

# The Forensic Carbon Accountant: green bond carbon footprint

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Figure 1. Image by juicy\_fish on Freepik.

Carbon emissions accounting is the calculation and reporting of greenhouse gas emissions from operations of investments. Transparent data is an essential input into influencing the climate crisis; after all, “what you don’t measure, you can’t manage”.<sup>1</sup>

We present the Forensic Carbon Accountant, investigating emissions disclosures, to support investors in aligning their portfolios to net zero.

Green bonds (debt securities where proceeds are reserved for environmental projects) have successfully raised over \$2.3trn for sustainable investment.<sup>2</sup> Emissions reporting for green bonds should support investors in understanding the climate impact of this significant product class.

In this note, we consider how emissions are allocated to green bonds, and whether the current approach incentivises the correct behaviour, maximising capital raised for climate-friendly investment.

**We conclude that the lack of a standardised emissions allocation framework for green bonds is a missed opportunity to quantify the benefits of those investments for investors, and so promote attractive funding spreads for issuers.**

- Investors are under increasing pressure to reduce their financed emissions. As carbon footprint becomes a scarce resource to be allocated, **we expect higher emission investments to require a higher hurdle rate of return.**
- A standardised approach, supported by issuer project emissions disclosure, would give investors confidence to report project-linked emissions for green bonds. **Green bonds, with lower emissions than vanilla debt can drive a ‘greenium’ for issuers and investors.**
- **Green bond emissions reporting must be consistent with total emissions reported by investors.** Lower emissions for green bonds must be balanced by higher emissions for vanilla debt. **This should deter greenwashing and encourage truly additive green bond financing, where emissions are reduced for all.**

<sup>1</sup> Generally attributed to Austrian-American management consultant Peter Drucker.

<sup>2</sup> “[Q1 2023 Market Update: Sustainable debt shows recovery](#)”, Climate Bonds Initiative, May 2023.

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# The Forensic Carbon Accountant

Carbon accounting is the calculation and reporting of greenhouse gas emissions. Financed carbon emissions is the carbon footprint of an investment portfolio. These figures were initially reported by corporates purely as environmental disclosure; however, they increasingly have financial impacts. For example, Sustainability-Linked Bonds often derive their coupons from issuer emissions, and so can be subject to risks around reporting and classifications.<sup>3</sup> Investors are also under increasing pressure to reduce their carbon footprint;<sup>4</sup> hence management and allocation of their fixed carbon budgets will become restricted.

The Forensic Carbon Accountant brings rigour and clarity to the murky world of carbon reporting. We shine a light on inconsistencies and try to ensure that the numbers work for all users, improving transparency and encouraging positive behaviours.

**Transparent and reliable emissions reporting is essential to understanding climate risk. As more users are directly financially impacted by the values, we expect greater scrutiny and improved standardisation.**

## Emissions reporting for investment portfolios

Emissions reporting standards have been developing since the 2015 Paris Accord, after which the Task Force on Climate Related Financial Disclosures (TCFD) was formed. TCFD has developed clear recommendations for voluntary disclosures for listed companies, which have been adopted as mandatory for UK companies and financial institutions from 2025.<sup>5</sup>

For investors, understanding and reporting financed emissions is how climate impact is managed; it is the metric being used to monitor progress towards net zero. Guidance is to disclose both absolute emissions and Weighted Average Carbon Intensity (WACI) for an investment portfolio. These should be calculated using the Global GHG Accounting and Reporting Standard for the Financial Industry developed by the Partnership for Carbon Accounting Financials (PCAF).<sup>6</sup> Further specific guidance suggests that for corporate bonds, emissions should be equally allocated across all liabilities.<sup>7</sup>

**Emissions reporting for investors is being adopted more widely, alongside net zero targets. We expect this to result in carbon footprint becoming a limited resource in portfolio investment decisions, thereby implicitly raising return hurdle rates for high-carbon assets.**

## Introduction to green bonds

The first green bond was issued in 2007 by the European Investment Bank and represented an innovation in raising sustainable debt.<sup>8</sup> The first corporate green bond was issued in 2013, and growth has been exponential since then. Cumulative issuance surpassed \$1trn in 2020.

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<sup>3</sup> For two identified 'carbon footprint arbitrages' please see "[Sembcorp: Carbon footprint arbitrage of a lifetime](#)", AFII, 6 Nov 2022 and "[Nobian SLB: a lot of hot air?](#)", AFII, 16 May 2023.

<sup>4</sup> "[Asset Owners with \\$8.5 Trillion Commit to Net Zero Emissions](#)", United Nations, 10 Mar 2021.

<sup>5</sup> "[UK to enshrine mandatory climate disclosures for largest companies in law](#)", UK Government, 20 Oct 2021.

<sup>6</sup> "[Guidance for Asset Managers](#)", TCFD, accessed 21 Jun 2023.

<sup>7</sup> For private companies they are allocated across total equity and debt, for public companies across EVIC. For full information please see "[Carbon Footprinting and Exposure Metrics](#)", TCFD, accessed 21 Jun 2016.

<sup>8</sup> "[Explaining Green Bonds](#)", Climate Bonds Initiative, accessed 19 Jun 2023.

Green bonds restrict the Use-of-Proceeds (UoP) of their funding to environmental investment and offer ongoing reporting of the assets financed using them. After the point of issuance however, the bonds are pari-passu to vanilla debt, with no preferential claim to green assets in the event of default.

There is much debate on the existence of a pricing ‘greenium’, a yield discount for green assets.<sup>9</sup> High demand from pools of dedicated capital could create a discount, even if this is hard to justify from a value point of view. There are theories that green bonds experience lower volatility, which could support a lower pricing spread, but this does not seem to have been categorically observed.<sup>10</sup> However, it continues to be observed and acknowledged.<sup>11</sup>

**It should be hard to justify buying green bonds at tighter spreads to traditional debt, given they have identical credit risk. Nevertheless, ‘greenium’ persists, and we present a theory on why it may be warranted.**

## Can direct emissions for green bonds be calculated?

The Green Bond Principles (GBP), published by International Capital Market Association (ICMA), an industry members association, detail best practice for green bond issuance.<sup>12</sup> Proceeds should be credited to a sub-account, and tracked as allocations are made to eligible projects. Ongoing reporting of financed projects is equivalent to a segregated asset portfolio.

Refinancing of existing assets is allowed, to recognise the extended financing requirement of infrastructure assets, but this can raise issues around additionality. Indeed, there are examples where existing borrowing has been refinanced into a green bond, when allocated against an eligible asset, benefitting from a ‘greenium’ discount with no additional investment into green projects.<sup>13</sup>

**When green bonds have their funds designated and reported versus identified assets, it should be possible to identify or estimate the specific emissions of those investments.**

## How is the carbon footprint of green bonds calculated in practice?

Green bond funds are segregated and allocated only to eligible green investments. It is reasonable to believe that assets funded by green bonds have a lower carbon intensity than the average across the full balance sheet of an issuer; for example, renewable energy projects funded by green bonds compared to the full balance sheet of an energy company. Depending on the investments, it should be possible to calculate the exact emissions of the renewable assets.

If green bonds are reported with a lower carbon footprint than a vanilla bond from the same issuer, then this could drive increased investor demand in an environment of limited financed emissions

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<sup>9</sup> [“Drivers of green bond issuance and new evidence on ‘greenium’](#), Löffler, K.U., Petreski, A. & Stephan, A, 19 Feb 2021.

<sup>10</sup> [“Squeeze on ‘greenium’ as ESG bond investors demand more value”](#), FT, 11 Oct 2021.

<sup>11</sup> A recent study seems to show a -3bp greenium in [“Green vs Social Bond Premium”](#), Amundi, 12 May 2023.

<sup>12</sup> [“Green Bond Principles \(GBP\)”](#), ICMA, accessed 21 Jun 2023.

<sup>13</sup> We note that Gecina, a French real estate company, reclassified 100% of their outstanding debt into green bonds, and claim to have benefited from a 10-15bp tightening in spreads, as reported in [“Accelerating the transition to sustainable finance via liability management”](#), Sustainabonds, 20 May 2022. This is covered in more details in the appendix.

budgets. This could rationally lead to reduced yields for green bonds, in response to investor restrictions around financed carbon footprints.

**In a world of limited emissions budgets for investors, green bonds with reduced footprints could have lower hurdle rates-of-return for investors, and so could reasonably incur reduced funding spreads.**

Official guidance on this point however is limited. PCAF issued a consultation in late 2021 covering this issue.<sup>14</sup> This consultation proposes allocating emissions to green bonds based on financed projects, and specifically that project emissions could be calculated using estimated factor multipliers for different categories of assets if needed.

We note the second version of PCAF’s guidance, published in 2022, included updates on the other two topics of the 2021 consultation, notably sovereign debt and emissions removals, but no detail on green bonds.<sup>15</sup>

Looking at ETF reporting, it would appear that no discount is given for green bonds. Table 1 shows WACI for some example green bond ETFs, compared to similar vanilla bond ETFs. In Europe, the two funds have similar WACI. In the US, the green bond fund has a materially higher WACI than vanilla bond ETFs. We note high allocations to traditionally high emission sectors such as Utility (16.84%) and Industrial (13.24%), and the top issuer allocations are the European Investment Bank (6.23%) and the Public Investment Fund of Saudi Arabia (3.97%), the largest two recent green bond issuers.<sup>16</sup> Such high carbon issuers may contribute to the fund’s high WACI, and certainly suggest that no discounted carbon footprint is being recorded for green bonds.

*Table 1. Example bond ETF Weighted Average Carbon Intensity. Source: iShares, accessed 21 Jun 2023.*

Bloomberg Ticker	Name	WACI (Tons CO2E/\$M Sales)	Average Yield to Maturity	Weighted Average Maturity
GRON	iShares EUR Green Bond UCITS ETF	154.14	3.81%	8.49
IEAC	iShares Core EUR Corp Bonds UCITS ETF	122.44	4.40%	5.08
BGRN	iShares USD Green Bond ETF	694.91	5.21%	5.5
LQDE	iShares USD Corp Bond UCITS ETF	145.51	5.35%	13.25
BUH1TRUU	iShares Core 1-5 Year USD Bond ETF	220.75	5.24%	2.66

Discussions with market participants confirm there is no clear guidance.

Some confirm no adjustment is made compared to a vanilla bond. This represents a lost opportunity to incentivise green bond investments, and potentially justify ‘greenium’ discounts.

Some suggest green bond emissions are reported at a flat discount to the equivalent vanilla debt, using a discount being applied of up to 100% (i.e. green bonds have zero emissions). It also seems that the level of discount can vary by client, which means that the same investment portfolio is being reported with inconsistent emissions by different asset owners.

<sup>14</sup> “[New methods for public consultation](#)”, PCAF, Nov 2021.

<sup>15</sup> “[PCAF launches the 2<sup>nd</sup> version of the Global GHG Accounting and Reporting Standard for the Financial Industry](#)”, PCAF, 14 Dec 2022.

<sup>16</sup> Public Investment Fund as an issuer of green bonds is covered in more details in “[PIF: big on Aramco, big on green bonds](#)”, AFII, 18 Apr 2023. PIF is also covered in an appendix at the end of this document.

A lack of standardisation prevents transparency. Identical holdings should not be reported with different emissions. It is hard to interpret reported emissions without an understanding of the approach used.

Allocating emissions uniformly across a debt structure which includes green bonds may fail to accurately attribute ownership of most polluting assets. Not allowing green bonds to benefit from their potential reduced footprint may fail to give investors a key benefit, and so impact both pricing levels and the growth of sustainable finance.

### Is carbon reporting complete when green bonds do receive a discount?

If green bonds emissions are calculated purely from the directly financed lower emissions assets, vanilla bonds will need their emission calculated only on remaining assets for the total to be correct. This point is also highlighted in the PCAF 2021 consultation document,<sup>14</sup> suggesting that demarcating green assets from remaining may be infeasible due to complexities and, therefore, lead to under-allocation of emissions.

This demarcation of assets could lead to some other important controls for additionality of green bond financing. Consider the example of a green bond issued to finance new low-emission investments. The vanilla bond holders’ assets and financing is unchanged and therefore so are their emissions. The green bond holders’ emissions will depend only on the new investments. Now consider a refinancing of existing eligible assets funded by vanilla debt, into a green bond. There are no emissions changes at the company level. The legacy vanilla debt has effectively been subordinated in terms of emissions. The green bonds now take their emissions from the eligible assets, whereas the legacy vanilla debt is funding the residual non-eligible assets, and so will have a commensurate increase in emissions.

If restricted carbon budgets for investors lead to a higher cost-of-capital for high emissions investments then, in the second situation, any ‘greenium’ benefit given to the new green bond should be offset by increased cost-of-capital required for the legacy vanilla debt.<sup>17</sup>

In our discussions with market participants, in situations where a discount was applied, no adjustment was applied to vanilla debt, suggesting an under-allocation was accepted.

We have estimated the potential size of emissions in question, based on the growing green bond market. We have estimated the emissions at the issuer level of all green bond issuers, and apportioned those emissions equally across all debt, to calculate the

Table 2. Estimated emissions of outstanding green bonds, when linear with vanilla debt. Source: Bloomberg, AFII, accessed 1 Jun 2023.

Country	Total green debt outstanding (\$bn)	Emissions (kt)
Germany	239	60,222
China	231	486,170
France	215	22,004
Supranational	163	34,407
United States	155	40,511
Netherlands	96	1,297
Italy	87	8,298
Spain	84	7,294
United Kingdom	78	7,332
Sweden	65	9,639
Rest of World	580	181,184
TOTAL	1,993	858,356

<sup>17</sup> One could imagine a situation where vanilla debt holders include covenants to prevent emissions subordination via green bond issuance.

numbers in Table 2.<sup>18</sup> The total estimated emissions attributable on a flat basis to green bond investors is 858Mt. If a 50% discount is applied to these emissions but not apportioned back onto vanilla debt, the missed emissions could be 429Mt.

**We are supportive of the carbon footprint of green bonds containing only assets which are financed. Applying a discount however can create ‘lost emissions’, without equivalent asset segregation for vanilla debt. Given the significant size of the green bond market, this ‘gap’ could be large.**

**Classifying emissions onto green and vanilla debt based on assets should lead to correct incentives to use green financing to improve the overall climate footprint.**

## Conclusions

Green bond reporting requires identification of specific eligible financed assets. It should therefore be possible to calculate green bond carbon footprints, thus offering an additional reporting benefit to green bond investors. **As carbon footprint of investment portfolios becomes a limiting factor, this should drive enhanced ‘greenium’ for green bonds.**

Lack of guidance prevents a discount being consistently applied. No discount prevents a reduced carbon footprint being enjoyed by green bond investors and may fail to encourage investment. **This effect will be amplified as investor pressure around carbon budgets intensifies.**

There should be an advantage to issuers to provide demarcated emissions, making it easier for investors to confidently reduce their financed emissions through green bond investing, and potentially enjoy more persistent ‘greenium’ on financing costs.

**This must be combined with correct emissions allocations for vanilla debt. The current approach has a risk of ‘lost emissions’, which may prevent issuer level climate improvements.** There are specific concerns if an issuer has only issued green bonds, or conducts grey to green bond refinancing, which are detailed in the Appendices.

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<sup>18</sup> Emissions data is from Bloomberg. For government issuers, emissions are applied across total debt. For corporate issuers, emissions are applied across total assets. Where data is missing, it is estimated using the FIONA framework, as used in “[Decarbonising iShares’ JPM EMB ETF](#)”, AFII, 11 May 2023. Where an issuer is missing from FIONA universe, sovereign data for the respective jurisdiction is used.

## Appendix – Public Investment Fund

Public Investment Fund (PIF) is the sovereign wealth fund of Saudi Arabia, with total estimated assets of \$650bn.<sup>19</sup> With a target size of \$1trn assets under management, Saudi Arabia's government has twice transferred 4% of Saudi Aramco shares to the investment arm of PIF.<sup>20</sup>

On the liability side, PIF (ticker PIFKSA) has issued \$8.5bn of green bonds, in two three-tranche deals. Given the current very strong finances of PIF, it is questionable why they would fund from the bond market and the choice to focus on green issuance may be a marketing exercise.<sup>21</sup> This size of issuance, however, makes them a very significant player in the green bond market - the second largest issuer in the first half of this year.<sup>16</sup>

This example does allow us to think through financed emissions for bondholders in an entity that is sizeable, not listed, and has only green debt. As the only investors, it does not seem appropriate for green bondholders to bear only the emissions on allocated projects; they should carry the full emissions of the entity. Given the size of the investment fund, and the nature of those investments, we expect these emissions to be significant. Such a process would make emissions reporting required for bond issuers and discourage marketing exercises that suggest the bond market is funding only the environmentally positive assets.

## Appendix – Gecina

Gecina (ticker GFCFP), a French real estate group, has €5.7bn bonds outstanding, split across eleven issues. In 2021 they sought permission from bondholders to reclassify 100% of outstanding bonds (then €5.6bn) into green bonds.<sup>22</sup> This was achieved by allocating an amount equal to the total proceeds of the notes, to refinancing of existing eligible assets.<sup>23</sup> All subsequent issuance (one bond in Jan 2022) has been green.

This is an interesting case to consider when thinking about the emissions footprint of green bonds. In this situation there are no traditional bonds and, by construction, zero additionality to the legacy green bond investments (they were reclassified post issuance, so the shift to green bonds will not have changed the total emissions of the issuer).

It may be that by reclassifying to green bonds and allocating only emissions of eligible projects, instrument emissions will be lower, but this will result in higher emissions being allocated to the equity investors. This would not be possible with a vanilla bond, as those (existing) green projects could not have been assigned to debt investors.

As reported, it was expected that bondholders would vote for the reclassification, as they would benefit from any 'greenium'.<sup>23,13</sup> Specific allocated lower emissions could be another reason, and a justification of any tightening, which would be supportive of the green bond market. This also champions the debt market, as offering sustainable products to investors.

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<sup>19</sup> [“Public Investment Fund of Saudi Arabia”](#), SWFI, accessed 26 Jun 2023.

<sup>20</sup> [“Saudi Arabia boosts sovereign wealth fund with transfer of \\$80bn Aramco stake”](#), FT, 16 Apr 2023.

<sup>21</sup> [“No green ePIFany”](#), AFII, 29 Sep 2022.

<sup>22</sup> [“100% of Gecina's bond issues now transformed into Green Bonds”](#), Gecina, 25 May 2021.

<sup>23</sup> [“Some Companies Are Now ‘Requalifying’ Their Old Bonds as Green”](#), Bloomberg, 18 Mar 2022.

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