The GLOBAL GHG ACCOUNTING & REPORTING Standard

PART A

New guidance and methods for public consultation

For financial institutions measuring and reporting scope 3 category 15 emissions

PCAF
Partnership for Carbon Accounting Financials

November 2024

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Foreword from the PCAF Board of Directors

This public consultation marks an important next chapter in PCAF's mission to address the complex, evolving needs of the financial industry through practical, industry-led methodologies that enable financial institutions to take meaningful and measurable steps to a lower carbon economy. From its inception, PCAF's focus has been rooted in the priorities expressed by the financial sector and its key stakeholders. In 2023, PCAF conducted an extensive survey of its signatories to identify the most pressing gaps in the Global GHG Accounting and Reporting Standard (the Standard). The survey results, complemented with inputs from key initiatives and stakeholders outside of PCAF, allowed the PCAF Core Team to select priority areas that align with the real-world reporting challenges faced by financial institutions. This engagement reflects our commitment to create standards that are not only technically rigorous but responsive and impactful to the needs of the industry.

Our efforts over the last year to expand and refine the PCAF Standard are the product of a rigorous and inclusive process. Over 100 experts from our signatory base contributed their expertise within structured working groups, led by the PCAF Core Team and PCAF's Technical Director. Together, they have safeguarded the foundational principles of the Greenhouse Gas Protocol (GHGP) while striving to expand its reach for modern instruments and practices. From methods assessing securitized and structured products to innovations like forward-looking emission metrics, these proposed methodologies reflect deep engagement, technical precision and above all else – a commitment to continuously improve industry standards.

Now we invite industry stakeholders to engage in a vital next step: public insight and feedback to finetune the collective work to this point.

This consultation presents an opportunity to shape standards that will have a lasting impact on the financial sector. Your perspectives will directly influence the final methodologies. By participating, you will contribute to establishing robust, credible and consistent GHG measurement tools that strengthen the sector's ability to transition to a lower carbon economy.

PCAF invites stakeholders from across the financial system to participate. Your contributions will help solidify and elevate the impact of these methodologies and ensure the Standard continues to meet the dynamic and evolving needs of the global sector.

We share our thanks in advance for your contribution as we work towards a more transparent, accountable and sustainable financial sector.

Signed, the PCAF Board of Directors

Acknowledgements

The Partnership for Carbon Accounting Financials (PCAF) would like to extend our heartfelt gratitude to all the individuals who contributed to the development of this public consultation.

Firstly, we extend our sincere appreciation and thanks to the PCAF Global Core Team, a group of individual representatives of PCAF signatories who govern the PCAF Standard. Your inputs, expertise, and leadership have been essential in ensuring the public consultation's development. We deeply appreciate your commitment and the time you've devoted to the expansion of the PCAF Standard.

The consultation on the Standard is led by the PCAF Global Core Team. In late 2023, the Core Team underwent a prioritization process to determine the areas to develop for this standard development cycle. The Core Team's contributions to this public consultation have been made on an individual rather than institutional level. The content set out within this public consultation and any views expressed do not necessarily represent the views of each individual Core Team member or the institutions they work for. Individuals who work at the following institutions make up the Core Team:

- Commonwealth Bank of Australia
- EIG
- HSBC
- ING
- Itaú Unibanco
- Metrics Credit Partners
- Mizuho Financial Group
- Morgan Stanley
- NMB Bank
- Nordea Group
- Phoenix Group
- PIMCO
- Swiss Re
- United Bank for Africa

We would also like to extend our deepest gratitude and appreciation to the over 100 industry experts from our signatory base who contributed their expertise within the Working Groups. The Working Groups underwent a rigorous drafting and review process throughout 2024 to deliver the guidance and methods presented in this consultation document. We are humbled and honoured by their unwavering dedication to PCAF. Thank you for being an integral part of this effort.

The PCAF Technical Director, together with the PCAF Secretariat facilitated the Core Team's work by moderating technical discussions, reviewing content, and compiling and editing this document. The PCAF Secretariat is operated by Guidehouse, a global consultancy firm specialized in energy, sustainability, risk, and compliance for the financial industry. Guidehouse serves as the Secretariat of PCAF, providing technical support to PCAF signatories in the development and implementation of the Global GHG Accounting and Reporting Standard for the Financial Industry.

In addition, we'd like to thank the PCAF Board of Directors for their efforts to convene the Core Team and for providing strategic guidance in the direction of the PCAF Standard's expansion. The current Board of Directors can be found on the PCAF website.

Finally, we want to thank Bloomberg Philanthropies, Sequoia Climate Foundation, Climate Arc, and the Laudes Foundation for their generous support of this work.

This document is open for public consultation until 28 February 2025.

1. Introduction

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The Partnership for Carbon Accounting Financials (PCAF) is an industry-led initiative that seeks to enable financial institutions (FIs) to consistently measure and disclose the absolute greenhouse gas (GHG) emissions associated with financial activities.

GHG accounting of financial products and services is the annual accounting and disclosure of scope 3 category 15 emissions at a fixed point in time in line with financial accounting periods. In November 2020, PCAF published the Global GHG Accounting and Reporting Standard for the Financial Industry ("the Standard"). Since then, banks and investors have asked to expand the standard with more methods, also covering other activities of the financial industry. From 2021 onwards, PCAF started the work on three parts under the umbrella of the Global GHG Accounting and Reporting Standard for the Financial Industry:

- Part A: update of the first version standard on measuring and reporting financed emissions, by adding a method for sovereign debt and guidance to account for emission removals ("Part A")
- Part B: development of a standard for measuring and reporting the GHG emissions associated to the capital market facilitation activities ("Part B")
- Part C: development of a standard for measuring and reporting the GHG emissions associated to re/insurance underwriting ("Part C")

The Standard is a response to industry demand for a global, standardized approach to measure and report emissions of financial activities. Written by a diverse, global team of FIs for FIs, the Standard combines deep industry insight with the rigor of the GHG Protocol, the supplier of the world's most widely used GHG accounting standards.

Global regulators and legislatures have started to acknowledge the PCAF Standard as a methodology of choice for complying with climate-related regulations:

- The Corporate Sustainability Reporting Directive (CSRD)'s reporting requirements include scope 1, 2, and 3 GHG emissions and thus financed emissions, and mandatory assurance. PCAF enables FIs to comply with this directive by providing a standardized methodology to measure financed emissions.
- The European Baking Authority's (EBA) Pillar 3 framework requires FIs to provide both qualitative and quantitative information to help market participants assess a bank's financial health risk and profile. EBA references PCAF as the methodology measure and disclose financed emissions.
- The disclosures of sustainability-related risks and opportunities for the audience of financial reporting are specified in ISSB's IFRS S2, including specific requirements for identification, measurement and disclosure of climate-related financial information. PCAF provides methodology to calculate financed emissions which are part of the requirement to report GHG inventory.

All in all, the uptake of PCAF globally and the continuous industry demand for methods that address all types of portfolios have led PCAF to draft additional methods. These new methods cover use of proceeds accounting, securitizations and structured products, sub-sovereign debt, and undrawn loan commitments. The following chapter describes them in detail. Additionally, the consultation includes a guidance document on avoided emissions and forward-looking emission metrics, and a discussion paper on inventory fluctuation, found in chapter three and four, respectively.

The Working Groups, consisting of PCAF signatories, drafted these new guidance and methods following the Principles of the GHG Protocol's Scope 3 inventories: completeness, consistency, relevance, accuracy, and

transparency. The methods are also meant to comply with the PCAF Standard requirements of recognition, measurement, attribution, data quality, and disclosure[1].

PCAF launched a public consultation of the new methods on 3 December 2024 and seeks feedback from all stakeholders, including FIs, regulators, policymakers, supervisors, data providers, consultants, and NGOs. The consultation will be open until 28 February 2025.

To participate in public consultation, stakeholders should follow the instructions on the PCAF website.

[1] For more information about these principles and requirements, see Figure 4-1 on page 36 of the Financed Emissions Standard – second version.

2. The new methods under public consultation

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2.1 Use of proceeds accounting

Introduction

This section proposes interconnected additions and adjustments to Part A on the topic of use of proceeds accounting. Use of proceeds accounting allows FIs to account for the specific assets being financed. This is essential to implement the 'measurement' principle underlying Part A, which highlights the 'follow the money' approach for GHG accounting. This means that the money should be followed as far as possible to understand and account for the climate impact in the real economy.

The high-level summary of the changes proposed to Part A is:

- Add a cross-cutting method titled 'Use of proceeds structures'
- Add a new subsection 'Accounting for projects without a separate balance sheet' in the 'Project finance' asset class
- Add paragraph on 'Accounting for financed scope 3 category 15 emissions' in asset classes 'Listed equity and corporate bonds' & 'Business loans and unlisted equity'

Use of proceeds structures

SCOPE OF METHOD AND GHG ACCOUNTING TREATMENT

This method includes all on-balance sheet debt and equity to 'Use of proceeds structures' (abbreviated in this method as 'UoP structures'). UoP structures contain a pool of one or multiple underlying assets. The term UoP structure is an abstract GHG accounting concept with a wide scope – it encompasses structures ranging from equity funds, debt funds and special purpose vehicles to labeled bonds and labeled loans.

The assets underlying a UoP structure can belong to any other asset class. Examples are companies, projects, and buildings. It is also possible that an underlying asset is a UoP structure itself, for example when an investment fund (a UoP structure) invests into a green bond (a UoP structure).

This method defines two roles for UoP structures (Figure 2.11):

- Investors. For sake of simplicity this method uses the general term 'investors' to cover any debt or equity provider to a UoP structure. These parties are, for example, banks. The investor might also be called 'lender' or 'asset owner' in certain contexts.
- Issuers. For sake of simplicity this method uses the general term 'issuer' to cover any party that creates, issues, or manages a UoP structure. These parties could be, for example, FIs, corporates, sovereigns, or consumers. The issuer might also be called 'asset manager', 'fund manager', 'customer', 'investee' or 'borrower' in certain contexts.

Issuers use this method to calculate the financed emissions of the UoP structure itself. Investors use this method to calculate the financed emissions related to their debt or equity provision to a UoP structure.

Worked examples for different UoP structures can be found in the technical appendix.

In addition, facilitators may facilitate the issuance of certain UoP structures (see Figure 2.11). The associated calculation of facilitated emissions will be covered by future additions to Part B.

Figure 2.11. Overview of the different roles surrounding UoP structures

Key questions for accounting treatment are indicated in blue

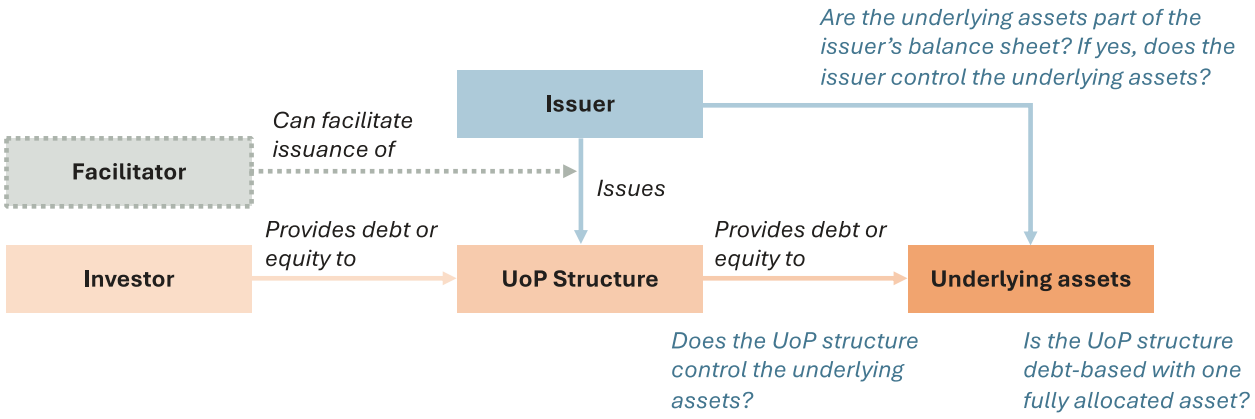
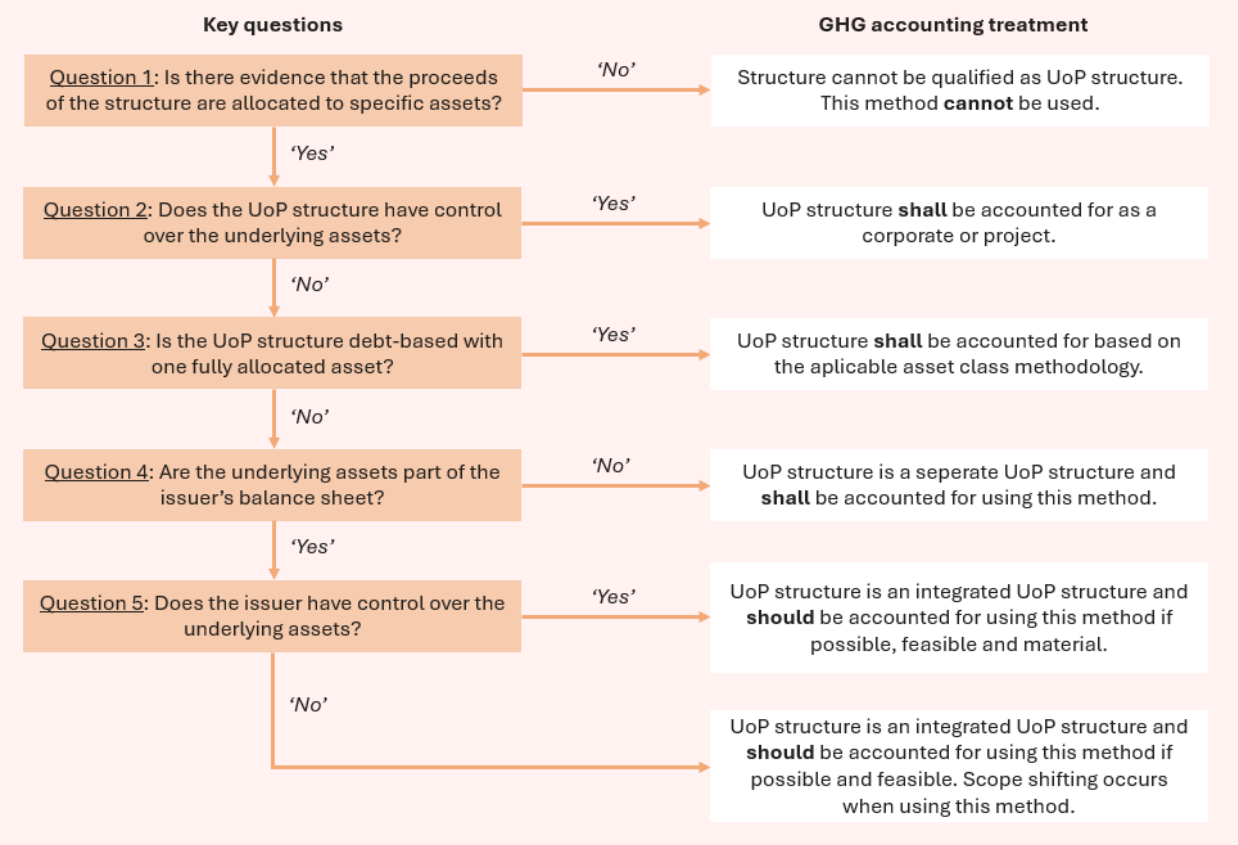


Figure 2.11 indicates key questions for the GHG accounting treatment of UoP structures in blue. These questions are included in Figure 2.12 which summarizes the GHG accounting treatment for UoP structures. The questions are further elaborated below.

Figure 2.12. Decision tree for GHG accounting treatment for UoP structures



QUESTION 1: IS THERE EVIDENCE THAT THE PROCEEDS OF THE STRUCTURE ARE ALLOCATED TO SPECIFIC ASSETS?

To answer Question 1 as Yes: FIs **shall** be transparent as to why an investment qualifies as a UoP structure. For this, it **shall** be evidenced that proceeds are only allocated to specific assets, for example through legal documentation at contracting or allocation reports by the issuer.

For the calculation of financed emissions, it is not relevant whether a UoP structure can be labeled specifically as, for example, 'green', 'transition finance', or 'sustainable' since estimations **shall** reflect actual emissions of underlying assets and **shall** be guided by the principle of conservativeness. Therefore, such labeling methodologies are outside the scope of this method. Nevertheless, this method is particularly useful for UoP structures with low-carbon assets, such as green bonds and green loans, as it allows for the accounting of emissions based on these underlying assets. This will generally lead to reduced financed emissions compared to issuer-level estimates.

If answer to Question 1 is No: If there is no sufficient evidence that proceeds are allocated to specific assets, the structure cannot be qualified as a UoP structure and this method cannot be used. The asset class is selected based on Figure 5-1 of Part A selecting 'Unknown' in the 'Use of proceeds' column. Examples are general purpose loans, working capital loans and general corporate bonds.

QUESTION 2: DOES THE UOP STRUCTURE HAVE CONTROL OVER THE UNDERLYING ASSETS?

To answer Question 2 as Yes: Only UoP structures that provide equity can have control over the underlying assets, since equity is required for control.[2] The main example of this is a top-level holding company in a corporate structure. In this case the financials of the underlying assets are generally consolidated on the balance sheet of the holding company. The holding company uses the GHG Protocol Corporate Accounting and Reporting Standard to define its organizational boundaries. If a control approach is used, the scope 1 emissions of the underlying assets are consolidated as the scope 1 emissions of the holding, and similarly for scope 2 and 3. If an equity share approach is used, the emissions of the underlying assets are proportionally consolidated based on the equity share.

In essence, a UoP structure with control over the underlying assets is equivalent to a corporate. Depending on whether the UoP structure is listed or not, it **shall** be accounted in line with the 'Listed equity and corporate bonds' method or the 'Business loans and unlisted equity' method.

A worked example for this case is the '*Example accounting UoP structure with control over underlying assets – agricultural holding company*'. There is one exception to this rule – the UoP structure **shall** be accounted in line with the 'Project finance' method if (1) there is one fully allocated asset under the UoP structure and (2) this asset is a project. This happens, for example, when a special purpose vehicle is set up to finance a project.

If answer to Question 2 Is No: If the UoP structure does not have control over the underlying assets, it can be conceptualized like an FI because the UoP structure is essentially an entity that provides debt or equity. As a result, Part A is applicable to the UoP structure, which means that financed emissions can be calculated for the UoP structure itself. One important consequence is that UoP structures **shall** apply the control approach to consolidate emissions, as outlined in section 4.2 of Part A.

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[2] Control is used as a combined term here to refer to both the financial control and operational control approaches under the GHG Protocol Corporate Accounting and Reporting Standard.

QUESTION 3: IS THE UOP STRUCTURE DEBT BASED WITH ONE FULLY ALLOCATED ASSET?

To answer Question 3 as Yes: A debt based UoP structure has only debt flowing in and out of the structure, i.e. investors provide only debt to the UoP structure and the UoP structure provides only debt to underlying assets. When there is only one underlying asset to which all debt in the debt based UoP structure is allocated, the UoP structure **shall** be accounted for based on the applicable asset class methodology. The asset class is selected based on Figure 5-1 of Part A selecting 'Known' in the 'Use of proceeds' column. Examples are motor vehicle loans, mortgages, and commercial real estate. A worked example for a debt-based UoP structure with one fully allocated project is the '*Example debt-based UoP structure with one fully allocated asset – a sovereign infrastructure project*'.

If answer to Question 3 is No: The UoP structure can be accounted for using this method and the specific GHG accounting treatment is determined based on questions 4 and 5.

QUESTION 4: ARE THE UNDERLYING ASSETS PART OF THE ISSUER'S BALANCE SHEET?

If answer to Question 4 is Yes: If the underlying assets are part of the issuer's balance sheet, the UoP structure is called an 'integrated UoP structure'. Examples are:

- Loan contracts specifying that proceeds will be allocated to designated projects, or to the purchase and refinance of residential property.
- Labeled debt, such as labeled bonds and labeled loans. In this case, the issuer allocates assets to the UoP structure based on certain characteristics, e.g. a 'green' loan or 'social' bond. A worked example for this case is the '*Example accounting labeled debt – a corporate green bond*'.

To answer Question 4 as No: The underlying assets can appear on the issuer's balance sheet as physical assets (e.g. a project the issuer owns and operates) or as financial assets (e.g. a loan the issuer provides to a company). If the underlying assets are not part of the issuer's balance sheet, the UoP structure is called a 'separate UoP structure'. Examples are debt funds, private equity funds and certain special purpose vehicles. Separate UoP structures **shall** be accounted for using this method. A worked example for this case is the '*Example accounting separate UoP structure – investment fund*'.

QUESTION 5: DOES THE ISSUER HAVE CONTROL OVER THE UNDERLYING ASSETS?

If the answer to Question 5 is Yes: Integrated UoP structures **should** be accounted for based on this method. For integrated UoP structures investors **may** calculate financed emissions based on issuer-level data.[3] Investors may choose to do this due to the following reasons:

- Theoretically impossible: The emissions of the underlying assets cannot be defined independently. For more information see subsection 'Accounting for projects without a separate balance sheet' in the 'Project finance' asset class.
- Practically not feasible: There is no sufficient data available on how the funds are allocated.
- Not material: The calculated emissions are not expected to materially differ from issuer-level estimates. This happens when the emissions intensity of the assets in the UoP structure and the emissions intensity of the issuer are similar.

If answer to Question 5 is No: If the issuer does not control the underlying assets in the UoP structure, the issue of 'scope shifting' occurs, which is elaborated in the section 'Assessment boundary'. In this case, the

[3] For separate UoP structures the underlying assets are not part of the issuer's balance sheet, so estimating financed emissions based on issuer-level data would be incorrect.

issuer is usually an FI, and the emissions of the underlying assets are part of the scope 3 category 15 emissions of the FI. Due to scope shifting, there is a material difference in the GHG accounting outcome between using issuer-level data and using data on the use of proceeds. Therefore, the UoP structure **should** be accounted for using this method if possible and feasible.

EMISSION SCOPES COVERED

In general, the GHG accounting approach for each underlying asset is selected based on Figure 5-1 of Part A.[4] For example, a general-purpose loan provided by a UoP structure to an unlisted company will be accounted for in line with the 'Business loans and unlisted equity' asset class.

Consequently, the emissions scopes covered for each underlying asset **shall** follow the requirements in the section 'Emission scopes covered' of the applicable asset class methodology. In the example of a general-purpose loan provided by a UoP structure to an unlisted company, the requirements on emission scopes covered can be found in the 'Business loans and unlisted equity' asset class.

ATTRIBUTION OF EMISSIONS

Annual emissions of UoP structures are calculated via a double attribution consisting of:

1. Attribution of the investor in the UoP structure
2. Attribution factors of the UoP structure in the underlying assets

$$Attribution\ factor = (1)\frac{Outstanding\ amount}{Total\ equity + debt\ in\ UoP\ structure} * (2)\sum_{asset} Attribution\ factor_{asset}$$

Outstanding amount UoP structure: This is the actual outstanding amount, which should be defined in line with the denominator. FIs should either use the calendar or financial year-end outstanding amount, provided the approach is communicated clearly and used consistently.

a) For debt, this is defined as the book value of the debt that the borrower owes to the lender (i.e., disbursed debt minus any repayments).

b) For equity, this is the outstanding value of equity that the FI holds in the UoP structure. It is calculated by multiplying the relative share of the FI in the UoP structure[5] by the total equity of the UoP structure.

Total equity + debt in UoP structure (denominator): this is the sum of total equity[6] and debt[7] in the UoP structure. For separate UoP structures that are separate legal entities, total equity and debt can be found on the balance sheet.[8] For other UoP structures, total debt and equity **should** be reported by the issuer. For example, fund managers report the total amount of debt and equity in an investment fund and bond issuers report the total amount of debt in a particular bond.

Attribution factors underlying assets: the attribution factor for each underlying asset is calculated in line with the applicable asset class methodology. For example, if the underlying asset is a project, the attribution

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[4] The 'Use of proceeds' column in Figure 5-1 refers to a UoP structure with one fully allocated asset.
[5] The relative share of the FI in the respective investee is calculated by dividing the number of shares that the FI holds in the respective investee by the total number of shares of the investee.
[6] In cases where the total equity value according to the client's balance sheet is negative, the FI shall set total equity to 0; this means that all emissions are attributed to debt only, while no emissions are attributed to equity investments. Such cases can happen when the retained earnings are negative while at the same time being higher than the other equity components on the balance sheet of the client.
[7] Total debt includes both current and long-term debt.
[8] If total debt or total equity cannot be obtained from a client's balance sheet for whatever reason (e.g., for some it might be difficult to obtain these values), FIs may fall back to the total balance sheet value (i.e., the sum of total equity and liabilities, which is equal to the client's total assets) with the intention of improving this data quality in the future.

factor would be 'Outstanding amount / Total equity + debt' in line with the attribution factor defined in the asset class for 'Project finance'.

EQUATIONS TO CALCULATE FINANCED EMISSIONS

The financed emissions of UoP structures are calculated by multiplying the attribution factor of the UoP structure by the asset-specific attribution factor and the asset's annual emissions, then summing the attributed emissions. The emissions of each underlying asset are calculated in line with the applicable asset class methodology.

$$Financed\ emissions = \frac{Outstanding\ amount}{Total\ equity + debt\ in\ UoP\ structure} * \sum_{asset} Attribution\ factor_{asset} * Emissions_{asset}$$

The financed emissions of the UoP structure **should** be reported directly by the issuer, for example in an annual impact report. When there is sufficient evidence that absolute emissions or emission removals have been attributed and reported in line with this method, financed emissions can be calculated as follows:

$$Financed\ emissions = \frac{Outstanding\ amount}{Total\ equity + debt\ in\ UoP\ structure} * Reported\ financed\ emissions\ UoP\ structure$$

Emissions at issuance

Financed emissions can only be calculated once funds have been allocated under the UoP structure. Therefore, financed emissions will be zero at issuance, unless assets had been allocated under the UoP structure before issuance.[9] A worked example for this case is the '*Example separate UoP structure – social investment fund at creation'*.

DATA REQUIRED

If reported emissions of the UoP structure are not available, emissions of underlying assets can be estimated in line with the applicable asset class methodologies. For example, the 'Project finance' chapter allows emissions to be estimated using default emissions factors based on physical activity (e.g., tCO_2e/MWh) or economic activity (e.g., tCO_2e/€ of revenue or tCO_2e/€ of asset).

The data quality score for the UoP structure **shall** be calculated based on a weighted average by outstanding amount of the underlying assets. If there are no assets allocated under the UoP structure, the data quality score cannot be defined.

[9] It is assumed that the sole provision of cash does not generate emissions. Emissions will only be accounted once money is allocated under the UoP structure.

Emissions estimations based on data quality score 5

It is recognized that data availability will remain a challenge until issuers report emissions.[10] Nonetheless, investors (and/or their data providers) can estimate emissions of UoP structures based on the data quality score 5 used in the asset classes 'Listed equities and corporate bonds', 'Business loans and unlisted equity', and 'Project finance'. The equation to calculate financed emissions becomes:

$$\begin{aligned} &Financed\ emissions \\ &\quad = \text{Outstanding amount} * Allocation\ percentage\ UoP\ structure \\ &\quad * \sum_{sector} Emission\ factor\left(\frac{tCO2_2e}{Euro\ or\ dollar\ invested}\right)_{sector} * Allocation\ percentage_{sector} \end{aligned}$$

Allocation percentage integrated UoP structure: the percentage of the UoP structure that has been allocated. At issuance without any funds allocated, this is 0%. When the UoP structure is fully allocated, this is 100%. If this percentage is unknown, it is conservative to assume an allocation percentage of 100% to calculate financed emissions.

Emission factors: the asset classes 'Listed equities and corporate bonds', 'Business loans and unlisted equity', and 'Project finance' provide further guidance on where to find suitable emission factors, such as EEIO databases. For example, if certain underlying assets are solar projects, this can be captured by a specific emission factor for the solar sector.

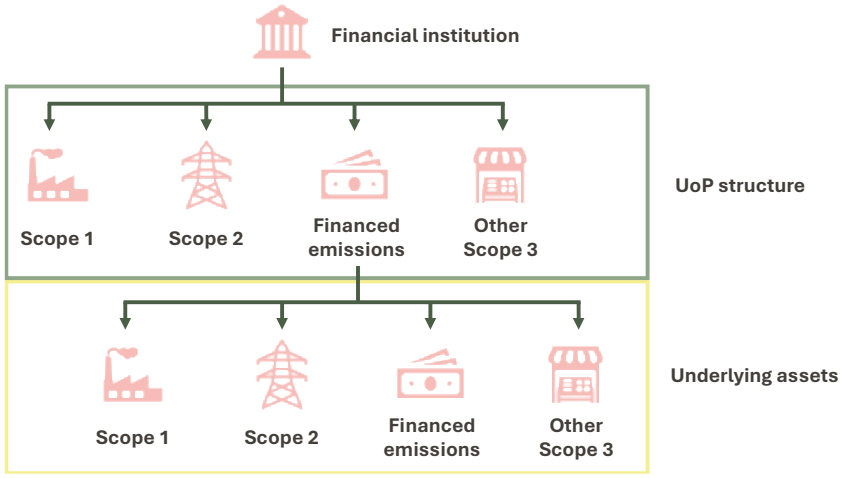
Allocation percentage sectors: the percentage of funds that has been allocated to different sectors. If direct allocation data is not available, these percentages **may** be estimated based on supporting documentation. For example, a prospectus or bond framework might indicate what sectors the money is earmarked for. A worked example for this case is the '*Example emissions estimation based on data quality score 5 – a transition finance fund*'.

ASSESSMENT BOUNDARY

For UoP structures accounted using this method, investors **shall** draw the assessment boundary around the underlying assets in line with the follow-the-money principle, i.e. around the yellow box in Figure 2.13. This means that the scope 1 emissions of underlying assets are reported within the investor's scope 3 category 15 as the financed scope 1 emissions of the investor, and similarly for scope 2 and 3.

[10] For example, the Handbook for a Harmonized Framework for Impact Reporting from the International Capital Market Association (ICMA) mentions absolute emissions under 'Other indicators' for certain sectors, but not as 'Core indicators', https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Handbook-Harmonized-Framework-for-Impact-Reporting-December-2020-151220.pdf.

Figure 2.13. Assessment boundary



When the assessment boundary is drawn around the underlying assets, the implicit assumption is made that the UoP structure does not generate any other material emissions than those related to the underlying assets. This is generally accurate as a UoP structure itself essentially does not have any independent economic activities. However, an argument can be made that the UoP structure also has scope 3 emissions related to purchased services from the issuer. The logic followed is that the management of a UoP structure by the issuer generates emissions, for example for business travel to perform due diligence for potential investments or for office buildings that are used by the issuer. The UoP structure might pay a management fee for these services. However, this method considers that these emissions related to purchased services from the issuer are not material compared to the emissions of the underlying assets and can therefore be neglected in the GHG accounting approach.

Scope shifting

Drawing the assessment boundary around the underlying assets leads to a phenomenon called 'scope shifting' for integrated UoP structures where the issuer does not control the underlying assets. The following example illustrates this.

'Example of scope shifting'

An investor provides two debt instruments to an issuer - a 10 MEUR general purpose loan and a 10 MEUR green loan. The issuer is an unlisted FI that will use the green loan to on lend to renewable projects. No other investors participate in the green loan. All numbers are for the reporting year 2024 and are illustrative for the purpose of this example. The financed emissions numbers have already been attributed.

	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (Categories 1 -14) (tCO_2e)	Financed Scope 1 emissions (tCO_2e)	Financed Scope 2 emissions (tCO_2e)	Financed Scope 3 emissions (tCO_2e)
Issuer (corporate inventory)	4,000	6,000	8,000	20,000	500,000	200,000	1,500,000
Integrated UoP structure (green loan)	10	N/A	N/A	N/A	500	200	1,800

The general purpose loan is accounted in line with the 'Business loans and unlisted equity' asset class methodology. The financed emissions are aggregated into scope 3 category 15 and added to the scope 3 category 1 – 14 emissions.[11] The green loan is accounted as an UoP structure. The investor reports the following emissions impacts:

	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (tCO_2e)
Financed emissions (general purpose loan)[12]	10 / 4,000 x 6,000 = 15	10 / 4,000 x 8,000 = 20	10 / 4,000 x (20,000 + 500,000 + 200,000 + 1,500,000) = 5,550
Financed emissions (green loan)	10 / 10 x 500 = 500	10 / 10 x 200 = 200	10 / 10 x 1,800 = 1,800

The total financed emissions of the general purpose loan of 5,585 tCO_2e (= 15 + 20 + 5,550) are higher than the total for the green loan of 2,500 tCO_2e (= 500 + 200 + 1,800). Nonetheless, the scope 1 emissions of the green loan of 500 tCO_2e are higher than the scope 1 emissions of the general purpose loan of 15 tCO_2e. This is because the follow-the-money approach 'shifts' the emissions away from scope 3.

ADJUSTMENT FOR UNDER- AND OVERALLOCATION IN INTEGRATED UOP STRUCTURES

The methodology outlined in the above sections has implications for 'non-UoP' investors, which provide either loans without known of proceeds or equity. Under- or overallocation of emissions can occur if the emissions and total debt[13] of integrated UoP structures are not correctly considered by non-UoP investors. The following example demonstrates this for a UoP transition bond issued by a communication services corporate. It is assumed that three transition bond investors each invest 1 MEUR (totaling 3 MEUR transition bond investments) while 397 general investors each invest 1 MEUR in the overall corporate (totaling 397 MEUR regular investments). All numbers are for the reporting year 2024 and are illustrative for the purpose of this example. Corporate emissions and debt figures remain inclusive of transition bond totals:

	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (tCO_2e)
Communication Services Corporate	400	300,000	4,000,000	9,000,000
UoP transition bond	3	1,000	0	50,000
Corporate including transition bonds	400	300,000	4,000,000	9,000,000

[11] This is in line with the proposed paragraph on 'Accounting for financed scope 3 category 15 emissions'.
[12] If the guidance of the next section on 'Adjustment for under- and overallocation in integrated UoP structures' is incorporated for this example, the financed emissions of the general purpose loan should be adjusted to exclude the emissions and total debt of the green loan.
[13] Investors can only provide debt to integrated UoP structures, not equity.

Focusing on scope 1 emissions, non-UoP and transition bond investors would then calculate the following financed emissions:

	Scope 1
Total for non-UoP investors	(1 MEUR / 400 MEUR x 300,000 tCO_2e) x 397 investors = 297,750 tCO_2e
Total for UoP transition bond investors	(1 MEUR / 3 MEUR x 1,000 tCO_2e) x 3 investors = 1,000 tCO_2e
Total financed emissions	297,750 + 1,000 = 298,750 tCO_2e

In this example, the total financed emissions calculated (298,750 tCO_2e) are less than the total corporate emissions (300,000 tCO_2e), leaving 1,250 tCO_2e in emissions unaccounted for, i.e. under allocation. This example illustrates that an under- or overallocation of emissions occurs when non-UoP investors fail to demarcate the emissions and total debt of integrated UoP structures from the issuer's inventory.

To resolve this issue, non-UoP investors **should** calculate financed emissions by restricting their assessment boundary to the issuer's assets not covered by integrated UoP structures. The equation to calculate financed emissions becomes:

$$\frac{Outstanding\ amount}{(EVIC\ or\ Total\ equity) + Total\ debt - UoP\ debt}\ x\ (Company\ emissions - UoP\ emissions)$$

In practice, this is only feasible when the emissions and total debt of integrated UoP structures are separately disclosed. This method therefore recommends that when FIs issue an integrated UoP structure, they **should** report separately the emissions (including data quality score) and total debt covered by the structures. A worked example for this is '*Example reporting – FI with green bond and transition bond*'. In addition, when FIs invest in an integrated UoP structure, they **should** encourage issuers to implement similar separate reporting.

Nevertheless, non-UoP investors **may** calculate financed emissions based on the issuer's unadjusted total debt and emissions. Investors may choose to do this due to the following reasons:

- Theoretically impossible due to interconnected emissions: the emissions of integrated UoP structures cannot be independently defined. For more information see subsection 'Accounting for projects without a separate balance sheet' in the 'Project finance' asset class.
- Theoretically impossible due to interconnected debt + equity: the total debt of the integrated UoP structures cannot be separated from the issuer's total debt + equity. One example are sovereigns – since the financed emissions of sovereign debt are calculated using PPP-adjusted GDP instead of total debt + equity, it is theoretically impossible to adjust the PPP-adjusted GDP for the debt of integrated UoP structures.
- Practically not feasible: there is no sufficient data available to adjust.
- Not material: the integrated UoP structures are demonstrated to be not material within the issuer's emissions and total debt + equity, i.e. the adjusted and unadjusted figures would practically lead to the same results.

The following demonstrates how under- and overallocation can be prevented in the previous example:

	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (tCO_2e)
Communication Services Corporate	**400**	**300,000**	**4,000,000**	**9,000,000**
Total transition bonds	3	1,000	0	50,000
Corporate excluding transition bond	397	299,000	4,000,000	8,950,000

Focusing on scope 1 emissions, non-UoP and transition bond investors would then calculate the following financed emissions:

	Scope 1
Total for non-UoP investors	(1 MEUR / 397 MEUR x 299,000 tCO_2e) x 397 investors = 299,000 tCO_2e
Total for transition bond investors	(1 MEUR / 3 MEUR x 1,000 tCO_2e) x 3 investors = 1,000 tCO_2e
Total financed emissions	299,000 + 1,000 = 300,000 tCO_2e

Total financed scope 1 emissions calculated across non-UoP and transition bond investors are now equal to total corporate scope 1 emissions.

Accounting for projects without a separate balance sheet

The method proposes the following changes in the 'Project finance' chapter (5.3) of Part A:

*Remove the sentences "*To calculate emissions, only the financed (ring-fenced) activities are included. Emissions and financials related to existing activities outside the financed project but within the financed organization are not considered.*" from the section 'Asset class definition' in the 'Project finance' asset class (section 5.3). These sentences are replaced/refined by the new section proposed below.*

Add the following text as a new subsection 'Accounting for projects without a separate balance sheet' in the 'Attribution of emissions' section of the 'Project finance' asset class (section 5.3)

The attribution methodology for this asset class presupposes, in principle, that a separate balance sheet is available for the project, which usually requires that the project needs to be financed via a separate legal entity (e.g. a special purpose vehicle). In this case the legal entity can be considered a separate UoP structure with control over the project as the sole underlying asset, which based on the UoP structures method is accounted in line with the 'Project finance' asset class.

However, projects can also be financed without a separate balance sheet. This happens when a project is financed via a debt-based integrated Use of Proceeds structure and is particularly common for energy efficiency projects. Some examples are:

- Project to replace fluorescent lights with LEDs in buildings.
- Project to install a new boiler to upgrade a production line in a manufacturing plant.

In this case, the total debt in a project might be clear at origination but is difficult or impossible to monitor afterwards. If no information is available on total debt, the default attribution methodology in this asset class cannot be applied.

In line with the 'follow the money' approach, this section allows financed emissions accounting for projects without a separate balance sheet under the requirement that the emissions of the project can be defined independently. This means that the project activities are independent enough from the overarching entity for emissions to be allocated to the project. For example:

- Project replaces fluorescent lights with LEDs. The electricity use of the LEDs can be estimated.
- Project installs a new boiler. The fuel use of the boiler can be measured.

When the emissions can be defined independently and total debt is not available, the following attribution factor **may** be used:

$$Attribution\ factor_p = \frac{Outstanding\ amount_p}{Total\ debt\ at\ origination_p}$$

The total debt is frozen at origination, i.e. the moment the investment is made. Issuers should adjust the total debt in proportion to any repayments made and report this to investors. If issuers do not provide adjusted figures, FIs **should** adjust the total debt to the extent possible so that emission estimations are conservative. Total debt should be adjusted for any repayments received directly. It may also be possible to adjust for repayments to other co-investors if, for example, the financing structure is such that all co-investors are repaid the same amount.

This accounting methodology **shall** only be applied if the emissions of the project can be defined independently. If this no longer applies, emissions **shall** be calculated and attributed based on the financing share in the issuer or overarching entity, e.g. the whole manufacturing plant.

A worked example can be found in the technical appendix.

Accounting for financed scope 3 category 15 emissions

For both sections 5.1 'Listed equity and corporate bonds' and section 5.2 'Business loans and unlisted equity', the method proposes to add the following at the end of the section 'Emission scopes covered':

For reports published in 2025 onwards, every sector shall be included for scope 3. This entails that financed scope 3 category 15 emissions shall be reported for loans[14] and investments into other FIs. These emissions **should** include all categories listed under scope 3 category 15 in the GHG Protocol Corporate Value Chain (Scope 3) Standard and **shall** aggregate the scope 1, 2 and 3 emissions under the other FI's scope 3 category 15 emissions. In practice, FIs **may** include only those scope 3 category 15 emissions for which a PCAF Standard was published. A worked example can be found in the technical appendix.

The reporting of financed scope 3 category 15 emissions is essential to reflect the total financed emissions impact of loans and investments into other FIs. Any resulting double counting is like other types of double

[14] This section is applicable to general purpose loans to other FIs. For the accounting of loans via UoP structures, please refer to the 'Use of proceeds structures' method.

counting in scope 3. In the case when two FIs provide mutual loans/investments, FIs may account for the other FIs emissions without taking account the reverse loan/investment to prevent calculation loops.

The method proposes both sections 5.1 and 5.2 add the following at the end of the section 'Attribution of emissions':

For loans and investments into other FIs, the book value of debt (which is part of total equity + debt for private companies and part of EVIC for listed companies) includes customer deposits as these form a substantial part of the funding base and facilitate the economic activities of FIs similar to debt and equity.

2.2 Securitizations and structured products

Introduction

The purpose of this method is to provide guidance to financial institutions (FIs) on how to calculate financed emissions of securitizations and structured products. The methodology leverages existing guidance on residential and commercial mortgages, business loans, and motor vehicle financing, and where relevant provides a recap of key points, but further information is available in the existing asset class guidance. Where securitizations and structured products are labeled as 'Secured green standard bonds' or similar (e.g. green RMBS), the consultation documents on 'Use of proceed accounting' and 'Financed avoided emissions' guidance may be relevant.

Similar to other bonds, the issuance of structured products involves capital market functions. Part B will be updated in due course to provide a methodology for calculating facilitated emissions for securitizations and structured products based on this methodology for financed emissions.

The technical appendix forms part of the guidance and the consultation, and is referenced where appropriate throughout the guidance. All relevant terms and definitions can be found in the glossary of this consultation document.

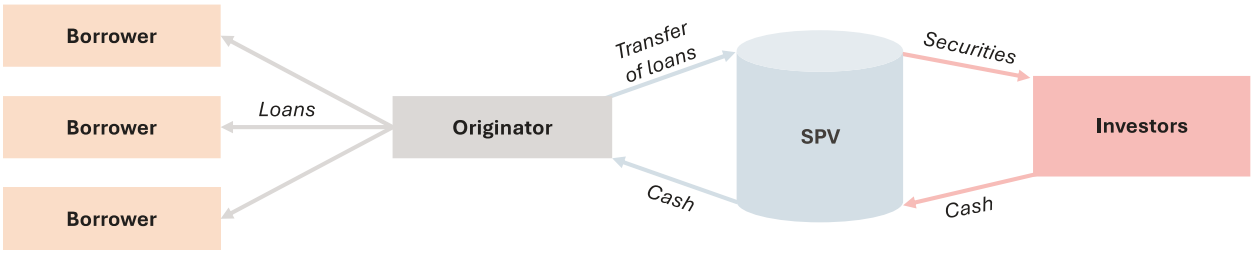
Asset class definition

Securitization is the process by which income-producing assets are typically sold by loan/lease originator(s) into a bankruptcy-remote entity, ringfencing them from the corporate risk of the originator. The entity can be a trust, special purpose vehicle (SPV), special purpose entity (SPE), or similar, and acts as the issuer of the securities issued to investors, off the back of the asset collateral, which forms the collateral pool for the deal. For some types of structures, such as covered bonds or synthetic securitizations (which are also covered by this methodology), the collateral pool (also known as reference pool) may remain on the originator's balance sheet rather than being sold to a trust or SPV, with ringfencing achieved through alternative legal provisions and contractual structures. For simplicity, this guidance refers to the issuing entity, which holds the collateral pool, as "SPV".

Assets in the collateral pool are held solely for the benefit of the investors. The assets could include a single loan/lease or a pool of loans/leases. For the sake of consistency, we will use the term "loan(s)" throughout this methodology to represent both loans and leases.

In securitization, investment banks create bond tranches by structuring the repayment of the debt (from the underlying assets) into different priorities to meet varying investor demands for risk, yield, maturity, etc. These tranches create the capital structure or capital stack. Bonds are typically issued by the SPV for each tranche and sold to investors.

Figure 2.21. Typical securitization process



For the sake of consistency, we will use the term "structured products" throughout this methodology to mean any whole loans (un-tranched), private asset-backed finance, and public securitizations where assets are legally ringfenced to achieve bankruptcy remoteness.

This asset class includes securitizations and structured products with various types of underlying collateral. An evaluation of the underlying collateral must be performed to determine the applicable methodology. Table 2.11 provides a summary of common collateral types that underpin structured products backed by different assets.

Table 2.11. General description of structured products in scope

Collateral type	Structured product type/acronym	Structured product investment	Inclusion guidance and PCAF reference
Residential and commercial real estate	RMBS	Agency and Non-Agency Residential Mortgage-Backed Securities (RMBS)	**Included** Built upon PCAF guidance in Part A (Mortgages subchapter 5.5)
	CMBS & CMO	Agency and Non-Agency Commercial Mortgage-Backed Securities (CMBS) Commercial Mortgage Obligations (CMO)	**Included** Built upon PCAF guidance in Part A (Commercial Real Estate subchapter 5.4)
	Mortgage Covered Bonds	Residential Mortgage Covered Bonds Commercial Real Estate Mortgage Covered Bonds	**Included** Built upon PCAF guidance in Part A (Mortgages subchapter 5.5, Commercial Real Estate subchapter 5.4)
	ABS/MBS	Other Property Backed Asset Backed Securities (such as, Triple Net Lease, Manufactured Housing, Single Family Rental, Timeshare)	**Included** Built upon PCAF guidance in Part A (Commercial Real Estate subchapter 5.4)
Business loans	CLO & CDO	Collateralized Loan Obligations (CLOs) Collateralized Debt Obligations (CDOs)	**Included** Built upon PCAF guidance in Part A (Business Loans and Unlisted Equity subchapter 5.2) for CLOs, and as appropriate for CDOs
Auto loans & leases	ABS	Automotive Asset Backed Securities (Auto ABS)	**Included** Built upon PCAF guidance in Part A (Motor Vehicle Loans subchapter 5.6)

Structured products out of scope			
Other hard assets	ABS	Other Hard Asset Backed ABS (e.g. Aircraft, Solar, Railcar, Equipment)	**Not included**, unless FI has access to asset-level emissions data
Miscellaneous	ABS	Consumer Related Structures (Cards, Student Loans, Small Business Loans, Home Equity Loans, etc.)	**Not included**, as no PCAF guidance is available yet, unless the FI has access to applicable asset level emissions data (small business loans)
	Covered bonds	Public Sector Covered Bonds, Land and Forest Covered Bonds	**Not included**, as no PCAF guidance available yet for public sector financing (except for sovereigns) or for land-based financing

The methodology cannot be applied if the nature of the assets held in the collateral pool is not known, i.e. a look through to the underlying assets is required, as per the PCAF principle of "follow the money". This pertains to both asset class and sector.

General guidance on emissions accounting

Securitizations and structured products are complex and involve multiple parties. This methodology can be used by various FIs along the structured product investment chain, including:

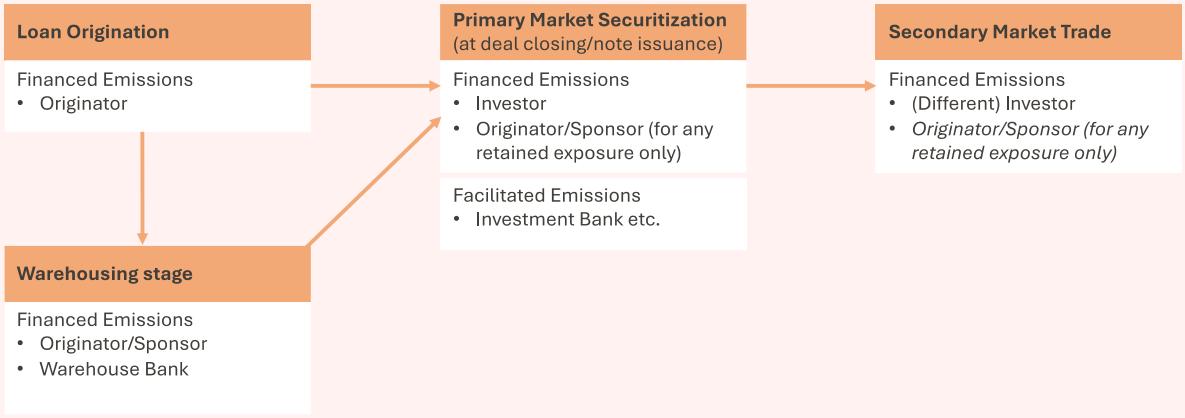
- **Originators:** Originators are often, but not always, FIs who originate and/or contribute assets to the securitization. The originator, sponsor, or original lender will include any assets held outside of the securitization as financed emissions under Part A, and this includes the loans destined for the deal, but pre-securitization. As loans are moved into the SPV, the originator may be able to reduce their financed emissions for the removed assets. Any loans retained by the originator, or in structured deals where there is no true sale to an SPV (such as covered bonds or synthetic securitizations), would be accounted for as financed emissions under Part A. For the sake of consistency, we will use the term "originator" to mean the originator, sponsor, or original lender of the loan(s) in the securitization.
- **Investors**: Investors (including investment banks acting as investors, or other parties participating in the deal as investors) will include any emissions associated with investments in structured products as financed emissions under Part A.
- **Arrangers/Banks/Intermediaries:** Arrangers assisting with the structuring and placement of the investment product at pre-issuance are responsible for most deal support (i.e. structuring advice, investor book, allocation, and roadshows. There are other roles such as underwriters, lead managers, banks, etc. Facilitators should account for emissions related to the transactions they have facilitated, as facilitated emissions under Part B as and when facilitate emissions guidance for this asset class becomes available.

Figure 2.22 illustrates how emissions are allocated throughout the loan origination and securitization process. When the loans are originated, the originator accounts for them as financed emissions. If they use a warehousing bank to hold loans until there is sufficient volume to issue a deal, the warehouse bank would also account for the loans as financed emissions for any portion it holds. The originator and warehouse bank are treated as lenders and Part A guidance for loans applies.

The transfer of the collateral pool from an originator to the SPV, and the issuance of bonds by the SPV happens simultaneously at deal closing. Once the bonds are issued and sold (allocated) to investors, the

emissions associated with the assets in the underlying collateral pool should be accounted for by the holders of those securities. Whether or not the originator needs to continue accounting for the emissions depends on the jurisdiction and whether the securitization transaction will be de-consolidated, and if they retain part of the loans or invest in some of the issued bonds, etc. Additional guidance on calculating emissions for risk retention can be found in the 'Technical appendix: *Part 2. Different types of exposures within structures'*.

Figure 2.22. Allocation of emissions (financed and facilitated) throughout the loan origination and securitization process



Note: Emissions should be allocated to an institution based on the role it is performing, noting that an institution may perform more than one role in a transaction (and therefore be allocated more tan one type of emisión). For example, an investment bank may act as an investor (e.g. via a treasury or through its trading book: financed emissions) and also a syndicate bank for transactions (facilitated emissions).

The guidance is focused on the most typical securitization structure, where assets are pooled and transferred to an SPV which issues tranched securities. However, there are various structures (e.g. synthetic securitizations, where the credit risk is transferred but the assets remain on the originator's balance sheet) and structural features (e.g. splitting bond tranches into interest only and principal only strips). Further guidance on how different structure types and structural features are handled can be found in the 'Technical appendix*: Part 1. Different types of structures'*.

Emission scopes covered

Investments in structured products would fall under scope 3 category 15 of a FI's emissions inventory. Emissions accounting for a structured product **shall** cover the absolute scope 1 and 2 emissions related to the hard assets backing the underlying collateral of that product. In the same way as the emissions from the assets backing loans fall under scope 3 category 15 of a FI's emissions inventory when sat on their balance sheet, these emissions fall under scope 3 category 15 of a securitization SPV's emissions inventory when the loans are held in an SPV (e.g. as part of a securitization transaction).

Real estate: Emissions accounting **shall** cover the absolute operational scope 1 and 2 emissions related to the energy use of the property financed, on a whole building basis, i.e. energy use includes the energy consumed by the building's occupants and shared facilities. Reporting financed emissions from the construction or renovation of buildings and embodied carbon (scope 3 emissions) is optional.

Business loans: Emissions accounting **shall** cover the absolute scope 1 and scope 2 emissions of borrowers and investees. For sectors where scope 3 emissions reporting is required, in line with PCAF's phase-in approach, absolute scope 3 emissions, including the specific sectors covered, shall be disclosed separately to scope 1 and scope 2 emissions. Separate reporting allows for full transparency while acknowledging potential double counting.

Auto loans/Leasing: Emissions accounting **shall** cover the annual scope 1 and scope 2 emissions of the vehicles being financed. scope 3 emissions related to the production of the vehicles, delivery of vehicles to buyers, or decommissioning of vehicles after use do not need to be covered.

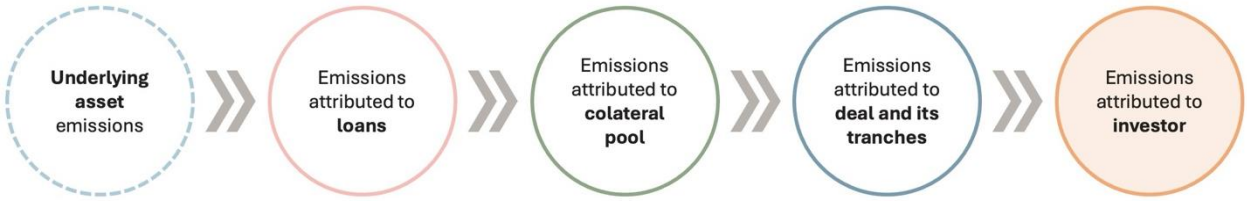
Other hard assets: Emissions accounting **shall** cover the annual scope 1 and scope 2 emissions of the equipment being financed. Scope 3 emissions related to the production of equipment, delivery of equipment to buyers, or decommissioning of equipment after use do not need to be covered.

Attribution of emissions

Emissions accounting for structured products requires consideration of both the hard assets in the collateral pool and the securities created through the transaction. More specifically, the emissions allocated to the securities are derived from the emissions attributed to the collateral pool, which in turn are determined from the emissions of the underlying hard assets backing the loans in the collateral pool. There are, therefore, four steps in the financed emissions attribution to investors:

1. Calculate asset level emissions of the individual loans.
2. Attribution of underlying asset emissions to individual loans in accordance with asset class guidance under Part A, i.e. in accordance with guidance as referenced in Table 2.21.
3. Attribution of loan emissions to the collateral pool, effectively a portfolio of loans.
4. Attribution of collateral pool emissions to the bond structure and allocation to each of the deal tranches, as well as to any retained interest, or equity, in the deal.
5. Attribution of tranche emissions to the investor, based on the share of holding relative to tranche size.

Figure 2.23. Overall attribution approach



Attribution of Facilitated Emissions to deal arrangers/underwriters should follow the same approach, but apply PCAF guidance under Part B.

GUIDING PRINCIPLES ON FINANCED AND FACILITATED EMISSIONS FOR STRUCTURED PRODUCT INSTRUMENTS

1. Total financed emissions allocated to the various tranches of a securitization should be equal to the emissions of the financed assets (no double counting between tranches). For these purposes:
   a. tranche means each of the separate elements of the principal liabilities of the securitization (e.g., class of notes, class of loan notes, sub-loans, balance-sheet financed covered bond pool buffer amount / retained senior exposure of SRT transaction, over-collateralization, etc.).

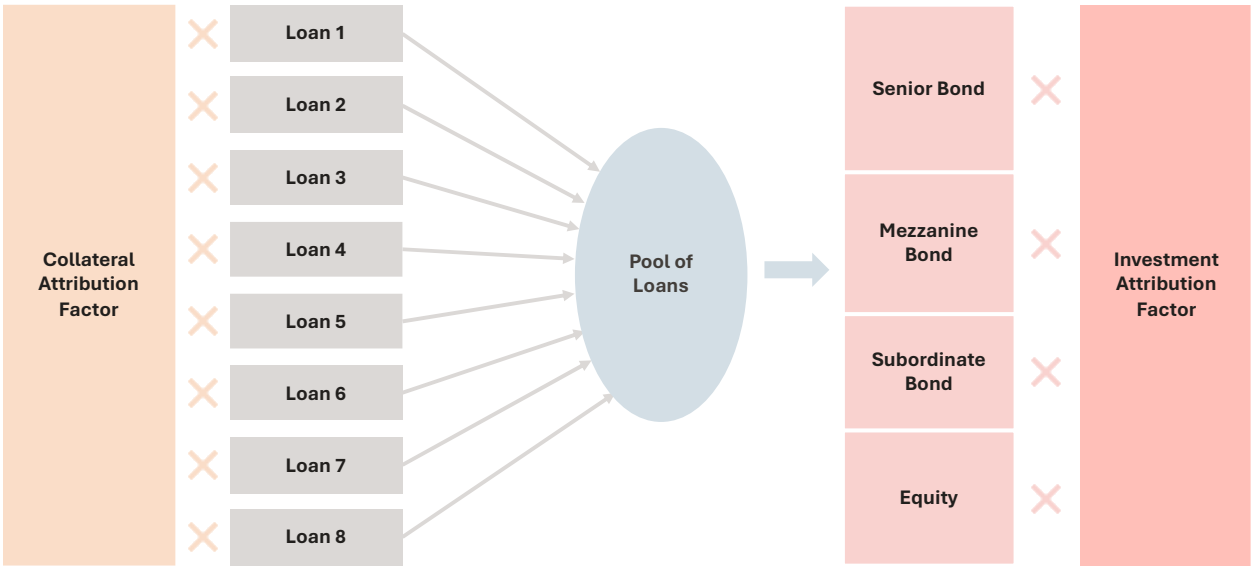
b. which, when taken together at their nominal amount, equal the nominal outstanding amount of the loans in the pool at the closing of the deal.

2. Total financed emissions allocated to the various tranches of a securitization should be equal to the emissions that would be attributed to the financed assets if they were on the balance sheet of an originator (regardless of whether they are on the balance sheet of the originator or not).
3. Tranches of the securitization are allocated financed emissions where they are (largely) repaid from (either directly or with reference to) the principal receipts of the loans secured by the financed assets.
4. Financed emissions of loans that are securitized but remain on the balance sheet of an originator will be accounted for by both the holders of the securitization tranches and the originator/sponsor, but this apparent double counting is not inconsistent with the general approach to scope 3 emissions.

The 'Technical appendix: *Part 2. Different types of exposures within structures'* provides more detailed information on different types of exposures within structures and on structural features.

The attribution of asset emissions to the collateral pool and to the investor requires multiple attribution factors.

Figure 2.24. Attribution Factors Diagram for Structured Products



1. COLLATERAL ATTRIBUTION FACTORS

The collateral attribution factor (CAF) is used to attribute emissions of the underlying hard assets to the loans held in the collateral pool underpinning the investment structure. These factors are asset class specific as per Table 2.22. All attribution factors reference the current outstanding amount (COA).

Table 2.22. General Collateral Attribution Factor formulae

Collateral type	Structure	Collateral attribution factor (CAF)
Real estate	RMBS	$CAF_{Real\ Estate} = \frac{COA\ (Nominal)}{Property\ Value\ at\ Origination}$
	CMBS & CMO	
	Mortgage Covered Bonds	
	Other Property-Backed ABS, MBS, or structured finance	
Business loans	CLO & CDO	By underlying asset: $CAF_{Business} = \frac{COA\ (Nominal)}{Total\ Equity + Debt}$ $CAF_{Corporate} = \frac{COA\ (Nominal)}{Enterprise\ Value\ Including\ Cash}$ $CAF_{Real\ Estate} = \frac{COA\ (Nominal)}{Property\ Value\ at\ Origination}$
Auto loans	Auto ABS	$CAF_{Hard\ Asset} = \frac{COA\ (Nominal)}{Total\ Value\ at\ Origination}$
Other hard assets	Other hard assets back by ABS	$CAF_{Hard\ Asset} = \frac{COA\ (Nominal)}{Total\ Value\ at\ Origination}$

Collateral attribution factors should never exceed a value of 1.0. A maximum value of 1 should be applied to avoid artificially creating emissions.

Where possible, FIs (e.g. originator, investor) shall strive to obtain the nominal value (rather than a market value) of the current outstanding amount (COA) of the loan at the time of GHG accounting to calculate the CAF. Current outstanding amount is the current remaining principal balance outstanding of the loan (or the current balance including accrued interest can be used if the current principal balance is not available).

If the COA cannot be obtained or calculated, the FI may use the nominal original outstanding amount (at the point of securitization) to determine the collateral attribution factor and shall disclose this in emissions reporting. Original outstanding amount (OOA) is the principal amount of the loan at the time of deal closing, i.e. issuance.

Where possible, the asset value at loan origination should be used rather than any more recently updated asset value. There are nuances to this approach in certain structures, e.g. US CMBS/ABS master trusts - see 'Technical appendix: *Part 2. Different types of exposures within structures'* for more details.

In order of priority or preference, the calculation for the CAF should be:

1. Current outstanding amount / Asset value at origination
2. Original outstanding amount / Asset value at origination
3. Current outstanding amount / Updated asset value
4. Original outstanding amount / Updated asset value

As a loan pays down, the loan's COA will be different from the OOA. This is often the case at the point the loan is sold into the SPV, i.e. the loan is "seasoned" at deal closing, adjusted for drawdowns, amortization, and other repayments relative to the initial outstanding amount from the time the loan was first originated by the originator. The loan amount at securitization deal closing is the OOA, as described above. Post-closing,

as the loan continues to pay down, the collateral attribution factor and financed emissions will evolve accordingly. Consideration should also be given to any drawdowns, if provided for in the terms of the loan, but treatment would depend also on the terms of the securitization.

Box 2.21. Note on amortization
Adjusting the outstanding amount for loan amortization captures the reduced level of financing, and increased level of equity, i.e. amortization shifts the emissions from the FIs to the borrower. Real-world decarbonization would come from improvements in the energy consumption and/or emissions of the underlying assets. Analysis of change can be used to disaggregate the contributors to changes in financed emissions and/or emissions intensity to isolate real-world impacts.

2. LOAN ATTRIBUTION FACTOR

The collateral pool emissions are the total of attributable loan emissions. The amount of attributed underlying asset emissions factored into collateral pool emissions is proportional to the share of the loan amount held in the pool relative to the total loan amount. For example, if 50% of a loan is contributed to collateral pool A and 50% to collateral pool B, the emissions attributed to the loan are split 50/50 between the two collateral pools. If the full loan is contributed to the collateral pool, the full attributed loan emissions are factored into the collateral pool emissions.

The general formula for loan attribution factor (LAF) is provided below, but as noted above the loan amounts factored in should be updated to COAs for each emissions accounting period to reflect any amortization and/or other capital repayment under the loan.

$$Loan\ attribution\ factor = \frac{Loan\ COA\ (Nominal)\ in\ Pool}{Total\ Loan\ COA\ (Nominal)}$$

3. TRANCHE ATTRIBUTION FACTOR

The emissions allocated across all relevant tranches within the capital structure need to match the emissions allocated to the collateral pool. Individual tranche allocations are based on the relative size of the tranches in the deal.

Tranche seniority, or position in the capital structure, does not affect financed emissions as each tranche is exposed to the same underlying collateral pool, and therefore, seniority is not considered in the equations to calculate financed emissions. Additional guidance on how to account for losses and default can be found in the 'Technical appendix: *Part 3. Principal loss and default'*.

The general formula for tranche attribution factor (TAF) is provided below. As for loans, the tranche amounts factored in should be updated to nominal COAs for each emissions accounting period to reflect any amortization and/or other capital repayment of the tranche.

$$Tranche\ attribution\ factor = \frac{Tranche\ COA_i}{\sum_{i=1}^{n} Tranche\ COA_i} = \frac{Tranche\ COA}{Deal\ COA}$$

4. INVESTMENT ATTRIBUTION FACTOR

Attribution of tranche emissions to the investor is based on the size of the investor's holding/allocation in the deal relative to the total size of the tranche:

$$Investment\ attribution\ factor = \frac{Tranche\ investment\ COA}{Total\ tranche\ COA}$$

Equations to calculate financed emissions

Where emissions information is available at the loan or collateral pool level, emissions are apportioned across the capital structure (all relevant tranches) corresponding to their relative share of the collateral, as per Table 2.23. The financed emissions formula set provides for both single collateral pool structures and structures that represent a portfolio of loan pools (pool of pools).

If a collateral pool attaches to a specific tranche or tranches, these should be treated as separate transactions to allow appropriate attribution of underlying asset emissions. The investor would then need to aggregate the attributed emissions across these transactions to calculate its investment portfolio financed emissions.

Table 2.23. Financed emission formulae

Level	Financed emissions (FE)
Loan	$FE_{loan} = \sum_{i=1}^{n} Emissions_{collateral_i} * CAF_{collateral_i}$ See Table 1. for collateral attribution factors by collateral type. If loans feature multiple types of collateral, each type should be assessed separately to reflect the appropriate collateral attribution factor (CAF).
Collateral pool	$FE_{pool} = \sum_{i=1}^{n} Loan\ attribution\ factor * FE_{loan_i} = \sum_{i=1}^{n} \frac{Loan\ COA\ (Nominal)\ in\ Pool_i}{Total\ Loan\ COA\ (Nominal)_i} * FE_{loan_i}$
Pool of pool (if relevant)	$FE_{PoP} = \sum_{i=1}^{n} \frac{Pool\ COA\ (Nominal)\ in\ Pop_{Deal_i}}{PoP\ COA\ (Nominal)_{Deal_i}} x FE_{Pool_i}$
Tranche	$FE_{tranche} = Tranche\ attribution\ factor_i * FE_{Pool\ (PoP)} = \frac{Tranche\ COA\ (Nominal)_i}{Deal\ COA\ (Nominal)_i} * FE_{Pool(or\ PoP)}$
Deal	$\sum_{i=1}^{n} FE_{tranche_i} = FE_{deal} = FE_{Pool(or\ PoP)}$
Investment	$FE_{Investment} = \sum_{i=1}^{n} \frac{Tranche\ investment\ COA\ (Nominal)_{tranche_i}}{Total\ tranche\ COA\ (Nominal)_{tranche_i}} * FE_{tranche_i}$

FIs shall use the nominal COA at the time of GHG accounting to calculate the financed emissions and, where calculated, emissions intensity. To determine the economic carbon intensity (ECI) of an asset, collateral

pool(s), tranche, or investment holding, a FI should divide the relevant financed emissions by the relevant nominal COA (e.g. pool financed emissions ÷ total pool nominal COA).

In certain cases, the financed emissions of the underlying collateral pool might be reported directly. For example, a covered bond issuer might publish an annual report containing the financed emissions. An investor's financed emissions can then be calculated as follows:

$$Investment\ financed\ emissions = \sum_{i=1}^{n} Investment\ attribution\ factor * Tranche\ attribution\ factor * Reported\ emissions$$

If the FI does not have the data required to follow the preferred approach noted above, emissions intensity (e.g. tCO_2e/$M) can be applied to the COA of a tranche or investment to determine the allocation of financed emissions. If this approach is taken it should be transparently disclosed in line with PCAF data quality score guidance.

Example: Emissions accounting for an RMBS

This worked example is for illustrative purposes only.

A loan pool of 5 mortgages secures a three-tranche RMBS deal. Most of the mortgages are amortizing and the mortgaged property emissions haven't changed since origination. As a result of loan amortization, financed emissions at loan and collateral pool level have reduced since the deal closing. Amortization from underlying loan collateral is applied fully sequentially across the capital structure, i.e. to the senior tranche until that is fully repaid, then to the mezzanine tranche, and finally to the subordinated tranche.

The calculations at the loan and collateral pool level are captured in the table below:

Loan level	Original outstanding amount	Current outstanding amount	Property value at origination	Collateral scope 1+2 emissions (tCO_2e)	Original collateral attribution factor	Original financed emissions (tCO_2e)	Current collateral attribution factor	Current financed emissions (tCO_2e)
Mortgage 1	550,000	500,000	1,000,000	5	0.55	2.75	0.50	2.5
Mortgage 2	1,000,000	900,000	1,200,000	10	0.83	8.3	0.75	7.5
Mortgage 3	1,000,000	1,000,000	1,667,000	30	0.60	18	0.60	18
Mortgage 4	450,000	400,000	1,000,000	15	0.45	6.75	0.40	6
Mortgage 5	650,000	600,000	750,000	20	0.87	17.4	0.80	16
Pool	**3,650,000**	**3,400,000**		**80**	-	**53.2**	-	**50**

Impact of asset emissions reductions: If the collateral emissions associated with Mortgage 3, for example, had been reduced, the loan and collateral pool financed emissions would have been reduced further. Let's assume Mortgage 3 emissions had reduced to 20 tCO_2e. The current financed emissions at loan level would

have reduced from 18 tCO_2e to 12 tCO_2e, and the current pool of financed emissions would have reduced to 44 tCO_2e as a result (all else equal).

By multiplying each individual loan's attribution factor and emissions, and summing the results, we can obtain the financed emissions of the entire MBS structure.

The follow-the-money principle is applied to the tranches within the capital structure to apportion the total deal emissions in the below table.

Capital (tranche) structure	Original tranche face amount	Original tranche attribution factor	Original financed emissions (tCO_2e)	Current tranche face amount	Current tranche attribution factor	Current financed emissions (tCO_2e)
Senior	2,250,000	0.62	32.8	2,000,000	0.59	29.4
Mezzanine	1,000,000	0.27	14.6	1,000,000	0.29	14.7
Subordinated	400,000	0.11	5.8	400,000	0.12	5.9
Deal	**3,650,000**	**-**	**53.2**	**3,400,000**	**-**	**50.0**

As the amortization from underlying collateral is applied fully sequentially across the capital structure, the financed emissions of the senior tranche reduce as the tranche attribution factor and the overall level of financed emissions falls, while the tranche attribution factors of the subordinated tranches increase.

Impact of pro-rata amortization of deal tranches: If amortization from the mortgage collateral pool were to be applied pro-rata across tranches, the tranche attribution factors would remain static and the impact of reduced emissions at the collateral pool level would be reflected in lower current financed emissions for all tranches.

Once financed emissions are calculated at the tranche level, an investor can then attribute their share of those emissions in proportion to their ownership of each tranche. The attributed financed emissions over time would, of course, depend on (i) the allocation (investment amount) per tranche, (ii) which tranches the investor already holds, (iii) and if total allocation across tranches has changed. If the investor held a higher proportion of their investment in an amortizing tranche, they would see a greater impact from the collateral pool financed emissions reductions than would be the case if the tranche were not amortizing.

The following table illustrates the attribution of emissions to the investor, assuming they hold 50% of each tranche (Investment attribution factor = 0.5).

Capital (tranche) structure	Original tranche face amount	Original tranche financed emissions (tCO_2e)	Original investment face amount	Original investment financed emissions (tCO_2e)	Current tranche face amount	Current tranche financed emissions (tCO_2e)	Current investment face amount	Current investment financed emissions (tCO_2e)
Senior	2,250,000	32.8	1,125,000	16.4	2,000,000	29.4	1,000,000	14.7
Mezzanine	1,000,000	14.6	500,000	7.3	1,000,000	14.7	500,000	7.3
Subordinated	400,000	5.8	200,000	2.9	400,000	5.9	200,000	3.0

Total	**3,650,000**	**53.2**	**1,825,000**	**26.6**	**3,400,000**	**50.0**	**1,700,000**	**25.0**

Emissions intensity, ECI, for the loan pool, for example, would be 14.7 calculated using the 50 tCO_2e mortgage pool financed emissions calculated above the COA of 3.4M. The ECI of the senior tranche, for example, would also be 14.7 but calculated using the 29.4 tCO_2e of senior tranche financed emissions and the 2M COA.

Data required and data quality score

It is not common for the reported emissions of the assets collateralizing structured products to be available. Thus, it is often challenging for originators to collect actual emissions data for the underlying assets. In this context, it should be noted that emissions for underlying assets may be estimated in line with relevant PCAF methodologies.

- For commercial and residential real estate, data may be available from various external sources and commercial databases that can be considered for building emissions estimates as outlined in Part A Chapters 5.4 and 5.5. This may include known building characteristics (building type, location, floor area, units), energy consumption/use, energy sources, renewable energy use, energy labels/scores, location-specific statistical data, supplier-specific data, etc.
- For motor vehicle loans and auto collateral, specific vehicle details (type, year, make, model, trim, fuel type), actual vehicle fuel consumption or actual vehicle distance traveled must be known to determine the actual vehicle emissions. As detailed in Part A Chapter 5.6, emissions can be estimated using vehicle efficiency data from official statistical data sources, and by estimating distance traveled based on government-supported data sources that provide local/ provide geography-specific statistical data on average vehicle distance traveled. PCAF's web-based emission factor database provides emissions factors per vehicle type for a large set of geographies.

Given the lack of publicly available data and the complexity of estimating emissions for hard assets, originators are urged to provide all applicable data to assist in calculations of financed emissions. In cases where it is not possible to provide loan-level data (which is the preferred approach), it is still acceptable to provide stratified data on the collateral pool, which can support emissions estimation (e.g. industry sector, property type, etc.). Originators are also urged to begin additional data collection processes with the borrower at loan origination. Over time, more relevant data will be collected and should be passed to investors for more accurate emission calculations.

When assessing the emissions of these assets, it's necessary to distinguish between asset types where emissions data is:

- available directly from the originator/sponsor
- able to be estimated using PCAF's EXIOBASE emission factor databases,
- available or estimated using an external third-party data source, or
- not currently available for the asset type.

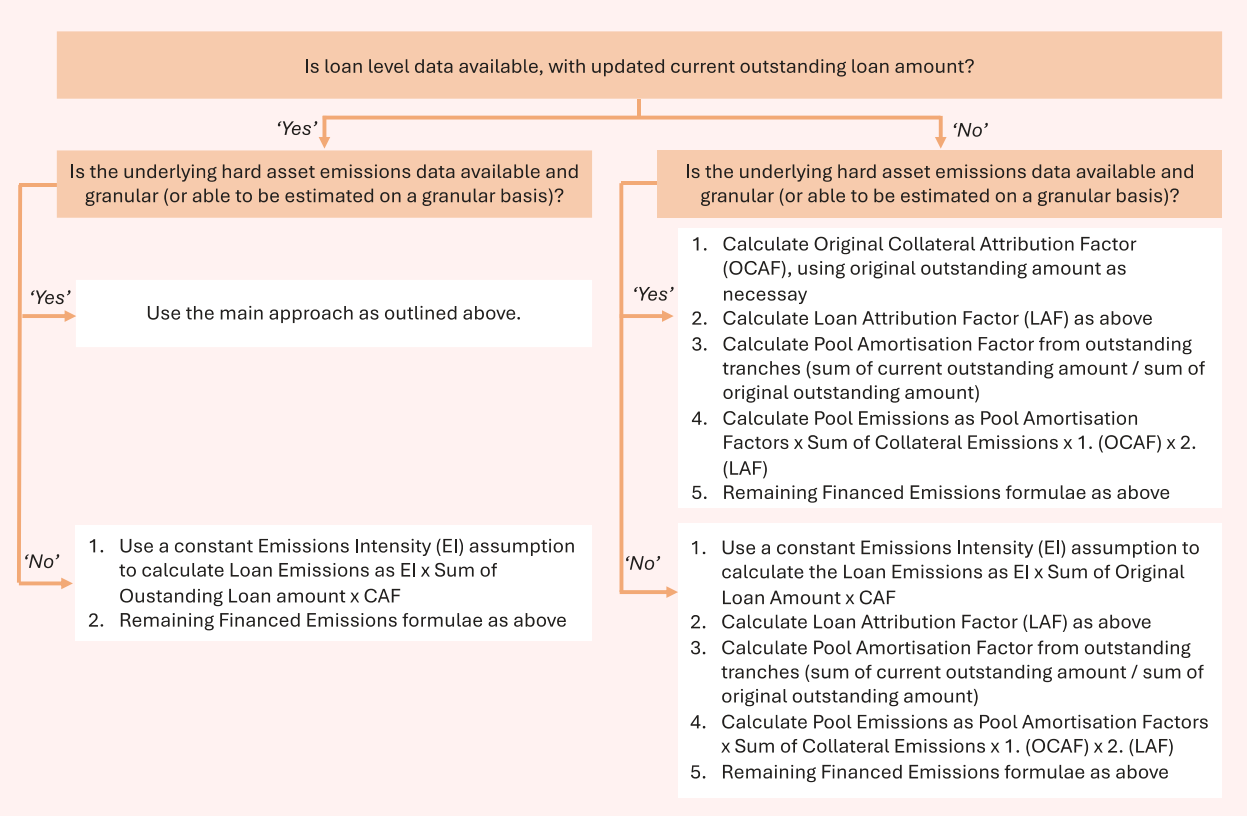
The accessibility and accuracy of emissions data can vary significantly, and access may be dependent on where the user sits in the investment chain. As regulatory and industry best practice disclosure standards evolve, it is expected that originator/sponsor will provide the majority of emissions data with the highest data quality, as they are best positioned to obtain or estimate this information.

FIs should use the highest quality dataset available and evaluate new data sources originator/sponsor regularly. Nonetheless, there may be cases where the only underlying data available for a given structured

product investment is the institution's investment amount and the structured product investment type. Whenever data is estimated, the FI should always take the most conservative approach and outline the approach in proper disclosures. For example, if residential property type is not provided in an RMBS transaction, a FI should assume all property types in the collateral pool are backed by single-family detached homes (or the most emissions-intensive property type equivalent).

This method assumes that original and current outstanding loan amounts are available at the collateral pool level. However, this may not be the case, in which case a pool amortization factor or constant emissions intensity can be used to estimate tranche-level, and investment-level, emissions metrics, as per Figure 2.25.

Figure 2.25. Structured products data quality decision tree



To encourage industry-wide improvement in the availability and usage of best-in-class data, PCAF provides **PCAF data quality scores** in Part A of the Standard which should be referred to for the underlying hard assets in the structured product. The structured products data quality decision tree can be calculated based on a weighted average by the COA of the underlying assets (mortgages, business loans, leases, etc.).

Given the complexity of estimating emissions for all hard assets, originators are strongly encouraged to provide emissions, and emissions-related data, at the loan (or, if not possible, pool) level to create more standardization in downstream emissions reporting. This will help improve data quality.

Assessment boundary

The assessment boundary for emissions is limited to the assets in the collateral pool of the deal.

For the avoidance of doubt, this methodology would also apply to structured products labeled 'green' or similar, e.g. a green CMBS. The methodology should be applied so that the financed emissions reflect the collateral pool composition. Where the hard asset(s) collateralizing the structured product include a "green" or "sustainable" attribute (such as, for example a LEED Platinum certified office building), FIs could also incorporate guidance, as applicable, from the consultation documents on 'Use of proceed accounting' and 'Financed avoided emissions' guidance.

Where deal structures allow for a changing collateral pool, the composition of the pool at the time of reporting should be reflected in financed emissions. Emissions attribution showing the drivers of change over the reporting period could be used to help explain changes in financed emissions due to changes in the collateral pool composition. More information on different types of structures and structural features is provided in the 'Technical appendix: *Part 1. Different types of structures'*.

FIs **shall** account for and disclose all financed from structured products as outlined in this methodology. FIs must calculate and disclose both financed and facilitated emissions of all structured products held at the time of reporting, noting that the point in time would depend on the deal reporting cycle and the FI's reporting cycle.

Limitations

RESULTS DEPEND ON DATA QUALITY

Many assumptions must be made to calculate the emissions of hard assets if emissions are not reported. Even though the calculation method does not differ greatly, different data sources can yield different results—for instance, when average energy consumption data is replaced by actual consumption data from utility companies. If deals are repackaged (e.g. a structured product deal invests in the bonds of a securitization), data sourcing and estimation might be further complicated. For existing deals which do not already provide for emissions tracking and reporting, it is unlikely that such information would be provided under the terms of the bonds. FIs should always report on any data assumptions made and external data sources used in estimating emissions.

COUNTRY-SPECIFIC ASSUMPTIONS

Some country-specific adjustments will need to be made to make the calculation applicable depending on the data availability and standards in each country. For example, the variations across countries in their systems of categorizing the energy efficiency of houses require a tailored approach for optimal accuracy in calculations (EPC A in the United Kingdom is not the same as EPC A, or EPC A++++ across some European countries).

DOUBLE COUNTING

Double counting is a frequent and inherent aspect of scope 3 GHG accounting and does not need to be seen as problematic, as long as:

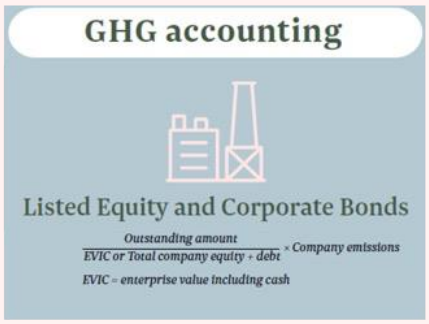
- Double counting does not interfere with stated decarbonization goals of issuers and investors.
- Methodologies and limitations are made transparent as part of the disclosure.

Under international accounting standards, the treatment of securitized assets and associated liabilities (e.g. for capital requirement purposes) depends on whether the securitization is considered a financing or a clean sale for accounting purposes. Specific accounting treatment may vary based on the jurisdiction and the applicable accounting standards (such as IFRS or US GAAP).

The securitization of different asset classes may result in the transfer of credit risk exposures from originators to investors. The structuring of these products potentially causes double counting of financed emissions in different areas e.g. through associating the same emissions with originators, issuers, investors, arrangers, etc.

Double counting in relation to the holders of listed equity and corporate bonds of an originator should not occur if both the securitized assets and associated securitization liabilities are included on the originator's balance sheet. In this case, the securitization debt in the EVIC denominator serves to reduce the volume of emissions allocated to the equity and corporate debt as these form part of the originator's overall on-balance sheet emissions. If the emission intensity of the securitized assets is different from the weighted average asset emissions intensity on the originator's balance sheet, then this may result in a small difference in the calculation of the carbon intensity of the listed equity and corporate bond per GHG accounting. Examples of accounting for a specific use of proceeds instrument (e.g. a securitization) and adjustments are provided in the consultation document for 'Use of proceeds accounting'.

Figure 2.26. If the assets are already on the corporate balance sheet, are we double counting by also allocating emissions to securitization tranches?



Illustrative example:

EVIC Components (£bn)	
Market cap. of shares	35
Book value securitised debt	5
Book value corporate debt	330
Customer Deposits	500
Total	870

Scope 3 Emissions (from balance sheet assets) $ktCO_2$	
Securitised mortgages	90
Un-securitised mortgages	5100
Other consumer loans	1540
Customer Deposits	1000
Total	7,730

Carbon Intensity of Listed Equity and Corporate Bonds per GHG = $\frac{\text{Company emissions}}{\text{EVIC or Total company equity + debt}} = \frac{7{,}730}{870} = 8.89\ tCO_2/£m$

But carbon intensity of securitised debt = $\frac{90}{5} = 18.0\ tCO_2/£m$

and therefore actual carbon intensity of everything *excluding* securitised debt = $\frac{7.730 - 90}{870 - 5} = 8.83\ tCO_2/£m$

To support the guiding principle that double counting should not arise within structures, the 'Technical appendix: *Part 1. Different types of structures',* gives guidance on the appropriate treatment for various structural nuances where questions on double counting could otherwise arise, such as where a tranche is split into interest only (IO) and principal only (PO) strips or under a repurchase agreement on a structured product.

2.3 Sub-sovereign debt

Introduction

The purpose of this method is to provide guidance to financial institutions (FIs) on how to calculate financed emissions from sub-sovereign debt. The methodology heavily leverages the PCAF Sovereign debt[15] method in Part A. Hence, it is recommended to read this chapter in conjunction with the method on sovereign debt.

Asset class definition

This asset class includes sub-sovereign bonds and sub-sovereign loans of all maturities issued in domestic or foreign currency. Sub-sovereign issuers are defined as issuers with jurisdiction and influence over a certain territory within a country below sovereign level e.g., regions, cities, municipalities. Depending on the respective country, the administrative levels may be different in terms of structure (e.g. while some countries have three administrative sub-sovereign levels, others have more or less relevant levels) and naming (e.g. "states" in the US correspond to "provinces" in Canada). Issuers of all administrative levels below the sovereign level are covered in this method. To ensure consistent language and clarity in the following, for this method three sub-sovereign levels are defined: regional, city and local level. When applying this method, FIs may deviate from the three-levels assumed here to reflect the administrative structure of different countries the FI is invested in.

Table 2.31. Territory classification example

Territory classification example for France (administrative levels for this method)	
Sovereign: Country	France
Sub-sovereign: Regional level	Ile-de-France
Sub-sovereign: City level	City of Paris
Sub-sovereign: Local level	Paris, Essonne and other municipalities

Sub-sovereign debt is typically issued by regional or local governments as well as cities. Both sub-sovereign loans and bonds lead to the transfer of funds to the respective sub-sovereign issuer creating a debt obligation to be repaid by the borrowing entity.

While data availability on sub-sovereign level was very limited in the past, improvements have been made for certain countries and emission scopes. Data availability is not yet complete, neither in terms of country coverage nor emission scopes. However, to signal that GHG accounting for sub-sovereign debt is important to FIs and to support greater emission reporting, the sovereign debt methodology has been extended to sub-sovereign debt with certain adjustments and limitations.

"SOVEREIGN-LIKE" VERSUS "CORPORATE-LIKE" SUB-SOVEREIGN ISSUERS

The sub-sovereign asset class is diverse in terms of the types of issuers included. As outlined above, sub-sovereign issuers may be issuers with jurisdiction and influence over a certain territory, similarly to sovereigns with jurisdiction over a country. These types of sub-sovereign issuers are classified as "sovereign-like" sub-sovereigns and include e.g. the state of New York and the province of Quebec.

[15] https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf

Sub-sovereign issuers generally also cover issuers that are responsible for specific public services and facilities like state owned companies and government agencies (e.g. Indiana Municipal Power Agency (US), Power Finance Corp Ltd (India), SNCF Reseau (France)). These types of sub-sovereign issuers are operating akin to a company and are therefore characterized as "corporate-like" sub-sovereign issuers. These "corporate-like" sub-sovereigns are not covered in this method. For investments in "corporate-like" sub-sovereign issuers, FI shall use the Listed equity & corporate bonds chapter and for lending to "corporate-like" sub-sovereign issuers, FIs shall use the 'Business loans' chapter of Part A.

Therefore, the type of sub-sovereign issuer (sovereign- or corporate-like) will determine whether emissions will be accounted for based on this methodology.

Emissions covered

When accounting for financed emissions from sub-sovereign debt, FIs **shall** report sub-sovereign borrowers' absolute scope 1 emissions in line with the proposed scope definition below. For certain sub-sovereign debt this approach permits estimates with lower data quality scores (see data quality score table, table 2.35). Moreover, scope 2 accounting **should** be reported but this data is limited on a sub-sovereign level. Scope 3 and exported emissions accounting **should** be reported but this data is largely not available on a sub-sovereign level.

SCOPE DEFINITION

The table below represents the sub-sovereign debt emission scope definitions. These definitions are in line with the definition for sovereign debt:

Table 2.32. Emissions scope definitions

Scope 1	Scope 2	Scope 3
Domestic GHG emissions from sources located within the regional, city or local territory where there is jurisdiction and direct influence	GHG emissions occurring as a consequence of the domestic use of grid-supplied electricity, heat, steam and/or cooling which is imported from another regional territory where there is no jurisdiction or direct influence	Emissions attributable to non-energy imports as a result of activities taking place within the regional territory where there is jurisdiction and direct influence

The GHG Protocol's definition of scope 1 emissions was initially developed for the classification of corporate emissions. Alongside corporate emissions, the GHG Protocol published a Global Protocol for Community-Scale Greenhouse Gas Inventories (i.e. an Accounting and Reporting Standard for Cities)[16], which translated the scope definitions to cities. PCAF currently mirrors this approach for the sovereign debt asset class. The sub-sovereign debt method aims to mirror this approach by applying the same logic for emissions accounting across sub-sovereign levels.

PCAF defines scope 1 emissions of sub-sovereigns as the domestic GHG emissions from sources located within the regional, city or local territory where there is jurisdiction and direct influence.

[16] Global Protocol for Community-Scale Greenhouse Gas Emission Inventories, GHG Protocol, 2014 (revised edition in 2021), https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities

The proposed scope 1 definition aligns with the definition of production emissions. Production emissions are emissions attributable to emissions produced domestically and include domestic consumption and exports. Scope 1 emissions **should** cover GHG emissions from key sectors and categories such as energy, industrial processes and product use, agriculture, forestry, other land use, and waste. However, there is a divergence of views among emissions data providers and climate experts regarding the accounting of land use, land-use change, and forestry (LULUCF) emissions given significant data uncertainty. Compared to sovereigns, LULUCF data reporting for sub-sovereigns has greater limitations. Nevertheless, there are some countries reporting scope 1 emissions including LULUCF on sub-sovereign level such as the state of California.

Table 2.33. Example of sub-sovereign emissions by inventory sector

California emissions by inventory sector, MMT CO2e	2022
Energy	321.740
Agriculture	33.370
Industrial processes and product use	19.318
Waste	15.297
Gross total	**389.726**
LULUCF	-32.724
Net total	**357.002**

Source: United States Environmental Protection Agency (EPA), GHG Inventory Data Explorer

Hence, FIs **shall** report scope 1 emissions, excluding LULUCF, and **should** report scope 1 emissions including LULUCF, if data is available. FIs **shall** be transparent about the underlying scope of emissions reported.

As scope 2, scope 3 and exported emissions accounting guidance is not required in the current method due to a lack of data, reporting of consumption emissions (i.e. scope 1 + scope 2 + scope 3 - exported emissions) is excluded as well.

Attribution of emissions

In line with the sovereign debt methodology, attributed emissions for sub-sovereign debt are calculated as follows:

$$Attributed\ emissions = \frac{Exposure\ to\ Sub-sovereign\ Bond\ (USD)}{Sub-sovereign\ PPP-adjusted\ GDP\ (international\ USD)} * Sub-sovereign\ emissions\ (tCO2e)$$

RATIONALE:

According to the general logic in Part A, the FI's share of emissions shall be proportional to its exposure to the borrower's total value. Another key principle of PCAF is 'follow the money,' meaning that the money should be followed as far as possible to understand and account for the climate impact in the real economy.
For a listed company, total value is measured by Enterprise Value Including Cash (EVIC). Applying the same logic to sub-sovereign issuers, such as local governments or cities proves more challenging as there is no

appropriate measurement of a sub sovereign's equity. This leaves only outstanding debt in the denominator of the attribution factor. Using only debt in the denominator neglects tax revenues as a main source of income for sub-sovereigns and may lead to unwanted incentives in portfolio steering. Using Capita in the denominator of the above formulars would not be reasonable for attributing production emissions. This would only be reasonable to attribute consumption emissions which exclude emissions related to exported goods and services.

Therefore, in line with the approach taken for sovereign debt, this methodology uses Purchasing Power Parity (PPP)-adjusted GDP to measure the 'total value for the sub-sovereign'. As outlined below, there are some limitations to using PPP-adjusted GDP on sub-sovereign level.

PPP-ADJUSTED GDP FOR SUB-SOVEREIGNS – ESTIMATION AND LIMITATIONS

As outlined in the sovereign debt chapter, the PPP-adjusted GDP reflects the real sizes of the economies and the output by subtracting the exchange rate effect. This effect becomes relevant for countries with a relatively stronger exchange rate effect and allows for a fairer treatment of the countries. However, in contrast to countries, PPP-adjusted GDP for areas corresponding to sub-sovereign territories are not readily available.

Due to the absence of PPP-adjusted GDP for sub-sovereign territories, the PPP-adjustment factor of the country shall be applied to the sub-sovereign GDPs within the respective country. The PPP-adjustment factor is derived by dividing PPP-adjusted GDP of a specific country by the unadjusted GDP of this country:

$$PPP-adjustment\ factor_c = \frac{PPP-adjusted\ GDP_c\ (current\ international\ \$)}{GDP_c\ (current\ US\$)}$$

(With c = Country)
In a second step, the PPP-adjustment factor can then be applied to the GDP of the sub-sovereign (e.g. region) to estimate PPP-adjusted GDP of this sub-sovereign:

$$PPP-adjusted\ GDP_s = PPP-adjustment\ factor_c \times GDP_s$$

(With s = Sub-sovereign)
This approach does not reflect that price levels in regions and cities within a country differ. However, in most cases price level differences within a country should be lower than between countries. In addition, PPP-conversion rates are the rates of currency conversion that try to equalize the purchasing power of different currencies. Hence, applying these rates to regions with the same currency seems reasonable.
Investing in sub-sovereign portfolios across different countries is a commonplace practice for investors.

Example: State of Bavaria, Germany
Step 1: Derive the PPP-adjustment factor for Germany based on GDP and PPP-Adjusted GDP of Germany (source: Worldbank Database)

GDP Germany 2022 (in mn US$)	PPP-Adjusted GDP Germany 2022 (in mn current international $)	PPP-adjustment factor
4,082,469	5,582,288	1.367

Step 2: Apply PPP-adjustment factor to GDP of Bavaria (source: Eurostat, Regional gross domestic product by NUTS 2 regions - million EUR)

GDP Bavaria 2022 (in mn US$)	PPP-adjustment factor	PPP-Adjusted GDP Bavaria 2022 (in mn current int. $)
765,644	1.367	1,046,926

Equations to calculate financed emissions and emission intensities

The financed emissions of sub-sovereign debt are calculated by multiplying the attribution factor by the emissions of the respective sub-sovereign borrower.

$$Attribution\ factor_s = \frac{Outstanding\ amount_s}{PPP - adjusted\ GDP_s}$$

$$Financed\ emissions = \sum_s Attribution\ factor_s \times Sub - sovereign\ emissions_s$$

$$Financed\ emissions = \sum_s \frac{Outstanding\ amount_s}{PPP - adjusted\ GDP_s} \times Sub - sovereign\ emissions_s$$

(with s = Sub-sovereign borrower)

Emissions intensities

In line with the sovereign debt method, the following intensity metric for normalization and comparison of sub-sovereign production GHG emissions intensity has been defined:
For sovereign production: *Production Emissions / PPP-adjusted GDP*

Scope 2 and scope 3 as well as exported emissions are not as available for sub-sovereigns and are therefore not included in this intensity method. Hence, consumption emissions cannot be calculated due to a lack of data. This may change once data availability has improved triggering an update to this method.

Data required and estimations

PCAF has identified the following data required for accounting sub-sovereign debt emissions and provides a list of public data sources for various countries and regions. However, this list is not exhaustive, and financial institutions may prefer to use other data providers and additional data sources for countries that are not explicitly included below. Independently of the data used, PCAF recommends aligning with the definitions of the data categories and being aware of the possible data specifics indicated earlier (e.g., inclusion or exclusion of land use (LULUCF) emissions in sub-sovereigns' production emissions).

Table 2.34. Overview of potential data sources

Data category	Description	Source	Scope	Limitations
Scope 1 – Absolute emissions	Domestic Emissions incl./excl. LULUCF **US**	Greenhouse Gas Inventory Data Explorer | US EPA	2022 data by state	
	Domestic Emissions excl. LULUCF **European Union**	EDGAR - The Emissions Database for Global Atmospheric Research (europa.eu)	2022 data by NUTS 2 level	No LULUCF data available
	Domestic Emissions incl./excl. LULUCF **Canada**	Canada's Official Greenhouse Gas Inventory - Environment and Climate Change Canada Data	2022 data by provinces and territories	
	Domestic Emissions incl./excl. LULUCF **Australia**	Emissions by state and territory | ANGA (climatechange.gov.au)	2022 by state and territory	
Regional GDP	Standard macro-economic metrics **US**	GDP by State | U.S. Bureau of Economic Analysis (BEA)	2023 data by state	
	Standard macro-economic metrics **EU**	Statistics | Eurostat (europa.eu)	2023 data by NUTS 2 level	
	Standard macro-economic metrics **Canada**	Add/Remove data - Gross domestic product, expenditure-based, provincial and territorial, annual (statcan.gc.ca)	2022 by provinces and territories	
	Standard macro-economic metrics **Australia**	Australian National Accounts: State Accounts, 2022-23 financial year | Australian Bureau of Statistics (abs.gov.au)	2023 by state and territory	
Country PPP-adjusted GDP	GDP adjusted by PPP	GDP, PPP (current international $) | Data (worldbank.org)	Global coverage, 2023 data	Data unavailable for some specific countries
Country Nominal GDP	Standard macro-economic metrics	World Bank/ International Monetary Fund (IMF) (worldbank.org), (www.imf.org)	Global coverage, 2023 data	

PCAF has decided to include “sovereign-like” sub-sovereigns as several large countries have started to report scope 1 emissions on a regional level e.g., “States” in the US, NUTS2 level in the EU. Data on local administrative levels are less available comprehensively and consistently, whilst reporting at city level has increased. As detailed in the data quality table further below, this method allows for using proxies for sub-sovereign scope 1 emissions. However, using actual reported emissions data, is the preferred option for issuers of all administrative levels.

Financial institutions **should** disclose financed emissions from regional, city and local levels separately. The table below provides data quality scores for options (if applicable) for scope 1 emissions of sub-sovereign issuers of different administrative levels.

Table 2.35. General description of the data quality score table for sub-sovereign Debt

Data quality	Options to estimate the financed emissions		When to use which approach	Issuer = Local	Issuer = City	Issuer = Region
				What is the administrative level of the emission data used		
Score 1	Option 1: Reported Emissions	1a	Verified reported sub-sovereign territory data	Local	City	Region
Score 2		1b	Unverified reported sub-sovereign territory data	Local	City	Region
Score 3	Option 2: Physical activity based emissions	2	Reported GHG emissions of sub-sovereign territory are not known. Emissions are calculated using primary physical activity data of the energy consumption within the sub-sovereign territory and emission factors specific to that primary data.	Local	City	Region
	Option 3: Territorial aggregation based emissions	3	Reported GHG emissions of the total sub-sovereign territory are not known. But reported emissions of a territory within the sub-sovereign territory are known e.g., city or local level data within a larger region. Emissions are calculated using reported data from a fraction of the sub-sovereign territory and extrapolated to represent the full region.	n/a	Local	Local/City
	Option 4: Break-down of emissions of larger territories	4	Reported GHG emissions of sub-sovereign territory of the issuer are not known. But reported emissions of a larger territory are known e.g., no city data but data for the region in which the city is located. Emissions are calculated using a break-down of reported data on a higher level using an appropriate allocation factor.	City/Region/ Country	Region/Country	Country
Score 4	Option 5: Economic activity based emissions	5	Reported GHG emissions of sub-sovereign territory of the issuer are not known. Emissions are calculated using sectoral revenue data of the sub-sovereign territory production and emission factors specific to that revenue data.	Local	City	Region
Score 5	Option 6: Use data from higher administrative levels without break-down (PPP-adjusted GDP from the same level to be used)	6a	Verified reported data on higher levels	City/ Region	Region/Country	Country
		6b	Unverified reported data on higher levels	City/ Region	Region/State	Country
		6c	Reported GHG emissions of sub-sovereign territory of the issuer are not known. Emissions are calculated using primary physical activity data of the energy consumption in a larger territory and emission factors specific to that primary data.	City/ Region	Region/State	Country
		6d	Reported GHG emissions of sub-sovereign territory of the issuer are not known. Emissions are calculated using sectoral revenue data of a larger territory production and emission factors specific to that revenue data.	City/ Region	Region/State	Country

Limitations

DATA AVAILABILITY

Emissions

Data availability for scope 1 emissions has improved in the recent past. However, this is mainly the case for developed economies and within the first or second administrative level below the sovereign level. This is not yet the case at local levels.

There is currently little data available for several emerging market countries. For those of which scope 1 emissions are available; it is recommended to implement practices to review the data quality.

Scope 2, scope 3 and exported emissions are currently mostly not available on sub-sovereign levels.

PPP-adjusted GDP

PPP-adjusted GDP is not available on sub-sovereign levels. Applying the respective country PPP-adjustment factor to convert sub-sovereign GDP to PPP-adjusted GDP has some limitations not reflecting that price levels deviate across regions within one country but seems reasonable for regions with the same currency.

EMISSIONS SCOPE (EQUIVALENT TO SOVEREIGN DEBT)

The presented approach to classify scope 1 emissions of sub-sovereigns is an attempt to mirror the approach developed and adopted for corporates and cities. However, these approaches cannot be compared one-to-one.

DOUBLE COUNTING (SIMILAR TO SOVEREIGN DEBT)

Double counting occurs in two dimensions:

1. Double counting of same territorial emissions at sovereign, sub-sovereign regional level (e.g. states) and sub-sovereign local levels (e.g. cities, municipalities)

This represents a challenge for an FI with investment and lending portfolios in multiple asset classes at territorial level. However, double, and even triple counting within the GHG emissions reports of FIs is not necessarily problematic as long as emission results of the different asset classes are clearly reported separately. Accounting for all emissions indirectly involved with loans and investments of the different individual asset classes ensures the right considerations are taken when making lending or investment decisions. FIs shall disclose financed emissions from sovereign and sub-sovereign levels separately. Financial institutions should disclose financed emissions from regional and local levels separately.

2. Double counting of emissions of non-sovereign sectors (e.g. corporates) due to accounting of emissions at sub-sovereign territorial level.

ATTRIBUTION FACTOR (EQUIVALENT TO SOVEREIGN DEBT)

PCAF acknowledges that PPP-adj. GDP has its limitations as the attribution factor: it is a flow metric, and the relationship between investments and GDP are not one-to-one. There are however reasons as stated previously that justify the usability of this attribution factor.

3. Financed avoided emissions and forward-looking emission metrics guidance document

PCAF

Partnership for
Carbon Accounting
Financials

Introduction

This guidance document is envisioned to serve as a separate document that accompanies the PCAF Standard. It is currently applicable for financed emissions and across asset classes. Future work may assess the applicability for facilitated, and insurance-associated emissions. The guidance document has the following main sections:

- **Avoided emissions:** the avoided emissions section expands upon prior guidance in the PCAF Standard, providing more detailed guidelines on reporting avoided emissions. Relating to Part A, it specifically expands avoided emissions reporting to all asset classes, while previously this was restricted to renewable power projects. Prior guidance from the PCAF Standard has been incorporated, where relevant, into this document.
- **Forward-looking emissions metrics:** forward-looking emissions metrics are an emerging topic in the industry. PCAF acknowledges new metrics are being created and proposes high-level reporting guidelines should FIs choose to disclose them.
  - **Expected emissions reductions (EER):** the guidance provides two specific options for the calculation of Expected Emissions Reductions (EER). The consultation aims to solicit feedback on the preferred approach.

Scope

The purpose of this document is to provide guidance to FIs on how to approach the reporting of avoided emissions and/or forward-looking emissions metrics, such as expected emissions reductions (EER). The guidance is applicable for financed emissions and across asset classes.

Avoided emissions[17]

Avoided emissions are the reduction in systemic emissions resulting from a project, product, or service compared to a counterfactual scenario, or put simply, emissions reductions that would not occur should the project, product, or service in question not exist[18].

Corporate avoided emissions

No official standards for avoided emissions accounting exist to date. The GHG Protocol Scope 3 Standard does reference the term (in section 9.5) and specifies them as "GHG reduction opportunities (that) lie beyond a company's scope 1, scope 2, and scope 3 inventories" and requires separate reporting from the regular inventory.

For companies/corporate accounting, several guidance documents were published on the topic. The most recent and most comprehensive is by the World Business Council for Sustainable Development (WBCSD)[19]. The note below from this publication provides an overview of corporate avoided emissions accounting and its difference with reductions in (generated) scope 3 emissions.

[17] Part A provides additional information on types of climate impact: generated emissions, emission removals, and avoided emissions.
[18] FIs are encouraged to review and familiarize themselves with the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard 9.5 Accounting for Avoided Emissions and WBCSD's Guidance on Avoided Emissions.
[19] WBCSD (2023). Avoided Emissions Guidance. Retrieved from: https://www.wbcsd.org/Imperatives/Climate-Action/Resources/Guidance-on-Avoided-Emissions

Box 3.1. What is the difference between a scope 3 reduction and avoided emissions?
There is often confusion between accounting for scope 3 emissions and avoided emissions. However, these two notions are very different:

- **Scope 3 emissions accounting** takes a company's point of view. In particular, emissions reductions of products are seen as changes in several scope 3 categories, which together reflect the life cycle emission of sold products. Further, scope 3 emissions are only compared to the same company's scope 3 emissions from previous years, whereas avoided emissions are compared to the most likely alternative that would have occurred without the solution, which could be a product from another company or a completely different solution altogether.
- **Avoided emissions accounting** is built from a societal context and the use of the solutions' point of view, where two situations are compared: one with the solution sold by the company, the other with the most likely scenario that would have occurred without the solution. Avoided emissions give an estimated emissions reduction in society due to the use of the solution but outside the solution provider's scope 1-3 emissions.

Source: (WBCSD, 2023)

Financed avoided emissions

For the financial sector accounting guidance is even more limited. Similar to companies, reporting on financed avoided emissions can also have merit for financial institutions. The 2024 WBCSD publication, in collaboration with PCAF, states that: *"Avoided emissions can support climate action in the finance sector as they provide an opportunity led approach to the current risk-dominated perspectives on climate action. Investors can use this metric to assess the environmental potential of a technology's decarbonization beyond an asset's direct footprint and examine the prospect of investing in them as a contribution to decarbonization. Avoided emissions can strengthen the ties between industry and finance decarbonization efforts when stakeholders have further advanced and aligned technical/methodological frameworks, allocation rules, practical guidance on asset classes/financial products and terminologies."*[20]

For this reason, the PCAF Standard states that FIs **may** report the (financed) avoided emissions associated with their financial services provided, while they **shall** be reported separately. Reporting avoided emissions is optional for FIs.

This guidance has focused on **financed** avoided emissions and when they may be calculated and attributed. The guidance is intended for FIs. It should not be used by the non-financial corporate sector as guidance for the calculation of avoided emissions figures. Corporate avoided emissions calculation guidance is covered by other bodies including the GHG Protocol and the WBSCD.

Financed avoided emissions through general corporate finance (entity level) or specific instruments (use of proceeds structures):
For the purpose of accounting for financed avoided emissions PCAF has identified 2 distinct ways avoided emissions can be attributed to FIs:

1. Through general corporate instruments: loans and investments to counterparties with general purposes (i.e., unknown use of proceeds as defined by the GHG Protocol).

[20] WBCSD (2024). Avoided emissions & Sustainable Finance. Retrieved from: WBCSD_Accelerating-decarbonization-by-aligning-the-efforts-of-business-and-finance.pdf

2. Through specific corporate instruments: loans and investments in projects, assets, or structures (i.e., known use of proceeds as defined by the GHG Protocol). The below table (Table 3.1) intends to further clarify the difference.

Table 3.1. Distinguishing general corporate and specific corporate instruments

Type	General corporate instrument	Specific corporate instrument
Use of proceeds	Unknown	Known
Level of reporting counterfactual	Company level	Project/product/service level
Coverage	Avoided emissions resulting from the reporting companies' operations but **occurring outside the value chain of the company**.	Avoided emissions resulting from (investments in) a specific project, product, or service. Savings can be in or outside the companies' value chain and at consumers.
Attribution	At company level using applicable asset class attribution (e.g. total equity + debt for business loans)	At project/product/service level (using Use of Proceeds structures method if relevant)
FI influence	More indirect, via investing in the company generating avoided emissions	More direct, by investing directly in the activity avoiding emissions
Example instrument	General equity investments, general bonds, or business loans	Project finance, green bonds
Example saving	Owning stock in a company selling insulation materials or solar energy. Business loan to a company selling meat replacement products.	Green bond investment in energy efficiency measures in commercial real estate or homes. Direct investment in a project closing down a fossil fuel power plant.

Assessment boundary

The following section summarizes the PCAF GHG accounting approach to financed avoided emissions. Requirements that only apply to generic or specific instruments have been noted.

- The time period over which financed avoided emissions are reported **shall** be consistent with the timeframe of the financed generated emissions of the counterparty[21]. This means:
  - If life cycle emissions are assessed and reported in the year of transaction in the company's GHG inventory, (see Use of Sold Products – Category 11 Scope 3 in the GHG Protocol), then avoided emissions **shall** also be assessed in the year of sale for the solution's entire life cycle[22].
  - If absolute emissions are assessed and reported annually in a company's GHG inventory (e.g., Scope 1 or Downstream Leased Assets – Category 13 Scope 3), then avoided emissions **shall** be assessed annually[23]. The counterfactual scenario **shall** pertain to the reporting year, and not to future years.[24] This means, for example, that for projects an annual number **shall** be used and not a cumulative or annualized number over the project lifetime.

[21] Counterparty refers to the investee, company, or other underlying investment term that the FI is providing a form of financing to.
[22] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf; https://ghgprotocol.org/sites/default/files/standards/Product-Life-Cycle-Accounting-Reporting-Standard_041613.pdf
[23] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf
[24] The 'EER Option 2' in the section on Forward-looking emission metrics would allow FIs to calculate such 'expected avoided emissions'.

- Avoided emissions **shall** (1) be reported based on direct counterparty data, or (2) be calculated based on physical activity by the FI reporting the financed avoided emissions of its investments itself. Additionally, data quality scores, as further defined below, **shall** be calculated.
- Avoided emissions numbers **shall** be based on a credible methodology and using a credible and conservative counterfactual scenario (including emissions reductions that will naturally occur without the avoided emissions activity in place).
  - When following an external methodology, the entity calculating the avoided emissions **shall** include the methodology source used (e.g. WBCSD).
- FIs **may** estimate avoided emissions that have not been disclosed adequately or reported directly by their counterparties if they apply the following best practices:
  - FIs **shall** disclose a clear and robust calculation methodology, including underlying assumptions and preferably built on country or regional data.
  - FIs **shall not** estimate avoided emissions based on economic intensities (due to the high uncertainty and low credibility associated with such an approach), such as input-output models, but on physical activity data only.
- Financed avoided emissions from general corporate instruments **shall** be accounted for only in cases where these have occurred outside of the counterparty's value chain.

Attribution of emissions

- Avoided emissions **shall** be attributed using the same method as absolute emissions based on the applicable PCAF Standard and asset class. For general corporate instruments this is at the company level, for specific corporate instruments at the project/product/service level (if applicable via a Use of Proceeds (UoP) structure).
- The assessment boundary applied to financed emissions shall be consistent with the most applicable asset class (e.g. if a listed corporate, an EVIC denominator should be used in both the financed emissions and financed avoided emissions calculations)
  - For general corporate instruments, FIs should calculate financed avoided emissions by restricting their assessment boundary to the issuer's assets not covered by integrated UoP structures. In practice, this is only feasible when the emissions and total debt of integrated UoP structures are separately disclosed. This guidance therefore recommends that when FIs issue an integrated UoP structure, they should report separately the financed avoided emissions (including data quality score). E.g. avoided emissions attributable to a green bond are subtracted from any corporate level reporting.

Reporting and data quality assurance

- Avoided emissions metrics **may** be reported but **shall** be disclosed separately from absolute emissions and emissions removals. Disclosure of financed avoided emissions **shall not** obfuscate disclosures covered under Part A of the PCAF Global Standard.
- Financed avoided emissions from general corporate instruments **should** be reported separately from financed avoided emissions resulting from specific corporate instruments.
- In cases where an FI uses both reported avoided emissions and their own estimates of avoided emissions, the proportional share of each **should** be disclosed[25].
- FIs **should** disclose a data quality score alongside their avoided emissions figures based on Table 3.2.

[25] For example, an FI could report that 70% of a total portfolio amount of 500,000 tCO_2e avoided emissions are based on data reported by counterparties and 30% was estimated by the FI.

Table 3.2. Data quality score table for avoided emissions

Data Quality	Options to estimate avoided emissions	When to use each option
1	Option 1: Reported avoided emissions	Verified avoided emissions of the counterparty are available and derived from a credible standard/framework
2		Unverified avoided emissions calculated by the counterparty are available derived from a credible standard/framework
	Option 2: Physical activity-based emissions	Avoided emissions are calculated using primary physical activity data of the counterparty's **energy consumption** as well as emission factors and a counterfactual scenario specific to that primary data
3		Avoided emissions are calculated using primary physical activity data of the counterparty's **production**, as well as emissions factors and a counterfactual scenario specific to that primary data

The quality of avoided emissions figures reported by counterparties is a critical input to the figures that FIs ultimately report. FIs **should** establish an internal assurance process to evaluate the consistency and quality of data used in their calculations and disclosures. Data quality assurance is of particular importance when disclosing avoided emissions given the lack of standardization of how these are reported. As a result, reported avoided emissions will vary in quality, including the risk that the impact might be overstated. This is especially problematic for avoided emissions as these make claims to a positive impact. Therefore, more scrutiny should be applied for avoided emissions reporting and hence more time spent on collecting evidence supporting disclosure. As such, FIs are encouraged to engage with their data vendors, clients, and internal teams to establish best practices.

Potential guardrails to consider include:

- Establish and disclose a data quality assurance policy for avoided emissions.
- Evaluate reported avoided emissions to ensure the calculation methodology has been sufficiently disclosed, and at least aligns with the 'time period' requirement in this guidance (see 'Assessment' section above).
- When using physical activity emissions factors, FIs should apply a conservative counterfactual scenario that uses the most granular pathway available (e.g. regional or country level).
- Require data reported by counterparties to:
  - Use credible methods such as the WBCSD publication on avoided emissions[26].
  - Be verified by a third-party auditor.
  - Transparently disclose calculation assumptions, including a credible and conservative counterfactual scenario (including emissions reductions that will naturally occur without the avoided emissions activity in place).

[26] WBCSD_Accelerating-decarbonization-by-aligning-the-efforts-of-business-and-finance.pdf

Forward-looking emission metrics

This section is an entity-level focused initial approach to transition finance applications, through the lens of forward-looking emissions metrics. It should not be interpreted as a portfolio level guide on how to handle forward-looking emissions metrics at whole portfolio (e.g. portfolio net zero). Additionally, this guidance does not include forward-looking financed emissions guidance due to managed phase out /exclusion targets, or sector targets (absolute or intensity).

The following text provides best practices related to forward-looking emissions metrics that FIs may choose to report on to complement backward-looking metrics, such as absolute and avoided emissions. Forward-looking emissions metrics can assess potential future reduction effects, such as expected emissions reductions or avoidance. For example, these metrics may estimate the expected future impact of a renewable energy project development pipeline that has yet to be constructed or commenced operation. Forward-looking emissions metrics can also enable quantification of potential GHG reductions for counterparties that may currently have higher carbon emissions but are poised to decarbonize in the future.

The following general guidelines pertain to forward-looking emissions metrics:

- Forward-looking emissions metrics **may** be reported, but **shall** be disclosed separately from absolute emissions, avoided emissions and emission removals. Disclosure of forward-looking metrics **shall not** obfuscate disclosures covered under Parts A, B, and C of the PCAF Standard.
- The FIs **shall** be transparent about and disclose the definitions, assumptions, and methodologies used.
- Forward-looking emissions metrics **shall** be attributed using the same method as absolute emissions based on the applicable PCAF Standard and asset class. This means that, in principle, the current share of financing is used and not the expected share of financing.
- FIs **shall** disclose the scope and coverage of forward-looking emissions metrics as a share of the total portfolio. If the entire portfolio is not covered, FIs **should** disclose criteria for what counterparties are included within forward-looking emissions metrics.

PCAF acknowledges that forward-looking emissions metrics are an emerging topic and that there has not yet been broad adoption of these types of metrics. For the purposes of this guidance, PCAF has chosen to focus on expected emissions reductions (EER), as an example of a forward-looking metric. Additional guidance on other forward-looking metrics is possible in the future, as the market further evolves, but is not included at this time.

Expected emission reductions (EER)

This section seeks to provide further guidance on the metric 'Expected emissions reductions' (EER). EER is a forward-looking metric primarily intended to be used in the context of transition finance[27], as it allows FIs to demonstrate that certain companies in the portfolio, which may currently be emission-intensive, are expected to lower their emissions in the future. In certain cases, companies might formally commit to such emissions reductions through, for example, sustainability linked bonds that are tied to decarbonization targets.

FIs **may** choose to report on EER and associated metrics. While EER has been suggested by other organizations[28], it has not been technically defined within PCAF. PCAF is aiming to further explore different

[27] While still an evolving concept, transition finance tends to refer to funding aimed at facilitating the shift from high-carbon to low-carbon and resilient business models, often used to enable carbon-intense industries to transition to the low-carbon economy over time.
[28] https://www.gfanzero.com/press/gfanz-launches-consultation-on-transition-finance-strategies-and-measuring-the-impact-on-emissions/

methodological options through this consultation. The two options considered here are:

Option	Type	Transition finance application
1	EER as 'expected absolute emissions'	Company level metrics (aligned/aligning)
2	EER as 'expected avoided emissions'	Project/product level metrics (solutions/phase out)

Both options are described below and a full worked example for an FI portfolio is provided in the Technical Appendix to illustrate the outcomes for both options.

OPTION 1: EER AS EXPECTED ABSOLUTE EMISSIONS

In this option, the formula to calculate EER for a specific asset is:

$$EER = Absolute\ emissions_{Base\ year} - Absolute\ emissions_{Expected\ year}$$

The *base year* is the year of contracting. FIs **may** choose a base year after the year of contracting but **shall not** use a base year before the year of contracting.

The *expected year* is the year by which the emissions reductions are expected to be achieved.
An FI calculates the EER across the portfolio using the following formula:

$$Portfolio - wide\ EER = \sum_{asset} Attribution\ factor\ in\ baseline\ year_{asset} * EER_{asset}$$

The attribution factor depends on the relevant asset class.

EERs **shall** be calculated per scope of emissions and in their reporting FIs **shall** make clear to what scope the EER pertains.

The EER **shall** only be reported in the year of contracting[29].

Example: Company A has 100,000 tCO_2 scope 1 emissions in 2025 and expected emissions are 50,000 in 2030. FI A provides a 10MEUR loan in 2025. Company A has 100MEUR EVIC.

*For the sake of this example, FI A only calculates the EER for Company A and not for the rest of the portfolio. This means FI A reports portfolio-wide scope 1 EER of (10 MEUR / 100 MEUR) * (100,000 – 50,000) = 5,000. FI A reports this number only in 2025.*

If the FI chooses to disclose an EER, it **shall** report two associated metrics in subsequent years over the life of the investment:

- Achieved emissions reductions (AER)
- Achieved expected emissions reductions % (% AER).

[29] The year of contracting most closely reflects when an investment, from an FI, takes place. Other sources may refer to this as the 'base year.'

The formula to calculate AER for a specific asset is:

$$AER = Absolute\ emissions_{Base\ year} - Absolute\ emissions_{Reporting\ year}$$

The *reporting year* is the year for which the emissions are reported.
An FI calculates the AER across the portfolio using the following formula:

$$Portfolio - wide\ AER = \sum_{asset} Attribution\ factor_{asset} * AER_{asset}$$

The attribution factor depends on the Standard (Part A, B or C) and the relevant asset class.

AERs **shall** be calculated per scope and in their reporting FIs **shall** make clear to what scope the AER pertains.

*In the above example, Company A has 85,000 tCO_2 scope 1 emissions in 2027. The AER is (100,000 - 85,000) = 15,000. Assuming that FI A still only reports EER for Company A and the attribution factor remained constant, FI A reports a portfolio-wide scope 1 AER of 10% * 15,000 = 1,500 in 2027.*

In order to calculate the % achieved EER, the 'interpolated EER' needs to be calculated using the following formula:

$$Interpolated\ EER = \frac{EER}{Expected\ year - base\ year} * (Reporting\ year - base\ year)$$

An FI **may** replace the above formula with direct data on the interpolated EER. This may be available if, for example, a company has set intermediate milestones on their expected emissions reductions.
An FI calculates the interpolated EER across the portfolio using the following formula:

$$Portfolio - wide\ interpolated\ EER = \sum_{asset} Attribution\ factor_{asset} * interpolated\ EER_{asset}$$

The formula to calculate % achieved EER is:

$$\%\ Achieved\ EER = \frac{Portfolio - wide\ AER}{Portfolio - wide\ interpolated\ EER}$$

*In the above example, the interpolated EER for Company A in 2027 is (100,000 – 50,000) / (2030 – 2025) * (2027-2025) = 20,000. Under the previous assumption that the FI A only reports EER for Company A and the attribution factor remained constant, the portfolio wide interpolated EER would be 10% * 20,000 = 2,000. In turn, the % achieved EER for scope 1 would be 1,500 / 2,000 = 75%. FI A reports this number in 2027. See fully worked example in the Technical Appendix for additional details.*

OPTION 2: EER AS EXPECTED AVOIDED EMISSIONS

In this option, the formula to calculate EER for a specific asset is:

$$EER = Absolute\ emissions_{Expected} - Absolute\ emissions_{Counterfactual\ scenario}$$

The fundamental difference with Option 1 is that the expected emissions are compared to a counterfactual scenario.[30] This makes EER similar to an 'expected avoided emissions' metric.

There are different sub-options for Option 2 in terms of calculating EER:

- **Annualized:** calculate the total expected absolute emissions and subtract the total absolute emissions in the counterfactual scenario. This total number is then annualized over the period covered[31].
- **Cumulative:** calculate the total expected absolute emissions and subtract the total absolute emissions in the counterfactual scenario.

An FI calculates the EER across the portfolio using the following formula:

$$Portfolio - wide\ EER = \sum_{asset} Attribution\ factor_{\ asset} * EER_{asset}$$

The attribution factor depends on the Standard (Part A, B or C) and the relevant asset class.
The EER **shall** only be reported in the year of contracting.

Example: Company A has 100,000 tCO_2 scope 1 emissions in 2025 is deploying a cutting-edge green technology in 2026. The technology has a five-year useful life. The green technology is expected to allow the companies scope 1 emissions to decline to 80,000 tCO_2 scope 1 emissions. The counterfactual scenario pathway emissions are as follows:

Year	2025	2026	2027	2028	2029	2030
Counterfactual scenario (tCO_2)	100,000	98,000	96,000	94,000	92,000	90,000

FI A provides a 10MEUR loan in 2025 to finance the purchase of the green technology. Company A has 100MEUR EVIC.

For the sake of this example, FI A only calculates the EER for Company A and not for the rest of the portfolio. This means FI A compares the emissions expected over the period 2026-2030 of 400,000 tCO_2 (80,000 tCO_2 per year), versus the counterfactual scenario pathway total emissions, 470,000 tCO_2. In 2025 (the year of contracting), FI A reports a cumulative and annualized EER number.

Cumulative EER = (470,000 - 400,000) * (10/100) = 7,000 tCO_2e
Annualized EER = 7,000 / 5 = 1,400 tCO_2e

[30] The term "counterfactual scenario" may be used interchangeably with "reference scenario" or "baseline scenario" in other guidance documents.
[31] If a solution's life cycle emissions are assessed and reported in the year of transaction in the company's GHG inventory, (e.g., Use of Sold Products – Category 11 Scope 3), then expected emissions should also be assessed in the year of sale for the solution's entire life cycle.

Box 3.2. The difference between avoided emissions and EER as expected avoided emissions
Avoided emissions from sold products focus on the emissions that have been avoided from sales that have already taken place in a given year. EER option 2 would entail the calculation of avoided emissions from products that will be sold in the future.

Comparing expected emission reduction options

The following differences can be distinguished between EER Option 1 and 2, which emphasize certain advantages and limitations of each option:

- Option 2 captures more clearly how the expected performance compares to different alternatives and can account for expected growth. For example, if a cement company expects to increase production significantly while still moderately reducing scope 1 emissions, this would lead to a smaller emissions intensity per ton of cement than if scope 1 emissions were reduced the same amount without increasing production. The counterfactual scenario in Option 2 can capture this dynamic, while Option 1 cannot as it focuses solely on absolute emissions reductions.
- Option 1 allows the EER to be used as a performance metric that can be continuously tracked, while Option 2 does not. This is because in option 2 the EER is only reported once at contracting but cannot be easily monitored afterwards, since a counterfactual scenario is used. In addition, the counterfactual scenario established in the year of contracting might not be applicable anymore in later years - for example, for the refurbishment of an industrial plant it might be that the counterfactual scenario in 2025 included certain technologies that in 2028 would no longer be considered a credible counterfactual.
- Option 1 does not capture 'ongoing' savings. For example, if equipment is being replaced the emissions reduction is only reflected in the year the new equipment is installed, but afterwards the absolute emissions remain stable. In Option 2, emissions reductions can continue to be calculated if the counterfactual scenario is applicable.
- Option 2 allows emissions reductions outside the asset's value chain to be considered, while Option 1 focuses on emissions reductions in the asset's own inventory.
- The definition of an appropriate counterfactual scenario for Option 2 is complex and time-consuming. This means that data quality assurance by the FI can be more laborious as it is difficult to establish whether a counterfactual scenario is credible and conservative. In contrast, Option 1 is straightforward to implement and monitoring only requires absolute emissions data, which the FI would probably require in any case for financed absolute emissions reporting.
- Option 1 has a built-in safeguard for overestimating EER as FIs need to report the achieved EER in subsequent years against actual emissions. Therefore, overestimating EER in the year of contracting comes at the expense of underperforming on achieved EER in subsequent years. Option 2 does not have such a built-in safeguard and the EER under option 2 is more easily overestimated as counterfactual scenarios are difficult to validate.

Reporting scope

FIs **should** report their absolute emissions separately for the portfolio for which EER is reported. This is especially helpful to provide an understanding of how transition finance will help to reduce the absolute emissions for that part of the portfolio.

Data quality assurance

While this guidance does not require, in principle, FIs to assess the quality of data reported by counterparties for EER calculations, it is recommended that FIs establish an internal assurance process to evaluate the quality of data used in their calculations and disclosures. Data quality assurance is of particular importance when disclosing metrics that are separate from absolute emissions given the lack of standardization of how these are reported. As a result, reported numbers will vary in quality, including the risk that impact might be overstated. This is especially problematic for EER as these make claims to a positive impact. Therefore, more scrutiny should be applied, and hence more time spent on collecting evidence support disclosure. As such, FIs are encouraged to engage with their data vendors, clients, and internal teams to establish best practices.

Potential guardrails to consider include:

- Establishing and disclosing a data quality assurance policy
- Require data reported by portfolio companies to:
  - Be verified by a third-party auditor.
  - Transparently disclose calculation assumptions. For EER Option 2 this includes a credible and conservative counterfactual scenario (including emissions reductions that will naturally occur without the avoided emissions activity in place).
  - Be accompanied by a transition plan that includes capital expenditures required to meet emissions reductions.

Part A: Option to disaggregate according to portfolio characteristics

In Part A Chapter 6 Reporting requirements and recommendations, the consultation proposes the addition of the following bullet under 'Absolute emissions':

When relevant to their business goals, FIs **may** disaggregate and disclose absolute emissions data according to different portfolio characteristics (see Box 3.3). Common examples of such characteristics include green finance, transition finance, managed phase-out, counterparties with SBTi targets, or counterparties' alignment with a regulatory framework (e.g. EU Taxonomy). If applicable FIs **should** be transparent on how they treat data overlaps, such as a green bond from a counterparty with a SBTi target.

Box 3.3. Disaggregating and disclosing absolute emissions data according to different portfolio characteristics

Disaggregating financed emissions according to portfolio characteristics can help FIs to clarify the drivers behind changes in financed emissions. This will enable FIs providing financing in hard-to-abate sectors and other sectors aimed at supporting decarbonization in the real-economy to appropriately segment emissions and provide stakeholders with additional clarity on underlying drivers of emissions.

Examples of assets that potentially qualify under such portfolio characteristics include green bonds, unlabeled bonds (or equity) from issuers meeting transition finance criteria, sustainability linked bonds and loans[32], Paris-aligned bonds and issuers[33] (e.g., issuer aligned or aligning to net zero based on IIGCC/PAII's framework for conventional bonds).

[32] https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/sustainability-linked-bond-principles-slbp/, https://www.lsta.org/content/sustainability-linked-loan-principles-sllp/

[33] https://www.iigcc.org/resources/tag/net-zero-investment-framework

The examples below illustrate how this disaggregated disclosure can help FIs to show that even though certain investments have a high emissions intensity ('Transition related' in Example 3.1 and 'Alignment status' in Example 3.2), they could be expected to decrease, given their transition orientation.

Example 3.1: FI disclosure of transition related investments and general financing

	Automotive sector			
Asset class	Outstanding amt (MEUR)	% of total financing	Financed emissions (tCO_2e)	Economic emissions intensity (tCO_2e / MEUR invested)
Corporate bonds	1,000	100%	200,000	200
Transition related*	300	30%	125,000	416
Generic	700	70%	75,000	107

*Transition related bucket adheres to the FI's definition/methodology for qualifying issuer level and or security level criteria. The definition/methodology is made available to investors

Example 3.2: FI disclosure of financed emissions by sector and carbon target status

*Power generation, oil, and gas
**Aviation, steel, automotive
***All other sectors

4. Inventory fluctuations discussion paper

PCAF
Partnership for
Carbon Accounting
Financials

Executive summary

Throughout the PCAF Standard Development cycle, the Inventory Working Group ("working group") was tasked with investigating causes for year-on-year changes ('fluctuations') in absolute financed emissions for the asset class 'Business loans and unlisted equity'. An analysis was conducted on potential adaptations of the current financed emissions formula, to objectively review if alternatives are more suitable than the current method, which relies on spot prices for EVIC in the denominator of the attribution factor for listed entities. All data used in the analysis was provided by S&P Global as part of their Accredited Partnership with PCAF. Additionally, the working group evaluated suitable reporting approaches could be adopted to explain the impact of factors causing fluctuations. Although the work is focused on the 'Business loans and unlisted equity' asset class, it is expected that the findings are applicable to other relevant asset classes as well. It should be noted that a correction approach to EVIC has been published by PCAF as part of the 'Listed equity and corporate bonds' asset class (*Refer "An approach for asset owners and managers to correct economic emissions intensity", page 63, Part A Standard*). While the approach previously published pertains to emissions intensities, the approaches discussed in this paper focus on absolute financed emissions.

Over the course of 2024, the working group tested multiple options to address factors causing inventory fluctuations. The working group has concluded that using alternative methodologies can address the factors to some extent, however they cannot be eliminated completely. The working group noted that improved transparency in reporting can enable a greater understanding of the drivers behind changes to financed emissions.

The working group invites industry participants for their feedback on its propositions.

Introduction

OVERVIEW

As the adoption and disclosure of emissions associated with financial activities leveraging the PCAF Standard has increased, certain challenges to the measurement of emissions have become clearer in practice. One challenge in particular is related to fluctuations in the GHG inventory resulting from changes over time to the financial attribution metrics, such as enterprise value including cash (EVIC).

Financial institutions have inquired how activities outside of their control such as inflation changes to EVIC or changes in data quality should be accounted for, particularly as these factors can have a significant impact on the increase or decrease of their absolute financed emissions inventory. The PCAF Working Group on Inventory Fluctuations ("working group") was formed in early 2024 to explore an industry wide approach to address the impacts of inventory fluctuations on the measurement of financed emissions.

PURPOSE OF THE DRAFT CONSULTATION PAPER

This draft consultation paper represents the discussion and findings from the working group. As changes to existing methodologies can be highly contentious, it was decided that the findings would be shared for public consultation prior to the development of a final guidance. The sections on testing methodology, results and discussion: denominator, and results and discussion: alignment of variables and emissions of this paper have follow up questions that can be found in the consultation survey. We ask readers to consider these questions in detail and provide feedback on the suggested approaches. The feedback will be considered when drafting guidance and recommendations for the next revision of the Part A (in 2025). Although the work is focused on the 'Business loans and unlisted equity' asset class, it is expected that the findings are applicable to other relevant asset classes as well.

Background on inventory fluctuations

The measurement of financed emissions is an important step to assess climate-related risks, set targets and develop effective strategies to decarbonize our society. The starting point of financed emissions related to financial exposure to individual organizations, is the balance sheet of a company. The asset side of a company "produces" the emissions which are then financed by the equity or debt (liability side). The financed emissions metric distributes the emissions according to the ownership of an FI.

Financed emissions are sensitive to several variables, and volatility in these variables can cause large changes in the financed emissions metric over time, which may not reflect changes in activity, or the decarbonization actions of FIs or their clients. The root cause and impact of this volatility on financed emissions is highly relevant as this metric informs climate action and progress of FIs on their path to net-zero.

The diversity of potential underlying causes for fluctuations poses a challenge for stakeholders to understand the actual real-world emission impact. Hence, it is important to understand the underlying factors which cause the volatility. These changes can reflect economic and financial variations and should therefore play a critical role in analyzing trends in financed emissions across periods. Volatility in the company value measured by EVIC is of particular interest here since this could link to factors outside of real-world changes in emissions and actions by FIs. Instead, volatility in EVIC reflects economic realities such as organic growth or fluctuations in market prices (FX, inflation, capital markets) which could be further analyzed. Moreover, as FIs and data providers work to improve the accuracy and precision of financed emissions measurements, changes to data quality, temporal misalignment of data, updates to emission factors, and other methodological enhancements can also contribute to fluctuations.

ISSUES ARISING FROM INVENTORY FLUCTUATIONS

Financed emissions are defined in Part A[34] as the emissions from debt and equity attributed to the FI, based on the proportional share of financing the investee. The total financed emissions in a portfolio is a sum of the financed emissions attributed to each investee i. The general equation, and the equation for the business loans and unlisted equity asset class are as follows:

$$Financed\ emissions = \sum_{i}^{N} Attribution_i \times Emissions_i = \sum_{i}^{N} \frac{Outstanding\ amount_i}{Company\ value_i} \times Emissions_i$$

The equation shows that financed emissions for this asset classes is dependent on three variables which may contribute to changes to financed emissions over time. These three variables are in turn dependent on many other factors that can cause changes.

Outstanding amount/ investment or asset value

Variation in the numerator "asset value" is caused by the financing activity of the FI and by the valuation of equity of the portfolio investees. This includes changes to the composition of the portfolio e.g., repayment of debt or sale of equity. These changes are well understood and are typically within the control of the FI. This paper therefore does not consider this as a source of fluctuations that requires further analysis.

Company value (denominator)

The company value appears in the denominator of the financed emissions equation. For listed equity and

[34] PCAF Standard Part A - Financed Emissions, p.40

debt, the company value is calculated by applying the EVIC (Enterprise value including cash). For unlisted companies, the market capitalization value required to calculate EVIC is not available. Therefore, instead of market capitalization, we consider the book values of total company equity and debt.

Changes in the company value (denominator) can have a significant impact on the final attributed absolute emissions. Broadly speaking, these changes can be caused by two types of factors:

- "Real" changes in company size: organic growth/degrowth of the company or inorganic changes in company value and market valuations, e.g. M&A activity.
- Changes caused due to market price volatility. These changes are 'artificial' and can create undesired fluctuations in financed emissions.

It is important to call out that many of these changes do reflect real shifts in total capital ownership and hence changes in attributed emissions may be a fair representation of reality. For example, high growth in the share value of a stock listed company will lead to a higher market capitalization and hence an increase of absolute emissions attributed to (equity) investors in that company, a decrease in emissions attributed to the providers of debt, while the total company emissions may remain constant. Given the fact that this is accompanied by a higher share of ownership (as well as revenues) for the equity holders this can be considered a realistic shift. However, given the dynamic character of the equity market it may still be relevant to isolate or dampen some of the shorter term, or temporary market fluctuations.

Emissions

Apart from "real" changes in emissions, e.g. due to company growth, or decarbonization, there are also causes for changes in emissions that do not reflect real-world changes. These "accounting" changes can be caused by changes in the scope or method of an investee's emissions reports. Drastic changes in financed emissions can occur in the absence of company data, when relying on emission proxies at lower PCAF data quality scores. Cause for these changes can be due to a change in methodology, or a change in underlying data inputs, including the emission proxy itself or improvements in PCAF data quality scores.

Alignment of variables

Measuring financed emissions at data quality scores 1 and 2 requires reported emission and financial data. Temporal misalignment of emission data is an issued recognized by PCAF and may result in a mismatch in years for reported emissions and financial data. This can impact the measurement of financed emissions and result in higher levels of measurement uncertainty. For example, if a company grows significantly each year, but emissions misalign by a year, then the resulting financed emissions will be underreported in a given reporting year. Temporal misalignment of data can impact financed emissions in other ways as well, such as through fluctuating FX rates. Since financial reporting is often reported in different currencies, FIs need to convert to a consistent currency (e.g. USD) for alignment of the financial variables in the financed emission calculation. FX rates can impact all financial variables used in measuring financed emissions, including outstanding amounts, revenue and EVIC. Issues primarily arise if different rates are used for these variables, creating potential misalignment in the measurement approach.

LITERATURE REVIEW

When defining the attribution metrics during the development of earlier versions of the PCAF Standard, several options were considered and evaluated by the relevant working groups. All had their specific limitations. The rationale for the current selection, and in particular choosing EVIC as denominator for listed companies is elaborated on in Box 4.1 as seen below.

Box 4.1 Rationale for EVIC as denominator in the attribution factor.

As described in subchapter 4.2 of the Standard, PCAF applies the same general attribution principles across all asset classes even though the actual equations and underlying (financial) data sources might differ per asset class. This principle defines that the attribution factor for all asset classes is calculated by determining the attribution factor of the outstanding amount of a financial institution over the total equity and debt of the company, project, property, etc. In which the financial Institution is invested. Applying this principle means that, for the attribution of listed companies, a metric needed to be defined that includes both the equity and debt of a listed company.

EVIC was selected as the attribution metric for listed equity and corporate bonds because it:

- Includes both equity and debt in line with PCAF attribution principles and other asse classes, ensuring alignment with similar asset classes (e.g. business loans).
- Is a common metric in the financial sector of a company's total value and is expected to gain more dominance because of its adoption by the EU TEG and the benchmark regulation.
- Is based on company data (market value of equity and total book value of debt), which is generally available to financial institutions and data providers. The availability of this data is expected to be further improved due to the EU climate benchmarks regulation, which will stimulate data providers to collect EVIC data.
- Includes market valuation of equity, which is the most common approach in the financial sector to determine company ownership.
- Avoids issues with negative enterprise values due to the inclusion of cash (not deducting cash as in the regular enterprise value definition) as well as issues with attributing more than 100% of a company's emissions to financial institutions.

The simplified example below highlights how EVIC ensures 100% attribution of company emissions by not deducting cash.

Example Company: Equity = 50, Debt = 50, Cash = 20

Approaches	Enterprise value	Attribution to equity	Attribution to debt	Total
EV excl. cash (standard)	50 + 50 –20 = 80	50/80 = 63%	50/80 = 63%	> 100%
EV excl. cash	50 + 50 = 100	50/100 = 50%	50/100 = 50%	100%

The topic of inventory fluctuations approaches is heavily debated in academic literature and a plethora of solutions are provided. For instance, Granoff and Lee (2024) suggest that using market value metrics, like EVIC, to calculate financed emissions exacerbates the effect of volatility on financed emissions.[35] Instead, using book value metrics to calculate financed emissions across the whole portfolio may potentially reduce the impact of market volatility by reducing the change in financed emissions primarily to underlying changes in emissions of portfolio companies.[36] Ekman et al. (2024) also suggest that using book values also helps maintain comparability.[4]

That said, a lot of scholars focus on approaches to dampen the volatility of EVIC instead. Wang et al. (2023) argue that it is important to align the numerator (outstanding amount) and the denominator (EVIC) to the

[35] Shocking Financed Emissions: The Effect of Economic Volatility on the Portfolio Footprinting of FIs (columbia.edu)
[36] Absolutely Sustainable Investing Across Asset Classes with Paris Aligned Benchmarks: An Application to AP2 by Claes Ekman, Andreas G. F. Hoepner, Peter Mannerbjörk, Tomas Morsing, Gabija Zdanceviciute :: SSRN

same date to capture the financing ownership accurately.[37] Given that companies may have different fiscal-year-end dates, reported EVIC dates of the companies in a portfolio will most likely be different. In addition, EVIC is usually updated less frequently due to technology and operational costs, and lack of data availability. As a result, there may be a measurement-date misalignment between EVIC, position value, and portfolio value that could introduce volatility and noise to the intensity metric over time. To dampen this volatility, Wang et al. (2023) suggest taking up a mixed approach, such as using annual EVIC and the latest position weights as of the analysis date. Ekman et al. (2023) purport that while the argument for EVIC inflation adjustment procedure is valid and non-controversial, its technical complexity may result in scenarios where GHG emissions and average EVIC-inflation adjustment would be constant but subtle shifts occur in the underlying distribution of security EVICs, resulting in inflation factor under- or over-adjusting[3].

Some scholars and FIs have experimented with changing the granularity of EVIC data. Atlasson et al. (2023) suggest an alternative approach to calculating GHG emissions attribution factors through more granular and time-sensitive data, such as quarterly EVIC data, as opposed to year-end values.[38] On the other hand, some institutions prefer to use rolling averages of EVIC, to smoothen out EVIC's volatility, generally using 3-5-year periods.

Another option presented in the discourse is to conduct a thorough emission attribution analysis, analysing the drivers of financed emission developments, rather than to make any adjustments to the attribution factor. This way the single drivers of financed emissions can be transparently disclosed and explained without any adjustments to official, audited data.[39] See Results and discussion: alignment or variables and emissions for further details.

There is a growing consensus in the industry that supports utilizing multiple metrics in reporting, such as adding to the absolute financed emissions, the portfolio-weighted physical emissions intensity, the weighted carbon intensity by EVIC, or the Weighted Average Carbon Intensity (WACI)[40]. Scholars and industry professionals behind this approach suggest reducing the emphasis on financed emissions as the sole metric in climate disclosures. However, the working group was focused solely on financed emissions, given its prevalence as the metric of choice in the industry, rendering this discussion out of scope for this paper.

Testing methodology

This section elaborates on the questions driving the analysis, the characteristics of the dataset used, as well as how the hypothetical portfolio was created. The analysis was motivated by the potential sources of fluctuations noted in the previous section, the several options in the literature to deal with these fluctuations, and a hope to understand how these options would compare in practice. The analysis is split into two parts. One part of the analysis focuses on options for managing denominator volatility, given how much scrutiny this receives from stakeholders and in the literature. The second part assesses the impact of emissions fluctuations and temporal misalignment of data.

DENOMINATOR ANALYSIS

Given the concerns with EVIC, an analysis was conducted to inquire if there was an alternative metric that was better suited than EVIC or if there was a method to dampen the volatility of EVIC.

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[37] Practical Considerations for Calculating Portfolios' Carbon Footprint - MSCI
[38] Accounting for time when estimating financed greenhouse gas emissions from investment and lending portfolios - ScienceDirect
[39] A Framework for Attributing Changes in Portfolio Carbon Footprint - MSCI
[40] FINAL-2017-TCFD-Report.pdf (bbhub.io)

The alternative metrics in contention were:

1. Total book value of debt + total book value of equity
2. Total assets
3. Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA)
4. Total sales/revenue

The following approaches to dampen the volatility of EVIC were considered alongside the status quo (EVIC values from fiscal year-end financial reporting):

1. Annual averages of EVIC (quarterly values averaged annually)
2. 3-year rolling averages of EVIC (average of quarterly EVIC values of last 3 years)
3. Constant EVIC[41]

The working group conducted an initial assessment of these metrics and approaches, by scoring them against several assessment criteria. This was done to understand if any metrics should be ruled out, and not be considered for quantitative testing. The criteria were as follows:

1. **Practicability:** The metric chosen should be understandable for all parties and practical to implement.
2. **Consistency and Comparability:** The metric should enable meaningful performance tracking of emissions over time, comparability between portfolios of FIs, and consistency with other global accounting frameworks, e.g. GHG Protocol.
3. **Accuracy:** The metric should try and minimize the risk of underreporting or overreporting of financed emissions, as far as can be judged. Therefore, when all the GHG emissions are allocated, all emissions are accounted for in terms of responsibility.
4. **Alignment:** How the metric is aligned to the current PCAF Standards, and the implications of a material change to this approach should be taken into consideration.
5. **Relevance:** The results from the chosen metric should appropriately reflect the FI's share of emissions, serve the decision-making needs of users, be used for real-world emission reductions, and enable measurement of progress towards climate goals. This criterion was the focus of the quantitative testing, and therefore not considered in the initial assessment and table below.

The metrics and dampening approaches were scored against these criteria on a binary scale (high (H) and low (L) by the working group. The table below shows the initial scoring by the working group, with the reasons for the scoring also explained below the table. For a detailed list of clarifications for the criteria, please refer to the reporting requirements section.

[41] The EU Platform on Sustainable Finance recommends using an 'inflationary adjustment'. This adjustment is also suggested for the correction of the emissions intensity in the PCAF Standard part A, p63 – 64. In their most recent guidelines (p157), they suggest to calculate the adjustment factor on a security level, which is equivalent to keeping EVIC constant.

		Practicability	Consistency and comparability	Accuracy	Alignment
Alternative metrics	EVIC	H	H	H	H
	Book value of debt and equity	H	H	L	H
	Assets	H	H	L	H
	EBITDA	L	L	L	L
	Sales	H	L	L	L
Dampening approaches	EVIC: Annual average	H	H	L	L
	EVIC: 3-year rolling avg.	H	H	L	L
	Constant EVIC	L	L	H	L

Based on this assessment, EBITDA was discarded from further analysis, as it scored low on all criteria. The final criterion, 'relevance', was tested quantitatively. Please refer to the 'Testing methodology' section on the quantitative approach and results.

EMISSIONS AND TEMPORAL MISALIGNMENT OF DATA ANALYSIS

The analysis for temporal misalignment of data looks at how 1-year and 2-year misalignments between the emissions and financial data impact financed emissions.

To assess the impact of changes in emissions estimation methodologies, total financed emissions were calculated with three different datasets:

- S&P data
- Exiobase revenue-based emission factors
- Exiobase asset-based emissions factors

Results were compared for 2019, the base year of the Exiobase emission factors, avoiding the need to correct for inflation.

S&P DATASET CHARACTERISTICS

The dataset used for this analysis was sourced from S&P and consisted of all companies in the MSCI All Country World Index (ACWI). The MSCI ACWI is a global equity index that measures the equity performance in both the developed and emerging markets. There were 2646 companies in this dataset. By virtue of being an index that follows developed as well as emerging markets, this dataset ensured diversity and comprehensive coverage with regards to geographic spread, industries, as well as company size.

The dataset was divided into three subsections, providing the following data about each company in the MSCI ACWI:

1. Financial: debt, equity, revenue, cash, and assets.
2. Environmental: GHG emissions (scopes 1-3).
3. Market capitalization: company size, including relevant exchange rates.

Each company is marked with a unique identifier and is tagged by their GICS Industry sector and sub-sector as well as their country of headquarters.

It is worth noting that this index only includes listed equities. Real-world portfolios may include listed as well as unlisted equities. Furthermore, the working group looked at the time-period from 2018-2022, which included volatility induced due to Covid-19.

TEST-PORTFOLIO SCENARIOS

The hypothetical portfolio created for this analysis included all companies in the dataset. No companies were excluded from the analysis. Furthermore, exposures (outstanding amount) assigned to all companies are constant over time, reflecting a portfolio for loan issuance (as covered by the PCAF business loans asset class).

The analysis uses four different portfolio scenarios which were created by varying two attributes, the relative exposure to each company and the change in emissions. The relative exposure of each company was varied in two ways:

1. **Unweighted portfolio:** Outstanding amount is equal for all companies.
2. **Weighted portfolio:** Outstanding amount is a proportion of EVIC (in 2022). This portfolio was weighted towards larger companies.

Furthermore, company emissions were subject to the following two scenarios for both the unweighted and weighted portfolio:

1. **Constant emissions:** 2022 GHG emissions were used for all years of the analysis. This is done to isolate the fluctuations in the denominator itself.
2. **Changing emissions:** each year was assigned its corresponding GHG emissions.

Note that that for testing alternative metrics to EVIC as well emission factor changes, only scope 1 and scope 2 emissions are considered. For testing temporal misalignment of data, scope 1 and 2 emissions are reported separately from scope 3 emissions (upstream and downstream).

Results and discussion: denominator

This section summarizes the results of the analysis on alternative metrics to EVIC as the denominator in the financed emissions calculation. The working group sought to analyze the outcomes of this analysis through two lenses.

1. Reduced volatility on year-on-year changes to financed emissions – The working group wanted to analyze volatility both during the short-term (year-on-year) as well as long-term (2018-2022). This was achieved by keeping emissions and outstanding amounts constant and isolating the impact of changes to the denominator alone (Figure 4.1).
2. Closest linkage to changes in the emission profile of the clients over time – This outcome was evaluated using a benchmark scenario where we kept the EVIC and outstanding amounts constant through the reference period (2018-2022) and comparing the other test scenarios against this benchmark (See Figure 4.2).

Figure 4.1. Understanding impact of changes to denominator in financed emissions
Keeping outstanding amounts and emissions constant

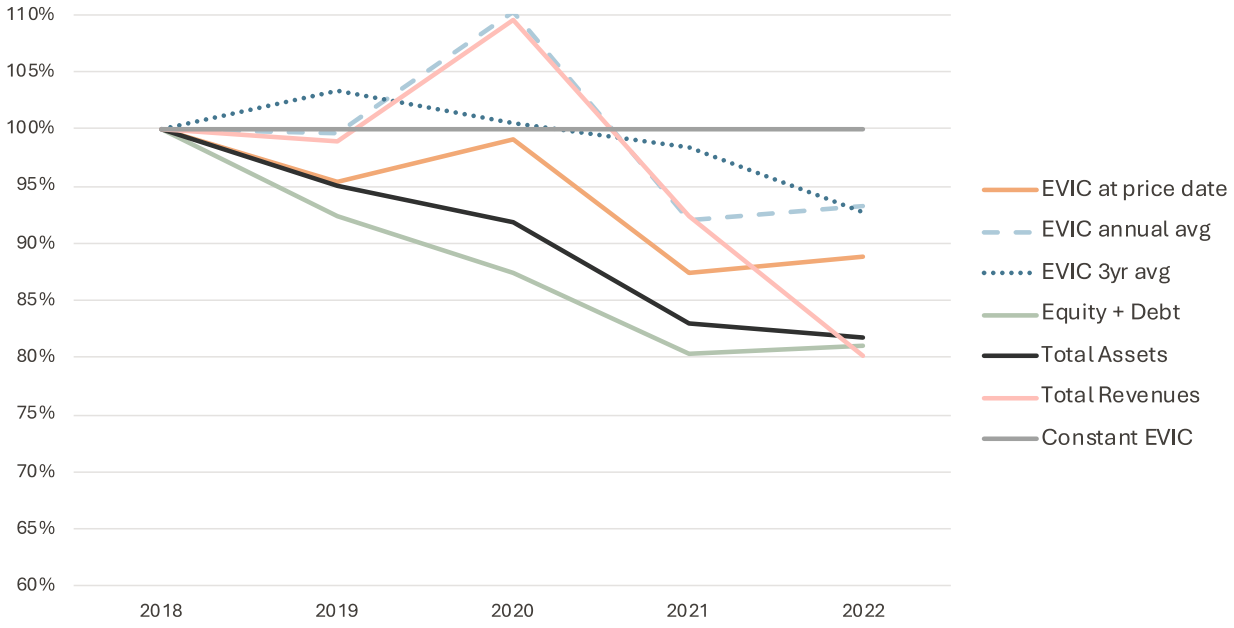
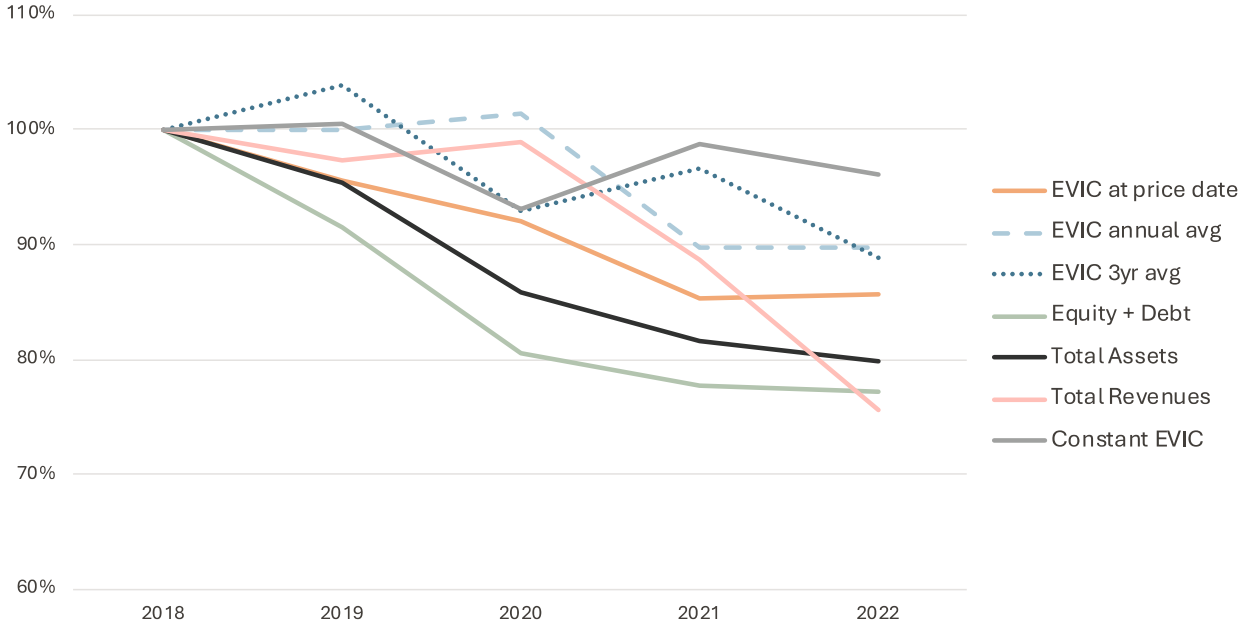


Figure 4.2. Examining linkage to emission changes
Keeping outstanding amounts constant. The grey line indicating 'Constant EVIC' represents the benchmark scenario.



This analysis is not without limitations, including that results are purely based on a hypothetical equities-only portfolio homogenously spread across multiple sectors. A FI's portfolio could look dramatically different and have specific sector- and/or geographic- concentration based on their business focus. To isolate the

influence of sector and geography, we have additionally replicated the same analyses across major sectors and geographies (included in the technical appendix) to provide additional insight on how financed emissions may be impacted across individual sectors or geographies. Another limitation is that across both our analyses, we have chosen to keep the outstanding amounts constant. Actual portfolios outstanding amounts would be expected to vary depending on changes to company sizes as well as shifts in the equity to debt ratios or business decisions on investments or divestments. We acknowledge such limitations could influence the results.

REDUCING VOLATILITY IN FINANCED EMISSIONS

Our analysis (Figure 4.1) indicates that volatility is inherent in any choice of the denominator metric. The working group has seen differences across short-term volatility (year-on-year) and long-term trends. In the short term, the choice of the denominator does indeed create volatility. In the constant emissions scenario, total assets and book value of equity and book value of debt are showing greater volatility over 5 years than EVIC, however, EVIC did have a steep fluctuation during the COVID-19 pandemic. Whilst it is acknowledged that EVIC fluctuations are high during market-stressed conditions it shows to be less volatile compared to total assets and book value of equity and book value of debt over a longer period.

However, the long-term trend is a consistent downward decline in financed emissions across all choices. Conceptually, this can be attributed to the fact that while there can be short-term fluctuations in EVIC creating volatility, the trends are likely to converge over a longer period of time. The common theme is that other denominator options do not have a noticeable advantage over EVIC and may even show more volatility. The read-through of this analysis is that movements in financed emissions should ideally be carried out over a larger timeframe with an acknowledgment that year-on-year changes are likely to be volatile due to the choice of the denominator. The analysis observed that these trends persist over various segmentations like industry, region, and company size.

LINKAGE TO CHANGES IN EMISSIONS

The benchmark scenario we considered in Figure 4.2 (bold grey line) indicates the pattern of the emissions profile of the clients in our model portfolio. The analysis indicates that the alternative denominators considered do not closely mimic this emissions profile and trend line over time, and distort this view further compared to EVIC.

However, the working group observed that using a three-year rolling average of EVIC (dark blue dotted line in Figure 4.2) has the potential to ‘dampen’ the volatility and more closely track the emissions trend. Conceptually, this can be explained by the fact that using a multi-year average will lead to a smoothening of any short-term volatility and hence will present a more logical trend. There is a case to be made if switching to a three-year rolling EVIC average is a recommended option to address inventory fluctuations. However, the working group believes that there are other conceptual and operational challenges in adopting such an approach, which have been detailed in the below section.

Adopting a moving average for EVIC to dampen volatility

It is conceptually understandable that using a moving average will naturally lead to dampening any short-term volatility in the metric. This has also been validated through the analysis using our model portfolio. However, there is also a need to consider if such an adoption is aligned with our other design principles involved in financed emissions calculation.

The working group are also cognizant of practical considerations that need to be considered while evaluating such a dampening approach.

1. At a minimum, FIs may include yearly averages to measure a three-year rolling average. Using additional granularity (e.g. quarterly data) may further help in dampening the volatility. In cases where data is unavailable or if the company's listing history is less than three years, FIs can choose to not apply a moving average or consider the closest proxy to a three-year moving average. Not choosing to apply a moving average could be particularly reasonable in cases of venture capital portfolios which may consist of newly listed companies.
2. In terms of implementation, FIs may consider reporting the financed emissions based on a moving average as a separate metric complementing existing metrics. Individual FIs may consider providing historical data for comparative purposes but are not required in implementing the three-year rolling average.
3. The dampening approach can be applied only in cases where the FI is using EVIC for calculating the attribution factor. In case of unlisted entities or where EVIC data is unavailable, FIs need not apply such a dampening approach.

In the below exhibit, the working group has evaluated the approach based on the 'Assessment criteria' highlighted in the section on issues arising from inventory fluctuations.

Assessment criteria	Working group observation on adopting 3-year average EVIC as denominator to dampen inventory fluctuations
Practicability	The data infrastructure required to source a 3-year average EVIC would be similar to what may be used to source EVIC data. However, there could be instances of data gaps where market data may not be available for a historic 3-year period. Hence additional guidance would be required to address such data gaps. Suggested approaches from the working group to address such data gaps include using the latest year numbers or adopting this method going forward and not for historic periods, building it up over time until there is enough data to calculate rolling averages
Consistency and comparability	Application of this suggested methodology may be challenging for asset managers and asset owners and would require additional interpretation and considerations. For instance, FIs may apply different approaches to calculate such moving averages and hence may not be comparable. However, we note that applying this methodology will create a misalignment of approach for calculating financed emissions for listed companies (where we will use a 3-year average EVIC as denominator) and private companies (where we will continue to use the stock value for total equity plus total debt or total assets).
Relevance	The analysis performed by the working group indicates that using a 3-year average EVIC would enable the most meaningful performance tracking of emissions over time. At the same time, it is evident that this approach will not completely eliminate volatility in the outputs.
Accuracy	The working group has noted that using a 3-year average EVIC for the denominator and using outstanding exposures (for financed emissions) potentially creates a conceptual misalignment in the attribution factor calculations.
Alignment	The working group has particularly noted that recommending a 3-year average EVIC for the denominator would represent a material change of methodology within Part A of the PCAF Standard. The financed emissions values reported by FIs are likely to change if they adopt this recommendation. This is likely to present challenges in reporting to ensure alignment with values already reported for the past periods. This would require evaluation of a restatement approach for past periods.

Evaluating additional disclosures to report impact from inventory fluctuations

If volatility is inherent in the calculations of financed emissions, the working group alternately reviewed if additional disclosures could help transparently disclose the impact of changes to company value to the financed emissions metrics. One such disclosure is an 'attribution analysis' that lays out the drivers of change for financed emissions between two periods. Please refer to the section on 'Changes to emission factor datasets' for further details on this disclosure approach.

Results and discussion: alignment of variables and emissions

This section summarized the results of the analysis on the materiality of temporal misalignment in emissions data and financial data on financed emissions calculations.

A temporal misalignment of data is defined as when the financial data (e.g. loan amount invested) used to calculate the financed emissions for a portfolio is of a more recent period than the underlying emissions data of the portfolio companies held by the FI (e.g. 2023 loan amount used compared to 2022 emissions data for the underlying companies).

Temporal misalignment of data is a persistent issue in financed emissions reporting as issuer emissions data is normally reported (and collected by data vendors) only after the FI has published their climate and sustainability reports.

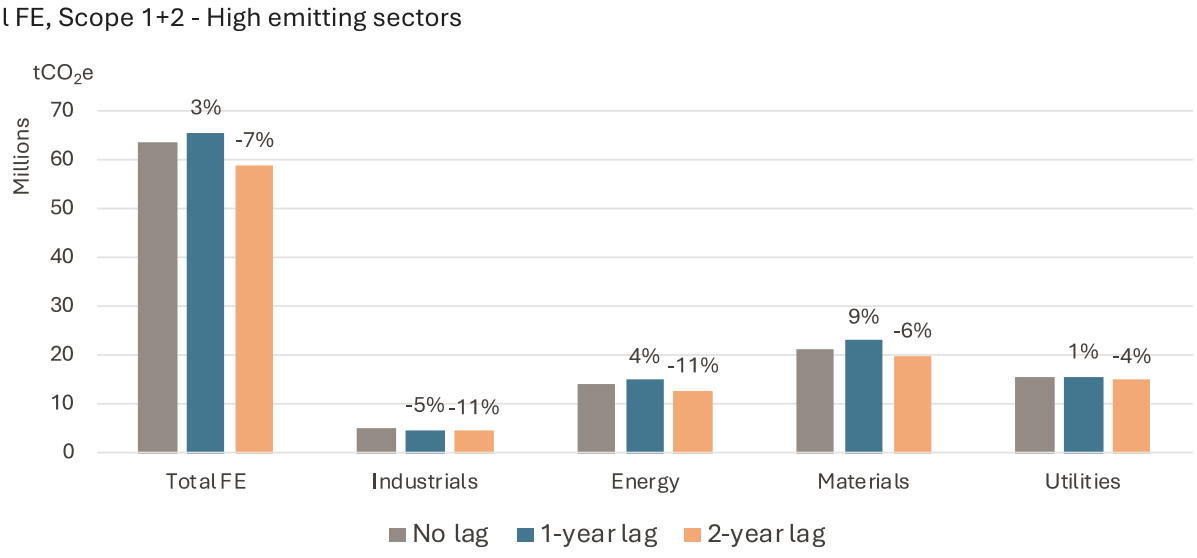
There can be a misalignment in the EVIC data when compared to the outstanding amount used in the attribution calculation in addition to the misalignment to the emissions year noted above. However, the focus of this section is on emissions year misalignments.

TREATING TEMPORAL MISALIGNMENT OF DATA

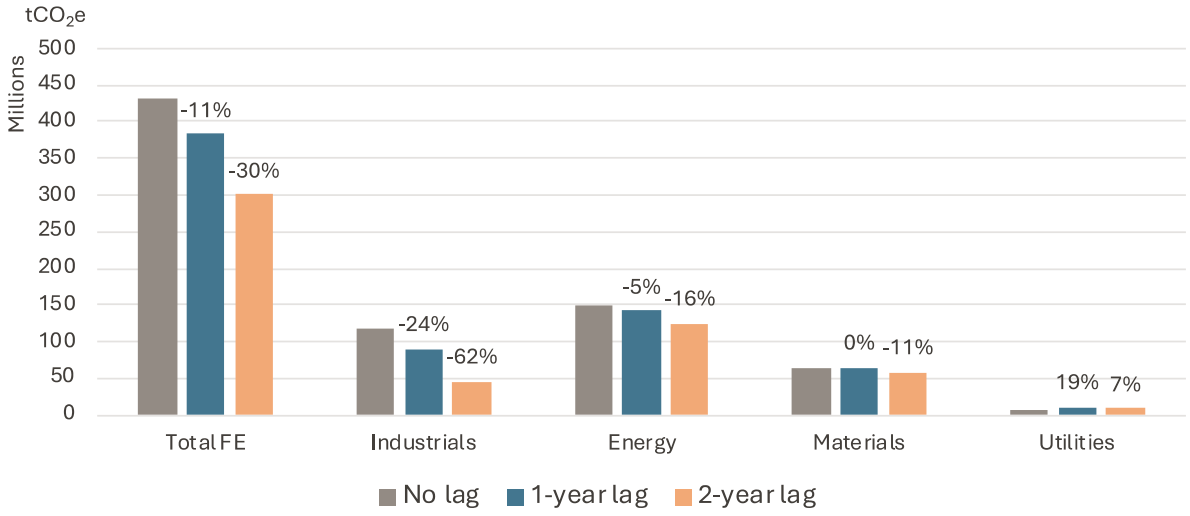
Results from S&P data

The following graphs display the results from the analysis for the total portfolio as high-emitting industries within the portfolio (industrials, energy, materials, and utilities):

Figure 4.3. Understanding impact of temporal misalignment of data in financed emissions (FE)



Total FE, Scope 3 U+D - High emitting sectors



In this analysis, scenarios where emissions data 'lags' behind financial data were compared. "No lag" refers to a scenario where emissions data and financial data are aligned, whereas "1-year lag" and "2-year lags" refer to scenarios where emissions data are one and two years behind financial data respectively. As seen in the first graph, the impact of 1-year temporal misalignment of data on scope 1 and 2 emissions is less impactful. However, this varies by sector with some sectors offsetting each other (e.g. materials vs. industrials). The impact of 2-year temporal misalignment of data is more impactful. This can be seen even more acutely by sector industrials and energy.

For scope 3 emissions, the impact is more significant than scope 1 and 2 across both 1- and 2-year lags. This can likely be attributed to the estimated nature of scope 3 emissions data, revisions in estimation models, and improvement in quality of reported data over time.

The above analysis is not conclusive and can be impacted by various factors such as COVID-19, which can cause emissions to fluctuate year to year. Taking that into the account, the analysis indicates that the impact of temporal misalignment of data can have a material impact depending on the size and composition of the FIs portfolio (e.g., more high intensity sectors like materials) as well as the scope of financed emissions being measured (scope 1 and 2 vs. scope 3). It is also worth noting that the portfolios could be a mix of 1- year and 2-year temporal misalignment of data as the availability of data can vary.

As the outcome of the quantitative assessment was not conclusive, a literature review was conducted to assess how companies have responded to the issue of emissions temporal misalignment of data with the best practice to be embedded into PCAF disclosure requirements.

Reporting practices

The working group conducted a literature review of the latest available climate and sustainability reports covering several banks and insurance companies across Canada, Europe, and the Middle East. From the review it was noted that there was diversity in practice in how FIs addressed emission year temporal misalignment of data. The responses to year temporal misalignment of data are grouped into four options, as laid out below.

Option	Emissions data	Financial data	Restate comparatives (historical calculations)?
1	Latest available at time of calculation	Aligned with the effective date used for the numerator	No
2	Latest available at time of calculation	Aligned with the effective date used for the numerator	Yes *Update to align emissions year with financial year when possible*
3	Latest available at time of calculation	Aligned with the effective date used for the numerator	For material changes only *Update to align emissions year with financial year when possible*
4	Latest available at time of calculation	Same as year of emissions data	No *No temporal misalignment of data present*

Although data lag is an issue faced by all FIs, the differences in portfolios, clients, data systems, and reporting requirements can make certain approaches more favorable for different institutions. Regardless, the working group attempted to assess the options with a view to recommend a best practice approach for disclosure.

Option 1 is perhaps the most straightforward to implement and allows for more insightful year-on-year trends as comparatives are not restated (unless a material error occurs). It also aligns with the latest available financial information on the statement of financial position. It was noted however that Option 1 would still have the misalignment of the financial year data and the emissions year and therefore may have systematic under- or over-estimations of financed emissions.

Option 2 and Option 3 are similar to Option 1 but require an additional analysis. For most reporting periods, all three would use the most recent financial and emissions data. However, under Option 2, FIs would need to reassess *all* comparatives (historical measurements) which now have updated emissions and/or financial data that remove data lag (i.e. the measurement periods now align). Option 3 is the same, except only those comparatives deemed material would be updated. Updating comparative makes trend analysis difficult, but this is balanced against a more accurate measurement of financed emissions. Operationally this may present challenges. If Option 3 is chosen, FIs are likely to have different definitions of "material". Lastly, it was noted that Options 1-3 are not in line with the IFRS® sustainability staff paper presented to the Transition Implementation Group (TIG) on IFRS S1 and S2.

Option 4 best addresses the principle of aligning emissions and financial data. However, the drawback to this method is that it introduces a temporal misalignment between financial and climate related reporting, which

could be as long as two years. Depending on the length of the misalignment, this could reduce the utility of climate related reporting and make it less relevant for decision-making by stakeholders.

Although not assessed directly, it was noted that temporal misalignment of data can arise in all financed emissions inputs, such as revenue, production, emission factors, etc. A detailed analysis of all factors was out of scope for this paper. As temporal misalignment of data will remain an issue until emissions reporting becomes more frequent, it is also important to set out more detailed reporting requirements (see 'Results and discussion: alignment of variables and emissions for these requirements'). These reporting requirements aim to improve the level of transparency in the disclosures in the market and increase the confidence in interpreting the results.

ECONOMIC EMISSION FACTOR ADJUSTMENT

Economic emission factors are used in line with PCAF methodologies for less accurate PCAF data quality scores[42]. Often there is a significant time lag in these emission factors. The PCAF Database released a 2019 dataset last year, with an accompanying guidance to adjust the emission factors for inflation and for currencies. The guidance is based on the principle that in the adjustment of economic emissions intensities only the monetary value is adjusted, not the emissions. The guidance is described below.

First, convert the emission factor using the appropriate spot market currency exchange rate for the base year of the emission factor[43]. An average currency conversion factor is recommended if the exact date of the emission factor is unknown. FIs should be transparent about the methods and assumptions used, when adjusting emission factors to their home currency.

Secondly, inflate the emission factor from its base year to the year of a FI's disclosure. We recommend using an inflation factor specific to the asset's location in your portfolio. If the location is unknown, proceed by using an inflation factor specific to the location of the FI's operations.

There are several inflation indexes that can be deployed, such as the Consumer Price Index (CPI), Producer Price Index (PPI), and Gross Domestic Product (GDP) Deflator. GDP Deflator and CPI have the highest global coverage. GDP Deflator includes government expenditures, which have minimal impact on a FI's holdings of equity and bonds asset classes.

Example: Emission factor for a company in the sector Metal & metal products, located in the United States for report in 2022.

EXIOBASE-based EF (2019)	tCO_2e/M. Euro
Scope 1	119.378
Scope 2	28.247
Scope 3	388.423

[42] This includes Business Loans and unlisted equity, data quality scores (DQS) 4 & 5, Listed equity and corporate bonds DQS 4 & 5, Project finance DQS 4 & 5, and Sovereign debt, DQS 4 & 5

[43] By using a currency conversion factor for the base year of the emission factor, fluctuations in the emission factor currency are discounted.

Scenario values	
2019 CPI, all Items (United States)	115.43
2022 CPI, all Items (United States)	128.93
Inflation factor equation	= 128.93 / 115.43
Inflation factor	1.117
EUR to USD conversion (average for 2019)	1.120

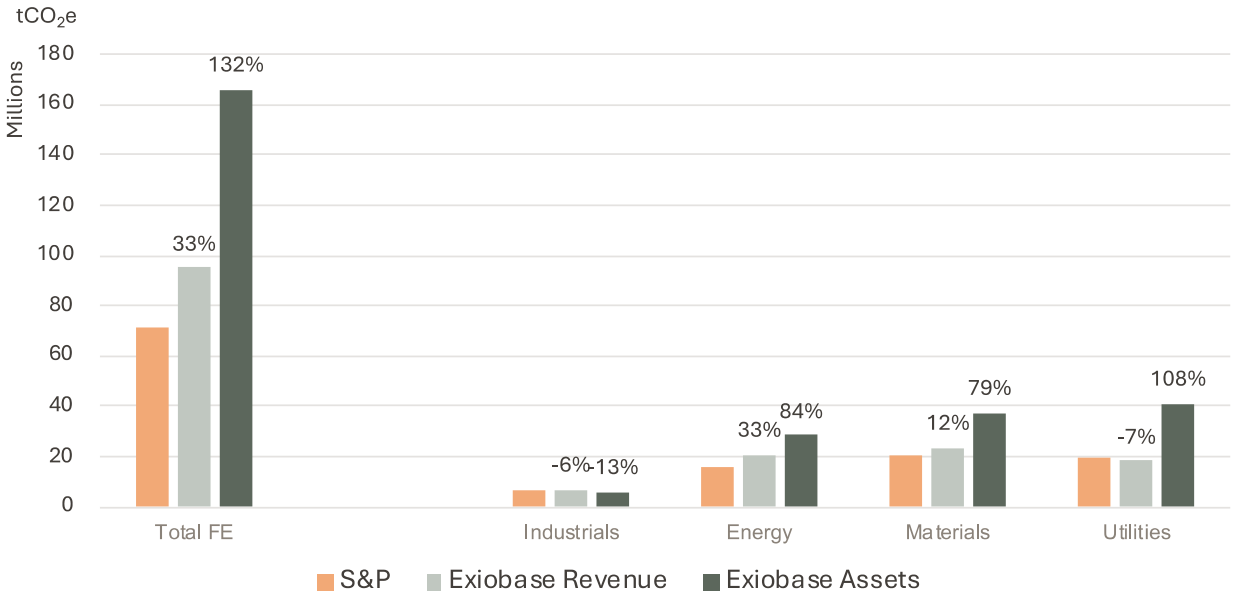
Step 1: Currency conversion to USD	tCO_2e/M. USD	Equation
Scope 1	106.597	= 119.378 / 1.120
Scope 2	25.223	= 28.247 / 1.120
Scope 3	346.837	= 388.423 / 1.120

Step 2: Inflation correction to 2022	tCO_2e/M. USD	Equation
Scope 1	95.435	= 106.597 / 1.117
Scope 2	22.582	= 25.223 / 1.117
Scope 3	310.521	= 346.837 / 1.117

CHANGES IN EMISSION FACTOR DATASETS

Figure 4.4. Understanding impact of changes to emissions factors in financed emissions

Total FE, Scope 1+2 – Different EF Datasets, High Emitting Sectors



The above graph shows the changes in financed emissions as a result of using 3 different sources for emissions data. This analysis was conducted for the same segmentations as we did for testing the denominator as well as temporal misalignment of data. For the portfolio at large as well as across all segmentations, Exiobase emissions factors appear to be overstating financed emissions as compared to reported data. Asset-based financed emission calculations seem particularly more volatile than revenue-based financed emission calculations. Among high-emitting industries, utilities and energy have a significant gap, which could be due to the more volatile nature of commodity prices.

As such, the working group has concluded that emission factors can have a material impact on the portfolio of a company, depending on the portfolio composition. In response to this, the working group have recommended that additional disclosure requirements are included in Part A. These are described in the next chapter.

Additional work is recommended by the PCAF Climate Data Working Group to investigate the large variances between reported and estimated emissions.

Reporting recommendations

Below are the incremental reporting requirements that the working group recommends to include in Part A. These requirements are driven by the desire to increase transparency in the financed emissions disclosure and to assist in making direct comparisons between FIs.

DISCLOSURE REQUIREMENTS

We propose to add the below points under the sub-section on 'Overall reporting requirements and recommendations' within 'Reporting requirements and recommendations'.

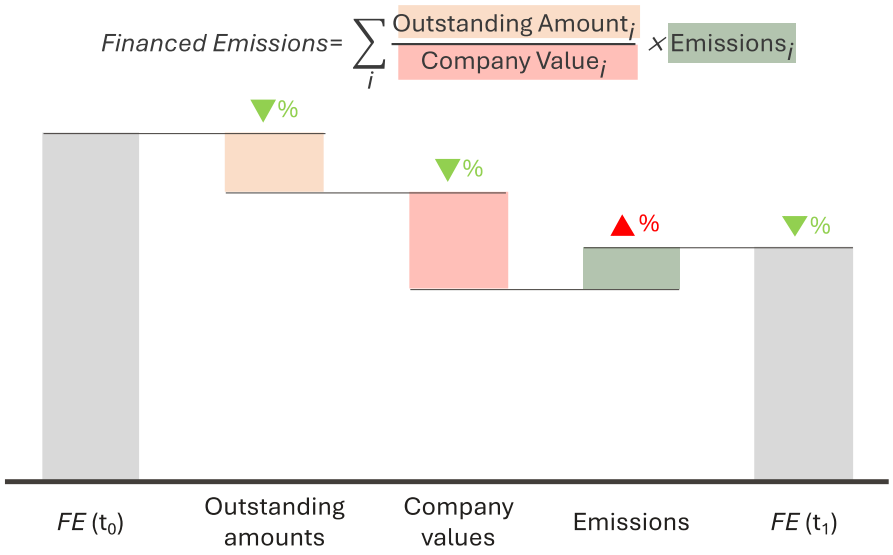
1. Under the 'Recalculation and significance threshold' point – The policy **should** address how temporal misalignment of data and emission factor changes are addressed in the reporting.
2. Separate sub-section on 'Attribution Analysis' with the below points.
    - FIs **may** provide an 'attribution analysis' explaining the drivers of changes to the financed emissions between two reporting periods. This will significantly aid transparency as it will provide users of climate and sustainability reports insight into whether emissions reduction shown in financed emissions are due to real-world decarbonization or due to changes in other factors such as portfolio allocations, EVIC volatility or the change in data quality.
    - FIs report financed emissions across sectors and asset classes. They **may** identify the portfolios for which an attribution analysis is required based on their business goals. There are multiple approaches to develop an attribution analysis for FI portfolios.
    - FIs **may** identify the most appropriate approach based on their internal reviews. FIs **should** disclose the approach used for reporting the attribution analysis.

An illustrative approach to providing such an analysis was laid out in the paper on 'Understanding the Drivers of Investment Portfolio Decarbonisation' published by the UN-convened Net-Zero Asset Owner Alliance (NZAOA)[44]. An illustrative example has also been laid out below, in figure 4.5.

[44] Understanding the Drivers of Investment Portfolio Decarbonisation – United Nations Environment – Finance Initiative (unepfi.org)

Figure 4.5. Attribution analysis

An illustrative example of an attribution analysis



In the illustrative example above, the absolute changes in total financed emissions between baseline year t_0 and the subsequent year t_1 are broken down into the primary components of the PCAF methodology, of outstanding amounts, company values, and emissions. The waterfall chart shows that while the outstanding amounts and company values have seen reductions, emissions have seen an increase. The analysis may be broken down into further components (e.g. outstanding amounts can be broken down into new investments and existing investments). The analysis can be conducted over any segment of the portfolio (e.g., for a certain asset class, or industry).

The proposed approach lays out the attribution analysis as an optional disclosure. This has been designed to encourage FIs to review potential approaches and develop their in-house approach to disclosing the drivers behind changes to their financed emissions.

Framing the public consultation

ROLE OF VOLATILITY DAMPENING APPROACHES IN THE PCAF STANDARD

The working group conclusion is that while adopting a dampening approach such as a 3-year average EVIC can help reduce the volatility of the metrics, there are significant practical challenges associated with this approach. Hence, the working group is concluding that a disclosure-based approach which can facilitate greater transparency of the impact due to fluctuations in EVIC would be a more practical approach. The working group invites feedback from industry participants on whether a dampening approach like using a three-year average should be further explored.

TREATING ALIGNMENT OF DATA AND VARIABLES

Temporal misalignment of data is a persistent issue in the calculation of financed emissions. Each of the options to treat misalignment of financial and environmental data presented in this consultation paper have their share of advantages and disadvantages. Therefore, the working group seeks industry participants to sharing their opinions on the various options as well as whether PCAF should recommend an option within the PCAF Standard.

REPORTING RECOMMENDATIONS: ATTRIBUTION ANALYSIS

The working group concluded that an attribution analysis could help explain the drivers of changes to the financed emissions between two reporting periods and significantly aid transparency. The working group invites feedback on experience with running such analyses and any implementation challenges that might arise in the process. Furthermore, the working group seeks to understand how industry participants on whether such an analysis should be optional or mandatory. Finally, the working group wants to gauge the appetite for dedicated efforts to develop prescriptive guidance on attribution analyses.

5. Undrawn loan commitments

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Introduction

This section outlines PCAF's approach to ensuring interoperability between the Part A of the PCAF Standard and the International Financial Reporting Standard (IFRS) S2 by defining a proposed calculation method for financed emissions from undrawn loan commitments. While IFRS S2 requires reporting emissions for undrawn loans as a separate asset class, Part A currently only covers drawn loans. With national regulations increasingly aligning with IFRS S1 and S2, and widely divergent undrawn loan commitment calculation approaches from different FIs emerging, PCAF recognizes the imperative to develop a harmonized methodology. This will enable FIs to fully comply with IFRS S2 reporting requirements and ensure comparability of reported financed emissions.

The proposed calculation methodology for undrawn loans builds upon the reporting and emission calculation methodology of Part A. It is to be seen as an additional calculation methodology to the relevant asset classes that account for and report emissions from undrawn loans, which are in nature different from the calculation methodologies of drawn finances provided in the PCAF Standard. After public consultation, this calculation methodology may be added to Part A.

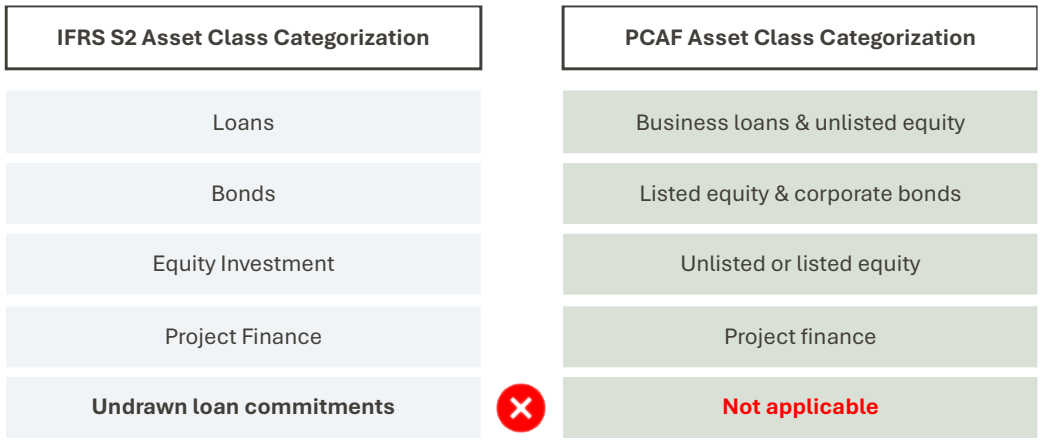
IFRS reporting requirements

The IFRS is a public interest organization that develops accounting and disclosure standards. With the formation of the International Sustainability Standards Board (ISSB) in 2021, IFRS consolidated the Climate Disclosure Standards Board (CDSB) and the Value Reporting Function (VRF). The result of this consolidation is the International Sustainability Standards Board (ISSB), which has developed the Sustainability Disclosure Standards IFRS S1 and IFRS S2. IFRS S1 and S2 aim to provide consistent and comparable information on an organization's ESG performance, sustainability-related risks and opportunities, and the potential financial impacts of sustainability issues. By embedding sustainability within financial reporting, ISSB aims to enhance transparency, accountability, and decision-making for stakeholders.
IFRS S1[45] requires companies (including FIs) to disclose material information on their sustainability-related risks and opportunities, covering four core reporting requirements: governance, strategy, risk management, and metrics and targets associated with sustainability-related risks and opportunities.

IFRS S2[46] specifies the disclosure requirements to identify climate-related risks and opportunities. It requires reporting on physical and transition risks, scenario analysis, financial effects, and metrics and targets. Per the IFRS S2 requirements, when reporting on metrics and targets, organizations should disclose qualitative and quantitative information including the reporting of scope 1, 2, and 3 GHG emissions. For scope 3 category 15: investments, IFRS S2 has specific requirements for commercial banking and the insurance industry. These requirements include disclosing scope 3 category 15 emissions of the following asset classes: loans, bonds, equity investment, project finance and undrawn loan commitments.
The PCAF Standard provides FIs with a methodology to report on the IFRS S2 asset classes loans, bonds, equity investment, and project finance. However, undrawn loan commitments are currently not considered in Part A.

[45] https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s1-general-requirements/#about
[46] https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s2-climate-related-disclosures/

Figure 5.1. Asset class comparison between IFRS S2 and the PCAF Standard



Undrawn loan commitments

Part A does not currently include a methodology for calculating emissions associated with undrawn loans. By following the principle of "follow the money", Part A only accounts for emissions of the past reporting period. In contrast, undrawn loan commitments are commitments an FI gives to a client as an option to access and draw a loan under predefined terms in future reporting periods. Undrawn loans generally have a fixed period in which they can be drawn, and a pre-defined maximum range. However, it is difficult for the FI to predict which part of the undrawn loan commitment will be drawn and when.

THE NEED FOR A HARMONIZED APPROACH

This difference in nature, between drawn and undrawn loans results in five main difficulties in applying the PCAF methodology:

1. Undrawn loan commitments cannot be added to drawn loans.

Undrawn loan commitments require distinct capital reserves (percentage of total undrawn loan commitments) on the FI's balance sheet. Consequently, applying the drawn loan approach to undrawn loan commitments leads to inaccurate reporting. Undrawn loans must be measured and reported separately from drawn loans.

2. Undrawn loans are not a backward-looking metric.

Part A measures emissions associated with financial activities that occurred in the previous reporting period. Undrawn loans can be drawn outside of the past reporting period. This leads to uncertainty in projecting the emissions from the drawn loan throughout the upcoming period as it is not known what will be drawn.

3. The amount of undrawn loan commitments is variable.

Undrawn loan commitments fluctuate as they can be drawn and repaid within the fiscal year. The challenge is that such variability may not be accurately reflected in balance sheets upon reporting, which can lead to the underreporting of emissions associated with undrawn loan commitments.

4. Undrawn loan commitments are not an asset class.

Undrawn loan commitments are often mistaken as a separate asset class, but rather they represent a state of loans. Misclassification of their nature might neglect the explanatory value of the relevant asset class emission trajectory over time.

5. No clear industry-wide definition of undrawn loans.

The absence of a clear definition by IFRS and varying interpretations of undrawn loans among FIs create reporting and measurement inconsistencies. This lack of clarity can hinder comparison and harmonized financial reporting across the industry.

In conclusion, financed emissions from drawn and from undrawn loan commitments indicate different impacts an FI has. A clear differentiation is necessary to underline that financed emissions show the impact a drawn loan had whereas emissions from undrawn loans simply reflect hypothetical financed emissions of committed loan positions.

SCOPE OF UNDRAWN LOAN COMMITMENTS

Undrawn loan commitments **may** be defined as loan arrangements where a credit limit is set for the client over a certain period, allowing them to borrow and repay funds any number of times within the limit. It refers to the maximum available amount to be drawn against a committed loan facility that has been agreed to be made available to a borrower at a given point in time, i.e. including committed facilities that are unconditionally cancellable.

Any undrawn loans that meet the criteria described above **shall** be reported. For the purposes of this calculation, project-specific undrawn loans **may** not be accounted for under the undrawn loan number if their purpose is different from the nature of undrawn loan commitments. Undrawn loans in a project context are in most cases likely to be drawn and are dependent on certain project-specific criteria to be fulfilled (e.g. progress of the project). These types of undrawn loans will be accounted for once drawn under the financed emissions of the asset class “project finance”.

Non-revolving loans which primarily function as pay-down-only facilities (such as mortgages, auto loans, or term loans) are also not suited to be considered as ‘undrawn loan commitments’ as a borrower does not have access to re-draw from the facility over the life of the loan. As such, regardless of the outstanding balance amount, the facility could be considered as ‘fully drawn’ at any point in time.

PCAF is aware of the lack of an industry-wide definition of undrawn loans. Hence, in addition to following the above criteria, FIs **shall** disclose their definition of undrawn loans highlighting what has been included in the calculation of financed emissions associated with undrawn loans, to ensure transparency in reporting. In case the FI excludes specific cases of undrawn loans; this **shall** be disclosed transparently together with a reasoning for the exclusion.

Proposed calculation methodology

The following calculation methodology for undrawn loans is the recommended calculation option proposed by PCAF. For transparency, other considered calculation options are highlighted in the technical appendix.

The proposed calculation methodology for undrawn loan commitments builds upon the calculation for the business loans and unlisted equity asset class in Part A, which is based on the drawn amount of a loan at the reporting date.

The financed emissions from undrawn loan commitments are calculated by multiplying the attribution factor with the emissions of the borrower.

For undrawn loan commitments to private companies:

$$Financed\ emissions = \sum_{C} \frac{Undrawn\ loan\ commitment_c}{Total\ equity + debt_c} * Company\ emissions_c$$

For undrawn loan commitments to listed companies:

$$Financed\ emissions = \sum_{C} \frac{Undrawn\ loan\ commitment_c}{Enterprise\ Value\ Including\ Cash_c} * Company\ emissions_c$$

For the numerator, the maximum undrawn loan commitment is applied. The undrawn loan commitment represents the difference between the total loan commitment and the drawn amount (on a gross exposure basis[47]) at the given point in time.

$$Undrawn\ loan\ commitment = Total\ loan\ commitment - drawn\ amount$$

The denominator consists of either EVIC or total equity + debt, as applicable for the company, per the methodology used to calculate financed emissions for the loan based on the drawn amount.
This proposed approach aligns with the calculation approach of the drawn amount (as per Part A) and the undrawn amount. Hence, it is not requiring the collection of extensive amounts of new data. Furthermore, it reflects the potential maximum emissions of the undrawn loans, should all borrowers fully draw on their committed facilities. It is a conservative approach that focuses on the highest possibility of emissions. PCAF is aware that this approach is not reflective of the probability that the loan might not be further drawn, nor refers to the future value or financial situation of the client. Hence, it is important to report emissions for undrawn loans separately from financed emissions. Nevertheless, this approach places the amount of undrawn loan commitment(s) in perspective to the financed company.

General characteristics of undrawn loan calculations

EMISSIONS SCOPES COVERED

*Financial institutions **shall** report the absolute emission associated with undrawn loans, in line with the 'emission scope requirements' of the relevant (same) asset classes as defined in Part A of the PCAF Standard (see figure 5.1 above).*

ASSET CLASSES IN SCOPE

PCAF proposes that the calculation of undrawn loan commitments cover all asset classes to which the concept of undrawn loan commitments is applicable. The same principle of changing the numerator to the undrawn equivalent would be applied to all asset classes of Part A: loans, bonds, and equity investments.

*The calculation of undrawn loan commitments **shall cover*** asset class but is rather an umbrella term for the state of a loan (e.g. that is not being activated). The IFRS classification of undrawn loans as a separate asset class could lead to confusion and inconsistency in reporting where future harmonization would be required. Nonetheless, this methodology will allow FIs to comply with the requirements as set forth by IFRS.

[47] IFRS S2 Climate Related Disclosures defined gross exposure as the funded carrying amounts (before subtracting the loss allowance, when applicable), whether prepared in accordance with IFRS Accounting Standards or other GAAP.

In case the FI excludes specific cases of undrawn loans in their disclosed emissions from undrawn loans, this **shall** be disclosed transparently and a reasoning for the exclusion **shall** be provided as well as the percentage of the excluded amount from total undrawn loans.

TIME OF REPORTING

In line with Part A, GHG accounting enables FIs to disclose financed emissions at a fixed point in time and in line with financial accounting periods. Hence, the time of reporting emissions associated with undrawn loan commitments **shall** be aligned with the financial reporting as well as the reporting of financed emissions from drawn loans. This is also in line with the reporting requirements of IFRS S1 and S2.

DATA QUALITY SCORE

The same calculation approaches for drawn loans are applied for the data quality of score of undrawn loans. FIs **should** use the most recently data available even if it is representative of different years, with the intention of aligning as much as possible. When determining the data quality score and which data to use, the data quality section for each asset class in Part A **shall** be referred to.

Reporting requirements and recommendations

PCAF underlines the importance of reporting undrawn loan financed emissions separately from drawn loan financed emissions. This is in line with the proposed reporting requirements from IFRS S2. IFRS S2 requires the percentage of undrawn loan commitments included in an entity's financed emissions calculation to be reported separately from financed emissions. The FI **shall** also disclose the full amount of the commitment separately from the drawn portion of the loan commitments.

Hence, PCAF recommends FIs **shall** report emissions from undrawn loan commitments separately to financed emissions from drawn loan commitments. In addition, it is recommended that FIs **shall** report on the undrawn loan commitments at a fixed point in time. Alongside to these reporting requirements, the overall reporting requirements and recommendations defined in Part A hold.

6. Glossary

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Securitizations and structured products glossary	
Asset back security	An asset-backed security (ABS) is a type of security that is secured by a specific pool of, generally financial, assets; these assets can be of a variety of types, including receivables, loans, or leases.
Amortization	Amortization in securitization refers to the process of repaying the principal amount of a loan or debt over time. In a securitization, as the principal amount of the underlying loans is repaid these funds are used to repay – or amortize – the ABS securities.
Capital structure/ capital stack	The hierarchy of debt that makes up the issuance of debt securities.
Collateral	Any contractual rights, property or financial or physical assets (such as vehicles or equipment) with monetary value, given as security for repayment of a debt.
Collateral attribution factor	The ratio of the outstanding loan secured on the hard assets to the total value of the collateral.
Collateral pool	The pool of loans, leases or other form of collateral backing the securitization.
Commercial mortgage-backed security	A commercial mortgage-backed security (CMBS) is a debt security whose cash flow is backed by the principal and interest payments from a specified pool of loans that are secured by mortgages over commercial property.
Covered bond	Debt securities whose repayment is a corporate obligation of the issuer but are also backed by cash flows from mortgage loan receivables in a mortgage cover bond.
Equity tranche	The most junior tranche of securitization, and it is the first to suffer losses if the underlying asset defaults.
Financed emissions	Emissions associated with the assets held by FIs, including those in structured products.
Facilitated emissions	Emissions related to the transactions facilitated by FIs, such as holding securities during the transfer from originator to investors.
Interest-only (IO) strip	A debt security whose entitlements relate solely to payment of interest (no principal payments). The debt security does not have a principal balance, and interest payments are calculated on a notional balance which may be fixed or change over time.
Investment attribution factor	The ratio of the nominal amount of a class of debt securities to the total nominal amount of all debt securities.
Issuer	The entity which issues the bonds off the back of the collateral pool associated with the securitization.
Loan to value ratio (LTV or LVR)	A percentage calculated by dividing the loan amount by the value of the property used as Security for the Loan.
Loan attribution factor	A factor that determines the share of loan emissions attributed to the collateral pool.
Mezzanine debt security	A Subordinated Debt Security, which therefore ranks below a senior ranking Debt Security, but ranks above the most Subordinated Debt Security in the structure (generally the unrated equity or First Loss Piece).
On-balance sheet securitization structures	An accounting treatment whereby an Originator recognizes securitized Assets on its own balance sheet for capital treatment purposes (although legally the assets may have been sold to a securitization SPV).
Off-balance sheet securitization structures	An accounting treatment whereby an Originator is entitled to remove securitized Assets from its own balance sheet for capital purposes although the assets may not actually have been sold.
Originator	Refers to the originator, sponsor, or original lender of the loan(s).

Pool of Pools	The assembly of pools of investments in individual securitizations of loans (Pools) and associated collateral by Originators as the basis for a securitization issuance.
Residential mortgage-backed security (RMBS also sometimes MBS)	A debt security whose cash flow is backed by the payments from a specified pool of loans that are secured by mortgages over residential property.
Ringfencing	Ringfencing is a legal technique that isolates the assets of a securitization from the assets of the originator. In the context of securitization, it is used to protect investors from losses in the event of the originator's bankruptcy. Ring-fencing is typically achieved by creating a special purpose vehicle (SPV) to hold the assets of the securitization.
Securitization	A technique that converts cash flows from Assets into tradeable Debt Securities which are limited in recourse to those Assets rather than the company that originated those Assets. The debt securities may be tranched, depending on market demand, allowing investors to take exposure to the transaction in line with their risk appetite.
Senior tranche	The tranche that has the highest priority of payment in the event of default.
Special purpose vehicle (or trust or special purpose entity or designated activity company – SPV, SPE, DAC)	A bankruptcy-remote legal structure that holds assets off or/separate from the originator's balance sheet, which then issues securities in the form of ABS/structured products.
Structured product data quality score	Separate from the PCAF data quality score table found in Part A, the structured product data quality score provides guidance on calculating the deal data quality score.
Subordinated debt security	Debt Security which ranks behind other Debt Securities in repayment of Principal, and is allocated losses before senior Debt Securities.
Synthetic securitizations	A type of transaction where the credit risk is transferred to the capital markets, but the assets remain on the originator's balance sheet.
Tranche	Tranche means each of the separate elements of the principal liabilities of the securitization (e.g. class of notes which, when taken together at their nominal original amount, equal the nominal outstanding amount of the loans in the pool of Assets at the closing of the deal.
Tranche attribution factor	The ratio of the outstanding nominal amount of a tranche to the total outstanding nominal amounts of all tranches.
Whole loan securitization	A whole loan is a single loan securitization issued by an originator/sponsor that is not included in a tranched securitization but is still ringfenced from the originator's assets. It can be kept on the lender's balance sheet or sold to investors.

7. Technical Appendix

PCAF
Partnership for
Carbon Accounting
Financials

7.1 Use of proceeds accounting

USE OF PROCEEDS STRUCTURES

This section includes worked examples illustrating different applications of the use of proceeds structures method. The numbers for all worked examples pertain to the reporting year 2024 and illustrative data is used for the purpose of the examples. For many examples, only scope 1 emissions are included for illustrative purposes.

Example accounting UoP structure with control over underlying asset – agricultural holding company
The following table shows the underlying assets for an unlisted holding company. The holding company controls all the underlying companies and projects. It applies the operational control approach from the GHG Protocol Corporate Accounting and Reporting Standard to define its organizational boundaries.

	EVIC (MEUR)	Total debt (MEUR)	Total equity (MEUR)	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Data quality score
Listed company for beef production	1,000	500	300	800	150,000	N/A
Unlisted company for dairy production	N/A	100	200	300	20,000	N/A
Project to construct and operate rice processing facility	N/A	50	50	100	5,000	N/A
Consolidated numbers for holding	N/A	650	550	1,200	175,000	2

For this example, an investor is investing 120 MEUR in the holding company, which means the attribution factor will be 120 MEUR/ 1,200 MEUR = 10%. Therefore, this investor would calculate the following emissions of this investment:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions of investor in agricultural holding company	10% x 175,000 = 17,500	2

Note that the data quality score is assessed on the holding level in this case and is not calculated by the holding based on the underlying assets, as the holding only reports one consolidated number. Simply put, the holding calculates the emissions based purely on the GHG Corporate Protocol without referencing the PCAF Standard.

Example debt-based UoP structure with one fully allocated asset – a sovereign infrastructure project
The following table illustrates the example of a 100 MEUR loan to a sovereign with a known use of proceeds for an infrastructure project. There are 5 co-lenders each providing 20 MEUR.

	GDP (MEUR)	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Data quality score
Sovereign	500,000	N/A	100,000,000	1
Infrastructure project	N/A	400	100,000	2

Since this is a debt based UoP structure with one fully allocated asset, co-lenders directly calculate their emissions impact based on the project finance asset class methodology. They calculate their attribution factor as 20 MEUR / 400 MEUR = 5% leading to the following financed emissions calculation:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions integrated UoP structure per co-lender	5% x 100,000 = 5,000	2

Example separate UoP structure – investment fund

This example illustrates how this method can be used for investment funds and for different underlying assets. The following table shows the underlying assets for a 150 MEUR investment fund created by a fund manager. The investment fund is not intended for environmental or social purposes.

	Investment	EVIC (MEUR)	GDP (MEUR)	Total debt (MEUR)	Total equity (MEUR)	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Data quality score
Listed company A	20 MEUR debt	1,000	N/A	500	300	800	80,000	3
Unlisted company B	30% of shares	N/A	N/A	10	20	30	20,000	4
Sovereign debt in country C	30 MEUR debt	N/A	500,000	N/A	N/A	N/A	100,000,000	1

The fund manager, i.e. the issuer, would report the following financed emissions of this investment fund:

	Scope 1 (tCO_2e)	Data quality score
Total financed emissions investment fund	(20 / 1000 * 80,000 + 30% *20/ 30 * 20,000 + 30 / 500,000 * 100,000,000) = 1,600 + 4,000 + 6,000 = 9,600	(20 * 3 + 30% * 20 * 4 + 30 * 1) / (20 + 30% * 20 + 30) = (60 + 24 + 30) / 56 = 2.04

For this example, an investor is investing 15 MEUR in the fund, which means the attribution factor in the fund will be 15 MEUR/150 MEUR = 10%. Therefore, this investor would calculate the following emissions impact for this investment:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions of investor in investment fund	10% x 9,600 = 960	2.04

If the investor would have access to the detailed asset-level data above, the total financed emissions of the investment fund could also be calculated directly by the investor. In this case the investor does not need to rely on financed emissions figures reported by the issuer.

Example labeled debt – a corporate green bond

The following table illustrates the example of a 12 MEUR green bond issued by an energy corporate. The bond has been partially allocated to two renewable energy projects the corporate owns and controls.

	Total debt + equity (MEUR)	Outstanding amount green bond (MEUR)	Scope 1 (tCO_2e)	Data quality score
Energy corporate	1,000	N/A	500,000	3
Operational geothermal project	20	2	500	2
Solar project in construction	50	8	100	4

Note that for this example, the outstanding amounts in the underlying projects (8 + 2 = 10 MEUR) do not equal the total green bond value (12MEUR). This occurs when the green bond proceeds have not been fully allocated yet.

The energy corporate, i.e. the issuer, would report the following emissions of this green bond:

	Scope 1 (tCO_2e)	Data quality score
Total financed emissions green bond	(2/20 * 500) + (8/50 * 100) = 66	(2 * 2 + 8 * 4) / 10 = 3.6

For this example, an investor is investing 6 MEUR in the green bond, which means the attribution factor in the green bond will be 6 MEUR/12 MEUR = 50%. Therefore, this investor would calculate the following emissions impact for this investment:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions green bond for investor	50% x 66 = 33	3.6

Example separate UoP structure – social investment fund at creation

The following table illustrates the example of a 50 MEUR investment fund created by a fund manager. The investment fund is intended to be used for social purposes, such as gender finance. The investment fund has just been set up and no investments have been made yet into underlying assets.

	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Data quality score
Fund manager (Issuer)	30	200	2
Investment fund	50	0	N/A

The fund manager, i.e. the issuer, would report the following financed emissions of this investment fund:

	Scope 1 (tCO_2e)	Data quality score
Total financed emissions investment fund	0	N/A

For this example, an investor is investing 10 MEUR in the fund, which means the attribution factor in the fund will be 10 MEUR/50 MEUR = 20%. Therefore, this investor would calculate the following emissions impact of this investment:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions of investor in investment fund	20% x 0 = 0	N/A

Example emissions estimation based on data quality score 5 – a transition finance fund

An investor provides 10 MEUR into a transition finance equity fund that has been earmarked in equal parts for renewable energy and energy efficiency in manufacturing plants. The total fund size is 50MEUR. The fund has been active for several years, but no information is available on the amount that was invested by the fund. As a result, the investor conservatively assumes an allocation factor of 100%. The relevant sector average for manufacturing for scope 1 was found in an EEIO table to be 300 tCO_2e/MEUR invested. The sector average for renewable energy for scope 1 was found to be 10 tCO_2e/MEUR invested. The financed scope 1 emissions can be calculated as follows:

Total financed scope 1 emissions =
10 MEUR [Outstanding amount] *
100% [Allocation percentage]
(300 tCO_2e/MEUR [Emission factor energy efficiency] * 50% [Allocation percentage energy efficiency] +
10 tCO_2e/MEUR [Emission factor renewable energy] * 50% [Allocation percentage renewable energy])
= 10MEUR x 100% * (150 tCO_2e/MEUR + 5 tCO_2e/MEUR) = 1,550 tCO_2e

Example reporting – FI with green bond and transition bond

An FI has issued a 500 MEUR green bond and a 250 MEUR transition bond. Both can be characterized as integrated UoP structures. Reporting of the FI should show the total debt + equity and the emissions of the UoP structures separately, as per below table. The financed emissions numbers are already attributed.

	Total debt + equity (MEUR)	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (Categories 1 -14) (tCO_2e)	Financed Scope 1 emissions (tCO_2e)	Financed Scope 2 emissions (tCO_2e)	Financed Scope 3 emissions (tCO_2e)
FI	4,000	6,000	8,000	20,000	500,000	200,000	1,500,000
Green bond	500	N/A	N/A	N/A	20,000	5,000	50,000
Transition bond	250	N/A	N/A	N/A	80,000	20,000	100,000
FI (adjusted for UoP structures)	3,250	6,000	8,000	20,000	400,000	175,000	1,350,000

The adjusted line item should be used by non-UoP investors in the FI.

ACCOUNTING FOR PROJECTS WITHOUT A SEPARATE BALANCE SHEET

The following table illustrates the example of a 15 MEUR green bond issued by an industrial company. The bond has been fully allocated to two energy efficiency projects in an industrial plant. Neither energy efficiency project has a separate balance sheet. One project replaced a boiler and has emissions that can be

independently defined. The other project improved insulation in the industrial plant, for which emissions cannot be independently defined.

	Total debt (MEUR)	Total equity (MEUR)	Outstanding amount green bond (MEUR)	Scope 1 (tCO_2e)	Data quality score
Industrial company	500	300		500,000	3
Project to replace boiler	20		10	10,000	1
Project to improve insulation	10		5	N/A	N/A

The industrial company, i.e. the issuer, would report the following financed emissions of the green bond:

	Scope 1 (tCO_2e)	Data quality score
Total financed emissions green bond	10/20 * 10,000 + 5/(500 + 300) * 500,000 = 8,125	(3 *5 + 1*10) / 15 = 1.3

Note that for the insulation project the financed emissions are calculated based on the industrial company, since emissions of the project itself could not be independently defined.
For this example, an investor is providing 3 MEUR, which means the attribution factor is 3 MEUR/15 MEUR = 20%. This investor would calculate the following emissions impact:

	Scope 1 (tCO_2e)	Data quality score
Financed emissions green bond investor	20% x 8,125 = 1,625	1.3

After 10 years, the green bond has been partially repaid to investors so that the total outstanding amount has decreased to 7.5 MEUR. The assumption is made that the repayments belong proportionally to each underlying project. In addition, the amount repaid is deducted from the total debt. This leads to the following table:

	Total debt (MEUR)	Total equity (MEUR)	Outstanding amount green bond (MEUR)	Scope 1 (tCO_2e)	Data quality score
Industrial company	400	400		400,000	2
Project to replace boiler	15		5	9,000	1
Project to improve insulation	7.5		2.5	N/A	N/A

The industrial company, i.e. the issuer, would then report the following financed emissions of the green bond:

	Scope 1 (tCO_2e)	Data quality score
Total financed emissions green bond	5/15 * 9,000 + 2.5/(400+400) * 400,000 = 4,250	(2 *2.5 + 1*5) / 7.5 = 1.3

ACCOUNTING FOR FINANCED SCOPE 3 CATEGORY 15 EMISSIONS

An FI (FI A) invests equity into an unlisted FI (FI B) so that it owns 10% of the total shares. FI B has multiple financial activities leading to financed, facilitated and insurance-associated emissions. All numbers are for the reporting year 2024 and are dummy data for the purpose of this example. The financed, facilitated and insurance-associated emissions numbers are already attributed by FI B in line with the relevant PCAF methodology.

	FI B
Total debt (MEUR)	3,500
Total equity (MEUR)	500
Scope 1 (tCO_2e)	6,000
Scope 2 (tCO_2e)	8,000
Scope 3 (Categories 1 -14) (tCO_2e)	20,000
Financed Scope 1 emissions (tCO_2e)	500,000
Financed Scope 2 emissions (tCO_2e)	200,000
Financed Scope 3 emissions (tCO_2e)	1,500,000
Facilitated Scope 1 emissions (tCO_2e)	100,000
Facilitated Scope 2 emissions (tCO_2e)	50,000
Facilitated Scope 3 emissions (tCO_2e)	250,000
Insurance-associated Scope 1 emissions (tCO_2e)	80,000
Insurance-associated Scope 2 emissions (tCO_2e)	50,000
Insurance-associated Scope 3 emissions (tCO_2e)	120,000

The scope 1, 2 and 3 of the financed, facilitated and insurance-associated emissions are aggregated into scope 3 category 15 and added to the scope 3 category 1 – 14 emissions. While PCAF generally recommends to report financed, facilitated and insurance-associated emissions separately (and FI B followed this), this recommendation does not apply to the financed scope 3 Category 15 emissions as it would make reporting overly complicated. FI A reports the following emissions impacts for its investment into FI B:

	Financed emissions reported by FI A
Scope 1 (tCO_2e)	10% * 500 / (3,500 + 500) x 6,000 = 75
Scope 2 (tCO_2e)	10% * 500 / (3,500 + 500) x 8,000 = 100
Scope 3 (tCO_2e)	10% * 500 / (3,500 + 500) X (20,000 + 500,000 + 200,000 + 1,500,000 + 100,000 + 50,000 + 250,000 + 80,000 + 50,000 + 120,000) = 35,875

7.2. Securitizations and Structured Products

Part 1. Different types of structures

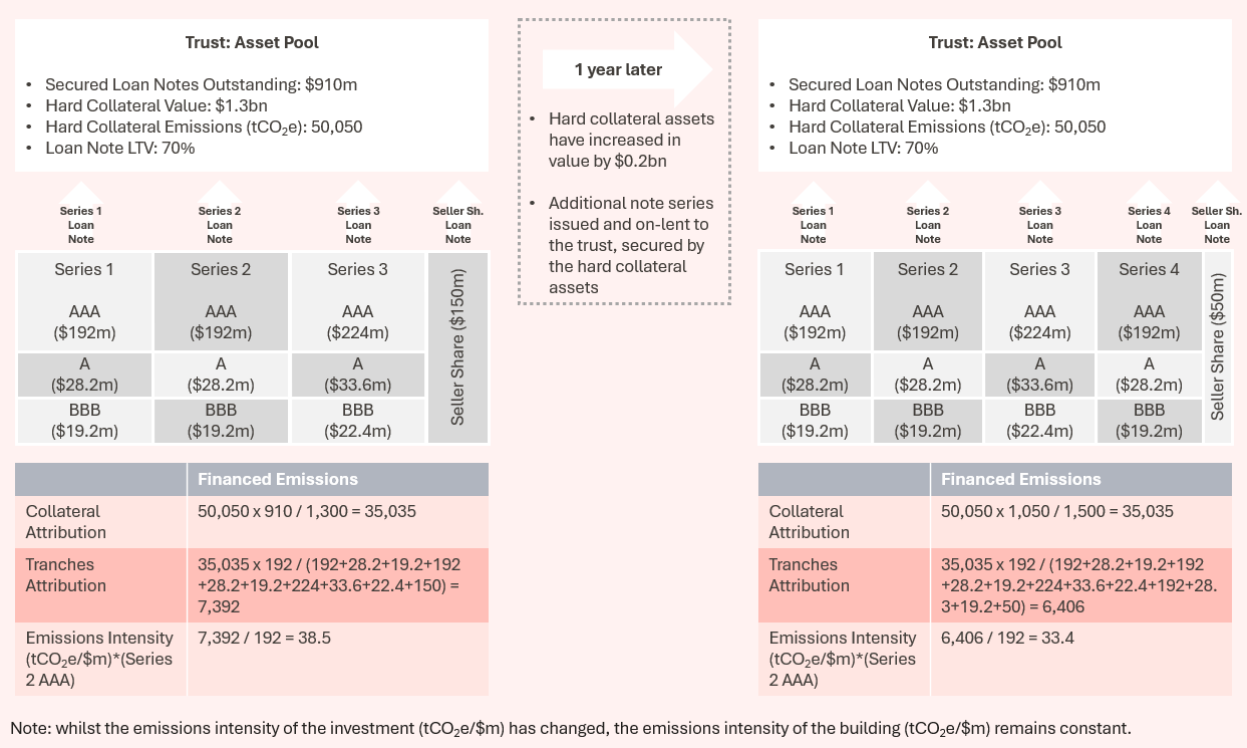
The standards for structured products started from considering a simple (but very common) structure whereby financial assets, backed by hard collateral, are sold to an SPV which issues structured notes. This may or may not result in the removal of those assets from the balance sheet but, in line with the "follow the money" approach, this is not relevant for the allocation of financed emissions to the structured notes.

However, there are many other ways of creating structured products; whilst the principles remain the same, guidance on some of the more common alternative structures is given in the table below. This guidance should be reviewed alongside the collateral type descriptions in Table 2.21 to identify in-scope transactions.

Structure type	Description	Treatment
Static vs. revolving pool	**Static**: with very limited exceptions, no assets are removed or added to the transaction's collateral pool other than through repayment and redemption of the loan **Revolving**: subject to eligibility criteria, new assets may be purchased into the collateral pool, typically using the principal redemption receipts from assets already in the pool instead of using them to repay ABS notes	These should both follow the stated methodology, in each case using the details of the collateral pool at the point of emissions accounting.
Significant risk transfer / credit risk transfer	Transactions designed to move asset risk off banks' balance sheets to reduce capital requirements	This should follow the stated methodology. Both funded and un-funded tranches count as tranches under the methodology and emissions should be allocated to a tranche with reference to the proportion of the collateral pool to which it has credit exposure.
Synthetic transaction	Transaction where credit risk transfer is achieved through a credit default swap referencing the asset pool and with no sale of assets taking place	This should follow the stated methodology. The on- or off- balance sheet treatment of the assets by the seller is not relevant for the allocation of emissions to the securitization.
Warehouse	Funding trade whereby a committed facility amount is utilized over time to fund a growing portfolio. Typically structured with a senior commitment and a junior (and possibly mezzanine) tranche.	This structure should follow the principles of the methodology. The total emissions of the asset pool at the point in time should be allocated to the drawn amounts of the various tranches (senior loan/facility, any mezzanine participation and the junior exposure) that are used to fund the loan origination.
Repurchase agreement (and master repurchase agreements)	Borrowing agreement to sell securities and repurchase them at a higher price on a later date	These sit under the separate derivative guidance when it becomes available. If Party A holds a securitization position and enters into a repo trade on the security with Party B: Party A should account for the financed emissions allocated to that

		securitization but not Party B (to avoid double counting).
Master trust	A securitization which issues multiple series of securities, backed by a pool of assets held on trust, whereby each series has an interest over the trust's entire asset pool. In addition to the different series of securities there is typically also a "seller share" (often used as regulatory risk retention) which is held by the seller/sponsor and which represents a retained interest in the asset pool. *Two separate approaches to emissions allocation are laid out for different asset scenarios*	**Revolving Portfolio**: financial assets amortize over time (loans) and issuance of new securities typically requires an addition of further assets to the trust (or a reduction in the seller share) This should follow the stated methodology, with the seller share treated as a tranche for the purposes of allocating the financed emissions of the pool.
		Appreciating Assets: value of underlying hard assets increases over time (e.g. commercial property) and new securities can be issued by creating an additional loan within the structure against the existing hard assets. This re-levers the transaction based on an updated valuation of the existing hard assets. A master trust with a structure that can be re-levered should treat each new issuance as a refinancing of the entire structure. PCAF guidance for mortgages is to use the property value at loan origination and, where that is not feasible, the latest property value available and fixing this value for the following years of GHG accounting (for a consistent denominator). The guidance also recognizes that if a loan on a property is refinanced, there will be a new loan, likely backed by an updated valuation, with emissions attributed to the new lender. After the new issue (the structure refinancing), the total value of the hard assets used in the collateral attribution factor should reflect the latest hard asset valuation(s) and all tranches (pre-existing securities PLUS newly issued securities PLUS seller share) should be included in tranche attribution factor calculations. This will likely result in the emissions intensity of an existing tranche reducing at the point of a new issuance: see worked example.

Figure 7.21. Master trust: appreciating assets – worked example



	Financed Emissions
Collateral Attribution	50,050 x 910 / 1,300 = 35,035
Tranches Attribution	35,035 x 192 / (192+28.2+19.2+192 +28.2+19.2+224+33.6+22.4+150) = 7,392
Emissions Intensity (tCO_2e/$m)*(Series 2 AAA)	7,392 / 192 = 38.5

	Financed Emissions
Collateral Attribution	50,050 x 1,050 / 1,500 = 35,035
Tranches Attribution	35,035 x 192 / (192+28.2+19.2+192 +28.2+19.2+224+33.6+22.4+192+28. 3+19.2+50) = 6,406
Emissions Intensity (tCO_2e/$m)*(Series 2 AAA)	6,406 / 192 = 33.4

Note: whilst the emissions intensity of the investment (tCO_2e/$m) has changed, the emissions intensity of the building (tCO_2e/$m) remains constant.

Part 2. Different types of exposures within structures

In a simple transaction structure, the total original nominal amount of the structured bonds is equal to the sum of the closing loan amounts in the pool. Allocating emissions across these tranches is straightforward, following the methodology above, and does not generate any double counting. However, there are numerous additional ways of having exposure to a securitization and the table below seeks to give guidance on how these should be treated for allocation of financed emissions purposes.

Exposure type	Description	Treatment
Interest only / principal only tranches	Most bonds combine a contractual interest payment (linked to the outstanding bond amount) and a right to principal repayment. These cashflows can be split into two independent streams to create two different securities: an interest-only/IO strip and a principal-only/PO strip. The contractual payments on the IO are based on the outstanding balance of the PO.	Under the methodology, calculating emissions for the combined security is straightforward. It is logical then for an IO/PO structure to allocate the emissions for the combined security to the two strips throughout the life of the relevant tranche. To ensure a consistent measure over time, not impacted by extraneous market movements, the IO/PO attribution is based on the relative values of the two strips at deal close: IO tranche FE = Financed Emissions$_{\text{whole tranche}}$ x "Total IO Issuance Proceeds" /"Total IO + PO Issuance Proceeds"
Reserve funds	A cash amount either funded at closing of the transaction or trapped	Out of scope of this methodology. It may be considered that provision of the funds is necessary

	from excess funds (or a combination) to provide credit and liquidity support to the transaction	to cover off certain risks specific to the transaction (e.g., risk of set off or liquidity shortfalls) , in which case this could be covered in an evolution of the Facilitated Emissions standards.
Liquidity facilities/funds	Either a contractual facility commitment or a fund (funded at closing of through trapped funds) to provide additional liquidity to the transaction	Out of scope of this methodology. It may be considered that provision of the facility/funds is necessary for the transaction to occur, in which case this could be covered in an evolution of the Facilitated Emissions standards.
Hedging instruments	Swaps, caps and other derivative instruments entered into by the securitization issuer to hedge its exposure to foreign currency exchange rates and or interest rates	Out of scope of this methodology. Likely covered in an evolution of the Facilitated Emissions standards.
Over-collateralization	The nominal value of loan collateral within the pool that is additional to the nominal value of the issued notes (i.e. not needed to repay notes if there are no losses in the pool) For the avoidance of doubt: this section applies only to over-collateralization in the form of additional loan collateral (with associated emissions) – not to cash or cash-like assets.	To avoid over-allocating emissions to notes (i.e. from the loans they have financed plus those of the overcollateralization) the overcollateralization should be seen as a tranche of the transaction for the purposes of this methodology. When calculating the attribution factor, the current outstanding loan amount of the overcollateralization (Loan COA of the total pool MINUS the COA (nominal) of the other tranches) should be used as the COA (nominal) of the overcollateralization tranche. In some structures, the financing for the overcollateralization e.g. sub-loan principal is repaid from revenue funds and therefore amortizes faster than the assets that form the overcollateralization. By designating the tranche value of the overcollateralization as being the current loan value of the overcollateralization (rather than the current nominal value of the sub-loan), the other tranches are not over-allocated emissions. This could create a situation where overcollateralization emissions are allocated to a sub-loan that has repaid – but there should in this case be an exposure held somewhere (assumed to be with the sub-loan lender) which represents rights to those assets.
Subordinated loans	Loans provided to the securitization issuer which can have varied use of proceeds e.g. funding reserve or liquidity funds, paying upfront transaction costs, purchasing overcollateralization	The purpose of a subordinated loan should be considered when deciding whether or how to allocate financed emissions. E.g. if 60% of the sub-loan is used to fund overcollateralization (in-scope) and 40% to fund a reserve fund then the emissions from the overcollateralization are allocated to the sub-loan holder and the reserve fund is out of scope.
X-notes (senior & subordinated) and residuals	Notes or certificates representing rights to excess cashflows (i.e. not contractually linked to the value of	Out of scope of this methodology.

	any note as an IO would be), rights to repurchase the pool etc.	
Risk retention	Many regulatory frameworks governing securitization require nominated party(ies) to a transaction, "Retention Holder(s)" (typically loan originators or transaction sponsors), to have an alignment of interest with investors, or "skin in the game". This is achieved through regulatory risk retention, which may be structured as an obligation to retain: an amount of loans that would otherwise have been securitized, a participation in each of the loans that are securitized, or a proportion of the bonds issued.	**Risk retention as loan portfolios or loan participations held on balance sheet:** emissions should be calculated as financed emissions in line with PCAF Part A. **Risk retention as issued bonds held on balance sheet:** emissions calculations should follow the stated methodology for securitized products. **Risk retention as issued bonds subject to a financing structure:** whereby financing is provided for the retained bonds – often in the form of a repurchase agreement – with the economic risk of the bonds remaining with the Retention Holder. In all cases, the Retention Holder should continue to account for emissions associated with the retained bonds in line with the stated methodology for structured products. This is in line with the guidance on repurchase agreements above; the repo counterparty does not need to account for the emissions. This is also consistent with the guidance for SRT, where full transfer of economic risk results in transfer of financed emissions. In situations where a repo counterparty sells the risk retention bonds into the market, the purchaser of those bonds will also account for the financed emissions of their holding in accordance with this methodology. This will result in double counting of the emissions relevant to the risk retention bonds, being accounted for by both the Retention Holder and the subsequent bond purchaser. However, as with other areas of overlap, this double counting is acknowledged, and not inconsistent with the general approach to scope 3 emissions.

Part 3. Principle loss and default

PRINCIPAL DEFICIENCY LEDGERS AND WRITE-DOWNS

In a "perfect world" as assets in a securitization repay, the tranches are repaid by an equivalent amount and when all the assets have repaid, all the tranches are repaid too. At all times there is a balance between the assets and the tranches that funded them. When losses are crystalized on the assets and there is no principal cash to pay down the tranches to maintain the balance, this can be dealt with using a principal deficiency ledger (PDL) or principal write-downs.

Using a **PDL**, losses are recorded on a principal deficiency ledger (first to the most junior tranche and then reverse-sequentially). Any excess revenue funds are allocated to clear the PDLs and diverted to principal funds to pay down the tranches. Typically used in transactions with granular assets pools that generate excess spread (e.g. mortgages, consumer loans). The nominal value of the tranche does not change but, if insufficient excess revenue is available to clear the PDL by the end of the deal, the tranche will be repaid in an amount equal to the nominal value less the PDL.

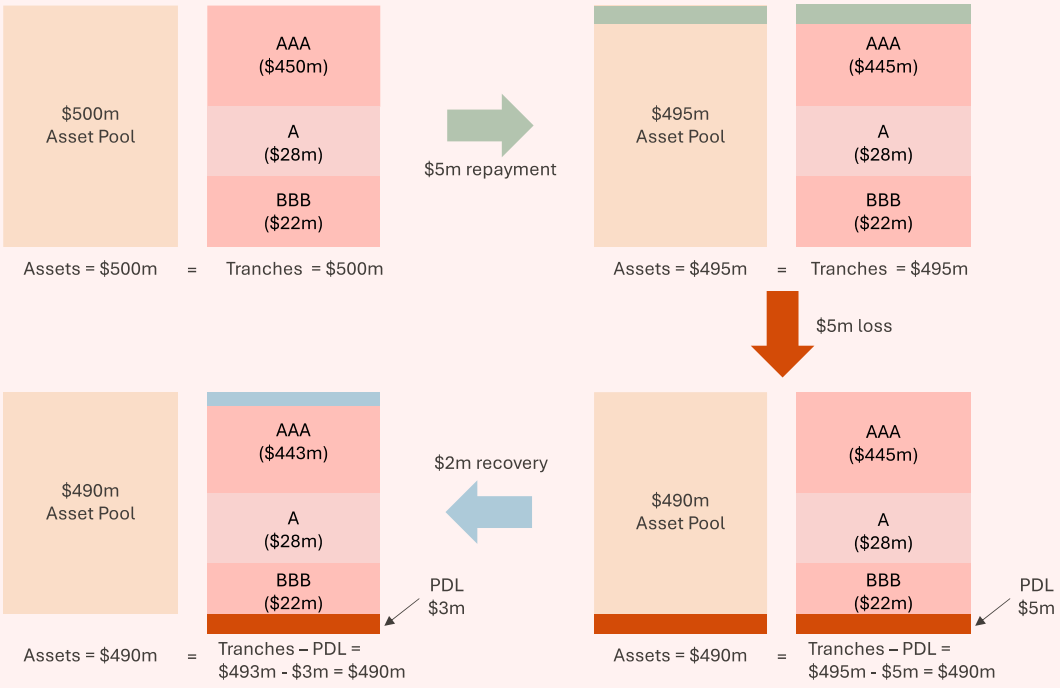
Other transactions (often where there is no excess spread or where exposures so concentrated that a loss is unlikely to be made good e.g. with commercial real estate) may contain a **principal write down** mechanism. This is a loss being recorded against the tranche and the mechanics can work in a few ways:

1. Principal write down is recorded against the tranche (shown in investor reports) and loss, once recognized, will not be recovered. Tranche will be repaid in an amount equal to the nominal value less the principal write downs.
2. Principal write down is recorded by a reduction in the bond's factor (with no associated payment) and loss, once recognized, will not be recovered. Tranche will be repaid in an amount equal to the nominal value (which, because of the factor reduction, incorporates write downs).
3. Principal write down is recorded against the tranche (shown in investor reports) but may be recovered over time. Tranche will be repaid in an amount equal to the nominal value less the principal write down net of any recoveries.
4. Principal write down is recorded by a reduction in the bond's factor (with no associated payment) and any allocated recoveries will be used to increase the bond's factor (again with no associated payment). Tranche will be repaid in an amount equal to the nominal value (which, because of the factor amendments incorporates the write down).

Ideally, COA (Nominal) used in any attribution calculations should be net of losses allocated to the tranche. This ensures that the emissions of the remaining assets are allocated across the correct nominal value of tranches and avoids the emissions intensity reducing. Since it will be excess spread (rather than any repayment of principal used to finance the hard assets) that is used to make up allocated losses, these allocated loss amounts are not financing hard assets and should not be allocated emissions.

However, PDLs or principal write downs not recorded via factor changes may be difficult to obtain systematically and in the absence of this, use of the COA (nominal) unadjusted for any loss allocations is acceptable.

Figure 7.22. Principal deficiency ledgers and write-downs – worked example



Note: For simplicity, these diagrams asume sequential allocation of principal cashflows to repay notes and reverse-sequential allocation of losses. Whilst transactions may have different allocation rules, the principles still hold.
The diagrams reference principal deficiency ledgers (PDLs) but principal write down mechanisms would work in exactly the same way.

DEFAULTS

In the event of a loan default, FIs shall use the loan's COA and the asset value at origination (subject to data availability as noted above) to calculate emissions until the loan/asset is removed from the collateral pool. At the point the asset is sold, the emissions will transfer to the new owner (and the loan is repaid/written off). Regardless of whether the asset is sold at a discount, or premium, FIs will use asset value at origination, and not any updated valuation, to calculate emissions, consistent with this methodology. If the loan defaults after partial paydown, emissions are still calculated using the loan's COA and the asset value at origination.

7.3 Financed avoided emissions and forward-looking metrics

Avoided Emissions

The below illustrative examples are provided to highlight how an FI may attribute financed avoided emissions.

EXAMPLE AVOIDED EMISSIONS REPORTED BY RAIL COMPANY

An electric passenger rail company discloses that 500,000 tCO_2e emissions were avoided in 2023 due to the creation of a new metro line that has displaced passenger vehicle trips that would have taken place in the absence of the expanded rail network. The avoided emissions reported by the company represent the savings that occurred in 2023 only. This figure was audited under limited assurance by an auditor and uses the WBCSD method for avoided emissions. For this example, an FI provided both equity and debt to the company, resulting in an attribution factor of 20%. The FI examined the avoided emissions figure provided and considered enough guardrails to be in place for the number to be credible.

The FI calculates financed avoided emissions of 500,000 x 20% = 100,000 tCO_2e

AVOIDED EMISSIONS EXAMPLE – RENEWABLE POWER PROJECT FINANCE

Annual avoided emissions for renewable power projects can be calculated by assuming that the annual power production of these projects avoids the counterfactual scenario in which certain fossil fuel power plants would need to run. The counterfactual scenario can be captured using emissions factors based on various approaches and assumptions, as illustrated in Table 7.31.

Table 7.31. Emissions factors per type of power mix

Preferred Options	Type of mix	Description of emissions factors
A	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).
B	Fossil fuel mix traded	Emissions 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.
C	Fossil fuel mix produced	Emissions factors based on the emissions of all fossil fuel power (including or excluding nuclear) produced in a country or region.
D	Average electricity mix	Emissions factors based on the emissions of all power (fossil and non-fossil) produced in a country or region.

Various publicly available data sources on national and international levels are available and provide the data to calculate these emissions factors (e.g., International Energy Agency (IEA), US Environmental Protection Agency (EPA), European Environment Agency (EEA)). If possible, emissions factors with greater

granularity across time (e.g. hourly or monthly) and space (e.g. sub-regional, local or nodal level) should be used.

If the operating margin is not available, FIs can use the fossil fuel mix traded, the fossil fuel mix produced, or (as a last resort) the average electricity mix. In principle, PCAF recommends excluding nuclear energy in line with the International Financial Institution (IFI) methodology but also allows the inclusion of nuclear as most data sources include nuclear power under the fossil fuel mix.

Example – pure-play renewable energy company finance

A pure-play independent power producer (IPP) company develops and operates a geothermal power plant project, with an installed capacity of 2x50 MW (100 MW). For 2024, the company reported an annual renewable power production of 700,000 MWh. For this example, an FI provided both equity and debt to the company, resulting in an attribution factor of 10%. The FI may report the avoided emissions for 2024 in line with the above guidance as follows:

(Operating margin – geothermal absolute emissions intensity) * annual power production * attribution factor =

(0.8 tCO_2e/MWh – 0.1 tCO_2e/MWh) * 700,000 MWh * 10% = 49,000 tCO_2e

Example – avoided emissions for a corporate green bond

FIs shall follow the draft 'Use of proceeds structures' guidance when attributing avoided emissions that result from instruments with specified use of proceeds. The following table illustrates the example of a 12 MEUR green bond issued by a steel corporate. The bond has been partially allocated to two electric steel facilities the corporate owns and controls. All numbers are for the reporting year 2024 and are illustrative for the purpose of this example.

	Total debt + equity (MEUR)	Outstanding amount (MEUR)	Data quality score	Avoided emissions (tCO_2e)
Electric steel facility A (operational)	20	2	2	20,000
Electric steel facility B (construction)	50	8	1	20,000

Note that for this example, the outstanding amounts in the underlying projects do not equal the total green bond value. This occurs when the green bond proceeds have not been fully allocated yet.

The energy corporate, i.e. the issuer, would report the following impact for this green bond:

	Data quality score	Avoided emissions (tCO_2e)
Total avoided emissions green bond	(2 * 2 + 8 * 1) / 10 = 1.2	(2 / 20 * 20,000) + (8/50 * 20,000) = 5,200

For this example, an investor is investing 6 MEUR in the green bond, which means the attribution factor in the green bond will be 6 MEUR/12 MEUR = 50%. Therefore, this investor would calculate the following avoided emissions for this investment:

	Data quality score	Avoided emissions (tCO_2e)
Avoided emissions green bond for investor	1.2	50% x 5,200 = 2,600

Forward-looking emissions metrics

FULL WORKED EXAMPLE FOR OPTIONS 1 & 2

For the sake of this example, the portfolio of FI A only comprises two loans, one loan to company A and one to company B. The loan to company A was a sustainability-linked loan. As part of this, company A has committed to reduce their scope 1 emissions from 200,000 tCO_2 in 2023 to 150,000 tCO_2 in 2030. They have also committed to annual intermediate targets, which FI A used for the interpolated EER. Company B has set a science-based target for 2028. As a result, the scope 1 emissions are expected to reduce from 80,000 in 2023 to 55,000 in 2028.

OPTION 1

The table below shows how the emissions and attribution factors for companies A and B progressed from 2023 to 2030, and what FI A would report accordingly for each year.

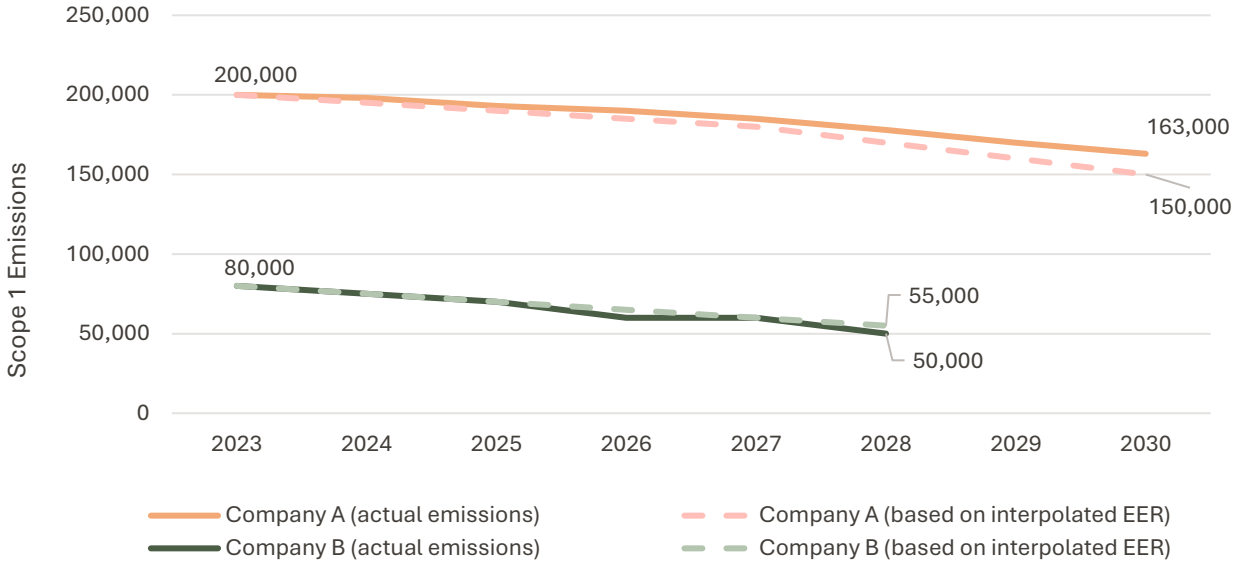
Company A	2023	2024	2025	2026	2027	2028	2029	2030
Actual emissions (tCO_2)	200,000	198,000	193,000	190,000	185,000	178,000	170,000	163,000
EER (tCO_2)	50,000							
Interpolated EER (tCO_2)	0	5,000	10,000	15,000	20,000	30,000	40,000	50,000
AER (tCO_2)	0	2,000	7,000	10,000	15,000	22,000	30,000	37,000
Attribution factor FI A	10%	9%	8%	7%	6%	5%	4%	3%

Company B	2023	2024	2025	2026	2027	2028	2029	2030
Actual emissions (tCO_2)	80,000	75,000	70,000	60,000	60,000	50,000		
EER (tCO_2)	25,000							
Interpolated EER (tCO_2)	0	5,000	10,000	15,000	20,000	25,000		
AER (tCO_2)	0	5,000	10,000	20,000	20,000	30,000		
Attribution factor FI A	25%	20%	15%	10%	5%	0%		

FI reporting	2023	2024	2025	2026	2027	2028	2029	2030
Portfolio-wide scope 1 EER (tCO_2)	11,250							
Portfolio-wide scope 1 interpolated EER (tCO_2)	0	1,450	2,300	2,550	2,200	1,500	1,600	1,500
Portfolio-wide scope 1 AER (tCO_2)	0	1,180	2,060	2,700	1,900	1,100	1,200	1,110

Portfolio-wide scope 1 % achieved EER	N/A	81%	90%	106%	86%	73%	75%	74%

Figure. 7.31. Fully worked EER example option 1



OPTION 2:

For option 2, the counterfactual scenario assumes that both companies are increasing production. For company A this leads to stable emissions in the counterfactual scenario and for company B the emissions are slightly decreasing in the counterfactual scenario. The table below shows how the EER for companies A and B would be calculated, and what FI A would report accordingly.

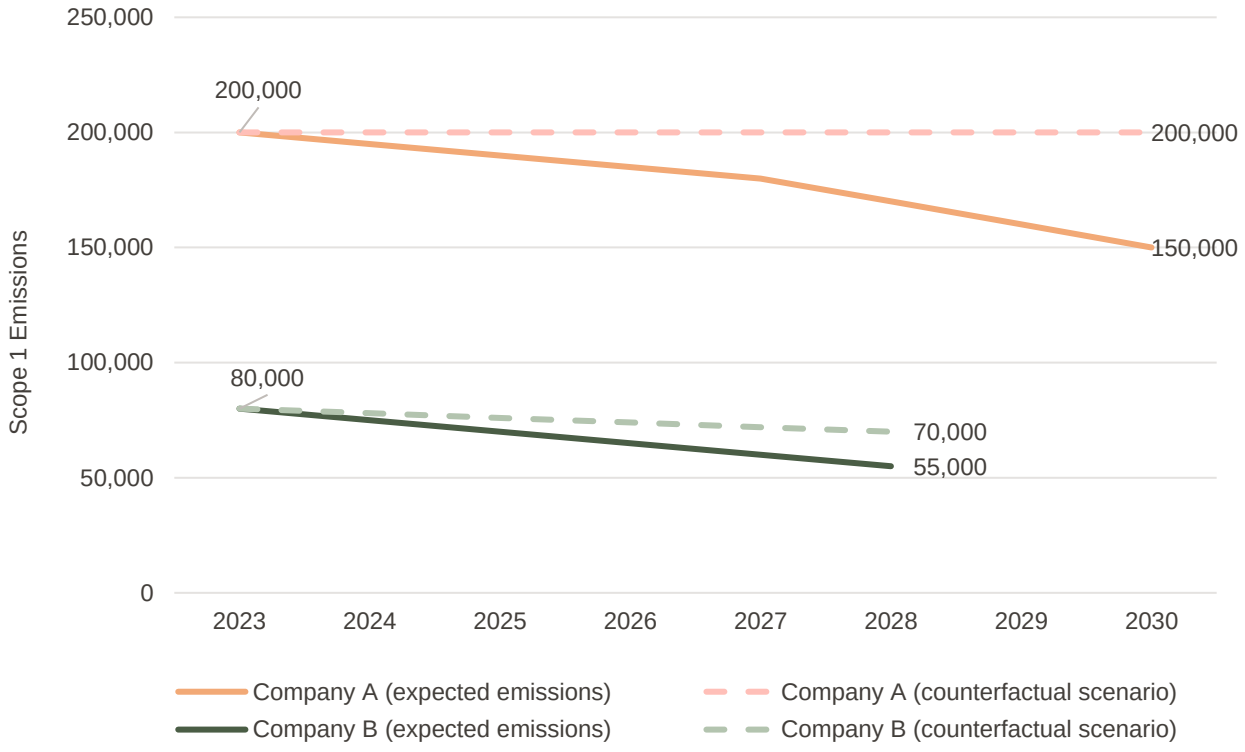
Company A	2023	2024	2025	2026	2027	2028	2029	2030
Counterfactual scenario (tCO_2)	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Expected emissions (tCO_2)	200,000	195,000	190,000	185,000	180,000	170,000	160,000	150,000
Annual EER (tCO_2)	0	5,000	10,000	15,000	20,000	30,000	40,000	50,000
Cumulative EER (tCO_2)	170,000							
Annualized EER (tCO_2)	24,286							
Attribution factor FI A	10%							

Company B	2023	2024	2025	2026	2027	2028	2029	2030
Counterfactual scenario (tCO_2)	80,000	78,000	76,000	74,000	72,000	70,000		
Expected emissions (tCO_2)	80,000	75,000	70,000	65,000	60,000	55,000		

Annual EER (tCO_2)	0	3,000	6,000	9,000	12,000	15,000		
Cumulative EER (tCO_2)	45,000							
Annualized EER (tCO_2)	9,000							
Attribution factor FI A	25%							

FI reporting	2023
Portfolio-wide cumulative EER (tCO_2)	28,250
Portfolio-wide annualized EER (tCO_2)	4,679

Figure 7.32. Fully worked EER example option 2



7.4 Inventory Fluctuations

Testing methodology: denominator analysis

Additional clarifications for the ratings given to the various alternative metrics and dampening approaches:

Practicability

Alternative metrics	Dampening approaches
For the multiple of EBITDA there is an element of subjectivity in deciding the multiples to value a company and EBITDA multiple can vary significantly across industries. (L)	Averages (annual or rolling) are relatively easy to understand and implement. (H) With constant EVIC, there is a challenge in explaining when to update the EVIC, e.g. due to a merger. EVIC mainly reflects organic growth which should not be frozen. (L)

Consistency & comparability

Alternative metrics	Dampening approaches
For EBITDA and for sales/revenue, the numerator which is the outstanding loan amount (the balance sheet) is not consistent with the denominator of sales revenue (income statement) and will require an additional factor to make consistent (asset turnover ratio), which cannot be standardized. (L)	Averages can be consistently applied if the approach is detailed in the Standard. (H) Constant EVIC scores low for comparability. There is a high chance it will not be applied consistently across all FIs and this would distort the equation of the sum of all shares adding up to 100% of the balance sheet. (L)

Accuracy

Alternative metrics	Dampening approaches
Accuracy of the GHG allocation will be most complete when using the EVIC metric for listed companies. All relevant parties are held responsible for their portion of GHG emissions from the investee. (H) Using approximate valuation of a company based on a multiple of EBITDA or sales/revenue may not accurately apportion responsibility between debt holders and equity investors (L).	Averages may not be seen to represent financed emissions accurately if the numerator and emissions are not averaged as well. (L) Constant EVIC has the benefit of being aligned with other methodologies in the PCAF Standard (Motor Vehicles, Mortgages, Commercial Real Estate), if the outstanding amount Is not impacted by refinancing or change in company structure. (H)

Alignment

Alternative metrics	Dampening approaches
Use of multiple of EBITDA or sales/revenue is a material change to the approach on the calculation of financed emissions and is not aligned to the current PCAF Standard (L) Whilst using debt and equity, and Total Assets are aligned to the current PCAF Standard for private firms or where data limitations exist, moving away from EVIC will likely have a material effect on financed emissions and may lead to recalculation or revisions to current reporting across many FIs (L).	All alternatives result in adjustments in PCAF methodologies. Dampening approaches may be considered as additional metrics, rather than replacing existing formulas. (L)

RESULTS AND ANALYSIS: ADDITIONAL GRAPHS

Figure 7.41. Examining fluctuations in high-emitting industries

Basis of Prep – Keep outstanding amounts constant. The grey line indicating 'Constant EVIC' represents the benchmark scenario.

Four high-emitting sectors were selected for further analysis (defined by GICS classification, level 1: sector). As can be seen, Individual sectors show a larger degree of fluctuations than the total portfolio. The effect of COVID is noticeable in all sectors, especially in the energy and industrial sectors. The resultant drop in emissions and in the market has varying effects when using different denominators (e.g. in Energy).

The constant EVIC line shows the trajectory of emissions over the time period. Across the board, alternative metrics seem to be equally volatile as EVIC, if not more. Among the dampening approaches, the 3-year rolling average tends to mirror the movement of real emissions closest.

7.5 Guidance on Undrawn Loan Commitments

Other calculation options that were under discussion

The following calculation options were considered by PCAF and discussed internally with a selection of PCAF signatories. PCAF recommends the calculation option as formulated in the main text of the consultation document. For transparency, other discussed calculation options are highlighted in this section.

OPTION 2: ALIGNMENT WITH PART C

In the second considered option, the concept of the attribution factor is based on Part C. In more detail, for having the option of an undrawn loan, clients pay a commitment fee to the FI for reserving the option for financing. In this approach, the commitment fee is used to calculate the emissions associated with undrawn loans in relation to the client's revenue. This highlights the security aspect of an undrawn loan commitment, which may be contracted for liquidity reasons.

Calculation option with alignment to PCAF Standard Part C – Commitment fee approach:

$$\frac{Commitment\ Fee}{Revenue} * Company\ emissions$$

In the numerator, the commitment fee that a client pays to have the option of the undrawn loan commitment is used. This is divided by the denominator which consists of the client's revenue. The attribution factor is multiplied by the client's emissions.

By using the commitment fee as the numerator, the only traceable transaction that has taken place related to the undrawn loan commitment is used to determine the associated emissions. This reflects that an undrawn loan is only existing hypothetically. As this is a similar expense to an insurance premium, it should be compared to the client's revenue stream.

The advantage of this approach is that the attribution is reflecting the nature of an undrawn loan commitment as a security ("guarantee for liquidity"). However, this approach is resulting in low emissions and could lead to understating emissions and the role of an undrawn loan commitment. Further, the denominator is not aligned with the drawn amount calculation, decreasing the level of comparability.

Another factor that decreases the level of comparability of this approach is the difference in commitment fees that are paid by a client for having an undrawn loan commitment option. The committee fee depends on the risk categorization of the borrowing company as well as the internal risk criteria of the FI. To give an example, if the commitment fee is lower due to different risk factors, fewer emissions are associated with the FI.
Due to this understating of emissions and low level of comparability between FIs but also between drawn amounts and undrawn amounts, PCAF advises against this calculation option.

OPTION 3: ALIGNMENT WITH PART A: RESERVED LOAN APPROACH

In the third considered calculation option, the attribution factor is aligned with Part A. When offering an undrawn loan commitment to a client, an FI reserves a portion of the loan commitment for the case that loan

commitment will be drawn. In this approach, this reserved portion of the loan commitment is used to calculate the emissions associated with the undrawn loan commitment. This portion reflects the impact of the undrawn loan commitment that it currently has on the FI. It reflects the state of the FI's balance sheet and hence follows the approach of "follow the money". This reserved portion cannot be used for a different purpose.

Calculation option with alignment to PCAF Standard Part A – Reserved loan approach:

$$\frac{Reserved\ amount\ of\ loan\ commitment}{EVIC\ or\ total\ equity + debt} * Company\ emissions$$

The numerator consists of the amount that the FI has set aside in case that the client will draw the committed finance. It is divided by the EVIC or total equity + debt of the client. The attribution factor is then multiplied by the client's emissions.

An advantage of this approach is, that the principle of "follow the money" is applied and only the portion on the FI's available funding that is reserved for this commitment is used for the calculation. This reflects the impact of the undrawn loan commitment that it has at the point of reporting, putting the emissions from an undrawn loan commitment in perspective and highlighting its hypothetical nature. Further, the calculation does not require new external data input. The nominator is reflecting the state of the FI's balance sheet and hence it aligns with the calculation for drawn amounts as it uses the same data sources.

The main disadvantage of this approach is the lack of comparability. The value of the reserved loan commitment might vary depending on the FI's internal risk criteria and size as well as the client's risk profile. Further, data on the reserved part of the loan commitment might not be available at the asset level. While it aligns with the concept of "follow the money", it is not showing the whole picture of the loan commitment if it is drawn. The disclosure of the undrawn loan commitment under IFRS S2 attempts to show a clearer picture of any potential transition risks. Calculating the emissions by only using the "reserved loan amount" does not reflect this intention.

Due to the difficulty of data availability, differences across FIs and clients, as well as the lack of ability to demonstrate the attempted impact of an undrawn loan commitment, PCAF advises against this calculation approach.

The GLOBAL GHG ACCOUNTING & REPORTING Standard

PART A

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