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Green Bonds: What's New, What's Next and Why Does it Matter?

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Summary

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

Although green bonds are a relatively new asset class, they are not a new financing mechanism. That is, they are debt instruments differentiated from other debt instruments by virtue of their targeted uses of proceeds and not by their financial architecture.

Green bonds are only meaningful to the extent that they represent environmentally beneficial activity, but there is no single definition of a green bond and, in fact, a green bond can be self-declared by the issuer. But because the green bond market is driven in large part by investor interest in supporting environmental solutions, there is great demand for transparency with regard to intended and actual uses of bond proceeds, and certain standards, definitions and processes have gained widespread acceptance in the market place.

The issuance of green bonds is growing very rapidly, though it is still a small portion of the overall debt market. Global sales of labeled green bonds have exceeded \$200 billion (\$US) in 2019, up from \$168 billion in 2018, \$81 billion in 2016, \$37 billion in 2014, and \$2.6 billion in 2012.² The worldwide debt securities market included bond sales of \$21 trillion in 2017,³ meaning that green bonds have now grown to about one percent of the total.

Growth in the market includes growing diversification of issuers, uses and geography:

- Green bond issuers were largely confined to multilateral development banks through 2012. Issuers now include commercial banks, industrial corporations, real estate entities, government-affiliated entities, such as transportation and water authorities, and governments, with green bonds increasingly seen as an instrument of policy.
- While renewable energy and energy efficiency projects have remained prevalent uses since the initial green bonds, uses now include low carbon transport, sustainable water, green buildings and other uses.
- In 2012, green bond issues were originated in 6 countries; in 2018, 44 countries.⁴

Coupled with investor demand, continued growth in the green bond market is fueled by countries' desires to meet their Nationally Determined Contributions (NDCs) toward 2015 Paris Agreement carbon reduction targets, the interests of states and localities to make local environments cleaner, as well as various corporate interests. Corporate use of green bonds is largely driven by demand for renewables, energy efficiency installations by energy companies and property owners, and by corporations such as Apple, Toyota and Unilever choosing green strategies in products, manufacturing and/or other operational processes. Green bond financing is one method companies use to highlight these activities to the public.

The success of the green bond market has contributed to the growth of a larger fixed income market supporting environmental, social and governance (ESG) goals. That includes green loans, as well as new types of labeled bonds, such as social bonds and sustainability bonds. Social bonds support such uses as affordable housing, food security and access to essential services including healthcare and education. Sustainability bonds incorporate both green and social bond features.⁵ This new labeled-bond universe is sometimes linked to projects and developments supporting the

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 (CBI); 2019 figure is \$212 billion through October per CBI website. Green Bonds State of the Market 2018; March 2019. Green Bonds Market Summary Q1 2018; April 2018. Green Bond Highlights 2016; Jan 2017. Year 2014 Green Bonds Final Report; Jan 15, 2015. Please note these figures exclude certain labeled green bonds that do not meet green bond standards, as judged by the CBI. Measurement of green bond activity tends to vary somewhat from source to source, based on differing standards of “green.”

³ Securities Industry and Financial Markets Association (SIFMA); 2018 Fact Book

⁴ Environmental Finance; The Green Bond Database. CBI; 2018 Green Bond Market Survey; Jan 2019

⁵ International Capital Markets Association (ICMA); Social Bond Principles; June 2018. ICMA; Sustainable Bond Guidelines; June 2018

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realization of the UN's Sustainable Development Goals.

As a related matter, it is notable that assets under management in the U.S. with ESG goals grew nearly six-fold from 2012 to 2018 and now exceed \$11 trillion.⁶ This explosive growth, mirrored internationally, is a significant statement of investors' values and preferences. 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 continue to grow as more and more people – as consumers, investors, and citizens – 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.⁷ That is, rather than issue bonds to fund a variety of projects without specific reference to environmental impact, they instead segregated environmentally beneficial projects into issues that could then be labeled green.

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 as a certain tax or fee.

To date, the vast majority of green bonds have been investment grade instruments,⁸ structured for purchase by the broadest possible investor market and not geared solely for environmental or social benefit funds.

The figures cited above on the green bond market's growth are based on bonds that are specifically labeled as green.⁹ The growth is impressive and an important marker of investor preferences and issuers' responses to environmental challenges, but it needs to be understood as an indicator rather than an accurate measure of new, additional or total debt-financed green activity. This is for several reasons:

- Many green uses are financed with bonds not labeled green. "Pure play" entities, such as Tesla and solar power companies, sometimes choose to issue without a specific green label.¹⁰ Green projects can also be included within issues that fund a variety of uses. The World Bank, for instance, has noted 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.¹¹
- Similarly, many of the uses of green bond proceeds, including such traditional areas of municipal finance as clean water projects and mass transit improvements, are not new. Instead, they may be newly categorized and labeled as green (and most climate-aligned U.S. municipal bonds continue to be issued without a green label).¹²
- Although there is a great deal of work focused on defining green bond eligibility, there is no single definition of green, and opinions can differ on whether certain labeled green bonds are, in fact, green. This can be technical and around the edges, such as whether or not an

⁶ The Forum on Sustainable and Responsible Investing; Report on US Sustainable, Responsible and Impact Investing Trends, 2016 and 2018 editions

⁷ The World Bank; What are Green Bonds; 2015

⁸ Moody's puts the figure at 98.6% investment grade for 2016 and 93.9% for 2017 through three quarters. Moody's Investor Service; Moody's: Global green bond issuance in 2017 eclipses 2016 record; Nov 9, 2017

⁹ Volume figures in this paper are as reported by the Climate Bonds Initiative (CBI). Other organizations tracking green bond issuance include Environmental Finance, Bloomberg, and Moody's. Their figures differ somewhat, typically based on technical interpretations of issuers' compliance with green bond standards.

¹⁰ Chasen, Emily; Tesla Skipping Green Bond Label Keeps Fledgling Market Limited; Bloomberg; Aug 16, 2017

¹¹ The World Bank Green Bond Impact Report; June 2015

¹² CBI; Bonds and Climate Change; Sept 2018. CBI data (as of 6/30/2018), puts outstanding unlabeled, climate-aligned municipal bonds at \$250 billion, as compared to \$14 billion in labeled municipal bonds

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issuer's reporting meets accepted verification standards, or more basic, as in the case of China's green bond standards, which include some coal-related uses. To give a sense of scale, the Climate Bond Initiative's \$168 billion green bond total for 2018 excludes \$24 billion in labeled green bonds that the CBI determined did not meet international standards.¹³ About half of the excluded bonds were issued in China.¹⁴

- Green bonds are often used to refinance an existing project.

To put it another way, the lack of a green label doesn't mean a funded activity isn't green, and the presence of a green label doesn't necessarily mean an activity is new or additional, and it may not even mean the activity meets a widely accepted definition of green. So it is hard to measure how big the market of bonds supporting green activities actually is and the degree to which its growth represents new environmentally beneficial activity.

These caveats may become less relevant as definitions are standardized and the market for labeled green bonds gets larger, particularly to the extent that market growth is fueled by projects in China, India and emerging markets where environmental benefit may be a new national priority and virtually every new appropriately labeled green financing can make an environmental contribution.

The CBI estimates the climate-aligned bond market, labeled green and otherwise, at \$1.45 trillion in bonds outstanding as of June 30, 2018, of which \$389 billion were labeled green.¹⁵

What is New About Green Bonds?

The advent of green bonds triggered a certain level of head scratching on Wall Street, with many wondering why the fuss given the absence of any financial innovation. Even when the proceeds are used to fund some kind of new environmental solution, for instance, the same can be done with non-green bonds, as in the Tesla example cited above. One columnist neatly summarized the skeptics' view: "Trendy green bonds offer little beyond feel-good vibes..."¹⁶

But it has become clear that the green bond concept speaks very powerfully to the preferences of a large and growing body of investors. This suggests a marketing advantage to green bonds that is more than just a "feel-good vibe." Beyond claiming a green aura, properly labeled green bonds represent something real: actual environmental benefit and the information needed to verify that accomplishment. And this gets to what is new about green bonds and what they contribute towards environmental solutions. They:

- Bundle uses of funds into solely environmentally-friendly purposes, and
- Use transparency protocols related to green uses (discussed further below), which may include pre-issuance disclosures, an environmental opinion from an outside party, and a compliance protocol.

That is, in an investment market exploding with interest in supporting environmentally sustainable projects, properly labeled green bonds provide the green uses and information to prove it. This is hugely valuable not only to investors, but also to the companies, countries, states and localities that want to make and demonstrate verifiable progress towards environmental goals.

The bundling of green uses helps not only those who want to support environmentally-friendly endeavors, but also those who additionally want to diversify their portfolios, including hedging against assets that are vulnerable to climate change. Per one study, as much as 55% of pension fund investments are exposed to climate risks.¹⁷ Similarly, the European Union's High-Level Expert

¹³ CBI; Green Bonds, State of the Market 2018

¹⁴ CBI & China Central Depository Clearing Company; China Green Bond Market 2018; Feb 2019. Per this report, 74% of Chinese green bonds issued in 2018 met international standards, up from 62% in 2017.

¹⁵ CBI; Bonds and Climate Change; Sept 2018

¹⁶ Amante, Maria; Trendy Green Bonds Offer Little Beyond Feel-Good Vibes For Issuers, Investors; Forbes; Feb 9, 2018

¹⁷ World Bank; What are Green Bonds. Asset Owners Disclosure Project (AODP); Global Climate Index 2013-2014. Although the AODP report is now 5+ years old, its findings are supported by the 2017 HLEG study cited in the next footnote. More recent AODP reports, which do not have this specific statistic, note the progress made and the distance yet to go. A 2018 study of the 100 largest public pension funds (Shareaction/AODP; Pensions in a Changing Climate; Nov 2018) found 1% of assets invested in low-carbon solutions, a figure which is similar to green bonds' proportion of the bond market.

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Group on Sustainable Finance (HLEG) reports institutional investor equity assets at 45% in carbon-intensive sectors and less than 1% in green infrastructure assets.¹⁸

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”,¹⁹ and there is value in public awareness of environmental progress.

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.²⁰ 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.

Issuers – the users of green bond proceeds – 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 [DC Water]. It helps municipalities attract a new cadre of investors who might otherwise ignore a water infrastructure bond program. Hawkins’s team made a 100-year taxable green bond offering ... 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.²¹

DC Water is not alone in its experience. Among many other examples, the Low Income Investment Fund, a non-profit Community Development Financial Institution (CDFI), issued a \$100 million sustainability bond in 2019, combining green and social features and tracking to eight of the UN’s Sustainable Development Goals (SDGs). The bond issue was 10 times oversubscribed, enabling a favorable re-pricing.²² The NY State Housing Finance Agency (HFA) has issued over \$1 billion in bonds for affordable housing meeting a low carbon building standard. In a presentation, an HFA executive said he was convinced that meeting green standards and adding a green label brought his agency more bond buyers, which could lead to lower borrowing costs.²³

While it may be impossible to prove that the green or sustainability label made any difference in the success of the DC Water and other bond sales -- 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.”²⁴

How Do We Know They are Green?

Although any issuer can call its bond issue green, once the universe of issuers moved in 2013 beyond the relatively few quasi-public development banks to include the far larger world of private

¹⁸ High-Level Expert Group (HLEG) on Sustainable Finance; Financing a Sustainable European Economy Interim Report; July 2017

¹⁹ DiStasio, Cat; MTA offers its first-ever green bonds to people who want to invest in the planet; Inhabitat.com; 02/16/16

²⁰ Cherney, Mike; D.C. Water Authority to Issue 100-Year ‘Green Bond’; Wall Street Journal; July 2, 2014; Goldman Sachs website (<http://www.goldmansachs.com/who-we-are/progress/dc-water/index.html>)

²¹ Gale, Sarah Fister; Green Bonds: Are Your Projects A Good Fit?; Waterworld.com; undated

²² Childs, Mary; A New ‘Sustainability Bond’ Got 10 Times the Investor Interest It Needed; Barron’s; July 31, 2019

²³ CBI; Green Bond Database. Sustainalytics; NY State Housing Finance Agency Climate Bond Verification Letter; Nov 11, 2016. Presentation at Environmental Finance ESG in Fixed Income Conference; New York City; Sept 17, 2019

²⁴ Ceres Investor Network on Climate Risk; A Statement of Investor Expectations for the Green Bond Market; Feb 10, 2015

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companies and municipal issuers,²⁵ the investment market responded rapidly to protect the integrity of the asset class by establishing standards.

The standards, although voluntary, appear to be effective. Investors, who want to be confident that their green preferences are met, predominantly invest through major funds such as public employee retirement systems and money management firms with large and capable research departments. Others in the market – issuers and underwriters -- want to accommodate investor demand by adhering to verifiable green bond standards.

Similarly, adherence to green bond standards enables companies, and now countries, to make investments that credibly demonstrate progress towards carbon reduction and other climate goals.

There are currently two sets of widely-accepted standards, and they compliment each other:

- Green Bond Principles (GBP), which focus on transparency and disclosure; and
- Climate Bonds Standards, which set specific green performance standards.

Others sets of standards have been developed, and yet more are in development, including country-specific standards. They generally build on and compliment the GBP and Climate Bond Standards, though there is concern of standards proliferation, as has occurred in other areas of green finance.²⁶

The GBP were 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 (That is, the GBP are a product of some of the largest, most sophisticated and most established capital market actors). The GBP's transparency protocols, described in more detail below, enable the investor community to make informed judgments 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 Climate Bonds Standards are promulgated by the Climate Bonds Initiative (CBI), a London-based non-profit. CBI expects an issuer to follow the GBP transparency processes and additionally sets specific performance standards that funded projects must meet to be "Climate Bond Certified." CBI has established or is completing standards for renewable energy uses, including solar, wind, geothermal and bioenergy; low carbon buildings and transport; land uses, including forestry, agriculture, land conservation and restoration; and water uses.²⁷ CBI has also set out principles defining projects that can meet a climate resilience definition.²⁸

The GBP processes and the CBI performance standards set a frame of reference that financial regulators in many countries are using for additional sets of criteria. For instance, regulators in China and India have set criteria for issues from their markets in connection with their national strategies to reach NDCs associated with the Paris agreements.²⁹

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.³⁰ China also established categories of projects eligible for green bond status.³¹ 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. The GBP and CBI exclude any coal uses, and an effort is under way to harmonize China's

²⁵ CBI website

²⁶ Roumpis, Nick; EIB and China working on "Rosetta Stone" of Green Finance; Environmental Finance; Nov 13, 2017. Hurley, M.; Proliferation of Standards is Impediment to Green Bond Market, says EIB; Environmental Finance; Oct 30, 2017

²⁷ CBI website

²⁸ CBI; Climate Resilience Principles: A Framework for Assessing Climate Resilience Investments; Sept 2019

²⁹ Robinson-Tillett, Sophie; Setting the Standard; Environmental Finance; Mar 30, 2016

³⁰ The People's Bank of China Announcement No. 39 [2015]; Dec 15, 2015

³¹ Green Finance Committee of China Society of Finance and Banking; Preparation Instructions on Green Bond Endorsed Project Catalogue (2015 Edition); Oct 2015

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standards with those of the West.³² The CBI excluded 26% of China's 2018 green bonds from its reported totals for the year.³³

India's standards, updated in 2017 by the Securities and Exchange Board of India (SEBI), follow the GBP, including eligible project categories, disclosure of the use of proceeds and projects financed, as well as procedures used for tracking the use of proceeds.³⁴

Moody's, in 2016, established a set of standards to assess an issuer's ability to manage the proceeds effectively and accomplish its green goals. In establishing its Green Bond Assessment criteria, which result in a GB1 (Excellent) through GB5 (Poor) grade, Moody's notes that green bonds are "generally" issued pursuant to the GBP, but cites the voluntary nature of the GBP and "variations...around the interpretation and application" of the GBP, particularly with regard to external reviews and assurances.³⁵

Although the various standards appear to be working together reasonably well, Moody's may see 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.³⁶

The GBP are the most widely recognized and replicated standards, and they are described here in more detail.

An Executive Committee, composed of equal numbers of major international investors, issuers and underwriters, oversees the GBP. Members currently include BlackRock, PIMCO, the World Bank, the European Investment Bank, HSBC and Bank of America Merrill Lynch.

The initial GBP standards were issued in 2014, with updates since then designed to protect the integrity of the market. Updates have included more specificity on expected environmental benefits and expected disclosure and external review, including suggested templates.³⁷

The GBP defines green bonds as any bond instrument where the proceeds are used "exclusively"³⁸ to finance or re-finance projects providing "clear environmental benefits, which will be assessed and, where feasible, quantified by the issuer"³⁹ and that follow GBP transparency processes. This "use of proceeds" concept is a commonly used control in the bond market, particularly for project-related bonds where bond purchasers' economic return depends on the proceeds being used to build and put into operation the project(s) described in the bond offering disclosure statements.

The GBP are clear that the activities must be fully disclosed so investors can 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," designed to address the "high level environmental objectives" of climate change mitigation and adaptation, natural resource and biodiversity conservation, and pollution prevention and control.⁴⁰ Specifically listed project categories are:

- Renewable energy and energy efficiency

³² European Investment Bank & Green Finance Committee of China Society for Finance and Banking; The Need for a Common Language in Green Finance; Nov 11, 2017

³³ CBI & China Central Depository Clearing Company; China Green Bond Market 2018; Feb 2019. Although this figure compares favorably to the 38% that were excluded from CBI's 2017 totals, it is too early to say this is a trend. Global Energy Monitor reports that China has new coal-powered energy capacity under development equivalent to the entire existing coal power capacity of the EU. Shearer, Christine, et al.; Out of Step: China is Driving the Continued Growth of the Global Coal Fleet; Global Energy Monitor; Nov 2019. Stanway, David; China Provides \$1 Billion in 'Green' Finance to Coal Projects in First Half of the Year; Reuters; Aug 19, 2019

³⁴ Securities and Exchange Board of India; Disclosure Requirements for Issuance and Listing of Green Debt Securities; May 30, 2017

³⁵ Moody's Investor Service; Green Bonds Assessment; Sept 24, 2019

³⁶ S&P Global, Moody's primary rating agency competitor, has created a Green Evaluation product to evaluate the environmental and resilience effectiveness of a given project, but the service is not specifically linked to green bonds.

³⁷ ICMA; The Green Bond Principles; 2014, 2015, 2016, 2017 and 2018 editions

³⁸ CBI defines "exclusively" as 95% of proceeds, with up to 5% used for general administrative purposes of the issuer. This is in line with common bond market practice, which generally allows a small percentage of flexibility to cover for differences in interpretation, administrative error, or general uses. Bonds excluded from CBI's green bond totals include those with non-green uses in excess of 5%.

³⁹ ICMA; The Green Bond Principles; 2018 edition

⁴⁰ ibid

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- Pollution prevention and control (including emissions reductions and waste prevention, reduction, and recycling)
- Sustainable land use and living natural resource management (including sustainable forestry, agriculture and fisheries)
- Protection of coastal, marine and watershed environments
- Clean transportation
- Sustainable water management (including clean and/or drinking water)
- Climate change adaptation, including climate observation and early warning systems
- Circular economy adapted products
- Green buildings⁴¹

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

- Use of proceeds, i.e., what Green Projects the bond proceeds will fund;
- The project selection process, including criteria for determining how the projects to be funded fit the Green Projects criteria and what the projects' environmental sustainability goals are;
- Management of bond 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 as to whether the financing has in fact complied with the GBP. Given that any issuer can call its bonds "green," and the term has no formal legal definition, a second opinion by a reputable organization creates credibility and lends value. Over 80% of green bonds issued in 2018 used some form of external review, and many of those who did not were municipal issuers with a undisputed green use, such as clean water.⁴²

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

- Intended use of proceeds;
- Internal processes used to vet projects;
- Compliance and reporting processes and procedures; and
- 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 provided the external review of the very first World Bank green bond in 2008,⁴³ created 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 low carbon, climate resilient solutions today, such as solar or wind renewable energy;
- Medium green, for projects that represent steps toward long-term climate solutions, such as "plug-in hybrid buses"; and
- Light green, for projects providing short-term gains but not a long-term climate solution. These can include energy efficiencies that reduce GHG emissions but do not shift away from a fossil fuel-based economy because no alternatives are currently available.⁴⁴

The European Union, through its Technical Expert Group on Sustainable Finance, released a report in June 2019 recommending the establishment of an EU Green Bond Standard (EU-GBS). The EU-GBS builds on both the Green Bond Principles and CBI's Climate Bond Standards. It would remain

⁴¹ ibid

⁴² CBI; Green Bonds State of the Market 2018

⁴³ CICERO website

⁴⁴ ibid

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voluntary, but turns the GBP recommendations into requirements. That is, the EU-GBS would be analogous to a club that one can choose to join or not, but those who join must follow the club's rules. It would further require that issuers demonstrate alignment with an EU Green Taxonomy. The Taxonomy is under development, but builds on CBI's Climate Bond Standard taxonomy. Similarly, reporting and external verification procedures would be mandatory for those seeking an EU-GBS label.⁴⁵

While the point of all these procedures and standards is to ensure that financed activities are actually and verifiably green, the proposed levels of regulation have raised concern that issuers will simply choose to turn away from green bonds. For instance, of the \$212 billion labeled green bonds issued in 2019 (through October), less than 20% have specifically gone through the process to demonstrate adherence to CBI's Climate Bond Standard.⁴⁶ And of the roughly 80% of issues in 2018 that included some form of external review, far fewer are adhering to the several layers over time proposed in the EU-GBS.⁴⁷

The EU report recognizes that overly burdensome processes can be self-defeating, and it proposes several financial incentives. These are discussed below in the final section of this paper. Ultimately, the EU's goal is to induce more activities that verifiably provide climate solutions, and these proposals fit within that broader framework.

Examples of Green Bond Financings

Since the inaugural green bonds issued by the European Investment Bank and the World Bank in 2007 and 2008, green bonds have diversified in many ways:

- The types of bonds now include not only standard recourse-to-issuer general obligation debt, but also revenue bonds, project bonds, and securitizations backed by a variety of asset types. 2017 saw the first green sukuk, a bond-like instrument that conforms with Islamic proscriptions against charging interest.⁴⁸
- From 11 multilateral development banks, issuers have diversified to industrial corporations, commercial banks, quasi-public agencies and all levels of government, including country-level sovereign bonds. In 2018, there were 204 new issuers, and to date, 628 issuers have come from 55 countries on 6 continents.⁴⁹
- The World Bank's initial green bonds funded renewable and energy efficiency projects,⁵⁰ and these remain leading uses. Additional uses by the various issuers have proliferated, as listed above, including transport, clean water, green buildings, and more.

Corporate use of green bonds is largely associated with the development of renewable sources and energy efficiency projects, with supply chain sustainability an increasing focus. Examples include:

- Apple issued \$1.5 billion in green bonds in 2016 followed by an additional \$1.0 billion in 2017 to fund a series of projects to help the company reach its goal of 100% renewable-powered operations. In November 2019, Apple issued €2 billion in green bonds, with the proceeds going towards the development of more energy efficient and recyclable products, as well as to cut carbon emissions in Apple's supply chain. An Apple official stated that the firm decided to issue green bonds in the wake of the December 2015 Paris climate summit, at which many corporations pledged to combat climate change.⁵¹

⁴⁵ European Union Technical Expert Group (TEG); Proposal for an EU Green Bond Standard; June 2019. TEG; Taxonomy Technical Report; June 2019. CBI; The Development of Taxonomies to Identify Green Assets; Mar 2019

⁴⁶ CBI website

⁴⁷ CBI; Green Bonds State of the Market 2018. CBI; Post-Issuance Reporting in the Green Bond Market Climate Bonds; Mar 2019

⁴⁸ CBI; Green Bond Highlights 2017; Jan 2018

⁴⁹ CBI; Green Bonds State of the Market 2018

⁵⁰ The World Bank; Green Bond Investor Update; 2009

⁵¹ Volcovici, Valerie; Apple Issues \$1.5 Billion in Green Bonds in First Sale; Reuters; Feb 17, 2016. Webb, Alex; Apple Issues a Second Green Bond to Finance Clean Energy; Bloomberg; June 13, 2017. Temple-West, Patrick; Apple Raises €2Bn in Green Bonds; Financial Times; Nov 7, 2019

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- TenneT, a Dutch grid operator, has raised €8.0 billion in multiple green issues since 2015 to develop grid connections for renewable energy, such as wind farms off the shore of the Netherlands and Germany. TenneT's goal is to connect offshore wind power to over 30 million homes by 2030.⁵²
- Solar City (now merged into Tesla Energy), an American solar power system provider, issued the first solar asset-backed securities in 2013, and has sold several dozen issues to fund corporate expansion (i.e., the ability to provide more rooftop solar power systems). It is an example of a smaller pure play that typically did not get an external green evaluation.⁵³
- PepsiCo issued its first green bond in October 2019, with \$1 billion allocated towards three broad categories: reduction of plastics and packaging; lower emissions in its operations and supply chain; and water sustainability. An external opinion notes that PepsiCo's planned uses align to seven GBP Green Project categories and six of the UN's SDGs.⁵⁴ The lead underwriter for Pepsi's bond issue was Morgan Stanley, which itself has a plastic waste initiative. Morgan Stanley's goal is to finance corporate programs such as this one of Pepsi so as to reduce the plastic waste stream by 50 million metric tons by 2030.⁵⁵
- HSBC has issued six green bonds, totaling nearly €2.0 billion (as well as two SDG-linked bonds). The bond proceeds capitalize HSBC's green lending, enabling it to provide loans for its clients' eligible green projects. HSBC selects green projects to finance pursuant to a framework rated Dark Green by CICERO (its best rating), and HSBC further engages PwC to independently assure that HSBC is following its framework.⁵⁶

CBI reports that the finance sector was the leading category for green bond issuance in 2018. Nonetheless, per S&P, green bonds remain a very small slice of banks' collective lending capital (1% or less). This means that a bank can have a very aggressive and successful green finance business, with a rigorous selection process, while also maintaining a successful business supporting and expanding the carbon economy. This contradiction was highlighted by the Saudi Aramco IPO (in December 2019), for which HSBC and Morgan Stanley were among the underwriters.⁵⁷

Public agencies in the United States are increasingly using green bonds as part of their capital strategies, and the examples below give a sense of their green bond uses:

- Fannie Mae was the largest green bond issuer in the world in both 2017 and 2018 with \$47 billion in green mortgage-backed securities. The financings cover multifamily residential buildings that receive green building certifications, such as LEED or Energy Star, or which include improvements designed to reduce energy or water use by at least 20%.⁵⁸
- The New York Metropolitan Transportation Authority (MTA) is the national leader in municipal green bonds, with over \$7 billion issued in total since 2016. Its initial issue of \$783 million, to support system upgrades for the subways and commuter rail systems serving New York City, 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

⁵² Environmental Finance; Bond of the Year - Corporate: TenneT; Apr 2, 2019. TenneT website.

⁵³ Martin, Christopher; Solar City to Offer \$200 Million Retail Green Bonds Online; Bloomberg; Oct 15, 2014. CBI website; Green Bond Database. CBI; Explaining Green Bonds

⁵⁴ Sustainalytics; PepsiCo, Inc. Green Bond Framework Second-Party Opinion; Oct 2019. Smith, M. & Mutua, C.; Pepsi Tries to Take Green Mainstream With Sustainable Bond Sale; Bloomberg; Oct 7, 2019. PepsiCo Press Release; PepsiCo Prices US\$1 Billion Green Bond to Fund Key Sustainability Initiatives; Oct 7, 2019

⁵⁵ Morgan Stanley website; Plastic Waste Resolution. Edie; PepsiCo Prices \$1bn Green Bond to Assist with Plastics Phase-Out; Oct 9, 2019

⁵⁶ HSBC Green Structured Bond Report 2018

⁵⁷ CBI; 2018 Green Bond Market Summary; Jan 2019. Petkov; Miroslav; A Look at Banks' Green Bond Issuance Through the Lens of Our Green Evaluation Tool; Mar 2, 2018. Croft, Adrian; Banks Set to Cash in on the Saudi Aramco IPO Want You to Know They're Still Serious About Climate Change; Fortune; Nov 14, 2019.

⁵⁸ Jones, Alicia; Fannie Mae Wins Recognition as Largest Issuer of Green Bond by the Climate Bonds Initiative; FNMA website; Mar 20, 2018

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Standards, and the bonds are Climate Bond Certified by CBI.⁵⁹

- Massachusetts, in 2013, issued the first municipal green bond. The \$100 million issue included a series of uses, including clean water, energy efficiency in State buildings, and open space protection. The bonds did not have a second opinion and the proceeds were not fully directed to green uses. This is an example of a self-declared green bond that predates the GBP and, although praised by environmentalists, does not meet current green bond standards.⁶⁰
- Like DC Water, discussed above, San Francisco, Spokane, Cleveland and St. Paul are among the cities that have issued green bonds to fund clean water projects.

Sovereign debt is a major factor in world capital markets, but a new entrant to the green bond market. Its introduction signals the importance of environmental factors in national policy, including commitments to meet NDCs, and is also an important milestone in the development of the green bond market. Sovereign issuers include:

- Poland issued the first sovereign green bonds, €750 million in late 2016, and followed it with €1.75 billion in 2018. The Polish issues raise a central debate -- can a brown issuer do a green project? Poland will use its green bond proceeds for GBP eligible uses, including renewable energy, clean transport and forestation, and received a positive second opinion from Sustainalytics. Per the World Health Organization, Poland is home to 33 of the 50 most polluted cities in Europe, in part due to the country's dependence on coal, which fuels 80% of its electricity. The coal industry is a major employer in Poland, and coal is seen as a national security hedge against dependence on Russian natural gas. In December 2017, the new Polish government reaffirmed its commitment to coal as the nation's primary source of energy and announced plans for two new coal mines. Two years later, as the EU announced its European Green Deal and pledged to reach net zero GHG emissions by 2050, Poland was the sole member of the 28 EU countries exempted from that timetable.⁶¹
- France was the second sovereign issuer, following Poland by a month, and has been the most prolific sovereign issuer, with eight issues totaling €20.7 billion since January 2017. An external opinion confirmed that the uses and management conform with the GBP and support various of the UN Development Goals, including affordable and clean energy, sustainable cities and communities, and climate action.⁶²
- Fiji, which includes 300 islands, was the third sovereign issuer and the first from an emerging market. Fiji's \$50 million issue, in 2017, supports climate resilience projects, including support towards its goal of 100% renewable energy by 2030. The World Bank provided technical assistance on the issue, and Sustainalytics a second opinion.⁶³

The number of sovereign issuers continues to grow, standing at 9 countries through 2018, including Nigeria, Belgium, and Indonesia (with the first sovereign sukuk).⁶⁴

While sovereigns, major corporations, multilateral development banks and sub-sovereign governmental issuers will no doubt continue to drive green bond volume, smaller issuers are also

⁵⁹ CBI; Bonds and Climate Change; Sept 2018. Metropolitan Transportation Agency (MTA) website. MTA to Issue Its First 'Green Bonds'; Feb 10, 2016; Environmental Finance; Bond of the Year – Municipality: MTA; Mar 28, 2018. MTA; Authorized Officer Certificate of the Metropolitan Transportation Authority in Connection With Climate Bond Initiative Annual Reporting; Apr 30, 2019

⁶⁰ Kidney, Sean; Massachusetts to issue AA+ \$100m Green Bond on 4 June; CBI Blog; May 23, 2013; CBI; Explaining Green Bonds

⁶¹ Allen, Kate and Shotter, James; Environmental Qualms Cloud Poland's Green Bond Sale; Financial Times; Feb 5, 2018; Kidney, Sean; Poland wins race to issue first green sovereign bond. A new era for Polish climate policy? CBI website; Dec 15, 2016; Sustainalytics; Republic of Poland Green Bond Framework Second Party Opinion; Dec 5, 2016; The Economist; Why 33 of the 50 most-polluted towns in Europe are in Poland; Jan 18, 2018; Nabrdalik, Maciek and Santora, Marc; Coal Warms Poland's Hearths, and Fouls Its Skies; New York Times; Apr 23, 2018; Carrington, Damian; Tackle Climate or Face Financial Crash, Say World's Biggest Investors; The Guardian; Dec 9, 2018. BBC; EU Carbon Neutrality: Leaders Agree 2050 Target Without Poland; Dec 13, 2019

⁶² Vigeo Eiris; Second Party Opinion on the Sustainability of the French Republic's Green OAT; Jan 2017

⁶³ World Bank press release; Fiji Issues First Developing Country Green Bond, Raising \$50 Million for Climate Resilience; October 17, 2017

⁶⁴ CBI; Green Bonds: The State of the Market 2018

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driving innovation in the market. Highlights include:

- The Low Income Investment Fund (LIIF) July 2019 \$100 million sustainability bond is a showcase for green strategies furthering urban reinvestment. LIIF's uses of bond proceeds track to eight of the UN's Sustainable Development Goals, supporting affordable housing, healthy foods, community health care, education and child care, all serving low-income communities and all with green benefits in the form of LEED certifications, energy efficiency retrofitting, and/or transit-friendly locations (i.e., transit-oriented development).⁶⁵
- Equilibrium Capital is capturing methane from the manure of 40,000 cows, turning livestock waste in manure lagoons into a source of renewable natural gas. This waste to energy anaerobic digester, in Pinal County, Arizona, was funded in 2018 through an unrated \$61 million green bond issue. The project is estimated to reduce carbon emissions by the equivalent of 880,000 tons per year.⁶⁶
- The Conservation Fund, with a \$150 million issue in September 2019, will acquire and preserve sustainably harvested forests to mitigate climate change, strengthen rural economies and protecting natural ecosystems. The Conservation Fund has a goal to preserve five million acres over the next 15 years.⁶⁷
- Seychelles, within the framework of its Blue Economy roadmap, has issued a \$15 million "blue bond" to help finance the island nation's transition to sustainable fisheries and to protect marine areas. The blue bond (i.e., a green bond of another color) is a mini sovereign issue, and it has credit backing from the World Bank and the Global Environment Facility (GEF).⁶⁸

Impact of Green Bond Initiatives

As with other aspects of the green bond market, market participants are working towards improved transparency and standardization of impact measurement, but there remains a good distance to go. CBI notes in a 2019 report that issuers use over 200 metrics, with many different reporting frameworks and little consistency.⁶⁹ Nonetheless, whereas the earliest impact reports tended to be simple descriptions of projects, the reporting trend is far more data-oriented.

In the absence of standardized measurement, there is no aggregate data on green bond impact, and it is not clear when reliable aggregate data may be available. Comparative data can present similar problems. That is, we know that green bonds, an asset class focused on renewable energy, energy efficiency, etc., is making significant contributions towards climate solutions, we just can't put reliable aggregate numbers on it.

In December 2015, a group of 11 multilateral development banks active in the green bond market (The World Bank and others) released a set of "core principles" for more standardized reporting, which they termed a "Harmonized Framework."⁷⁰ The statement, though couched in the passive and conditional language sometimes needed to achieve widespread agreement, nonetheless presented a clear set of impact reporting concepts, along with suggested reporting templates focused on renewable energy and energy efficiency projects. The principles are consistent with the GBP and include recommendations for:

- Formal processes for allocating funds to their declared green projects;
- Annual reporting on use of proceeds, and expected and actual environmental impact; and

⁶⁵ Sustainalytics; LIIF Sustainability Bond Second Party Opinion; Jun 28, 2019

⁶⁶ Environmental Finance; Green Project Bond of the Year: Equilibrium Capital; Apr 2, 2019. Equilibrium Capital; Turning Livestock Waste into Renewable Fuel: Green Bond Case Study; Presentation at Conservation Finance Investor Conference; Jan 9, 2019

⁶⁷ Kart, Jeff; Green Bonds Worth \$150 Million Will Conserve Millions Of Acres Of At-Risk Forests; Forbes; Oct 16, 2019

⁶⁸ The World Bank; Seychelles Launches World's First Sovereign Blue Bond; Oct 29, 2018. Seychelles' Blue Economy; Strategic Policy Framework and Roadmap: Charting the Future (2018-2030)

⁶⁹ CBI; Post-Issuance Reporting in the Green Bond Market Climate Bonds; Mar 2019. CBI; Green Bonds Market Summary Q1 2019; Apr 2019

⁷⁰ African Development Bank, et. al.; Green Bonds - Working Towards a Harmonized Framework for Impact Reporting; December 2015

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- Use of a limited set of core indicators to facilitate comparisons, including GHG emissions reduced or avoided, energy savings and renewable energy produced.

The 2015 principles remain a central reporting guidance. In June 2019, the ICMA's GBP Impact Reporting Working Group released a Reporting Handbook including a slightly edited update to the 2015 statement. Tellingly, the update notes that, "While there are on-going efforts to harmonize GHG accounting methodologies..., given the current differences in calculation approaches, reporting GHG emission data based on a uniform, consistent and published methodology remains a challenge."⁷¹ As in the 2015 statement, the 2019 update recommends that issuers make their assumptions and methodologies clear.

Although this rather major reporting challenge remains, the GBP Impact Reporting Working Group has built on the 2015 statement, periodically releasing suggested metrics for specific categories of Green Projects. These are incorporated into the 2019 Handbook and include green buildings, clean transport, sustainable water and wastewater management projects, along with energy efficiency and renewable energy frameworks that date to the original statement.⁷²

The multilateral development banks are seen as best practice leaders in many areas of green finance, including reporting, and the International Finance Corporation (IFC) provides a good example of the direction of impact reporting, with increasingly detailed annual reports. Its 2014 report, which was its first, was predominantly a set of project descriptions, with some estimates of clean energy production. Its 2015 Green Bond Impact Report states, "Total GHG reductions reached almost 2.5 million tons of CO₂e[*the*] 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."⁷³ The report backs those totals with detailed lists of projects with individual impact estimates.

The IFC is in many ways a green bond leader. It started its green bond program in 2010 and is a member of the GBP Executive Committee.⁷⁴ 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.⁷⁵

One IFC project demonstrates the many difficulties of defining "green" and reporting overall green impacts accurately in situations where environmental priorities are in conflict with each other. The project is the green bond financing of a hydroelectric dam on the Reventazón River in Costa Rica. The Reventazón hydroelectric dam project is projected to generate 10% of the energy produced in Costa Rica and decrease carbon emissions by displacing fossil fuel power generation.⁷⁶ The IFC impact report, from 2014, does not include an estimate of GHG reduction/avoidance. 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"⁷⁷ 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."⁷⁸ To mitigate these impacts, the Costa Rican national power company created a plan in compliance with IFC's Environmental and Social Performance Standards, assisting displaced families as well as addressing environmental concerns. A follow-up report indicates some level of mitigation success.⁷⁹

Issuers have more recently avoided placing a green label on hydropower financings, particularly if they include the creation of large reservoirs, leading to displacement of established communities, habitat damage and threats to biodiversity. Because hydropower is a significant source of carbon-

⁷¹ ICMA; Handbook – Harmonized Framework for Impact Reporting; June 2019

⁷² *ibid*

⁷³ IFC; Green Bond Impact Report FY 2015.

⁷⁴ IFC website; Overview of IFC's Green Bonds

⁷⁵ CICERO; 'Second Opinion' on IFC's Green Bond Framework; Nov 23, 2015

⁷⁶ IFC; Green Bond Stories of Impact; circa 2015 (undated)

⁷⁷ IFC website; excerpt from World Bank Operational Policy 4.01, Environmental Assessment, Jan 1999

⁷⁸ IFC Projects Database; Reventazon HPP Environmental & Social Review Summary

⁷⁹ IFC; Safeguarding Wild Cat Habitats in a Hydro Plant's Backyard; Oct 2018.

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free energy, however, CBI has convened a working group to establish green hydropower criteria. Members include the World Wildlife Fund, the Nature Conservancy, the International Hydropower Association and others.⁸⁰

The Hydropower Association's interest in creating green standards says something about the standing of green bonds. The Association's CEO acknowledges that other sources of financing are available, but green bonds "provide an indication that the technology is viewed as publicly acceptable" and help attract additional financing.⁸¹

The question of green bonds' impact is central to a couple of recurrent debates in the field:

- **Additionality** – If the purpose of green bonds is to create environmental benefit, why do refinancings qualify? And aren't many, or maybe even most, green bonds a refinancing? Doesn't this just misleadingly pump up the numbers with no new benefit? While this additionality debate correctly notes that new bonds do not necessarily create new impact, it understates the value of refinancings. Specifically, many investments creating environmental benefit would never occur in the first place if investors were not confident they could exit within a certain timeframe. Refinancings are among the more common exit vehicles. In addition, projects have a common natural lifecycle with, most simply, a build/start-up phase and a long-term steady operations phase. Different investors are comfortable with different phases, and when a long-term refinancing such as a green bond replaces the initial shorter-term start-up financing, then the initial investor is re-loaded and able to invest in the next new project, creating yet new benefit. And again, the likelihood of the longer-term refinancing is a strong inducement for investors to make the initial shorter-term financing. Finally, refinancings enable investors to strengthen their balance sheets, better positioning them for additional impactful investment. For these reasons, green bond refinancings are central to the creation of the environmental benefit for which they earn the green label.
- **Transition financing** – How does a brown issuer transition to green? If we are to transition the economy from brown to green, it can only be accomplished by brown companies adopting green practices, which calls for transition financing. But virtually any company, no matter how brown, has some aspect of its operations that would qualify as green. Should those financings necessarily qualify as green? When is it green, and when is it green washing? One concept is that a green bond financing must be an element of a broader green transition strategy, as opposed to funding the isolated green aspect of an otherwise brown operation. But there is a lot of gray in the transition from brown to green. Where do Poland's bonds fit, or those funding the Reventazón hydroelectric dam? Or new solar arrays powering oil derricks within a cap and trade framework?⁸² How about mining, steel and air travel, industries that may never be green, but can certainly be less brown? Should there be a new "transition bond" label to protect the integrity of the green bond concept while giving credit to brown industries trying to do the right thing? Or is that just confusion-inducing label proliferation?⁸³

CICERO's Shades of Green provide some guidance, with light green available for fossil-fueled endeavors, so long as 1) there is no carbon-free alternative; 2) the project reduces GHG emissions; and 3) it does not unnecessarily lock in carbon uses beyond a transitional timeframe (which of course might be unknown). The European Bank for Reconstruction and Development (ERBD) has created a Green Economy Transition (GET) approach, in which it defines transitional projects as those with clearly designated environmental activities that can be disaggregated from non-environmental activities, implemented with best available EU environmental and social standards, while producing net total environmental benefit as

⁸⁰ CBI website; Hydropower page

⁸¹ Whieldon, Esther; Hydropower Largely Excluded From Burgeoning Green Bond Market; S&P Global; Oct 10, 2018

⁸² Mooney, Chris; One of the Country's Biggest Oil Fields Just Turned to an Unexpected Power Source: Solar; Washington Post; Nov 29, 2017

⁸³ Avery, Helen; Green finance: Calls for Transition Bonds Gain Traction; EuroMoney; July 11, 2019. Michaelsen, Jacob; A Nuanced Perspective on 'Transition Bonds'; Environmental Finance; Oct 15, 2019

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measured against a baseline.⁸⁴ Canada, with green priorities but an economy weighted towards extractive industries, is looking for a pathway and working on a transition taxonomy.⁸⁵ This is a high priority for other countries and industries, as well. The EU's Green Deal proposal, announced in December 2019, includes the concept of a Just Transition Mechanism and a €100 billion Just Transition Fund, with details to be worked out.⁸⁶ Given the necessary level of transition, and the number of people in every country whose current livelihood is in some way tied to fossil-fueled industries, it is clear that this discussion is just getting started.

Green Bonds' Financial Performance

Given all of the investor interest, green bond issuers and market watchers are constantly on the lookout for a green bond premium – a “greenium” -- with investors willing to pay more and accept a lower yield in return for making a green investment.

Most data suggests that there is no greenium, with green bonds performing similarly to comparably rated non-green bonds. 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. It is reasonable to assume, for instance, that there would be no difference in performance between an Apple green bond and an Apple non-green bond, with each an equal obligation of Apple. It is not surprising, therefore, that a 2019 Stanford study of 640 matched pairs of green and non-green municipal issues issued on the same day, with identical maturity and rating and issued by the same municipality, found no difference in pricing.⁸⁷

Nonetheless, there are reasons why there could be a pricing differential. Most particularly, it is possible that demand for green bonds could simply outstrip supply or has at certain times, as more and more investors put more and more money into ESG-oriented funds, and the funds pay up to meet their mandate. And there have been reports from time to time of the emergence of a greenium.⁸⁸ The general consensus, however, is that green bonds price with the broader market, at least to date.

The CBI has conducted a continuing study of green bond performance, with a series of reports covering bonds issued since 2016. Findings thus far include:

- In the primary market, green bonds performed comparably to the broader market on a series of measures, including pricing and levels of oversubscription, although greater levels of oversubscription are not uncommon.
- Issuers routinely report that green bonds attract a broader set of investors, which suggests reduced volatility over time, a positive.
- The data have suggested, at times, a possible pricing differential in the secondary market, with green bonds trading at a slightly higher price, but this has not been sufficiently consistent to draw any conclusions.⁸⁹

A consistent secondary market premium would presumably soon translate into a primary market premium – lower-cost funds for green purposes. As good as that sounds, it's hard to imagine it as a long lasting condition, as the vast majority of investment managers are obligated to get market returns and would be precluded from purchasing higher-priced, lower-yielding green bonds. And this is probably a good thing for the green bond market, since it forces it back into the mainstream,

⁸⁴ CICERO website; Shades of Green. Climate Policy Initiative; Implementing the EBRD Green Economy Transition; May 2018.

⁸⁵ Expert Panel on Sustainable Finance; Mobilizing Finance for Sustainable Growth, Final Report; Government of Canada, Ministry of Environment and Climate Change; 2019

⁸⁶ European Commission; The European Green Deal; Dec 11, 2019. European Commission; Just Transition Mechanism; Dec 2019

⁸⁷ Larker, David & Watts, Edward; Where's the Greenium?; Stanford University, Graduate School of Business; Oct 3, 2019. Gilbert, Mark; The Explosion in Green Bonds Comes Without a Premium; Bloomberg; Oct 28, 2019

⁸⁸ Two examples: Schuele, Finn & Wessel, David; Municipalities Could Benefit From Issuing More Green Bonds; Brookings; July 16, 2018. Preclaw, Ryan and Bakshi, Anthony; The Cost of Being Green; Barclays Credit Research; Sept 18, 2015

⁸⁹ Harrison, Caroline, et. al.; Green Bond Pricing in the Primary Market; CBI and the International Finance Corporation (IFC); reports published July 2017; Nov 2017; Feb 2018; May 2018; CBI; Green Bond Pricing in the Primary Market; Oct 2019

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where funding is abundant, and safely away from a green bubble.

As the market continues to mature over time and as it further diversifies, with, among other things, a higher proportion of non-investment grade and other lower-rated issuers, the green bond market should experience defaults at rates similar to comparable bond issues. 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. The financial gyrations and controversies of Tesla and Tesla Solar, for instance, have not cast a cloud on the market for green financing, even though CEO Elon Musk's eccentricities have been newsworthy (and perhaps not "standard"), but largely unrelated to Tesla's environmental bona fides.⁹⁰ Should a default be related to a deceptive or fraudulent environmental claim – 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. The performance of green bonds, particularly as compared to otherwise similar non-green bonds, remains an interesting and important area of continued inquiry.

What's Next for Green Bonds?

The future of green bonds appears likely to continue to include:

- Growth, spurred not only by investor demand, but also by public demand for green solutions, and supported by policy changes as well as improved financial infrastructure, such as green bond funds;
- Greater standardization of definitions and protocols; and
- Increased transparency.

Public support for green and climate change solutions will drive funding needs, and investor demand will support green bonds as a material portion of that funding. 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."⁹¹ Moody's further notes, "Green bonds have gained attention for their potential role in mobilizing capital toward environmental solutions."⁹² The growth of ESG funds is one measure of investor interest, but there is a great deal of evidence that growth to date is just the beginning of a very large wave. For instance, HSBC reports that 97% of its investor clients in Europe and 85% in the U.S. want to increase their investments in climate solutions, and B of A Merrill reports that 90% of its younger clients share this interest.⁹³ A 2018 survey of 20 leading investment banks found greater optimism for SRI/green bond volume growth than any other market segment.⁹⁴

Christiana Figueres, the former Executive Secretary of the UN Framework Convention on Climate Change and an architect of the Paris agreements, has said that effective climate action requires \$1 trillion in annual green bond investment by 2020.⁹⁵ Despite the market's rapid growth, that goal will not be met, and the CBI, in its advocacy role, has now modified its \$1 trillion annual target timeline to be reached in the early 2020s.⁹⁶ Sovereign issuers, whose debt comprises 40-50% of global debt capital markets but only a small percentage of green bonds thus far, are a logical source of substantial growth as they seek funding for the very large infrastructure needs associated with their NDCs and climate change resilience.

Private companies, as well as municipalities and other sub-sovereign levels of government, also show great interest in investment that supports NDCs, but not incidentally also leads to lower operating costs, cleaner local environments, and greater climate change resilience. This is particularly relevant in the U.S., where, in response to the federal government effectively

⁹⁰ Among many examples: Goldstein, Matthew; Elon Musk and S.E.C. Reach New Accord, Lifting Cloud Over Tesla; New York Times; Apr 26, 2019. Mitchell, Russ; Elon Musk Knew SolarCity Was Going Broke Before Merger with Tesla, Lawsuit Alleges; Los Angeles Times; Sept 23, 2019

⁹¹ Moody's Investor Service; Green Bonds Assessment; March 30, 2016

⁹² *ibid*

⁹³ Klier, Daniel; presentation at HSBC Sustainable Financing and Investing Responsibly Forum; NYC; September 18, 2017; Coleman, Murray; Financial Times; US Investors Drawn to Environmentally Friendly Green Bonds 3/30/17

⁹⁴ Global Capital; Debt Capital Markets Outlook Survey; Jan 2018

⁹⁵ Figueres, Christiana, et al.; Three Years to Safeguard Our Climate; Nature.com; June 28, 2017

⁹⁶ CBI website

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abandoning its NDC, many states, localities and private companies are stepping in. This is an element in the continuing diversification of the market.

Growth and diversification is further supported by the emergence of green bond indices and green bond funds, which bring increased liquidity to the market and thereby support yet more investment. This is another milestone in the mainstreaming of the green bond market, and another indicator of the success of the green bond concept which, from its beginnings, was designed to tap into the \$100 trillion mainstream debt capital markets, where funding availability for climate solutions is effectively unlimited.

The increasing urgency of climate change challenges has spurred policy developments designed to attract investment. At the modest end of the scale, first Singapore and now several other countries are covering the costs of independent reviews and/or some of the upfront structuring costs.⁹⁷

China, even as it remains a leader in new coal-generated power, has also been a leader in policy support for green investment, including “central bank policy support and incentives ... for financial institutions issuers in the form of collateral eligibility, relending and interest subsidies”,⁹⁸ leading directly to Chinese issuers’ major presence in the green bond market.

In 2017, China announced the establishment of five “green finance reform and innovation experimental zones” to test various incentives to “raise the share of ... green finance” in certain sectors.⁹⁹ The focus in one zone is on strengthened cooperation with non-Chinese financial institutions,¹⁰⁰ which could help foster increased use of green principles by China and its international partners in the ambitious Belt and Road Initiative (BRI), a long list of infrastructure projects linking China to some 70 trading partners and carrying a cost estimate of \$6 trillion. Results to date are not encouraging. Although the BRI includes sustainability objectives in its conceptual framework, in fact most energy and transportation sector investment under the BRI has further developed carbon-intensive strategies such as coal, roads and airports.¹⁰¹

The European Union, through its High-Level Expert Group (HLEG) on Sustainable Finance, is looking at policy changes to support a sustainable European economy, with climate change initiatives and Paris agreement commitments first on the agenda. The HLEG’s final report, released in January 2018, included broader recommendations designed to encourage the longer-term investment horizons needed to support sustainability along with specific recommendations to create a sustainability taxonomy and adopt official green bond standards.

The HLEG’s proposals were based in a belief that, to mobilize capital at scale, markets need definitions of “green” and “sustainable” and the required disclosure protocols to make everything transparent and verifiable.¹⁰² These recommendations have quickly turned into the EU Green Bond Standards now under consideration and the EU Taxonomy well under development.

A potentially very high-impact policy considered by the HLEG is the use of a “green supporting factor” – reduced capital requirements for lending to green projects. As intriguing as the concept is, the HLEG found it fraught with serious complications, including the absence of quantified reduced lending risk to justify lenders’ holding less capital for green loans and the potential to induce a green bubble. Nonetheless, given the proposal’s ability to attract green investment at great scale, the HLEG recommended further study of quantifiable risk differentials that could support such a factor.¹⁰³

⁹⁷ Hay, Jon; Green Finance – Everyone is Doing It; Global Capital; Jan 3, 2018. CBI; Bonds and Climate Change; Sept 2018

⁹⁸ Moody’s Investor Service; Moody’s: Green Bond Issuance Could Exceed \$50 Billion in 2016; Moody’s Global Credit Research; Feb 1, 2016

⁹⁹ Ministry of Ecology and Environment, The People’s Republic of China; China to Establish Green Finance Reform and Innovation Experimental Zones; Xinhua; June 15, 2017

¹⁰⁰ Stanway, David; China Launches Five ‘Green Finance’ Pilot Zones; Reuters; June 26, 2017

¹⁰¹ Zhou, Lihuan, et al; Moving The Green Belt and Road Initiative: From Words To Actions; World Resources Institute & Global Development Policy Center; Oct 2018. Paulson Institute; China’s Green Finance Pilot Zones: Ready for Takeoff; Apr 4, 2019. Hillman, Jonathan; China’s Belt and Road Initiative: Five Years Later; Center for International Strategic Studies; Jan 25, 2018

¹⁰² High-Level Expert Group on Sustainable Finance; Financing a Sustainable European Economy, Final Report; Jan 2018

¹⁰³ *ibid*

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Underlying the HLEG recommendations is the concept that policy support and incentives necessarily bring regulation to ensure that public support drives the achievement of public goals. And we see the regulatory hand in the shift from the pure voluntarism underlying the Green Bond Principles to the requirements of the EU Green Bond Standards. With adequate support and a collaborative approach from all sides, the shift to a regulated green market can be smooth and continued growth can be encouraged. A heavy hand, of course, can produce the opposite result.

Bank regulation, such as capital reserve requirements, falls largely to central banks in each country, so they would be the bodies to decide on whether and how to implement incentives like a green supporting factor or disincentives such as a brown penalizing factor. In December 2017, an eight-member coalition of central banks and financial regulators established the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). The NGFS now has 51 members, including the central banks of nearly 50 countries, as well as the European Central Bank. The US Federal Reserve Bank is not a member, though the New York State banking regulator is (and the sole sub-national level member as of December 2019).¹⁰⁴ The purpose of the NGFS is to define and promote best practices “to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development.”¹⁰⁵

The NGFS is moving carefully, calling for central banks to incorporate climate-related risks into financial stability monitoring, including engaging with the commercial banks they oversee to ensure that climate-related risks are understood at the Board level and incorporated into investment and risk management decisions.¹⁰⁶ Christine Lagarde, the new head of the European Central Bank (ECB), has advocated an aggressive approach for the ECB, including incorporating climate risk into economic forecasts and potentially favoring green bonds in the ECB’s own investment strategies.¹⁰⁷

In connection with the December 2015 Paris Agreement, a group of institutional investors representing \$11 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 called 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 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.¹⁰⁸

The green bond market has moved and continues to move in precisely these directions. The question remains as to the speed and urgency with which this market, and all its participants, will act.

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¹⁰⁴ Network of Central Banks and Supervisors for Greening the Financial System (NGFS) website. The US Federal Reserve has largely steered clear of climate related matters. The Federal Reserve Bank of San Francisco in October 2019 released a report related to climate risks in low-income communities, but this was not directly related to bank regulation.

¹⁰⁵ NGFS website; Governance/Origin & Purpose

¹⁰⁶ NGFS; A Call for Action: Climate Change as a Source of Financial Risk; Apr 2019

¹⁰⁷ Elliott, Larry; Climate Emergency: Lagarde Says ECB Must Step Up Action; The Guardian; Dec 3, 2019

¹⁰⁸ ACTIAM, et. al. The Paris Green Bonds Statement; Dec 2015

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