

# Fixed Income Investments in a Carbon-Conscious World

Yvette Klevan, Managing Director, Portfolio Manager/Analyst<sup>1</sup>

In recent years, institutional investors have become increasingly focused on environmental, social, and governance (ESG) factors in their portfolios. In large part, this heightened awareness has resulted in efforts to evaluate companies and countries within an ESG framework encompassing both qualitative and quantitative attributes. For fixed income investors, the emergence of green bonds has opened the possibility of owning specific securities aimed at funding renewable energy, sustainable infrastructure, or other projects with positive environmental characteristics and goals.

In this paper, we provide an introduction to green bonds. We define these securities, explain the underlying principles, as well as outline the market and issuance. In our view, these bonds represent a compelling (and growing) opportunity as issuers and investors seek to reduce the carbon footprint of their activities and portfolios.

## Introduction

In November 2015, the United Nations Climate Change Conference, or COP 21, was held in Paris, France to negotiate the Paris Agreement, which focuses on the reduction of greenhouse gas emissions that contribute to climate change. Each country submitted INDCs, or “Intended Nationally Determined Contributions,” with the goal of limiting global warming to a two-degree-Celsius increase compared to pre-industrial-era levels. Initially, 71 countries have set out funding requirements, and it is estimated that \$6 trillion would be required to implement these INDCs. Once 55 countries, representing 55% of total global emissions ratify the agreement, it will become legally binding.<sup>2</sup> Although emission reduction is voluntary and there are no current enforcement mechanisms, this is a clear signal to investors that countries all over the world are committed to taking this issue seriously. This historic measure aims to intensify and accelerate the actions and investments needed to both mitigate and adapt to climate change. Successfully addressing these challenges will result in substantial changes to the global economy, and there will be winners and losers across all corporate sectors, as well as for sovereigns. We believe that companies and countries that can reduce emissions and adapt to the impact of climate change, will have a competitive advantage. Green bonds are an important mechanism to mobilize capital and encourage financial incentives for emission reductions and other projects.

Green bonds are standard fixed income instruments whose proceeds are applied exclusively toward financing or re-financing new and/or existing eligible green projects. Although green bonds are often conflated with renewable energy projects, the scope of these securities is much broader than renewables and overlaps substantially with needed infrastructure improvements related to sustainability. Green bonds fall under the framework of environmental, social, and governance (ESG) investing, where these three practices and associated implications are factored into investment decisions. Although green bonds most likely belong to the “environmental” category of ESG, all three categories are highly interconnected.

Green bonds can be a useful financing vehicle for increased sustainable infrastructure investment. Currently, the overall infrastructure debt universe (according to Moody’s) is roughly broken down into 75% utility debt and around 25% transportation debt. These categories lend themselves to financing through green bonds. Global infrastructure development needed by 2025 is estimated to be around \$78 trillion. In the United States alone, over \$3.6 trillion will likely be required for investment in infrastructure that received a D+ grade from the American Society of Civil Engineers.<sup>3</sup> Infrastructure projects can vary but may also include sustainable waste management, sustainable water management, climate change adaptation, and sustainable land use. Green bonds lend themselves to public-

private partnerships where private sector efficiencies are combined with public sector governance, in an investment collaboration that provides relative stability and where interests are aligned. With global monetary policy tools largely tapped out, infrastructure spending could provide much-needed fiscal stimulus to jump-start or enhance local and global growth, helping to contribute to social goals at the same time.

Green bonds could also be used to invest in “disruptive” businesses such as electric vehicles (EV) and battery development. In the first half of 2016, companies such as Toyota and Zhejiang Geely cumulatively issued \$2.5 billion through green bonds to finance electric and hybrid vehicle manufacturing and research. Toyota’s financing unit, which issued the first asset-backed green bond in 2014, has issued a total of \$4.6 billion since then. It is notable that Norway currently has 22% EV usage, and recently mandated a ban on new sales of gas-powered cars by 2025. Bloomberg New Energy Finance estimates that electric vehicle penetration in the overall global automotive fleet could reach as much as 25% by 2040. In the United States, nearly 75% of total petroleum consumption is currently utilized in the transportation sector, with 48% in the form of gasoline for motor vehicles. The United States represents 20% of global oil consumption,<sup>4</sup> implying that the potential opportunity for EVs is large both in the United States and beyond. As such, any shift towards EVs and away from gas-guzzling cars will have a profound impact on most countries and companies in some way. The trend toward EV adoption represents a significant opportunity for green bond issuance to fund vehicle and battery development, as well as charging station infrastructure development.

### What Constitutes a Green Project?

Although the Green Bond Principles lay out a framework for what should count as a green project, what is “green” or “sustainable” is largely in the eye of the beholder, and varies by country and region. Take for instance, an oil company that issues a green bond to fund a renewable energy project. Investor X thinks this is an acceptable approach to utilize green bonds because it is promoting and generating clean energy. On the other hand, investor Y thinks that companies whose primary revenue is based around fossil fuels shouldn’t be able to issue green bonds. This scenario is playing out in the real world as China issues its own guidelines for green bonds that allow clean coal development to be considered a green project. This exemplifies the “shades of green” spectrum many projects fall under and highlights the importance of disclosure and transparency as the market evolves and matures.

## Green Bond Characteristics and Principles

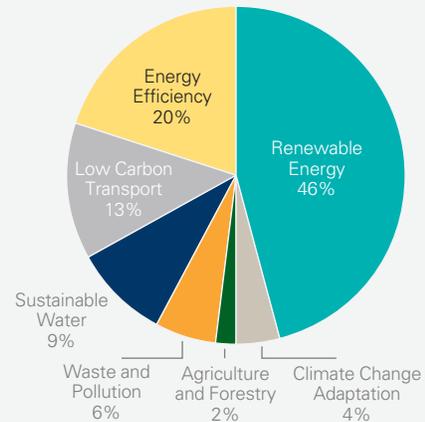
Defining a green bond is easier said than done. Although it is clear that proceeds from these standard fixed income instruments will fund “green projects,” determining what constitutes a green project proves to be difficult given the varied perspectives, biases, and motivations. Since 2007, when the European Investment Bank (EIB) issued the first green bond, there has been a call for more clarity and standardization for green bond issuance. The Green Bond Principles (GB Principles) have emerged as the most established framework for evaluating these instruments. Put forth by the International Capital Markets Association, the GB Principles are “voluntary process guidelines that recommend transparency and disclosure, and promote integrity in the development of the green bond market.” They aim to aid issuers with guidance on key components involved in launching a credible green bond, and by promoting the availability of information so that investors can accurately gauge the environmental impact of their investments. Lastly, they aim to aid underwriters by moving markets toward expected disclosures that will help standardize and facilitate transactions. The GB Principles are separated into four components—discussed next—that include a clear use of proceeds, a process for project evaluation and selection, management of proceeds, and ongoing reporting.<sup>5</sup>

**1. Use of proceeds.** The main foundation of the GB Principles is the use of proceeds for eligible green projects, which should be clearly described in the legal documentation of the bond, and explicitly recognize a few broad categories that are eligible to be considered a green project. These include projects that aim to address natural resource depletion, climate change, loss of biodiversity, and pollution control. The GB Principles do not aim to take a position on which green technologies and standards are optimal for the environment but highlight broad acceptable categories. An overall breakdown of use of proceeds, and examples of projects that qualify are shown in Exhibit 1. Furthermore, many institutions can provide analysis and guidance as to the quality of certain green projects and definitions of green projects can vary widely by geography and sector.

**2. Project evaluation.** The second component of the GB Principles is a clearly defined process for evaluation and selection of different green projects. Issuers of a green bond should outline a process to determine how the project fits within the eligible green project categories as well as the environmental and sustainability objectives of the project. The GB Principles recommend the highest level of transparency in this process as well as a third-party review. From an investor’s perspective, green bonds may also take into account the issuers’ overall profiles as well as their historical performance with regards to sustainability and environmental focus.

Exhibit 1  
Acceptable Green Bond Projects and Use of Proceeds

Use of Proceeds from 2015 Issuance



### Green Bond Projects Examples

Category	Issuer	Description
Renewable Energy	Southern Power	Fund solar and wind electricity generation. The company is the first US investment grade utility to issue a green bond for renewables.
	KFW	Finance renewable energy projects.
	State of Hawaii	Finance photovoltaic-related technologies like storage and other technologies that support photovoltaic interconnection.
	EIB	Finance renewable energy projects including wind, solar, and hydroelectric.
Sustainable Water	District of Columbia Water	Finance a portion of the DC Clean Rivers Project, which aims to construct a deep tunnel system that will transport combined sewage and storm water to a water treatment facility.
Sustainable Transportation	Toyota	Fund new retail contracts and lease contracts for Toyota and Lexus vehicles that meet powertrain, fuel efficiency, and emission standards.
	New York MTA	Support infrastructure upgrades to public transportation systems.
Climate Change Adaptation	World Bank	Finance proposed projects ranging from flood protection to sustainable forest management.
Sustainable Buildings	Columbia University	Include sustainable design features in the Jerome L. Science Center building to reduce cooling and heating requirements.
Energy Efficiency	Province of Ontario	Fund clean transportation and energy efficiency projects within the Province of Ontario.

All data reflect rounding.

Source: Bloomberg, Climate Bond Initiative

**3. Management of proceeds.** For the management of proceeds, the net proceeds of the green bonds should be moved to a sub-account, sub-portfolio, or otherwise tracked by the issuer in an appropriate manner. This should be monitored as long as the bonds are outstanding. This is important in that it considers that money is inherently fungible and makes every attempt to ensure that the proceeds raised for green projects are used appropriately.

**4. Project reporting.** The GB Principles outline a systematic reporting scheme for the use of proceeds until all the money is allocated. This includes a list of all projects, a description of the proceeds allocated to each project, and the expected impact of these proceeds. Transparency is particularly valuable in the reporting process and should include qualitative performance factors as well as quantitative performance factors where appropriate. This would include measurements such as greenhouse gas emission reduction, energy capacity, or value of ecosystem service protected.

Third-party verification is recommended for each of the four components and can include consultant reviews, verification, certification, or ratings. The GB Principles have become the preeminent green bond metric and are continuously being refined and adapted to changing market conditions. Currently, they focus on four types of green bonds. The first is a green use of proceeds bond, which is a standard recourse to the issuer's debt obligation where the proceeds are placed in a sub-account or tracked by the issuer. Next, there is a green use of proceeds revenue bond, a non-recourse debt obligation in which the credit exposure in the bond is pledged to the cash flows of revenue streams, fees, and taxes. A green use of proceeds project bond is a project bond for single or multiple green projects where the investor has direct exposure to the risk of the project with or without recourse to the issuer. Lastly, green use of proceeds securitized bonds are bonds collateralized by one or more green projects and includes ABS, MBS, covered loans, and other structures. As the market develops, additional types of green bonds may emerge.<sup>6</sup> Equally important for investors to consider is the Green Bond Assessment (GBA) published by Moody's, which evaluates green bonds and arrives at a composite grade from GB1 (excellent) to GB5 (poor).

In an attempt to bring further clarity to the green bond universe, Barclays and MSCI developed and released the Barclays MSCI Green Bond Index (Exhibit 2). This benchmark relies on the GB Principles and fixed income eligible criteria—mirroring Barclays flagship indices—to define index constituents. Furthermore, the index brings global coverage of the green bond market as well as sub-index level data across regions, issuers, currencies, and use of proceeds.<sup>7</sup> It should be noted again, however, that some investors are conducting their own research and may consider purchasing other (non-index) bonds based on their proprietary criteria and process for what constitutes a “green” investment.

## Historical Issuance

Historically, renewable energy and energy efficiency were the initial and primary focus of green bond proceeds. As the market has developed there has been a gradual increase in the variety of projects funded using these bonds. In 2015, additional categories included low-carbon transport, sustainable water, waste and pollution, agriculture and forestry, and climate adaptation. In addition to an increase in the diversity of projects, there has also been a substantial increase in the amount of issuance.

The first green bond was issued by the EIB in 2007 for \$700 million, and total cumulative issuance has progressed to almost \$100 billion as of the end of 2015 (Exhibit 3, page 5). Issuance is expected to grow dramatically in 2016, between \$80 and \$100 billion, potentially doubling the overall universe by the end of this year. Although this is still a relatively small market sector when

### Exhibit 2 Barclays MSCI Green Bond Universe Characteristics Overview

Characteristics Shown as a Share of Total Index

Issuer Sector	(%)
Agency	32.7
Supranational	27.7
Financial	15.7
Utility	11.9
Local Authority	6.4
Industrial	4.8
Currency <sup>a</sup>	
EUR	44.8
USD	41.3
GBP	6.4
CAD	3.5
AUD	2.2
SEK	1.2
CHF	0.5
Credit Rating <sup>b</sup>	
Aaa	47.0
Aa	15.5
A	20.1
Baa	17.4

As of 30 June 2016

All data reflect rounding.

a Approximately 2% of the overall universe for green bonds are issues denominated in Chinese renminbi (CNY), however they are not represented in the currency breakdown for the Barclays MSCI Green Bond Index based on incompatibility with inclusion rules.

b The Barclays MSCI Green Bond Index includes investment grade securities only—currently there is over 5% high yield securities (below investment grade) in issuance outstanding, as a percentage of the overall universe for green bonds (as of 30 June 2016).

Source: Barclays, Bloomberg, MSCI

compared to the \$47 trillion global bond market (represented by the Barclays Global Aggregate Bond Index), Citigroup estimates green bonds could easily grow to be a robust trillion-dollar market by 2020.<sup>8</sup>

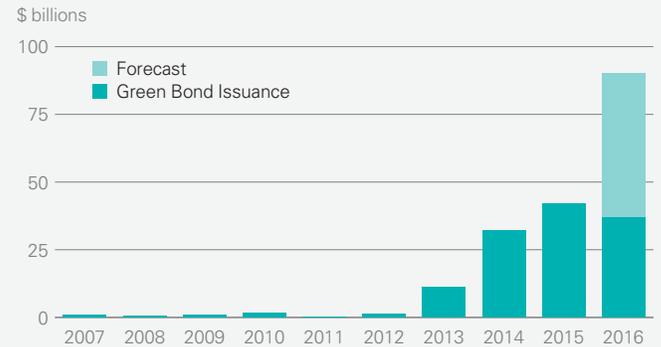
Issuers have also become more diverse over the past few years, including new green bonds sponsored by corporations, development banks, and local governments. Corporations are especially taking notice, and issuance is expected to continue flourishing. In fact, in early 2016, Apple issued a \$1.5 billion US dollar-denominated green bond, which matures in 2023. According to an independent review from Sustainalytics, the use of proceeds will fit into various categories including renewable energy projects, energy efficient buildings, water efficiency, recycling, and/or greener building materials. We believe Apple's issuance is expected to spur more issuance from technology companies that are concerned about sustainability and the type of energy that powers their data centers and offices.

Along with project and issuer diversity, currency diversity is also growing as the global popularity of green bonds increases. Although most issuance occurs in euro and US dollar, the yuan has represented 32% of 2016 issuance by value.<sup>9</sup> In early July 2016, the Bank of China sold CNY 20 billion (approximately \$3.03 billion) in new green bonds, making this the largest international issuance of its kind. Both China and India are expected to become major players in the green bond market in order to achieve their ambitious carbon and pollution reduction targets.

## The Opportunity of Green Bonds Can Benefit Issuers and Investors

From an issuer perspective, green bonds can attract institutional investors that are being mandated to incorporate sustainability into their investment process. The number of asset managers who focus on green bond investments (both dedicated and tactical) is growing, especially as the issuance of such bonds develops. In addition, regardless of one's view on divestment of fossil fuel assets, divestment by institutions has reached almost \$3.4 trillion.<sup>10</sup> This is due to the growing pressure of such divestment in the institutional marketplace, perhaps partially driven by consultants. One of the pioneers of such divestment, ironically, is Norges Bank Investment Management (Norway's sovereign wealth fund, which is largely funded by oil revenue), demonstrating significant interest in how money is invested and the subsequent impact their investments have on the environment. They are viewed as a thought leader for building sustainable strategies, and in fact, divested from 73 companies in 2015 based on their assessment of environmental and social risk factors. Other large public pensions around the world appear to be following in their footsteps.

Exhibit 3  
Green Bond Issuance Is Expected to Grow Substantially



As of 12 July 2016

Estimates for full-year 2016 issuance are between \$80 and \$100 billion; we display this in the chart at \$90, as that is the midpoint of the forecast. Forecasted or estimated results do not represent a promise or guarantee of future results and are subject to change.

Source: Barclays Research, Bloomberg (for 2010 onward), Climate Bonds Initiative, MSCI ESG Research

For investors, green bonds can offer potential benefits through diversification and also scarcity value, as the sector evolves and issuance reaches critical mass. Institutional investors are more aware of ESG factors and potential intrinsic upside in the green bond market, as these securities may provide diversification and could be viewed as being less risky than comparable investments not focused on sustainability. Over the medium to long run, this positioning could not just offer protection from losses in a transition to a low-carbon economy, but position ESG-aware portfolios to generate better returns than do more carbon-intensive portfolios. By underweighting high greenhouse gas emitters and fossil fuel reserve holders, ESG strategies can potentially expect to benefit if carbon or emission taxes (or other penalties) become prevalent.

Investing in a green bond could also help shield asset owners from environmental and financial catastrophes such as the GE chemical contamination of the Hudson River that may cost the company more than \$750 million to remediate.<sup>11</sup> This is a tangible example of the pressure faced by institutional investors to incorporate ESG criteria into their investments. Green bonds could explicitly satisfy these criteria and serve as positive “branding” for investors as well as issuers, whereby everyone's interests are aligned. In our view, this thematic approach to investing with sustainability in mind, will likely add value over time—from both an opportunistic and a defensive perspective.

## Improvements in the Issuance Process and Expansion of the GB Principles

Currently, issuing a green bond could potentially cost more due to third-party verification and additional documentation. As time goes on, however, issuers will gain process expertise with each new issue, streamlining the process, and lowering the barriers of entry to the green bond market. Most importantly, the definitions and frameworks for evaluating green bonds will need to be continuously refined and scrutinized. For the market to grow, investors also need to be confident that their investment is being used on projects in a way that meets their expectations.

The Paris Agreement recognized that “climate change represents an urgent and potentially irreversible threat to human societies.”<sup>12</sup> In June 2016, a revision to the GB Principles included the expansion of the “use of proceeds” bond concept that aims to include projects with social objectives. These “social bonds” can be issued through the framework of the GB Principles and this further exemplifies the interconnectedness of ESG factors. Social projects funded by these bonds are those that directly aim to help address or mitigate a specific social issue and/or seek to achieve a positive social outcome, for particular population groups. Some examples of social project categories include affordable housing, food security, affordable sanitation, and socioeconomic advancement.<sup>13</sup>

## Conclusion

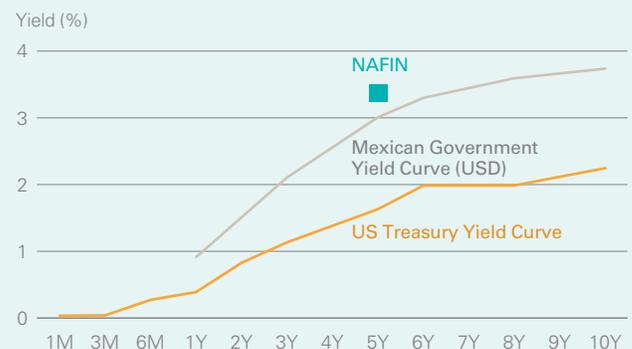
Green bonds are becoming increasingly popular along with their parent category of ESG investing. Green bond use of proceeds are designed to result in tangible climate benefits, and can run the spectrum from renewable energy projects to much-needed infrastructure improvements, or even participation in so-called disruptive businesses such as EVs and battery storage. Pressure on a global basis from large investors and consultants is also driving the movement towards sustainable investing, with an emphasis on ESG factors being incorporated into investment decisions. Looking forward, fossil fuel investments may suffer as a result.

Supply of green bonds has been on the rise in recent years and corporations are slated to play a larger role in future issuance. Demand for green bonds is currently high, with many being oversubscribed, and their valuations may reflect some degree of “scarcity” value. Pricing anomalies or idiosyncratic situations may also present unique investment opportunities. Currently, green bond issuers are navigating the voluntary verification process, where the benefits of attracting new investors are weighed against the cost of third-party verification. For investors, as the global economy shifts to a lower-carbon footprint, we believe that portfolios that have proactively reduced their carbon exposure will be better positioned to outperform the broad market.

## Green Bonds in Practice: Some Green Bonds Exhibit Attractive Relative Value Opportunity

One example of an attractive risk/reward tradeoff can be seen in the inaugural green bond issuance in December 2015 by Nacional Financiera (NAFIN), Mexico’s development bank. This bond is backed by explicit guarantees from the Mexican government, and the revenue is being used to fund renewable energy projects in Mexico, such as wind farms. The bond has a third-party verification from Sustainalytics and others. NAFIN is an A3/BBB+ rated government agency and this 5-year US dollar–denominated bond was initially priced at 190 basis points (bps) over US treasuries, and about 80 bps above US dollar–denominated Mexican sovereign debt.

### NAFIN Bond and Yield Curves



As of 27 July 2016

Source: Bloomberg

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## Notes

- 1 This paper is also the result of the work and research by Tim Luthin, summer intern on Lazard's Global Fixed Income team.
- 2 [www.cop21paris.org](http://www.cop21paris.org)
- 3 <http://www.forbes.com/sites/greatspeculations/2015/11/25/three-ways-to-profit-from-78-trillion-in-global-infrastructure-investment/#64dc0ec5adab>
- 4 [http://www.eia.gov/energyexplained/index.cfm?page=oil\\_use](http://www.eia.gov/energyexplained/index.cfm?page=oil_use)
- 5 ICMA Green Bond Principles, June 2016
- 6 ICMA Green Bond Principles, June 2016
- 7 Barclays MSCI Green Bond Index fact sheet: [https://www.msci.com/resources/factsheets/Barclays\\_MSCI\\_Green\\_Bond\\_Index.pdf](https://www.msci.com/resources/factsheets/Barclays_MSCI_Green_Bond_Index.pdf)
- 8 <http://cleantechnica.com/2016/06/26/global-green-bonds-likely-trillion-dollar-market-2020-says-citi/>
- 9 As of June 2016
- 10 <http://gofossilfree.org/commitments/>
- 11 <http://www.wsj.com/articles/ge-nears-end-of-hudson-river-cleanup-1447290049>
- 12 <https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf>
- 13 BNP Paribas Green Bond Sales Teach-In-Updated

## Important Information

An investment in bonds carries risk. If interest rates rise, bond prices usually decline. The longer a bond's maturity, the greater the impact a change in interest rates can have on its price. If you do not hold a bond until maturity, you may experience a gain or loss when you sell. Bonds also carry the risk of default, which is the risk that the issuer is unable to make further income and principal payments. Other risks, including inflation risk, call risk, and pre-payment risk, also apply. Securities in certain non-domestic countries may be less liquid, more volatile, and less subject to governmental supervision than in one's home market. The values of these securities may be affected by changes in currency rates, application of a country's specific tax laws, changes in government administration, and economic and monetary policy. Derivatives transactions, including those entered into for hedging purposes, may reduce returns or increase volatility, perhaps substantially. Forward currency contracts, and other derivatives investments are subject to the risk of default by the counterparty, can be illiquid and are subject to many of the risks of, and can be highly sensitive to changes in the value of, the related currency or other reference asset. As such, a small investment could have a potentially large impact on performance. Use of derivatives transactions, even if entered into for hedging purposes, may cause losses greater than if an account had not engaged in such transactions.

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