ARTICLE

GREEN BOND REPORTING

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Are green bonds really "green"? A number of legal scholars have addressed various aspects of this critical question. However, none has focused on issuers' post-issuance assertions about what they spend the bond proceeds on and on the way those assertions are, or are not, verified.

This paper is the first empirical study in legal scholarship of post-issuance reporting on the use of green-bond proceeds. Using a dataset from the Bloomberg service that covers all 155 dollar-denominated corporate green bonds from US corporate issuers in the period from mid-2019 to mid-2022, supplemented by a Web review of reporting, the paper reports that almost 10% of green bonds appear to have no post-issuance reporting and that around one third of the bonds lack reporting that is attested by a third party. Project-level attestation, the most detailed type, exists for around 30% of attested bonds and 20% of all US corporate green bonds.

Much of the commentary on green-bond verification focuses on assessments by pre-issuance reviewers, building on an analogy to credit rating agencies. But an important difference between green-bond verification and credit rating is that

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investors are likely to find it difficult to determine whether an issuer used bond proceeds for green purposes, while they will typically know if the bond is paying them on time or not. Thus, credible post-issuance reporting is especially important in the green-bond context. Moreover, this study finds that pre- and post-issuance reporting quality have been negatively correlated in some respects. Thus, advocates of green-bond market reform should concentrate more on improving post-issuance reporting than they have to date.

Specifically, the International Capital Markets Association should consider amending its green-bond standards to require attestation of post-issuance reporting and withdrawal of pre-issuance "greenness" opinions if issuers do not report as required on use of proceeds.

I. INTRODUCTION

Green bonds are bonds whose proceeds are to be spent for "green" purposes, usually combating or adapting to climate change.[1] In the first half of 2023, funds lent globally through green bonds and loans exceeded funds lent to the fossil fuel industry for the first time.[2] However, observers noted that "[i]t's too early to say whether this is good news" because "it's unclear precisely how all these funds are being used and what this means for the energy transition."[3] This Article examines how US green bond issuers use the funds they raise.

The idea of green bonds is alluring indeed. Organizations that need funds for the vast investment needed to decarbonize the global economy can market special bonds to private investors who are eager to finance the transition. Tapping this pool of investors could accelerate the transition and/or reduce the need for taxes or other government measures to pay for it.

The green-bond concept has found favor: one landmark was the 2015 Paris Green Bonds Statement, in which signatories owning or managing $11.2 trillion in assets endorsed green bonds and undertook "to work . . . to grow a large and robust market that makes a real contribution to addressing

[1] *See, e.g.*, INT'L CAP. MKTS. ASS'N, GREEN BOND PRINCIPLES: VOLUNTARY PROCESS GUIDELINES FOR ISSUING GREEN BONDS 3 (2021) [hereinafter 2021 GREEN BOND PRINCIPLES] ("Green Bonds are any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or re-finance . . . new and/or existing eligible Green Projects."); *see id.* at 4–5 (listing categories of "eligible Green Projects").

[2] *See* Tim Quinson, *Green Bonds Take Big Lead Over Fossil Fuels*, BLOOMBERG (July 5, 2023), https://www.bloomberg.com/news/articles/2023-07-05/green-bonds-take-big-lead-over-fossil-fuel-debt-deals?cmpid=BBD070523_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=230705&utm_campaign=greendaily [https://perma.cc/V4AE-6U7Y].

[3] *Id.*

climate change."[4] And the market has grown rapidly. In particular, the data reported in this paper show that the green share of the US corporate bond market has more than tripled since mid-2019,[5] and that over $35 billion in US corporate green bonds was reportedly issued in the twelve months ending June 1, 2023.[6] Globally, over $1.0 trillion in corporate green bonds reportedly were issued from mid-2019 to mid-2022.[7]

Despite (or perhaps because of) this growth, concerns about the market persist. Scholars have criticized the lack of a controlling legal definition of "green" under U.S. law,[8] potential weaknesses with the system for checking whether issuers' plans for bond proceeds are green before the bonds are sold to investors,[9] and the frequent absence of contractually enforceable promises to use proceeds for green purposes.[10] They have suggested reforms along each of these lines.[11]

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[4] PARIS GREEN BONDS STATEMENT (Dec. 9, 2015), https://www.climatebonds.net/files/files/Paris_Investor_Statement_9Dec15.pdf [https://perma.cc/3ZWQ-NPRL].

[5] *See infra* note 139 and accompanying text.

[6] *Id.*

[7] *See infra* note 138 and accompanying text.

[8] *See* Bryant Rivera, *Green Bonds: Reforming ESG Regulation in the United States to Meet the Requisite Funding Demand for a Decarbonized Economy*, 28 HASTINGS ENV'T L.J. 191, 208–09 (2022); Cristina M. Banahan, *The Bond Villains of Green Investment: Why an Unregulated Securities Market Needs Government to Lay Down the Law*, 43 VT. L. REV. 841, 865–66 (2019); Stephen Kim Park, *Investors as Regulators: Green Bonds and the Governance Challenges of the Sustainable Finance Revolution*, 54 STAN. J. INT'L L. 1, 44 (2018).

[9] *See* Paul Rose, *Sustainability Verification*, 72 AM. U. L. REV. 1017, 1055–65 (2022) [hereinafter *Verification*]; Paul Rose, *Certifying the 'Climate' in Climate Bonds*, 14 CAP. MKTS. L.J. 59, 70–71 (2019) [hereinafter *Certifying*].

[10] *See* Quinn Curtis, Mark Weidemaier & Mitu Gulati, *Green Bonds, Empty Promises*, 102 N.C. L. REV. 131, 131, 168–70 (2023).

[11] *See, e.g.*, Park, *supra* note 8, at 45 (recommending government green-bond labeling that incorporates definitions from the Climate Bonds Initiative, a nonprofit that promotes green bonds); Rose, *Verification*, *supra* note

All these efforts depend on some way of checking how green-bond funds are used. Even if all the suggested reforms are adopted and succeed, so that the market has a strong definition of "green," backed by enforceable contract terms and sound verification that issuers say they plan to use proceeds for green purposes, that will all be of limited use if issuers can simply spend the funds on whatever they want without being detected. The prevailing green-bond standards recognize this and require issuers to report on how they use green-bond funds.[12]

This Article is the first piece of legal scholarship to address how this reporting requirement is working in practice.[13] The author, together with research assistants, used the Bloomberg Financial Information Service to create a dataset of all 155 US-dollar-denominated green bonds from US corporate issuers over the three-year period from June 1, 2019 to May 31, 2022. The team then hand-collected the post-issuance disclosures that could be located, coded them for measures of

9, at 1081–85 (recommending imposition of liability under Section 11 of the Securities Act of 1933 on green-bond verifiers); Curtis et al., *supra* note 10, at 170–78 (recommending various measures to induce green-bond issuers to make enforceable promises of greenness).

12 *See* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6.

13 The Climate Bonds Initiative has published three reports on post-issuance reporting in the global green-bond market, most recently in 2021. *See* CLIMATE BONDS INITIATIVE, POST-ISSUANCE REPORTING IN THE GREEN BOND MARKET (2021) [hereinafter CBI 2021 REPORT]; CLIMATE BONDS INITIATIVE, POST-ISSUANCE REPORTING IN THE GREEN BOND MARKET (2019) [hereinafter CBI 2019 REPORT]; CLIMATE BONDS INITIATIVE, POST-ISSUANCE REPORTING IN THE GREEN BOND MARKET (2017). It also published a report in 2022 on post-issuance reporting in the Chinese green-bond market. *See* CLIMATE BONDS INITIATIVE, POST-ISSUANCE REPORTING IN CHINA'S GREEN BOND MARKET (2022). These reports, which use older data, do not focus primarily on the US market or the role of external reviewers, and their findings about the global and Chinese markets differ in a number of respects from the findings here about the US market, including with respect to the relationship between pre-issuance external review and reporting quality. *See* CBI 2021 REPORT, *supra*, at 9 (finding a "[c]lear positive correlation between external reviews and reporting"); CBI 2019 REPORT, *supra*, at 5 (same).

reporting quality, and analyzed them. Some type of post-issuance reporting was found for around 90% of the green bonds.[14]

The Article focuses on two measures of reporting quality. One measure is attestation: whether a third party certified that the issuer fairly reported its use of the funds. Less than 70% of green bonds in the dataset had attested reporting.[15]Another measure is specificity: whether the issuer described the use of proceeds in enough detail for the user to determine what projects the proceeds were spent on. Around 60% of issues reported allocation at this "project level" of detail;[16] the others either do not report or report at a general level, such as asserting that the issuer used the proceeds for "wind power generation."[17]

The author explored relationships in the data using a number of correlations and regressions. Key findings here include: (1) more creditworthy issuers seem to provide higher-quality disclosure; (2) there is some evidence of a negative relationship between the pre-issuance review scholars have focused on and the post-issuance reporting quality discussed here, and (3) there is limited support for the idea that repeat issuers engage in high-quality reporting to build their reputation for greenness.[18]

The research leads to two policy proposals: first, and most important, ICMA should consider requiring that green-bond issuers' statements about how they use bond proceeds be

[14] Specifically, the team located reporting for 91% of green bonds by issue count, accounting for 94% of dollar volume. *See* discussion *infra* Part IV.

[15] Specifically, this study finds attestations for 66% of US corporate green bonds by issue count, covering 72% of the dollar amount issued. *See* discussion *infra* Part I. For the subset of green bonds that have some post-issuance reporting, the fraction attested is 73% by issue count and 76% by dollar amount. *Id.*

[16] Specifically, 58% of green bonds, reflecting 57% of dollar volume, reported at the project level. *See* discussion *infra* Section IV.A.2.

[17] *See* discussion *infra* Section IV.A.2.

[18] *See* discussion *infra* Section IV.B.

attested by a reliable third party.[19] The research presented below indicates that issuers do not take this currently optional step in a fairly large number of cases.[20] But attestation seems even more important than auditing of financial statements. Financial statements can help predict payment default,[21] but investors at least can detect payment default when it happens because they stop receiving payments. In the case of "green default," where a company does not spend green-bond proceeds as intended, investors may not be able to detect default at all unless they have some way of monitoring the company's spending. That inability to detect default makes third-party attestation even more important.

Second, ICMA should consider requiring entities that check issuers' green intentions prior to bond issuance to: (1) monitor issuers' post-issuance disclosure and (2) withdraw their statements verifying the bond's greenness if disclosure is materially deficient.[22] The findings below indicate a significant possibility that a fair number of issuers do not provide the reporting the green-bond standards require.[23] At a minimum, such issuers should not be able to benefit from a third party's imprimatur of greenness.

The Article proceeds as follows: Part II introduces the green-bond market and the importance of disclosing use of proceeds. It also surveys the literature on the green-bond market and discusses how this Article relates to the existing body of scholarship. Part III gives an empirical overview of the US

19 *See* discussion *infra* Section V.A.

20 *See* discussion *infra* Section IV.A.1.

21 *See, e.g.*, Edward I. Altman, *Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA® Models, in* HANDBOOK OF RESEARCH METHODS AND APPLICATIONS IN EMPIRICAL FINANCE 8, 11 (Adrian R. Bell ed., 2000), https://pages.stern.nyu.edu/~ealtman/Zscores.pdf [on file with the Columbia Business Law Review] (describing use of "balance sheet and income statement data" in a statistical model to predict financial distress, that is, "defaults and bankruptcies").

22 *See* discussion *infra* Section V.B.

23 *See* discussion *infra* Section IV.A.1.

and global green-bond markets based on the dataset. Part IV focuses on post-issuance reporting in the US, describing two measures of reporting quality, what the data says about reporting quality, and some relationships in the data that may suggest drivers of reporting quality. Part V makes policy proposals based on the findings in Parts III and IV. Part VI concludes.

II. BACKGROUND ON GREEN BONDS AND POST-ISSUANCE REVIEW

A. What Is a "Green" Bond?

A bond is "green" if its proceeds are to be used for environmentally friendly, or "green" purposes, commonly for projects that address climate change.[24] This definition raises three questions: (1) What counts as a "green purpose"? (2) How do investors and others know the proceeds actually will be spent for green purposes? (3) What if the proceeds are not in fact spent for green purposes? The Article addresses each in turn.

1. Defining "Green"

There is no universal, global definition of a "green" bond, and, in the United States, there is no legal definition of the term.[25] However, there are private green-bond standards,

[24] *See* OECD, GREEN FINANCE AND INVESTMENT: MOBILIZING BOND MARKETS FOR A LOW-CARBON TRANSITION 23 (2017) (noting that green bonds are "debt instruments used to finance green projects that deliver environmental benefits").

[25] *See* Sergio Gilotta, *Green Bonds: A Legal and Economic Analysis*, *in* RESEARCH HANDBOOK ON ENVIRONMENTAL, SOCIAL, AND CORPORATE GOVERNANCE (Thilo Kuntz ed., forthcoming 2024) (manuscript at 2), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4427927 [https://perma.cc/AMX7-V7MB]. *Cf.* Curtis et al., *supra* note 10, at 175 (green-bond certification regimes are "products of private ordering"). The author's understanding is that the term "green" is not specifically regulated under EU law either. India, and possibly China, do seem to impose specific

such as the International Capital Markets Association's Green Bond Principles (ICMA GBP), last revised in June 2021.[26] The Bloomberg financial information service reports that almost all US-dollar-denominated green bonds from US issuers adhere to the ICMA GBP.[27] For this reason, this Article focuses on the GBP's definition, although other green-bond standards are important internationally.[28]

requirements for marketing bonds as "green." *See* Gilotta, *supra* (manuscript at 2 n.10) (asserting that China and India have mandatory requirements).

[26] 2021 GREEN BOND PRINCIPLES, *supra* note 1.

[27] In the dataset of USD-denominated US-issuer green bonds, 98.7% (153 of 155) were reported as aligned with the ICMA GBP. *See* John Patrick Hunt, *Workpapers for CBLR – All Fields* (2024) (on file with the Columbia Business Law Review).

[28] The Climate Bonds Initiative offers another framework and will certify bonds that meet it. *See Certification Under the Climate Bonds Standard*, CLIMATE BONDS INITIATIVE, https://www.climatebonds.net/certification. The European Union appears to be on the verge of adopting the EU Green Bonds Standard. *See Update: Provisional Agreement Reached on the European Green Bond Standard*, NORTON ROSE FULBRIGHT (2023), https://www.nortonrosefulbright.com/en/knowledge/publications/3a31a991/update-provisional-agreement-reached-on-the-european-green-bond-standard [https://perma.cc/8PUJ-F8TK] (reporting that on February 28, 2023, "the Council of the European Union and the European Parliament announced that they had reached a provisional agreement on the creation of European green bonds," that the standard would be "a voluntary standard," and that the agreement would need to be "confirmed by the [European] Council and the European Parliament, and adopted by both institutions before it is final"). The proposed standards are voluntary despite efforts by the European Central Bank to make elements of the EU Green Bonds Standard mandatory. *See, e.g.*, David Ray & Lea Gamsjäger, *ECB Calls for Mandatory EU Green Bond Standard*, NORDEA (2021), https://www.nordea.com/en/news/ecb-calls-for-mandatory-eu-green-bond-standard [https://perma.cc/D7MP-97LM]. Europe is a particularly important geographic market for green bonds. Issuers coded with European "Country" codes accounted for 49% of corporate green-bond issuance by dollar volume over the three-year period June 1, 2019 to May 31, 2022. For comparison, Asian issuers (including Oceania) accounted for 24%, North American issuers for 12%, and issuers in other locations (including supranational issuers, issuers with multiple country codes, and issuers from

Perhaps unsurprisingly, given that they are promulgated by an industry group,[29] the ICMA GBP appear very forgiving about the use of green-bond proceeds. They provide that projects funded by a green bond should be "appropriately described in the legal documentation of the security"[30] and "should provide clear environmental benefits."[31] Beyond that, the GBP do "explicitly recognize several broad categories of eligibility for Green Projects," such as "renewable energy" and "green buildings."[32] These categories are defined in very

offshore jurisdictions such as the Cayman Islands) for 15%. Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – Global Data* (2024) (on file with the Columbia Business Law Review).

China adopted the China Green Bond Principles in 2022. INT'L CAP. MKTS. ASS'N, ANALYSIS OF CHINA'S GREEN BOND PRINCIPLES (Sept. 2022), https://www.icmagroup.org/assets/Analysis-of-Chinas-Green-Bond-Principles.pdf [https://perma.cc/58JH-BWJ5] (reporting that the China GBP "is a self-regulated framework and by nature not a rule or regulation"). The Association of Southeast Asian Nations has adopted a green-bond framework, as has Japan. *See* ACMF, ASEAN GREEN BOND STANDARDS (Mar. 8, 2019), https://www.theacmf.org/images/downloads/pdf/AGBS2018.pdf [https://perma.cc/FXN9-WF8M]; *see also* MINISTRY OF THE ENV'T, JAPAN'S GREEN BOND GUIDELINES (2017), https://www.env.go.jp/policy/green-bond/gb/gl_point_en.pdf [https://perma.cc/5X9H-JQZW]. The only set of mandatory green-bond rules appears to be India's, which covers bonds marketed as green in that country. *See* Farah Imrana Hussain & Helena Dill, *India Incorporates Green Bonds into Its Climate Finance Strategy*, WORLD BANK BLOGS (June 12, 2023), https://blogs.worldbank.org/climatechange/india-incorporates-green-bonds-its-climate-finance-strategy [https://perma.cc/HBE7-VV4T].

29 ICMA's LinkedIn page describes the association as "the trade association for the international capital market with over 600 member firms from 66 jurisdictions globally, including issuers, banks, asset managers, central banks, infrastructure providers and law firms." ICMA – International Capital Markets Association, LINKEDIN, https://www.linkedin.com/company/international-capital-market-association-icma-/ [https://perma.cc/3RP3-L4SX] (last visited July 30, 2023).

30 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 4.

31 *Id.*

32 *Id.* at 4–5. The other listed categories are "[e]nergy efficiency," "[p]ollution prevention and control," "[e]nvironmentally sustainable

general terms. For example, the complete definition of "[r]enewable energy" is: "[r]enewable energy (including production, transmission, appliances and products)."[33]

Another notable aspect of the GBP is that they permit use of green-bond funds to refinance existing projects within a lookback period defined by the issuer.[34] For example, a real-estate investor with a two-year lookback period could issue a green bond in 2023 to pay off a loan incurred to buy a green building in 2021.[35] Indeed, the author's impression from reviewing the data is that this practice is not uncommon.[36]

management of living natural resources and land use," "[t]errestrial and aquatic biodiversity," "[c]lean transportation," "[s]ustainable water and wastewater management," "[c]limate change adaptation," and "[c]ircular economy adapted product, production technologies and processes." *Id.*

[33] *Id.* at 4.

[34] *Id.*

[35] *See, e.g.*, ALEXANDRIA REAL EST. EQUITIES, INC., GREEN BOND ALLOCATION REPORT 5 (Feb. 2022) ("Eligible Green Projects include (a) projects with disbursements made in the three years preceding the respective initial issuance dates of the notes . . . ."); BOSTON PROPS. LTD. P'SHIP, 2021 GREEN BOND ALLOCATION REPORT 6 (Dec. 31, 2021) ("BPLP management asserts that . . . an amount equal to the proceeds of [the green bond issue] was used for the financing and refinancing of previously incurred costs associated with the Eligible Green Projects . . . ."). BPLP also notes that Eligible Green Projects include "investments in acquisitions of buildings . . . that have received, or are expected to receive . . . a LEED Silver, Gold, or Platinum certification." *Id.*

[36] *See, e.g.*, ALEXANDRIA REAL EST. EQUITIES, INC., GREEN BOND ALLOCATION REPORT 5 (Feb. 2022) (management's assertion that green-bond proceeds were used for "Eligible Green Projects," which include "projects with disbursements made in the three years preceding the respective initial issuance dates of the notes"); BOSTON PROPS. LTD. P'SHIP, 2021 GREEN BOND ALLOCATION REPORT 6 (Dec. 31, 2021) (management's assertion that green-bond proceeds were used for "financing or refinancing of previously incurred costs associated with the Eligible Green Projects," including "investments of acquisitions of buildings . . . that have received, or are expected to receive, in the three years prior to the issuance of the notes or during the term of the notes, a LEED Silver, Gold, or Platinum certification").

2. Mechanisms for Assuring that Proceeds Are Spent for Green Purposes

The Green Bond Principles contain provisions to promote confidence that green-bond proceeds are used for green purposes. They provide that green-bond issuers should do the following: (1) have a clearly communicated process for selecting projects to be funded with green-bond proceeds;[37] (2) track green-bond proceeds and attest to their use;[38] (3) "make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and on a timely basis in case of material developments."[39]

To buttress these directives, the GBP recommend, but do not require, that issuers retain external reviewers at two stages of the process: pre-issuance and post-issuance.[40] Pre-issuance external review involves reviewing the issuer's green bond program to ensure its "alignment" with the GBP components just described.[41] Essentially, a pre-issuance review focuses on whether the proposed uses of proceeds meet the GBP's (forgiving) definition of green purpose and on whether the issuer has processes in place to meet the selection, tracking, and reporting requirements just described.[42] Most legal scholarship to date on green-bond verification has focused on the definition of "green" and on pre-issuance review.[43]

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37 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 5.

38 *Id.* at 6.

39 *Id.*

40 *Id.* at 7.

41 *Id.*

42 *See, e.g.*, SUSTAINALYTICS, SECOND-PARTY OPINION: WALMART, INC. GREEN FINANCING FRAMEWORK 1 (2021) [on file with the Columbia Business Law Review] (reporting that Walmart's "eligible categories for the use of proceeds" are aligned with the GBP, that a "dedicated Sustainable Finance Committee will be responsible for assessing project eligibility and making the final decision on project selection," that "[t]he company's Treasury team will monitor and track the net proceeds," and that "Walmart Inc. intends to publish allocation and impact reporting on an annual basis").

43 *See* discussion *infra* Section II.B.1.

As for post-issuance review, the GBP provide the following:

> Post issuance, it is recommended that an issuer's management of proceeds be supplemented by the use of an external auditor, or other third party, to verify the internal tracking and allocation of funds from the Green Bond proceeds to eligible Green Projects.[44]

This paper is concerned with post-issuance external review, along with the associated post-issuance tracking and reporting requirements.

3. Consequences for "Green Default"

A "green default" can be defined as an issuer's failure to spend green-bond proceeds for green purposes.[45] This section briefly summarizes potential consequences for green default. As relevant to the rest of the paper, and at the risk of belaboring the obvious, none of these consequences will attach unless the green default is detected.

a. Contractual Liability

When a bond issuer fails to pay interest or principal as agreed, the issuer will go into default and bondholders may sue for breach of contract.[46] One might assume that a similar principle applies to the use of green-bond proceeds; if the

[44] *See* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 7.

[45] As explained below, this event often is not an actual bond default because green bonds often lack contractual obligations to spend proceeds for green purposes. Commentators have identified the risk of green default as an issue with the green-bond market. *See* Curtis et al., *supra* note 10, at 138 ("[E]ven if the issuer has promised that it will use the proceeds in a particular way, and even if an investor can prove noncompliance, the investor will probably have no remedy."); Gilotta, *supra* note 25, (manuscript at 10, 13) (calling deliberate breach of green commitments "*ex post* opportunism").

[46] *See* WILLIAM W. BRATTON, CORPORATE FINANCE 367–68 (8th ed. 2016). Individual bondholders' rights to sue for defaults other than nonpayment, and to accelerate the debt, may be limited by bond indenture provisions. *See id.*

issuer misspends them, one might expect that bondholders could sue for breach. However, recent research indicates that this often is not the case.[47] Although many issuers do make contractual commitments related to greenness,[48] these commitments are far from universal and appear sometimes to be vague, qualified, or disclaimed to the point of meaninglessness.[49]

b. Fraud Liability

Even issuers that do not make contractual promises to spend green-bond proceeds on green projects may state a present intention to do so. Indeed, a green bond arguably is not very "green" without such a statement of intention. It appears that such statements of intention in prospectuses are very common.[50] These assertions open the issuer up to fraud liability in the event that the issuer does not in fact intend to spend

[47] *See* Curtis et al., *supra* note 10, at 174.

[48] *See id.* at 145, 148 tbl.2, 152 (finding that 64% of their sample of "sustainable finance" bonds in the Perfect Information database from 2012-22 have documents that contain "some language of commitment").

[49] *See id.* at 148–51 (giving examples from green-bond documents supporting the assertion that "the fact that a bond uses promissory language does not mean that it represents a firm commitment, much less an enforceable one").

[50] *See, e.g.*, Ford Motor Co., Prospectus Supplement (Form 424B2) S-4 (Nov. 8, 2021), https://www.sec.gov/edgar/search/#/dateRange=custom&category=form-cat5&entityName=ford&startdt=2021-11-09&enddt=2021-11-09 [https://perma.cc/B6J6-ZY8V] ("Ford intends to allocate an amount equal to the net proceeds from this offering to finance or refinance . . . new or existing green projects, assets, or activities . . . ."); Visa, Inc., Prospectus Supplement (Form 424B2) S-6 (Aug. 10, 2020), https://www.sec.gov/edgar/search/#/dateRange=custom&category=form-cat5&entityName=visa&startdt=2020-08-11&enddt=2020-08-11 [https://perma.cc/EJW4-AB7K] ("We intend to use the net proceeds from the offering of the 2027 notes to refinance or finance . . . 'Eligible Green Projects.'").

the proceeds appropriately when it solicits the purchase.[51] Of course, it may be difficult to show that a subsequent failure to spend on green projects reflects a lack of intent to do so in the first place, as opposed to a changed mind and/or unexpected difficulties.

c. Decertification

A bond's loss of "green" status could be a significant consequence of green default. However, it is unclear that most pre-issuance greenness verifiers will take this step.[52]

d. Index Dropping

A number of indices of green bonds exist,[53] and some evidence indicates that issuers want their bonds to be included

[51] *See, e.g.*, 17 C.F.R. § 240.10b-5 (2023) (prohibiting the making of untrue statements of material fact and other forms of fraud in connection with the sale of securities).

[52] As noted, the nonprofit Climate Bonds Initiative certifies some green bonds, *see* discussion *supra* note 28, and the CBI reportedly will decertify a bond if the proceeds are not spent on green projects. *See* Curtis et al., *supra* note 10, at 173–74.

[53] These include the Bloomberg Barclays MSCI Global Green Bond Index, *see* MSCI, BLOOMBERG BARCLAYS GREEN GLOBAL GREEN BOND INDEX (2021), https://www.msci.com/documents/10199/242721/Barclays_MSCI_Green_Bond_Index.pdf/6e4d942a-0ce4-4e70-9aff-d7643e1bde96 [https://perma.cc/KP6V-X84N], as well as a family of indices maintained by S&P, including the S&P Green Bond Index. *See Green Bonds*, S&P DOW JONES INDICES, https://www.spglobal.com/spdji/en/index-family/esg/fixed-income-esg/green-bonds/#overview [https://perma.cc/G3F8-DQJQ] (last visited Mar. 1, 2024). An ICMA working group compiled information on green-bond indices in 2018. *See* GBP SBP DATABASES AND INDICES WORKING GROUP, SUMMARY OF GREEN – SOCIAL - SUSTAINABLE FIXED INCOME INDICES PROVIDERS (June 2018), https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/June-2018/2018_Green%20and%20Social%20Bond%20Indices%20140618.pdf [https://perma.cc/6DDN-EYUR].

in such indices.[54] One consequence of green default could be that the bond in question is dropped from some or all green-bond indices. Indices have declined to include purportedly green bonds on the grounds of insufficient greenness,[55] although the author has not been able to find examples of bonds being dropped from indices for green default.

e. Loss of Investor Confidence

Even without any other consequence, a "green default" might be expected to lead to loss of investor confidence in the issuer, making the issuance of subsequent green bonds (or other securities) more difficult. It has been reported that fear of reputational consequences is the main deterrent of green default at this time.[56]

B. Literature Survey

1. Review of Green-Bond Literature

Like the green-bond market itself, the literature on regulation of green bond verification is relatively small but rapidly growing.[57] In 2018, Professor Stephen Kim Park surveyed the

[54] *See* John Caramichael & Andreas C. Rapp, *The Green Corporate Bond Issuance Premium* 1 (Int'l Fin. Discussion Papers, No. 1346, June 2022), https://www.federalreserve.gov/econres/ifdp/files/ifdp1346.pdf [https://perma.cc/F6GX-WRQ9] ("[W]e find that the greenium is linked to two proxies of demand pressure, bond oversubscription and bond index inclusion.").

[55] *See* Banahan, *supra* note 8, at 857 (reporting that "most major green indices declined" to list a green bond issued by Spanish energy and petrochemical company Repsol).

[56] *See* Curtis et al., *supra* note 10, at 159 ("In the view of most of our respondents, the green part of the bond markets was entirely driven by reputation.").

[57] *See* Gilotta, *supra* note 25; Rose, *Verification*, *supra* note 9; Paul Rose, *Catalyzing Sustainable Investment*, 51 ENV'T L. 1221 (2021); Park, *supra* note 8. Insofar as it focuses on liability as a way of ensuring that green

governance of the global green-bond market, finding that the market was "primarily shaped by the very same market participants that sell, buy, trade, or assess these financial instruments."[58] To combat "greenwashing"[59] in this participant-governed market, Park recommended two substantive reforms and one procedural one. He characterized all his recommendations as hybrid between public and private.[60] The substantive reforms were: (1) amending Regulation S-K to require disclosure of second-party opinions (apparently referring to pre-issuance verification);[61] and (2) incorporating green bonds into government green-bond labeling schemes, potentially incorporating CBI certification as a requirement to be called "green" in this context.[62] Professor Park's procedural suggestion was to include a broader group of stakeholders in governance of the green-bond ecosystem and possibly provide government subsidies to participants.[63]

Also in 2018, Professor Paul Rose wrote specifically on *Certifying the 'Climate' in Climate Bonds*.[64] Rose surveyed ICMA's and CBI's green-bond rules[65] and presented three case studies of pre-issuance reviews of sovereign bonds (issued by France, Fiji, and China).[66] Rose concluded that "the texts of the verifications studied above do not themselves inspire confidence in the 'climate' nature of the climate bonds verified

bond proceeds are spent as represented and discusses green-bond disclosure, the recent paper by Professors Curtis, Weidemaier, and Gulati arguably falls into this category. *See* Curtis et al., *supra* note 10. Contributions from commentators who are not full-time members of the academy include Rivera, *supra* note 8, and Banahan, *supra* note 8.

58 Park, *supra* note 8, at 6.

59 *Id.* at 6–7.

60 *Id.* at 44.

61 *Id.* at 44–45.

62 *Id.* at 45.

63 *Id.* at 45–46.

64 *See* Rose, *Certifying*, *supra* note 9.

65 *Id.* at 63–65.

66 *Id.* at 65–70.

thereunder. The issuers have made assurances, and the verifiers have reviewed those assurances for compliance with the standards, often relying solely on publicly available information to verify those assurances."[67] To improve the market, Rose recommended that CBI encourage the use of nonprofit and analogous business forms for green bond verifiers[68] and that regulators consider creating rules that expose verifiers to liability for poor-quality verification.[69] He advocated waiting until the market matures further before taking the latter step.[70]

Rose followed up in 2022 with a longer piece, titled *Sustainability Verification*.[71] As the title suggests, this paper does not focus on use-of-proceeds reporting, but rather on verification of the "green" qualities of green bonds: pre-issuance green verification[72] and, to a lesser extent, post-issuance impact reporting[73] and green scoring or rating.[74] Rose demonstrated the importance of sustainability reporting to the growing green-bond industry[75] and argued that the time had come for imposition of securities liability under Section 11 of the Securities Act on green-bond verifiers and, by extension, on green-bond issuers.[76]

Professors Quinn Curtis, Mark Weidemaier, and Mitu Gulati offered an empirical study (really, a pair of empirical studies) of the green-bond market in 2022.[77] Their key quantitative findings were that many green bonds (37% of those they

67 *Id.* at 70.
68 *Id.* at 76.
69 *Id.* at 76–77.
70 *Id.* at 77.
71 *See* Rose, *Verification*, *supra* note 9.
72 *Id.* at 1037–38.
73 *Id.* at 1038–39.
74 *Id.* at 1040–41.
75 *Id.* at 1022–48.
76 *Id.* at 1081–85.
77 *See* Curtis et al., *supra* note 10.

reviewed) lack any contractual commitment to "greenness,"[78] and that greenness commitments that do exist were often heavily qualified or undercut by other language.[79]

The authors also conducted over 50 interviews with industry participants,[80] and they drew on these interviews to explain their findings on contractual enforceability. In essence, the authors portrayed their interviewees' views as follows: The principal buyers of green bonds are funds with a mandate for at least some ESG investment, which want to buy "green" bonds but are not willing to pay extra for them.[81] They are unwilling to pay more because the funds themselves attract investors based on traditional financial performance, not on the quality of their greenness.[82] Thus, issuers do not realize a large "greenium" (green premium) for green bonds.[83] That means, in turn, that they are not willing to assume liability for breach of green promises.[84] It also means that the entire green-bond market has an artificial quality: as an interview subject says, "None of these issuers is producing new green [or] blue . . . projects . . . to tap funds."[85]

78 *Id.* at 148 tbl.2.

79 *Id.* at 148–51 (describing qualifications, limits, and contradictory language in bond documents that tend to undermine green commitments).

80 *Id.* at 157.

81 *Id.* at 158–60.

82 *Id.* at 159–61, 168–70.

83 *Id.* at 141 ("[W]hile evidence from corporate and municipal bond markets is mixed, there is little evidence of a significant greenium for most investors."); *see also id.* at 137 n.23 (summarizing the literature as showing that the greenium, "[a]t best (or worst) . . . is tiny").

84 *Id.* at 158 (quoting interviewee as saying, "There is no issuer . . . of an ESG bond willing to bear the risk of legal liability [for failure to fulfill promises]. . . . The premium the issuer would have to receive for issuing the bond would have to be much bigger . . . ."); *see also id.* at 163 (presenting a quotation that "captur[ed] the broad sense we got from market participants": "On the EU side, there was talk of enhancing the promises underlying the green labels. But we have argued against that. It is dead. No one can afford liability.").

85 *Id.* at 161.

Curtis, Weidemaier, and Gulati reviewed a global dataset of municipal, corporate, and sovereign green bonds,[86] not just US corporate green bonds. Their findings about contractual enforceability may be equally subject to a glass-half-full reading as to the glass-half-empty interpretation they offer – after all, they find that over half of green bonds do have contract commitments to greenness.[87] And the ESG-fund-driven explanation of the green-bond market bears further investigation.[88] Nevertheless, the authors' findings and explanation seem compelling as applied to the US market.

Curtis, Weidemaier, and Gulati offer three proposals to strengthen green-bond contractual commitments. First, they advocate requiring some degree of green-promise enforceability as a condition of green certification.[89] Second, they argue that ESG funds should have to disclose their policies on green-

[86] *Id.* at 145–46 (describing the dataset).

[87] *Id.* at 147. The authors paint a rosier picture in this regard than Professor Rose. *See* Rose, *Verification*, *supra* note 9, at 1028 ("There is thus no contractual obligation that the UK will use the proceeds for green purposes, and it appears that no issuer has added such a contractual provision to its issuance documents. Instead, issuers will explicitly disclaim that a failure to use proceeds in a particular way constitutes an event of default.").

[88] For example, many green bonds are held by plain-vanilla index funds, rather than ESG funds. Bloomberg's HDS function reports holders for 46% of dollar volume of outstanding US USD-denominated green bonds in the dataset. BlackRock is the largest holder, and it holds about 4% of the outstanding bonds in the dataset. BlackRock holds on behalf of various beneficiaries, the largest of which are bond index ETFs (*e.g.*, iShares iBOXX Investment Grade Corporate Bond ETF, iShares Core Aggregate Bond ETF, etc.). The 1895 Wereld Bedrijfdobligaties Fonds is the highest-ranked BlackRock ESG-specific beneficiary, and it is ranked 4th among BlackRock beneficiaries and accounts for just over 4.45% of BlackRock's green-bond holdings. By contrast, the investment-grade and aggregate ETFs just mentioned account for 8.6% and 6.3% of BlackRock's holdings, respectively. Computation based on Bloomberg data (Bloomberg last accessed on Feb. 9, 2024). *See* John Patrick Hunt, *Bloomberg Data Pulled for CBLR – BlackRock* (2024) (on file with the Columbia Business Law Review).

[89] Curtis et al., *supra* note 10, at 172–75.

promise enforceability.[90] Finally, they advise issuers to consider marketing green bonds specifically to investors who are willing to pay a "greenium" for enforceable green promises.[91]

A recent book chapter by Professor Sergio Gilotta focuses on the European market and argues that ad hoc public regulation of the green bond market is not wise.[92] Gilotta contends that private-ordering solutions and securities law are sufficient and that it is unclear that government rules would perform better than the rules and principles the market has adopted.[93] Post-issuance reporting is important to Gilotta's argument, although he does not discuss the subject in detail. Specifically, he argues that issuers "may subject themselves to detailed ex post reporting obligations as regards the use of proceeds raised through the bond,"[94] that "independent third parties [may be] entrusted with the task of checking the progress made in the development of the project,"[95] and that "these arrangements are common practice in the green bond market, as international standard setters require their adoption for the issuance of green bonds."[96]

Authors who are not full-time scholars also have published on the subject in the legal literature. Sustainability advisor Cristina Banahan draws an analogy between pre-issuance verifiers and credit rating agencies, finding the verifiers to be the "Bond villains" of the green market.[97] She advocates for the creation of a US commission, modeled on China's, to promulgate a legal definition of green and regulate green

90 *Id.* at 175–76.

91 *Id.* at 177–78.

92 *See* Gilotta, *supra* note 25 (manuscript at 3).

93 *Id.* (manuscript at 22).

94 *Id.* (manuscript at 16).

95 *Id.*

96 *Id.* As noted, the ICMA Green Bond Principles do require post-issuance reporting on use of proceeds. 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6. They do not, however, require third-party attestation of such reporting, although they do recommend it. *Id.*

97 *See* Banahan, *supra* note 8 (article title).

verification.[98] As a law student, Bryant Rivera advocated mandatory definitions of bond greenness and ESG reporting standards.[99] Improved post-issuance disclosure would increase the effectiveness of both sets of proposals by helping investors and regulators understand whether the actual use of funds met the authors' proposed greenness definitions.

2. Relationship of This Project to Existing Work

a. Importance of Post-Issuance Reporting

None of the authors just discussed addresses use-of-proceeds reporting in detail[100] or directs proposals specifically to the improvement of such reporting. This paper's survey and analysis of post-issuance use-of-proceeds reporting complements the analysis and recommendations in existing scholarship. This section addresses each piece of prior scholarship in turn.

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98 *See id.* at 864–68.

99 *See* Rivera, *supra* note 8, at 208–10. It is not clear whether Rivera's advocacy of mandatory ESG reporting covers use-of-proceeds reporting. *Id.*

100 Park notes that "[i]ndependent third-party audits verify compliance with a standard in a more rigorous, consistent manner and often monitor compliance on an ongoing basis, whereas second opinions are executed on a one-time basis prior to issuance," Park, *supra* note 8, at 44, but apparently does not further discuss post-issuance review, except to note that "third-party audits have not yet become standard practice in the green bond market," *id.*, and that "it may not be feasible to mandate independent audits at this time." *Id.* Rose's 2018 paper does not always distinguish between pre-issuance verification and post-issuance reporting and attestation, but it appears that the recommendations were directed primarily to pre-issuance verification. *See* Rose, *Certifying*, *supra* note 9, at 70 ("The issuers have made assurances, and the verifiers have reviewed those assurances for compliance with the standards, often relying solely on publicly available information to verify those assurances."). Rose's 2022 paper, as noted, focuses on pre-issuance verification and to some extent on post-issuance reporting, rather than post-issuance use-of-proceeds verification. *See supra* notes 71–76 and accompanying text. Gilotta devotes a couple of sentences to post-issuance monitoring. *See supra* notes 92–96 and accompanying text.

Park's first substantive proposal is to incorporate private standards for calling bonds "green" into government standards for greenness. The main potential environmental and market-integrity benefit of this idea, if successful, would be to prohibit issuers from calling bonds "green" unless the intended use of proceeds actually meets some standard of greenness. For instance, it might become illegal to market bonds to fund "clean coal" as "green."[101] The benefit would be greater with strong assurances that the actual uses of proceeds would also meet those standards.

Park's second proposal, for public disclosure of pre-issuance verification[102] (i.e., third-party checking that the bond proceeds' intended uses are green), is more effective if backed by post-issuance review of how the proceeds are actually used.

Rose suggests imposing securities liability on pre-issuance green verifiers and, by extension, issuers.[103] Here, securities liability and third-party verification could reinforce each other, as they do for financial statements. Public-company

[101] Some green-bond standards have been criticized for allowing "clean coal" to count as "green." *See., e.g.*, Yuzo Yamaguchi & Rehan Ahmad, *Investors Applaud China's Plan to Ban Clean Coal from Green Bond Financing*, S&P GLOB. (Sept. 9, 2020), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/investors-applaud-china-s-plan-to-ban-clean-coal-from-green-bond-financing-60257794 [https://perma.cc/KK2W-WJSF**]**.

[102] Park's proposed disclosure requirement would apply to "second [party] opinions," which he describes as reviews of the "rules, regulations, and guidelines used by a green bond issuer" – not the use of proceeds. *See* Park, *supra* note 8, at 28.

[103] Current market practice at issuance is for issuers to assert an intention to use funds in a particular way. *See* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 5. It seems that if funds were not used in a particular way, issuers could argue that their original statement was accurate and not misleading and that they simply changed their mind in good faith. Unless market practice changes, it seems that this issue could reduce the effectiveness of securities liability in policing green-bond quality.

financial statements are audited,[104] and false ones give rise to securities liability.[105] Similarly, the use of green bond proceeds could be checked, and misleading claims in that regard could give rise to securities liability.

This Article also complements the work of Curtis, Weidemaier, and Gulati in three respects. First, their finding that green issuers have only weak contract obligations highlights the importance of reputational consequences for green default. Such consequences depend on detection of default, so post-issuance review is important in bringing them about. As the three authors note, "While the quality of contractual promises has declined over time, investors have been pushing for increasing transparency and disclosure [around use of proceeds]."[106] Even if investors are not demanding contractual promises of greenness, they do want assurance that proceeds are used as expected.

Second, assuming the authors are right that the green bond market does not induce new green investment at this time, better information about whether issuers follow through is still desirable. Information about green default protects investors who seek to support green projects,[107] and it may help develop investor confidence in the market to the point where

104 *See Exchange Act Reporting and Registration*, SEC, https://www.sec.gov/education/smallbusiness/goingpublic/exchangeactreporting [https://perma.cc/KA5F-8DUF] (last visited Feb. 24, 2024).

105 *See, e.g.*, *In re* Charter Comms. Sec. Litig., No. MDL 1506, 4:02-CV-1186 CAS, 2004 WL 3826761, at *10, *18 (E.D. Mo. Oct. 12, 2004), *aff'd as to separate issue*, 443 F.3d 987 (8th Cir. 2006), *aff'd as to separate issue sub nom*, Stoneridge Inv. Partners, LLC v. Scientific-Atlanta, Inc., 552 U.S. 148 (2008) (denying motion to dismiss claims against Arthur Andersen based on allegation that the firm issued false and misleading statements that Charter's financial statements conformed to generally accepted accounting principles).

106 Curtis et al., *supra* note 10, at 171.

107 *Id.* at 164 ("Given that green bonds are a demand-driven phenomenon, it is also implausible that green bond investors are indifferent to the 'greenness' of the bonds they purchase.").

a persistent greenium does exist and can induce new green investment.

Finally, Curtis, Weidemaier, and Gulati present proposals to promote enforceability of green promises. Enforcement of a broken promise requires detection of breach, and improved post-issuance disclosure should promote such detection.

Gilotta argues that post-issuance verification is an important mechanism for assuring that green bonds are green without going into detail on the subject.[108] This Article agrees with Gilotta's point and complements it by arguing that post-issuance verification can be further improved.[109]

b. Green Bond Verification and Securities Gatekeeping

As Rose has pointed out, the green-bond ecosystem makes use of several different types of green verification.[110] Pre-issuance second-party opinions, typically issued by specialized green-finance firms, are the type that has attracted the most scholarly attention.[111] When authors have drawn analogies between green-bond verification and other types of securities gatekeeping, they have compared green-bond verification to credit rating.[112] The analogy makes sense in that credit ratings and pre-issuance green-bond verification are both types of pre-issuance third-party certification.[113] This section points

108 *See supra* notes 93–96 and accompanying text.

109 *See* discussion *infra* Part V.

110 *See* Rose, *Verification*, *supra* note 9, at 1036–43.

111 *See* discussion *supra* Section II.B.1.

112 *See, e.g.*, Rose, *Verification*, *supra* note 9, at 1021 (describing credit rating agencies as "the closest analog to sustainability verifiers"); Rose, *Certifying, supra* note 9, at 70–71 (stating that "the verifier relationship is not unlike the relationship of credit ratings agencies to issuers"); Banahan, *supra* note 8, at 850–55 (arguing that "[t]he similarities between credit rating agencies and green bond verifiers underscore the importance of ethical rules and processes needed to improve the reliability of these financial offerings").

113 *See Rose, Verification, supra note 9*, at 1055–57; Banahan, *supra* note 8, at 850 ("[G]reen bond certifiers and credit agencies both function as

out that there are some limits to the analogy on its own terms and that it has even more limited application to the subject of this paper, post-issuance reporting and certification.

As Professor Frank Partnoy has pointed out, credit rating agencies are "not like other gatekeepers," such as lawyers and accountants.[114] Partnoy's observation is relevant here because pre-issuance green-bond opinions are likewise unique, and what they express is fairly different from what credit ratings do. The critical issues for green-bond pre-issuance opinions appear to be (1) whether the intended use of the bond proceeds is "green" according to a particular framework's definition of "green," and (2) whether the issuer has processes in place that give some assurance that the proceeds will actually be used that way.[115] The first seems akin to a legal opinion,[116]

information intermediaries between issuers and investors."). On third-party certification generally, *see* Jonathan M. Barnett, *The Certification Paradox*, *in* THE CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW 252, 252–268 (Jorge L. Contreras ed., 2019).

114 *See* Frank Partnoy, *How and Why Credit Rating Agencies Are Not Like Other Gatekeepers*, *in* FINANCIAL GATEKEEPERS: CAN THEY PROTECT INVESTORS? 59, 81–85 (Yasuyuki Fuchita & Robert E. Litan eds., 2006).

115 The ICMA Green Bond Principles recommend "that issuers appoint (an) external review provider(s) to assess through a pre-issuance external review the alignment of their Green Bond or Green Bond programme and/or Framework with the four core components of the GBP." *See* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 7. The four components are (1) use of proceeds, (2) process for project evaluation and selection, (3) management of proceeds, and (4) reporting. *Id.* at 4. Given that the review is conducted before the bond is issued and the proceeds received, the focus of the review is on the *planned* use of proceeds and the systems in place for project selection, proceeds management, and reporting. A review of several pre-issuance reviews confirms this view. *See, e.g.*, discussion *supra* note 42.

116 For example, bond-issuance opinion letters for offerings that do not require registration commonly contain an opinion that registration is not required, applying the statutory and regulatory provisions governing registration of securities to the planned offering. *See Legal Opinion (Rule 144A and/or Regulation S Debt Offering) (Issuer's Counsel)*, LEXISNEXIS, https://advance.lexis.com/open/document/lpadocument/?pdmfid=1000522&pddocfullpath=%2Fshared%2Fdocument%2Fforms%2Furn%3AcontentItem%3A57P3-VDM1-JN14-G0HY-

and the second seems akin to accountant's test of internal controls.[117] A credit rating, by contrast, largely turns on the rater's view of the issuer's likely ability to pay on time over the life of the bond.[118] In theory, the rating reflects a financial and business judgment that turns on a multitude of future events and is fundamentally a more subjective determination.[119] The author suggests that it might be fruitful to look beyond credit ratings to legal opinions and auditing when thinking about the pre-issuance verification market.

00000-00&pdcontentcomponentid=101381&pdteaserkey=sr0&pditab=allpods&ecomp=ntrg&earg=sr0 [on file with the Columbia Business Law Review].

117 *See* Bikki Jaggi, *Corporate Governance: Structure and Consequences*, *in* ENCYCLOPEDIA OF FINANCE 1187, 1206 (C.F. Lee & A.C. Lee eds. 2022) (describing how SOX requires certain large filers to present auditors' assessments of internal controls in annual reporting and describing internal controls as including a firm's "plan of organization, procedures, and tests concerned with the decision-making processes" as well as controls dealing with "the safeguarding of assets, reliability of financial records, conformity with accounting standards, and reasonably assurances on accuracy and reliability of reported information").

118 *See* MOODY'S, RATING SYMBOLS AND DEFINITIONS 5 (Nov. 9, 2023), https://ratings.moodys.com/api/rmc-documents/53954 [on file with the Columbia Business Law Review] ("Ratings assigned on Moody's global long-term and short-term rating scales are forward-looking opinions of the relative credit risks of financial obligations . . . . Moody's defines credit risk as the risk that an entity might not meet its contractual financial obligations as they come due and any estimated financial loss in the event of default or impairment."); *S&P Global Ratings Definitions*, S&P GLOB. (June 9, 2023), https://www.spglobal.com/ratings/en/research/articles/190705-s-p-global-ratings-definitions-504352 [https://perma.cc/KHF3-XWQD] ("7. Issue credit ratings are based, in varying degrees on S&P Global Ratings' analysis of the following considerations: —The likelihood of payment . . . .").

119 Partnoy has disputed whether this is the function that the ratings actually serve in the marketplace. *See, e.g.*, Frank Partnoy, *What's (Still) Wrong with Credit Ratings?*, 92 WASH. L. REV. 1407, 1409–10 (2017) (explaining "regulatory license" view of credit ratings, under which they function to "unlock[] access to the markets – even if the ratings themselves have little or no informational value").

The credit-rating analogy that has been important to earlier scholarship is farther afield when it comes to post-issuance reporting and verification, the subject of this Article. Although the distinction between fact and opinion is rarely totally clear, post-issuance reporting is largely factual in nature: Did the issuer spend the proceeds on certain types of projects? Verification of such reporting is, in essence, a variety of fact-checking, far removed from the predictive judgment, the opinion, that defines what credit ratings should be.

At the same time, the quality of post-issuance reporting is critically important, because green default is generally harder to detect than payment default. Although there certainly can be debates over whether a borrower has defaulted on debt,[120] investors typically will know that they are not being paid. If the debt received a high credit rating, investors may decide not to trust the relevant rating agency in the future, opening up at least the theoretical possibility of market discipline of rating quality.

There is no analogous natural detection mechanism for green default. Even in the case of bonds issued specifically to finance the construction of a specific building or power plant,[121] it is generally harder for investors to determine whether something has been built than whether they are being paid. But in many cases, determining whether an issuer used proceeds for green purposes is much harder than looking at photos of a building site. For example, many green bonds

120 *See, e.g.*, *Bondholders Claim Tyco in Default on up to $4 Bln*, REUTERS (Nov. 28, 2007), https://www.reuters.com/article/idUSN28615477/ [https://perma.cc/6LAE-RZAZ] (describing the dispute between Tyco International and a trustee of its bonds, the Bank of New York, over whether Tyco had defaulted on the bonds).

121 *See* Curtis et al., *supra* note 10, at 137–38 ("[M]any green bonds are issued to finance specific projects that are identified to investors in advance. These bonds do not raise particularly acute monitoring or enforcement concerns. . . . Compliance is easy to monitor; either the issuer pursues the project or it does not. Such bonds may not need detailed monitoring and enforcement provisions focused on the green aspects of the transaction.").

are issued by banks to support the bank's making green loans.[122] A typical bond investor may have no way of checking what specific loans the bank has made since issuing the green bond, much less whether the green-bond funds were allocated to green lending. Thus, post-issuance review is a critical aspect of green-bond integrity that does not have a clear analogy in the rating-agency context.

Two other types of green-bond verification deserve brief mention. One is the auditing of "impact reporting." "Impact reporting" is reporting on the actual environmental effect of green-bond expenditures, not just what they were used for. The ICMA GBP call on issuers to report on the "expected impact" of projects funded by green-bond proceeds.[123] Insofar as signing off on this type of impact reporting involves a prediction, it may be more akin to credit rating than a second-party opinion or use-of-proceeds attestation, the two types of verification discussed so far. Even so, the analogy to credit ratings is limited. Predicting the environmental impact of a project[124] seems at first blush to be more of a scientific and engineering exercise than a financial one. In any event, the author's limited review suggests that third-party signoff on impact

122 *See, e.g.*, BANK OF AM. CORP., GREEN AND EQUALITY PROGRESS SUSTAINABILITY BOND ISSUANCES, USE OF PROCEEDS ATTESTATION, REPORT OF INDEPENDENT ACCOUNTANTS, Ex. 1 (2022) (asserting that green bond proceeds were used to make loans to at least 11 different borrowers).

123 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6.

124 INT'L CAP. MKTS. ASS'N, HANDBOOK: HARMONISED FRAMEWORK FOR IMPACT REPORTING, 9 (June 2023) [hereinafter 2023 IMPACT REPORTING FRAMEWORK], https://www.icmagroup.org/assets/documents/Sustainable-finance/2023-updates/Handbook-Harmonised-framework-for-impact-reporting-June-2023-220623.pdf [https://perma.cc/2ZMM-LRRE] (providing that impact reporting "should illustrate the expected environmental impact or outcomes made possible as a result of projects to which the green bond proceeds have been allocated").

reporting has been very rare in the US corporate green-bond market.[125]

The second additional type of green-bond certification is green credit rating or scoring, provided by firms including credit rating agencies.[126] Insofar as such scoring or rating does, at least in some cases, purport to assess the likelihood that the firm will achieve its environmental objectives,[127] it may be analogous to credit rating. However, it is unclear whether this type of rating or scoring is at all common in the US market: although Bloomberg states that it reports these ratings when available,[128] the service does not appear to have a Moody's green-bond rating for any US green bond issued in the three-year period discussed in this Article.[129]

In sum, credit ratings furnish an analog to post-issuance green verification that is useful to some extent, but great care must be taken in extrapolating from the rating-agency market to the market under discussion here.[130] In many ways, post-

125 The author's review of 47 US corporate green bonds from the study period for which Bloomberg indicated that impact reporting was available turned up no examples of attestation of impact reporting.

126 *See* Rose, *Verification*, supra note 9, at 1041–42 (reporting that the credit rating agency Moody's provides such scoring and presenting its rating scale and explanations).

127 *See id.* at 1042 tbl. 1 (demonstrating that Moody's green rating scale ranges from GB1 meaning "[p]rospects for achieving stated environmental objectives are excellent" to GB5 meaning "[p]rospects for achieving stated environmental objectives are poor").

128 *See* E-mail from Bloomberg Help Desk to John Patrick Hunt, Professor of L. and Martin Luther King, Jr. Hall Rsch. Scholar, U.C. Davis Sch. of L. and Author (Aug. 17, 2023, 19:33[UTC]) (on file with the Columbia Business Law Review).

129 A search for the Moody's green-bond rating returned "#N/A N/A" for each bond in the dataset. BLOOMBERG FIN. INFO. SERV. (last visited Feb. 7, 2024) (on file with the Columbia Business Law Review).

130 *See* Rose, *Verification*, *supra* note 9, at 1073 ("The pathologies of the credit rating system are directly relevant to the business of sustainability ratings, and the lessons learned from attempted regulation of CRAs can help protect against the growth of these pathologies in the sustainability ratings industry."); Rose, *Certifying*, *supra* note 9, at 72–77 ("outlin[ing]

issuance green reporting and verification must be considered on their own terms.

III. EMPIRICAL OVERVIEW OF THE U.S. AND GLOBAL GREEN BOND MARKETS

This section presents an overview of the U.S. and global green-bond markets using data obtained from the Bloomberg Financial Information Service. Among U.S. finance professionals, Bloomberg is a highly regarded service, particularly for bond data.[131] Although the focus of the Article is post-issuance reporting on green bonds, the dataset permits the author to describe the U.S. market in other respects and to give more detail about it than has previously appeared in legal scholarship, which has tended to describe green bonds in fairly abstract terms.

A. Description of Datasets and Methods

Bloomberg attaches a "green bond indicator" to bonds that meet its definition of "green." Bloomberg uses a broad definition of "green." The service codes a bond as green if the issuer states in offering documents that 100% of the net proceeds or

existing regulatory structures in certification markets, particularly the regulations applied to CRAs [credit rating agencies], and . . . discuss[ing] the applicability of those approaches to climate bond verification"). *See also* Banahan, *supra* note 8, at 843 (arguing that the United States should learn from its experience with credit rating agencies in the global financial crisis in regulating green bond verification).

131 The assertion is based primarily on the author's interactions with finance professionals over a period of many years. *See* Jessica Martel, *Best Bloomberg Terminal Alternatives*, INVESTOPEDIA (Sept. 30, 2023), https://www.investopedia.com/terms/b/bloomberg_terminal.asp# [https://perma.cc/344X-FLNX] ("The Bloomberg terminal is seen by many as the gold standard in the financial industry; it is one of the oldest and most used financial terminals.").

an amount equal to the proceeds will be used for eligible green projects.[132]

The author used Bloomberg's search function to generate the bond lists discussed in this Article. The main dataset contains all dollar-denominated corporate[133] green bonds on the Bloomberg service issued by U.S. issuers[134] from June 1, 2019 to May 31, 2022.[135] After removal of apparent duplicate bonds,[136] this dataset contained 155 bonds with an aggregate face value at issuance of $91.3 billion.[137] Appendix 1 presents a list of the bonds, including issue dates and amounts issued.

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132 *See* E-mail from Bloomberg Help Desk to John Patrick Hunt (Aug. 17, 2023, 19:33[UTC]) (on file with the Columbia Business Law Review). Bloomberg also indicates that it reviews "any second party opinion or framework documents available from the Issuer." *Id.* Bloomberg indicates that corporate bonds are marked green if "the security has been classified as a Green Bond/Loan in Use of Proceeds." *FLDS DT607*, BLOOMBERG FIN. INFO. SERV. (last visited April 3, 2024). That classification in turn depends on the "issuer's intended use of the capital raised by the offering." *FLDS DY056*, BLOOMBERG FIN. INFO. SERV. (last visited April 3, 2024).

133 "Corporate" here refers to the "Corporate" asset-class designation in Bloomberg.

134 A "U.S. issuer" is defined here as one that has a "Country" code of "United States" in Bloomberg. Bloomberg advises that its "Country" code states the issuer's country of incorporation. *FLDS DS003*, BLOOMBERG FIN. INFO. SERV. (last visited April 3, 2024).

135 The end date of May 31, 2022 was chosen because the ICMA Green Bond Principles recommend annual post-issuance reporting, and June 1 provides for one year to have passed between issuance and initial data collection, which occurred in early June 2023. The dataset was finalized in early August 2023.

136 In several instances, two bonds with different identifiers on Bloomberg were issued by the same issuer on the same date in the same currency in the same amount. The team treated such issues as duplicates and removed all but one instance from the dataset.

137 Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review). Importantly, this dataset does not include U.S. green municipal bonds, which are significantly more numerous than green corporate bonds, although they do not have as large a principal value. Over the three-year period in question, Bloomberg reports that 10,054 municipal

For global comparisons, the author also made use of a larger dataset containing all corporate green bonds issued worldwide (excluding US duplicates removed earlier) over the same three-year period for which amount issued is available. This dataset contains 3,832 bonds with an aggregate face value at issuance of $1.01 trillion.[138]

B. Size and Growth of the U.S. Corporate Green Bond Market

The U.S. corporate green bond market has been growing, as the following table reflects. After the period depicted in the table, issuance in the market has continued to run at over $30 billion annually, despite the downturn in bond issuance generally.[139]

green bonds were issued and that the aggregate value was about $65 billion. Calculation from Bloomberg data. *See* John Patrick Hunt, *Bloomberg Data Pulled for CBLR* (2024) (on file with the Columbia Law Review).

[138] For bonds issued in non-dollar currencies, Bloomberg converts the amount issued to dollars using the exchange rate prevailing on the issuance date. The research team's review indicates that Bloomberg's service does appear to contain some duplicates. These duplicates were removed for US corporate green bonds but not others, so the numbers cited in the text likely moderately overstate the number of global green bond issues and their amount.

[139] Calculation from Bloomberg data. *See* John Patrick Hunt, *Bloomberg Data Pulled for CBLR* (2024) (on file with the Columbia Business Law Review). In the year from June 1, 2022 through May 31, 2023, green issuance slowed along with bond issuance generally, but its share continued to grow. In that period, 59 issues (index = 174) with total dollar volume $35.8 billion (index = 183) appeared. *See* John Patrick Hunt, *Bloomberg Data Pulled for CBLR* (2024) (on file with the Columbia Law Review). The green share of total USD-denominated US-issuer corporate issuance by dollar value was 2.40% (index = 309). *See id.*

Year of Issuance	Number of Green Issues	Green Issue Index (6/1/19-5/31/20 = 100)	Green Amount Issued Total (billions)	Green Amount Issued Index (6/1/19-5/31/20 = 100)	Green Share of Total US Corporate USD Issuance	Green Share Index (6/1/19-5/31/20 = 100)
6/1/19-5/31/20	34	100	$19.6	100	0.8%	100
6/1/20-5/31/21	53	156	$28.9	147	1.0%	133
6/1/21-5/31/22	68	200	$42.9	219	2.0%	259

Even so, green bonds are still a relatively small proportion of U.S. issuance; over the three-year period in question, green issuance accounted for about 1.2% of the dollar volume of US issuers' USD-denominated corporate bond issuance.[140]

C. Pre-Issuance Verification in the U.S. Green Bond Market

As noted, much of the law-review literature on green bonds to date has focused on "pre-issuance verification," that is, analysis before the bond is sold of whether the issuer's statement of intended uses of bond proceeds matches a green framework (typically the ICMA Green Bond Principles) and of whether the issuer has systems and processes to allocate bonds proceeds as planned, track their use, and report on them.[141] The dataset here contains some evidence on pre-issuance verification in the U.S. corporate green-bond market, discussed below.

[140] Calculation from Bloomberg data. *See* John Patrick Hunt, *Bloomberg Data Pulled for CBLR* (2024) (on file with the Columbia Law Review).

[141] *See supra* Section II.B.1.

At least according to data provided by Bloomberg, less than half of U.S. green bonds receive pre-issuance verification. The service's "ESG Assurance Providers" field reports that about 48% of US green bonds received such verification.[142] The corresponding figure for global issuance is 89%.[143] These numbers suggest that pre-issuance verification is less common in the US than it is in other markets.

The market for U.S. pre-issuance green bond verification is dominated by a single firm, Sustainalytics, which was acquired by Morningstar in 2020.[144] Over the period of this study, Sustainalytics had a 67% share of the U.S. corporate market by number of issues.[145]

142 Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – All Fields* (2024) (on file with the Columbia Business Law Review).

143 Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – Global Data* (2024) (on file with the Columbia Business Law Review).

144 *See* Press Release, Morningstar, Inc. Completes Acquisition of Sustainalytics, SUSTAINALYTICS (July 6, 2020), https://www.sustainalytics.com/esg-news/news-details/2020/07/05/morningstar-inc.-completes-acquisition-of-sustainalytics [https://perma.cc/7RMF-62SG]. Morningstar had acquired 40% of Sustainalytics in 2017. *See Morningstar to Acquire Sustainalytics and Expand Access to ESG Research, Data, and Analytics for Investors Worldwide*, PR NEWSWIRE (Apr. 21, 2020), https://www.prnewswire.com/news-releases/morningstar-to-acquire-sustainalytics-and-expand-access-to-esg-research-data-and-analytics-for-investors-worldwide-301044196.html [https://perma.cc/5AJT-CGXW].

145 Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review). Sustainalytics's share by dollar amount issued was 70%. Other providers and their market shares, by number of issues, are: Vigeo Eiris (7.1%), S&P Global (7.1%), Deloitte (4.3%), CICERO (4.3%), Climate Bonds Initiative (4.3%), ISS ESG (2.9%), DNV Business Assurance (1.4%), and Scientific Certification Systems (1.4%).

D. U.S. Corporate Green Bond Issuance by Industry

The following table presents U.S. green bond issuance by industry. The table is presented by Bloomberg's industry classification.[146]

Industry	Issues (% of total)	Amount Issued in $ billion (% of total)
Bank	4 (2.6%)	3.3 (3.6%)
Electric Utility	61 (39.4%)	33.7 (36.7%)
Financial	53 (34.2%)	30.1 (33.0%)
Industrial	32 (20.7%)	20.4 (22.3%)
Rail Transportation	2 (1.3%)	0.9 (1.0%)
Telephone	3 (1.9%)	3.0 (3.3%)
Total	155 (100.0%)	91.3 (100.0%)

As the table indicates, the electric-utility industry issues more green bonds than any other. The author's impression from reviewing the documents is that these green bonds are used primarily to finance and refinance renewable energy generation facilities, such as solar plants and wind farms.[147]

146 Bloomberg coded seven bonds totaling $4.2 billion in principal as "Special Purpose." This accounts for 4.5% of all US corporate green bonds by issue count and 4.6% by amount issued. These bonds' issuers appeared to have little in common and to fall fairly intuitively into other industry categories. The author therefore recoded the "Special Purpose" bonds under other industry classifications, as described in the underlying workpapers *See* John Patrick Hunt, *Workpapers for CBLR – Relationship Analysis* (2024) (on file with the Columbia Business Law Review)*;* John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

147 *See, e.g.*, AES, GREEN FINANCING FRAMEWORK REPORTING 1–3 (Sept. 28, 2023) (indicating investment of green-bond proceeds in over 20 solar projects, among others); N. STATES POWER CO., MANAGEMENT'S ASSERTION REGARDING DISBURSEMENTS FOR ELIGIBLE GREEN PROJECTS 2 (2023) ("Expenditures for the Eligible Green Projects consist of development, construction and operation of, as well as transmission infrastructure to support, wind energy projects.").

A notable exception is green bonds issued by California electric utilities, which have used the proceeds for wildfire resilience, specifically grid hardening.[148]

What Bloomberg designates the "Financial" industry comes in second place. About half of issuances in this category are from real-estate investors, mostly real-estate investment trusts (REITs).[149] The author's impression is that, unsurprisingly, REITs' green bonds tend to fund investments in green buildings.[150]

The only other industry that accounts for more than 10% of green-bond issuance is "Industrial." Bloomberg defines this category broadly, so that it encompasses "classic" industrial issuers such as Ford Motor and Dana Inc., consumer-products and retail issuers such as PepsiCo and Walmart, healthcare issuers such as Kaiser Foundation Hospitals and Boston

148 *See, e.g.*, SCE RECOVERY FUNDING, LLC, SUSTAINABLE FINANCING REPORT 4 (Feb. 2023) (describing eligible uses of green-bond proceeds, including "[i]nfrastructure hardening of SCE's physical assets in high fire risk areas" and "improved fire situational awareness"); SEMPRA, SUSTAINABLE FINANCING REPORT 5 (Aug. 2022) (describing use of majority of green-bond funds for "climate change adaptation," including "infrastructure for hardening and resilience, primarily for wildfire mitigation").

149 The author's coding indicates that 30 of the 53 financial green-bond issues (57%) came from real-estate investors. Issues from real-estate investors accounted for $14.1 billion of the $30.1 billion in financial-industry green-bond issuance (53%). Green bonds issued by real-estate investors accounted for 19% of all issues and 18% of all issuance by dollar volume. Calculation from Bloomberg data. *See* John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

150 *See, e.g.*, VORNADO REALTY TRUST, GREEN BOND USE OF PROCEEDS REPORT 6 (May 2023) (reporting that green bonds' net proceeds were allocated to "new development or existing redevelopment buildings that have achieved a Gold LEED certification level"); BOSTON PROPERTIES, INC., GREEN BOND ALLOCATION REPORT 6 (Sept. 30, 2020) (reporting that green bonds' net proceeds were allocated to investments in "building developments or redevelopments . . . renovations in existing buildings . . . and tenant improvement projects" that "have received, or are expected to receive . . . LEED Silver, Gold, or Platinum certification").

Children's Hospital, and even The Nature Conservancy and Oberlin College.[151] Impressionistically, it appears that issuers in this category typically invest in "greening" their operations, such as by upgrading buildings' energy efficiency or making manufacturing processes more efficient.[152] Some issuers in this space, such as Ford Motor Co. and Lucid Group, invest in development of "green" products such as electric vehicles.[153]

E. Examples of U.S. Corporate Green Bonds

To give concreteness to the discussion of the U.S. corporate green-bond market, this section briefly describes a few bonds in the dataset that come from high-profile issuers. It also gives

151 Classifications from Bloomberg Financial Information Service. *See* John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file the with Columbia Business Law Review).

152 *See, e.g.*, PEPSICO, PEPSICO 2022 GREEN BOND REPORT 7 (Oct. 17, 2022) (reporting use of green bond proceeds for "decarbonization of our operations and supply chain" and "water sustainability" as well as "sustainable plastics and packaging"); WALMART, 2021 GREEN BOND IMPACT REPORT 8 (reporting allocation of green-bond proceeds in six categories; the largest allocations were to (1) "renewable energy," described as "projects including solar and wind power purchase agreements, solar and wind virtual power purchase agreements and onsite solar and wind," and (2) "high-performance buildings," described as "projects including efficient lighting and HVAC upgrades, sustainable building materials, and refrigeration retrofitting").

153 *See* FORD MOTOR CO., SUSTAINABLE FINANCING REPORT 7 (2022) ("Approximately 83% of the spending so far has been allocated to investments into specific products in our EV lineup. A significant portion of that has been spending for vehicles already available for customers now – the Mustang Mach-E, F-150 Lightning, and E-Transit. However, we have also allocated spending to vehicles that are still in the design and development phase and will be unveiled in the future."); LUCID GROUP, INC., MANAGEMENT'S ASSERTION REGARDING GREEN BOND PROCEEDS 2 (Dec. 13, 2022) (defining eligible investments as investments in "development, manufacturing or distribution of products, key components and machinery related to electric vehicles" and reporting that "[t]he Company was able to allocate the entirety of the proceeds from the offering towards investing in its manufacturing capabilities, inventory purchases, and research and development.").

the actual or intended use of the bond proceeds, as available. To name a few:[154]

Bank of America: $2 billion issued in October 2019. Bank of America states that it lent the proceeds to fourteen different entities for development and construction of eighteen solar plants and wind farms.[155]

Citigroup: $1.5 billion issued in May 2020. Citigroup reports that the proceeds of these bonds, along with those of certain other issues, were used to finance its "green" portfolio, which consists of "refinanced assets," 95% of which are in the "green building" and "renewable energy" categories.[156]

Ford Motor Co: $2.5 billion issued in November 2021. As of August 31, 2022., the date of Ford's last report, the company had allocated $1.8 billion of the proceeds to "specific products in our EV lineup," such as the F-150 Lightning and Mustang Mach-E, and $370 million to "cross portfolio EV development."[157]

Kaiser Foundation Hospitals: $1.25 billion in June 2021. Kaiser states that as of December 31, 2021, it had allocated $892 million of the $1.25 billion to LEED certified Gold and Platinum buildings.[158]

Lucid Group Inc.: $2.0 billion in December 2021. Lucid, an electric-vehicle manufacturer, states that as of December 13,

154 The dollar amounts and issue dates are from the Bloomberg Financial Information Service. This information for all USD-denominated U.S. Corporate green bonds issued during the study period is presented in Appendix 1.

155 BANK OF AMERICA CORP., GREEN AND EQUALITY PROGRESS SUSTAINABILITY BOND ISSUANCES: USE OF PROCEEDS ATTESTATION AND REPORT OF INDEPENDENT ACCOUNTANTS 4 (2022).

156 CITIGROUP INC., CITI GREEN AND SOCIAL BOND REPORT 13 (Dec. 2022).

157 *See* FORD MOTOR CO., *supra* note 153, at 7.

158 KAISER FOUNDATION HOSPITALS, 2021 GREEN BONDS: USE OF PROCEEDS.

2022, it had used the proceeds on "capital expenditures," "purchase of inventory," and "R&D expenditure."[159]

The Nature Conservancy: $350 million in March 2022. The Nature Conservancy reports that as of February 2023, it had allocated $145 million of the proceeds to 18 projects across in four categories: environmentally sustainable management of living natural resources and land use, climate change adaptation, sustainable water and wastewater management, and renewable energy.[160] The largest expenditure was the purchase and management of 236,000 acres in the Belize Maya Forest for $50 million.[161]

Oberlin College: $81 million in July 2021. According to a pre-issuance verification report by Kestrel Verifiers, Oberlin planned to use the funds for sustainable infrastructure, including "energy conservation measures, conversion of the campus steam system to hot water, and installation of a geothermal heat pump."[162] As of the close of data collection for this project in early August 2023, the author was unable to locate reporting on Oberlin's use of proceeds.

PepsiCo Inc.: $1.0 billion in October 2019. PepsiCo reports that it spent the proceeds on "[s]ustainable plastics and packaging" (e.g., purchase of recycled PET for use in product packaging), "decarbonization of our operations and supply chain" (e.g., improving energy efficiency of operations), and "water sustainability" (e.g., improving water-use efficiency at PepsiCo locations).[163]

Verizon Communications Inc.: nearly $1.0 billion in each of September 2020, September 2021, and March 2022. Verizon

159 LUCID GROUP INC., *supra* note 153, at 2.

160 NATURE CONSERVANCY, GREEN BONDS 2023 ANNUAL IMPACT REPORT 3–4 (2023).

161 *Id.* at 6, 9.

162 KESTREL VERIFIERS, OBERLIN COLLEGE TAXABLE BONDS SERIES 2021A VERIFIER'S REPORT SUMMARY 1–2 (2021).

163 PEPSICO, *supra* note 152, at 6–7.

reports that it allocated the proceeds of each bond to virtual power purchase agreements for renewable energy.[164]

IV. POST-ISSUANCE REPORTING IN THE U.S. MARKET

The author has attempted to locate and gather information on all post-issuance reporting on the U.S. green bonds issued during the period of this study. Bloomberg reports that 65% of such bonds by issue count and 69% by dollar volume have some type of post-issuance reporting.[165]

However, Bloomberg turned out to be significantly incomplete in this respect. Thus, the research team supplemented Bloomberg with web searches and hand-collected a number of post-issuance reports that did not appear on Bloomberg. Taking Bloomberg and the web together, the team found some sort of post-issuance reporting for 91% of US green bond issues over the period of the study, representing 94% of the dollar value issued.[166]

Post-issuance reporting can be divided into two types: allocation reporting and impact reporting. Allocation reporting involves reporting that the proceeds of the bond issue were in fact invested in the "green" manner described at issuance.

Impact reporting involves attempting to specify the environmental benefits of the investment. Impact reporting can take the form of stating tons of greenhouse gas production avoided, stating the green qualities of assets constructed or

164 VERIZON COMMC'NS INC., GREEN BOND IMPACT REPORT FEBRUARY 2023 1, 5, 7 (2023); VERIZON COMMC'NS INC., GREEN BOND IMPACT REPORT FEBRUARY 2022 8 (2022); VERIZON COMMC'NS INC., GREEN BOND IMPACT REPORT AUGUST 2021 3–4 (2021).

165 Calculation based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – All Fields* (2024) (on file with the Columbia Business Law Review).

166 Calculation based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

acquired with bond proceeds (such as green buildings or solar electricity generation facilities), or other forms.[167]

The ICMA Green Bond Principles call on issuers to report the "expected impact" of projects financed by green bonds,[168] but environmental impact does not define a green bond under the GBP. Instead, the defining feature is the use of proceeds for green purposes.[169] This study therefore focuses on use of proceeds reporting rather than on impact reporting.

A. The State of Green-Bond Post-Issuance Reporting Quality

This Article discusses two aspects of allocation reporting quality. The first measure is attestation: whether a third-party attests to the allocation that the issuer claims, and if so in what level of detail. This is a measure of reporting quality because it should reflect some degree of checking by a party with some degree of independence. The second measure is the level of detail at which the issuer itself reports its allocation. This is a measure of reporting quality because more detailed reporting may reasonably be considered more testable and therefore more credible.

1. Attestations

When a company reports on its use of green-bond proceeds, the report may or may not be attested by a third party. Typically, third-party attestation takes the form of a letter to the issuer's management stating that in the third party's opinion, management's assertion about the use of bond proceeds is "fairly stated, in all material respects."[170] For each green bond

167 *See generally* 2023 IMPACT REPORTING FRAMEWORK, *supra* note 124, at 8–9, 11, 27–28 (describing various types of impact reporting).

168 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6.

169 *Id.* at 4.

170 *See, e.g.*, DUKE REALTY, GREEN BOND ALLOCATION REPORT 3 (2022) (reporting opinion of accounting firm KPMG in the form discussed in the text).

in the dataset, the research team coded whether the bond was attested and, if so, at what level of detail the attestation operated.

A total of 103 green-bond issuances with a total amount issued of $65.3 billion, representing 66% of all green-bond issues and 72% of the total dollar amount issued, had third-party-attested allocation reporting.[171] Of bonds that had post-issuance reporting, 73% were attested; those bonds make up 76% of the total dollar amount issued.[172]

The post-issuance attestation this paper addresses is provided, by and large, by firms that are different from the ones that provide pre-issuance verification. As discussed above, Bloomberg data indicates that in the US, specialized ESG-centered firms (usually Sustainalytics) provide almost all pre-issuance verification. Post-issuance allocation review, however, is typically provided by an accounting firm. The following table presents market-share data for the 103 green-bond issuances with post-issuance third-party attestation.[173]

Table 1: Market Shares of Attestation Providers

Reviewer	Number of Issues Reviewed	Share by Number of Issues Reviewed	Dollar Volume of Issues Reviewed ($ billions)	Share by Dollar Volume of Issues
PWC	31	30.1%	22.8	34.8%
Deloitte	29	28.2%	14.9	22.8%
EY	21	20.4%	14.1	21.5%
KPMG	13	12.6%	7.6	11.6%

171 Calculation based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

172 Calculation based on Bloomberg data. *See id.*

173 The values in the table are calculations based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

Grant Thornton	2	1.9%	2.4	3.7%
Sustainalytics	2	1.9%	1.0	1.5%
Cventure	2	1.9%	1.0	1.5%
Moss Adams	1	1.0%	1.0	1.5%
Weaver & Tidwell	1	1.0%	0.4	0.6%
Frazier & Deeter	1	1.0%	0.3	0.5%

The attestations were reviewed to determine both the level of assurance provided and the specificity of what management asserted and the reviewer attested. The latter is different from the level of detail in management's allocation reporting, discussed in the next section, because issuers sometimes make claims about allocation that are not covered by management's formal assertion and the reviewers' attestation.[174]

First, consider the level of assurance provided. Under standards developed by the American Institute of Certified Public Accountants (AICPA), an accounting group, and adopted by the Public Company Accounting Oversight Board (PCAOB), the regulator of the US auditing industry,[175] there are two levels of attestation: "examination" and "review."[176] An examination is "designed to provide a high level of assurance."[177] A review is "designed to provide a moderate level of

174 *See, e.g.*, AVALONBAY COMMUNITIES, 2021 AVALONBAY COMMUNITIES GREEN BOND REPORT 4–6 (2021) (reporting on allocation of green-bond proceeds to specific real estate projects but leaving the project identification out of management's assertion and therefore out of the scope of the accountants' attestation); PROLOGIS, 2020 GREEN BOND REPORT 7–10, 14–15 (2020) (same).

175 *See* PCAOB, ATTESTATION STANDARDS UPDATE (Sept. 26, 2022), https://pcaobus.org/oversight/standards/standard-setting-research-projects/attestation-standards-update [https://perma.cc/HR2P-ZQ3A].

176 PCAOB, AT § 101.01. Another possibility is an "agreed-upon procedures report." *Id.*

177 PCAOB, AT § 101.54.

assurance."[178] AICPA standards further provide that an examination is to be designed and conducted so that the attesting party can "obtain reasonable assurance about whether the subject matter . . . is free from material misstatement."[179] A review is to be planned and performed to "obtain limited assurance about whether material modifications should be made" to the assertion in question.[180]

For 90% of the issues with attestation, corresponding to 91% of the total amount issued in this category, the attestation resulted from an examination.[181] The remaining attestations resulted from reviews or other procedures designed to give limited assurance. The high percentage of attestations resulting from examinations indicates that users apparently can generally have a relatively high degree of confidence, within the relevant framework, that the management assertions the accountants are reporting are accurate.

Second, consider the specificity of management's attested assertion. As discussed, this review is related to, but different from, the review of the level of detail in the allocation report discussed in the next section. This is because attestation typically covers only a specifically defined "management

178 PCAOB, AT § 101.55.

179 AICPA, AT-C § 205A.03(a), Examination Engagements. Three of the post-issuance external reviews in the dataset were performed by Sustainalytics, which is not an accounting firm. These reviews did not use the same standardized language that the accounting-firm reviews did, but they do refer to "limited assurance procedures" and express an opinion in the form that "nothing has come to Sustainalytics' attention" that caused the reviewer to doubt the issuer's assertions. *See, e.g.*,PRUDENTIAL FIN., INC., GREEN BOND REPORT 7 (2022) (presenting external review report of Sustainalytics). Thus, these assurances seem similar to the "reviews" described in the text.

180 AICPA, AT-C § 210A.03(a), Review Engagements.

181 Calculation based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

assertion," usually captured on one page of the allocation report.[182] The report as a whole often contains more detail about how the company claims to have used green-bond proceeds, but the accountants do not attest to this additional information.[183]

The review focused on whether management's assertions and the related attestations were at the "project level." An example of a project-level assertion would be a claim that proceeds were disbursed for "'100 Binney Street/Greater Boston/Cambridge/Inner Suburbs' with a designation that the building was 'LEED Certification: Gold (achieved).'"[184] Naming a specific power generation project would also constitute project-level reporting. An example of reporting not at the project level would be asserting that green-bond proceeds were used for "16 solar power projects."[185]

Examples of project-level assertions would be claims that bond proceeds were allocated to specific projects, such as the acquisition of buildings at particular addresses or named power generation projects. Examples of assertions that are not at the project level would be statements that bond proceeds were allocated to particular types of projects. A description such as "wind power generation" or "acquisition of buildings with LEED Gold or Platinum certification" would be so categorized. Of the 103 attestations, 49% by bond count and 52%

182 *See, e.g.*, AVALONBAY COMMUNITIES, *supra* note 174, at 5–6 (presenting, on page 5, management's assertion that green bond proceeds were allocated to eligible green projects that met certain criteria without specifying what the projects were, and presenting, on page 6, a list of projects to which the funds were allegedly allocated); PROLOGIS, *supra* note 174, at 7–10, 15 (presenting the proceeds allocations on pages 7–10, and management's assertion on page 15).

183 *See, e.g.*, AVALONBAY COMMUNITIES, *supra* note 174, at 4 (attestation expressly disclaiming that accountants are opining on anything but "management's assertion included herein").

184 ALEXANDRIA REAL EST. EQUITIES, INC., GREEN BOND ALLOCATION REPORT 6, 8 (2022).

185 HANWHA ENERGY USA, GREEN BOND IMPACT REPORT 2 (2020).

by dollar volume clearly were not at the project level.[186] Attestations that were clearly at the project level accounted for 31% of the bond count and 27% of the dollar volume.[187] Attestations that were ambiguous as to whether they were at the project level or not made up 20% of the bond count and 21% of the dollar volume.[188] Taking into account the bonds for which post-issuance reporting could not be located at all, it appears that around two-thirds of US green bonds had third-party-attested allocation reporting,[189] and that about one-fifth of US green bonds clearly had third-party-attested allocation reporting at the project level. Put differently, 32 of the 155 US corporate green bonds issued during the study period (21%) met the "gold standard" of allocation reporting clearly attested at the project level.[190]

2. Allocation Reporting

The research team coded the green-bond allocation reports to determine the level of detail at which they reported. As just discussed, this is a similar, but not identical, exercise to

186 John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

187 *Id.*

188 *Id.*

189 Specifically, this research finds that bonds with attestation amount to 66% of the issue count and 75% of the dollar value of green bonds issued during the period. Calculations based on Bloomberg data. John Patrick Hunt, *Workpapers for CBLR – Regression Fields* (2024) (on file with the Columbia Business Law Review).

190 The author completed the review of documents for this study in early August 2023, so the latest-issued bonds in the sample may have had as little as fourteen months to report. Although the GBP call for annual reporting on proceeds allocation, *see* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6, it is possible some of these bonds may report in the future. Notably, bonds issued as late as May 20, 2022, or 98.9% of the way through the sample period, have issued attested reports on proceeds allocation. *See* ONCOR ELECTRIC DELIVERY CO., MANAGEMENT'S ASSERTION REGARDING DISBURSEMENTS FOR ELIGIBLE GREEN PROJECTS (May 19, 2023). Thus, the reporting-lag issue seems unlikely to change the reported results materially.

coding the level at which attestations operate. The documents all reported at either the "project" level, discussed above, or at the "category" level. The latter term describes reporting that is not specific enough to allow identification of individual projects, but that does state the general type of green expenditure, such as "green buildings" or "wind power generation."

The following table summarizes the findings.

Table 2: Allocation Reporting Levels

	All Bonds with Allocation Reporting		Bonds with Attested Allocation Reporting		Bonds with Unattested Allocation Reporting	
Allocation Reporting Level	Bond Count	Amount Issued ($ billion)	Bond Count	Amount Issued	Bond Count	Amount Issued
Category Level	59 (42%)	$37.1 (43%)	46 (44.7%)	$32.0 (49.0%)	13 (34.2%)	$5.1 (24.8%)
Project Level	82 (58%)	$48.8 (57%)	57 (55.3%)	$33.3 (51.0%)	25 (65.8%)	$15.5 (75.2%)
Total	141 (100%)	$85.9 (100%)	103 (100.0%)	65.3 (100.0%)	38 (100%)	$18.6 (100%)

Some bonds with category-level allocation reporting provided a bit more detail by giving illustrative examples of projects without fully accounting for all expenditures of proceeds at the project level. This describes 22 of 59 bonds (37.3%) that reported at the category level, and $13.7 billion of the $37.1 billion issued (36.9%) of bonds reporting at the category level.

Combining the previous two tables yields the following results for green bonds that have at least some project-level reporting (that is, green bonds that report at the project level or report only at the category level but have project examples).

The following table combines the results in this section and the previous one. It reports the shares of US corporate green bonds that have various levels of reporting quality, reflecting both attestation and allocation reporting level.

Table 3: Attestation and Allocation Reporting Level: Combined Statistics

	Bonds with Allocation Reporting		All US Corporate Green Bonds	
	Bond Count	Amount Issued ($ billion)	Bond Count	Amount Issued ($ billion)
No Reporting			14 (9.0%)	$5.5 (6.0%)
No Attestation & Category-Level Reporting	13 (9.2%)	$5.1 (5.9%)	13 (8.4%)	$5.1 (5.6%)
No Attestation & Project-Level Reporting	25 (17.7%)	$15.5 (18.0%)	25 (16.1%)	$15.5 (16.9%)
Attestation & Category-Level Reporting	46 (32.6%)	$32.0 (37.3%)	46 (29.7%)	$32.0 (35.1%)
Attestation & Project-Level Reporting	57 (40.4%)	$33.3 (38.8%)	57 (36,8%)	$33.3 (36.4%)
Total	141 (100.0%)	$85.9 (100.0%)	155 (100.0%)	$91.4 (100.0%)

3. Discussion

The results just reported offer support for both a positive and a negative view of the US green-bond market. Defenders of the market as it exists can point to the facts that allocation reporting is available in at least nine out of ten of the bonds issued during the study period and that accountants apparently attested to the reporting for around three quarters of the bonds with reporting. Moreover, the large majority of

attestations (90%) are based on "examinations" resulting from a process the accountants judged sufficient to allow them to form a judgment about the fairness of management's reporting.

As for the allocation reporting itself, it was at least arguably at the project level for 52% of reporting bonds. Most green bond reporting tells the user of disclosures what the company says it did with the money with enough specificity to allow the user to follow up if it has the inclination and ability to do so. And almost 40% of the bonds that report only at the category level at least provide illustrative examples of the issuers' claimed green projects.

Critics might point to the fact that the ICMA Green Bond Principles require "readily available" allocation reporting,[191] and they might be concerned that Bloomberg and Google searches failed to turn up any reporting for around 10% of green bonds, accounting for 6% of dollar volume. And even among bonds with reporting, around 9% (6% by dollar volume) have neither attestation nor project-level reporting. But perhaps the most troubling finding is that around a quarter of green-bond allocation reporting appears to be unattested. This finding is disturbing because use of proceeds is central to the ICMA GBP's definition of "greenness," even though the finding does not reveal a violation of any rules because the GBP do not require attestation.

B. Exploring Green-Bond Post-Issuance Reporting Quality

To identify possible relationships within the data that might explain post-issuance reporting quality, the author examined how reporting quality correlated with other variables captured in the data and conducted regressions. The Article reports this analysis for both the principal measures of

[191] 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6.

reporting quality it discusses: attestation and allocation reporting level. Three questions of particular interest are as follows.

(1) Do issuers that are "higher quality," in the sense of more creditworthy, provide better post-issuance reporting? This is important because if high-quality issuers provide high-quality reporting, perhaps rules reforms could be focused on the lower-quality segment of the market.

(2) Are measures of pre-issuance and post-issuance verification quality correlated? This is important because it is plausible either (a) that issuers view the different types of review as complements because they mutually reinforce green credibility, or (b) that issuers view the different types of review as substitutes because one is enough to "check the box" of greenness. The latter result could be interpreted as providing some support for the view that the market seeks bonds that are labeled green more than bonds that actually are green.

(3) Do companies that issue more than one green bond (repeat issuers) provide better post-issuance reporting than companies that are not repeat issuers? If repeat issuers are already doing a better job of reporting than non-repeat issuers, that could suggest that reporting requirements could be more relaxed for the former group.[192]

1. Variables Explored

One might imagine a number of drivers of post-issuance reporting quality. The following characteristics might be associated with higher-quality post-issuance reporting.

(1) Status as a repeat green-bond issuer. Globally, most corporate green bonds appear to be issued by repeat

[192] By analogy, "well-known seasoned issuers" are able, under U.S. securities law and regulation, "to access US capital markets with fewer restrictions." BENEFITS OF BEING A WKSI 1–2, Westlaw Practical Law Practice Note 2-386-0656 (on file with the Columbia Business Law Review).

players.[193] As just discussed, companies that issue green bonds repeatedly might be expected to do a better job on average with post-issuance reporting, in order to build a reputation for greenness to support later issues.

(2) Investment-grade status. Investment-grade issuers have higher credit ratings and lower default rates than high-yield issuers.[194] They may have more to lose from any perception that they are not using green-bond proceeds as indended. Thus, they perhaps are more likely to provide high-quality post-issuance reporting. Conversely, it could be argued that firms that issuer riskier bonds are more intensively monitored and therefore under more pressure to provide high-quality reporting.[195]

(3) Pre-issuance verification. Issuers that secure pre-issuance verification of their green bonds might be seen as more committed to "greenness" and therefore more likely to provide high-quality post-issuance verification. Conversely, perhaps such issuers see the pre-issuance verification as sufficient to certify the bonds' green status, so that they are less likely to engage in high-quality post-issuance verification.

(4) Attestation and allocation reporting level. Similarly, as discussed above, issuers might regard the two indicators of high-quality post-issuance reporting, attestation and detailed allocation reporting, as complements (contributing to overall confidence in the issuer's greenness) or as substitutes (in that high-quality reporting in one respect might make up for low-quality reporting in the other).

193 For example, in the dataset of the 3,893 corporate bonds issued globally between June 1, 2019 and May 31, 2022 and listed on Bloomberg, with duplicate US bonds removed, 3,173 (82%) came from issuers that issued more than one bond during the period. Calculation from Bloomberg data John Patrick Hunt, *Workpapers for CBLR – Global Data* (2024) (on file with the Columbia Business Law Review).

194 *See* SURESH SUNDARESAN, FIXED INCOME MARKETS AND THEIR DERIVATIVES 201–204 (3d ed. 2009).

195 I thank Professor Robert Miller for this point.

(5) Industry. Issuers in certain industries might be more likely to provide high-quality post-issuance than issuers in other industries. This could arise, for example, from different regulatory reporting requirements in different industries or because of different investor expectations.

The author also incorporated a number of variables without a clear theoretical connection to reporting quality into the

analysis as controls. These variables include the bond's issue date, coupon,[196] maturity, and amount issued.

This table summarizes the variables that were used in exploring relationships relevant to green-bond reporting quality.

Variable Name	Definition
HasAttestation	Whether the bond's allocation reporting is attested to by a third party. This is "0" if the reporting is not attested and "1" if it is attested.
AllocationReportingLevel	The level of detail at which the issuer reports on the bond's proceeds allocation. This is "1" if the issuer did not report on proceeds allocation, "2" if the issuer reported on proceeds allocation at the category level, and "3" if the issuer reporting on proceeds allocation at the project level.[197]
IsInvestmentGrade	Whether the bond is investment grade.[198] "0" if no, "1" if yes.

[196] One would expect non-investment-grade issuers to have to offer higher interest rates. Indeed, non-investment-grade bonds are sometimes called "high-yield" bonds. See BRATTON, *supra* note 46, at 333. Thus, one would expect coupon to be positively correlated with high-yield status. The correlation would be imperfect, for example because the bonds were issued at different times and interest rates change over time.

[197] Hypothetical examples of category-level reporting would be "LEED Platinum Certified green buildings" or "Wind renewable energy generation." Corresponding examples of project-level reporting would be "LEED Platinum certified green building at 123 Main St., Boston, MA" or "Wind power project at Stillwater, OK."

[198] This determination is based on the "Bloomberg Composite" credit rating field found on the Bloomberg Financial Information Service. Bonds with composite ratings of BBB- or higher were coded as investment-grade, and

FromRepeatIssuer	Whether the issuer issued more than one green bond during the three-year period under examination. "0" if no, "1" if yes.[199]
HasPreIssuanceVerification	Whether the bond received pre-issuance "green" verification from a third party, such as Sustainalytics. "0" if no, "1" if yes.
Industry_[[Industry Name]]	Dummy variable for bond issuer's industry, as assigned by Bloomberg. The industries are: BANK, ELEC_UTILITY, FINANCIAL, INDUSTRIAL, RAIL_TRANS, and TELEPHONE.[200]
Coupon	The bond's coupon, or the amount of interest promised on the bond's principal amount.
Maturity	The date on which the bond principal is to be repaid.
IssueDate	The date on which the bond was issued.
AmtIssued	The amount of the bond's principal.

bonds with composite ratings of BB+ or below were coded as not investment-grade. *See* SUNDARESAN, *supra* note 194, at 6 (employing same breakpoint for investment-grade status).

[199] For this purpose, instances where an issuer issued more than one bond on the same date were coded as a single issue.

[200] Seven bonds in the dataset had a Bloomberg industry code of "SPECIAL_PURPOSE." These bonds had little in common, and each at least arguably fit into another industry category, so the author recoded them accordingly.

2. Methods Used

To examine relationships between the measures of reporting quality and other variables, the author used both correlations and least-squares regressions. The author calculated correlations between each of the two measures of reporting quality and the independent variables described above. The Article presents both the correlation and the "p-value." The p-value can be interpreted as the probability that the correlations observed in the data resulted from chance rather than a "true" association between the variables, under certain assumptions.[201]

To check for spurious correlations, the author ran linear regressions on each measure of reporting quality against the independent variables of choice. This technique controls each relationship between an independent variable and the quality measure for the levels of the other independent variables.

The author makes a few preliminary notes on the conceptual background for this analysis and the nature of the claims being made here. First, the paper reports p-values and therefore tacitly assumes that certain results might not be "representative" because they could have arisen by chance. But recall that the analysis covers the entire universe of US corporate green bonds issued during the study period. There is no question of sampling or representativeness of the results here with respect to that period – the associations presented are the ones that did in fact exist over the period in question. P-values are reported because they are relevant to extrapolating from past results into the future.[202]

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[201] *See Multiple Linear Regression: Interpreting Results in Explanatory Modeling*, JMP STATISTICAL DISCOVERY, https://www.jmp.com/en_us/statistics-knowledge-portal/what-is-multiple-regression/interpreting-results-in-explanatory-modeling.html [https://perma.cc/J8RE-DVU3] (last visited Mar. 1, 2024).

[202] It is possible to conceive the bonds issued during the study period as a sample of an imaginary distribution of green bonds from which bonds

As for the claims being made here, the paper presents an exploration of observational data. It identifies relationships that have existed in the past and that, to the extent that the present is like the past and that the results are significant, are likely to continue to exist today. The nature of the exercise does not permit causal claims, and none are made here. Nor, when significance levels are reported, are they adjusted to reflect the fact that multiple models have been fitted to the data.[203] The p-values should be understood as ordinal indicators of likely significance of relationships than as literally numerically correct. In other words, a p-value of 0.01 suggests that a relationship is less likely to arise from chance than a p-value of 0.80. But the paper should not be understood as claiming that the probability that the relationship that was observed literally has only a 1% chance of arising from chance.

What, then, do the results reported in this section mean? They identify relationships that existed in the past and therefore provide some evidence that those relationships continue to exist today. They suggest both avenues for future research and tentative directions for policy reform.

3. First Quality Measure: Attestation

The author first examined the correlations between whether a green bond's reporting is attested and other variables described above[204] and then calculated the p-value of those correlations. The results are presented in Table 1.[205] Confining the discussion to relationships with a p-value of

issued in the present are also drawn. It is in this context that the p-values would be meaningful.

[203] That said, the paper reports the results of all the regression models the author fitted.

[204] The text discusses Pearson correlations. Because some of the data could be considered ordinal, the author also computed Spearman correlations for all correlation tables. Using Spearman instead of Pearson correlation made very little difference, as discussed further in the footnotes to Appendix 2.

[205] All tables discussed in this section are located in Appendix 2.

0.02 or less,[206] attestation is positively associated with investment-grade status, issuance by a financial issuer, and issuance by a repeat issuer. Attestation is negatively associated with issuance by an industrial issuer.

To examine how these relationships held up with controls, the author performed a regression without dummy variables for the issuer's industry. In a regression without industry dummies, investment-grade status ($p < 0.01$) and repeat-issuer status ($p = 0.01$) are positively associated with attestation. The results are presented in Table 2.

The results do change when industry dummies are added to the regression, as shown in Table 3. Although attestation is still significantly positively associated with investment-grade status ($p = 0.01$), a low-p-value relationship between attestation and issuance by a repeat issuer no longer exists. Notably, none of these analyses indicates an association between pre-issuance verification and attestation.

The author also examined whether there is an association between the two measures of post-issuance reporting quality, attestation and level of allocation reporting detail. For this analysis, the author confined the data to bonds that have some reporting, as bonds without any reporting at all inherently lack attestation. The analysis here began by examining correlations for this dataset between attestation and the other variables, including allocation reporting level. The results are presented in Table 4. Within this reporting-bonds dataset, there are positive correlations with p-values of 0.02 or less between attestation and issuance by a financial issuer, investment-grade status, and issuance by a repeat issuer.

To explore these relationships within the reporting-bonds dataset, the author performed linear regressions on HasAttestation, again including AllocationReportingLevel. Without industry dummies, significant positive associations appear between attestation and repeat-issuer status ($p < 0.01$),

[206] As discussed, a low p-value can be interpreted as indicating that a correlation is not the result of chance.

investment-grade status ($p = 0.04$). A negative association appears between attestation and allocation reporting level ($p = 0.04$). The results are presented in Table 5.

With industry dummies, regressing attestation against the other variables in this dataset again yields a potentially significant negative relationship between attestation and allocation reporting level ($p = 0.01$) and a positive relationship between attestation and investment-grade status ($p = 0.02$). The results are presented in Table 6.

3. Second Quality Measure: Level of Allocation Reporting Detail

The author carried out a similar analysis on the other measure of reporting quality, level of allocation reporting detail. The analysis again started with examining the correlation between the selected measure of reporting quality and all other variables except the other quality measure. In the dataset of all bonds, there are positive associations with p-values of 0.02 or less between allocation reporting level and investment-grade status, repeat-issuer status, and issuance by a financial issuer. This suggests that bonds from investment-grade issuers may be more likely to report at a greater level of detail. The results are presented in Table 7.

In a regression on AllocationReportingLevel against the other variables (excluding HasAttestation) without industry dummies, it again appears that investment-grade issuer status is highly significantly associated ($p < 0.01$) with higher levels of detail in allocation reporting. Coupon ($p = 0.04$) and repeat-issuer status ($p = 0.08$) are associated with attestation reporting level at lower levels of significance. The results are presented in Table 8.

When industry dummies are added to the regression, it again appears that only investment-grade issuer status is highly significantly associated ($p < 0.01$) with greater allocation reporting detail. Coupon is associated with allocation reporting detail at a lower level of significance ($p = 0.04$). The results are presented in Table 9.

The preceding analysis considered all bonds in the dataset. Bonds with project-level reporting were coded with a value of "3" for allocation reporting level, bonds with category-level reporting were coded with a value of "2," and bonds with no reporting were coded with a value of "1." The author also analyzed a smaller dataset composed only of bonds that had some reporting, that is, only of bonds with an allocation reporting level of two or three.

In calculating the correlations and p-values between AllocationReportingLevel for bonds in the dataset, allocation reporting level is negatively associated with pre-issuance verification ($p < 0.01$) and positively associated with repeat-issuer status ($p = 0.02$). These are the only associations with a p-value of 0.02 or less. The results are presented in Table 10.

In a regression on allocation reporting level in the dataset consisting only of reporting bonds without industry dummies, allocation reporting level is negatively associated with pre-issuance verification and positively associated with investment-grade status ($p < 0.01$ in both cases). Weaker associations include a negative one between allocation reporting level and attestation ($p = 0.04$), and positive ones between allocation reporting level and both repeat-issuer status ($p = 0.05$) and coupon ($p = 0.05$).[207] The results are presented in Table 11.

In the same regression with industry dummies added, allocation reporting level is still significantly positively associated with investment-grade status ($p = 0.01$). Allocation reporting level is significantly negatively associated with pre-issuance verification ($p = 0.01$) and attestation ($p = 0.01$). Allocation reporting level is positively associated with issuance by a financial issuer ($p = 0.02$) and issuance by an electric utility issuer ($p = 0.09$). The results are presented in Table 12.

[207] Bonds that are not investment-grade tend to have higher coupons, complicating the analysis of this phenomenon.

5. Summary and Discussion of Findings

The table below summarizes the findings of the regression analyses reported above. Each cell of the table reports the most significant relationships in order of significance. Only relationships with p-values of 0.10 or less are reported; p-values are rounded to the nearest 0.01.

Attestation

	No Dummies	With Dummies
All Bonds	Investment Grade ($p < 0.01$), Repeat Issuer ($p = 0.01$) (Tbl. 2)	Investment Grade ($p < 0.01$) (Tbl. 3)
Reporting Bonds	Repeat Issuer ($p < 0.01$), Investment Grade ($p = 0.04$), Allocation Reporting Level (negative) ($p = 0.04$) (Tbl. 5)	Allocation Reporting Level (negative) ($p = 0.01$) Investment Grade ($p = 0.02$) (Tbl. 6)

Allocation Reporting Level

	No Dummies	With Dummies
All Bonds	Investment Grade ($p < 0.01$), Coupon ($p = 0.04$), Repeat Issuer ($p = 0.08$) (Tbl. 8)	Investment Grade ($p < 0.01$), Coupon ($p = 0.04$) (Tbl. 9)
Reporting Bonds	Pre-issuance Verification (negative) ($p < 0.01$), Investment Grade ($p = 0.01$), Attestation (negative) ($p = 0.04$), Repeat Issuer ($p = 0.05$), Coupon ($p = 0.05$) (Tbl. 11)	Investment Grade ($p = 0.01$), Pre-issuance Verification (negative) ($p = 0.01$), Attestation (negative) ($p = 0.01$), Financial ($p = 0.02$), Coupon ($p = 0.03$), Electric Utility ($p = 0.09$) (Tbl. 12)

Thus, the answer to the first question motivating the analysis ("Do 'high-quality' issuers engage in high-quality reporting?") seems to be "yes," at least in this dataset. The most persistent relationship apparent from the regression analysis is between investment-grade status and both measures of reporting quality. Thus, highly rated issuers may seek to protect their market reputation through high-quality reporting.

The answer to the second research question ("Are quality measures correlated?") seems to be "no": the findings seem to cut against the idea that some issuers identify themselves as "super-green" by engaging in pre-issuance verification coupled with post-issuance reporting or by providing post-issuance reporting that is of high quality according to both measures. There is no positive association between measures of greenness quality in any specification. Moreover, for reporting bonds, there is a negative association between detailed post-issuance reporting and both pre-issuance verification and attestation of post-issuance results. Thus, the results suggest that issuers may view the different types of reporting as substitutes rather than complements. They can be interpreted as underscoring the idea that strengthening pre-issuance disclosure may not be enough to improve the market.

As for the third question ("Do repeat issuers provide higher-quality reporting?"), the analysis reveals limited evidence in the affirmative. In linear regression specifications that omit industry dummies, there is a positive association between repeat-issuer status and attestation ($p \sim 0.01$) and a weaker positive association between repeat-issuer status and reporting level ($p = 0.05$-0.08), but any significance disappears when industry dummies are included. This can be interpreted as some indication that issuers may try to build credibility for future issues with high-quality reporting, but probably not as a strong one at this stage.

Relationships also appeared between issuer industry and reporting quality in some specifications; in particular, financial-industry issues may be more likely to be provide project-

level reporting.[208] This suggests that further investigation of industry-specific reporting requirements or investor expectations is warranted.

V. POLICY IMPLICATIONS

As discussed, legal commentators' substantive[209] suggestions for improving the green-bond market fall generally into the following categories: (1) tighten up the definition of "green,"[210] (2) improve pre-issuance verification of the "greenness" of proposed projects,[211] and (3) make green commitments more enforceable.[212] The author has no quarrel with any of these proposals, but this article suggests that improving post-issuance disclosure is a helpful ancillary, or even a necessary complement, to all of them. A tight definition of "green," backed by strong verification that the issuer's plans meet that definition and robust promises to carry out those plans, is more valuable if breach of the promise will easily be detected than if it will not.

Of course, some commentators believe none of these reforms are necessary.[213] Their argument would seem to be that

208 *See* discussion *supra* Section IV.B.4.

209 For an example of a proposal that is "procedural" rather than "substantive" in nature, consider Professor Park's intriguing idea of involving a broader group of stakeholders in green-bond governance. *See* Park, *supra* note 8, at 45–46.

210 *See* Park, *supra* note 8, at 45; Banahan, *supra* note 8, at 864–66; Rivera, *supra* note 8, at 208–10. Given the finding that the issuers of almost all US corporate green bonds listed on the Bloomberg service claim that their bonds align with the ICMA Green Bond Principles, *see supra* note 27 and accompanying text, this complaint is not so much about nonuniformity as about the substance of the ICMA GBP, which are after all a creation of the financial industry and have been challenged for being both too vague and too permissive in terms of what counts as "green."

211 *See* Rose, *Verification*, *supra* note 9, at 1081–85; Banahan, *supra* note 8, at 867–68; Rose, *Certifying, supra* note 9, at 76–77; Park, *supra* note 8, at 44–45.

212 *See* Curtis et al., *supra* note 10, at 172–78.

213 *See* Gilotta, *supra* note 25, (manuscript at 1).

issuers' fear of loss of reputation will prevent green default. But reputational sanctions also depend on the ability to detect green default, so disclosure is important here as well.

The finding that pre-issuance verification apparently has been negatively associated with post-issuance reporting quality[214] underscores the point. It suggests, although it does not prove, that strengthening pre-issuance verification may not fix post-issuance reporting.

Before introducing the article's substantive suggestions for improving post-issuance disclosure, it is important to acknowledge that the author has not been able to locate a clear, quantitative picture of who buys green bonds.[215] If, as has been posited,[216] green-bond buyers are primarily institutional ESG funds with their own research staffs, then arguably less disclosure is needed.[217] But even assuming that at least some sophisticated investors can use their leverage to find out credibly how a company uses particular funds, such as by asking for documentation of the allocation, it is hard to see why it is efficient to put each such investor to the effort of doing so.

It might be arguable that if only professionals buy green bonds, the disclosures need only be findable by professionals, but the industry-created ICMA Green Bond Principles themselves provide that post-issuance reporting should be "readily available."[218] The research of Curtis, Weidemaier, and Gulati

214 *See* discussion *supra* Sections IV.B.3–B.5.

215 The non-law-review literature also seems to lack such a picture, although the research there cannot be considered as comprehensive. As noted, Bloomberg's HDS function reports holders for 45% of dollar volume of outstanding US USD-denominated green bonds in the database. *See supra* note 88.

216 *See* discussion *supra* Section II.B.1.

217 *Compare* Rose, *Verification, supra* note 9, at 1062 (reporting Senate committee finding that 95% of corporate bonds are held by institutional investors with in-house research departments, arguably raising questions about the value of credit ratings generally).

218 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6.

indicates that the market wants disclosure,[219] and ICMA's recent action to compile and harmonize its various impact-reporting pronouncements indicates that the organization sees a need for user-friendliness.[220]

A. Consider Requiring Attestation

The article's main policy proposal is that ICMA should consider requiring third-party attestation of post-issuance use-of-proceeds reporting. The proposal is directed to ICMA because it appears that that organization currently sets the standard for the US market.[221] ICMA currently recommends, but does not require, attestation or something similar.[222] ICMA also allows companies not to report at the project level for competitive or other reasons.[223] Appendix 3, Part 1, Option A provides language implementing this proposal.

The premise is that investors should not simply have to take a company's word for it that green-bond proceeds were allocated as represented. Use of proceeds for green purposes

219 *See* Curtis et al., *supra* note 10, at 171 ("[I]nvestors have asked for increasing transparency and disclosure.").

220 *See* 2023 IMPACT REPORTING FRAMEWORK, *supra* note 124. The latest version of the Framework emerged in June 2023. *Id.*

221 As noted, Bloomberg reports that almost all US corporate green bonds claim to align with the ICMA GBP. *See supra* note 27 and accompanying text.

222 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 7 ("Post issuance, it is recommended that an issuer's management of proceeds be supplemented by the use of an external auditor, or other third party, to verify the internal tracking and the allocation of funds from the Green Bond proceeds to eligible Green Projects.").

223 *Id.* at 6 ("The annual report should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects, the amounts allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g., percentage allocated to certain project categories).").

is the essence of a green bond,[224] and to the extent that the green-bond market has a reason for existing, this disclosure would appear highly material. Financial investors do not simply take at face value a public company's representation that it made a particular level of profit; the company's financial statements are audited.[225] Green investors deserve a like level of assurance.

The research presented here reveals that the market falls significantly short of the ideal. Only 67% of US corporate green bonds in the study period (73% of bonds with reporting) have third-party attestation of their allocation reporting.[226] And 9% of bonds that report on allocation have neither project-level reporting nor attestation.[227] When bonds for which reporting could not be located at all are included, the figure rises to 17%.[228]

It might be argued that an attestation requirement risks importing the pathologies of the credit-rating-agency market into the green-bond sphere by creating a regulatory license.[229]

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224 *See id.* at 4 ("1. Use of Proceeds. The cornerstone of a Green Bond is the utilization of the proceeds of the bond for eligible Green Projects."). "Use of Proceeds" is the first of the four "core components" of the GBP. The other three components, process for project selection, management of proceeds, and reporting, all relate to making sure the first component is carried out. *Id.* at 4–6.

225 *See What is a Private Company Audit?,* AM. INST. OF CERTIFIED PUBLIC ACCOUNTANTS (Sept. 30, 2023), https://www.aicpa-cima.com/news/article/what-is-a-private-company-audit [https://perma.cc/N2FJ-4LW8] ("By law, the annual financial statements of public companies must be audited each year by independent auditors.").

226 *See supra* notes 171–72 and accompanying text.

227 *See* discussion *supra* Section IV.A.3.

228 The author located no reporting for 14 of the 155 bonds in the dataset and found allocation reporting, but no attestation or project-level reporting for 13 more bonds. *See* discussion *supra* Section IV.A.2. Together, 27 bonds out of the 155 in the dataset (17%) have no reporting, or reporting without attestation or project-level reporting. *See id.*

229 *Cf.* Rose, *Verification, supra* note 9, at 1081 (recommending that sustainability verification market be "lightly regulated to avoid the creation

However, such a fear might be overstated. The US market for green-bond post-issuance attestation is overwhelmingly dominated by Big Four accounting firms,[230] which arguably already operate under regulatory licenses after the Sarbanes-Oxley Act of 2002 ("SOX").[231] Even if ICMA were to require that attestation be performed by a firm licensed under the SOX regime, there would be no material increase on the degree to which that market is affected by regulatory-license issues. The regulated US audit industry audits thousands of US public companies each year,[232] and performing limited, straightforward attestation engagements on around 50 green bonds per year is simply immaterial. Given the vast disparity between audit and green-bond markets, the point stands even if the green-bond market grows dramatically in the future. Rating agencies were mightily tempted by the rich revenues from structured products in the years leading up to the Global Financial Crisis.[233] Yet nothing comparable seems to be on the horizon for green bonds.

of a regulatory license," as has arguably occurred in the credit-rating market).

230 *See supra* note 173 and accompanying text and table.

231 *See Registration*, PCAOB, https://pcaobus.org/oversight/registration [https://perma.cc/MEZ5-NPCC] (last visited Feb. 5, 2024) ("The Sarbanes-Oxley Act requires public accounting firms to register with the PCAOB to prepare or issue an audit report for a U.S. public company or a broker-dealer, or to play a substantial role in those audits.").

232 *See* Statista Research Department, *Comparison of the Number of Listed Companies on the New York Stock Exchange and NASDAQ from 2018 to 1st Quarter 2023, by Domicile*, STATISTA (May 22, 2023), https://www.statista.com/statistics/1277216/nyse-nasdaq-comparison-number-listed-companies/ [https://perma.cc/S569-B8MY] ("As of March 2023, the NYSE had a combined total of 2,385 listed domestic and international companies, while the figure for the Nasdaq was much higher, standing at 3,611.").

233 *See* John Patrick Hunt, *Credit Rating Agencies and the 'Worldwide Credit Crisis': The Limits of Reputation, the Insufficiency of Reform, and a Proposal for Improvement*, 2009 COLUM. BUS. L. REV. 109, 173 (2009) (reporting that structured-product ratings revenue for Moody's, the only major rating agency to present rating revenue by category, grew 87% from 2004 to 2006 and accounted for 54% of the company's ratings revenue in 2006).

Moreover, audit firms apparently do not enjoy the First Amendment defense against litigation that credit-rating agencies do,[234] so concerns about liability being an insufficient guardian of quality for rating agencies are less forceful for auditors.[235] Finally, although major accounting firms certainly are not perfect,[236] they may not, for example, bear the same level of responsibility for the Global Financial Crisis as credit rating agencies.[237]

234 *See* Frank Partnoy, *How and Why Credit Rating Agencies Are Not Like Other Gatekeepers*, *in* FINANCIAL GATEKEEPERS: CAN THEY PROTECT INVESTORS? 59, 84 (Yasuyuki Fuchita & Robert E. Litan eds., 2006) ("[R]ating agencies have been unique among gatekeepers in their ability to argue that their function is merely to provide 'opinions,' which are protected by the First Amendment.").

235 *See* Frank Partnoy, *What's (Still) Wrong with Credit Ratings?*, 92 WASH. L. REV. 1407, 1445 (2017) (arguing that, in part due to the agencies' First Amendment liability defenses, "there is only limited accountability for credit rating agencies" despite intense reform efforts after the Global Financial Crisis).

236 *See, e.g.*, *EY Fined over Audits of Failed German Payments Firm Wirecard*, AP (April 3, 2023), https://apnews.com/article/wirecard-ey-germany-audit-fines-01230bcc1d3f6a3e0bc9eef2ab1f047b [https://perma.cc/EDA4-YLAM] (reporting that Big Four accounting firm Ernst & Young was fined 500,000 euros for "breach of professional duty" after failing to discover fraud at German payments firm Wirecard).

237 It is of course difficult to apportion blame for the GFC. However, it is the author's impression that attention focused on credit rating agencies to a far greater extent than on public-company auditing. *See, e.g.*, Michael Rapoport, *Role of Auditors in Crisis Gets Look*, WALL. ST. J. (Dec. 23, 2010) https://www.wsj.com/articles/SB10001424052748703814804576036094165907626 [https://perma.cc/5STL-YLQ2] ("Auditors weren't involved in a lot of the primary causes of the crisis: bad lending and investment decisions; a lack of understanding of risk; and flaws in the credit-rating system."). As a rough indication of this difference in focus, note that the Dodd-Frank act devoted an entire subtitle, with 17 sections, to credit rating agencies. *See* Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. 111-203, 124 Stat. 1382, Title IX, Subtitle C, §§ 931-939H. By contrast, the author has not located Dodd-Frank provisions governing public-company audits. except for provisions governing the production of work papers and other work product of non-U.S. auditors, *see id.* § 929J, and bringing broker-

Another argument against requiring attestation is cost. The author has been unable to find information on the cost of use-of-proceeds attestations, but tracking a set of proceeds appears to be a fairly simple enterprise, especially given that the GBP already mandate that issuers take measures that make such tracking easier.[238]

Another counterargument is that there is, at present, no documented problem with green default. It is true that publicized instances of "greenwashing" have not involved situations where funds were not used as advertised, but rather where the (disclosed) uses arguably were not green. Examples are the issuance of green bonds by the oil company Repsol,[239] or Michelin's issuance of green bonds to replace trees that its own joint-venture partner in the reforestation effort had cut down.[240] These instances also both occurred outside the United States. However, apart from the obvious rejoinder that green defaults may be going on undetected because of weak

dealer auditors under PCAOB jurisdiction, *see id*. § 982. The latter provision appears to be a response to the fraud perpetrated by Bernard Madoff, whose enterprise notoriously was not audited by a major accounting firm. *See*, *Auditing the Auditors: Creating the Public Company Accounting Oversight Board*, SECS. & EXCH. COMM'N HISTORICAL SOC'Y, https://www.sechistorical.org/museum/galleries/pcaob/pcaob07_expanding_mandate.php [on file with the Columbia Business Law Review] (last visited Mar. 1, 2024) (describing extension of PCAOB jurisdiction as described in wake of Madoff scandal).

238 *See* 2021 GREEN BOND PRINCIPLES, *supra* note 1, at 6 (providing that green-bond proceeds "should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner").

239 Repsol's bonds were for energy efficiency and carbon emission reduction. Criticism reportedly centered on the fact that Repsol remained a fossil-fuel company and was simply making its operations incrementally greener. *See* Banahan, *supra* note 8, at 856–57.

240 *See* Mighty Earth, *Report: Michelin Covered Up Industrial Deforestation By Its Indonesian Partner in "Eco-friendly" Rubber Venture*, FARMLANDGRAB.ORG (Oct. 6, 2020), https://www.farmlandgrab.org/post/view/29896-report-michelin-covered-up-industrial-deforestation-by-its-indonesian-partner-in-eco-friendly-rubber-venture [https://perma.cc/9F3U-2LTN].

disclosure requirements, one should consider that the rapidly growing green market may attract bad actors as it becomes more lucrative. The absence of a large greenium does not necessarily forestall this, as research suggests that companies may benefit from issuing green bonds in ways other than by being able to pay less interest.[241]

Finally, it might be argued that the existing regime, including the threat of fraud liability for false or misleading disclosures of intention,[242] is already producing the optimal level of post-issuance disclosure. The argument thus would be that requiring more disclosure would impose an unjustified cost on issuers. On a factual level, Curtis, Weidemaier, and Gulati have found that market participants do want greater disclosure,[243] although that may be a separate question from whether they are willing to pay for it.

On a theoretical level, this unfalsifiable argument can be countered by another: the absence of a greenium, together with the explanation by Curtis, Weidemaier, and Gulati of how the green-bond market could grow quickly without a greenium and without inducing new green investment,[244] suggests that the market may not be functioning terribly well relative to its promise. Perhaps improved disclosure standards would strengthen green credibility for the market as a whole, increase the greenium, and pull in new investment. Given the speculative nature of both the existing-disclosure-is-optimal

241 *See* Caroline Flammer, *Corporate Green Bonds*, 142 J. FIN. ECON.499, 500, 507 (2021), https://doi.org/10.1016/j.jfineco.2021.01.010 [https://perma.cc/62L2-RA5G], at 2 (finding in an event study that green-bond issuers experience a 0.49% cumulative abnormal return in the "short time window around the announcement of green bond issues").

242 As discussed, fraud liability and third-party verification can be mutually reinforcing mechanisms for inducing disclosure, as they are in the context of public-company financial statements, which are governed by the securities-fraud regime and by auditing requirements. *See* discussion *supra* Section II.B.2.

243 Curtis et al., *supra* note 10, at 47.

244 *See* discussion *supra* notes 80–88 and accompanying text.

and more-disclosure-would-improve-the-market contentions, the more compelling point seems to be that those who directly or indirectly buy green bonds because of their greenness deserve protection.

If the limited proposal presented here goes too far for ICMA, there are two nonexclusive possibilities for restricting it further. These approaches are less preferred by the author. The first potential limit follows from the finding that investment-grade status has been associated with reporting quality.[245] If that indicates a market expectation that such firms will attest, then perhaps existing market discipline is enough for that market segment. If ICMA were to adopt an attestation requirement limited to investment-grade bonds, it should heed Partnoy's warning that incorporating ratings into financial regulation can entrench particular rating agencies' market positions and reduce rating quality.[246] ICMA should thus consider some form of market-based definition of "investment grade," rather than defining the term according to particular agencies' ratings. Such a definition could be based on the "credit spread,"[247] the difference between the yield promised by the green bond issuer and the yield that would be promised on a comparable bond with no credit risk.[248]

Another possible limit would be to require attestation only for companies that do not provide project-level allocation reporting.[249] If the issuer claims to have funded a particular solar plant, investors can check whether the plant was actually

245 *See* discussion *supra* Section IV.B.5.

246 Frank Partnoy, *The Siskel and Ebert of Financial Markets?: Two Thumbs Down for the Credit Rating Agencies*, 77 WASH. U.L.Q. 619, 690–704 (1999) (arguing that this process occurred after extensive incorporation of ratings in to financial regulation began in 1973).

247 *See id*. at 704–07 (advocating use of credit spreads instead of credit ratings in financial regulation).

248 *See id.* at 655 (defining credit spread).

249 Recall that a negative relationship appears to exist between attestation and level of allocation reporting detail. *See* discussion *supra* Section IV.B.0.

built. This proposal has some problems. Apart from the inefficiency of putting each investor individually to the task of verification, the proposal also suffers from the difficulty that defining "project-level" might be difficult in some cases. Although a solar or wind plant is fairly easily defined as a project, it might be harder to define what counts as "project-level" reporting in the context of a utility's energy conservation program.

Conversely, ICMA might consider going farther and requiring not just attestation, but project-level attestation. As noted, only about 30% of US corporate green bonds have met this standard of disclosure.[250] However, the requirement of attestation at the project level seems likely to be materially helpful to users only if the projects are disclosed,[251] and the Green Bond Principles currently recognize that project-level reporting could raise competitive concerns in some instances.[252] Moreover, although attestation by a credible third party reduces concerns about the credibility of overly general disclosures, it does not address investors' individual preferences about what particular types of green projects to support. For example, bird-loving investors may not wish to support wind power, and they would not be able to express that preference if they know only that the accountants certified that a given green bond was used to fund "renewable energy generation." Suggested language implementing this proposal appears in Appendix 3, Part 1, Option B.

B. Consider Requiring Withdrawal of External Reviewer's "Green" Verification for Failure of Post-

250 *See* discussion *supra* Section IV.A.1.

251 It might be argued that project-level allocation with more general attestation is not a problem, because the attestation necessarily implies the attesting party's confidence in the project-level allocation. If that were the case, it is unclear why the attestation is not simply made at the project level, to avoid any potential misunderstanding.

252 *See* discussion *supra* note 223 and accompanying text.

Issuance Disclosure

As noted, green bonds with pre-issuance reviews apparently have been less likely to have higher-quality post-issuance reporting.[253] This could be interpreted to suggest that pre-issuance review substitutes for post-issuance review to some extent.

At the same time, the research presented here at least raises questions about whether all US corporate green-bond issuers are complying with the ICMA GBP's provision that they provide post-issuance reporting.[254] Although CBI's rules appear to provide for withdrawal of certification of a bond's "greenness" upon green default,[255] the author has been unable to find evidence that other certifiers do so.

Pre-issuance external verifiers under the ICMA GBP arguably should be required to monitor the issuer's disclosures and withdraw green verification if the issuer materially fails to meet the GPB's disclosure requirements. Given that this change requires only that the green-bond verifier monitor the issuer's public disclosures, it is a low-cost measure. Curtis, Weidemaier, and Gulati may well be correct that this kind of loss of certification is a purely reputational measure that is "likely of modest impact,"[256] but as a matter of protection of investors' reasonable expectations, bonds that have been proven not to be green should not continue to be considered "green." Suggested language implementing this proposal appears in Appendix 3, Part 2.

VI. CONCLUSION

Post-issuance reporting of use of green-bond proceeds is a critical aspect of the market for green bonds, one that legal scholars have to date largely overlooked. This study provides

253 *See* discussion *supra* Section IV.B.5.

254 *See* 2021 GREEN BOND PRINCIPLES, supra note 1, at 6–7.

255 *See* Curtis et al., *supra* note 10, at 50.

256 *See id.* at 51.

ammunition for both optimists and pessimists. On the glass-half-full side, the large majority of green bonds have post-issuance reporting, and most of those are attested and/or report in enough detail that users can verify the issuer's claims. On the glass-half-empty side, a large slice of the market seems not to have attested reporting, a considerable number of green bonds have reporting that is neither attested nor at project level, and an even larger number have no reporting at all, at least that the author could locate. Poorer-quality reporting appears to be concentrated in the non-IG portion of the market, among non-financial firms, and perhaps among firms that have not issued more than one green bond. It also appears to be the case that pre-issuance verification has been negatively correlated with high-quality post-issuance reporting, and that the two measures of post-issuance reporting quality discussed here are negatively correlated.

In light of these results, ICMA should consider amending the Green Bond Principles to require attestation of use of proceeds. Moreover, pre-issuance verifiers should monitor post-issuance disclosure and withdraw their "green" verification if the issuer does not comply with the GBP's post-issuance disclosure requirements. Both approaches seem to be a low-cost, incremental measures that could increase market confidence in green bonds.

Appendix 1 – U.S. Corporate Green Bonds Issued June 1, 2019 to May 31, 2022

Source: Bloomberg Financial Information Service.

Issuer	Coupon	Maturity	Issue Date	Amt. Issued ($ million)
AES Corp	1.375	1/15/2026	12/4/2020	800.0
AES Corp	2.45	1/15/2031	12/4/2020	1,000.0
AES Corp	1.375	1/15/2026	8/18/2021	797.9

AES Corp	2.45	1/15/2031	8/18/2021	996.9
Alexandria Real Estate Equities Inc	2	5/18/2032	2/18/2021	900.0
Alexandria Real Estate Equities Inc	2.95	3/15/2034	2/16/2022	800.0
Ameren Illinois Co	2.9	6/15/2051	6/29/2021	350.0
Amgen Inc	3	2/22/2029	2/22/2022	750.0
Analog Devices Inc	2.95	4/1/2025	4/8/2020	400.0
Arizona Public Service Co	2.65	9/15/2050	9/11/2020	400.0
AvalonBay Communities Inc	2.05	1/15/2032	9/15/2021	700.0
AvalonBay Communities Inc	1.9	12/1/2028	11/18/2021	400.0
Avangrid Inc	3.2	4/15/2025	4/9/2020	750.0
Bank of America Corp	2.456	10/22/2025	10/22/2019	2,000.0
Big River Steel LLC / BRS Finance Corp	6.625	1/31/2029	9/18/2020	900.0
Bloom Energy Corp	2.5	8/15/2025	8/11/2020	230.0
Boston Properties LP	3.4	6/21/2029	6/21/2019	850.0
Boston Properties LP	2.55	4/1/2032	3/16/2021	850.0
Boston Properties LP	2.45	10/1/2033	9/29/2021	850.0

Brightline Trains Florida LLC	8	1/1/2028	8/11/2021	400.0
Citigroup Global Markets Holdings Inc/United States	2	3/23/2028	3/23/2021	80.0
Citigroup Inc	4.96257	12/20/2025	12/20/2019	47.7
Citigroup Inc	1.678	5/15/2024	5/14/2020	1,500.0
Clearway Energy Operating LLC	4.75	3/15/2028	12/11/2019	850.0
Clearway Energy Operating LLC	4.75	3/15/2028	5/21/2020	250.0
Clearway Energy Operating LLC	3.75	2/15/2031	3/9/2021	925.0
Clearway Energy Operating LLC	3.75	1/15/2032	10/1/2021	350.0
Conservation Fund A Nonprofit Corp	3.474	12/15/2029	9/26/2019	150.0
Consolidated Edison Co of New York Inc	3.35	4/1/2030	3/31/2020	600.0
Consolidated Edison Co of New York Inc	3.95	4/1/2050	3/31/2020	1,000.0
Consolidated Edison Co of New York Inc	3.6	6/15/2061	6/8/2021	750.0
Dana Inc	4.25	9/1/2030	5/13/2021	400.0

Dominion Energy Inc	2.25	8/15/2031	8/12/2021	1,000.0
DTE Electric Co	1.9	4/1/2028	3/29/2021	575.0
DTE Electric Co	3.25	4/1/2051	3/29/2021	425.0
DTE Electric Co	3.65	3/1/2052	2/24/2022	400.0
Duke Energy Florida LLC	2.5	12/1/2029	11/26/2019	700.0
Duke Realty LP	2.875	11/15/2029	11/15/2019	400.0
Duke Realty LP	1.75	2/1/2031	1/21/2021	450.0
Duke Realty LP	2.25	1/15/2032	11/10/2021	500.0
Eco Material Technologies Inc	7.875	1/31/2027	2/9/2022	525.0
Enphase Energy Inc	0	3/1/2026	3/1/2021	632.5
Enphase Energy Inc	0	3/1/2028	3/1/2021	575.0
Equinix Inc	1	9/15/2025	10/7/2020	700.0
Equinix Inc	1.55	3/15/2028	10/7/2020	650.0
Equinix Inc	2.5	5/15/2031	5/17/2021	1,000.0
Equinix Inc	3.9	4/15/2032	4/5/2022	1,200.0
ERP Operating LP	1.85	8/1/2031	8/9/2021	500.0
Federal Realty Investment Trust	1.25	2/15/2026	10/13/2020	400.0
Fifth Third Bancorp	1.707	11/1/2027	11/1/2021	500.0
Fisker Inc	2.5	9/15/2026	8/17/2021	667.5
Forbright Inc	4	1/1/2032	12/22/2021	125.0

Ford Motor Co	3.25	2/12/2032	11/12/2021	2,500.0
Hannon Armstrong Sustainable Infrastructure Capital Inc	0	8/15/2023	8/21/2020	143.8
Hanwha Energy USA Holdings Corp	2.375	7/30/2022	7/30/2019	300.0
HAT Holdings I LLC / HAT Holdings II LLC	5.25	7/15/2024	7/2/2019	500.0
HAT Holdings I LLC / HAT Holdings II LLC	5.25	7/15/2024	9/12/2019	150.0
HAT Holdings I LLC / HAT Holdings II LLC	6	4/15/2025	4/21/2020	400.0
HAT Holdings I LLC / HAT Holdings II LLC	3.75	9/15/2030	8/25/2020	375.0
HAT Holdings I LLC / HAT Holdings II LLC	3.375	6/15/2026	6/28/2021	1,000.0
HAT Holdings I LLC / HAT Holdings II LLC	0	5/1/2025	4/13/2022	200.0
Healthpeak OP LLC	1.35	2/1/2027	7/12/2021	450.0
Healthpeak OP LLC	2.125	12/1/2028	11/24/2021	500.0

Host Hotels & Resorts LP	3.375	12/15/2029	9/26/2019	650.0
Host Hotels & Resorts LP	3.5	9/15/2030	8/20/2020	750.0
Host Hotels & Resorts LP	2.9	12/15/2031	11/23/2021	450.0
Interstate Power and Light Co	3.5	9/30/2049	9/26/2019	300.0
Jabil Inc	4.25	5/15/2027	5/4/2022	500.0
JPMorgan Chase & Co	0.653	9/16/2024	9/16/2020	1,000.0
JPMorgan Chase & Co	0.768	8/9/2025	8/10/2021	1,250.0
Kaiser Foundation Hospitals	2.81	6/1/2041	6/15/2021	1,250.0
Kilroy Realty LP	2.5	11/15/2032	8/12/2020	425.0
Kilroy Realty LP	2.65	11/15/2033	10/7/2021	450.0
Kimco Realty OP LLC	2.7	10/1/2030	7/13/2020	500.0
Leeward Renewable Energy Operations LLC	4.25	7/1/2029	7/8/2021	375.0
Liberty Utilities Finance GP 1	2.05	9/15/2030	9/23/2020	600.0
Livent Corp	4.125	7/15/2025	6/25/2020	245.8
Lucid Group Inc	1.25	12/15/2026	12/14/2021	2,012.5
Mather Foundation	2.675	10/1/2031	10/5/2021	100.0

Metropolitan Life Global Funding I	0.95	7/2/2025	7/2/2020	750.0
Micron Technology Inc	2.703	4/15/2032	11/1/2021	1,000.0
MidAmerican Energy Co	3.15	4/15/2050	10/15/2019	600.0
MidAmerican Energy Co	2.7	8/1/2052	7/22/2021	500.0
MP Materials Corp	0.25	4/1/2026	3/26/2021	690.0
Nature Conservancy	2.449	3/1/2025	3/3/2022	6.2
Nature Conservancy	3.957	3/1/2052	3/3/2022	350.0
New York State Electric & Gas Corp	2.15	10/1/2031	9/24/2021	350.0
NextEra Energy Capital Holdings Inc	1.9	6/15/2028	6/8/2021	1,500.0
Niagara Mohawk Power Corp	1.96	6/27/2030	6/25/2020	600.0
Norfolk Southern Corp	2.3	5/15/2031	5/12/2021	500.0
Northern States Power Co/MN	2.9	3/1/2050	9/10/2019	600.0
Northern States Power Co/MN	2.6	6/1/2051	6/15/2020	700.0
Northern States Power Co/MN	2.25	4/1/2031	3/30/2021	425.0

Northern States Power Co/MN	3.2	4/1/2052	3/30/2021	425.0
Northern States Power Co/MN	4.5	6/1/2052	5/9/2022	500.0
NSTAR Electric Co	3.95	4/1/2030	3/26/2020	400.0
NSTAR Electric Co	3.1	6/1/2051	5/27/2021	300.0
Oberlin College	2.874	10/1/2051	7/28/2021	80.6
Oncor Electric Delivery Co LLC	4.15	6/1/2032	5/20/2022	400.0
Owens Corning	3.95	8/15/2029	8/12/2019	450.0
PacifiCorp	2.9	6/15/2052	7/9/2021	1,000.0
Pattern Energy Operations LP/ Pattern Energy Operations Inc	4.5	8/15/2028	7/28/2020	700.0
PepsiCo Inc	2.875	10/15/2049	10/9/2019	1,000.0
Piedmont Operating Partnership LP	3.15	8/15/2030	8/12/2020	300.0
Plug Power Inc	3.75	6/1/2025	5/18/2020	212.5
PNC Financial Services Group Inc	2.2	11/1/2024	11/1/2019	650.0
Prologis LP	1.25	10/15/2030	8/20/2020	750.0

Prudential Financial Inc	1.5	3/10/2026	3/10/2020	500.0
Public Service Co of Colorado	3.2	3/1/2050	8/13/2019	550.0
Public Service Co of Colorado	2.7	1/15/2051	5/15/2020	375.0
Public Service Co of Oklahoma	2.2	8/15/2031	8/13/2021	400.0
Public Service Co of Oklahoma	3.15	8/15/2051	8/13/2021	400.0
Public Service Electric and Gas Co	3.1	3/15/2032	3/11/2022	500.0
Renewable Energy Group Inc	5.875	6/1/2028	5/20/2021	550.0
Rexford Industrial Realty LP	2.15	9/1/2031	8/9/2021	400.0
San Diego Gas & Electric Co	2.95	8/15/2051	8/13/2021	750.0
SCE Recovery Funding LLC	1.977	11/15/2028	2/15/2022	100.0
SCE Recovery Funding LLC	2.943	11/15/2042	2/15/2022	305.0
SCE Recovery Funding LLC	3.24	11/15/2046	2/15/2022	128.3
Seattle Children's Hospital	1.208	10/1/2027	2/11/2021	102.1
Seattle Children's Hospital	2.719	10/1/2050	2/11/2021	300.0
SK Battery America Inc	1.625	1/26/2024	1/26/2021	300.0
SK Battery America Inc	2.125	1/26/2026	1/26/2021	700.0

Sonoco Products Co	1.8	2/1/2025	1/21/2022	400.0
Sonoco Products Co	2.25	2/1/2027	1/21/2022	300.0
Sonoco Products Co	2.85	2/1/2032	1/21/2022	500.0
Southern Power Co	0.9	1/15/2026	1/8/2021	400.0
Southwestern Electric Power Co	3.25	11/1/2051	11/3/2021	650.0
Southwestern Public Service Co	3.75	6/15/2049	6/18/2019	300.0
Southwestern Public Service Co	3.15	5/1/2050	5/18/2020	600.0
Southwestern Public Service Co	5.15	6/1/2052	5/31/2022	200.0
Stem Inc	0.5	12/1/2028	11/22/2021	460.0
Sunnova Energy Corp	5.875	9/1/2026	8/17/2021	400.0
Toyota Motor Credit Corp	2.15	2/13/2030	2/13/2020	750.0
Tucson Electric Power Co	1.5	8/1/2030	8/10/2020	300.0
UDR Inc	3.1	11/1/2034	10/11/2019	300.0
UDR Inc	1.9	3/15/2033	12/14/2020	350.0
Union Electric Co	2.625	3/15/2051	10/9/2020	550.0
Union Electric Co	2.15	3/15/2032	6/22/2021	525.0
Union Electric Co	3.9	4/1/2052	4/1/2022	525.0

Verizon Communications Inc	1.5	9/18/2030	9/18/2020	1,000.0
Verizon Communications Inc	2.85	9/3/2041	9/3/2021	1,000.0
Verizon Communications Inc	3.875	3/1/2052	3/1/2022	1,000.0
Visa Inc	0.75	8/15/2027	8/17/2020	500.0
Vistra Corp	7	6/15/2061	12/10/2021	1,000.0
Vornado Realty LP	2.15	6/1/2026	5/24/2021	400.0
Vornado Realty LP	3.4	6/1/2031	5/24/2021	350.0
Walmart Inc	1.8	9/22/2031	9/22/2021	2,000.0
Welltower OP LLC	2.7	2/15/2027	12/16/2019	500.0
Welltower OP LLC	3.85	6/15/2032	3/31/2022	550.0
Wisconsin Power and Light Co	1.95	9/16/2031	9/16/2021	300.0
Wisconsin Public Service Corp	2.85	12/1/2051	11/18/2021	450.0
WP Carey Inc	2.45	2/1/2032	10/15/2021	350.0
Xylem Inc/NY	1.95	1/30/2028	6/26/2020	500.0
Xylem Inc/NY	2.25	1/30/2031	6/26/2020	500.0

Appendix 2 – Statistical Results

Table 1: Correlation Between HasAttestation and Other Variables, Not Including Allocation Reporting Level (All Bonds)[257]

```
      ##                              HasAttestation
PValue
      ## IsInvestmentGrade                     0.34
0.00
      ## Industry_FINANCIAL                    0.31
0.00
      ## FromRepeatIssuer                      0.24
0.00
      ## Industry_INDUSTRIAL                  -0.21
0.01
      ## AmtIssued                             0.17
0.04
      ## Coupon                               -0.16
0.05
      ## Industry_ELEC_UTILITY                -0.13
0.12
      ## Maturity                              0.08
0.35
      ## Industry_BANK                        -0.06
0.48
      ## IssueYear                            -0.05
0.58
```

[257] The table reports Pearson correlations. Results with Spearman correlations are very similar. Attributes correlated with attestation at a p-value of 0.02 or less using Spearman correlations are: IsInvestmentGrade (p = 0.00), Industry_FINANCIAL (p = 0.00), FromRepeatIssuer (p = 0.00). Industry_INDUSTRIAL (p = 0.01).

```
      ## IssueDate                              -0.04
0.60

      ## Industry_RAIL_TRANS                    -0.04
0.62

      ## HasPreIssuanceVerification             -0.01
0.86
```

Table 2: Linear Regression of HasAttestation Against Other Variables, Not Including Allocation Reporting Level or Industry Dummies (All Bonds)

```
      ## Residuals:

      ##     Min      1Q  Median      3Q     Max

      ## -0.8938 -0.3640  0.1504  0.3305  0.7209

      ##

      ## Coefficients:

      ##                                Estimate Std.
Error t value Pr(>|t|)

      ## (Intercept)                   2.050e+00  5.4
92e+00   0.373  0.70950

      ## FromRepeatIssuer              2.000e-01  7.6
22e-02   2.623  0.00962 **

      ## IsInvestmentGrade             3.000e-01  9.4
17e-02   3.185  0.00176 **

      ## HasPreIssuanceVerification  2.602e-02  7.4
91e-02   0.347  0.72879

      ## Coupon                       -2.921e-02  2.9
56e-02  -0.988  0.32472

      ## Maturity                     -2.241e-06  1.1
57e-05  -0.194  0.84664
```

```
      ## IssueDate                   -3.425e-05  1.2
52e-04  -0.274  0.78475

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.4432 on 148 deg
rees of freedom

      ## Multiple R-squared:  0.1586, Adjusted R-sq
uared:  0.1245

   ## F-statistic: 4.649 on 6 and 148 DF,  p-value:
0.0002332 rcorr
```

Table 3: Linear Regression of Attestation Against Other Variables, Not Including Allocation Reporting Level but Including Industry Dummies (All Bonds)

```
      ## Residuals:
      ##      Min       1Q   Median       3Q      M
ax
      ## -0.99297 -0.30299  0.04719  0.33767  0.749
24
      ##
      ## Coefficients:
      ##                                Estimate Std.
Error t value Pr(>|t|)
      ## (Intercept)                   1.359e+00  5.4
62e+00   0.249  0.80382
      ## FromRepeatIssuer              7.646e-02  8.9
51e-02   0.854  0.39440
      ## IsInvestmentGrade             2.911e-01  9.2
25e-02   3.155  0.00196 **
      ## HasPreIssuanceVerification  2.015e-02  7.5
10e-02   0.268  0.78888
      ## Coupon                       -1.445e-02  3.0
18e-02  -0.479  0.63287
      ## Maturity                      1.534e-05  1.2
75e-05   1.203  0.23108
      ## IssueDate                    -3.380e-05  1.2
35e-04  -0.274  0.78465
      ## Industry_BANK                -2.731e-01  3.5
03e-01  -0.780  0.43697
      ## Industry_ELEC_UTILITY        -2.996e-01  2.6
56e-01  -1.128  0.26126
      ## Industry_FINANCIAL            3.755e-02  2.6
85e-01   0.140  0.88896
```

```
      ## Industry_INDUSTRIAL        -2.519e-01  2.8
23e-01  -0.892  0.37385

      ## Industry_RAIL_TRANS        -1.773e-01  4.1
53e-01  -0.427  0.67012

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.431 on 143 degr
ees of freedom

      ## Multiple R-squared:  0.2311, Adjusted R-sq
uared:  0.172

      ## F-statistic: 3.908 on 11 and 143 DF,  p-va
lue: 5.888e-05
```

Table 4: Correlations Between HasAttestation and Other Variables, Including ReportingAllocationLevel (Reporting Bonds Only)[258]

```
      ##                              HasAttestation
PValue

      ## Industry_FINANCIAL                    0.32
0.00

      ## IsInvestmentGrade                     0.24
0.00
```

[258] The table reports Pearson correlations. Results with Spearman correlations are very similar. Attributes correlated with attestation at a p-value of 0.02 or less using Spearman correlations are: Industry_FINANCIAL (p = 0.00), IsInvestmentGrade (p = 0.00), and FromRepeatIssuer (p=0.01).

```
      ## FromRepeatIssuer                        0.23
0.01
      ## Industry_INDUSTRIAL                    -0.19
0.02
      ## Coupon                                 -0.18
0.03
      ## Industry_ELEC_UTILITY                  -0.14
0.11
      ## AmtIssued                               0.11
0.20
      ## AllocationReportingLevel               -0.09
0.27
      ## Industry_BANK                          -0.09
0.30
      ## HasPreIssuanceVerification             -0.07
0.40
      ## Maturity                                0.07
0.44
      ## Industry_RAIL_TRANS                    -0.06
0.46
      ## IssueYear                              -0.02
0.78
      ## IssueDate                               0.00
0.96
```

Table 5: Linear Regression on HasAttestation and Other Variables, Including ReportingAllocationLevel but Excluding Industry Dummies (Reporting Bonds Only)

```
      ## Residuals:
      ##     Min      1Q  Median      3Q     Max
```

```
      ## -0.9018 -0.3081  0.1660  0.3060  0.7190

      ##

      ## Coefficients:

      ##                                Estimate Std.
Error t value Pr(>|t|)

      ## (Intercept)                -1.552e+00  5.5
15e+00  -0.281  0.77878

      ## FromRepeatIssuer            2.105e-01  7.6
54e-02   2.750  0.00679 **

      ## IsInvestmentGrade           2.121e-01  1.0
37e-01   2.046  0.04270 *

      ## HasPreIssuanceVerification -4.817e-02  7.7
58e-02  -0.621  0.53569

      ## AllocationReportingLevel   -1.589e-01  7.8
34e-02  -2.028  0.04457 *

      ## Coupon                     -3.226e-02  3.3
04e-02  -0.977  0.33055

      ## Maturity                    2.977e-07  1.1
51e-05   0.026  0.97940

      ## IssueDate                   5.715e-05  1.2
55e-04   0.455  0.64959

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.4238 on 133 deg
rees of freedom

      ## Multiple R-squared:  0.1396, Adjusted R-sq
uared:  0.09437

      ## F-statistic: 3.084 on 7 and 133 DF,  p-val
ue: 0.004815
```

Table 6: Linear Regression on HasAttestation and Other Variables, Including ReportingAllocationLevel and Industry Dummies (Reporting Bonds Only)

```
      ## Residuals:
      ##      Min       1Q   Median       3Q      M
ax
      ## -0.97767 -0.28190  0.08451  0.25795  0.734
57
      ##
      ## Coefficients:
      ##                                 Estimate Std.
Error t value Pr(>|t|)
      ## (Intercept)                -2.161e+00  5.4
55e+00  -0.396   0.6927
      ## FromRepeatIssuer            1.008e-01  8.8
21e-02   1.143   0.2552
      ## IsInvestmentGrade           2.336e-01  1.0
11e-01   2.310   0.0225 *
      ## HasPreIssuanceVerification -4.960e-02  7.6
53e-02  -0.648   0.5181
      ## AllocationReportingLevel   -1.921e-01  7.7
37e-02  -2.482   0.0143 *
      ## Coupon                     -7.177e-03  3.3
74e-02  -0.213   0.8319
      ## Maturity                    1.818e-05  1.2
56e-05   1.447   0.1503
      ## IssueDate                   5.272e-05  1.2
33e-04   0.428   0.6696
      ## Industry_BANK              -1.657e-01  3.3
77e-01  -0.491   0.6244
```

```
      ## Industry_ELEC_UTILITY      -1.679e-01  2.5
66e-01  -0.654   0.5142

      ## Industry_FINANCIAL          1.932e-01  2.6
18e-01   0.738   0.4618

      ## Industry_INDUSTRIAL        -9.607e-02  2.7
50e-01  -0.349   0.7274

      ## Industry_RAIL_TRANS        -8.991e-02  3.9
92e-01  -0.225   0.8221

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.4084 on 128 deg
rees of freedom

      ## Multiple R-squared:  0.2311, Adjusted R-sq
uared:  0.159

      ## F-statistic: 3.205 on 12 and 128 DF,  p-va
lue: 0.0004846
```

Table 7: Correlation Between AllocationReportingLevel and Other Variables, Not Including HasAttestation (All Bonds)[259]

```
      ##                                CorrWithAllocat
ionReportingLevel PValue

      ## IsInvestmentGrade
0.30   0.00
```

[259] The table reports Pearson correlations. Results with Spearman correlations are very similar. The attributes correlated with allocation reporting level at a p-value of 0.02 or less using Spearman correlations are IsInvestmentGrade (p = 0.00) and Industry_FINANCIAL (p = 0.02).

```
      ## FromRepeatIssuer
0.22   0.01

      ## Industry_FINANCIAL
0.18   0.02

      ## Industry_INDUSTRIAL
-0.17   0.03

      ## HasPreIssuanceVerification
-0.11   0.16

      ## AmtIssued
0.08   0.30

      ## Maturity
0.04   0.60

      ## Coupon
0.03   0.71

      ## Industry_ELEC_UTILITY
-0.02   0.85

      ## Industry_BANK
0.02   0.85

      ## IssueYear
-0.01   0.89

      ## Industry_RAIL_TRANS
0.01   0.89

      ## IssueDate
-0.01   0.93
```

Table 8: Linear Regression of AllocationReportingLevel Against Other Variables, Not Including HasAttestation or Industry Dummies (All Bonds)

```
      ## Residuals:
      ##     Min      1Q  Median      3Q     Max
      ## -1.7795 -0.4697  0.1659  0.4508  1.2115
```

```
      ##
      ## Coefficients:
      ##                                  Estimate Std.
Error t value Pr(>|t|)
      ## (Intercept)                     1.778e+00  7.6
15e+00   0.233   0.8157
      ## FromRepeatIssuer                1.884e-01  1.0
57e-01   1.783   0.0766 .
      ## IsInvestmentGrade               5.584e-01  1.3
06e-01   4.277 3.38e-05 ***
      ## HasPreIssuanceVerification -1.442e-01  1.0
39e-01  -1.389   0.1670
      ## Coupon                          8.361e-02  4.0
99e-02   2.040   0.0431 *
      ## Maturity                       -2.792e-05  1.6
04e-05  -1.741   0.0838 .
      ## IssueDate                       3.084e-05  1.7
35e-04   0.178   0.8592
      ## ---
      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1
      ##
      ## Residual standard error: 0.6145 on 148 deg
rees of freedom
      ## Multiple R-squared:  0.1553, Adjusted R-sq
uared:  0.121
      ## F-statistic: 4.534 on 6 and 148 DF,  p-val
ue: 0.0002998
```

Table 9: Linear Regression of AllocationReportingLevel Against Other Variables, Not Including HasAttestation but Including Industry Dummies (All Bonds)

```
      ## Residuals:
      ##     Min      1Q  Median      3Q     Max
      ## -1.7974 -0.4623  0.1353  0.4479  1.1277
      ##
      ## Coefficients:
      ##                                 Estimate Std.
Error t value Pr(>|t|)
      ## (Intercept)                  -1.274e+00  7.7
85e+00  -0.164   0.8702
      ## FromRepeatIssuer              1.506e-01  1.2
76e-01   1.181   0.2397
      ## IsInvestmentGrade             5.434e-01  1.3
15e-01   4.133 6.08e-05 ***
      ## HasPreIssuanceVerification -1.029e-01  1.0
70e-01  -0.962   0.3378
      ## Coupon                        8.837e-02  4.3
02e-02   2.054   0.0418 *
      ## Maturity                     -1.459e-05  1.8
18e-05  -0.803   0.4234
      ## IssueDate                     7.199e-05  1.7
60e-04   0.409   0.6831
      ## Industry_BANK                 6.915e-01  4.9
93e-01   1.385   0.1683
      ## Industry_ELEC_UTILITY         5.162e-01  3.7
86e-01   1.363   0.1749
      ## Industry_FINANCIAL            7.093e-01  3.8
27e-01   1.854   0.0659 .
```

```
      ## Industry_INDUSTRIAL          4.985e-01  4.0
24e-01   1.239   0.2174

      ## Industry_RAIL_TRANS          6.473e-01  5.9
19e-01   1.093   0.2760

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.6144 on 143 deg
rees of freedom

      ## Multiple R-squared:  0.1843, Adjusted R-sq
uared:  0.1215

      ## F-statistic: 2.937 on 11 and 143 DF,  p-va
lue: 0.001571
```

Table 10: Correlations Between AllocationReportingLevel and Other Variables, Including HasAttestation (Reporting Bonds Only)[260]

```
      ##                                CorrWithAllocat
ionReportingLevel PValue

      ## HasPreIssuanceVerification
-0.27   0.00

      ## FromRepeatIssuer
0.20   0.02
```

[260] The table reports Pearson correlations. Results with Spearman correlations are very similar. The only attribute correlated with allocation reporting level at a p-value of 0.02 or less using Spearman correlations is HasPreIssuanceVerification (negative correlation) (p = 0.00) and FromRepeatIssuer (p = 0.02).

```
      ## Industry_FINANCIAL
0.18   0.03

      ## Industry_INDUSTRIAL
-0.14   0.11

      ## IsInvestmentGrade
0.12   0.14

      ## HasAttestation
-0.09   0.27

      ## Coupon
0.08   0.34

      ## IssueDate
0.08   0.37

      ## AmtIssued
-0.04   0.60

      ## IssueYear
0.04   0.65

      ## Industry_BANK
-0.03   0.74

      ## Industry_RAIL_TRANS
-0.02   0.82

      ## Maturity
0.02   0.84

      ## Industry_ELEC_UTILITY
0.00   1.00
```

Table 11: Linear Regression on AllocationReportingLevel and Other Variables, Including HasAttestation but Excluding Industry Dummies (Reporting Bonds Only)

```
      ## Residuals:

      ##     Min      1Q  Median      3Q     Max
```

```
      ## -0.8348 -0.4098  0.1431  0.3821  0.7757

      ##

      ## Coefficients:

      ##                                Estimate Std.
Error t value Pr(>|t|)

      ## (Intercept)                 -3.489e+00  6.0
06e+00  -0.581  0.56221

      ## FromRepeatIssuer             1.697e-01  8.4
50e-02   2.008  0.04663 *

      ## IsInvestmentGrade            2.973e-01  1.1
18e-01   2.658  0.00883 **

      ## HasPreIssuanceVerification -2.598e-01  8.1
64e-02  -3.182  0.00182 **

      ## HasAttestation              -1.888e-01  9.3
09e-02  -2.028  0.04457 *

      ## Coupon                       7.107e-02  3.5
61e-02   1.996  0.04801 *

      ## Maturity                    -1.904e-05  1.2
44e-05  -1.531  0.12820

      ## IssueDate                    1.527e-04  1.3
63e-04   1.121  0.26448

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.4619 on 133 deg
rees of freedom

      ## Multiple R-squared:  0.1729, Adjusted R-sq
uared:  0.1294

      ## F-statistic: 3.973 on 7 and 133 DF,  p-val
ue: 0.0005652
```

Table 12: Linear Regression on AllocationReportingLevel and Other Variables, Including HasAttestation and Industry Dummies (Reporting Bonds Only)

```
      ## Residuals:
      ##     Min      1Q  Median      3Q     Max
      ## -0.8562 -0.3819  0.1065  0.3623  0.8164
      ##
      ## Coefficients:
      ##                                 Estimate Std.
Error t value Pr(>|t|)
      ## (Intercept)                   -6.284e+00  6.0
66e+00  -1.036  0.30217
      ## FromRepeatIssuer               1.363e-01  9.8
20e-02   1.388  0.16755
      ## IsInvestmentGrade              3.107e-01  1.1
18e-01   2.779  0.00628 **
      ## HasPreIssuanceVerification -2.129e-01  8.3
44e-02  -2.551  0.01191 *
      ## HasAttestation                -2.391e-01  9.6
34e-02  -2.482  0.01435 *
      ## Coupon                         8.155e-02  3.6
96e-02   2.206  0.02915 *
      ## Maturity                      -5.474e-06  1.4
12e-05  -0.388  0.69896
      ## IssueDate                      1.881e-04  1.3
66e-04   1.376  0.17109
      ## Industry_BANK                  5.175e-01  3.7
44e-01   1.382  0.16936
      ## Industry_ELEC_UTILITY          4.850e-01  2.8
36e-01   1.710  0.08970 .
```

```
      ## Industry_FINANCIAL          7.035e-01  2.8
60e-01   2.460  0.01524 *

      ## Industry_INDUSTRIAL         4.964e-01  3.0
39e-01   1.633  0.10484

      ## Industry_RAIL_TRANS         4.542e-01  4.4
37e-01   1.024  0.30794

      ## ---

      ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*
' 0.05 '.' 0.1 ' ' 1

      ##

      ## Residual standard error: 0.4557 on 128 deg
rees of freedom

      ## Multiple R-squared:  0.2255, Adjusted R-sq
uared:  0.1528

      ## F-statistic: 3.105 on 12 and 128 DF,  p-va
lue: 0.0006894
```

Appendix 3 – Proposed Green Bond Principles Language

This appendix presents suggested language amending the ICMA Green Bond Principles (GBP's) to implement the proposals discussed in this article. Part 1 provides language requiring post-issuance use-of-proceeds reporting without changing the GBP's language relating to project-level reporting ("Option A"). It also provides language requiring post-issuance use-of-proceeds reporting, as well as project-level attestation in the event that the issuer reports allocation at the project level. ("Option B"). Option B contains all the language of Option A, together with additional amending language.

Part 2 provides language forbidding issuers from designating bonds as "green" if they fail to meet monitoring and

reporting requirements. The language in Part 2 could be used even if neither option of Part 1 is adopted.

Part 1: Reporting Requirements

Option A: Basic Attestation Requirement

This recommendation is shown as a redline of points 3 and 4 of the existing Green Bond Principles, found at p.6 of the 2021 Green Bond Principles.

> "3. Management of Proceeds The net proceeds of the Green Bond, or an amount equal to these net proceeds, should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner, and attested to by the issuer in a formal internal process linked to the issuer's lending and investment operations for eligible Green Projects. So long as the Green Bond is outstanding, the balance of the tracked net proceeds should be periodically adjusted to match allocations to eligible Green Projects made during that period. The issuer should make known to investors the intended types of temporary placement for the balance of unallocated net proceeds. The proceeds of Green Bonds can be managed per bond (bond-by-bond approach) or on an aggregated basis for multiple green bonds (portfolio approach). The GBP encourage a high level of transparency. An issuer's management of proceeds should be supplemented by the use of an external auditor, or other third party, to verify the internal tracking method and the allocation of funds from the Green Bond proceeds (see Key Recommendations section below).
>
> 4. Reporting Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and on a timely basis in case of material developments. The annual report should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects, the amounts

allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g. percentage allocated to certain project categories). Transparency is of particular value in communicating the expected and/or achieved impact of projects. The annual report should be examined by a reputable third party, which should give assurance that the issuer's assertions about the allocation of proceeds are fairly stated in all material respects. The third party should be guided by the American Institute of Certified Public Accountants' standards for attestation or by analogous non-US accounting standards. The third party's assurance should be included in the annual report on use of proceeds. The GBP recommend the use of qualitative performance indicators and, where feasible, quantitative performance measures and disclosure of the key underlying methodology and/or assumptions used in the quantitative determination. Issuers should refer to and adopt, where possible, the guidance and impact reporting templates provided in the Harmonised Framework for Impact Reporting. The use of a summary, which reflects the main characteristics of a Green Bond or a Green Bond programme, and illustrates its key features in alignment with the four core components of the GBP, may help inform market participants. To that end, a template can be found in the sustainable finance section of ICMA's website which once completed can be made available online for market information (see Resource Centre section below)."

This recommendation is shown as a redline of ICMA's 'Key Recommendations: External Reviews," on p.7 of the 2021 Green Bond Principles:

External Reviews It is recommended that issuers appoint (an) external review provider(s) to assess through a pre-issuance external review the alignment of their Green Bond or Green Bond programme and/or Framework with the four core components of the GBP (i.e. Use of Proceeds, Process for Project Evaluation and Selection, Management of Proceeds and Reporting) as defined above.

Post issuance, an issuer's management of proceeds should be supplemented by the use of an external auditor, or other third party, to verify the internal tracking and the allocation of funds from the Green Bond proceeds to eligible Green Projects. [[or delete this paragraph entirely, as use of an auditor for proceeds tracking is no longer a "recommendation"]]

There are a variety of ways for issuers to obtain outside input to their Green Bond process and there are several types of review that can be provided to the market. Issuers should consult the Guidelines for External Reviews for recommendations and explanations on the different types of reviews. Post-issuance reviews of use of proceeds should substantially comply with the American Institute of Certified Public Accountants' attestation standards for examination engagements or analogous non-US accounting standards.

These Guidelines have been developed by the GBP to promote best practice. They are a market-based initiative to provide information and transparency on the external review processes for issuers, underwriters, investors, other stakeholders and external reviewers themselves.

The GBP encourage external review providers to disclose their credentials and relevant expertise and communicate clearly the scope of the review(s) conducted. Issuers should make external reviews publicly available on their website and/or through any other accessible communication channel as appropriate and if feasible, as well as use the template for external reviews available in the sustainable finance section of ICMA's website.

Option B: Post-issuance reporting (project-level attestation required)

> "3. Management of Proceeds The net proceeds of the Green Bond, or an amount equal to these net proceeds, should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner, and attested to by the issuer in a formal internal process linked to the issuer's lending and investment operations for eligible Green Projects. So long as the Green Bond is outstanding, the balance of the tracked net proceeds should be periodically adjusted to match allocations to eligible Green Projects made during that period. The issuer should make known to investors the intended types of temporary placement for the balance of unallocated net proceeds. The proceeds of Green Bonds can be managed per bond (bond-by-bond approach) or on an aggregated basis for multiple green bonds (portfolio approach). The GBP encourage a high level of transparency. An issuer's management of proceeds should be supplemented by the use of an external auditor, or other third party, to verify the internal tracking method and the allocation of funds from the Green Bond proceeds (see Key Recommendations section below).
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> 4. Reporting Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and on a timely basis in case of material developments. The annual report should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects, the amounts allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g. percentage allocated to certain project categories). Transparency is

of particular value in communicating the expected and/or achieved impact of projects. The annual report should be examined by a reputable third party, which should give assurance that the issuer's assertions about the allocation of proceeds are fairly stated in all material respects. The third party should be guided by the American Institute of Certified Public Accountants' standards for attestation or by analogous non-US accounting standards. The third party's assurance should be included in the annual report on use of proceeds. Where the issuer reports on allocation at the project level, the third party should provide assurance that the project-level allocation is fairly reported in all material respects. The GBP recommend the use of qualitative performance indicators and, where feasible, quantitative performance measures and disclosure of the key underlying methodology and/or assumptions used in the quantitative determination. Issuers should refer to and adopt, where possible, the guidance and impact reporting templates provided in the Harmonised Framework for Impact Reporting. The use of a summary, which reflects the main characteristics of a Green Bond or a Green Bond programme, and illustrates its key features in alignment with the four core components of the GBP, may help inform market participants. To that end, a template can be found in the sustainable finance section of ICMA's website which once completed can be made available online for market information (see Resource Centre section below)."

This recommendation is shown as a redline of ICMA's 'Key Recommendations: External Reviews," on p.7 of the 2021 Green Bond Principles:

External Reviews It is recommended that issuers appoint (an) external review provider(s) to assess through a pre-issuance external review the alignment

of their Green Bond or Green Bond programme and/or Framework with the four core components of the GBP (i.e. Use of Proceeds, Process for Project Evaluation and Selection, Management of Proceeds and Reporting) as defined above.

Post issuance, an issuer's management of proceeds should be supplemented by the use of an external auditor, or other third party, to verify the internal tracking and the allocation of funds from the Green Bond proceeds to eligible Green Projects. [[or delete this paragraph entirely, as use of an auditor for proceeds tracking is no longer a "recommendation"]]

There are a variety of ways for issuers to obtain outside input to their Green Bond process and there are several types of review that can be provided to the market. Issuers should consult the Guidelines for External Reviews for recommendations and explanations on the different types of reviews. Post-issuance reviews of use of proceeds should substantially comply with the American Institute of Certified Public Accountants' attestation standards for examination engagements or analogous non-US accounting standards and should provide assurance at the project level if the issuer reports proceeds allocation at the project level.

These Guidelines have been developed by the GBP to promote best practice. They are a market-based initiative to provide information and transparency on the external review processes for issuers, underwriters, investors, other stakeholders and external reviewers themselves.

The GBP encourage external review providers to disclose their credentials and relevant expertise and communicate clearly the scope of the review(s) conducted. Issuers should make external reviews publicly available on their website and/or through any other accessible communication channel as appropriate and if feasible, as well as use the template for external reviews available in the sustainable finance section of ICMA's website.

Part 2: Decertification

This recommendation is shown as a redline of points 3 and 4 of the existing Green Bond Principles, found at p.6 of the 2021 Green Bond Principles. The changes recommended here are independent of those described in Part 1 above.

> "3. Management of Proceeds The net proceeds of the Green Bond, or an amount equal to these net proceeds, should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner, and attested to by the issuer in a formal internal process linked to the issuer's lending and investment operations for eligible Green Projects. So long as the Green Bond is outstanding, the balance of the tracked net proceeds should be periodically adjusted to match allocations to eligible Green Projects made during that period. The issuer should make known to investors the intended types of temporary placement for the balance of unallocated net proceeds. The proceeds of Green Bonds can be managed per bond (bond-by-bond approach) or on an aggregated basis for multiple green bonds (portfolio approach). The GBP encourage a high level of transparency and recommend that an issuer's management of proceeds be supplemented by the use of an external auditor, or other third party, to verify the internal tracking method and the allocation of funds from the Green Bond proceeds (see Key Recommendations section below). Issuers that do not comply with the provisions of this section 3 with respect to a bond should cease designating the bond as "green" for any purpose. A pre-issuance external reviewer that has rendered an opinion that an issuer's Green Bond or Green Bond programme and/ or Framework aligns with the four core components of the GBP should take reasonable steps to monitor the issuer's compliance with this section 3 and should withdraw its opinion if it becomes aware that the issuer is not in compliance with this section 3. In this event, the external reviewer should take reasonable steps to notify the public of the withdrawal of its opinion.

> 4. Reporting Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and on a timely basis in case of material developments. The annual report should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects, the amounts allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g. percentage allocated to certain project categories). Transparency is of particular value in communicating the expected and/or achieved impact of projects. The GBP recommend the use of qualitative performance indicators and, where feasible, quantitative performance measures and disclosure of the key underlying methodology and/or assumptions used in the quantitative determination. Issuers should refer to and adopt, where possible, the guidance and impact reporting templates provided in the Harmonised Framework for Impact Reporting. The use of a summary, which reflects the main characteristics of a Green Bond or a Green Bond programme, and illustrates its key features in alignment with the four core components of the GBP, may help inform market participants. To that end, a template can be found in the sustainable finance section of ICMA's website which once completed can be made available online for market information (see Resource Centre section below)." Issuers that do not comply with the provisions of this section 4 with respect to a bond should cease designating the bond as "green" for any purpose. A pre-issuance external reviewer that has rendered an opinion that an issuer's Green Bond or Green Bond programme and/ or Framework aligns with the four core components of the GBP should take reasonable steps to monitor the issuer's compliance with this section 4 and should withdraw its opinion if it becomes aware that the

issuer is not in compliance with this section 4. In this event, the external reviewer should take reasonable steps to notify the public of the withdrawal of its opinion.