DRAFT

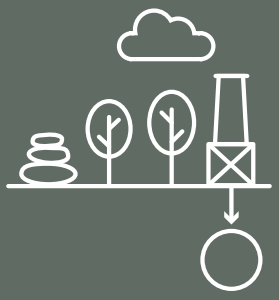
New methods

for public consultation

For financial institutions measuring and reporting scope 3 category 15 emissions

Green bonds

Sovereign bonds



Emissions removals

PCAF
Partnership for
Carbon Accounting
Financials

November 2021

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Acknowledgements

The Partnership for Carbon Accounting Financials (PCAF) is an industry-led initiative. Created in 2015 by Dutch financial institutions (FIs), PCAF extended to North America in 2018 and scaled up globally in 2019. The globalization of PCAF is meant to enable FIs worldwide to consistently measure and disclose the greenhouse gas (GHG) emissions of their financial activities.

As an industry-led partnership, PCAF is governed by a Steering Committee of ABN AMRO, Amalgamated Bank, ASN Bank, the Global Alliance for Banking on Values, Morgan Stanley, NMB Bank, Triodos Bank, and a representative from the United Nations (UN)-convened Net-Zero Asset Owner Alliance. At the time of publishing this document, more than 170 banks and investors participate in PCAF.[2]

Responding to industry demand for a global, standardized GHG accounting and reporting approach, PCAF developed the Global GHG Accounting and Reporting Standard for the Financial Industry ("the Standard"). Published in November 2020, the Standard provides detailed methodological guidance to measure and disclose GHG emissions associated with six asset classes: listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, and motor vehicle loans.

Since then, banks and investors have asked to expand the Standard with more methods. Thus, 21 PCAF participants volunteered to develop three additional methods for sovereign bonds, green bonds, and emissions removals. This group of volunteers makes up the PCAF Global Core Team and is listed below:

ABN AMRO	CDC	HSBC
AIMCo	CTBC Holding	Landsbankinn
Amalgamated Bank	Deutsche Bank	Morgan Stanley
Banco Pichincha	Federated Hermes	Produbanco
Bank of America	FirstRand	Robeco
Barclays	FMO	Triodos Bank
Boston Common Asset Management	Hannon Armstrong	UN-convened Net-Zero Asset Owner Alliance

The PCAF Secretariat facilitated the Core Team's work by moderating their technical discussions, reviewing their 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

This document is open for public consultation until 17 December, 2021. The methodologies in this consultation document remain under development and the PCAF Core Team will continue to review these methodologies in light of the consultation responses.

Please cite this document as: PCAF (2021). PCAF's draft new methods for public consultation.

2 The full list of PCAF participants can be found at: https://carbonaccountingfinancials.com/financial-institutions-taking-action#overview-of-financial-institutions.

Foreword by the PCAF Steering Committee

Six years after the Paris Agreement was signed, the world is on the way to breaching the Agreement's goal of limiting average global temperature rise to 1.5° C. The latest Intergovernmental Panel on Climate Change report on the physical science basis of climate change highlights this risk and shows that the world must accelerate short-term decarbonization efforts to limit the worst consequences of climate change. These short-term efforts mean achieving interim targets that help us reach net-zero emissions by 2050 at the latest.

Achieving net zero requires unprecedented cooperation and action-oriented commitments, as well as profound changes in our economies and the way we do business. We believe that this is possible. The International Energy Agency (IEA)'s Net Zero by 2050 report shows us scenarios with feasible milestones (actions and proven technologies) in buildings, transport, industry, electricity, and heat that can put the world on the right path.

We believe that financial institutions (FIs) can help achieve these milestones and the ultimate net-zero goal by lending, investing, and offering financial products and services that enable deep decarbonization. Measuring, tracking, and reporting are crucial components for accountability.

That is why members of the Steering Committee for the Partnership for Carbon Accounting Financials (PCAF) have been convening FIs worldwide to collaborate in the development of methodologies that help our sector measure and disclose the greenhouse gas (GHG) emissions. These methodologies apply to emissions from loans, investments, and financial products and services.

One year ago, PCAF published the Global GHG Accounting and Reporting Standard for the Financial Industry ("the Standard"), which is currently used by more than 170 FIs worldwide representing more than $54 trillion in total assets. They use it to assess risk, manage impact, meet the disclosure expectations of important stakeholders, and assess progress toward their climate goals. In the past year, the Standard has become vital for FIs to measure and track progress toward their contribution to net-zero emissions.

As such, there has been a surge of interest from FIs worldwide to continue expanding the Standard with more methodologies. As members of the Steering Committee for PCAF, we are delighted to act upon this request and will continue supporting the needs of the sector in the race to net zero.

This report is a response to this global request. It presents three new draft methodologies that we aim to add to the Standard in 2022. This draft is the result of the tenacious work of FIs that are part of the PCAF Global Core Team and that volunteered their time to create it. We encourage you to engage in the consultation process and provide further feedback to the Core Team and to help them deliver the final version to be published next year.

We thank the William & Flora Hewlett Foundation, IKEA Foundation, Tempest Advisors, Sequoia Climate Fund, and Bloomberg Philanthropies for their generous support of this work. We also thank the institutions we work for that provided us with the time to work on something that can benefit the industry as a whole.

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Introduction

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"). 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.

The Standard has been reviewed by the GHG Protocol and conforms with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard for Category 15 investment activities.

As of November 2021, over 170 FIs from more than 45 countries globally have committed to measure and disclose emissions associated with their financial activities, and 43 have published their reports. The increased uptake of PCAF methods by FIs worldwide has triggered financial regulators and other actors to consider PCAF as the Standard for accounting and disclosing the climate impact of portfolios.

For example, the Task Force on Climate-related Financial Disclosures (TCFD) recommends in its Proposed Guidance on Climate-related Metrics, Targets, and Transition Plans that FIs use PCAF's methodology to measure the GHG emissions of their financial activities. As TCFD becomes mandatory in multiple countries, FIs can count on PCAF for harmonized and robust approaches to measure and report these emissions.

Regulators in the European Union (EU) have started to acknowledge the PCAF Standard as a methodology of choice for complying with climate-related regulations:

- The European Central Bank Guide on climate-related and environmental risks indicates that FIs are expected to disclose the financed emissions for the whole group. The Guide mentions PCAF as a methodology that FIs are already using to fulfill this expectation.
- The draft regulatory technical standards for the Sustainable Finance Disclosure Regulation (SFDR) require financial market participants to disclose financed emissions following the methods of the PCAF Standard, specifically when referring to listed equity.
- The European Banking Authority proposes to require all banks under its jurisdiction (EU banks and non-EU banks with EU subsidiaries) to measure and disclose financed emissions by June 2024 at the latest.

Similarly, in the US, the Securities and Exchange Commission (SEC) has begun to take steps toward more stringent disclosure regulation, starting with holding a public consultation in March 2021 to receive comments on climate change disclosures. SEC Chairman Gary Gensler has indicated his goal to develop a mandatory climate disclosure rule by the end of 2021 that enables consistent, comparable, and decision-useful disclosures.

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 green bonds, sovereign bonds, and loans and investments in emissions removals. The following chapter describes them in detail.

The PCAF Core Team drafted these new 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.[2]

PCAF launched a public consultation of the new methods on 10 November 2021 and seeks feedback from all stakeholders, including FIs, regulators, policymakers, supervisors, data providers, consultants, and NGOs.

To participate in public consultation, stakeholders should follow the instructions on https://carbonaccountingfinancials.com/public-consultation.

2 For more information about these principles and requirements, see Figure 4-1 on page 34 of the Global GHG Accounting and Reporting Standard for the Financial Industry.

The new methods under public consultation

Green bonds

Sovereign bonds

Emissions removals

2.1 Green bonds

ASSET CLASS DEFINITION

This section provides further information on accounting for corporate bonds that have a clear use of proceeds for underlying green projects (i.e., green bonds). This section only applies to green bonds where the underlying assets are under the operational control of the corporate. It does not apply to other types of green bonds, such as corporate green bonds where the proceeds are invested in projects outside the operational control of the corporate or green bonds issued by sovereigns or FIs. These other types of green bonds could be covered by future updates of the Standard once methodologies for indirect investments are available.

While referring primarily to green bonds, the methodology outlined might be applied similarly to other bonds with the use of proceeds such as social or sustainability bonds. This section does not cover sustainability-linked bonds because sustainability-linked bonds do not have a clear use of proceeds. In general, green, sustainability, and social bonds are connected to a specific framework—often referred to as green, sustainability, or social bond frameworks, respectively. The bond framework builds on the green and social bond principles published by the International Capital Markets Association (ICMA)[3] and outlines how the proceeds from the bond issuance will be used.

EMISSIONS SCOPES COVERED

FIs shall report the absolute Scope 1 and 2 emissions of the project.[4] Scope 3 emissions should be covered if relevant.[5] Avoided and removed emissions may be reported if relevant, but they must be reported separately from absolute emissions.

ATTRIBUTION OF EMISSIONS

Assessment boundary based on the use of proceeds

When accounting for the emissions impact of a green bond, the assessment boundary shall be drawn around the projects for which the proceeds of the green bond are used.[6] If the impact report provides attributed absolute, avoided, or removed emissions in line with the PCAF Global Standard, the FI only needs to implement attribution determined by the ratio of its outstanding amount in the green bond (numerator) and the par value of the green bond (denominator). When an issuer finances a pool of projects with several green bonds and only reports for the aggregated portfolio, the FI may attribute based on the total sum of green bond par values:

$$Attribution\ factor_b = \frac{Outstanding\ par\ amount\ held\ by\ financial\ institution_b}{Green\ bond\ par\ value_b}$$

$$(with\ b = green\ bond)$$

3 See more information here: https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/

4 Impact reporting may need to evolve because it does not yet consitently disclose absolute emissions breakdowns for scopes 1, 2, and 3.

5 Examples of projects where scope 3 emissions are relevant include but are not limited to hydroelectric power plants and infrastructure projects.

6 Corporates may report emissions from several green bonds. The investor should only calculate emissions for the specific green bond that it has purchased.

EQUATIONS TO CALCULATE FINANCED EMISSIONS

When attributed absolute, avoided, or removed emissions in line with the PCAF Global Standard are not available, then the FI needs to calculate the financed or avoided emissions using the following equation:[7]

$$Financed\ emissions = Attribution\ factor * \sum_{project} \frac{Green\ bond\ part\ of\ project}{Debt + Equity\ of\ project} * project\ emissions$$

The project emissions can be calculated based on the guidance in the Project Finance chapter of the PCAF Standard. This means that these emissions can also be estimated using default emissions factors based on physical activity (e.g., t CO_2e/MWh) or economic activity (e.g., t CO_2e/€ of revenue or t CO_2e/€ of asset). To calculate emissions, only the green bond-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.

The following table illustrates the example of a corporate green bond, where an energy corporate issues a 3 MEUR green bond based on three renewable energy projects it owns and fully funds with green bonds. This means that the attribution term that appears in the summation part of the financed emissions equation above is equal to 1 (i.e., 100% attribution, so the green bond finances all debt and equity in the project).

	Total debt + equity (MEUR)	Outstanding investment	Scope 1	Scope 2	Scope 3	Avoided emissions
Energy corporate	15		500,000	50,000	300,000	N/A
Green bond (total)	3	1.5	1,000	0	50,000	100,000
Solar project (operational)	1		500	0	5,000	60,000
Wind project (operational)	1		500	0	5,000	40,000
Solar project (construction)	1		0	0	40,000	0

For this example, an investor is investing 1.5 MEUR in the green bond, which means the attribution factor will be 1.5 MEUR/3 MEUR=50%. Therefore, this investor would calculate the following emissions impact for this green bond investment:

	Scope 1	Scope 2	Scope 3	Avoided emissions
Financed emissions (green bond)	500	0	25,000	50,000

7 If the allocation of bond proceeds to specific projects is not made clear in the impact reports, the investor should make a reasonable assumption on the allocation to underlying projects. If this is not possible, the financed emissions may be calculated using the total sum of debt plus equity and emissions for all underlying projects.

These absolute emissions can be added to the overall portfolio emissions of the investor. Avoided emissions can also be reported as part of the overall portfolio, but they must be reported separately from absolute financed emissions.

DATA REQUIRED

The use of impact reports

The issuer of a green bond typically publishes an impact report annually. This report indicates the estimated environmental impact from projects or activities financed by using proceeds from the green bond.[8] The information in an impact report can be used to calculate financed emissions, but the FI has to make sure that all information used is in line with the PCAF Standard. This means that absolute emissions shall be reported by the FI. If absolute emissions are not available in the impact report or the impact report has not been issued, the FI needs to estimate the absolute emissions using other means—for example, for project finance, investments by using physical activity-based emissions or economic activity-based emissions (see further detail under limitations).

LIMITATIONS

Insufficient data in impact reports

Many impact reports are not yet in line with the requirements of the PCAF Standard, but the green bonds methodology intends to provide an incentive for more issuers to do so.

In addition, issuers of green bonds shall have the impact reports audited or verified by a third party, confirming that the proceeds have been allocated to eligible projects. Underlying green bond frameworks shall have received and publicly published a second party opinion.

Method does not convey other environmental or social benefits

Impact reports may report other environmental benefits of green bonds in addition to reduction of greenhouse gas (GHG) emissions. Although PCAF recognizes that green, social, and sustainable bonds may provide other benefits and focus on aspects other than GHG emissions reduction, these are not to be considered in the context of climate impacts covered in the PCAF Standard.

Under-allocation or over-allocation of emissions in the context of "use of proceeds"

The PCAF Standard relies on a follow-the-money approach for GHG accounting, and its attribution method is intended to account for 100% of corporate emissions while minimizing double counting to the extent possible. Limited data continues to be a main challenge in calculating financed emissions with accuracy, and the incorporation of the green bonds reporting methodology outlined in the above sections has implications for financed emissions reporting at the total corporate level.

Where a corporate's green bond emissions and financials are not both disclosed or not correctly taken into account, the calculation of financed emissions at a corporate level can result in under allocated or over-allocated emissions. This occurs due to the "use of proceeds" component of green bonds outlined in the ICMA's Green Bond Principles, which demands that any absolute

8 See more information about impact reporting in the International Capital Market Association's Harmonized Framework for Impact reporting and the Nordic Public Sector Issuers Position Paper on Green Bonds Impact Reporting.

emissions of a green bond project be "ring-fenced" and solely attributed to owners of that green bond like avoided emissions.

According to this logic, if a corporate issues a green bond, non-green bond "regular investors" should restrict their assessment boundary to those corporate assets outside of the green bond. This means that a green bond project's absolute emissions should be demarcated from the absolute emissions of its overall corporate. Likewise, a green bond project's total value (total debt) should be demarcated from the corporate's total Enterprise Value Including Cash (EVIC). In practice, this scenario is not usually feasible, so the under-/over-allocation of emissions is a limitation of this method.

An under-allocation of emissions can occur when there is a failure to demarcate (subtract) a green bond project's total value from the EVIC of the overall corporate to which it belongs. In this event, "regular investors" end up calculating their attribution of the corporate's emissions based on an inflated denominator (inclusive of green bonds' total debt, which is supposed to be ring-fenced). Parallel demarcation of a green bond project's absolute emissions from those of an overall corporate is also necessary for methodological accuracy, but failure to do so does not contribute to the under allocation of emissions.

The following example demonstrates emissions under-allocation as a result of not adjusting total EVIC of a communication services corporate to exclude the value of its green bond(s). We assume that three green bond investors each invest 1 MEUR (totaling 3 MEUR green bond investments) while 397 regular investors each invest 1 MEUR (totaling 397 MEUR regular investments). Corporate emissions and debt figures remain inclusive of green bond totals:

	Scope 1	Scope 2	Scope 3	Avoided emissions[9]	Total debt + equity (MEUR)
Communication Services Corporate	**300,000**	**4,000,000**	**9,000,000**	**900,000**	**400**
Corporate incl. green bonds (reg. investors)	300,000	4,000,000	9,000,000	900,000	400
Total green bonds (green bond investors)	1,000	0	50,000	900,000	3

9 If the International Capital Markets Association protocol on ring-fencing of green assets is not implemented, a double counting of avoided emissions can also occur (i.e., if regular investors are taking credit for avoided emissions solely funded by green bond investors).

Focusing on Scope 1 emissions, regular corporate and green bond investors would then calculate the following financed emissions:

	Scope 1
Total for 397 regular investors	(300,000 x 1 / 400 MEUR) x 397 = 297,750 t CO_2e
Total for three green bond investors	(1,000 x 1 / 3 MEUR) x 3 = 1,000 t CO_2e
Total financed emissions calculated	297,750 + 1,000 = 298,750 t CO_2e

In this example, the total financed emissions calculated (298,750 t CO_2e) are less than the total corporate emissions (300,000 t CO_2e), leaving 1,250 t CO_2e in emissions unaccounted for.

An emissions over-allocation can also occur in the following cases:

1. Emissions per MEUR invested into a green bond are greater than emissions per MEUR invested in an overall corporate.
2. Green bond total value has been successfully demarcated from corporate total EVIC, but parallel adjustment has not been made to demarcate green bond emissions from total corporate emissions.

To avoid under-allocating or over-allocating emissions:

1. Issuers (corporates) should report the financials and emissions profiles of individual green bond projects separate from their other assets.
2. To the extent enabled by issuer disclosures, FIs and users of PCAF should make every effort to demarcate (subtract) green bond "total debt" and emissions from total EVIC and emissions figures used for financed emissions calculation at the corporate level.

The following example demonstrates the correct allocation of emissions by adjusting total EVIC of the same communication services corporate to exclude the value of its green bond(s). We still assume that three green bond investors each invest 1 MEUR (totaling 3 MEUR green bond investments) while 397 regular investors each invest 1 MEUR (totaling 397 MEUR regular investments). Corporate emissions and debt figures are no longer inclusive of green bond totals:

	Scope 1	Scope 2	Scope 3	Avoided emissions	Total debt + equity (MEUR)
Communication Services Corporate	**300,000**	**4,000,000**	**9,000,000**	**900,000**	**400**
Corp., ex Green Bond (reg. investors)	299,000	4,000,000	8,950,000	N/A	397
Total green bonds (green bond investors)	1,000	0	50,000	900,000	3

Focusing on Scope 1 emissions, regular corporate and green bond investors would then calculate the following financed emissions:

	Scope 1
Total for 397 regular investors	(299,000 x 1 / 397 MEUR) x 397 = 299,000 t CO_2e
Total for three green bond investors	(1,000 x 1 / 3 MEUR) x 3 = 1,000 t CO_2e
Total financed emissions calculated	299,000 + 1,000 = 300,000 t CO_2e

In this example, total financed emissions calculated across regular and green bond investors (299,000 + 1,000 t CO_2e) is now equal to total corporate emissions (300,000 t CO_2e).

Where there is not yet sufficient data or capacity to demarcate green bond emissions and financials from an overall corporate's figures, an under-allocation or over-allocation of emissions may occur. Under-allocation may be mitigated in cases where a corporate's total green bond value is small compared with its total enterprise value.

2.2 Sovereign bonds

ASSET CLASS DEFINITION

This asset class includes sovereign bonds and sovereign loans of all maturities issued in domestic or foreign currencies. Both sovereign loans and bonds lead to the transfer of funds to the country, which in turn creates a debt obligation to be repaid by the borrowing country.

Sovereign debt is typically issued by the central government or treasury. FIs' exposure to central banks typically consists of cash, foreign exchange, and derivative (repo) transactions. This central bank exposure is not within scope of this accounting standard. However, in some countries, central banks also issue debt on behalf of the sovereign. In those cases, central banks should be assigned the emissions of the respective sovereign.

It is challenging to extend the accounting standard to sub-sovereign and municipal counterparties due to very limited data availability and because these counterparties are not directly subject to international GHG emissions inventory standards (e.g., by the United Nations Framework Convention on Climate Change [UNFCCC]). Therefore, these counterparties are not explicitly part of this asset class, but FIs might consider using an approximation approach (e.g., by share of GDP generated by sub-sovereigns) to evaluate the emissions attributable to sub sovereign and municipal counterparties.

Supranationals are political unions first, and their balance sheets represent the aggregated balance sheets of their members. Technically, it is possible to aggregate the GHG emissions of supranationals as a weighted sum of the emissions of its members. Practically, this would lead to double counting and could be misleading for financial portfolio assessments. However, the aggregated view can be useful for engagement with respective bodies.

EMISSIONS COVERED

The GHG Protocol's definition of Scope 1, 2, and 3 emissions was initially developed for classification of corporate emissions. PCAF has attempted to mirror this approach for sovereign debt and has identified two possible scope accounting methods: Territorial Approach and Government Approach.

At the same time, PCAF recognizes that both approaches only offer an approximation, and PCAF recommends accounting for sovereign emissions by using the more readily available standardized metrics: Production Emissions and Consumption Emissions. However, FIs might have to report the Scope 1, 2, and 3 emissions due to regulatory requirements in the EU, for example. Therefore, PCAF suggests two approaches for public consultation as described below.

Territorial Approach

Production Emissions	Scope 1: Production excl. exports Scope 3: Exports
Consumption Emissions	Scope 1: Production excl. exports Scope 2: Imports

Government Approach

Production Emissions / Consumption Emissions depending whether only production or also consumption scope is taken into account	Scope 1: Direct government Scope 2: Indirect government Scope 3: Government expenditures + non-government country emissions

In its sovereign GHG accounting approach, PCAF suggests primarily aligning with the metric fulfilling the reporting requirements of UNFCCC territorial GHG emissions (Production Emissions).

Production emissions are emissions attributable to emissions produced domestically and include domestic consumption and exports. This definition follows the territorial emissions approach adopted by UNFCCC for annual national inventories and is typically referenced by sovereigns in their Nationally Determined Contributions (NDCs).

In line with UNFCCC, the emissions should cover GHG emissions from specified key sectors and categories (energy, industrial processes and product use, agriculture, forestry, other land use, and waste).[10] 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. Also, LULUCF emissions have the potential to distort the overall trends of the key sectors (energy, industrial processes) that contribute to global warming.

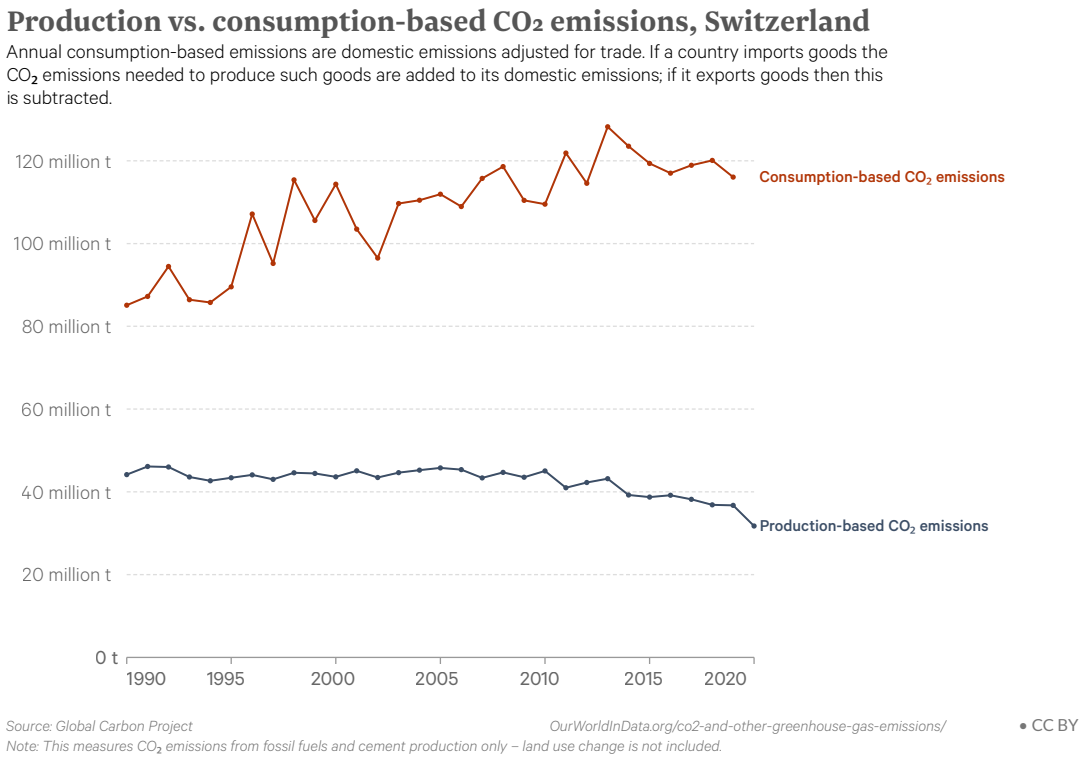
Because LULUCF emissions are typically included in countries' mitigation targets in their NDCs, PCAF recommends using the complete emissions data (including LULUCF) for reporting for accounting purposes. FIs might also consider tracking and reviewing the data excluding LULUCF for a deeper assessment of sovereign GHG reduction progress.

Although Production Emissions is currently the key metric to account for sovereign GHG emissions, PCAF also recommends that FIs track the GHG emissions of countries more holistically and use Consumption Emissions as an optional supporting metric (e.g., Absolute Emissions Levels, Emission Intensity).

Consumption Emissions reflect the demand side of sovereign emissions and account for consumption patterns and trade effects. This metric provides a broader view of a sovereign's GHG emissions and tackles the issue of carbon leakage that arises due to production shifts from countries where goods are actually consumed later. It is also an important metric in the context of broader sovereign responsibility for emissions caused. As sovereigns focus on production emissions-driven GHG reduction targets, their consumption emissions might follow a different trend, which can be seen in the example below:[11]

10 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

11 https://ourworldindata.org/grapher/production-vs-consumption-co2-emissions?country=~CHE



Although consumption emissions are currently not included in the UNFCCC Paris Agreement Framework and inventory, FIs can use this metric for a more holistic assessment of a sovereign's carbon emissions and for engagement with sovereigns. They can also use this metric for potential collective engagement with UNFCCC to broaden the scope of countries' accountability.

Nevertheless, PCAF acknowledges that there are current limitations to the usability of this metric given the following:

- Difficulty in accurate allocation of emissions along the supply value chain
- Involvement of input output models that can vary depending on the data provider
- Time lag in data availability (approximately 2 years compared with production emissions)
- The fact that only CO_2 emissions are typically available

PCAF notes that using Production and Consumption Emissions for sovereign GHG accounting implies that sovereign debt emissions would be considered separately from corporate emissions and other asset classes in a portfolio when individuals would rather compare these to each other rather than to GHG accounting of other asset classes. The advantage of using these metrics is better availability at a global level and stronger alignment with UNFCCC inventory and sovereigns' national climate plans (at least for Production Emissions). Both metrics can also be used in intensity metrics for comparison of the sovereigns as stated in the following section.

Territorial Approach

Under this approach, a sovereign is seen primarily as a national territory, and its direct (Scope 1) GHG emissions are attributable to the emissions produced and consumed within its boundaries. Similar to the Scope 1, 2, and 3 logic of corporate emissions, the indirect emissions have two dimensions:

emissions generated from purchased sources (Scope 2: Imports) and emissions generated by activities outside of the national boundaries of a country (Scope 3: Exports).

Scope 1	Scope 2	Scope 3
Domestic territorial production emissions excluding emissions attributable to gross exports	Emissions attributable to gross imports	Emissions attributable to gross exports

The approach deems capturing emissions generated by a country's production, consumption, and trade activity.

One of the limitations of the approach is that given the accounting of all emissions attributable to a national territory, it introduces double counting of emissions generated by other sectors of the economy (corporate, sub-sovereign) and complicates GHG accounting for financial portfolios containing multiple asset classes.

A further limitation of the approach is limited data quality. At the granularity of single Scope 1, 2, and 3 categories, public data is currently available only for Organisation for Economic Co-operation and Development (OECD) countries[12] (around 35% of global emissions) and with a considerable time lag (2015). The data is derived from allocation of emissions to countries and sectors on the basis of inter country input-output tables. Extension of data coverage in scope and time is theoretically possible with the help of estimates and modeling, though at a loss of accuracy. PCAF currently does not recommend a particular modeling approach.

To extend the accounting to sub-sovereign and municipal counterparties, FIs might consider using an approximation approach (e.g., by share of GDP generated by sub-sovereigns) to evaluate the emissions attributable to these counterparties, noting that aggregation of GHG emissions at a portfolio level would involve multiple counting.

Government Approach

Another approach under consideration to account for sovereign GHG emissions is focused on the central government role of a sovereign, which contains the central government activities themselves and the influence exerted by policies and regulations on the economy.

Scope 1	Scope 2	Scope 3
Direct emissions of the central government (e.g., government-owned buildings, vehicles)	Indirect emissions of the central government (emissions attributable to energy purchases)	3.1 Indirect emissions of the central government (expenditures, subsidies, investments)[13]
		3.2 Non-governmental territorial production/consumption emissions of the country (e.g., corporate sector) minus 3.1

Similar to companies, a sovereign's Scope 1 emissions are attributable to emissions generated by the central government's buildings and transport vehicles. Scope 2 indirect emissions for

12 https://stats.oecd.org/Index.aspx?DataSetCode=IO_GHG_2019

13 In the case of production emissions, 3.1 should only cover indirect emissions within the country boundary.

companies arise from the purchase of electricity, steam, heat, or cooling, similar to corporate Scope 2 accounting. In a sovereign's case, Scope 2 indirect emissions would be attributable to emissions associated with a central government's purchase of energy. Scope 3 indirect emissions are attributable to sources not owned or controlled by the reporting entity. In PCAF's opinion, Scope 3 covers a broad range of emissions for a sovereign:

- Emissions of the central government arising from expenditures, transfers, and investments
- All the territorial non-governmental emissions attributable to the country that include territorial Production and Consumption Emissions

The range of Scope 3 emissions reflects the broad influence of a government from its own operations to all the sectors of its country's economy, influenced by the government's policies and regulations. Notably, Scope 3 emissions introduce double counting with other sectors of the economy. At the Scope 1 and 2 levels, this approach allows separating the public sector from the private sector and accounting for these economic sectors separately. However, the share of Scope (1+2) emissions would account for less than 1% of total country emissions as indicated below for the largest European countries, limiting the relevance of accounting for Scope (1+2) emissions.

The following table indicates the Scope 1 numbers for a pool of European countries, calculated on the basis of Eurostat input-output tables:

Government operational emissions (Scope 1)	2015	2016	2017	2018
Austria	0.1000%	0.1000%	0.1000%	0.1000%
Belgium	0.0012%	0.0012%	0.0011%	0.0011%
Denmark	0.0007%	0.0007%	0.0010%	0.0009%
Germany	0.0008%	0.0008%	0.0007%	0.0006%
Ireland	0.0008%	0.0010%	0.0011%	0.0011%
Greece	0.0025%	0.0027%	0.0025%	0.0023%
Spain	0.0012%	0.0013%	0.0012%	0.0012%
France	0.0008%	0.0008%	0.0008%	0.0008%
Italy	0.0004%	0.0005%	0.0004%	0.0005%
Netherlands	0.0007%	0.0006%	0.0007%	0.0006%

The Scope 2 and 3 data can also be calculated on the basis of input-output tables, subject to availability of raw data.[14]

It is also possible to approximate the total (direct and indirect) central government emissions by a share of central government expenditure in relation to GDP:

$$Sovereign's\ Scope\ (1+2+3.1) = \frac{Government\ total\ expenditure}{\mathrm{GDP}_i} * Total\ Sovereign\ Emissions_s$$

where s = sovereign, Total Sovereign Emissions = Total Production or Consumption Emissions

14 Sources: World Input-Output Database (WIOD), Eurostat, Global Trade Analysis Project (GTAP)

Admittedly, this approximation is imperfect because ideally it would be necessary to distinguish between local and foreign sovereign expenditures. In this case, local expenditures would allow approximating a central government's production emissions, whereas adding foreign expenditures would allow approximating consumption emissions.

The data covering Total Production or Consumption Emissions is available as described below. The Scope (1+2+3.1) emissions cover the emissions of the central government and allow separating public and private sectors in a multi-asset portfolio that already accounts for Scope 3 emissions, noting the double counting contained in the Scope 3.1 emissions.

To calculate Scope 3.2 emissions, one would subtract the Scope (1+2+3.1) emissions from the country's total emissions.

$$\textit{Scope 3.2 emissions} = \textit{Total Country Emissions} - (\textit{Scope 1+2+Scope 3.1}) \textit{ Emissions}$$

A similar calculation is applicable to calculate the total Scope 3 emissions of a sovereign:

$$\textit{Scope 3 Emissions} = \textit{Total Country Emissions} - (\textit{Scope 1+2}) \textit{ Emissions}$$

If raw data is available (or as it becomes available), the calculation can be extended to the sub sovereign sector and be aggregated at Scope 1+2 levels without double counting.

Please see below for a comparison of key features of the two approaches.

Approach	Advantages	Limitations
Territorial Approach	- Broad sovereign role and responsibility at all scope levels, not limited to central government - Allows accounting for Production and Consumption Emissions	- Double counting emissions with other sectors (e.g., corporates) - Limited Scope 1, 2, and 3 data availability—extension of coverage would require estimates and time extrapolation
Government Approach	- Separation of emissions from public and private sectors at Scope 1+2 levels, mitigation of double counting - Allows accounting for Production and Consumption Emissions if Scope 1, 2, and 3 are considered	- Risk of incomplete accounting for sovereign emissions if only Scope 1+2, which typically account for <1% of sovereign emissions, is considered - Limited separate Scope 1, 2, and 3 data availability—approximations are imprecise and complex

With a varying degree of data availability as stated above, Scope 1, 2, and 3 data can be reported in both approaches. PCAF generally recommends reporting Scope 1, 2, and 3 data while being mindful of the double counting present for portfolio aggregating purposes, particularly in the Territorial Approach. On the contrary, the Government Approach allows reporting and aggregating Scope 1 and 2 level emissions without double counting, noting that Scope (1+2) emissions would account for <1% of Total Production Emissions of the sovereign.

Ultimately, as mentioned in the beginning, both approaches converge to the key two metrics that are widely used for reporting and sovereign comparison purposes: Production Emissions (in line with UNFCCC inventory requirements) and Consumption Emissions (for a wider holistic view of the sovereign).

ATTRIBUTION OF EMISSIONS

According to PCAF requirements, 'the FI's share of emissions shall be proportional to the size of 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 of the real economy.

For a listed company, total value is measured by EVIC. Applying the same logic to countries is more challenging because there is no appropriate measurement of a sovereign's equity, leaving only outstanding debt in the denominator of the attribution factor.

However, using debt for attribution of sovereign emissions has limitations. It is inaccurate because sovereigns rarely finance themselves primarily with debt as opposed to tax revenue. This approach is controversial because using outstanding national debt levels only (not including a measurement for equity) as a normalizing factor makes the approach highly dependent on the extent of a country's government's debt.

The table below illustrates this point. Singapore and Hong Kong have fairly comparable GHG emissions outputs and similar GDP levels. However, the low level of outstanding debt contracted by Hong Kong relative to Singapore leaves a hypothetical investor (with equal $1 million USD investments in sovereign bonds of both entities) with significant GHG emissions ownership in Hong Kong compared with Singapore.

Country	Emissions (t CO_2e)	Debt ($ Millions USD)	Exposure ($ Millions USD)	Debt Ownership Approach (t CO_2e)
Singapore	61,451,586	312,935	1	196
Hong Kong	42,654,105	159	1	268,264

The attribution is computed as follows:

$$\frac{Exposure\ to\ Sovereign\ Bond\ (USD)}{Debt\ of\ Country\ (USD)} * Sovereign\ Production\ Emissions\ (tCO_2e)$$

Singapore's attribution is computed as follows:

$$\frac{Exposure\ to\ Sovereign\ Bond\ (USD)}{Debt\ of\ Country\ (USD)} * Sovereign\ Production\ Emissions\ (tCO_2e) = \frac{\$1\ mm}{\$312{,}935\ mm} * 61{,}451{,}586\ tons = 196\ tons$$

As the example above shows, attributing emissions by government debt only can generate unwanted incentives in portfolio steering.

These effects are also present in corporate emissions accounting, where emissions attributed to FIs are strongly dependent on the underlying enterprise value (EVIC) of the respective corporate. However, the impacts on portfolio steering tend to be less pronounced because the EVIC metric includes a measurement for equity (not attributing all emissions to debt) and given that a much larger universe of corporates exists compared with sovereigns.

In PCAF's view, there is an alternative approach to emissions attribution allowing for a link to the real economy impact. This alternative involves taking Purchase Power Parity (PPP)-adjusted GDP (i.e., the value of a country's output as a proxy for the 'value of the country') adjusted by the PPP factor to improve the comparison between the actual economy sizes (see the Intensity Section below to demonstrate the comparison) and attribution of emissions by the sovereign's GDP:

$$Attributed\ Emissions = \frac{Exposure\ to\ Sovereign\ Bond\ (USD)}{PPP-adjusted\ GDP\ (international\ USD)} * Sovereign\ Production\ Emissions\ (tCO_2e)$$

Country	Emissions (t CO_2e)	Debt ($ Millions USD)	PPP-adjusted GDP ($ Millions USD International)	Exposure ($ Millions USD)	Debt attribution approach (t CO_2e)	PPP-adjusted GDP attribution approach (t CO_2e)
Singapore	61,451,586	312,935	579,762	1	196	106
Hong Kong	42,654,105	159	469,182	1	268,264	91

Given comparable sizes of the economies as measured by PPP-adjusted GDP, the countries would receive a more appropriate treatment in terms of owned emissions in investors' portfolios proportional to the generated emissions.

The following table illustrates further examples of the difference in ranking by the two attribution factors. Relating emissions to the sizes of the economy and to produced output (PPP-adjusted GDP) allows for a potentially fairer treatment. For example, the US and Japan—two of the largest emissions producers in the world—would rank much more favorably by debt attribution factor given their relatively large sizes of outstanding debt.

Country	Absolute Production Emissions Mt CO_2e	Gross government Debt ($ Millions USD)	PPP-adj. GDP ($ Millions Int'l)	Rank Production Emissions/ Debt	Rank by Production Emissions/ PPP adj. GDP
China	11.535	7.905.659	23.487.798	2	1
Australia	433	573.961	1.324.171	6	2
Canada	585	1.528.280	1.898.870	8	3
South Korea	652	667.605	2.209.424	5	4
India	2.597	1.980.623	9.560.220	3	5
United States	5.107	22.869.681	21.433.226	15	6
Japan	1.154	12.071.286	5.345.808	25	7
Thailand	275	225.431	1.342.165	4	8
Indonesia	626	327.789	3.338.144	1	9
Mexico	485	686.599	2.608.650	7	10
Belgium	104	530.794	628.371	16	11
Finland	43	161.257	285.024	12	12
Netherlands	156	472.075	1.031.484	9	13
Germany	703	2.198.292	4.644.166	10	14
Brazil	478	1.662.405	3.229.055	11	15
Austria	72	316.751	520.804	13	16
Spain	259	1.337.221	1.988.355	17	17
Portugal	48	285.248	378.124	18	18
Italy	332	2.673.312	2.677.118	23	19
United Kingdom	365	2.423.556	3.240.511	20	20
France	315	2.693.686	3.320.559	24	21
Singapore	53	406.936	579.763	22	22
Ireland	37	242.618	430.334	19	23
Sweden	45	197.622	565.620	14	24
Switzerland	39	277.619	602.641	21	25

Naturally, attribution by PPP-adjusted GDP is not the perfect metric, and countries with larger PPP-adjusted GDP receive a relatively more favorable treatment. For example, take Thailand versus Spain: the countries have comparable emissions levels, but Spain's larger GDP allows it to rank more favorably. An improvement for Thailand as compared to attribution by debt exists in its improved ranking (8 versus 4) when PPP-adjusted GDP attribution is applied.

PCAF admits that there is not a 1:1 relationship between an FI's investment and a sovereign's GDP, in contrast to a more straightforward relationship between an FI's purchase of a share of a sovereign's outstanding debt. However, empirical evidence suggests that there is limited interdependence between sovereign debt and emissions, whereas a country output production is linked more closely to the generated emissions. Furthermore, FIs' funds would typically spur economic growth and therefore GDP,[15] implying impact on production processes and therefore emissions.

15 Admittedly, this relationship is valid up to a certain threshold because very large public debt might become unsustainable and detrimental for growth. See The impact of high and growing government debt on economic growth: an empirical investigation for the euro area (europa.eu).

EQUATIONS TO CALCULATE FINANCED EMISSIONS

The financed emissions of sovereign bonds are calculated by multiplying the attribution factor by the emissions of the respective sovereign borrower.

$$Financed\ emissions = \sum_{s} Attribution\ factor_s \times Sovereign\ Production\ Emissions_s$$
$$(with\ s = sovereign\ borrower)$$

As described in the attributions section, two options are under consideration to calculate the attribution factor:

Debt Attribution:

$$Financed\ emissions = \sum_{s} \frac{Outstanding\ amount_s}{Gross\ Government\ Debt_s} \times Sovereign\ Production\ Emissions_s$$

GDP Attribution:

$$Financed\ emissions = \sum_{s} \frac{Outstanding\ amount_s}{PPP-adjusted\ GDP_s} \times Sovereign\ Production\ Emissions_s$$
$$(with\ s = sovereign\ borrower)$$

As specified above, PCAF recommends using Absolute Production Emissions of a sovereign as the key emissions metric.

Despite the data limitation specified earlier, PCAF considers tracking the development of a sovereign's consumption emissions and using it for broader assessment of a sovereign's GHG emissions to be helpful.

Emissions intensities

In the course of the work of PCAF's sovereign debt working group, the following intensity metrics for normalization and comparison of sovereign production and consumption GHG emissions intensity, respectively, have been defined as follows:

- For sovereign production: Production Emissions/PPP-adjusted GDP
- For consumption emission intensity: Consumption Emissions per Capita

For a **comparison of production emissions intensity**, using a GDP metric in the denominator appears straightforward, given the link between a country's production and industrial processes causing emissions and the country's output (GDP). The PPP adjustment of GDP allows for comparing 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 in particular and allows for a fairer comparison of the countries, as the table below illustrates (2019 data):

Country	Nominal GDP ($ Millions USD)	PPP-adj. GDP ($ Millions Int'l)
China	14,279,937	23,487,798
US	21,433,226	21,433,226
India	2,868,929	9,560,220
Japan	5,081,770	5,345,808
Germany	3,861,124	4,644,166
Indonesia	1,119,191	3,338,144
France	2,715,518	3,320,559

When comparing production emissions intensity, the PPP adjustment mitigates the negative effect for countries where production and emissions are concentrated:

Country	Absolute Production Emissions Mt CO_2e	Nominal GDP ($ Millions USD)	PPP-adj. GDP ($ Millions Int'l)	(Production Emissions/ Nominal GDP)*1,000	(Production Emissions/ PPP-adj. GDP)*1,000
China	11,535	14,279,937	23,487,798	0.81	0.49
US	5,107	21,433,226	21,433,226	0.24	0.24
India	2,597	2,868,929	9,560,220	0.91	0.27
Japan	1,154	5,081,770	5,345,808	0.23	0.22
Germany	703	3,861,124	4,644,166	0.18	0.15
Indonesia	626	1,119,191	3,338,144	0.56	0.19
France	315	2,715,518	3,320,559	0.12	0.09

Emissions source: Edgar, 2019. Intensity KPIs are multiplied by 1,000 for better visualization of the comparison.

For **consumption emissions**, PCAF recommends using normalization per capita. Consumption emissions reflect the demand side of the economy, and normalization per capita appears natural. In line with the arguments stated above, PCAF recommends using the consumption emissions intensity as an additional metric to obtain a holistic view of a country's GHG emissions.

The table below illustrates that some countries tend to have higher consumption emissions than production emissions, but the difference is not always significant (e.g., India), implying that countries with notable contributions to production emissions can be equally high consumers.

PCAF recommends considering both the production and consumption intensity metrics when comparing, monitoring, and engaging with sovereigns.

Country	Absolute Production Emissions $MtCO_2e$	Absolute Consumption Emissions $MtCO_2e$	Rank by Production Emissions/PPP-adj. GDP	Rank by Consumption Emissions per Capita
China	11,535	8,960	1	5
US	5,107	5,767	3	1
India	2,597	2,355	2	7
Japan	1,154	1,312	4	2
Germany	703	862	6	3
Indonesia	626	591	5	6
France	315	442	7	4

For all of the metrics, PCAF recommends that FIs review at least 5 years of historical data for a better understanding of sovereigns' overall emissions trends and underlying patterns (e.g., production versus consumption).

DATA REQUIRED

PCAF has identified the following data required for accounting sovereign debt emissions and provides a list of public data sources[16] with the most current and comprehensive data coverage per data category. However, this list is not exhaustive, and FIs might prefer to use other data providers. 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., GHG versus CO_2 emissions, inclusion or exclusion of land use (LULUCF) emissions in a country's production emissions).

Data Category	Description	Source	Scope	Limitations
Territorial Approach				
Scope 1 absolute emissions **Scope 2 absolute emissions** **Scope 3 absolute emissions**	CO_2 production – CO_2 gross exports emissions CO_2 gross imports emissions CO_2 production emissions (incl. gross exports)	Carbon dioxide emissions embodied in international trade (oecd.org)	OECD countries, 2015 most recent data	Limited country coverage, significant data time lag, only CO_2 data available
Government Approach				
Scope 1, 2, and 3	Raw data on the basis of data directly available (Eurostat) or input-output tables	WIOD (WIOD Home), Eurostat, GTAP	Eurostat: only EUR data, Global for WIOD & GTAP	Varying country coverage, data time lags
Aggregated Metrics				
Absolute Production Emissions	Territorial production emissions in line with UNFCCC definition	World | Total including LUCF | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)	GHG emissions, global country coverage, other sources (PIK, UNFCCC) available	Slight time lag (2018), but in line with UNFCCC
		EDGAR - The Emissions Database for Global Atmospheric Research (europa.eu)	CO_2 2019 emissions, global coverage	Most recent GHG emissions data available in 2015
Absolute Consumption Emissions	Domestic territorial production emissions + imports - exports	Carbon Footprint Results (worldmrio.com)	Global coverage, 2016 most recent data	Calculation based on input-output models, notable data time lag (2016)
		CO_2 emissions - Our World in Data	Global coverage, 2018 most recent data	Complex supply value chain allocation, estimates involved
PPP-adjusted GDP	GDP adjusted by PPP	GDP, PPP (current international $) | Data (worldbank.org)	Global coverage, 2019 data	
Nominal GDP, Population	Standard macroeconomic metrics	World Bank/ International Monetary Fund (IMF)	Global coverage, 2019 data	

16 PCAF is currently investigating if these sources are all freely available, or come under certain license restrictions. Depending on the outcome, this list of data sources might be revised.

LIMITATIONS

Emissions scope

The two approaches to classify Scope 1, 2, and 3 emissions of sovereigns are an attempt to mirror the approach developed and adopted for corporates. However, sovereigns are different types of counterparties than corporates, and it might not be necessary to introduce the Scope 1, 2, and 3 categories for sovereigns.

Double counting

When reporting emissions associated with sovereign bonds beyond the emissions of the governmental organization only, double counting occurs with Scope 1 and 2 emissions generated by other sectors. This double counting may also spill over to GHG accounting from FIs with investment portfolios in multiple asset classes (e.g., loans or investments to corporates). This type of double counting occurs with all approaches described in this chapter including: Production and Consumption Emissions, the Territorial Approach, and Scope 3 of the Government Approach. Scope 1 and 2 of the Government Approach avoids double counting but raises the risk of FIs accounting for only a fraction of sovereign emissions if Scope 1 and 2 emissions are considered alone. At the Scope 3 level of the Government Approach, there is double counting involved.

However, doubling 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 does ensure that the right considerations are taken when making lending or investment decisions.

2.3 Emissions removals

This draft on emissions removals encompasses narratives that will be added into various sections of the current PCAF Standard:

- A narrative on net-zero financed emissions by 2050 will be added either into chapter 3 of the current PCAF Standard or incorporated as a standalone chapter.
- A description of how to measure emissions removals for three asset classes that already exist in the PCAF Standard will be added. Each approach will be added to the specific subchapter in the PCAF Standard:
    - Subchapter 5.1. Listed Equity and Corporate Bonds
    - Subchapter 5.2. Business Loans and Unlisted Equity
    - Subchapter 5.3. Project Finance
- A description of how to report emissions removals will be added into chapter 6 of the current PCAF Standard (i.e., "Reporting recommendations and requirements")

The following draft presents the narrative in the same order as listed above.

NET-ZERO FINANCED EMISSIONS BY 2050

The Paris Agreement was reached in 2015 with the express aim of pursuing efforts to limit the global temperature increase to 1.5°C above pre-industrial levels.[17] Achieving this goal requires global emissions to decline by about 50% by 2030 relative to 2010 levels and to reach net zero by 2050.[18] Nonetheless, global emissions continue to increase. The level of ambition to achieve the goals of the Paris Agreement and steer global emissions toward net zero in 2050 is significant. FIs play a crucial role in facilitating this transition by facilitating the allocation of capital flows toward these net-zero goals.

The Race to Zero for businesses and investors has started, a UN-backed global campaign rallying non state actors to take action to halve global emissions by 2030 ahead of COP26.[19] In addition, the COP26 Private Finance Agenda is building up momentum with the Glasgow Financial Alliance for Net Zero under Vice Chairman and Head of Impact Investing at Brookfield Asset Management Mark Carney. It brings together the Net-Zero Asset Owner Alliance, Net Zero Asset Managers Initiative, and Net-Zero Banking Alliance (launched together in April 2021); the Net-Zero Insurance Alliance (launched in July 2021); and most recently, the Net Zero Financial Services Provider Alliance (launched in September 2021).

A critical component in the commitment to these net-zero initiatives is decarbonizing lending and investment portfolios following a 1.5°C scenario with low or no overshoot in the global average

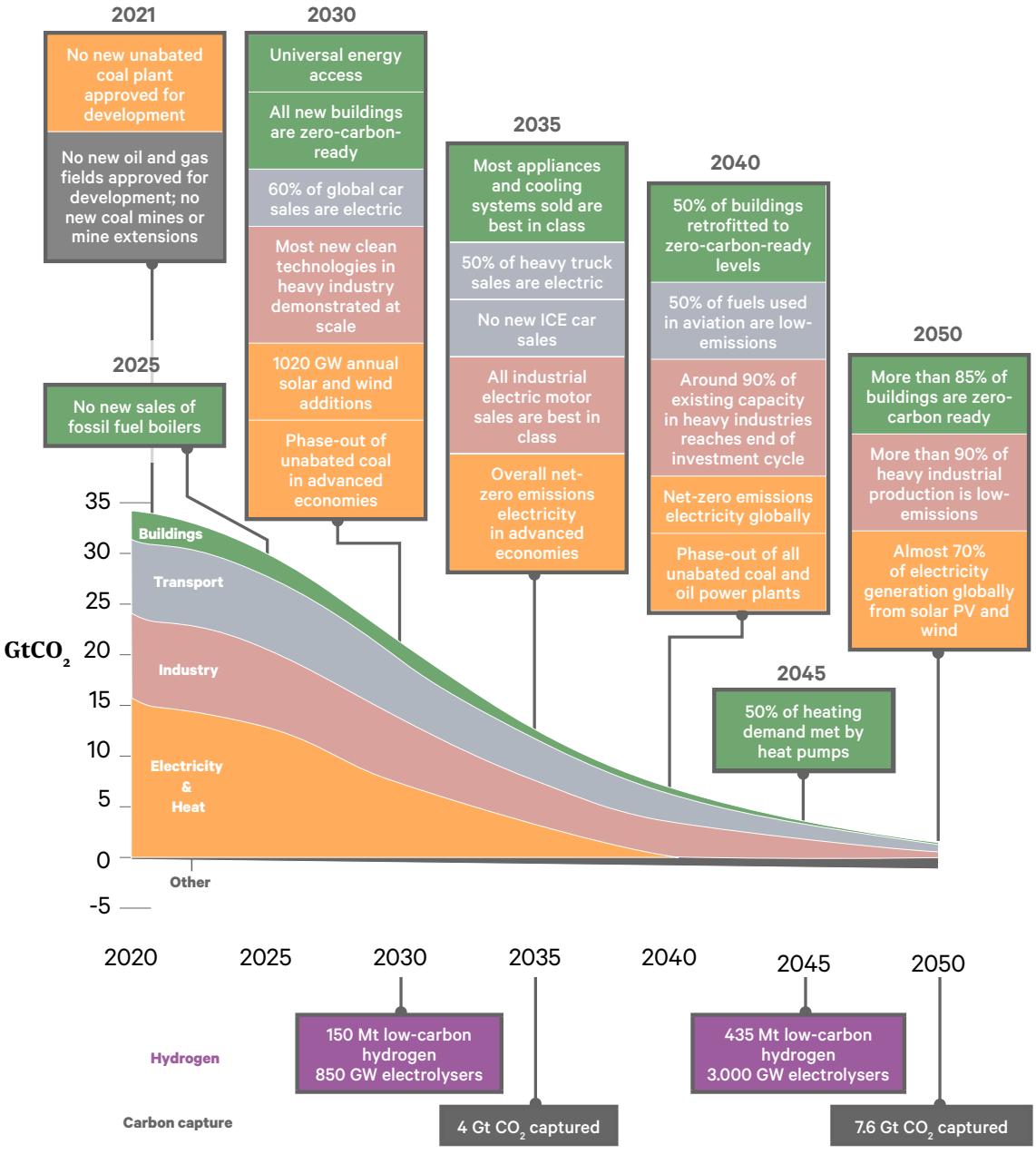
17 United Nations Framework Convention on Climate Change, The Paris Agreement, 2015.

18 Intergovernmental Panel on Climate Change, 2018: Global Warming of 1.5°C. An Intergovernmental Panel on Climate Change Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global GHG emissions pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

19 https://racetozero.unfccc.int

temperature increase. Recently, the International Energy Agency (IEA) launched a climate scenario that meets this criterion in its Net Zero by 2050 Roadmap. This scenario clearly shows the rapid transition and milestones that are required to limit global warming to 1.5°C (see chart below).

Key Milestones on the Pathway to Net Zero



Source: IEA, "Net Zero by 2050: A Roadmap for the Global Energy Sector," July 2021, 3rd Edition

Net zero is reached when anthropogenic emissions in the atmosphere are balanced by anthropogenic removals over a specified period. Climate science tells us that achieving net zero will help humanity avoid the most catastrophic effects of climate change and huge financial risks. Achieving net zero requires two primary components:

1. Deep decarbonization in energy, urban infrastructure and industrial systems, as well as reversing emissions growth from land use systems
2. Permanently removing the residual GHG emissions that are unfeasible to reduce or avoid

FIs can help this transition by lending and investing capital into activities that drive deep decarbonization, including technology and nature-based emissions removal solutions. Measuring and reporting both generated emissions and emissions removals enables FIs to track progress toward net zero.

FIs can finance emissions removals via three ways:

- **Credits purchases:** FIs can buy carbon removal credits[20] based in the voluntary carbon market. Because these purchases are not part of their lending or investment portfolio, these credits are not incorporated into the PCAF Standard. For more information, FIs should refer to the GHG Protocol on how to include carbon credits in their accounting.
- **Business Loans and Unlisted Equity**: FIs can lend to or invest in companies such as forestry companies that have emissions removals within their organizational boundaries. They can also lend to or invest in companies that purchase carbon removal credits to offset their emissions. For more information on the GHG accounting of these lending and investment activities, see the chapter on Listed Equity & Corporate Bonds and the chapter on Business Loans & Unlisted Equity in the PCAF Standard.
- **Project Finance**: FIs can lend to or invest in nature-based or technological projects that remove emissions from the atmosphere. They can also lend to or invest in projects that purchase carbon removal credits to offset their emissions. The general context for these investments is covered in the next paragraphs; for more information on the GHG accounting of these lending and investment activities, see the chapter on Project Finance in the PCAF Standard.

The global transition to net zero requires increased lending to and investment in both mitigation solutions (avoided emissions) and emissions removal solutions (emissions removals). The annual energy sector investment, which averaged $2.3 trillion USD globally over 2016-2020, needs to nearly double to $5 trillion USD by 2030 according to IEA's Net Zero by 2050 Roadmap. Examples of mitigation solutions can include renewable energy and carbon capture and storage (CCS), both of which avoid the release of new fossil fuel emissions into the air whether from industrial sites or conventional power plants. Examples of emissions removal solutions can include technological methods such as direct air capture or nature-based methods such as forestry and land management, both of which sequester existing emissions from the atmosphere.

20 Reporting around the use of carbon offsets may need to evolve because it does not yet consistently distinguish between avoidance (reduction) and removal offsets.

The distinction between avoided emissions and emissions removals is increasingly important from an accounting standard, which will need to distinguish between avoidance (reduction) offsets and removal offsets. Classifications of both offset types are illustrated in the figure below:

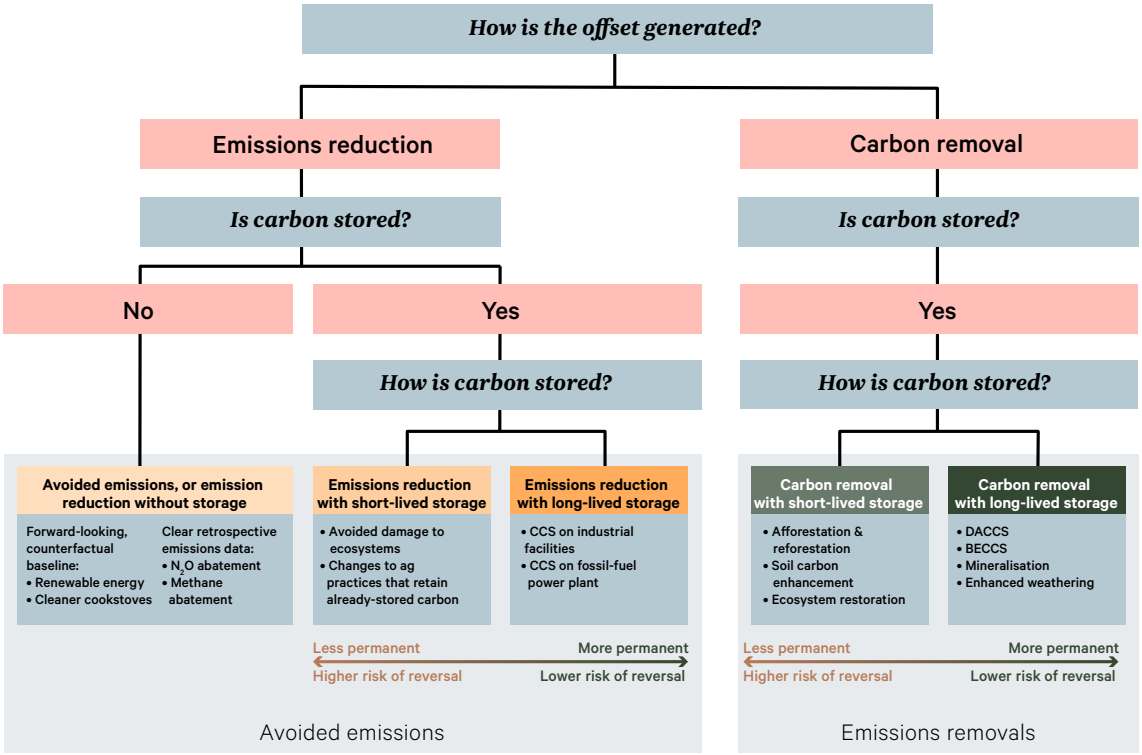


Figure adapted from the Oxford Principles on Carbon Offsets[21]

LISTED EQUITY & CORPORATE BONDS + BUSINESS LOANS & UNLISTED EQUITY

Companies in an FI's portfolio can also report on emissions removals, whether nature- or technology- based,[22] as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance, and total emissions removals shall be reported separately from both absolute emissions and any carbon credits purchased and sold. A company's total emissions removals will consist of:

1. Any removals within the company's organizational boundary
2. Removals purchased by the company via carbon removal credits

Note that for purposes of transparency, reporting around the use of carbon credits may need to evolve because it does not yet consistently distinguish between avoidance and removal credits. Carbon credits purchased and sold should be reported and should be reported separately from emissions removals. This provides transparency and context for the total emissions removals figure. However, any purchased removal credits are only a potential subcomponent of total

21 Oxford offsetting principles, accessed at https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf

22 Note that new GHG Protocol guidance is being developed on accounting for land sector activities and CO_2 removals in corporate GHG inventories, building on the Corporate Standard and Scope 3 Standard. Draft guidance for this is expected in 2022.

emissions removals; they will not necessarily equal the latter. Ultimately, the goal of the PCAF Standard is to transparently report the total emissions impacts of investments, not diluted by credits purchased or sold.

FIs can calculate attribution of companies' reported emissions removals using the existing GHG accounting logic set out in the PCAF Standard (see formula below); this same logic applies to any attribution of companies' reported emissions removal credits. Emissions removals shall be reported separately from absolute emissions.

$$Emissions\ removals = \sum_{c} \frac{Outstanding\ investment_c}{(EVIC\ or\ Total\ company\ equity + debt)_c} \times Company\ emissions\ removals_c$$

$$(with\ c = borrower\ or\ investee\ company)$$

Example accounting – a portfolio of different companies

For example, an FI invests into multiple companies with different emissions profiles as illustrated in the following table. All numbers are in t CO_2e for the reporting year 2020 and are dummy data for the purpose of this example.

	Scope 1	Scope 2	Scope 3	Emissions removals	Carbon credits purchased	Carbon credits sold	Attribution factor
Forestry company	1,000	100	5,000	20,000	0	5,000	10%
Industrial company	20,000	5,000	30,000	0	25,000	0	25%
Energy company	5,000	0	10,000	1,000	5,000	500	20%

The portfolio contains a forestry company that sells carbon credits based on its forestry activities, an industrial company that buys carbon credits based on forestry activities, and a green energy company that builds renewable energy plants combined with afforestation activities. The FI would report aggregated numbers for this portfolio per the table below. This table sums the attributed emissions and credits of the forestry, industrial, and energy companies from the table above. Note that reporting carbon credits purchased by clients is optional.

Based on companies in above table	Calculation	Total portfolio number
Scope 1 – Absolute emissions	1,000 x 10% + 20,000 x 25% + 5,000 x 20%	6,100
Scope 2 – Absolute emissions	100 x 10% + 5,000 x 25%	1,260
Scope 3 – Absolute emissions	5,000 x 10% + 30,000 x 25% + 10,000 x 20%	10,000
Emissions removals	20,000 x 10% + 1,000 x 20%	2,200
Carbon credits purchased	25,000 x 25% + 5,000 x 20%	7,250
Carbon credits sold	5,000 x 10% + 500 x 20%	600

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits purchased may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal")[23] or classified based on the credit standard (e.g., Verified Carbon Standard (VCS) or Gold Standard). The FI may choose to separately report 'net' numbers that display total absolute emissions minus total emissions removals, for example. Nonetheless, for the purposes of the PCAF Standard, the fundamental requirement is that companies' reporting should include separate total numbers for absolute emissions and emissions removals in addition to any 'net' numbers at a minimum.

Example tool to calculate emissions removals – the FoRESt Carbon Sequestration (FRESCOS) Tool

FMO has been working with three other European development finance institutions (CDC, Finnfund, and Swedfund) and Finnish forestry expert Simosol to build an online tool to estimate the amount of carbon sequestered through plantation and agroforestry operations, called the FRESCOS Tool. The tool is built upon the IPCC Guidelines for National GHG Inventories and can be found at https://www.frescos.earth. While PCAF does not endorse the use of this tool specifically, the FRESCOS Tool is an example of a tool that can be used by FIs as a basis for calculating financed emissions removals. The FRESCOS tool is open for other FIs and interested parties to use.

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits purchased may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal") or classified based on the credit standard (e.g., Verified Carbon Standard (VCS) or Gold Standard). The FI may choose to separately report 'net' numbers that display total absolute emissions minus total emissions removals, for example. Nonetheless, for the purposes of the PCAF Standard, the fundamental requirement is that companies' reporting should include separate total numbers for absolute emissions and emissions removals in addition to any 'net' numbers at a minimum.

PROJECT FINANCE

Projects in an FI's portfolio can also report on emissions removals, whether nature- or technology based,[24] as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance, and total emissions removals shall be reported separately from both absolute emissions and any carbon credits purchased and sold. A project's total emissions removals will consist of:

1. Any removals within the project's organizational boundary
2. Removals purchased by the project via carbon removal credits

Note that for purposes of transparency, reporting around the use of carbon credits may need to evolve because it does not yet consistently distinguish between avoidance and removal credits.

23 Reporting around the use of carbon offsets may need to evolve because it does not yet consistently distinguish between avoidance (reduction) and removal offsets.

24 Note that new GHG Protocol guidance is being developed on accounting for land sector activities and CO_2 removals in corporate GHG inventories, building on the Corporate Standard and Scope 3 Standard. Draft guidance for this is expected in 2022.

Carbon credits purchased and sold should be reported and should be reported separately from emissions removals. This provides transparency and context for the total emissions removals figure. However, any purchased removal credits are only a potential subcomponent of total emissions removals; they will not necessarily equal the latter. Ultimately, the goal of the PCAF Standard is to transparently report the total emissions impacts of investments, not diluted by credits purchased or sold.

FIs can calculate attribution of a project's reported emissions removals using the existing GHG accounting logic set out in the PCAF Standard (see formula below); this same logic applies to any attribution of a project's reported emissions removal credits.

$$Emissions\ removals = \sum_{p} \frac{Outstanding\ investment_p}{Total\ project\ equity + debt_p} \times Project\ emissions\ removals_p$$

$$(with\ p = project)$$

Example accounting – a portfolio of different projects

An FI invests into multiple projects with different emissions profiles as illustrated in the following table. All numbers are in t CO_2e for the reporting year 2020 and are dummy data for the purpose of this example.

	Scope 1	Scope 2	Scope 3	Avoided emissions	Emissions removals	Carbon credits purchased	Carbon credits sold	Attribution factor
Forestry project	1,000	100	5,000	0	20,000	0	5,000	10%
Industrial project	20,000	5,000	30,000	0	0	25,000	0	25%
Energy project	5,000	0	10,000	20,000	1,000	5,000	500	20%

The portfolio contains a forestry project that sells carbon credits based on its forestry activities, an industrial project that buys carbon credits based on forestry activities, and a green energy project that builds renewable energy plants combined with afforestation activities. The FI would report aggregated numbers for this portfolio per the table below. This table sums the attributed emissions and credits of the forestry, industrial, and energy projects from the table above. Note that reporting of avoided emissions and carbon credits purchased by clients is optional.

Based on projects in above table	Calculation	Total portfolio number
Scope 1 – Absolute emissions	1,000 x 10% + 20,000 x 25% + 5,000 x 20%	6,100
Scope 2 – Absolute emissions	100 x 10% + 5,000 x 25%	1,260
Scope 3 – Absolute emissions	5,000 x 10% + 30,000 x 25% + 10,000 x 20%	10,000
Avoided emissions	20,000 x 20%	4,000
Emissions removals	20,000 x 10% + 1,000 x 20%	2,200
Carbon credits purchased	25,000 x 25% + 5,000 x 20%	7,250
Carbon credits sold	5,000 x 10% + 500 x 20%	600

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits purchased may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal") or classified based on the credit standard (e.g., VCS or Gold Standard). The FI may separately report 'net' numbers that display total absolute emissions minus total emissions removals, for example. Nonetheless, for the purposes of the PCAF Standard, the fundamental requirement is that companies' reporting should at a minimum include separate total numbers for absolute emissions and emissions removals, in addition to any 'net' numbers.

REPORTING

On page 100 of the PCAF Standard in the section 'Absolute emissions,' the following bullet will be added: 'Absolute emissions shall be reported without taking into account carbon credits purchased by clients and projects to offset these emissions. Carbon credits purchased by clients and projects may be reported, and if so, shall be reported separately.'

On page 101 of the PCAF Standard in the section 'Avoided emissions and emissions removals,' the following bullet will be added: 'Avoided emissions and emissions removals shall be reported without taking into account carbon credits sold by clients and projects for these same emissions. Carbon credits sold by clients and projects should be reported, and if so, shall be reported separately.'

Example tool to calculate emissions removals – the FoRESt Carbon Sequestration (FRESCOS) Tool

FMO has been working with three other European development finance institutions (CDC, Finnfund, and Swedfund) and Finnish forestry expert Simosol to build an online tool to estimate the amount of carbon sequestered through plantation and agroforestry operations, called the FRESCOS Tool. The tool is built upon the IPCC Guidelines for National GHG Inventories and can be found at https://www.frescos.earth. While PCAF does not endorse the use of this tool specifically, the FRESCOS Tool is an example of a tool that can be used by FIs as a basis for calculating financed emissions removals. The FRESCOS tool is open for other FIs and interested parties to use.

N.B. 'Carbon credits purchased' and 'carbon credits sold' will be added in the reporting example in the Annex as additional line items (Table 10-8 and Table 10-29).

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