



NYU | STERN

Center for
Sustainable Business

Green Bonds

Tom Manning, Research Scholar
Tensie Whelan, Director

Center for Sustainable Business
May 2016

Summary

Green bonds are a newly-labeled asset class created to “help mobilize private sector financing for sound climate- and environmentally-sustainable investments and help enhance transparency of environmental finance.”¹

Green bonds are not a newly-created financing mechanism. That is, they are debt instruments differentiated from other debt instruments by virtue of their uses of proceeds and not by their financial architecture.

There is at present no single definition of a green bond, and they can be self-declared by the issuer. That said, there are certain standards, definitions and processes that are rapidly gaining acceptance in the market place. In particular, there is greater and greater demand for transparency, both prior to and after issuance, with regard to intended and actual uses of green bond proceeds and the environmental benefits of the funded projects.

Green bond issuers include corporations, multilateral development banks, such as the World Bank, and governments and government-affiliated entities, such as transportation and water authorities. In 2015, 46% of green bond proceeds went towards renewable energy projects, followed by energy efficiency (20%), low carbon transport (13%) and sustainable water projects (9%).²

The issuance of green bonds is growing rapidly, though it is still a very small portion of the overall debt market. Global sales of labeled green bonds totaled \$41.8 billion (\$US) in 2015, up from \$2.6 billion in 2012.³ For 2016, Moody’s initially projected sales of \$50 billion,⁴ and, after strong first quarter growth, particularly in China, it stated that \$70 billion was possible.⁵ The worldwide debt securities market was valued at \$97 trillion in 2014.⁶

It appears that continued growth in the green bond market will be fueled by countries’ needs to meet the 2015 Paris Agreement carbon reduction targets, the interests of states and localities in cleaner local environments, and corporate interests. Corporate use of green bonds is largely driven by energy companies meeting growing demand for renewables and energy efficiency installations. It is also driven by corporations such as Apple, Toyota and Unilever choosing to pursue green strategies in manufacturing and other operational processes and using green bond financing as one way to highlight those activities.

As a related matter, it is worth noting that assets under management with environmental, social and governance (ESG) goals increased by nearly 8 times from 2010 to 2014 and now exceed \$4 trillion.⁷ The explosive growth of ESG-related investment funds is not only a driver of increased issuance of green bonds and related instruments, but also a significant

¹ African Development Bank, et. al.; Joint communication on a revised proposal for Green Bond impact reporting harmonization; December 2, 2015

² Climate Bonds Initiative; 2015 Green Bond Market Roundup

³ *ibid*

⁴ Moody’s Investor Service; Moody’s: Green bond issuance could exceed \$50 billion in 2016; Global Credit Research - 01 Feb 2016

⁵ Reuters; Moody’s lifts green bond issuance estimate to \$70 bln this year; by Nina Chestney; April 21, 2016

⁶ OECD; Green Bonds: Mobilising the Debt Capital Markets for a Low-Carbon Transition; December 2015

⁷ The Forum on Sustainable and Responsible Investing; Report on US Sustainable, Responsible and Impact Investing Trends, 10th Edition, 2014

statement of values and preferences by an influential body of opinion leaders. As such, it is likely a factor not simply in the decisions of corporations and units of government to issue green bonds for qualifying activities, but also, and far more importantly, to adopt more and more practices that merit a green label. And this is likely to grow as consumers and investors continue to make their preferences clear.

Background

The first labeled green bonds date to 2007 and 2008 when, in response to investor desire to support environmentally beneficial projects, the European Investment Bank and the World Bank structured bonds whose proceeds solely supported such projects.⁸ That is, rather than issue bonds to fund a variety of projects without reference to environmental impact, they instead segregated environmentally beneficial projects into issues that could then be labeled green.⁹

From a financial standpoint, green bonds are the same as other project-oriented bonds. That is, just like any bond financing, green bonds can be secured by, for example:

- The general credit strength of the issuing entity;
- Solely the specific project or projects financed by the specific bond issue; or
- A specific and dedicated revenue source, such a certain tax or fee.

To date, the vast majority of green bonds have been investment grade instruments,¹⁰ structured for purchase by the broadest possible investor market and not geared solely for environmental or social benefit funds.

Many of the uses of green bond proceeds, such as clean water projects, are not new. Instead, they are newly categorized and labeled as green. In addition, many green uses are financed with bonds not labeled green. Moreover, since there is no single definition of green, opinions differ on whether certain labeled green bonds are, in fact, green. So it is hard to measure how big the market actually is and the degree to which the growth in green bonds represents new environmentally beneficial activity. These caveats may become less relevant to the extent that green bond market growth is fueled by projects in emerging markets where environmental benefit may be a new national priority. The Climate Bond Initiative estimated the climate-aligned bond market, labeled green and otherwise, at \$598 billion in bonds outstanding as of mid-2015, of which \$66 billion were labeled green.¹¹

What is New About Green Bonds?

Green bonds are new in two ways:

- The bundling of uses of funds into solely environmentally-friendly purposes, and proclaiming them as such, so as to attract new or more investment. At the margin, this may lower the cost of capital and enable more green activities.

⁸ The World Bank; What are Green Bonds; 2015

⁹ The European Investment Bank calls its green bonds Climate Awareness Bonds.

¹⁰ IFC & Kellogg School of Management; Next Season's Green Bond Harvest: Innovations in Green Credit Markets; June 2014

¹¹ Climate Bonds Initiative; Bonds and Climate Change: The State of the Market in 2015; July 2015

- The use of transparency protocols related to green uses, which may include pre-issuance disclosures, an environmental opinion from an outside party, and a compliance protocol. These environmentally-related transparency processes are discussed more below (and come at a cost that may exceed any interest rate advantage associated with increased demand for green bonds).

In emerging markets, including China and India, where efforts to address environmental concerns are at a relatively earlier stage, the issuance of labeled green bonds can play a particularly important role in helping to reach carbon reduction targets. In addition, with the attendant transparency protocols, green bonds will make it easier for countries, developed and emerging, to demonstrate their progress towards carbon goals and for others to monitor progress from the earliest stages of implementation.

The aggregation of green uses has a marketing appeal to an apparently growing body of investors including:

- Retail investors, and funds that market to individuals, who want to support environmentally-friendly endeavors; and
- Institutional investors, whose motives include a desire to support green initiatives as well as a need to hedge against assets that are vulnerable to climate change. Per one estimate, as much as 55% of pension fund investments are exposed to climate risks.¹²

Although the uses of green bonds are not necessarily new, particularly in developed markets, the label lends “visibility to projects that might otherwise fly under the public’s radar.”¹³

For instance, water districts in the United States have been issuing bonds for clean water projects for decades. In 2014, the Washington, DC Water and Sewer Authority (DC Water) issued \$350 million in green bonds for a clean water project, and the project received a certain level of public notice as a “first green bond” in several categories, such as the first green century bond and the first green bond for clean rivers.¹⁴ In the past, this bond issue would have been categorized as a “water bond,” part of a large and mature market that tends not to get much press, no matter how important or environmentally beneficial the financed water projects might be. Similarly, the market for financing energy efficiency projects pre-dates green bonds, but this type of project is a core recipient of green bond proceeds.

It stands to reason that any investment grade green bond issue can be successfully sold with or without the green label. But, just as clearly, participants see advantage to the green label. Looking again at the DC Water example:

"It is a way to identify to the investor community who you are and what you do," said George Hawkins, general manager of the District of Columbia Water and Sewer Authority (DC Water). It helps municipalities attract a new cadre of investors

¹² The Economist 7/5/2014 – Green Grow the Markets, O; The World Bank; What are Green Bonds?

¹³ Inhabitat.com 02/16/16 -- MTA offers its first-ever green bonds to people who want to invest in the planet; by Cat DiStasio

¹⁴ Wall Street Journal; D.C. Water Authority to Issue 100-Year 'Green Bond'; July 2, 2014; Goldman Sachs website (<http://www.goldmansachs.com/who-we-are/progress/dc-water/index.html>)

who might otherwise ignore a water infrastructure bond program. Hawkins's team made a 100-year taxable green bond offering last July, and within a few hours on the first day of sale, they had \$1.1 billion in buy-orders, with \$116 million from socially responsible funds that only invest in green initiatives. The huge level of interest allowed DC Water to extend the initial offering from \$300 to \$350 million and to lower their interest rate by 15 basis points, which saved rate payers \$9 million. "It eclipsed all of our best case scenarios," Hawkins said.¹⁵

While it is impossible to prove that the green label made any difference in the success of the DC Water bond sale -- under favorable market conditions, any bond issue can be expanded in size and the interest rate lowered -- it is clear that the market finds the new label useful. In the words of the Investor Network on Climate Risk, green bonds "enable investors to incorporate environmental objectives into their investment strategies and, as such, are likely to attract increased investor interest."¹⁶

How Do We Know They are Green?

Although any issuer can call its bond issue green, the market is responding rapidly to protect the integrity and credibility of this emerging asset class by establishing standards.¹⁷

In particular, major institutional investors, such as public employee retirement funds, want to be able to invest in projects that are green and can be publicly declared as such without controversy. Others in the market -- issuers and underwriters -- want to accommodate that demand.

Similarly, countries want to use green bonds as a strategy supporting demonstrable and credible progress towards carbon reduction goals.

There are currently two sets of widely-accepted standards, and others are being developed. The two now most widely in use appear to be:

- Green Bond Principles (GBP), promulgated under the auspices of the International Capital Markets Association (ICMA), a trade association of major lenders, investors, law firms and others involved in the capital markets.
- Climate Bonds Standards, promulgated by the Climate Bonds Initiative (CBI), a London-based non-profit.

The GBP, described in more detail below, focus on transparency, so the investor community can make an informed judgment as to a particular green bond's environmental bona fides and impact. The GBP establish guidelines on the types of projects they seek to encourage, set forth a set of processes, including disclosure, and recommend that green bond issuers get an outside opinion as to whether the issuer has complied with the GBP.

The CBI expects an issuer to follow the GBP transparency processes and additionally sets specific standards that issuers must meet to be "Climate Bond Certified." CBI has established standards for solar, wind, low carbon buildings, low carbon transport and

¹⁵ Waterworld.com; Green Bonds: Are Your Projects A Good Fit?; By Sarah Fister Gale; undated

¹⁶ Ceres Investor Network on Climate Risk; A Statement of Investor Expectations for the Green Bond Market; 2/10/15

¹⁷ *ibid*

geothermal projects and is completing standards for projects related to bioenergy, water, land use, including agriculture and forestry, and the marine environment.¹⁸

The GBP and the CBI standards set a frame of reference that others are using for additional sets of criteria. For instance, financial market regulators in China and India have set criteria for issues from their markets in connection with their national strategies to reach Intended Nationally Determined Contributions (INDCs) associated with the COP21 agreements.¹⁹

China's standards set expectations with regard to transparency in the offering documents as well as segregation, tracking and reporting on use of proceeds. The standards encourage third party assessments.²⁰ China also established categories of projects eligible for green bond status.²¹ Reflecting the relative nature of environmental benefit, China's definition of green includes not only renewable energy, clean transport and other expected categories, but also cleaner coal standards.

India's standards provide no definition of green, but suggest that the Securities and Exchange Board of India (SEBI) will provide guidance. The SEBI standards require annual disclosure of the use of proceeds and projects financed, as well as procedures used for tracking the use of proceeds.²²

In March 2016, Moody's released a set of standards. The Moody's standards are not credit ratings but an assessment of an issuer's ability to manage the proceeds effectively. As such, the Moody's Green Bond Assessment, as it is called, judges "the relative likelihood that bond proceeds will be invested to support environmentally beneficial projects..."²³ In establishing its Assessment criteria, which result in a GB1 (Excellent) through GB5 (Poor) grade, Moody's cites the voluntary nature of the GBP and "variations around the interpretation and application" of the GBP.²⁴

It remains to be seen if a proliferation of standards will create confusion, rather than more transparency. It is likely that Moody's sees an opportunity in the proliferation for its assessment to act as an overlay that creates the transparency the market will require, much as its ratings do for the myriad credits seeking market access.

At the moment, it appears that the GBP are the most widely recognized standards, and they are described here in more detail.

An Executive Committee composed of equal numbers of major investors, issuers and underwriters oversees the GBP. Members currently include Blackrock, TIAA-CREF, The World Bank, Unilever, HSBC and JP Morgan Chase.

The initial GBP standards were issued in 2014, and the ICMA issued updated standards in 2015, including more specificity on expected environmental benefits.²⁵

¹⁸ Climate Bonds Initiative website

¹⁹ Environmental Finance; March 30, 2016; Setting the Standard; by Sophie Robinson-Tillett

²⁰ The People's Bank of China Announcement No. 39 [2015]; December 15, 2015

²¹ Green Finance Committee of China Society of Finance and Banking; Preparation Instructions on Green Bond Endorsed Project Catalogue (2015 Edition); October 2015

²² Securities and Exchange Board of India; SEBI Board Meeting minutes; January 11, 2016

²³ Moody's Investor Service; Green Bonds Assessment; March 30, 2016

²⁴ *ibid*

²⁵ Wall Street Journal; Updated Green-Bond Guidelines Show 'Incremental Progress' by Mike Cherney; Mar 27, 2015

The GBP defines green bonds as any bond instrument whose proceeds are used exclusively for “projects and activities that will promote progress on environmentally sustainable activities as defined by the issuer”²⁶ and that follow GBP transparency processes. Please note that the environmentally sustainable projects and activities are “as defined by the issuer.” While this gives one pause, the GBP are clear that the activities must be fully disclosed so as to enable investors to make their own determinations as to how green the financed activities may be. In addition, the GBP provides clear guidance on the types of projects they anticipate promoting, called “Green Projects,” including those addressing “climate change, natural resources depletion, biodiversity conservation and/or pollution,”²⁷ which may involve such activities as:

- Renewable energy
- Energy efficiency (including efficient buildings)
- Sustainable waste management
- Sustainable land use (including sustainable forestry and agriculture)
- Biodiversity conservation
- Clean transportation
- Sustainable water management (including clean and/or drinking water)
- Climate change adaptation²⁸

The GBP transparency processes, all to be clearly described in the offering documents, cover:

- The project selection process, including criteria for determining how the projects to be funded fit the Green Projects criteria and what the project’s environmental sustainability goals are;
- Management of bond proceeds, referred to as “ring-fencing” of proceeds, to track their use for eligible Green Project uses; and
- Reporting, where the GBP recommend an annual process detailing use of funds and environmental benefit.

Finally, the GBP recommend the use of outside assurances – a second opinion as to whether the financing has in fact complied with the GBP. Given that any issuer can call their bond “green,” and the term has no formal legal definition, a second opinion by a reputable organization creates credibility and lends value. It should be noted, however, that the opinions carry no guarantee that the proceeds will ultimately be used for green purposes. About 60% of total green bond issuance to date has incorporated a second-party review.²⁹

Organizations providing ‘green opinions’ include Deloitte and other major accounting firms, as well as specialized firms such as Sustainalytics, The opinions follow the GBP and include descriptions of:

- the intended use of proceeds
- the internal processes used to vet projects

²⁶ ICMA; The Green Bond principles; 2015 edition

²⁷ *ibid*

²⁸ *ibid*

²⁹ Barclays Credit Research; The Cost of Being Green; by Ryan Preclaw and Anthony Bakshi; September 18, 2015

- compliance and reporting processes and procedures
- a concluding opinion based on the information above.

CICERO (the Centre for International Climate and Environmental Research - Oslo), an academic consortium based in Oslo, which describes itself as “the world’s biggest provider of second opinions of green bonds,”³⁰ has introduced a “Shades of Green” methodology to enable some comparison of the relative environmental benefit from one green bond to the next (i.e., “how green is green”). The three-level methodology includes:

- Dark green, for projects implementing a 2050 climate solution today, such as solar or wind renewable energy;
- Medium green, for projects on the way to a 2050 climate solution, such as “sustainable buildings” with good energy efficiency ratings; and
- Light green, for projects providing short-term gains but not a long-term climate solution, such as energy efficiencies that reduce GHG emissions but do not shift away from a fossil fuel-based economy.³¹

Examples of Green Bond Financings

As of April 2016, there have been approximately 650 green bond issues worldwide.³² The first green bonds are attributed to the European Investment Bank and the World Bank in 2007 and 2008, and multilateral development banks remain major green bond issuers.³³ The World Bank’s initial green bond projects funded:

- Energy efficiency projects in Montenegro and China; and
- Wind and solar energy installations in rural Argentina.³⁴

The World Bank and other multilateral development banks were virtually the sole green bond issuers for several years, and the CBI attributes the substantial growth in the market to corporate and municipal issuers, who joined the market in 2013.³⁵ In 2016, green bond issues from emerging markets, particularly China, appear to be the biggest drivers of new growth.³⁶

The World Bank appears to remain the largest single issuer of green bonds, having issued 100 green bonds for 77 projects, committing US\$13.7 billion in the following categories:

- Renewable energy and energy efficiency – 38% of committed funds
- Transport – 34%
- Agriculture, forestry and eco-systems – 12%
- Water, waste water & solid waste management – 9%

³⁰ CICERO website; CICERO grades climate-friendly bonds with shades of green; by Christa Clapp and Asbjorn Torvanger; April 30, 2015

³¹ *ibid*

³² Climate Bonds Initiative website

³³ *ibid*

³⁴ The World Bank; Green Bond Investor Update; 2009

³⁵ Climate Bonds Initiative website

³⁶ *ibid*

- Resilient infrastructure, built environment & other – 7%³⁷

The World Bank further notes that its labeled green bonds, where 100% of the proceeds go towards green uses, represent only about one-quarter of its commitments with climate benefits.³⁸

Corporate use of green bonds is largely associated with the development of renewable sources and energy efficiency projects. Examples include:

- TenneT, a Dutch grid operator, issued \$1.2 billion in 2015 to develop grid connections for wind farms off the shore of Germany.³⁹
- Solar City, an American solar power system provider, has sold multiple tranches of green bonds to fund corporate expansion (i.e., the ability to provide more solar power systems).⁴⁰
- Unilever, in 2014, issued £250 million to fund multiple projects designed to reduce GHG emissions, water usage and waste generation by 50% in new factories and 30% in retrofitted factories.⁴¹
- Apple, in 2016, issued \$1.5 billion in green bonds for a series of energy efficiency projects throughout the company. An Apple official stated that the firm decided to issue the green bonds in the wake of the December 2015 Paris climate summit, at which many corporations pledged to combat climate change.⁴²

The examples below give a sense of green bond uses by public agencies in the United States:

- Massachusetts, in 2013, issued \$100 million in green bonds for a series of uses, including clean water, energy efficiency in State buildings, and open space protection. The issue did not have a second opinion and the proceeds were not 100% reserved for green uses.⁴³ This is an example of a self-declared green bond that pre-dates the GBP and, although praised by environmentalists,⁴⁴ does not meet current green bond standards.
- The New York Metropolitan Transportation Authority (MTA), in 2016, issued \$783 million in green bonds to support system upgrades for the subways and commuter rail systems serving New York City. The issue was originally sized at \$500 million and was increased due to favorable demand and pricing. The MTA bonds' uses meet the CBI's Low Carbon Transport Standards, and the bonds are Climate Bond Certified by CBI.⁴⁵
- Like DC Water, discussed above, the cities of Spokane, Cleveland and St. Paul have all issued green bonds to fund clean water projects.

³⁷ The World Bank Green Bond Impact Report; June 2015

³⁸ *ibid*

³⁹ Environmental Finance; Bond of the Year - Corporate: TenneT; May 3, 2016

⁴⁰ Bloomberg; SolarCity to Offer \$200 Million Retail Green Bonds Online; by Christopher Martin; October 15, 2014

⁴¹ Unilever website; Unilever issues first ever green sustainability bond; March 19, 2014

⁴² Reuters; Apple issues \$1.5 billion in green bonds in first sale; by Valerie Volcovici; 2/17/16

⁴³ CBI Blog; Massachusetts to issue AA+ \$100m Green Bond on 4 June May 23, 2013 by Sean Kidney

⁴⁴ *ibid*

⁴⁵ MTA website. MTA to Issue Its First 'Green Bonds'; 2/10/16

Impact of Green Bond-funded Initiatives

As with other aspects of the green bond market, impact measurement is undergoing rapid changes towards transparency and standardization. Whereas earlier impact reports, if they existed, were simple descriptions of projects, typically including, for instance, how much energy the project was expected to produce, more recent reports are more data-oriented and likely to include, at a minimum, an estimate of projected greenhouse gas (GHG) reduction levels.

There does not appear to be any aggregate data on green bond impact, and it appears that there are so many methodological and other differences that aggregate data will not be available for some time. Comparative data can present similar problems.

In December 2015, a group of 11 multilateral development banks active in the green bond market (The World Bank and others) released a proposal for more standardized reporting, which they termed a “Harmonized Framework.”⁴⁶ The statement includes a series of core principles, but it also illustrates how far the sector needs to progress in its impact reporting.

The core principles include:

- Issuers are “encouraged” to report annually on both use of proceeds and expected environmental impact.
- Issuers are “encouraged” to put in place a formal process for allocating funds to their declared green projects.
- “It is recommended” that issuers provide a list of green projects.
- “In case” the issuer verifies actual results achieved, “it is recommended” that the results be included in its reporting.
- To facilitate comparisons, “it is suggested” that issuers “aim to report” on a limited set of core indicators, including GHG emissions reduced or avoided, energy savings and renewable energy produced.
- “In the absence of one single commonly-used standard for the calculation of GHG emissions reduced/avoided, issuers may follow their own methodologies while making these available to investors.”⁴⁷

In short, the weakness of the core principles illustrates the difficulties of getting many large actors from around the world to commit to a single set of agreements. That said, the impact reports of The World Bank and the International Finance Corporation (IFC), which are both signatories to the Harmonized Framework, appear increasingly detailed and authoritative and provide most if not all of the information recommended and encouraged in the core principles.

For instance, the IFC, in its 2015 Green Bond Impact Report reported, “Total GHG

⁴⁶ African Development Bank, et. al.; Green Bonds - Working Towards a Harmonized Framework for Impact Reporting; December 2015

⁴⁷ *ibid*

reductions reached almost 2.5 million tons of CO₂e[.] [T]hat is equivalent of taking around 500,000 cars off the road or carbon sequestered by 2 million acres of U.S. forest in one year. Annual renewable energy generation of 3.5 million MWh is sufficient to supply over 300,000 U.S. homes with electricity.”⁴⁸ The report backs those totals with detailed lists of projects with individual impact estimates.

The 2015 report demonstrates the IFC’s quick progress in reporting. Its 2014 report, which was its first, was predominantly a set of project descriptions, with some estimates of energy production.

One IFC project demonstrates the many difficulties of defining “green” and reporting overall green impacts accurately. The project is the green bond financing of a hydroelectric dam on the Reventazón River in Costa Rica. The IFC, a subsidiary of the World Bank, is in many ways a green bond leader. It started its green bond program in 2010 and is a member of the Green Bonds Principles Executive Committee.⁴⁹ In November 2015, it released CICERO’s “Second Opinion” of its Green Bond program. CICERO noted IFC’s focus on GHG reductions and gave IFC’s program a “medium green” shading.⁵⁰

The Reventazón hydroelectric dam project is projected to produce 10% of the energy produced in Costa Rica and decrease carbon emissions by displacing fossil fuel power generation.⁵¹ The IFC impact report, from 2014, does not include an estimate of GHG reduction. At the same time, the project is classified, based on its Environmental Assessment, as a project likely to cause the highest level of environmental damage. Specifically, “it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented”⁵² because of the “potential significant and irreversible impacts on the Mesoamerican biological corridor which is considered critical habitat, the ecological integrity of the Reventazón River, and on the complex and ecologically sensitive downstream ... hydro-biological system.”⁵³

Green Bonds’ Financial Performance

Over most of their brief history, green bonds have performed similarly to comparably rated non-green bonds.⁵⁴ This makes sense, since green bonds are differentiated from other bonds by virtue of the uses of proceeds and not by credit strength or financial structure.

Barclays released a report in 2015 showing green bonds trading at a 20 basis point premium to comparable bonds over the course of that year.⁵⁵ Presumably, there should be no pricing differential between comparable green and non-green bonds. It is reasonable to assume, for instance, that none should exist between, say, an Apple green bond and an Apple non-green bond.

⁴⁸ IFC; Green Bond Impact Report FY 2015.

⁴⁹ IFC.org; Overview of IFC’s Green Bonds

⁵⁰ CICERO; ‘Second Opinion’ on IFC’s Green Bond Framework; 23 November 2015

⁵¹ IFC; Green Bond Stories of Impact; circa 2015 (undated)

⁵² IFC.org; excerpt from World Bank Operational Policy 4.01, Environmental Assessment, January 1999

⁵³ IFC Projects Database; Reventazon HPP Environmental & Social Review Summary

⁵⁴ Barclays Credit Research; The Cost of Being Green; by Ryan Preclaw and Anthony Bakshi; September 18, 2015

⁵⁵ *ibid*

Nonetheless, there are specific reasons why there could be a pricing differential. Most particularly, it is possible that demand for green bonds simply outstrips supply or has at certain times, as more and more investors want to support environmentally beneficial endeavors. The Barclays report cites the nearly eight-fold growth of funds with ESG goals as a possible explanation.⁵⁶ The performance of green bonds, particularly as compared to otherwise similar non-green bonds, will be an interesting and important area of continued inquiry.

Per the CBI, no green bonds have defaulted to date.⁵⁷ This is not surprising, since the green bond market is quite young and has been dominated by very strong issuers for much of its brief existence, such as the triple-A rated World Bank. As the market matures over time and as it further diversifies into non-investment grade and other lower-rated issuers, the green bond market should experience defaults at rates similar to the market as a whole. To the extent that the defaults are related to standard business failures, they should not have a significant impact on green bonds and the reputation of the market. Should a default be related to a deceptive or fraudulent activity – if Volkswagen had financed its diesel engines via green bonds, for instance – it could have a serious impact on the credibility of the green bond market.

What's Next for Green Bonds?

The future of green bonds appears likely to include continued:

- Growth
- Standardization
- Transparency

Given the evident success of green bond issues, some of the immediate growth may come simply from attaching a green label to existing activities that already meet green standards. New issue clean water bonds in the United States alone, for instance, are approximately \$15 billion per year. On their own, they would represent a roughly 35% increase in the 2015 green bond volume. This is significant in terms of supporting the green bond market, but does not represent any additional environmentally beneficial activity.

Much greater and more meaningful growth is likely to come from meeting the investment needs associated with GHG reductions. Moody's states that meeting the emissions targets of the December 2015 Paris Agreement "will require an unprecedented allocation of capital, measured in trillions of dollars a year."⁵⁸ Moody's further notes, "Green bonds have gained attention for their potential role in mobilizing capital toward environmental solutions."⁵⁹

China, in particular, is poised to become a major presence in the green bond market "due to central bank policy support and incentives announced for financial institutions issuers in the form of collateral eligibility, relending and interest subsidies -- terms which are generally

⁵⁶ *ibid*

⁵⁷ email response to inquiry, 5/24/16

⁵⁸ Moody's Investor Service; Green Bonds Assessment; March 30, 2016

⁵⁹ *ibid*

not available in other countries.”⁶⁰ Indeed, in the first quarter of 2016, Chinese entities issued the largest volume of green bonds.⁶¹ It is too early to know if this is a trend.

To date, most green bond issues have been fairly plain vanilla -- highly rated, low risk, with recourse to the issuer.⁶² The market is becoming more diversified, however, with other types of issues, including project bonds backed solely by the revenues of a given project, such as a wind farm, and asset-backed securities, formed by joining together hundreds or thousands of contracts. The first asset-backed green bonds were issued in 2013 as a security backed by over 100 wind, solar and energy efficiency projects.⁶³ Depending on the credit, any of these can be investment grade or high-yield (aka, junk) bonds, and high yield may be an area of growth.

In connection with the December 2015 Paris Agreement, a group of institutional investors representing \$10 trillion in assets released "The Paris Green Bonds Statement," in which they recognized the “significant risk” of climate change and made three broad recommendations to support the continued growth of a green bond market “that makes a real contribution to addressing climate change.” The recommendations call for:

- Government action in the form of policies, regulations and credit supports, such as guarantees and tax credits, to support investments that address climate change while allowing the investors to meet their fiduciary responsibilities;
- Clear standards, created by recognized and independent experts, to measure the climate change impacts and benefits of financed projects; and
- Increased transparency with regard to use of proceeds and project benefit, including the use of credible third party reviews and verifications.⁶⁴

Market participants are moving rapidly to enhance the green bond sector by creating more precise standards and demanding increasing levels of transparency. Each of these will support continued growth. The degree of government action to support yet more growth, growth at the levels needed to meet climate change targets, remains to be seen.

* * *

⁶⁰ Moody’s Investor Service; Moody’s: Green bond issuance could exceed \$50 billion in 2016; Global Credit Research – February 1, 2016

⁶¹ Reuters; Moody’s lifts green bond issuance estimate to \$70 bln this year; by Nina Chestney; April 21, 2016

⁶² IFC & Kellogg School of Management; Next Season’s Green Bond Harvest: Innovations in Green Credit Markets; June 2014

⁶³ *ibid*

⁶⁴ ACTIAM, et. al. The Paris Green Bonds Statement; December 2015

Sources:

Climate Bonds Initiative (CBI) website (<https://www.climatebonds.net>)

CBI 2015 Green Bond Market Roundup

(<http://www.climatebonds.net/files/files/2015%20GB%20Market%20Roundup%2003A.pdf>)

Moody's Investor Service; Moody's: Green bond issuance could exceed \$50 billion in 2016; Global Credit Research - 01 Feb 2016 https://www.moodys.com/research/Moodys-Green-bond-issuance-could-exceed-50-billion-in-2016--PR_343234

Reuters; Moody's lifts green bond issuance estimate to \$70 bln this year; by Nina Chestney; April 21, 2016 <http://www.reuters.com/article/climatechange-greenbonds-moodys-idUSL5N17O5MY>

OECD; Green Bonds: Mobilising the Debt Capital Markets for a Low-Carbon Transition; December 2015

The World Bank; What are Green Bonds; 2015

Climate Bonds Initiative; Bonds and Climate Change: The State of the Market in 2015; July 2015

Sustainalytics opinion of Apple green bond of 2/16/16

(http://www.sustainalytics.com/sites/default/files/apple_green_bond_framework_and_opinion_-_16-02-2016.pdf)

The Economist 7/5/2014 – Green Grow the Markets, O

(<http://www.economist.com/news/finance-and-economics/21606326-market-green-bonds-booming-what-makes-bond-green-green-grow>)

CFA Institute Blog; Green Bonds: What's Right; What's Wrong; By Usman Hayat, CFA; July 9, 2015 (<https://blogs.cfainstitute.org/investor/2015/07/09/green-bonds-whats-right-whats-wrong/>)

Triple Pundit; Why are Investors Paying Over market for Green Bonds; 9/29/2015

(<http://www.triplepundit.com/2015/09/investors-paying-market-rates-green-bonds/>)

Green Bond Principles; International Capital Market Association; 3/27/2015

Moody's Investor Service; Green Bonds Assessment; March 30, 2016

World Bank Report (<http://treasury.worldbank.org/cmd/htm/World-Bank-Launches-Green-Bond-Impact-Report.html>)

Reuters; Apple issues \$1.5 billion in green bonds in first sale; by Valerie Volcovici; 2/17/16;

<http://www.reuters.com/article/us-apple-greenbonds-idUSKCN0VQ2K2>

The Guardian; Can Apple's \$1.5bn green bond inspire more environmental investments?;

3/20/16 (<http://www.theguardian.com/sustainable-business/2016/mar/20/apple-green-bond-environment-energy-toyota-climate-change?CMP=ema-1706&CMP=>)

Wall Street Journal; D.C. Water Authority to Issue 100-Year 'Green Bond'; by Mike Cherney; July 2, 2014 (<http://www.wsj.com/articles/d-c-water-authority-to-issue-100-year-green-bond-1404326402>)

Goldman, Sachs website - <http://www.goldmansachs.com/who-we-are/progress/dc-water/index.html>

Inhabitat.com 02/16/16 -- MTA offers its first-ever green bonds to people who want to invest in the planet; by Cat DiStasio

Wall Street Journal Updated Green-Bond Guidelines Show 'Incremental Progress'

By Mike Cherney; Mar 27, 2015 <http://blogs.wsj.com/moneybeat/2015/03/27/updated-green-bond-guidelines-show-incremental-progress/>

Ceres.org; How Green is that Bond? by Peter Ellsworth, Director, Investor Program, Ceres; Mar 23, 2015 <http://www.ceres.org/press/blog-posts/how-green-is-that-bond>

Ceres.org; Press Release: Investors Encourage Further Transparency, Standardization to Spur Green Bond Market Growth; Feb 10, 2015; <http://www.ceres.org/press/press-releases/investors-encourage-further-transparency-standardization-to-spur-green-bond-market-growth>

Ceres Investor Network on Climate Risk; A Statement of Investor Expectations for the Green Bond Market; 2/10/15

Green Biz - What Green Bond indices tell us; Michael Puckett; Tuesday, June 9, 2015 <https://www.greenbiz.com/article/what-green-bond-indices-tell-us>

Micheal Puckett is - Manager, Clean Energy Finance Forum; Yale University

Welcome to the Wild West of green bonds; Iliana Lazarova; Tuesday, March 8, 2016 <https://www.greenbiz.com/article/welcome-wild-west-green-bonds>

Waterworld.com; Green Bonds: Are Your Projects A Good Fit?; By Sarah Fister Gale; undated <http://www.waterworld.com/articles/print/volume-31/issue-3/features/green-bonds-are-your-projects-a-good-fit.html>

National Association of Clean Water Agencies (NACWA) & Association of Metropolitan Water Agencies (AMWA); The Impacts of Altering Tax-Exempt Municipal Bond Financing on Public Drinking Water & Wastewater Systems; July 2013 http://www.amwa.net/sites/default/files/AMWA-NACWA_MuniBondAnalysis_July13.pdf

Barclays, US Credit Focus; The Cost of Being Green; 9/18/2015; https://www.environmental-finance.com/assets/files/US_Credit_Focus_The_Cost_of_Being_Green.pdf

Wall Street Journal; 'Green Bonds' for a Parking Garage?; By Mike Cherney; March 12, 2015

<https://www.google.com/search?client=safari&rls=en&q=www.wsj.com/articles/green-bonds-for-a-parking-garage-1426176294&ie=UTF-8&oe=UTF-8>

Bloomberg; New York's Subways Court Millennials With First Green Bonds; by Martin Z Braun; February 10, 2016 <http://www.bloomberg.com/news/articles/2016-02-10/new-york-s-subways-add-new-brand-to-its-bonds-environmentalist>

MTA website. MTA to Issue Its First 'Green Bonds'; 2/10/16 <http://www.mta.info/news-bonds-green-bonds-mta/2016/02/10/mta-issue-its-first-'green-bonds'>

NYC Comptroller; A Green Bond Program for New York City; April 2015

The World Bank Green Bond Impact Report; June 2015

The World Bank; Green Bond Investor Update; 2009

IFC; Green Bond Stories of Impact; circa 2015 (undated)

IFC; Green Bond Impact Report FY 2015

IFC.org; Overview of IFC's Green Bonds

http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Finance/Investor+Information/Green_Bonds

CICERO; 'Second Opinion' on IFC's Green Bond Framework; November 2015

IFC Projects Database; Reventazon HPP Environmental & Social Review Summary

<http://ifcextapps.ifc.org/ifcext/spiwebsite1.nsf/78e3b305216fcdba85257a8b0075079d/32d788deecf0a3d885257a2c00550cf3?opendocument>

Excerpt from World Bank Operational Policy 4.01, Environmental Assessment, January 1999;

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTENVAS/S/0,,contentMDK:20484429~menuPK:1182591~pagePK:148956~piPK:216618~theSitePK:407988,00.html>

African Development Bank, et. al.; Green Bonds - Working Towards a Harmonized Framework for Impact Reporting; December 2015

African Development Bank, et. al.; Joint communication on a revised proposal for Green Bond impact reporting harmonization; 02 December 2015

Environmental Finance; Bond of the Year - Corporate: TenneT; May 3, 2016

Bloomberg; SolarCity to Offer \$200 Million Retail Green Bonds Online; by Christopher Martin; October 15, 2014

Unilever website; [Unilever issues first ever green sustainability bond](#); March 19, 2014

Euromoney.com; CSR: Impact Reporting Colours Green Bonds; by Catherine Snowdon; January 2016 <http://www.euromoney.com/Article/3518670/CSR-Impact-reporting-colours-green-bonds.html?copyrightInfo=true>

Euromoney.com; Bond markets: After Volkswagen, Trust is Key for Green Growth; by Catherine Snowdon and Tessa Wilkie; November 2015
<http://www.euromoney.com/Article/3502954/Bond-markets-After-Volkswagen-trust-is-key-for-green-growth.html>

ACTIAM, et. al. The Paris Green Bonds Statement; December 2015

IFC & Kellogg School of Management; Next Season's Green Bond Harvest: Innovations in Green Credit Markets; June 2014

Environmental Finance; March 30, 2016; Setting the Standard; by Sophie Robinson-Tillett
<https://www.environmental-finance.com/content/analysis/setting-the-standard-2016.html>

Environmental Finance; March 3, 2016; Green Bond Principles working group on defining 'green' holds first meeting by Hamza Ali <https://www.environmental-finance.com/content/news/green-bond-principles-working-group-on-defining-green-holds-first-meeting.html>

Environmental Finance; 2/26/16; Are investors beginning to pay up for green bonds? By Hamza Ali <https://www.environmental-finance.com/content/analysis/are-investors-beginning-to-pay-up-for-green-bonds.html>

Environmental Finance; April 15, 2015; Unilever's green bond: a difference of opinions; Pernille Holtedahl, et al. <https://www.environmental-finance.com/content/analysis/unilevers-green-bond-a-difference-of-opinions.html>

CBI Blog; Massachusetts to issue AA+ \$100m Green Bond on 4 June May 23, 2013 by Sean Kidney <http://www.climatebonds.net/2014/05/massachusetts-issue-aa-100m-green-bond-4-june>

Enterprising Investor blog of the CFA Institute; Green Bonds: What's Right, What's Wrong
By Usman Hayat, CFA; July 9, 2015
<https://blogs.cfainstitute.org/investor/2015/07/09/green-bonds-whats-right-whats-wrong/>

Triple Pundit; Why Are Investors Paying Over Market Rates For Green Bonds; by Graham Sinclair; Sep 29th, 2015 <http://www.triplepundit.com/2015/09/investors-paying-market-rates-green-bonds/>

Bloomberg; Investors Are Paying Extra for Environmentally Friendly Bonds, Barclays Says; by Tracy Alloway; September 18, 2015
<http://www.bloomberg.com/news/articles/2015-09-18/investors-are-paying-extra-for-environmentally-friendly-bonds-barclays-says>

Barclays Credit Research; The Cost of Being Green; by Ryan Preclaw and Anthony Bakshi; September 18, 2015

The Forum on Sustainable and Responsible Investing; Report on US Sustainable, Responsible and Impact Investing Trends, 10th Edition, 2014

Default Risk of Securitized Commercial Mortgages: Do Sustainability Property Features Matter? Xudong An, Gary Pivo; March 30, 2015, revised April 16, 2015

World Resources Institute; With New Guidelines, China's Green Bond Market Poised to Take Off in the Year of the Monkey; by Shouqing Zhu; January 08, 2016
<http://www.wri.org/print/43743>

Climate Bonds Initiative; India's securities' regulator finalises official green bond listing requirements + says green bonds are a tool to finance India's INDC (national climate change plan) - yes they are!; by Sean Kidney; Jan 12, 2016
<https://www.climatebonds.net/2016/01/india's-securities'-regulator-finalises-official-green-bond-listing-requirements-says-green>

Securities and Exchange Board of India; SEBI Board Meeting minutes; January 11, 2016
<http://203.199.247.102/sebiweb/home/detail/32793/yes/PR-SEBI-Board-Meeting>

World Resources Institute; By Taking 5 Steps, China Can Start Leading the Green Finance Revolution; by Shouqing Zhu; November 11, 2015
<http://www.wri.org/blog/2015/11/taking-5-steps-china-can-start-leading-green-finance-revolution>

The People's Bank of China Announcement No. 39 [2015]; December 15, 2015

Green Finance Committee of China Society of Finance and Banking; Preparation Instructions on Green Bond Endorsed Project Catalogue (2015 Edition); October 2015

CICERO website; CICERO grades climate-friendly bonds with shades of green; by Christa Clapp and Asbjorn Torvanger; April 30, 2015
<http://www.cicero.uio.no/en/posts/single/cicero-grades-climate-friendly-bonds-with-shades-of-green>

Climate Bonds Initiative; Scaling Up Green Bond Markets for Sustainable Development – An Executive Briefing; September 2015

Climate Bonds Initiative; Scaling Up Green Bond Markets for Sustainable Development - A strategic guide for the public sector; September 2015

Climate Bonds Initiative; So what's next? How to grow green bond markets around the world; 2015

EDF+Business blog; With Green Bonds, Legitimacy Comes to Those Who Verify; By: Namrita Kapur / Wed, Mar 30, 2016 <http://business.edf.org/blog/2016/03/30/with-green-bonds-legitimacy-comes-to-those-who-verify/>