

THE CURRENT STATE OF ACCOUNTING FOR COMPANIES' AND SOVEREIGNS' GREENHOUSE GAS EMISSIONS



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INTRODUCTION



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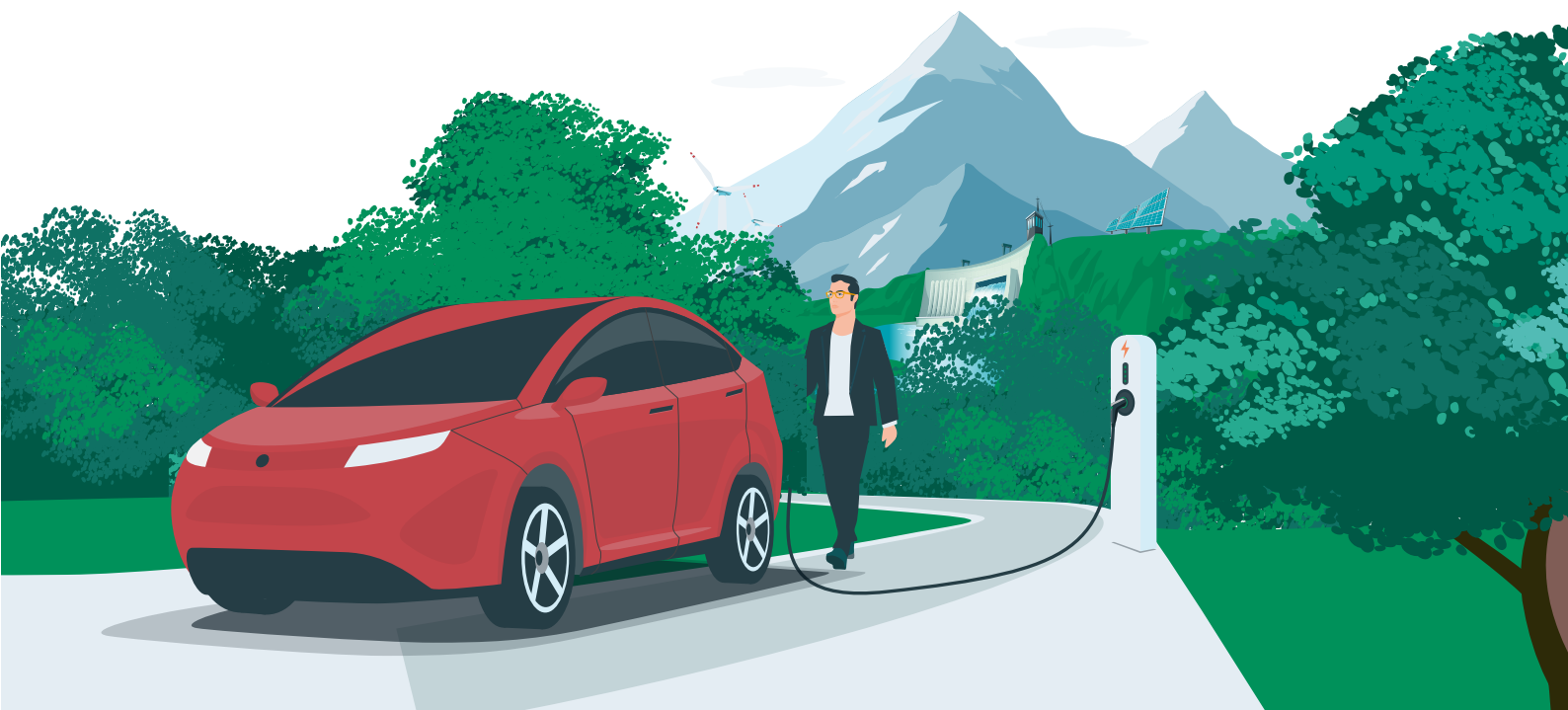
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Concerns about climate change have increased in recent years. In response, industry standards have been developed for reporting and accounting carbon emissions. This progress has facilitated the setting of science-based emissions reduction targets, the identification of climate-related risks and opportunities, as well as increasing the transparency of greenhouse gas (GHG) disclosures.

Investors and insurers need to gauge the quality of such disclosures by corporate and sovereign issuers of equities and bonds. However, the picture often remains cloudy because of differences in the details of – and the methods that underpin – GHG emissions reporting and accounting standards across industries and regions.

As a leading participant in the organisations addressing the development of GHG disclosure standards that help investors in their decision-making, BNP Paribas Asset Management has produced this update on progress to date.

We hope you find it useful in understanding recent and impending developments in this critical field.



An update on the current efforts towards clearer, more standardised and more accurate accounting of companies' and sovereigns' greenhouse gas emissions

EXECUTIVE SUMMARY

The carbon footprint of investment portfolios has become a central metric in tracking net zero ambitions of portfolios – particularly in the assessment of green bonds. Increasingly stringent regulations, such as fund labelling requirements like Towards Sustainability, move towards prohibiting the use of 'zero emissions' as a default footprint for green bonds. However, using an issuer-level carbon footprint to evaluate these bonds can render them ineffective as a sustainable investment tool, especially for firms in high-emission sectors like utilities that issue green bonds to fund their decarbonisation efforts.

In practice, issuers most commonly report the avoided emissions of their green bonds and rarely disclose the absolute carbon footprint of projects funded by green bonds. As a result, investors frequently rely on issuer-level data or basic estimation methods, which can lead to inconsistent or even misleading assessments of a bond's climate impact. This underscores the need for a standardised and robust methodology to estimate the carbon footprint of green bonds.

A more reliable framework would provide multiple benefits. For investors, it would enhance confidence and accuracy in tracking progress toward decarbonisation and net-zero goals. For issuers, such a methodology would facilitate alignment with increasingly rigorous sustainability disclosure standards, such as those under the EU's Sustainable Finance Disclosure Regulation (SFDR), which includes metrics related to carbon intensity and greenhouse gas emissions.

Overall, the development of a transparent, consistent methodology for assessing the carbon footprint of green bonds would improve comparability across investments and enhance both issuer-level and security-level ESG analysis. Although a market standard has yet to be established, the Partnership for Carbon Accounting Financials (PCAF) has initiated efforts to fill this gap by seeking industry input on a proposed methodology. The consultation has now been completed, and the results are being reviewed.

Through case studies, we demonstrate the varying implications of different carbon accounting approaches, emphasising that using absolute emissions provides more transparency and comparability than relying on avoided emissions. We advocate for issuers to report project-level carbon footprints using recognised standards and suggest that the most effective route to industry-wide adoption would be through updates to the International Capital Market Association (ICMA) Green Bond Principles - specifically, the elevation of absolute annual project emissions to a core metric in the [Green Bond Harmonized Framework for Impact Reporting](#).

1. INTRODUCTION TO GREENHOUSE GAS (GHG) ACCOUNTING

GHG emissions are usually divided into three separate groups called Scope 1, 2 and 3 emissions.

- **Scope 1** (Direct GHG emissions): These emissions come from sources that the issuers directly own or control
- **Scope 2** (Indirect GHG emissions from purchased electricity): This scope covers emissions resulting from the generation of purchased electricity that the company consumes
- **Scope 3** (Other indirect GHG emissions): Scope 3 allows for the reporting of other indirect emissions. These are emissions resulting from the company's activities but occurring from sources not owned or controlled by the company, such as emissions from the production of purchased materials or transportation of fuels.

Furthermore, there are so-called '*Scope 4 emissions*', also referred to as *avoided emissions*. These types of emissions represent the reduction in GHG emissions achieved by a particular project or action compared to a conventional or higher-emission alternative. Unlike Scopes 1, 2, and 3 emissions, which measure direct and indirect emissions produced by an organisation, Scope 4 focuses on the emissions that are prevented by implementing lower-carbon solutions, such as renewable energy projects or energy efficiency improvements.

Scope 4 emissions are often highlighted in impact reporting, especially in sustainable finance, to demonstrate the carbon savings generated by choosing greener alternatives over traditional, more polluting options.

Emissions are measured in units called 'carbon dioxide equivalents' (CO₂e), a standard metric for measuring all GHG emissions collectively. These units can be used to calculate an organisation's weighted average carbon intensity (WACI) and carbon footprint. For investors, the WACI and the absolute emissions disclosure are important metrics to understand in terms of reports on financed emissions, how climate impact is managed and monitoring progress towards Net Zero within investment portfolios.

Table 1: Emission levels definitions and calculation methodologies

Weighted average carbon intensity (tCO₂/ USD million sales)	Carbon intensity calculations involve taking a company's total Scope 1 and Scope 2 emissions and normalising them by its revenue (in US dollars). This unaltered data is then weighted to determine an investor's share.
Carbon footprint (tCO₂/ USD million enterprise value including cash (EVIC))	When calculating a company's carbon footprint, its total Scope 1 and Scope 2 emissions are normalised by the company's market capitalisation plus the book value of its debt (also known as enterprise value including cash, or EVIC) in US dollars. An investor's holdings of an issuer's debt are used to re-weight it and determine its share of emissions.

2. DIFFERENT CARBON METRICS

There are different standards that offer methodologies on how to measure an organisation's emissions. The most-used standards are outlined below, offering a brief description of the key components that need to be considered for calculating an organisation's emissions under each standard.

2.1 GHG PROTOCOL AND CORPORATE ACCOUNTING STANDARD¹ AND SCOPE 3 STANDARD²

The Corporate Accounting Standard outlines a structured framework for organisations to inventory and report their greenhouse gas (GHG) emissions. This standard includes six key GHGs covered under the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

When reporting according to the Corporate Accounting Standard, companies are required to disclose both Scope 1 and Scope 2 emissions, while Scope 3 reporting is optional. However, when organisations adhere to both the GHG Protocol and the Scope 3 Standard, they must report emissions across all three scopes (Scopes 1, 2 and 3).

The process of establishing a company's GHG emissions inventory involves two key steps: defining organisational boundaries and operational boundaries.

1 A Corporate Accounting and Reporting Standard The Greenhouse Gas Protocol. (1500). Available at: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

2 GHG Protocol (2011). Corporate Value Chain (Scope 3) Accounting and Reporting Standard Supplement to the GHG Protocol Corporate Accounting and Reporting Standard. Available at: https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf

Organisational boundaries specify which parts of the company's operations are included in the emissions inventory. There are three approaches available for determining these boundaries, and it is important to apply a consistent approach across all emissions categories to ensure proper classification of direct and indirect emissions:

- **Equity share approach:** Under this approach, a company accounts for GHG emissions based on its share of equity in a given operation. The equity share corresponds to the company's economic interest, which represents its exposure to the risks and benefits of the operation.
- **Financial control approach:** With this method, the company accounts for 100% of the GHG emissions from operations over which it has financial control, excluding emissions from operations where the company holds an interest but lacks financial control.
- **Operational control approach:** In this approach, the company reports 100% of the emissions from operations where it exercises operational control, excluding emissions from operations where it holds a stake but lacks operational authority.

Operational boundaries define which direct and indirect emissions are to be included, based on the organisational boundary set by the company. Next, the company selects an operational boundary and applies it consistently to categorise and account for emissions. Both boundaries collectively form a company's emissions inventory boundary.

Companies classify emissions as direct or indirect based on the consolidation approach chosen (equity share, financial control or operational control). The operational boundary further categorises emissions into three distinct scopes:

- **Scope 1 (Direct GHG emissions):** These emissions come from sources that the company directly owns or controls. For example, emissions from chemical production processes in equipment owned or controlled by the company fall under Scope 1
- **Scope 2 (Indirect GHG emissions from purchased electricity):** This scope covers emissions resulting from the generation of purchased electricity that the company consumes. Purchased electricity is any electricity imported into the organisational boundary of the company
- **Scope 3 (Other indirect GHG emissions):** Scope 3 allows for the optional reporting of other indirect emissions. These are emissions resulting from the company's activities but occurring from sources not owned or controlled by the company, such as emissions from the production of purchased materials or transportation of fuels.

Together, these three scopes provide a comprehensive framework for corporations to manage, account for, and reduce their direct and indirect GHG emissions effectively.

The Scope 3 Standard serves as a supplement to the above-mentioned GHG Protocol Corporate Accounting and Reporting Standard and should be used alongside it. The framework covers the same six GHGs as the Corporate Standard and is designed to help companies comprehensively track and report all indirect emissions that occur along their value chain.

Scope 3 emissions are significant as they often represent the largest portion of a company's carbon footprint and include upstream and downstream activities. *Upstream emissions* are those related to goods and services that a company purchases or acquires, including raw materials, transportation and manufacturing processes. *Downstream emissions* are those linked to products sold by the company, including emissions from product use by customers, transportation and end-of-life disposal. The Scope 3 Standard classifies Scope 3 emissions in 15 individual categories, as outlined below in Table 2. These categories are mutually exclusive, which ensures that there is no double counting.



Table 2. Scope 3 classifications and categories

Upstream or downstream	Scope 3 category
Upstream Scope 3 emissions	• Purchased goods and services • Capital goods • Fuel and energy-related activities (not included in Scope 1 or Scope 2) • Upstream transportation and distribution • Waste generated in operations • Business travel • Employee commuting • Upstream leased assets
Downstream Scope 3 emissions	• Downstream transportation and distribution • Processing of sold products • Use of sold products • End-of-life treatment of sold products • Downstream leased assets • Franchises • Investments

The Scope 3 Standard focuses on giving companies the flexibility to determine which Scope 3 emissions to report, though it recommends that companies consistently apply their chosen organisational boundary approach across all scopes – whether equity share, financial control or operational control.

Overall, by providing companies with the tools to assess the full range of emissions that occur throughout the value chain, the Scope 3 Standard enables companies to be better equipped to set meaningful reduction targets, influence suppliers and customers, and develop strategies to support global GHG reduction efforts. Hence, although Scope 3 emissions can be difficult to quantify and manage, addressing them is crucial for companies committed to sustainability.



2.2 GHG PROTOCOL FOR PROJECT ACCOUNTING/AVOIDED EMISSIONS³

For the quantification and reporting of greenhouse gas reductions – i.e., the reduction of greenhouse gas emissions or the increase of GHG removals and/or storage – from climate change mitigation programmes (GHG projects), the GHG Protocol for project accounting offers specific conceptual and methodological principles and techniques. The standard focuses on quantifying avoided emissions.

The project protocol can be used by any organisation seeking to measure GHG reductions resulting from projects. However, it is not intended as a mechanism for quantifying GHG reductions at the corporate or entity level (the corporate accounting standard is to be used for this purpose). The following key steps are involved in project accounting:

- Defining the GHG assessment boundary
- Selecting a baseline procedure
- Identifying baseline candidates
- Estimating baseline emissions (two approaches available: Project-specific procedure and performance standard procedure)
- Monitoring and quantifying GHG reductions
- Reporting GHG reductions.

The *GHG assessment boundary* encompasses GHG effects irrespective of where they arise and who controls the associated GHG sources or sinks. To establish the GHG assessment boundary in accordance with the standard, the boundary must incorporate all primary and significant secondary effects associated with the GHG project.

A *primary effect* refers to a change compared to the baseline, describing the intentional change resulting from a project activity in terms of GHG emissions, removal or sequestration connected to a GHG source or sink. In contrast, a *secondary effect* is an unintentional change caused by a project activity related to GHG emissions, removal or storage in connection with a GHG source or sink. Secondary effects are usually minimal in comparison to the primary effect of a project activity.

The Project Protocol outlines two different methods to estimate baseline procedures and the associated baseline emissions. The first available method is the *project-specific procedure*. This approach generates an estimate of baseline emissions by establishing a base case that is specific to the planned project activity. The base case is defined through a methodical examination of the project activity and its potential outcomes. Only the defined project activity is eligible for the baseline emissions obtained from the base case.

The second method proposed by the Project Standard is called the *performance standard procedure*. Using a GHG emission rate obtained from a numeric assessment of GHG emission levels of all baseline candidates, this process generates an estimate of baseline emissions. Because it can be used to calculate baseline emissions for numerous project activities of the same kind, the performance standard is also referred to as a multi-project baseline or benchmark. Although it eliminates the need to establish a baseline scenario for each project activity, it serves the same purpose as a baseline scenario.

Both the project-specific and the performance-based basic procedures depend on the selection of baseline candidates. Baseline candidates are alternative technologies or processes within a given geographic area and period that can deliver the same product or service as the project activity. They may include existing and emerging technologies and processes.

3 The Greenhouse Gas Protocol. The GHG Protocol for Project Accounting. (2000). Available at: https://ghgprotocol.org/sites/default/files/standards/ghg_project_accounting.pdf.

2.3 PCAF STANDARD FOR FINANCED EMISSIONS⁴

So-called 'financed emissions' are an important indicator for financial institutions that want to understand and manage climate-related risks and opportunities. Financed emissions are defined as the absolute emissions that financial institutions fund through their loans and investments. They are measured as the amount of greenhouse gases generated, avoided, or removed by an institution.

The Financed Emissions Standard by PCAF⁵ allows financial institutions to report their share of corporate clients' emissions based on each client's enterprise value (or an equivalent value for non-commercial actors). Financial institutions are exposed to credit risk through on-balance sheet exposures, which include loans and investments, that are often carried on the balance sheet for a significant period (typically years). Financiers must select initiatives that reduce absolute emissions to achieve the goals of the Paris Agreement. The following defines the project asset finance class and describes how to calculate the respective absolute or avoided emissions as outlined in the PCAF standard.

2.3.1 PROJECT FINANCE

The project finance asset class comprises any on-balance sheet loans or stakes in projects or activities designed for particular purposes, i.e., with a specified use of proceeds as per the GHG Protocol definition. Specifically, these projects rely primarily on the project's cash flow for repayment. When calculating the emissions, only the (demarcated) activities are considered. This means that emissions and financial data associated with existing operations outside of the funded project but in the funded organisation are not considered.

The standard for project finance includes the absolute emissions of the project (Scopes 1 and 2). Where relevant, Scope 3 emissions should also be considered. Examples of projects where Scope 3 emissions would be relevant are nuclear power plants, hydroelectric power plants, infrastructure projects (airports, highways) and oil & gas exploration. Avoided emissions may be disclosed if relevant, however they must be presented separately from the absolute emissions.

The first step is to allocate the emissions. To do this, the financial institution accounts for a portion of the annual emissions of the financed project as a basic allocation principle. This ratio is defined by the attribution factor, which represents the proportion of the outstanding amount of the institution (numerator) to the total equity and debt of the financed assets (denominator).

In general, the attribution factor calculation is only viable for project finance transactions where project-specific financial data is accessible. For project finance transactions where such data is not accessible, the attribution factor cannot be determined, but it is still possible to make broad estimates of attribution based on regional and sector-specific average financial data and the amount outstanding. The following formula is used for calculating the attribution factor:

$$\text{attribution factor}_p = \frac{\text{Outstanding investment}_p}{\text{Total equity} + \text{debt}_p}$$

(where p = project)

4 Financed Emissions The Global GHG Accounting & Reporting Standard Part A. (2nd Version, December 2022). PCAF. Available at: [The Global GHG Accounting and Reporting Standard for the Financial Industry \(carbonaccountingfinancials.com\)](https://www.carbonaccountingfinancials.com/)

5 PCAF is an industry-led initiative created to enable financial institutions to assess and disclose the GHG emissions associated with their financial activities by establishing suitable standards, methodologies and approaches.

Once the attribution factor is determined, one can calculate the absolute or financed emissions.

To calculate the **financed or absolute emissions** of a single project, the attribution factor is multiplied by the emissions of the relevant project. The equation below is used to calculate the cumulative funded emissions of several projects:

$$\text{Financed emissions} = \sum_p \text{Attribution factor}_p \times \text{Project emissions}_p$$

(where p = project)

For this asset class, the sum reflects all projects of a financial institution's portfolio, while the attribution factor reflects the portion attributable to a specific project – i.e., the proportion of the amount outstanding relative to total equity and debt:

$$\text{Financed emissions} = \sum_p \frac{\text{Outstanding investment}_p}{\text{Total equity} + \text{debt}_p} \times \text{Project emissions}_p$$

Depending on the availability of project-specific data, three distinct options for computing project emissions are available – reported emissions, physical-based emissions and economic activity-based emissions. The best data quality is found in reported project-specific emissions, followed by physical activity-based data and project-specific physical data.

To calculate **avoided emissions**, the GHG Protocol for Project Finance is used. The difference between calculating avoided emissions and calculating absolute emissions should not be overlooked. In the context of renewable energy projects, avoided emissions are the difference between the emissions from the financed project and the baseline emissions (the emissions that would have been released in the absence of the project). It is difficult to calculate the annual emissions avoided by a financial institution's portfolio of renewable energy projects at a specific point in time and in line with the financial reporting cycle.

For the calculation, it is necessary to compare the energy mix for each country over the same period with the (estimated) annual energy production of these projects during the reporting period. In this comparison, it is assumed that the need to operate certain fossil fuel facilities may have been avoided if renewable power had been produced during the reporting period. As described in the following table 3, there are four options for calculating the electricity mix and the corresponding grid emission factors.

Table 3: Options for calculations the energy/electricity mix

Preferred options	Type of mix	Description of emission factors
1	Operating margin	The operating margin represents the marginal generating capacity in the existing dispatch hierarchy in a country/region that will most likely be displaced (i.e., the generation from the power plants with the highest variable operating costs in the economic merit order dispatch of the electricity system)
2	Fossil fuel mix traded	Emission factors based on the emissions of all fossil fuel power (including or excluding nuclear) traded (i.e., produced and imported minus exported) in a country or region
3	Fossil fuel mix produced	Emission factors based on the emissions of all fossil fuel power (including or excluding nuclear) produced in a country or region
4	Average electricity mix	Emission factors based on emissions of all power (fossil and non-fossil) produced in a country or region

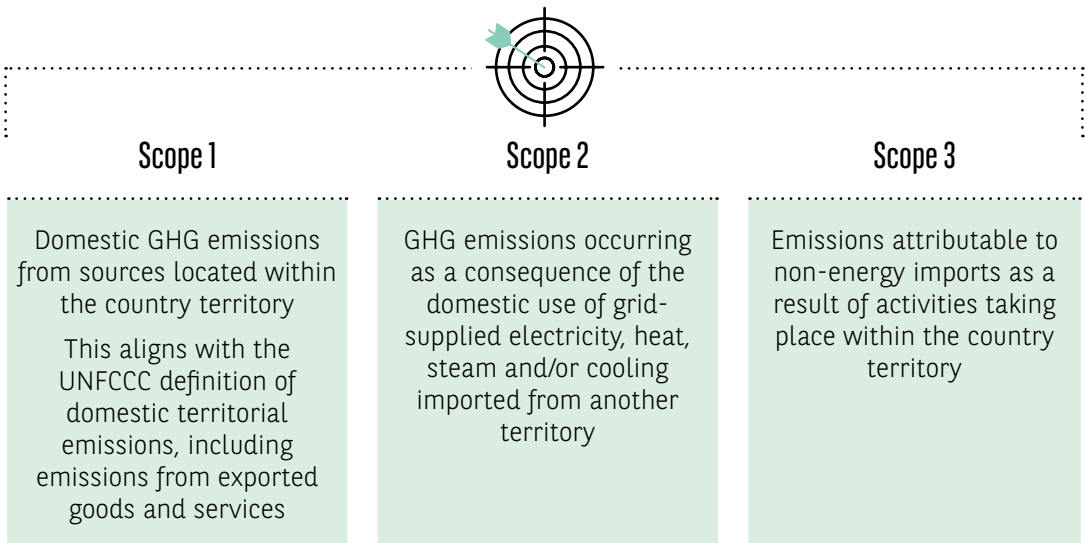
These emission factors can be calculated using data from a variety of publicly accessible national and international data sources (e.g., the European Environment Agency or the International Energy Agency). PCAF advises accounting for avoided emissions from renewable energy portfolios during the reporting period using the operating margin emission factor. Should the operating margin not be accessible, financial institutions may instead use the mix of fossil fuels traded or produced, or the average electricity mix (only if no other indicators are available).

2.3.2 SOVEREIGN DEBT⁶

The sovereign-financed emission standard by PCAF includes government bonds and loans of all maturities denominated in domestic and foreign currencies. Expanding the methodology to sub-state and municipal entities remains challenging given the scarcity of available data and the lack of direct international greenhouse gas accounting standards for these entities.

The sovereign emissions covered under the PCAF Standard are absolute Scope 1, 2 and 3 emissions, which are defined by PCAF as follows⁷ in Table 4:

Table 4 : The sovereign emissions covered under the PCAF Standard



Given that the GHG Protocol definitions for Scope 1, 2 and 3 emissions were originally designed for corporate emissions classification and only the Global Protocol for Community-Level Greenhouse Gas Inventories is available alongside the Corporate Standard, the above table is PCAF's attempt to align these two approaches for sovereign debt.

A further key concept within the Sovereign Standard is the distinction between production and consumption emissions. PCAF advises that both production and consumption intensity figures be used when assessing, ranking and engaging with sovereign countries, as this provides a more holistic view, see Table 5.

6 For more on BNPP AM's sovereign and corporate carbon footprint methodologies, see www.bnpparibas-am.com/en/measuring-carbon-footprints/
7 Facilitated Emissions The Global GHG Accounting and Reporting Standard Part B. (1st Version, 2023). PCAF. Available at: [The Global GHG Accounting and Reporting Standard for the Financial Industry \(carbonaccountingfinancials.com\)](http://carbonaccountingfinancials.com), p.11

Table 5: Definitions of Production and Consumption emissions

 Production emissions Include emissions occurring in the country as well as emissions from domestic consumption and exports	 Consumption emissions Mirror the demand dimension of government emissions, taking into account patterns of consumption and trade effects
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To calculate sovereign emissions, the attribution factor must first be considered. PCAF outlines the formula below for calculating the attribution factor, which allocates emissions for sovereign debt.

$$\text{Attributed Emissions} = \frac{\text{Exposure to Sovereign Bond (USD)}}{\text{PPP - adjusted GDP (international USD)}} \times \text{Sovereign Emissions (tCO}_2\text{)}$$

To link the national debt to the real economy, the methodology uses the purchasing power parity (PPP) - adjusted GDP (i.e. the value of a nation's output as a measure of the nation's 'worth') normalised by the PPP factor to enhance the comparability of actual economic sizes and the allocation of emissions to the GDP of the state:

$$\text{Attributed Emissions} = \frac{\text{Exposure to Sovereign Bond (USD)}}{\text{PPP - adjusted GDP (international USD)}} \times \text{Scope 1 Emissions (tCO}_2\text{e)}$$

Once the attribution factor is calculated, it can be used to derive the equations for calculating the funded issuance.

$$\begin{aligned} \text{Financed emissions} &= \sum_s \text{Attribution Factor}_s \times \text{Sovereign emissions}_s \\ \text{Financed emissions} &= \sum_s \frac{\text{Outstanding amount}_s}{\text{PPP - adjusted GDP}_s} \times \text{Sovereign Emissions}_s \end{aligned}$$

(where s = sovereign borrower)

2.4 PCAF STANDARD FOR FACILITATED EMISSIONS⁸

There are two main differences between facilitated and financed emissions. Firstly, facilitated emissions are usually not recorded on a financial institution's balance sheet. Secondly, the financial institution's involvement in the transaction is usually only temporary and no credit risk is held. Due to these differences, there is a conceptual difference in the way emissions are treated.

Within the scope of the Facilitated Emissions Standard are new public debt, public equity and facilitated debt investments in private enterprises, facilitated equity investments in private companies, and syndicated loans. Sovereign bonds, covered bonds, securitised instruments, derivative financial products and advisory services are not included in the Standard's scope.

⁸ Facilitated Emissions The Global GHG Accounting and Reporting Standard Part B. (1st Version, 2023). PCAF. Available at: [The Global GHG Accounting and Reporting Standard for the Financial Industry \(carbonaccountingfinancials.com\)](https://www.carbonaccountingfinancials.com)

Furthermore, the current approach solely targets lead bookrunners. Lastly, since there is currently no PCAF method to determine the emissions related to green bonds and other known use-of-proceeds bonds, the Facilitated Emissions Standard does not include green bonds, either. However, PCAF is giving top priority to the creation of a methodology that covers green bonds.

The calculation process starts with the attribution of emissions. In this step, three main elements need to be considered:

- (i) Annual emissions: covering the period in which the facilitation service is recorded
- (ii) Allocation factor (facilitated amount/enterprise value): This takes into account how the emissions are allocated to the various facilitators of an issuance
- (iii) Weighting factor: Considers the liability of a facilitator for the estimated emissions of the issuer.

The Facilitated Emissions Standard carefully incorporates the above elements and derives the formula below for calculating facilitated emissions from the primary issuance of capital market instruments.

$$\text{Facilitated emissions} = \sum_s \frac{\text{Facilitated amount}_c}{\text{Company value}} \times \text{Weighting factor} \times \text{Annual emissions}_c$$

Facilitated amount = (Total raised amount x League table credit)

(where c = the issuing company)

Facilitated amount: The volume attributable to the financial institution (or league table credit⁹) multiplied by the total amount raised.

Company value: The enterprise value including cash (EVIC) of each customer is the company value for all listed firms. When there is no market value for equity, EVIC should only be replaced for private enterprises by the total of the company's debt and equity.

3. GREEN BOND EMISSIONS ACCOUNTING METHODS

To prove the additionality of green bonds, investors need to assess and report on their underlying carbon footprint. However, to date, market standards for carbon reporting are focused on the issuer level rather than the security level. In exploring the development of a market standard at the security level instead of the issuer level, market practitioners generally rely on the following five methods to calculate a green bond's carbon footprint.

3.1 ISSUER'S CARBON FOOTPRINT

In this approach, green bonds are given the same carbon footprint as the issuer's conventional bonds. While this approach is cautious, it fails to capture the carbon benefit of the green bond when it funds projects with lower carbon intensity than the broader economic activities of the issuer. Green bonds are often used by issuers to support their low-carbon transition, and the projects financed may therefore have a significantly lower carbon profile than those financed by a conventional bond.

3.2 ZERO EMISSIONS/ BLANKET PROPORTIONAL REDUCTION IN EMISSIONS

Without robust emissions data for projects funded by green bonds, a straightforward way to calculate the carbon benefit of a green bond is to attribute a zero-carbon footprint by default or to apply an emissions profile that is reduced by a blanket percentage (e.g., 50%) compared to the issuer's carbon footprint.

⁹ EVIC is defined as the sum of the market capitalisation of ordinary shares at fiscal year-end, the market capitalisation of preferred shares at fiscal year-end, and the book values of total debt and minorities' interests. No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values. PCAF chose to align the definition of EVIC with the common definition provided by both: 1. EU TEG in its Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks' ESG Disclosure; and 2. Commission Delegated Regulation (EU) 2020/1818 of 17 July 2020 Supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks, which says EVIC should be used to determine the GHG intensities for the benchmarks.

While the issuance of climate-focused green bonds, primarily by companies transitioning to a low-carbon strategy, would likely lead to a reduction in CO₂ emissions, the use of a zero-emissions profile means that stakeholders risk being exposed to an increase in their claimed carbon footprint in the future should data become accessible or other methodological approaches be developed.

The difficulties in implementing a zero-emissions profile, as described above, suggest an approach in which a flat-rate proportional reduction is applied to the issuer's overall profile, tailored to the sector and type of project. Although this approach could better represent the emission reductions achieved by green bonds, both methods – despite their simplicity and consistent carbon benefits – fall short in terms of precision.

3.3. GREEN BOND ESTIMATES PROVIDED BY EXTERNAL DATA PROVIDERS (E.G., MSCI, S&P TRUCOST, ICE)

MSCI: Several external data providers offer data on the carbon footprint of green bonds. For example, MSCI has developed a methodology that approximates the carbon footprint of a green bond by grouping projects into seven environmental buckets and applying the average emissions intensity for each relevant category. In this approach, MSCI assumes that proceeds are completely allocated and that projects are fully operational rather than under construction. This methodology implies that all green bonds are treated as being equal: two green bonds from different issuers, but with identical allocations (e.g., 100% for energy efficiency), receive the same carbon footprint. However, this approach does not consider the specific location of a project's emissions, nor the differences between projects within the same category. For example, a solar project's carbon footprint would differ from that of a wind energy project. As a result, while this approach is straightforward, it only provides broad estimations.

Trucost (S&P): The Trucost dataset includes three key data points: annual and lifetime greenhouse gas emissions and intensities (in tCO₂e per GWh); avoided greenhouse gas emissions published by the issuer (tCO₂e), and avoided emissions calculated based on Trucost's proprietary methodology. The Trucost methodology calculates avoided emissions using a full life cycle assessment for Green Energy, Green Buildings, Green Transport and Energy Efficiency and to date includes 130 technologies.

To derive the underlying indicators, Trucost gathers and assesses publicly available disclosures from issuers, such as impact reports, environmental data sources and information disclosed on the corporate website or in other public sources. The database is updated annually, and projects are mapped to the Green Bond Principles and the Climate Bond Initiative (CBI) taxonomy. The process for calculating avoided emissions includes the following steps: baseline selection, baseline emissions calculation, project impact calculation, project avoided emissions calculation, and green bond avoided emissions calculation. It is important to note that, for refinancing, the methodology expects the allocated annual avoided emissions to cover the entire life cycle of the project. Therefore, the annual emissions avoided over the entire lifetime are only allocated for the term of the bond and the impact is then distributed according to the issuer's share in the project. Some additional assumptions in the methodology are after the end of the plant's lifetime, the plants are considered to be decommissioned, and the benefits of plants are assumed to end. It is also implied that the energy produced by the plant directly displaces energy produced by another origin. A further assumption is that the efficiency of the deployed asset and the asset it replaces remains constant over time.

3.4 PCAF RECOMMENDATIONS¹⁰

The PCAF released draft methodologies for accounting for greenhouse gas emissions, which includes guidance for green bonds. Specifically, the proposed methodology targets bonds where the proceeds are under the operational control of the issuer, thus excluding green bonds from banks. PCAF proposes the use of attributed absolute, avoided or removed emissions as reported in the issuer's post-issuance impact reporting. Yet, PCAF recognises that this data is often not provided and presents the following equation for calculating the carbon footprint of a green bond:

$$\text{Financed Emissions} = \text{Attribution factor} \times \sum_{\text{project}} \frac{\text{Green bond part of project}}{\text{Debt} + \text{Equity of Project}} \times \text{project emissions}$$

¹⁰ Draft New Methods for public consultation. (2021). PCAF. Available at: [PCAF's draft new methods for public consultation \(carbonaccountingfinancials.com\)](https://www.pcaf.com/consultation/carbonaccountingfinancials.com)

Emissions estimates must conform to the guidelines set out in the PCAF Standard for Project Finance, in which emissions from green bond activities are calculated using standard emission factors that are linked to either respective physical or economic activities. The benefit of this approach is its accuracy. However, for this methodology to be widely used, issuers need to report project-specific carbon data in their impact reporting.

In December 2024, PCAF opened a [consultation](#)¹¹ introducing vital updates, including guidance on metrics, Financed Avoided Emissions and Use of Proceeds Accounting. These methodologies are designed to enhance transparency, accountability and the capacity of financial institutions to align with global climate targets.

3.5 AVOIDED EMISSIONS TREATMENT BY ISSUERS

Most issuers calculate the avoided emissions included in their green bond impact reporting by comparing the emissions generated by the financed green projects to baseline emissions of an alternative project, which typically has a higher carbon intensity. For this calculation, issuers usually use their own methodology. Based on the GHG Protocol for Project Accounting or PCAF Project Finance Standard the calculation of the avoided emissions usually comprises of the following steps:

- **Baseline selection:** Issuers select a baseline scenario, which is often based on emissions of a conventional project within the same sector or region. For example, a renewable energy project might use the average emissions from a coal or natural gas project as the baseline
- **Attribution factor:** Issuers apply the emission factors to both the baseline and green project. This allows for the calculation of the emissions that would have been generated by the conventional project in the absence of the green project
- **Calculation of avoided emissions:** Emissions from the baseline project are subtracted from those of the green project, which allows for the estimation of the avoided emissions. The avoided emissions represent the carbon savings that the green bond project achieved
- **Post-issuance reporting:** As part of the International Capital Market Association (ICMA) guidance through the impact reporting framework, issuers usually report annually on the avoided emissions of a green bond project in their impact reporting. Ideally, the issuer also discloses the underlying methodology that outlines how the avoided emissions were calculated.

4. CURRENT MARKET CHALLENGES

The methods described above for calculating the carbon footprint of green bonds are associated with challenges, the most important of which are outlined in the following sub-sections.

4.1 ABSOLUTE EMISSIONS

Firstly, for calculating absolute emissions, there is the problem of data availability and quality. Issuers do not yet report financed emissions consistently at the project level. For example, many issuers are facing inconsistent data, especially for Scope 3 emissions, which is difficult to quantify. This can lead to incomplete or inaccurate emissions reports.

Secondly, there is the question of standardisation, as there is currently no universal standard for calculating and reporting absolute emissions at the green bond level. However, as mentioned above, PCAF is currently working on such a standard.

Furthermore, allocation and attribution pose a challenge. On the one hand, the exact allocation of proceeds is often only known after the issuance. On the other hand, especially for projects that are only partially financed by green bonds, it can be difficult to allocate the exact share of emissions to the green bond. This is particularly true for projects with multiple sources of financing. The issue of potential under-allocation and the need for both equity and non-green bond investors to adjust their emission accounting practices for the financed emissions equations to fully allocate emissions, might lead to such investors being unwilling to agree to this methodology.

¹¹ PCAF public consultation on new methods and guidance (Dec 2024): [PCAF public consultation on new methods and guidance](#)

4.3 AVOIDED EMISSIONS

One of the main challenges of calculating avoided emissions is that it is a forward-looking metric and hence, one only knows if it materialises at maturity. This exposes issuers – and investors – to the risk of overestimation. At the issuer level, it risks what we see – as in the case of electric vehicle (EV) producers – in terms of an under-estimation, especially if the assumptions about the baseline scenario or operational efficiency are overly optimistic.

In addition, the calculation process for avoided emissions is complex and based on numerous assumptions. This increases the risk for errors. For example, selecting a suitable baseline scenario is complex because the emissions of a conventional project that would have been carried out instead of the green bond project must be determined. The assumptions for the baseline vary greatly, which can lead to inconsistent estimates of the emissions avoided.

Furthermore, there is no universally accepted method for calculating avoided emissions, which leads to different approaches among issuers. This lack of standardisation makes it difficult for investors to effectively compare avoided emissions in green bonds and analyse this in aggregate for the purposes of impact reporting on green bond strategies.

Moreover, it can be difficult to allocate the emission savings. This is the case in particular with projects that have several sources of financing, where it can be difficult to allocate the proportion of avoided emissions to the green bond. Another challenge is that the timing of avoided emissions can vary, with some issuers reporting based on the potential lifetime of the project and others using annual or short-term metrics. This can lead to discrepancies in the reported emissions savings.

Overall, as already mentioned, the calculation of avoided emissions is based on many assumptions. This makes avoided emissions a less suitable metric with regulatory requirements becoming more stringent.

5. CURRENT MARKET INITIATIVES

5.1 BARCLAYS¹²

- A challenging, but important, proposition: Creating a standard is complex and will require many assumptions unless issuers start to provide considerably more information in post-issuance reporting.

5.2 ANTHROPOCENE FIXED INCOME INSTITUTE¹³

- Carbon emissions accounting will play an important role in the climate transition, given the adage “what you don’t measure, you can’t manage”. Carbon emissions accounting is the calculation and reporting of GHG emissions from operations. Transparent data is an essential input into influencing the climate crisis. Anthropocene presents the Forensic Carbon Accountant, designed to promote transparent and useable emissions disclosures, to support investors in reducing the climate footprint of their portfolios.

5.3 INSIGHT INVESTMENTS¹⁴

- A standardised approach, with sufficient coverage, would lead to benefits for investors, issuers and policymakers pursuing wider sustainability objectives. Therefore, issuers should be encouraged to disclose the carbon footprint associated with projects financed by green bonds using widely accepted industry standards. This could best be achieved by an update to the International Capital Market Association (ICMA) Green Bond Principles guidance to issuers
- A complementary approach would be to seek to encourage collaborative industry groups to agree and establish a standard. This may mean further work on the PCAF standard so that it can be practicably applied, or updating the GHG Protocol.

12 Green bond emissions accounting: a challenging, but important, proposition. (2024). Barclays.

13 Richardson, J. (2023). The Forensic Carbon Accountant: green bond carbon footprint. [online] Anthropocenefii.org. Available at: <https://anthropocenefii.org/transparency/the-forensic-carbon-accountant-green-bond-carbon-footprint> [Accessed 9 Aug. 2024].

14 Insightinvestment.com. (2024). Carbon footprinting for green bonds: a way forward. [online] Available at: <https://www.insightinvestment.com/investing-responsibly/perspectives/carbon-footprinting-for-green-bonds-a-way-forward/> [Accessed 9 Aug. 2024].

5.4 CARBON YIELD¹⁵

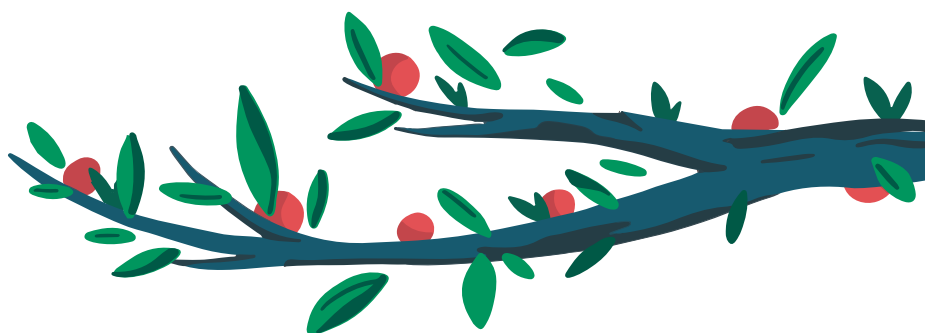
- Carbon yield is a new metric designed to quantify the environmental impact of a green bond in terms of GHG emissions avoided through the financed activities
- Impact is expressed in Potential Avoided Emissions (PAE) enabled by the use of proceeds of the bond
- In terms of tCO₂e /unit of capital/year, i.e., how many tonnes of carbon dioxide equivalent (tCO₂e) are expected to be avoided per unit of investment per year?

5.5 NETWORK FOR GREENING THE FINANCING SYSTEM¹⁶

- The compilation of carbon footprints poses challenges regarding data availability for both debtor-level and creditor-level information, thus raising concerns about the consistency and representativeness of indicators across jurisdictions. The indicators are broadly in line with those proposed by the Taskforce on Climate-related Financial Disclosures (TCFD), PCAF and the report on Macroprudential Challenges of Climate Change compiled by the European Systemic Risk Board (ESRB) and the European Central Bank (ECB). Similar indicators are also currently being discussed by other Eurosystem Committees. As methodological details and concrete implementation assumptions differ widely, results do too, hence stressing the need for developing common methodological and compilation standard.
- Suggested best practices (see below).

5.6 MIROVA & ROBECO¹⁷

- Creation of a standard for a global database of emission avoidance factors
- For the financials sector, the initiative will generate estimates of the emissions avoided by the activities financed, making them transparent and comparable
- Database being built will initially cover 80 specifically defined low-carbon solutions (examples: biomass energy, recycled plastic, low-carbon concrete, etc.)
- Geographical differentiation of the reference scenarios taken into consideration for each solution and the various links in the value chains of these solutions will result in the creation of ca. 9,600 distinct avoidance factors during first phase, which ended in the fourth quarter of 2024
- Creation of a standardised and transparent database of avoidance factors should make it possible to quantify, compare and audit the emissions avoided by companies and projects
- Each emissions factor will have details of assumptions made (i.e. functional unit used/ carbon footprint of solution/ reference scenario used/ lifespan of solution/ time value of carbon/ rebound effect).



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15 THE CARBON YIELD METHODOLOGY. (n.d.). Available at: <https://carbonyield.org/wp-content/uploads/2018/01/Carbon-Yield-Methodology.pdf> [Accessed 9 Aug. 2024].

16 Network for Greening the Financial System Information Note Improving Greenhouse Gas Emissions Data Foreword 4. (2024). Available at: https://www.ngfs.net/sites/default/files/medias/documents/ngfs_information_note_on_improving_ghg_emission_data.pdf.

17 Robeco.com - The investment engineers. (2024). Robeco and Mirova announce I Care and Quantis to develop a global standard for calculating emissions avoided by low-carbon solutions | Robeco Global. [online] Available at: <https://www.robeco.com/en-int/media/press-release/robeco-and-mirova-announce-i-care-and-quantis-to-develop-a-global-standard-for-calculating-emissions-avoided-by-low-carbon-solutions> [Accessed 9 Aug. 2024]

6. CASE STUDIES

To prove the additionality of green bonds, investors need to assess and report on their underlying carbon footprint. However, to date, the market standards for carbon reporting are focused at the issuer level rather than the security level. Additionality matters because it demonstrates that the capital raised through green bonds leads to tangible environmental benefits that would not have occurred in the absence of the investment.

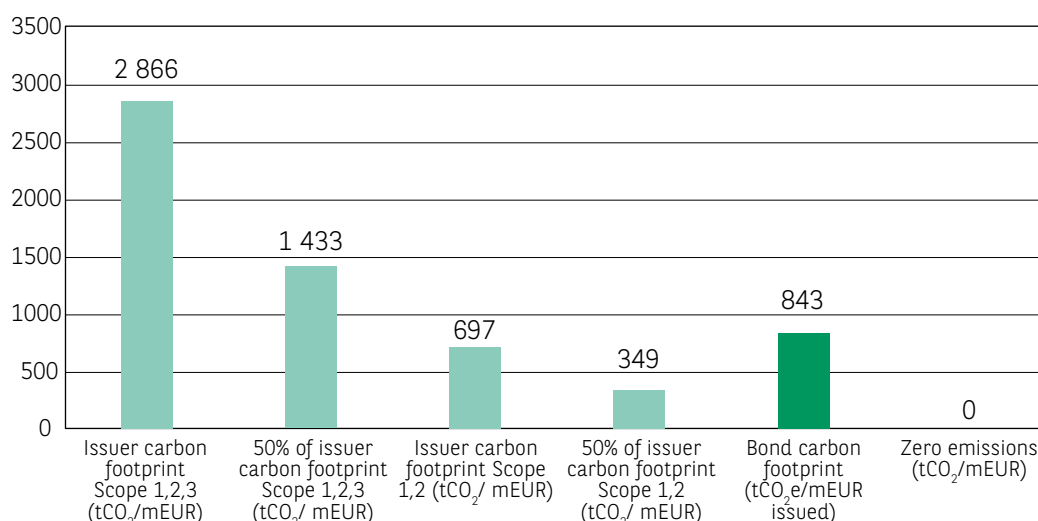
Investors care about the differences between the carbon footprint of green and non-green bonds because it allows them to evaluate whether their investments are truly contributing to climate goals, rather than simply funding business-as-usual operations with a green label. Without clear differentiation, the current approach of estimating the carbon footprint for green bonds can lead to the unintended consequence of misinterpreting a bond's environmental impact, where green bonds might appear no different from conventional bonds in carbon reporting. This undermines credibility, investor confidence and the integrity of sustainable finance.

However, transitioning to the use of absolute carbon footprint at the bond level offers a more accurate and credible measure of a bond's climate impact, enhancing the ability to assess true additionality. Unlike avoided emissions metrics, which can overstate climate benefits, such as in the case of electric vehicles by comparing them to hypothetical high-emission alternatives, absolute emissions provide a consistent and verifiable baseline. This reduces the risk of misinterpreting data and helps guard against greenwashing.

For funds with stringent climate mandates, such as those aligned with the Paris-Aligned Benchmark, this distinction is critical. These funds must ensure that every asset included meaningfully contributes to decarbonisation. Without bond-level reporting focused on absolute emissions, investors may unknowingly allocate capital to securities with overstated climate benefits, ultimately undermining their climate objectives.

To illustrate the varying outcomes of the most commonly used GHG emissions accounting methods for green bonds, we have selected three multinational utilities: Iberdrola, EDP and A2A. These companies were chosen for their significant volume of outstanding, green-labelled debt and strong impact reporting practices. Iberdrola and EDP have also committed to achieving net-zero emissions by 2045, while A2A has a 2040 net zero target. Additionally, the energy sector has a substantial carbon footprint, with the International Energy Agency (IEA) estimating that it accounts for over two-thirds of global GHG emissions due to its heavy reliance on fossil fuels.¹⁸

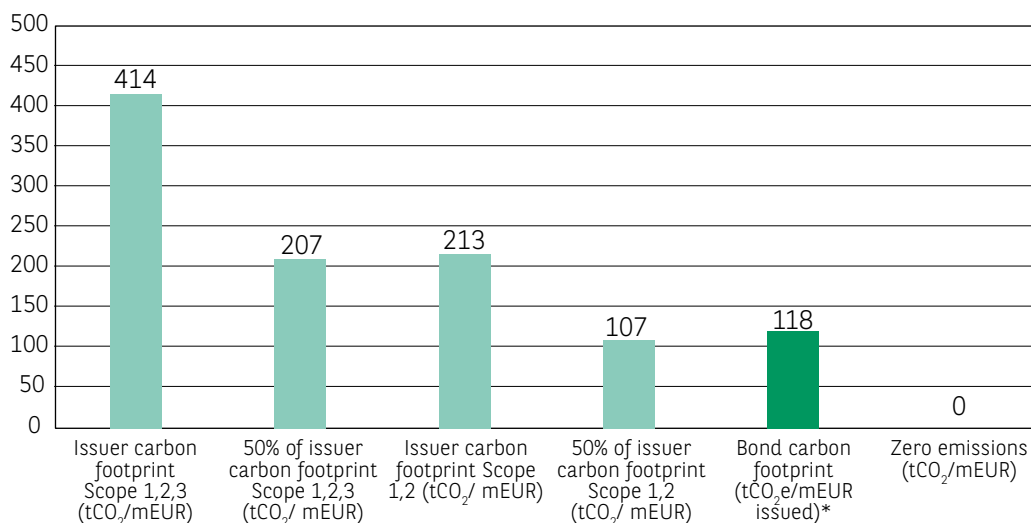
Chart 1: A2A - Issuer and Green Bond Carbon Footprint Levels



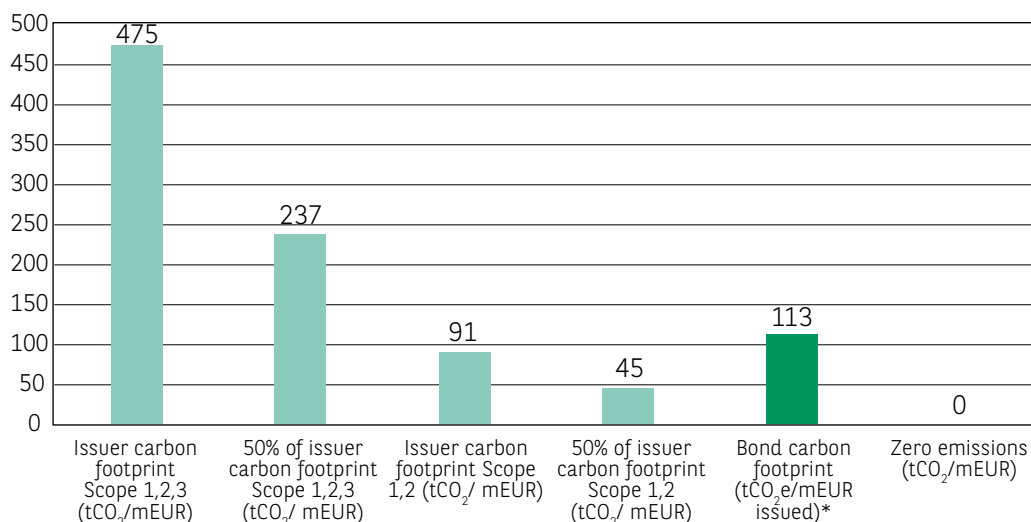
Source: BNP Paribas Asset Management Trucost, Bloomberg; May 2025

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¹⁸ Climate Change 2022: Mitigation of Climate Change, 2022, Intergovernmental Panel on Climate Change (IPCC).

Chart 2: EDP - Issuer and Green Bond Carbon Footprint Levels

Source: BNP Paribas Asset Management Trucost, Bloomberg; May 2025

Chart 3: Iberdrola - Issuer and Green Bond Carbon Footprint Levels

Source: BNP Paribas Asset Management Trucost, Bloomberg; May 2025

*The bond carbon footprint is the number of Annual Construction & Disposal emissions (tCO₂e) plus the Annual Operational emissions (tCO₂e) and divided by the Nominal Amount.

The graphs for all three show that different carbon footprinting methodologies¹⁹ yield significantly different carbon footprints for the same green bonds, leading to substantial variations in the total carbon footprint an investor reports for a portfolio. This affects how suitable these instruments appear for funds with decarbonisation goals or low-carbon investment thresholds. A key consideration is that once a green bond's carbon footprint is determined, it influences the issuer's overall carbon footprint across all financial instruments, including green bonds, conventional debt and equities. If this adjustment is not made, the issuer's total emissions may be understated.

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19 BNPP AM Proprietary Methodology, [Measuring Carbon Footprints - BNP Paribas Asset Management - Corporate EN](#)

For Iberdrola, EDP and A2A, incorporating Scope 3 emissions into carbon footprint calculations produces markedly different results compared to considering only Scope 1 & 2 emissions. This underscores the necessity of including Scope 3 emissions, as—consistent with expectations for utility companies—they constitute the largest share of total emissions. Furthermore, these examples demonstrate that applying a zero-emissions assumption or a simplistic proportional reduction leads to inaccurate and unreliable estimates of a green bond’s carbon footprint. A more granular approach is required for credible and meaningful assessments.

For the calculation of the avoided emissions per green bond the bonds noted below were used. While Iberdrola reports on a bond-by-bond basis, EDP and A2A report their impact indicators at the portfolio level. To ensure comparability, we have attributed the CO₂ emissions avoided to the specific bond using the below formular:

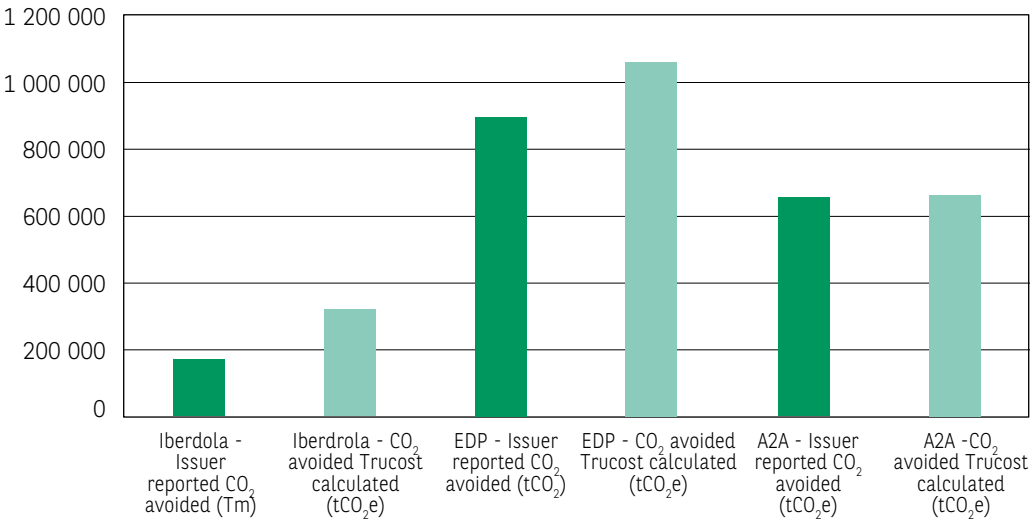
Avoided Emissions for Bond X = total Avoided Emissions x

Bond X Issuance Size

total Issuance Size of All Green Bonds

Issuer	ISIN Code	Issuance Date	Maturity	Amount issued	Source
Iberdrola	XS1398476793	21/04/2016	04/2026	1000 EUR m	Green financing returns report. Year 2023
A2A	XS2534976886	19/09/2022	19/09/2030	650 EUR m	green-bond-2024.pdf
EDP	PTEDPOM0021	14/09/2021	14/03/2082	750 EUR m	Integrated Annual Report 2024 - Unofficial Version - Unaudited.pdf, p.470

Chart 4: Avoided emissions (Issuer reported versus Trucost calculated)



Source: S&P Trucost, BNPP AM

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When looking at the avoided emissions reported by issuers in their green bond impact reporting versus, for example, the avoided emissions reported by external data providers such as Trucost, the graphs for Iberdrola and EDP illustrate that the reported unit itself already poses a challenge in terms of comparability. While the issuers report on tCO₂ or Tm of CO₂ avoided, Trucost reports in terms of tCO₂e. While the former metric only focuses on CO₂, the latter usually also includes non-CO₂ gases. This means that the tCO₂e metric will usually be higher. Trucost reports in tCO₂e because it conducts a comprehensive lifecycle analysis that includes all greenhouse gases, not just CO₂. With additional data, Trucost fills gaps in the issuer reports and allows investors to compare tCO₂e data, which is necessary for accurate portfolio accounting under frameworks like the SFDR or for net-zero targets. The additional GHGs included in the tCO₂ equivalent metric are important as some GHGs have a higher warming potential than CO₂.

The example of measuring avoided emissions for renewable energy projects illustrates this point well. While CO₂ represents only direct carbon dioxide reductions, CO₂e accounts for all greenhouse gases – including methane (CH₄) and nitrous oxide (N₂O) – which have significantly higher global warming potential.

For example, a solar wind farm primarily reduces CO₂ by displacing fossil fuel-based electricity, but its lifecycle emissions (such as from manufacturing and maintenance) also include small amounts of CH₄ and N₂O. In contrast, a hydropower project may avoid large amounts of CO₂ from coal-fired power plants but can also generate methane emissions from organic matter decomposing in its reservoir. Similarly, biomass plants avoid CO₂ emissions by replacing fossil fuels but can produce significant CH₄ and N₂O from burning organic material.

By reporting on CO₂e investors and stakeholders get a full picture of climate impact, ensuring that renewable energy projects are fairly compared based on their total greenhouse gas footprint, not just CO₂ reductions.

For A2A, the reported avoided emissions associated with its green bonds – measured in tCO₂e – demonstrates the company's commitment to supporting decarbonisation through sustainable financing. Notably, Trucost data indicates slightly higher avoided emissions compared to the figures disclosed by the issuer. This minor variance may reflect methodological differences in estimation, which once again highlights the importance of establishing a common methodological standard in calculating emissions associated with green bonds. This is especially important as, given the nature of the (traditionally high-emission) sector, even modest differences can be meaningful.

While avoided emissions provide valuable insights how much CO₂ or CO₂e a renewable energy projects prevents compared to a fossil fuel alternative, using absolute emissions as an impact metric would be even more robust and transparent. Absolute emissions measure the total greenhouse gases emitted throughout a project's lifecycle, rather than just the difference from a hypothetical baseline.

For example, a wind farm may avoid emissions from coal power, but still has embedded emissions from manufacturing turbines, transporting materials, and maintenance over time. Similarly, a solar farm may prevent CO₂ from gas-fired power plants, but the production of solar panels involves energy-intensive processes that generate emissions. Tracking absolute emissions would allow for an assessment of the true carbon footprint of each project, ensuring renewables are optimised to be as low-emitting as possible across their lifecycle. This allows for a more accurate comparison between technologies, guiding investment towards the cleanest energy solution.

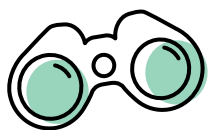
Finally, when comparing the options:

- Using the issuer's carbon footprint for a green bond vs.
- Zero emissions or a blanket proportional reduction in emissions vs.
- Avoided emissions reported by the issuer or external data providers such as Trucost.

The cases of Iberdrola and EDP highlight the significant variation in potential outcomes when estimating green bond carbon footprints. In the absence of issuer-reported data, many investors independently assess the emissions impact of specific green bonds to align with carbon reduction targets such as net zero commitments and to track progress toward these goals.

However, due to the lack of a standardised methodology, existing approaches produce widely differing results, as demonstrated above. Establishing a harmonised framework with comprehensive coverage would offer clear benefits to investors, issuers and policymakers working toward broader sustainability objectives by ensuring data comparability and transparency in financed emissions reporting.

Therefore, we encourage issuers to disclose the carbon footprint of projects funded with green bonds using recognised industry standards. In our view, the most effective way to do so would be to update the International Capital Market Association (ICMA) Green Bond Principles, providing clearer guidance to issuers, specifically making absolute emissions a core indicator in the Green Bond Harmonized Framework for Impact Reporting.²⁰



NEXT STEPS AND RECOMMENDATION(S)

- Complete the development of the PCAF methodological standards for green bonds
"NO PCAF method exists yet to calculate the emissions associated with green bonds and other known use of proceeds bonds. PCAF has prioritized the development of a method covering green bonds moving forward."²¹
- Updates to the International Capital Market Association Green Bond Principles - specifically, the elevation of absolute emissions to a core metric in the Green Bond Harmonized Framework for Impact Reporting.
- Other investors such as Pimco also advocate for the use of absolute emissions as an impact metric for green bonds.

According to PIMCO²² the recommendation is: Regarding carbon emissions, issuers should include avoided emissions and aggregate absolute (Scope 1, 2, and, where material, Scope 3) emissions, carbon intensity per sales and relevant output-based metrics (e.g., megawatt hour (MWh) for energy or square metre for real estate), to allow comparison with firm-wide carbon performance and peers in a portfolio context, and in line with the Greenhouse Gas (GHG) Protocol that indicates 'Companies should not make claims about positive impacts without being transparent about whether their Scope 1, 2, and 3 emissions are increasing or decreasing'.

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²⁰ [Handbook-Harmonised-Framework-for-Impact-Reporting-June-2024.pdf](#)

²¹ Facilitated Emissions: The Global GHG Accounting & Reporting Standard, Part B, First Version, December 2023, p.8

²² <https://www.pimco.com/us/en/documents/8f81f3e2-d3de-4e9e-9565-e90bd107863e>

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