedFinancialsAUFeb-17NZDYYContact 2018 Annual ReportEnergyGeothermal98Iberdrola Finanzas SAUtilitiesKSFeb-17NZDYYContact 2018 Annual ReportEnergyGeothermal99FlexiGroup LimitedFinancialsAUFeb-17RURYYIberdrola Sustainability Report 2018EnergyWind99Svensk FastighetsFinansiering ABFinancialsSEFeb-17EURYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investors Report 2018EnergyWin	91	Atrium Ljungberg AB	Financials	SE	Mar-17	SEK	Y	Y	Atrium Ljungberg Green Bonds Investor Letter 2017	Buildings	Certified Buildings
93Omega Energia Renovavel S/AEnergyBRMar-17BRLYYRelatório Post-Issuance Green Bond PTMI11EnergyWind94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYNaB Annual Green Bond Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYOcntact 2018 Annual ReportEnergyGeothermal97FlexiGroup LimitedFinancialsAUFeb-17NZDYYContact 2018 Annual ReportEnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17AUDYYIberdrola Sustainability Report 2018EnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Svensk FastighetsFinansiering ABFinancialsSEFeb-17EURYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSeB Green Bond Investor Report 2018EnergyWind	92	Entra ASA	Financials	NO	Mar-17	NOK	Y	Y	Entra Green Bond Report 2017	Buildings	Certified Buildings
94National Australia Bank LtdFinancialsAUMar-17EURYYNAB Annual Green Bond Report 2017EnergyWind95Iberdrola Finanzas SAUtilitiesESMar-17EURYYIberdrola Sustainability Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYOcntact 2018 Annual ReportEnergyGeothermal97FlexiGroup LimitedFinancialsAUFeb-17NZDYYFlexigroup LTD Green Securitisation 2017 DNV GL Post Issuance Assurance OpinionEnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Sensk FastighetsFinansiering ABFinancialsSEFeb-17EURYYSEB Green Bond Investors in SFF's green bonds 2017BuildingsCertified Buildings101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	93	Omega Energia Renovavel S/A	Energy	BR	Mar-17	BRL	Y	Y	Relatório Post-Issuance Green Bond PTMI11	Energy	Wind
95Iberdrola Finanzas SAUtilitiesESMar-17EURYIberdrola Sustainability Report 2018EnergyWind96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual ReportEnergyEnergyGeothermal97FlexiGroup LimitedFinancialsAUFeb-17AUDYYDedrola Sustainability Report 2018EnergySolar98Iberdrola Finanzas SAUtilitesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Svensk FastighetsFinansiering RaFinancialsSEFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind90Svensk FastighetsFinansiering RaFinancialsSEFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind91Svensk FastighetsFinansiering RaFinancialsSEFeb-17SEKYYAnnual report onvestors in SFF's green bonds 2017BuildingsCertified Buildings91Svandinaviska Enskilda Banken RaFinancialsSEFeb-17SEKYYSEB Green Bond Investor Report Green Bonds 31 December 2017BuildingsCertified Buildings91Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	94	National Australia Bank Ltd	Financials	AU	Mar-17	EUR	Y	Y	NAB Annual Green Bond Report 2017	Energy	Wind
96Contact Energy LtdUtilitiesNZFeb-17NZDYYContact 2018 Annual ReportEnergyGeothermal97FlexiGroup LimitedFinancialsAUFeb-17AUDYYFlexigroup LTD Green Securitisation 2017 DNV GL Post Issuance Assurance OpinionEnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyGeothermal99Sensk FastighetsFinansiering ABFinancialsSEFeb-17SEKYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investor Report 2018EnergyWind101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017Buildings	95	Iberdrola Finanzas SA	Utilities	ES	Mar-17	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
97FlexiGroup LimitedFinancialsAUFeb-17AUDYFlexigroup LTD Green Securitisation 2017 DNV GL Post Issuance Assurance OpinionEnergySolar98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind98Svensk FastighetsFinansiering ABFinancialsSEFeb-17SEKYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investor Report 2018EnergyWind101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	96	Contact Energy Ltd	Utilities	NZ	Feb-17	NZD	Y	Y	Contact 2018 Annual Report	Energy	Geothermal
98Iberdrola Finanzas SAUtilitiesESFeb-17EURYYIberdrola Sustainability Report 2018EnergyWind99Svensk FastighetsFinansiering ABFinancialsSEFeb-17SEKYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investor Report 2018EnergyWind101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	97	FlexiGroup Limited	Financials	AU	Feb-17	AUD	Y	Y	Flexigroup LTD Green Securitisation 2017 DNV GL Post Issuance Assurance Opinion	Energy	Solar
99Svensk FastighetsFinansiering ABFinancialsSEFeb-17SEKYYAnnual report to investors in SFF's green bonds 2017BuildingsCertified Buildings100Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investor Report 2018EnergyWind101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	98	Iberdrola Finanzas SA	Utilities	ES	Feb-17	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
Skandinaviska Enskilda Banken ABFinancialsSEFeb-17EURYYSEB Green Bond Investor Report 2018EnergyWind101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	99	Svensk FastighetsFinansiering AB	Financials	SE	Feb-17	SEK	Y	Y	Annual report to investors in SFF's green bonds 2017	Buildings	Certified Buildings
101Vasakronan ABFinancialsSEFeb-17SEKYYVasakronan Impact Report, Green Bonds 31 December 2017BuildingsCertified Buildings	100	Skandinaviska Enskilda Banken AB	Financials	SE	Feb-17	EUR	Y	Y	SEB Green Bond Investor Report 2018	Energy	Wind
	101	Vasakronan AB	Financials	SE	Feb-17	SEK	Y	Y	Vasakronan Impact Report, Green Bonds 31 December 2017	Buildings	Certified Buildings

102	Westpac Banking Corp	Financials	AU	Feb-17	USD	Y	Y	Westpac Climate Bond Impact Report May 2018	Energy	Wind
103	Svensk FastighetsFinansiering AB	Financials	SE	Feb-17	SEK	Y	Y	Annual report to investors in SFF's green bonds 2017	Buildings	Certified Buildings
104	MidAmerican Energy Co	Utilities	US	Feb-17	USD	Y	Y	MidAmerican Energy Company Eligible Green Projects Disbursement Report as of February 1, 2018	Energy	Wind
105	Fibria Overseas Finance Ltd	Materials	BR	Jan-17	USD	Y	Y	Fibria's Green Bond Report 2017: Use of Proceeds Attestation	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
106	Enel Finance International NV	Utilities	IT	Jan-17	EUR	Y	Y	Enel Sustainability Report 2017	Energy	Wind
107	MEP Group GmbH	Energy	GE	Jan-17	EUR	Y	Y	Post-Issuance Climate Bond Certification for the First Green Loan issued by MEP	Energy	Solar
108	Yes Bank Ltd	Financials	IN	Dec-16	INR	Y	Y	Yes Bank Green Bond Impact Report FY 2017-18	Energy	Solar
109	Alperia SpA	Utilities	IT	Dec-16	EUR	Y	Y	Alperia SPA Green Bond DNV GL Elibility Assessment - Post Issuance	Energy	Hydro
110	Alpha Trains Finance	Consumer Discretionary	LU	Dec-16	EUR	Y	Y	Alpha Trains Group Investor Report 2017	Transport	Transport logistics
111	Cofinimmo SA	Financials	BE	Dec-16	EUR	Y	Y	Cofinimmo's 2017 Sustainability Report	Buildings	Certified Buildings
112	Iberdrola Finanzas SA	Utilities	ES	Dec-16	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
113	Bancolombia SA	Financials	со	Dec-16	СОР	Y	Y	Grupo Bancolombia Informe Gestión Empresarial Responsabilidad Corporativa 2017	Energy	Hydro
114	Caja Rural de Navarra SCC	Financials	ES	Dec-16	EUR	Y	Y	Caja Rural de Navarra Sustainability Report on the Loan Portfolio 2016	Energy	Energy Performance
115	BNP Paribas SA	Financials	FR	Dec-16	EUR	Y	Y	BNP Paribas Green Bond - Reporting 2017	Energy	Wind
116	Svensk FastighetsFinansiering AB	Financials	SE	Dec-16	SEK	Y	Y	Annual report to investors in SFF's green bonds 2017	Buildings	Certified Buildings
117	Stockholms Kooperativa Bostadsforening kooperativ hyresrattsforening	Financials	SE	Nov-16	SEK	Y	Y	Green Bond Investor Report 2018-12-31	Buildings	Certified Buildings
118	Suzano SA	Materials	BR	Nov-16	BRL	Y	Y	Suzano Relatório Anual CRA Verde 2018	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
119	BMCE Bank	Financials	MO	Nov-16	MAD	Y	Y	BMCE Bank of Africa Green Bonds Report 2016	Energy	Solar
120	Southern Power Co	Utilities	US	Nov-16	USD	Y	Y	Southern Power Company Eligible Green Projects Disbursement Report for the period from November 16, 2015 through December 31, 2016 for the November 2016 Notes	Energy	Wind

121	Bank of China Ltd/London	Financials	CN	Nov-16	USD	Y	Y	Annual Report on Bank of China's November 2016 China Green Covered Bond	Transport	Urban rail
122	SNCF Reseau EPIC	Industrials	FR	Nov-16	EUR	Y	Y	SNCF Réseau Green Bonds Report 2017	Transport	Passenger trains
123	Masen Capital	Energy	MO	Nov-16	MAD	Y	Y	MASEN Post-Issuance Verification Statement by Vigeo Eiris	Energy	Solar
124	Bank of America Corp	Financials	US	Nov-16	USD	Y	Y	Bank of America Corporation Green Bond II & III Issuance Use of Proceeds Attestation	Energy	Wind
125	MTR Corp CI Ltd	Consumer Discretionary	нк	Nov-16	USD	Y	Y	MTR Green Bond Report 2016	Transport	Passenger trains
126	Svensk FastighetsFinansiering AB	Financials	SE	Oct-16	SEK	Y	Y	Annual report to investors in SFF's green bonds 2016	Buildings	Certified Buildings
127	TenneT Holding BV	Utilities	NL	Oct-16	EUR	Y	Y	Tennet Green Finance Report 2016	Energy	Electricity Grid
128	Vasakronan AB	Financials	SE	Oct-16	SEK	Y	Y	Vasakronan Bondholder's Report on Green Bonds 2016-12-31	Buildings	Certified Buildings
129	Modern Land China Co Ltd	Financials	CN	Oct-16	USD	Y	Y	Modern Land (China) Co. Limited 2017 Annual Report	Buildings	Certified Buildings
130	Vasakronan AB	Financials	SE	Oct-16	SEK	Y	Y	Vasakronan Bondholder's Report on Green Bonds 2016-12-31	Buildings	Certified Buildings
131	Electricite de France SA	Utilities	FR	Oct-16	EUR	Y	Y	EDF Green Bonds Investor presentation 2018	Energy	Wind
132	Cooperatieve Rabobank UA	Financials	NL	Oct-16	EUR	Y	Y	Rabobank Green Bond Report 2017	Energy	Wind
133	Societe Generale SA	Financials	FR	Oct-16	EUR	Y	Y	Societe Generale Positive Impact Bonds 2015, 2016 & 2018 Annual Use of Proceeds Reporting as of 31st of December 2018	Energy	Wind
134	Castellum AB	Financials	SE	Oct-16	SEK	Y	Y	Castellum's Green Bonds 2019	Buildings	Certified Buildings
135	Berlin Hyp AG	Financials	DE	Sep-16	EUR	Y	Y	Berlin Hyp AG Annual Reporting 2016/17 Green Bonds	Buildings	Resources Efficiency
136	Entra ASA	Financials	NO	Sep-16	NOK	Y	Y	Entra Green Bond Report 2016	Buildings	Certified Buildings
137	Nomura Research Institute Ltd	Technology	JP	Sep-16	JPY	Y	Y	Website - NRI Green Bond	Buildings	Resources Efficiency
138	Iberdrola International BV	Utilities	ES	Sep-16	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
139	Mitsubishi UFJ Financial Group Inc	Financials	JP	Sep-16	USD	Y	Y	Website - MUFG Green Bond Reporting (Issue Date 13- Sep-16)	Energy	Solar
140	Svensk FastighetsFinansiering AB	Financials	SE	Sep-16	SEK	Y	Y	Annual report to investors in SFF's green bonds 2016	Buildings	Certified Buildings
141	Link Finance Cayman 2009 Ltd/The	Financials	НК	Jul-16	USD	Y	Y	Link Real Estate Investment Trust Annual Report 2016/2017	Buildings	Certified Buildings

142	Suzano Austria GmbH	Materials	BR	Jul-16	USD	Y	Y	Suzano Relatório Anual Green Bonds 2018	Sustainable Land Use & Agriculture	FSC Forestry/cellulose & paper
143	Bank of China Ltd/Luxembourg	Financials	CN	Jul-16	USD	Y	Y	Annual Report on Bank of China's July 2016 Offshore Green Bond	Transport	Urban rail
144	Bank of China Ltd/Luxembourg	Financials	CN	Jul-16	EUR	Y	Y	Annual Report on Bank of China's July 2016 Offshore Green Bond	Transport	Urban rail
145	Bank of China Ltd/New York NY	Financials	CN	Jul-16	CNY	Y	Y	Annual Report on Bank of China's July 2016 Offshore Green Bond	Transport	Urban rail
146	Alperia SpA	Utilities	IT	Jun-16	EUR	Y	Y	Alperia SPA Green Bond DNV GL Elibility Assessment - Post Issuance	Energy	Hydro
147	SBAB Bank AB	Financials	SE	Jun-16	SEK	Y	Y	SBAB Bank AB Green Bonds Impact Report 2017	Buildings	Certified Buildings
148	Southern Power Co	Utilities	US	Jun-16	EUR	Y	Y	Southern Power Company Eligible Green Projects Disbursement Report for the period from June 20, 2015 through December 31, 2016 for the June 2016 Notes	Energy	Solar
149	TenneT Holding BV	Utilities	NL	Jun-16	EUR	Y	Y	Tennet Green Finance Report 2016	Energy	Electricity Grid
150	Deutsche Kreditbank AG	Financials	DE	Jun-16	EUR	Y	Y	Reporting 2016 DKB Senior Unsecured Green Bond	Energy	Solar
151	Westpac Banking Corp	Financials	AU	Jun-16	AUD	Y	Y	Westpac Climate Bond Impact Report May 2017	Energy	Wind
152	Hemso Fastighets AB	Financials	SE	Jun-16	SEK	Y	Y	Hemso 2017 Annual Report	Buildings	Certified Buildings
153	Axis Bank Ltd/Dubai	Financials	IN	Jun-16	USD	Y	Y	Axis Bank Green Bond Impact Report 2018	Energy	Solar
154	ABN AMRO Bank NV	Financials	NL	May-16	EUR	Y	Y	ABN Amro Green bond report Group Treasury - issue 2	Buildings	Resources Efficiency
155	Covivio	Financials	FR	May-16	EUR	Y	Y	Foncière des Régions Independent Assurance Report 2017 - Ernst & Young Audit	Buildings	Resources Efficiency
156	Turkiye Sinai Kalkinma Bankasi AS	Financials	TR	May-16	USD	Y	Y	TSKB Green/Sustainable Bond Allocation & Impact Reporting 2017	Energy	Hydro
157	TenneT Holding BV	Utilities	NL	May-16	EUR	Y	Y	Tennet Green Finance Report 2016	Energy	Electricity Grid
158	Toyota Motor Credit Corp	Consumer Discretionary	US	May-16	USD	Y	Y	Green Bond Use of Proceeds Certificate to Indenture Trustee for the month ending September 30, 2016 - Toyota Auto Receivables 2016-B Owner Trust	Transport	Low emission vehicles
159	FlexiGroup Limited	Financials	AU	Apr-16	AUD	Y	Y	Flexigroup LTD Green Securitisation 2016 DNV GL Post Issuance Assurance Opinion	Energy	Solar
160	Alliander NV	Utilities	NL	Apr-16	EUR	Y	Y	Alliander Green Bond Report 2016	Energy	Electricity Grid
161	Iberdrola International BV	Utilities	ES	Apr-16	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
162	Latvenergo AS	Utilities	LV	Apr-16	EUR	Y	Y	Latvenergo 2017 Sustainability and Annual Report	Energy	Hydro

163	Vasakronan AB	Financials	SE	Apr-16	SEK	Y	Y	Vasakronan Bondholder's Report on Green Bonds 2016-12-31	Buildings	Certified Buildings
164	Nordex SE	Energy	DE	Apr-16	EUR	Y	Y	2018 Nordex Group Annual Report	Energy	Wind
165	Svensk FastighetsFinansiering AB	Financials	SE	Mar-16	SEK	Y	Y	Annual report to investors in SFF's green bonds 2016	Buildings	Certified Buildings
166	Aboitiz Power Corp	Utilities	РН	Mar-16	PHP	Y	Y	AP Renewables Green Bond DNV GL Post Issuance Assurance Opinion	Energy	Geothermal
167	Georgia Power Co	Utilities	US	Mar-16	USD	Y	Y	Georgia Power Company Eligible Green Expenditures Report 2017	Energy	Solar
168	Apple Inc	Technology	US	Feb-16	USD	Y	Y	Apple Annual Green Bond Impact Report Covering Fiscal Year 2016	Buildings	Certified Buildings
169	ING Bank NV	Financials	NL	Dec-15	USD	Y	Y	ING Post-Issuance Green Bond Report 2017	Energy	Wind
170	Svensk FastighetsFinansiering AB	Financials	SE	Dec-15	SEK	Y	Y	Annual report to investors in SFF's green bonds 2016	Buildings	Certified Buildings
171	BPCE SA	Financials	FR	Dec-15	EUR	Y	Y	Attestation of one of the statutory auditors of BPCE on the information related to the allocation, as of 31st December 2016, of funds raised for the Green Bond issued by BPCE on 14th December 2015	Energy	Wind
172	HSBC France SA	Financials	FR	Dec-15	EUR	Y	Y	HSBC Green Bond Report September 2016	Energy	Wind
173	IDBI Bank Ltd/GIFT-IFC	Financials	IN	Nov-15	USD	Y	Y	IDBI Bank Auditors' Certification 2017	Energy	Solar
174	Societe Generale SA	Financials	FR	Nov-15	EUR	Y	Y	Societe Generale Positive Impact Bonds 2015, 2016 & 2018 Annual Use of Proceeds Reporting as of 31st of December 2018	Energy	Wind
175	ING Bank NV	Financials	NL	Nov-15	USD	Y	Y	ING Post-Issuance Green Bond Report 2017	Energy	Wind
176	ING Bank NV	Financials	NL	Nov-15	EUR	Y	Y	ING Post-Issuance Green Bond Report 2017	Energy	Wind
177	Svensk FastighetsFinansiering AB	Financials	SE	Nov-15	SEK	Y	Y	Annual report to investors in SFF's green bonds 2016	Buildings	Certified Buildings
178	Southern Power Co	Utilities	US	Nov-15	USD	Y	Y	Southern Power Company Management Eligible Green Projects Disbursement Report as of December 31, 2015	Energy	Solar
179	Vasakronan AB	Financials	SE	Oct-15	SEK	Y	Y	Vasakronan Bondholder's Report 2015-12-31	Buildings	Certified Buildings
180	Agricultural Bank of China Ltd	Financials	CN	Oct-15	USD	Y	Y	Agricultural Bank of China Corporate Social Responsibility Report 2016	Energy	Wind
181	Agricultural Bank of China Ltd	Financials	CN	Oct-15	CNY	Y	Y	Agricultural Bank of China Corporate Social Responsibility Report 2016	Energy	Wind
182	Sumitomo Mitsui Banking Corp	Financials	JP	Oct-15	USD	Y	Y	Website - Green Impact 2017 Sumitomo Mitsui Financial Group	Energy	Wind

183	Electricite de France SA	Utilities	FR	Oct-15	USD	Y	Y	EDF Green Bonds Investor presentation 2018	Energy	Wind
184	Aquafin NV	Industrials	BE	Sep-15	EUR	Y	Y	Aquafin Consolidated financial statement 2015	Water & Wastewater	Water treatment
185	Uppsalahem AB	Financials	SE	Sep-15	SEK	Y	Y	Uppsalahem Green Bond Investors Report 2018-12-31	Buildings	Certified Buildings
186	Contact Energy Ltd	Utilities	NZ	Sep-15	NZD	Y	Y	Contact 2017 Annual Report	Energy	Geothermal
187	Vasakronan AB	Financials	SE	Aug-15	SEK	Y	Y	Vasakronan Bondholder's Report 2015-12-31	Buildings	Certified Buildings
188	Argo Infrastructure Partners LLC	Financials	US	Aug-15	USD	Y	Y	Cross-Sound Cable Green Evaluation - S&P Global Ratings	Energy	Electricity Grid
189	Yes Bank Ltd	Financials	IN	Aug-15	INR	Y	Y	Yes Bank Green Bond Impact Report FY 2016-17	Energy	Solar
190	Big60Million Ltd	Energy	GB	Jul-15	GBP	Y	Y	Big60Million Bonds letter to the CBI	Energy	Solar
191	Fastighets AB Forvaltaren	Financials	SE	Jul-15	SEK	Y	Y	Forvaltaren Green Bonds Investor Report 2016-12-31	Buildings	Certified Buildings
192	Digital Realty Trust LP	Financials	US	Jun-15	USD	Y	Y	Digital Realty Green Bond Use of Proceeds Statement June 2016	Buildings	Certified Buildings
193	Renewi PLC	Industrials	GB	Jun-15	EUR	Y	Y	Shanks Group plc Corporate Responbility Report 2016	Waste Management	Waste to energy
194	Toyota Motor Credit Corp	Consumer Discretionary	US	Jun-15	USD	Y	Y	Green Bond Use of Proceeds Certificate to Indenture Trustee for the month ending August 31, 2015 - Toyota Auto Receivables 2015-B Owner Trust	Transport	Low emission vehicles
195	Latvenergo AS	Utilities	LV	Jun-15	EUR	Y	Y	Latvenergo 2016 Sustainability and Annual Report	Energy	Electricity Grid
196	ABN AMRO Bank NV	Financials	NL	Jun-15	EUR	Y	Y	ABN Amro Green bond report Group Treasury - issue 1	Buildings	Resources Efficiency
197	Morgan Stanley	Financials	US	Jun-15	USD	Y	Y	Morgan Stanley "Green Bond" Issuance Report on the Use of Proceeds and Management's Assertion as of December 31, 2015	Energy	Wind
198	TenneT Holding BV	Utilities	NL	Jun-15	EUR	Y	Y	Tennet Green Bond Report 2015	Energy	Electricity Grid
199	Australia & New Zealand Banking Group Ltd	Financials	AU	Jun-15	AUD	Y	Y	EY Independent Reasonable Assurance Report to the Directors and Management of ANZ	Energy	Wind
200	BRF SA	Consumer Staples	BR	Jun-15	EUR	Y	Y	BRF Green Bond Report 2017	Waste Management	Waste Prevention
201	Lloyds Bank PLC	Financials	GB	Jun-15	GBP	Y	Y	Lloyds ESG Bonds Annual Report Statement of Allocation 2017	Energy	Wind
202	Stockholm Exergi Holding AB	Utilities	SE	May-15	SEK	Y	Y	Fortum Värme Annual Green Bond Report 2016	Waste Management	Waste to energy
203	Bank of America Corp	Financials	US	May-15	USD	Y	Y	Bank of America Corporation Green Bond II & III Issuance Use of Proceeds Attestation	Energy	Wind

204	Berlin Hyp AG	Financials	DE	May-15	EUR	Y	Y	Berlin Hyp AG Annual Reporting 2015/16 Green Pfandbrief	Buildings	Resources Efficiency
205	Unibail-Rodamco SE	Financials	FR	Apr-15	EUR	Y	Y	Website - Unibail Rodamco Green Financing	Buildings	Certified Buildings
206	Yes Bank Ltd	Financials	IN	Feb-15	INR	Y	Y	Yes Bank Green Bond Impact Report FY 2016-17	Energy	Solar
207	Vasakronan AB	Financials	SE	Feb-15	SEK	Y	Y	Vasakronan Bondholder's Report 2015-12-31	Buildings	Certified Buildings
208	DNB Bank ASA	Financials	NO	Feb-15	NOK	Y	Y	DNB Report Use of Green Bond Proceeds for the period 01.01.2015 to 31.12.2016	Energy	Wind
209	National Australia Bank Ltd	Financials	AU	Dec-14	AUD	Y	Y	NAB Annual Green Bond Report 2017	Energy	Wind
210	Verbund AG	Utilities	AT	Nov-14	EUR	Y	Y	Oekom Research's Annual Verification of the Sustainability Quality of the Green Bond issued in 2014 by Verbund AG	Energy	Wind
211	Vasakronan AB	Financials	SE	Nov-14	SEK	Y	Y	Vasakronan Green Bond Investors Report 2014-12-31	Buildings	Certified Buildings
212	Stockland Trust	Financials	AU	Nov-14	EUR	Y	Y	Stockland Green Bond - Use of Proceeds Statement 2015	Buildings	Certified Buildings
213	Big60Million Ltd	Energy	GB	Oct-14	GBP	Y	Y	Big60Million Bonds letter to the CBI	Energy	Solar
214	Fastighets AB Forvaltaren	Financials	SE	Oct-14	SEK	Y	Y	Forvaltaren Green Bonds Investor Report 2015-12-31	Buildings	Certified Buildings
215	Abengoa Greenfield SA	Industrials	ES	Sep-14	EUR	Y	Y	Abengoa Annual Report 2014	Energy	Electricity Grid
216	Abengoa Greenfield SA	Industrials	ES	Sep-14	USD	Y	Y	Abengoa Annual Report 2014	Energy	Electricity Grid
217	Muenchener Hypothekenbank eG	Financials	DE	Sep-14	EUR	Y	Y	MünchenerHyp ESG Pfandbrief Quarterly Reporting: Q4 2015	Buildings	Resources Efficiency
218	Anstock II Ltd	Technology	ΤW	Jul-14	USD	Y	Y	ASE Group Corporate Sustainability Report 2015	Buildings	Certified Buildings
219	Hera SpA	Utilities	IT	Jul-14	EUR	Y	Y	Gruppo Hera Green Bond projects 2016	Energy	District heating/cooling
220	Vornado Realty LP	Financials	US	Jun-14	USD	Y	Y	Vornado Realty Trust Sustainability Report 2015	Buildings	Certified Buildings
221	Rodamco Sverige AB	Financials	FR	Jun-14	SEK	Y	Y	Website - Unibail Rodamco Green Financing	Buildings	Certified Buildings
222	Engie SA	Utilities	FR	May-14	EUR	Y	Y	Engie Registration Document 2015	Energy	Wind
223	Regency Centers LP	Financials	US	May-14	USD	Y	Y	Regency Centers Green Bond Issuance Use of Proceeds Attestation Report of Independent Accountants as of March 31, 2017	Buildings	Certified Buildings
224	Iberdrola International BV	Utilities	ES	Apr-14	EUR	Y	Y	Iberdrola Sustainability Report 2018	Energy	Wind
225	Vasakronan AB	Financials	SE	Apr-14	SEK	Y	Y	Vasakronan Green Bond Investors Report 2014-12-31	Buildings	Certified Buildings

226	Toyota Motor Credit Corp	Consumer Discretionary	US	Apr-14	USD	Y	Y	Green Bond Use of Proceeds Certificate to Indenture Trustee for the month ending June 30, 2014 - Toyota Auto Receivables 2014-A Owner Trust	Transport	Low emission vehicles
227	Skanska Financial Services AB	Industrials	SE	Apr-14	SEK	Y	Y	Projects eligible for Skanska Green Bond funding, currently being financed. Updated Q2 2016.	Buildings	Certified Buildings
228	Toronto-Dominion Bank/The	Financials	CA	Apr-14	CAD	Y	Y	TD Green Bond – Use of Proceeds as at October 31, 2016	Buildings	Resources Efficiency
229	Essity AB	Consumer Staples	SE	Apr-14	SEK	Y	Y	SCA Annual Green Bond Letter 2015	Energy	Energy Performance
230	Unilever PLC	Consumer Staples	GB	Mar-14	GBP	Y	Y	DNV GL Independent Limited Assurance Report to the Directors of Unilever PLC	Buildings	Resources Efficiency
231	Contact Energy Ltd	Utilities	NZ	Mar-14	NZD	Y	Y	Contact 2017 Annual Report	Energy	Geothermal
232	Vasakronan AB	Financials	SE	Mar-14	SEK	Y	Y	Vasakronan Green Bond Investors Report 2014-12-31	Buildings	Certified Buildings
233	Unibail-Rodamco SE	Financials	FR	Feb-14	EUR	Y	Y	Website - Unibail Rodamco Green Financing	Buildings	Certified Buildings
234	Bank of Kunlun Co Ltd	Financials	CN	Dec-17	CNY	N	N	None	Not Reported	Not Reported
235	Hebei Financial Leasing Co Ltd	Financials	CN	Dec-17	CNY	Y	N	None	Not Reported	Not Reported
236	Enel Green Power SpA	Utilities	BR	Dec-17	BRL	Y	Ν	None	Not Reported	Not Reported
237	Taiwan Power Co	Utilities	ΤW	Dec-17	TWD	Ν	Ν	None	Not Reported	Not Reported
238	Toda Corp	Industrials	JP	Dec-17	JPY	Y	Ν	None	Not Reported	Not Reported
239	CGNPC International Ltd	Utilities	CN	Dec-17	EUR	Y	N	None	Not Reported	Not Reported
240	Zhejiang Tailong Commercial Bank Co Ltd	Financials	CN	Dec-17	CNY	Ν	N	None	Not Reported	Not Reported
241	Akuo Energy SAS	Energy	FR	Dec-17	EUR	N	Ν	None	Not Reported	Not Reported
242	GCL Intelligent Energy Co Ltd	Utilities	CN	Dec-17	CNY	N	N	None	Not Reported	Not Reported
243	Concord Wind Power Investment Co Ltd	Industrials	НК	Dec-17	CNY	N	N	None	Not Reported	Not Reported
244	Yantai Bank Co Ltd	Financials	CN	Dec-17	CNY	N	N	None	Not Reported	Not Reported
245	Shandong Lipeng Co Ltd	Materials	CN	Dec-17	CNY	N	N	None	Not Reported	Not Reported
246	Bank of Beijing Co Ltd	Financials	CN	Nov-17	CNY	Y	N	None	Not Reported	Not Reported
247	Huarong Xiangjiang Bank Corp Ltd	Financials	CN	Nov-17	CNY	N	N	None	Not Reported	Not Reported
248	Shenzhen Energy Group Co Ltd	Utilities	CN	Nov-17	CNY	N	N	None	Not Reported	Not Reported

249	Bank of Lanzhou Co Ltd	Financials	CN	Nov-17	CNY	N	Ν	None	Not Reported	Not Reported
250	Scatec Solar ASA	Energy	NO	Nov-17	NOK	Y	N	None	Not Reported	Not Reported
251	Canadian Solar Inc	Energy	JP	Nov-17	JPY	Y	N	None	Not Reported	Not Reported
252	Oriental Energy Co Ltd	Energy	CN	Nov-17	CNY	N	Ν	None	Not Reported	Not Reported
253	Bank of Communications Co Ltd	Financials	CN	Oct-17	CNY	N	N	None	Not Reported	Not Reported
254	Photon Energy NV	Utilities	CZ	Oct-17	EUR	N	Ν	None	Not Reported	Not Reported
255	Jiangsu Zhongli Group Co Ltd	Industrials	CN	Oct-17	CNY	N	Ν	None	Not Reported	Not Reported
256	China Three Gorges Corp	Utilities	CN	Oct-17	CNY	Y	N	None	Not Reported	Not Reported
257	innogy Finance BV	Utilities	DE	Oct-17	EUR	Y	Ν	None	Not Reported	Not Reported
258	Mann + Hummel Holding GmbH	Industrials	DE	Oct-17	EUR	Y	N	None	Not Reported	Not Reported
259	Hebei Financial Leasing Co Ltd	Financials	CN	Oct-17	CNY	Y	Ν	None	Not Reported	Not Reported
260	Quantum Solar Park Semenanjung Sdn Bhd	Utilities	MY	Oct-17	MYR	Y	N	None	Not Reported	Not Reported
261	Hanjin International Corp	Industrials	KR	Sep-17	USD	Y	Ν	None	Not Reported	Not Reported
262	Fabege AB	Financials	SE	Sep-17	SEK	Y	N	None	Not Reported	Not Reported
263	Pingxiang Huifeng Investment Co Ltd	Financials	CN	Sep-17	CNY	Ν	Ν	None	Not Reported	Not Reported
264	ACCIONA Financiacion Filiales SA	Industrials	ES	Sep-17	EUR	Y	N	None	Not Reported	Not Reported
265	Mexico City Airport Trust	Industrials	MX	Sep-17	USD	N	Ν	None	Not Reported	Not Reported
266	CPC Corp/Taiwan	Energy	τw	Sep-17	TWD	Ν	Ν	None	Not Reported	Not Reported
267	Hypo Vorarlberg Bank AG	Financials	AT	Sep-17	EUR	Y	Ν	None	Not Reported	Not Reported
268	Klabin Finance SA	Materials	BR	Sep-17	USD	Y	N	None	Not Reported	Not Reported
269	Evercore Casa de Bolsa SA de CV / Gobierno del Distrito Federal	Financials	МХ	Sep-17	MXN	N	N	None	Not Reported	Not Reported
270	CGN Wind Energy Ltd	Energy	CN	Sep-17	CNY	Y	Ν	None	Not Reported	Not Reported
271	Qingdao TGOOD Electric Co	Industrials	CN	Sep-17	CNY	Y	N	None	Not Reported	Not Reported
272	Bank of Dongguan Co Ltd	Financials	CN	Sep-17	CNY	Y	N	None	Not Reported	Not Reported
273	Leshan City Commercial Bank Co Ltd	Financials	CN	Sep-17	CNY	N	N	None	Not Reported	Not Reported

274	Kaifeng Development Investment Co Ltd	Industrials	CN	Sep-17	CNY	Ν	Ν	None	Not Reported	Not Reported
275	Bank of Zhengzhou Co Ltd	Financials	CN	Sep-17	CNY	N	N	None	Not Reported	Not Reported
276	CECEP Wind-Power Corp	Energy	CN	Sep-17	CNY	Y	N	None	Not Reported	Not Reported
277	Xuzhou Economic Technology Development Zone State Owned Asset Management Co Ltd	Financials	CN	Sep-17	CNY	Y	N	None	Not Reported	Not Reported
278	Tenaska Power Services Co	Energy	US	Sep-17	USD	Y	Ν	None	Not Reported	Not Reported
279	Inner Mongolia M-Grass Ecology And Enviroment Group Co Ltd	Consumer Discretionary	CN	Sep-17	CNY	Y	N	None	Not Reported	Not Reported
280	Fabege AB	Financials	SE	Aug-17	SEK	Y	Ν	None	Not Reported	Not Reported
281	Guangdong Huaxing Bank Co Ltd	Financials	CN	Aug-17	CNY	Y	N	None	Not Reported	Not Reported
282	Shaanxi Xixian New Area Fengxi New City Development & Construction Group Co Ltd	Industrials	CN	Aug-17	CNY	Ν	N	None	Not Reported	Not Reported
283	Wuhan Metro Group Co Ltd	Industrials	CN	Aug-17	CNY	Ν	Ν	None	Not Reported	Not Reported
284	China Huadian Corp Ltd	Utilities	CN	Aug-17	CNY	Y	Ν	None	Not Reported	Not Reported
285	Hebei Financial Leasing Co Ltd	Financials	CN	Aug-17	CNY	Y	N	None	Not Reported	Not Reported
286	Oriental Energy Co Ltd	Energy	CN	Aug-17	CNY	N	N	None	Not Reported	Not Reported
287	Tesla Inc	Consumer Discretionary	US	Aug-17	USD	Ν	N	None	Not Reported	Not Reported
288	Guangdong Nanhai Rural Commercial Bank Co Ltd	Financials	CN	Aug-17	CNY	Y	N	None	Not Reported	Not Reported
289	China Three Gorges Corp	Utilities	CN	Aug-17	CNY	Y	N	None	Not Reported	Not Reported
290	Leshan City Commercial Bank Co Ltd	Financials	CN	Aug-17	CNY	Ν	N	None	Not Reported	Not Reported
291	Australian Catholic University Ltd	Consumer Discretionary	AU	Aug-17	AUD	Y	N	None	Not Reported	Not Reported
292	GCL Intelligent Energy Co Ltd	Utilities	CN	Aug-17	CNY	N	N	None	Not Reported	Not Reported
293	Invenergy Renewables LLC	Energy	US	Aug-17	USD	Y	N	None	Not Reported	Not Reported
294	China Longyuan Power Group Corp Ltd	Utilities	CN	Aug-17	CNY	Ν	N	None	Not Reported	Not Reported
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295	Jiangsu Hongze Lake Shenzhou Tourism Development Co Ltd	Industrials	CN	Aug-17	CNY	N	N	None	Not Reported	Not Reported
296	Qingdao Rural Commercial Bank Corp	Financials	CN	Aug-17	CNY	N	N	None	Not Reported	Not Reported
297	Tadau Energy Sdn Bhd	Utilities	MY	Jul-17	MYR	Y	N	None	Not Reported	Not Reported
298	Helvetia Environnement Groupe SA	Industrials	СН	Jul-17	CHF	Y	N	None	Not Reported	Not Reported
299	Wuhan Metro Group Co Ltd	Industrials	CN	Jul-17	CNY	Y	N	None	Not Reported	Not Reported
300	Greenko Dutch BV	Utilities	IN	Jul-17	USD	Y	Ν	None	Not Reported	Not Reported
301	Terna Energy Finance SA	Utilities	GR	Jul-17	EUR	Y	Ν	None	Not Reported	Not Reported
302	Bank of Changsha Co Ltd	Financials	CN	Jul-17	CNY	Y	N	None	Not Reported	Not Reported
303	China Huadian Corp Ltd	Utilities	CN	Jul-17	CNY	Ν	N	None	Not Reported	Not Reported
304	SNCF Reseau EPIC	Industrials	FR	Jul-17	EUR	Y	N	None	Not Reported	Not Reported
305	BAIC Motor Corp Ltd	Consumer Discretionary	CN	Jul-17	CNY	N	N	None	Not Reported	Not Reported
306	ACCIONA Financiacion Filiales SA	Industrials	ES	Jun-17	EUR	Y	N	None	Not Reported	Not Reported
307	China Huadian Corp Ltd	Utilities	CN	Jun-17	CNY	Ν	Ν	None	Not Reported	Not Reported
308	Fabege AB	Financials	SE	Jun-17	SEK	Y	N	None	Not Reported	Not Reported
309	China Three Gorges Corp	Utilities	CN	Jun-17	CNY	Y	Ν	None	Not Reported	Not Reported
310	Leshan City Commercial Bank Co Ltd	Financials	CN	Jun-17	CNY	N	N	None	Not Reported	Not Reported
311	Obvion NV	Financials	NL	Jun-17	EUR	Y	N	None	Not Reported	Not Reported
312	Aggregated Micro Power Infrastructure 2 PLC	Energy	GB	May-17	GBP	N	N	None	Not Reported	Not Reported
313	Bank of Gansu Co Ltd	Financials	CN	May-17	CNY	Ν	Ν	None	Not Reported	Not Reported
314	Bank Sinopac	Financials	τw	May-17	USD	Y	N	None	Not Reported	Not Reported
315	CTBC Bank Co Ltd	Financials	τw	May-17	TWD	Y	N	None	Not Reported	Not Reported
316	E.SUN Commercial Bank Ltd	Financials	тw	May-17	USD	Y	N	None	Not Reported	Not Reported
317	KGI Bank	Financials	τw	May-17	TWD	Y	N	None	Not Reported	Not Reported
318	Bank of Changsha Co Ltd	Financials	CN	May-17	CNY	Y	N	None	Not Reported	Not Reported
319	China Longyuan Power Group Corp Ltd	Utilities	CN	May-17	CNY	Y	N	None	Not Reported	Not Reported

320	Bank of Luoyang Co Ltd	Financials	CN	May-17	CNY	Y	N	None	Not Reported Not Reported
321	China Power Clean Energy Development Co Ltd	Utilities	CN	May-17	CNY	Y	N	None	Not Reported Not Reported
322	Harbin Bank Co Ltd	Financials	CN	May-17	CNY	Y	N	None	Not Reported Not Reported
323	Quadran SASU	Energy	FR	May-17	EUR	Y	Ν	None	Not Reported Not Reported
324	Senvion Holding GmbH	Energy	DE	May-17	EUR	Y	Ν	None	Not Reported Not Reported
325	Kaiser Foundation Hospitals	Health Care	US	May-17	USD	Y	Ν	None	Not Reported Not Reported
326	Bank of Nanjing Co Ltd	Financials	CN	Apr-17	CNY	Y	Ν	None	Not Reported Not Reported
327	State Grid Energy Conservation Service	Utilities	CN	Apr-17	CNY	Y	N	None	Not Reported Not Reported
328	Banco Davivienda SA	Financials	CO	Apr-17	СОР	Y	Ν	None	Not Reported Not Reported
329	ICPF Finance Pty Ltd	Financials	AU	Apr-17	AUD	Y	Ν	None	Not Reported Not Reported
330	Fabege AB	Financials	SE	Apr-17	SEK	Y	Ν	None	Not Reported Not Reported
331	Bank of Beijing Co Ltd	Financials	CN	Apr-17	CNY	Y	Ν	None	Not Reported Not Reported
332	Harbin Bank Co Ltd	Financials	CN	Apr-17	CNY	Y	N	None	Not Reported Not Reported
333	Concord Wind Power Investment Co Ltd	Industrials	НК	Apr-17	CNY	N	N	None	Not Reported Not Reported
334	Investa Office Fund	Financials	AU	Apr-17	AUD	Y	Ν	None	Not Reported Not Reported
335	Canadian Solar Inc	Energy	JP	Apr-17	JPY	Y	Ν	None	Not Reported Not Reported
336	SNCF Reseau EPIC	Industrials	FR	Mar-17	EUR	Y	Ν	None	Not Reported Not Reported
337	Paprec Holding SA	Industrials	FR	Mar-17	EUR	Y	Ν	None	Not Reported Not Reported
338	Covanta Holding Corp	Industrials	US	Mar-17	USD	N	Ν	None	Not Reported Not Reported
339	Dongjiang Environmental Co Ltd	Industrials	CN	Mar-17	CNY	N	N	None	Not Reported Not Reported
340	Chongqing Longhu Development Co Ltd	Financials	CN	Mar-17	CNY	N	N	None	Not Reported Not Reported
341	GEN-I Sonce	Energy	SL	Mar-17	EUR	N	Ν	None	Not Reported Not Reported
342	Indian Renewable Energy Development Agency Ltd	Energy	IN	Feb-17	INR	N	N	None	Not Reported Not Reported
343	Wuhai Bank Co Ltd	Financials	CN	Feb-17	CNY	Y	N	None	Not Reported Not Reported
344	Fabege AB	Financials	SE	Feb-17	SEK	Y	N	None	Not Reported Not Reported
345	China Huarong Financial Leasing Co Ltd	Financials	CN	Feb-17	CNY	Y	N	None	Not Reported Not Reported

346	Neerg Energy Ltd	Energy	IN	Feb-17	USD	Y	N	None	Not Reported	Not Reported
347	Jain International Trading BV	Industrials	IN	Feb-17	USD	Y	N	None	Not Reported	Not Reported
348	Electricite de France SA	Utilities	FR	Jan-17	JPY	Y	N	None	Not Reported	Not Reported
349	Panda Green Energy Group Ltd	Energy	НК	Jan-17	USD	Ν	Ν	None	Not Reported	Not Reported
350	Pattern Energy Group Inc	Utilities	US	Jan-17	USD	N	N	None	Not Reported	Not Reported
351	Repower AG	Utilities	СН	Jan-17	EUR	Y	N	None	Not Reported	Not Reported
352	Hebei Financial Leasing Co Ltd	Financials	CN	Jan-17	CNY	Y	N	None	Not Reported	Not Reported
353	Fantoft Utvikling AS	Financials	NO	Dec-16	NOK	N	N	None	Not Reported	Not Reported
354	Guangdong Huaxing Bank Co Ltd	Financials	CN	Dec-16	CNY	Y	N	None	Not Reported	Not Reported
355	Hero Wind Energy Pvt Ltd	Energy	IN	Dec-16	INR	Y	N	None	Not Reported	Not Reported
356	Jiangsu Nantong Rural Commercial Bank Co Ltd	Financials	CN	Dec-16	CNY	Y	N	None	Not Reported	Not Reported
357	Bank of Urumqi Co Ltd	Financials	CN	Dec-16	CNY	Y	N	None	Not Reported	Not Reported
358	Green Bancorp Inc	Financials	US	Dec-16	USD	N	N	None	Not Reported	Not Reported
359	DunAn Holding Group Co Ltd	Industrials	CN	Dec-16	CNY	Y	N	None	Not Reported	Not Reported
360	Fabege AB	Financials	SE	Nov-16	SEK	Y	N	None	Not Reported	Not Reported
361	ACCIONA Financiacion Filiales SA	Industrials	ES	Nov-16	EUR	Y	N	None	Not Reported	Not Reported
362	Bank of Qingdao Co Ltd	Financials	CN	Nov-16	CNY	Y	N	None	Not Reported	Not Reported
363	Bank of Communications Co Ltd	Financials	CN	Nov-16	CNY	Y	N	None	Not Reported	Not Reported
364	Rikshem AB	Financials	SE	Nov-16	SEK	Y	N	None	Not Reported	Not Reported
365	China Three Gorges Corp	Utilities	CN	Nov-16	CNY	Y	N	None	Not Reported	Not Reported
366	Industrial Bank Co Ltd	Financials	CN	Nov-16	CNY	N	N	None	Not Reported	Not Reported
367	Beijing Enterprises Water Group China Investment Ltd	Utilities	CN	Nov-16	CNY	Y	N	None	Not Reported	Not Reported
368	Wuhan Metro Group Co Ltd	Industrials	CN	Oct-16	CNY	Y	N	None	Not Reported	Not Reported
369	China Datang Corp Renewable Power Co Ltd	Utilities	CN	Oct-16	CNY	Y	N	None	Not Reported	Not Reported
370	State Grid Corp of China	Utilities	CN	Oct-16	CNY	N	N	None	Not Reported	Not Reported

371	Aggregated Micro Power Infrastructure 2 PLC	Energy	GB	Oct-16	GBP	N	Ν	None	Not Reported	Not Reported
372	Poten Environment Group Co Ltd	Industrials	CN	Oct-16	CNY	Y	N	None	Not Reported	Not Reported
373	Stangastaden AB	Financials	SE	Oct-16	SEK	Y	N	None	Not Reported	Not Reported
374	Mexico City Airport Trust	Industrials	MX	Sep-16	USD	Ν	Ν	None	Not Reported	Not Reported
375	CPFL Energia SA	Energy	BR	Sep-16	BRL	Y	N	None	Not Reported	Not Reported
376	ReNew Power Ltd	Utilities	IN	Sep-16	INR	Y	Ν	None	Not Reported	Not Reported
377	China Datang Corp Renewable Power Co Ltd	Utilities	CN	Sep-16	CNY	Y	N	None	Not Reported	Not Reported
378	China Energy Conservation & Environmental Protection Group	Energy	CN	Sep-16	CNY	Y	N	None	Not Reported	Not Reported
379	China Datang Corp Renewable Power Co Ltd	Utilities	CN	Sep-16	CNY	Y	Ν	None	Not Reported	Not Reported
380	Beijing Enterprises Water Group China Investment Ltd	Utilities	CN	Sep-16	CNY	Y	Ν	None	Not Reported	Not Reported
381	Xinjiang Goldwind Science & Technology Co Ltd	Energy	CN	Sep-16	CNY	Y	N	None	Not Reported	Not Reported
382	China Three Gorges Corp	Utilities	CN	Aug-16	CNY	Y	Ν	None	Not Reported	Not Reported
383	China Energy Conservation & Environmental Protection Group	Energy	CN	Aug-16	CNY	Y	N	None	Not Reported	Not Reported
384	Greenko Investment Co	Utilities	IN	Aug-16	USD	Y	N	None	Not Reported	Not Reported
385	NTPC Ltd	Utilities	IN	Aug-16	INR	Y	Ν	None	Not Reported	Not Reported
386	Jiangxi Bank Co Ltd	Financials	CN	Aug-16	CNY	Y	Ν	None	Not Reported	Not Reported
387	Xinjiang Goldwind Science & Technology Co Ltd	Energy	CN	Aug-16	CNY	Y	Ν	None	Not Reported	Not Reported
388	Beijing Enterprises Water Group Ltd	Utilities	CN	Aug-16	CNY	Y	N	None	Not Reported	Not Reported
389	Industrial Bank Co Ltd	Financials	CN	Jul-16	CNY	N	N	None	Not Reported	Not Reported
390	Shanghai Pudong Development Bank Co Ltd	Financials	CN	Jul-16	CNY	Y	N	None	Not Reported	Not Reported
391	Jiangxi Bank Co Ltd	Financials	CN	Jul-16	CNY	Y	N	None	Not Reported	Not Reported
392	Bajaj Finance Ltd	Financials	IN	Jul-16	INR	N	N	None	Not Reported	Not Reported
393	Akuo Energy SAS	Energy	FR	Jul-16	EUR	Y	N	None	Not Reported	Not Reported

394	Huaneng Renewables Corp Ltd	Utilities	НК	Jul-16	CNY	Ν	N	None	Not Reported	Not Reported
395	Obvion NV	Financials	NL	Jun-16	EUR	Y	N	None	Not Reported	Not Reported
396	Vela Energy Finance SA	Energy	ES	Jun-16	EUR	N	N	None	Not Reported	Not Reported
397	Westar Energy Inc	Utilities	US	Jun-16	USD	Y	N	None	Not Reported	Not Reported
398	Advanced Soltech Sweden AB	Energy	SE	Jun-16	SEK	Y	N	None	Not Reported	Not Reported
399	Sodra Skogsagarna Ekonomisk Forening	Materials	SE	Jun-16	SEK	Y	N	None	Not Reported	Not Reported
400	Wallenstam AB	Financials	SE	May-16	SEK	Y	N	None	Not Reported	Not Reported
401	LTC GB Ltd	Consumer Discretionary	CN	May-16	USD	Y	N	None	Not Reported	Not Reported
402	Xinjiang Goldwind Science & Technology Co Ltd	Energy	CN	May-16	CNY	Y	N	None	Not Reported	Not Reported
403	Fabege AB	Financials	SE	May-16	SEK	Y	N	None	Not Reported	Not Reported
404	Regency Centers Corp	Financials	US	May-16	USD	Ν	N	None	Not Reported	Not Reported
405	Rikshem AB	Financials	SE	Apr-16	SEK	Y	N	None	Not Reported	Not Reported
406	Banco Nacional de Costa Rica	Financials	CR	Apr-16	USD	Ν	Ν	None	Not Reported	Not Reported
407	BAIC Motor Corp Ltd	Consumer Discretionary	CN	Apr-16	CNY	Y	N	None	Not Reported	Not Reported
408	Concord Wind Power Investment Co Ltd	Industrials	нк	Apr-16	CNY	Y	N	None	Not Reported	Not Reported
409	Shanghai Pudong Development Bank Co Ltd	Financials	CN	Mar-16	CNY	Y	N	None	Not Reported	Not Reported
410	Hannon Armstrong Sustainable Infrastructure Capital Inc	Financials	US	Mar-16	USD	N	N	None	Not Reported	Not Reported
411	Hyundai Capital Services Inc	Consumer Discretionary	KR	Mar-16	USD	Y	N	None	Not Reported	Not Reported
412	Bank of Qingdao Co Ltd	Financials	CN	Mar-16	CNY	Y	N	None	Not Reported	Not Reported
413	Sveaskog AB	Materials	SE	Mar-16	SEK	Y	N	None	Not Reported	Not Reported
414	Hero Wind Energy Pvt Ltd	Energy	IN	Feb-16	INR	Y	N	None	Not Reported	Not Reported
415	Industrial Bank Co Ltd	Financials	CN	Jan-16	CNY	N	N	None	Not Reported	Not Reported
416	Shanghai Pudong Development Bank Co Ltd	Financials	CN	Jan-16	CNY	Y	N	None	Not Reported	Not Reported

417	Gaelectric Holdings Plc	Energy	IR	Jan-16	EUR	N	Ν	None	Not Reported	Not Reported
418	Tesla Energy Operations Inc/DE	Energy	US	Jan-16	USD	N	N	None	Not Reported	Not Reported
419	Tesla Energy Operations Inc/DE	Energy	US	Dec-15	USD	N	N	None	Not Reported	Not Reported
420	WindMW GmbH	Energy	DE	Dec-15	USD	Y	Ν	None	Not Reported	Not Reported
421	WindMW GmbH	Energy	DE	Dec-15	EUR	Y	N	None	Not Reported	Not Reported
422	Schneider Electric SE	Industrials	FR	Dec-15	EUR	Ν	N	None	Not Reported	Not Reported
423	Scatec Solar ASA	Energy	NO	Nov-15	NOK	Y	Ν	None	Not Reported	Not Reported
424	Tesla Energy Operations Inc/DE	Energy	US	Nov-15	USD	N	N	None	Not Reported	Not Reported
425	Neoen SAS	Utilities	FR	Oct-15	EUR	Y	N	None	Not Reported	Not Reported
426	Tesla Energy Operations Inc/DE	Energy	US	Oct-15	USD	N	N	None	Not Reported	Not Reported
427	Schneider Electric SE	Industrials	FR	Oct-15	EUR	Ν	Ν	None	Not Reported	Not Reported
428	Lm Group Holding A/S	Energy	DK	Oct-15	NOK	Y	N	None	Not Reported	Not Reported
429	CLP India Pvt Ltd	Utilities	IN	Sep-15	INR	Ν	N	None	Not Reported	Not Reported
430	Tesla Energy Operations Inc/DE	Energy	US	Sep-15	USD	N	N	None	Not Reported	Not Reported
431	Stangastaden AB	Financials	SE	Sep-15	SEK	Y	Ν	None	Not Reported	Not Reported
432	Tesla Energy Operations Inc/DE	Energy	US	Aug-15	USD	N	N	None	Not Reported	Not Reported
433	Terraform Global Operating LLC	Utilities	US	Aug-15	USD	N	N	None	Not Reported	Not Reported
434	Hannon Armstrong Sustainable Infrastructure Capital Inc	Financials	US	Aug-15	USD	Ν	N	None	Not Reported	Not Reported
435	Goldwind New Energy HK Investment Ltd	Energy	нк	Jul-15	USD	Y	N	None	Not Reported	Not Reported
436	Tesla Energy Operations Inc/DE	Energy	US	Jul-15	USD	N	N	None	Not Reported	Not Reported
437	500 Georgia Office Partnership	Financials	CA	Jul-15	CAD	Y	N	None	Not Reported	Not Reported
438	Clearway Energy Operating LLC	Utilities	US	Jul-15	USD	Y	N	None	Not Reported	Not Reported
439	TerraForm Power Operating LLC	Utilities	US	Jul-15	USD	N	N	None	Not Reported	Not Reported

440	Akuo Energy SAS	Energy	FR	Jun-15	EUR	Ν	Ν	None	Not Reported	Not Reported
441	Tesla Energy Operations Inc/DE	Energy	US	Jun-15	USD	N	N	None	Not Reported	Not Reported
442	TerraForm Power Operating LLC	Utilities	US	Jun-15	USD	N	Ν	None	Not Reported	Not Reported
443	Nelja Energia AS	Utilities	EE	Jun-15	EUR	Y	Ν	None	Not Reported	Not Reported
444	Tesla Energy Operations Inc/DE	Energy	US	May-15	USD	N	N	None	Not Reported	Not Reported
445	Rikshem AB	Financials	SE	May-15	SEK	Y	N	None	Not Reported	Not Reported
446	Tesla Energy Operations Inc/DE	Energy	US	Apr-15	USD	N	N	None	Not Reported	Not Reported
447	Senvion Holding GmbH	Energy	DE	Apr-15	EUR	Y	Ν	None	Not Reported	Not Reported
448	Paprec Holding SA	Industrials	FR	Mar-15	EUR	Y	N	None	Not Reported	Not Reported
449	Tesla Energy Operations Inc/DE	Energy	US	Mar-15	USD	N	N	None	Not Reported	Not Reported
450	Wallenstam AB	Financials	SE	Mar-15	SEK	Y	Ν	None	Not Reported	Not Reported
451	Vestas Wind Systems A/S	Energy	DK	Mar-15	EUR	Y	Ν	None	Not Reported	Not Reported
452	TerraForm Power Operating LLC	Utilities	US	Jan-15	USD	N	N	None	Not Reported	Not Reported
453	Industrial & Commercial Bank of China Asia Ltd	Financials	НК	Dec-14	HKD	N	N	None	Not Reported	Not Reported
454	Energia Eolica SA	Energy	PE	Dec-14	USD	Y	Ν	None	Not Reported	Not Reported
455	Vardar AS	Utilities	NO	Dec-14	NOK	Y	N	None	Not Reported	Not Reported
456	Rikshem AB	Financials	SE	Dec-14	SEK	Y	N	None	Not Reported	Not Reported
457	Nord-troendelag Elektrisitetsverk AS	Utilities	NO	Nov-14	NOK	Y	N	None	Not Reported	Not Reported
458	Innovatec SpA	Energy	IT	Oct-14	EUR	N	N	None	Not Reported	Not Reported
459	Tesla Energy Operations Inc/DE	Energy	US	Oct-14	USD	Ν	Ν	None	Not Reported	Not Reported
460	BKK AS	Utilities	NO	Oct-14	NOK	Y	Ν	None	Not Reported	Not Reported
461	Massachusetts Institute of Technology	Consumer Discretionary	US	Sep-14	USD	Y	N	None	Not Reported	Not Reported
462	Arise AB	Utilities	SE	Sep-14	SEK	Y	N	None	Not Reported	Not Reported
463	Clearway Energy Operating LLC	Utilities	US	Aug-14	USD	Y	N	None	Not Reported	Not Reported

464	THP Partnership	Financials	CA	Jun-14	CAD	Y	Ν	None	Not Reported	Not Reported
465	Rikshem AB	Financials	SE	May-14	SEK	Y	N	None	Not Reported	Not Reported
466	Green Arrow 11 SRL	Energy	IT	May-14	EUR	N	N	None	Not Reported	Not Reported
467	Aligera Holding AB publ	Utilities	SE	May-14	SEK	Y	N	None	Not Reported	Not Reported
468	Arise AB	Utilities	SE	Apr-14	SEK	Y	N	None	Not Reported	Not Reported

APPENDIX 2 – SDG MAPPING TABLE MATCHED WITH GBP CATEGORY AND PROJECTS CATEGORY OR SUBCATEGORY

SDG #	SDG Name	Target	Target Description	GBP Category	Projects Category or SubCategory
		2,3	By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non- farm employment	Environmentally sustainable management of living natural resources and land use	
2	Zero hunger	2,4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Climate Change Adaptation Environmentally Sustainable Agriculture	Subcategories: Afforestation/parks
		2,5	By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	Terrestrial and Aquatic Biodiversity Conservation Environmentally Sustainable Agriculture;	
2	Good health	3,9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Pollution prevention and control Renewable Energy Wastewater Treatment	Subcategories: Pollution control Waste prevention
3	health	3.d	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	Climate Change Adaptation	Waste to energy Renewables energy Wastewater treatment
		6,1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all	Sustainable water and wastewater management	
6	Clean water and	6,2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	Sustainable water and wastewater management	Categories: Water and wastewater Subcategories: Afforestation/parks
	sanitation	6,3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	Sustainable water and wastewater management Pollution Prevention and Control	Pollution control Waste prevention

		6,4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	Sustainable water and wastewater management	
		6,5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	Sustainable water and wastewater management	
		6,6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	Terrestrial and Aquatic Biodiversity Conservation	
		6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	Sustainable water and wastewater management	
		6.b	Support and strengthen the participation of local communities in improving water and sanitation management	Sustainable water and wastewater management	
		7,2	By 2030, increase substantially the share of renewable energy in the global energy mix	Renewable Energy	
		7,3	By 2030, double the global rate of improvement in energy efficiency	Energy Efficiency	
7	Affordable and clean energy	7.a	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	Renewable Energy Energy Efficiency	Categories: Energy
		7.b	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	Renewable Energy Energy Efficiency	
	Decent work	8,2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	Renewable Energy Eco-efficient and/or circular economy adapted products, production technologies and processes	
8	and economic growth	8,4	Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead	Energy Efficiency Eco-efficient and/or circular economy adapted products, production technologies and processes	Categories: Energy
9	Industry, innovation and infrastructure	9,1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	Renewable Energy Climate Change Adaption	Categories: Energy Buildings

		9,4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Energy Efficiency Renewable Energy Green Buildings Eco-efficient and/or circular economy adapted products, production technologies and processes	
11	Sustainable cities and communities	11,2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Clean Transport	Categories: Transport Subcategories: Afforestation/parks Certified Buildings Renewable Energy Recycling Waste prevention Pollution control Waste to energy
		11,3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	Renewable Energy	
		11,4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage	Terrestrial and Aquatic Biodiversity Conservation	
		11,6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Pollution prevention and control	
		11.c	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials	Green buildings	
12	Responsible consumption and production	12,2	By 2030, achieve the sustainable management and efficient use of natural resources	Environmentally sustainable management of living natural resources and land use	
		12,3	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	Pollution prevention and control Environmentally sustainable management of living natural resources and land use	Categories: Energy Subcategories: FSC Forestry/cellulose & paper Waste prevention Waste to energy Recycling Pollution control
		12,4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	Pollution prevention and control Renewable Energy Eco-efficient and/or circular economy adapted products, production technologies and processes	
		12,5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	Pollution prevention and control	
13	Climate action	13,1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Climate Change Adaptation Renewable Energy	Subcategories : Renewable Energy
		13,3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Climate Change adaptation	

		13.b	Promote mechanisms for raising capacity for effective climate change- related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	Climate Change adaptation	
14	Life below water	14,1	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	Terrestrial and Aquatic Biodiversity Conservation Pollution and Prevention Control	Categories: Waste management Water & wastewater Subcategories: Afforestation/parks
		14,2	By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	Terrestrial and Aquatic Biodiversity Conservation	
		14,3	Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	Terrestrial and Aquatic Biodiversity Conservation Pollution and Prevention Control Climate Change Mitigation	
		14,4	By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	Environmentally sustainable management of living natural resources and land use	
		14,5	By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	Terrestrial and Aquatic Biodiversity Conservation	
		14,6	By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation	Terrestrial and Aquatic biodiversity conservation Environmentally sustainable management of living natural resources and land use	
		14,7	By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism	Environmentally sustainable management of living natural resources and land use	
		14.a	Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries	Terrestrial and Aquatic biodiversity conservation Environmentally sustainable management of living natural resources and land use R&D related to GBP categories	

		14.b	Provide access for small-scale artisanal fishers to marine resources and markets	Environmentally sustainable management of living natural resources and land use	
15	Life on land	15,1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Terrestrial and Aquatic Biodiversity Conservation	Categories: Waste management Sustainable land use & agriculture
		15,2	By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Terrestrial and Aquatic Biodiversity Conservation	
		15,3	By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	Terrestrial and Aquatic Biodiversity Conservation Climate Change Adaptation Pollution and Prevention Control Sustainable Land Use	
		15,4	By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	Terrestrial and Aquatic Biodiversity Conservation	
		15,5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	Terrestrial and Aquatic Biodiversity Conservation	
		15,7	Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	Environmentally sustainable management of living natural resources and land use Terrestrial and Aquatic Biodiversity Conservation	
		15,8	By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	Environmentally sustainable management of living natural resources and land use Terrestrial and Aquatic Biodiversity Conservation	
		15.a	Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	Environmentally sustainable management of living natural resources and land use Terrestrial and Aquatic Biodiversity Conservation	
		15.b	Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	Terrestrial and Aquatic Biodiversity Conservation	
		15.c	Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	Environmentally sustainable management of living natural resources and land use Terrestrial and Aquatic Biodiversity Conservation	
APPENDIX 3 - RESULTS FOR GREEN BOND ISSUANCES WITH AND WITHOUT GREEN BOND FRAMEWORK CRITERIA: ALL ISSUES BY SEPARETED REGIONS OF THE ISSUERS

	Europe	China	North America	Asia	Oceania	Latin America	Africa	Total
Issuances without Framework	13 0,07	41 0,31	23 0,43	3 0,07	0 0,00	4 0,18	0 0,00	84
	(35,90)	(23,69)	(9,69)	(7,36)	(3,05)	(3,95)	(0,36)	
locuance with	187	91	31	38	17	18	2	
Framework	0,94	0,69	0,57	0,93	1,00	0,82	1,00	384
Trainework	(164,10)	(108,31)	(44,31)	(33,64)	(13,95)	(18,05)	(1,64)	
Total	200	132	54	41	17	22	2	468

APPENDIX 4 - RESULTS FOR GREEN BOND ISSUANCES WITH AND WITHOUT GREEN BOND FRAMEWORK CRITERIA: ALL ISSUES BY SEPARETED SECTORS OF THE ISSUERS

	Financials	Utilities	Energy	Industrials	Consumer Discretionary	Materials	Technology	Consumer Staples	Communications	Health Care	Total
lssuances without Framework	26 0,12	16 0,15	26 0,39	13 0,34	2 0,10	1 0,10	0 0,00	0 0,00	0 0,00	0 0,00	84 0,18
Issuance with Framework	192 0,88	90 0,85	40 0,61	25 0,66	19 0,90	9 0,90	4 1,00	3 1,00	1 1,00	1 1,00	384 0,82
Total	218	106	66	38	21	10	4	3	1	1	468

APPENDIX 5 – -P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR ISSUING A GREEN BOND FRAMEWORK CRITERIA: ALL GREEN BOND ISSUES BY REGION

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
0,01	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,05	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,1	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,15	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,2	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,25	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,3	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,35	0,000	0,000	0,001	0,000	0,000	0,000	0,000
0,4	0,000	0,000	0,007	0,000	0,000	0,000	0,000
0,45	0,000	0,000	0,045	0,000	0,000	0,000	0,000
0,5	0,000	0,000	0,170	0,000	0,000	0,001	0,000
0,55	0,000	0,001	0,415	0,000	0,000	0,004	0,000
0,6	0,000	0,021	0,703	0,000	0,000	0,013	0,000
0,65	0,000	0,196	0,904	0,000	0,001	0,042	0,000
0,7	0,000	0,645	0,983	0,000	0,002	0,111	0,000
0,75	0,000	0,954	0,999	0,004	0,008	0,247	0,000
0,8	0,000	0,999	1,000	0,024	0,023	0,460	0,146
0,85	0,000	1,000	1,000	0,118	0,063	0,713	0,965
0,9	0,057	1,000	1,000	0,403	0,167	0,915	1,000

APPENDIX 6 – P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR ISSUING A GREEN BOND REPORT CRITERIA: ALL GREEN BOND ISSUES BY REGION OF ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
0,01	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,05	0,000	0,000	0,000	0,000	0,000	0,000	0,000
0,1	0,000	0,001	0,000	0,000	0,000	0,000	0,000
0,15	0,000	0,127	0,000	0,000	0,000	0,000	0,000
0,2	0,000	0,654	0,000	0,000	0,000	0,000	0,000
0,25	0,000	0,960	0,008	0,000	0,000	0,000	0,000
0,3	0,000	0,999	0,061	0,000	0,000	0,001	0,000
0,35	0,000	1,000	0,227	0,005	0,000	0,005	0,000
0,4	0,000	1,000	0,507	0,027	0,000	0,022	0,000
0,45	0,000	1,000	0,777	0,102	0,002	0,065	0,021
0,5	0,000	1,000	0,933	0,266	0,006	0,154	0,555
0,55	0,000	1,000	0,987	0,508	0,018	0,299	0,990
0,6	0,025	1,000	0,999	0,750	0,046	0,489	1,000
0,65	0,304	1,000	1,000	0,911	0,103	0,687	1,000

APPENDIX 7 – P-VALUE RESULTS OF THE THE STATISTICAL TEST OF PROPORTIONS FOR ISSUING A GREEN BOND FRAMEWORK CRITERIA: ALL GREEN BOND ISSUES BY SECTOR OF ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
0,01	0,000	0,000	0,000	0,000	0,000
0,05	0,000	0,000	0,000	0,000	0,000
0,1	0,000	0,000	0,000	0,000	0,000
0,15	0,000	0,000	0,000	0,000	0,000
0,2	0,000	0,000	0,000	0,000	0,000
0,25	0,000	0,000	0,000	0,000	0,000
0,3	0,000	0,000	0,000	0,000	0,000
0,35	0,000	0,000	0,000	0,000	0,000
0,4	0,000	0,000	0,000	0,000	0,000
0,45	0,000	0,000	0,000	0,000	0,000
0,5	0,000	0,000	0,001	0,000	0,000
0,55	0,000	0,000	0,008	0,000	0,000
0,6	0,000	0,000	0,044	0,000	0,000
0,65	0,000	0,002	0,163	0,001	0,000
0,7	0,000	0,063	0,411	0,005	0,000
0,75	0,000	0,471	0,720	0,021	0,000
0,8	0,001	0,936	0,929	0,072	0,146

0,85 0,118	1,000	0,994	0,207	0,965
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APPENDIX 8 – P-VALUE RESULTS OF THE STATISTICAL TEST OF PROPORTIONS FOR ISSUING A GREEN BOND REPORT CRITERIA: ALL GREEN BOND ISSUES BY SECTOR OF ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	CD, Tech., Com. & HC	Total
0,01	0,000	0,000	0,000	0,000	0,000
0,05	0,000	0,000	0,000	0,000	0,000
0,1	0,000	0,000	0,000	0,000	0,000
0,15	0,000	0,000	0,002	0,000	0,000
0,2	0,000	0,000	0,037	0,000	0,000
0,25	0,000	0,000	0,185	0,000	0,000
0,3	0,000	0,025	0,468	0,000	0,000
0,35	0,000	0,297	0,752	0,001	0,000
0,4	0,000	0,795	0,921	0,005	0,000
0,45	0,000	0,984	0,983	0,019	0,021
0,5	0,000	1,000	0,998	0,061	0,555
0,55	0,023	1,000	1,000	0,153	0,990
0,6	0,306	1,000	1,000	0,309	1,000

APPENDIX 9 – INITIAL CONTINGENCY TABLE FOR ISSUANCES WITH AND WITHOUT GREEN BOND REPORT CRITERIA: ALL ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAm & Africa	Total
Issuance without Report	66 0,33 (100 43)	107 0,81 (66,28)	32 0,59 (27 12)	18 0,44 (20 59)	3 0,18 (8 54)	9 0,38 (12,05)	235 0,50
Issuance with Report	134 0,67 (99,57)	25 0,19 (65,72)	22 0,41 (26,88)	23 0,56 (20,41)	14 0,82 (8,46)	15 0,63 (11,95)	233 0,50
Total	200	132	54	41	17	24	468

APPENDIX 10 - INITIAL CONTINGENCY TABLE FOR ISSUANCES WITH AND WITHOUT GREEN BOND REPORT CRITERIA: ALL ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Issuances without Report	83 0,38 (109,47)	108 0,63 (86,37)	35 0,69 (25,61)	9 0,33 (13,56)	235 0,50
Issuance with Report	135 0,62 (108,53)	64 0,37 (85,63)	16 0,31 (25,39)	18 0,67 (13,44)	233 0,50
Total	218	172	51	27	468

APPENDIX 11 - RESULTS FOR THE BUSINESS CASE FOR SUSTAINABILITY CRITERIA: REPORTED ISSUES BY SEPARETED MOST FINANCED PROJECTS CATEGORY

	Energy	Transport	Buildings	Waste	Water &	Land Use &	Total
			2 4 1 4 1 9 4	Management	Wastewater	Agriculture	
Up to Level 1:	33	4	8	0	1	0	16
Monetary	0,29	0,16	0,10	0,00	0,33	0,00	40
Expenditures	(22,11)	(4,94)	(15,60)	(1,58)	(0,59)	(1,18)	0,20
Up to Level 2:	9	0	18	2	2	1	วา
Qualitative Non-	0,08	0,00	0,23	0,25	0,67	0,17	0.14
financial Impacts	(15,38)	(3,43)	(10,85)	(1,10)	(0,41)	(0,82)	0,14
Up to Level 3:	66	20	52	5	0	5	110
Quantitative Non-	0,59	0,80	0,66	0,63	0,00	0,83	140
financial Impacts	(71,14)	(15,88)	(50,18)	(5,08)	(1,91)	(3,81)	0,04
Up to Level 4:	4	1	1	1	0	0	7
Quantitative	0,04	0,04	0,01	0,13	0,00	0,00	0.02
Financial Impact	(3,36)	(0,75)	(2,37)	(0,24)	(0,09)	(0,18)	0,03
Total	112	25	79	8	3	6	233

APPENDIX 12 – P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR DIFFERENT LEVELS OF THE BUSINESS CASE FOR SUSTAINABILITY CRITERIA: REPORTED GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Up to Level 1:							
Monetary	0,000	0,000	0,000	0,000	0,000	0,010	0,000
Expenditures							
Up to Level 2:							
Qualitative Non-	0,000	0,002	0,020	0,002	0,131	0,140	0,000
financial Impacts							
Up to Level 3:							
Quantitative Non-	0,000	0,000	0,000	0,000	0,000	0,000	0,000
financial Impacts							
Up to Level 4:							
Quantitative	0,046	0,222	0,198	0,206	0,131	0,010	0,010
Financial Impact							

APPENDIX 13 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR DIFFERENT LEVELS OF THE BUSINESS CASE FOR SUSTAINABILITY CRITERIA: REPORTED GREEN BOND ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Up to Level 1: Monetary Expenditures	0,000	0,000	0,011	0,000	0,000
Up to Level 2: Qualitative Non- financial Impacts	0,000	0,135	0,000	0,165	0,000
Up to Level 3: Quantitative Non- financial Impacts	0,000	0,000	0,000	0,000	0,000
Up to Level 4: Quantitative Financial Impact	0,743	0,000	0,149	0,165	0,010

APPENDIX 14 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR DIFFERENT LEVELS OF THE BUSINESS CASE FOR SUSTAINABILITY CRITERIA: REPORTED GREEN BOND ISSUES BY MOST FINANCED PROJECT CATEGORY

	Energy	Transport	Buildings	Others	Total
Up to Level 1: Monetary Expenditures	0,000	0,000	0,000	0,157	0,000
Up to Level 2: Qualitative Non- financial Impacts	0,000	0,222	0,000	0,000	0,000
Up to Level 3: Quantitative Non- financial Impacts	0,000	0,000	0,000	0,000	0,000
Up to Level 4: Quantitative Financial Impact	0,027	0,222	0,548	0,157	0,010

APPENDIX 15 – INITIAL CONTINGENCY TABLE FOR THE BUSINESS CASE FOR SUSTAINABILITY CRITERIA: REPORTED GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	LatAM & Africa	Total
Up to Level	38	7	15	11	3	74
2 only	0,28 (45,28)	0,28 (8,45)	0,68 (7,43)	0,48 (7,77)	0,20 (5,07)	0,34
At least	96	18	7	12	12	1/15
Level 3	0,72 (88,72)	0,72 (16,55)	0,32 (14,57)	0,52 (15,23)	0,80 (9,93)	0,66
Total	134	25	22	23	15	219

APPENDIX 16 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR QUANTITIY OF PROMOTED SDG CRITERIA: REPORTED GREEN BOND ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
1 to 3 SDGs	0,00	0,47	0,00	0,00	0,00
4 to 5 SDGs	0,05	0,00	0,00	0,17	0,00
6 to 7 SDGs	0,00	0,00	0,15	0,17	0,00
8 to 10 SDGs	0,74	0,00	0,15	0,17	0,09

APPENDIX 17 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR QUANTITIY OF PROMOTED SDG CRITERIA: REPORTED GREEN BOND ISSUES BY MOST FINANCED PROJECT CATEGORY

	Energy	Transport	Buildings	Others	Total
1 to 3 SDGs	0,676	0,000	0,000	0,000	0,000
4 to 5 SDGs	0,000	0,222	0,548	0,157	0,000
6 to 7 SDGs	0,000	0,222	0,548	0,001	0,000
8 to 10 SDGs	0,676	0,222	0,548	0,000	0,086

APPENDIX 18 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR BOND ASSIGNED RATING CRITERIA: ALL GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	0,000	0,000	0,000	0,000	0,001	0,000	0,000
All other investment grade	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Superior	0,000	0,000	0,000	0,008	0,000	0,214	0,000

APPENDIX 19 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR BOND ASSIGNED RATING CRITERIA: REPORTED GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	0,000	0,002	0,198	0,000	0,008	0,000	0,000
All other investment grade	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Superior	0,000	0,000	0,000	0,022	0,000	0,140	0,000

APPENDIX 20 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR CURRENCY OF THE ISSUE CRITERIA: ALL GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
USD	0,016	0,000	0,000	0,000	0,157	0,000	0,000
EUR	0,000	0,011	0,102	0,063	0,001	0,214	0,000
CNY	0,866	0,000	0,419	0,338	0,157	0,214	0,000
Other	0,000	0,000	0,002	0,000	0,000	0,000	0,000

APPENDIX 21 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR TERM TO MATURITY OF THE ISSUE CRITERIA: ALL GREEN BOND ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Others	Total
Short Term	0,000	0,000	0,000	0,000	0,000
Intermediate Term	0,000	0,000	0,000	0,000	0,000
Long Term	0,000	0,000	0,000	0,000	0,000

APPENDIX 22 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR TERM TO MATURITY OF THE ISSUE CRITERIA: REPORTED GREEN BOND ISSUES BY MOST FINANCED PROJECT CATEGORY

	Energy	Transport	Buildings	Others	Total
Short Term	0,006	0,000	0,000	0,157	0,000
Intermediate Term	0,000	0,000	0,000	0,000	0,000
Long Term	0,000	0,000	0,000	0,000	0,000

APPENDIX 23 - P-VALUE RESULTS OF THE STATISTICAL TESTS OF PROPORTIONS FOR MOST FINANCED PROJECT CATEGORY CRITERIA: REPORTED GREEN BOND ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	CD, Tech., Com. & HC	Total	
Energy	0,000	0,000	0,001	0,165	0,000	
Transport	0,000	0,474	0,149	0,000	0,000	
Buildings	0,000	0,474	0,011	0,000	0,000	
Others	0,743	0,000	0,000	0,165	0,000	

APPENDIX 24 - INITIAL CONTINGENCY TABLE FOR THE FOR BOND ASSIGNED RATING CRITERIA: ALL GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	125	110	28	26	3	18	310
	(132,48)	0,83 (87,44)	0,52 (35,77)	0,63 (27,16)	0,18 (11,26)	0,75 (15,90)	0,66
	75	22	26	15	14	6	150
grade	0,38	0,17	0,48	0,37	0,82	0,25	0.34
Brade	(67,52)	(44,56)	(18,23)	(13,84)	(5,74)	(8,10)	0,34
Total	200	132	54	41	17	24	468

APPENDIX 25 - INITIAL CONTINGENCY TABLE FOR THE FOR BOND ASSIGNED RATING CRITERIA: REPORTED GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
Speculative grade or not rated	67	3	1	11	2	12	96
	0,50	0,12	0,05	0,48	0,14	0,80	0,41
	(55,21)	(10,30)	(9,06)	(9,48)	(5,77)	(6,18)	·
All other	67	22	21	12	12	3	127
investment grade	0,50	0,88	0,95	0,52	0,86	0,20	0.59
investment graue	(78,79)	(14,70)	(12,94)	(13,52)	(8,23)	(8,82)	0,39
Total	134	25	22	23	14	15	233

APPENDIX 26 - INITIAL CONTINGENCY TABLE FOR THE CURRENCY OF THE ISSUE CRITERIA: ALL GREEN BOND ISSUES BY REGION OF THE ISSUER

	Europe	China	North America	Asia	Oceania	LatAM & Africa	Total
USD / EUR	110	21	50	20	4	10	215
	0,55	0,16	0,93	0,49	0,24	0,42	0,46
	(91,88)	(60,64)	(24,81)	(18,84)	(7,81)	(11,03)	
Other	90	111	4	21	13	14	252
	0,45	0,84	0,07	0,51	0,76	0,58	255
	(108,12)	(71,36)	(29,19)	(22,16)	(9,19)	(12,97)	0,54
Total	200	132	54	41	17	24	468

APPENDIX 27 - INITIAL CONTINGENCY TABLE FOR THE TERM TO MATURITY OF THE ISSUE CRITERIA: ALL GREEN BOND ISSUES BY SECTOR OF THE ISSUER

	Financials	Utilities & Energy	Industrials, Mat. & CS	Other	Total
Short Term	82 0,38 (52,64)	18 0,10 (41,53)	8 0,16 (12,31)	5 0,19 (6,52)	113 0,24
Intermediate Term	107 0,49 (103,88)	81 0,47 (81,96)	24 0,47 (24,30)	11 0,41 (12,87)	223 0,48
Long Term	29 0,13 (61,49)	73 0,42 (48,51)	19 0,37 (14,38)	11 0,41 (7,62)	132 0,28
Total	218	172	51	27	468

ANNEX A – GREEN BOND FRAMEWORK EXAMPLE

ANNEX B – GREEN BOND EXTERNAL REVIEW EXAMPLE

ANNEX C – MTR GREEN BOND REPORT 2017