Financed Emissions

The GLOBAL GHG ACCOUNTING & REPORTING Standard / PART A

PCAF
Partnership for Carbon Accounting Financials

Second edition
December 2022

BUILT ON GHG PROTOCOL

The first edition of this Financed Emissions Standard has been reviewed by the GHG Protocol and is in conformance with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, for Category 15 investment activities. The newly added sovereign debt methodology and guidance on emission removals in this second edition are pending GHG Protocol review and approval.

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PCAF

Partnership for Carbon Accounting Financials

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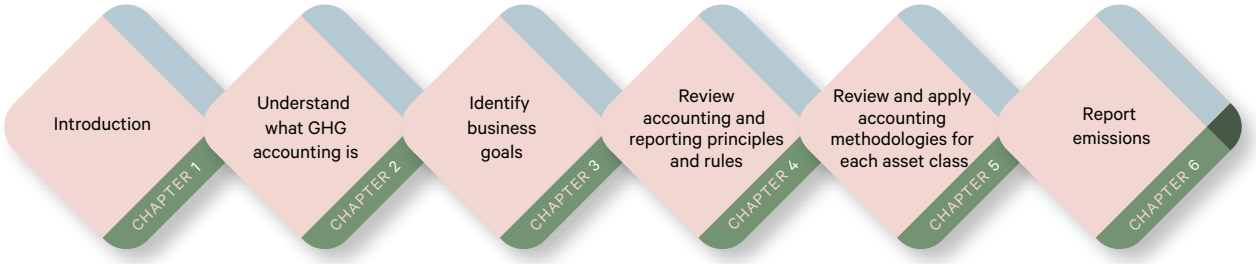

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Acknowledgements

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 enables 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 which consists 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 300 banks and investors participate in PCAF.[1]

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, focusing on measuring and reporting financed emissions. 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, 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 ("Financed Emissions Standard – second version")
- Part B: development of a standard for measuring and reporting the GHG emissions associated to the capital market facilitation activities ("Facilitated Emissions Standard")
- Part C: development of a standard for measuring and reporting the GHG emissions associated to re/insurance underwriting ("Insurance-Associated Emissions Standard")

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

For Part A, 22 PCAF participants volunteered to develop a method for sovereign debt and guidance to account for emission removals. This group of volunteers is listed below:

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

This document is an update of the Financed Emissions Standard published in 2020, and includes:

- A new methodology for sovereign debt
- Guidance on how to measure financed emissions related to GHG emission removals
- Minor editorial changes to the first version of the Standard

The PCAF Secretariat facilitated the Core Team's work by moderating their technical discussions, reviewing the content, and compiling and editing this document. The PCAF Secretariat is operated by Guidehouse, a global consulting firm specialized in energy, sustainability, risk, and compliance for the financial industry.

Guidehouse

Throughout the development of the new methods (February 2021 – April 2022), PCAF engaged with multiple stakeholders to consider their ideas, discuss PCAF methodological approaches, and receive feedback. During November and December 2021, PCAF also held a public consultation with financial institutions, policymakers, data providers, consultants, and nongovernmental organizations (NGOs).

In 2020 the GHG Protocol reviewed and approved the methodologies for listed equity and

corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, and motor vehicle loans. These methodologies are in conformance with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard for Category 15 investment activities. The sovereign debt methodology and the guidance on emission removals are pending GHG Protocol review and approval.

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PCAF (2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second Edition.

Executive summary

The Partnership for Carbon Accounting Financials (PCAF) is a financial industry-led initiative. Created in 2015 by Dutch financial institutions, PCAF extended to North America in 2018 and scaled up globally in 2019. PCAF helps financial institutions assess and disclose the greenhouse gas (GHG) emissions from their loans and investments through GHG accounting.

GHG accounting enables financial institutions to disclose these emissions at a fixed point in time and in line with financial accounting periods. Measuring financed emissions allows financial institutions to make transparent climate disclosures on their GHG emissions exposure, identify climate-related transition risks and opportunities, and set the baseline emissions for target-setting in alignment with the Paris Agreement.

Responding to industry demand for a global, standardized GHG accounting approach, PCAF developed the Global GHG Accounting and Reporting Standard for the Financial Industry (the version of the Financed Emissions Standard). In 2020 the GHG Protocol reviewed and approved the methodologies for listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, and motor vehicle loans. These methodologies are in conformance with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard for Category 15 investment activities. The sovereign debt methodology and the guidance on emission removals are pending GHG Protocol review and approval.

The Financed Emissions Standard provides detailed methodological guidance for specific asset classes. Widely tested by banks and investors, these methods assist in the measurement and disclosure of GHG emissions associated with seven asset classes:

Listed equity and corporate bonds

Business loans and unlisted equity

Project finance

Commercial real estate

Mortgages

Motor vehicle loans

Sovereign debt

The Financed Emissions Standard also provides guidance on the treatment of GHG emission removals in three asset classes: listed equity and corporate bonds, business loans and unlisted equity, and project finance.

The Financed Emissions Standard provides detailed guidance for each asset class to calculate the financed emissions resulting from activities in the real economy that are financed through lending and investment portfolios. Emissions are attributed to financial institutions based on robust, consistent accounting rules specific to each asset class. By following the methodologies outlined in the Financed Emissions Standard, financial institutions can measure GHG emissions for each asset class and produce disclosures that are consistent, comparable, reliable, and clear.

Limited data is often the main challenge in calculating financed emissions. However, data limitations should not deter financial institutions from starting their GHG accounting journeys. Beginning with estimated or proxy data can help financial institutions identify emission-intensive hotspots in lending and investment portfolios. The Financed Emissions Standard provides guidance on data quality scoring per asset class, facilitating data transparency and encouraging improvements to data quality in the medium and long term. The Financed Emissions Standard also provides recommendations and requirements for disclosures, which include a minimum disclosure threshold with flexibility to report beyond this level. Any requirements not fulfilled must be accompanied by an explanation.

Using this Financed Emissions Standard equips financial institutions with standardized, robust methods to measure financed emissions and enables them to:

- Assess climate-related risks in line with the recommendation of the Task Force on Climate-related Financial Disclosures (TCFD).
- Set science-based targets (SBTs) using methods developed by the Science Based Targets initiative and other science-based methodologies.
- Report to stakeholders like the CDP.
- Inform climate strategies and actions to develop innovative products that support the transition toward a net-zero emissions economy.

WRI and WBCSD published Corporate Value Chain (Scope 3) Accounting and Reporting Standard **2011**

PCAF founded by Dutch financial institutions **2015**

PCAF launched in North America **2018**

PCAF published 2 reports on GHG accounting methods **2019**

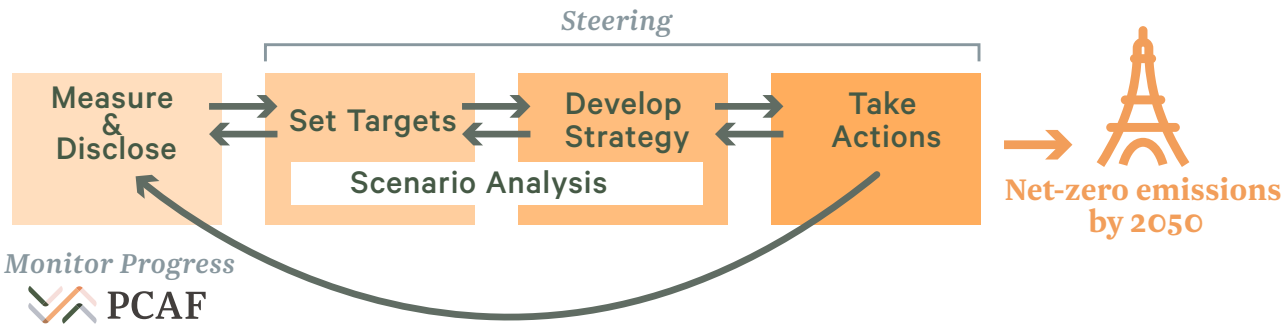
PCAF launched globally **2019**

PCAF launches Global GHG Accounting and Reporting Standard for the Financial Industry **2020**

The GLOBAL GHG ACCOUNTING & REPORTING Standard

FOR THE FINANCIAL INDUSTRY

Using the Standard is the first step in the journey to align with the Paris Agreement



Over 340 financial institutions, with over $ 85 Trillion in financial assets committed (November 2022).

BUILT ON GHG PROTOCOL

This Standard was reviewed by the GHG Protocol and is in conformance with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, for Category 15 investment activities.

Listed Equity and Corporate Bonds

$$\frac{\text{Outstanding amount}}{\text{EVIC or Total company equity + debt}} \times \text{Company emissions}$$

EVIC = enterprise value including cash

Business Loans and Unlisted Equity

$$\frac{\text{Outstanding amount}}{\text{EVIC or Total company equity + debt}} \times \text{Company emissions}$$

EVIC = enterprise value including cash

Project Finance

$$\frac{\text{Outstanding amount}}{\text{Total project equity + debt}} \times \text{Project emissions}$$

GHG accounting for seven asset classes

Commercial Real Estate

$$\frac{\text{Outstanding amount}}{\text{Property value at origination}} \times \text{Building emissions}$$

Mortgages

$$\frac{\text{Outstanding amount}}{\text{Property value at origination}} \times \text{Building emissions}$$

Motor Vehicle Loans

$$\frac{\text{Outstanding amount}}{\text{Total value at origination}} \times \text{Vehicle emissions}$$

Sovereign Bonds

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

PCAF Partnership for Carbon Accounting Financials

The Partnership for Carbon Accounting Financials (PCAF) is an industry-led initiative enabling financial institutions to measure and disclose greenhouse gas (GHG) emissions of loans and investments.

1. Introduction

The role of the financial sector

Under current national and international policies, the planet is on a trajectory to reach a global increase in temperature between 2.1°C and 3.9°C by 2100 compared to pre-industrial levels.[2] There is an urgent need to act in the short term for our long-term benefit. To limit global warming to 1.5°C above preindustrial levels, all sectors of society need to decarbonize and collectively reach net-zero emissions by 2050. The financial sector can help facilitate the transition in line with a 1.5°C scenario by directing capital to support decarbonization.

To trigger changes in capital flows and signals for all sectors, the financial industry must acknowledge and endorse the need for as well as the pace of decarbonization. The financial industry should begin by better understanding the climate risks to their portfolio and the greenhouse gas (GHG) emissions (or climate impact) associated with their loans and investments. Measuring financed emissions is crucial in providing this understanding. If financial institutions know the emissions financed by loans and investments, they can better identify and manage risks, navigate emission reduction goals, act to reduce their portfolio climate impact, and disclose progress. This understanding then triggers internal discussions and engagements with stakeholders to identify concrete actions that help lower financed emissions.

The role of PCAF and GHG emissions accounting in reporting, managing risks and opportunities, and aligning financial flows with the Paris Agreement

Prior to the establishment of the Partnership for Carbon Accounting Financials (PCAF), financial institutions used different approaches and accounting methodologies to measure financed emissions and opted for various reporting metrics, which led to inconsistent assessments of the industry's climate impact. This lack of standardization hampered transparency, comparability, and accountability of the financial sector.

Therefore, in 2019 banks, investors, and fund managers from five continents partnered to create the Partnership for Carbon Accounting Financials (PCAF).[3] Committed to the measurement and disclosure of the absolute GHG emissions of their portfolios (financed emissions), this industry-led initiative has rapidly expanded in North America, Latin America, Europe, Africa, and Asia Pacific.[4] PCAF aims to standardize the way financial institutions measure and disclose financed emissions and increase the number of financial institutions that commit to measuring and disclosing financed emissions. Standardization increases transparency, comparability, and accountability of the financial sector.

Measuring financed emissions is critical for financial institutions that want to improve their climate reporting. Measuring and transparently reporting financed emissions helps financial institutions and their stakeholders understand the climate impact of the organization's lending and investment activities.

2 (New Climate Institute and Climate Analytics, 2020)
3 More information about PCAF is found at: https://carbonaccountingfinancials.com/
4 A full list of PCAF participants is found at: https://carbonaccountingfinancials.com/financial-institutions-taking-action#overview-of-institutions

Additionally, financed emissions provide useful information to identify and manage climate-related transition risks and opportunities. For example, financed emissions can be used as a metric to stress test the resilience of portfolios against climate policies that could have a material effect on the viability of an activity (e.g., carbon pricing). This information is helpful to develop risk management strategies and to identify business opportunities that could support risk management and the transition to a low carbon economy.

Lastly, accounting for financed emissions is an important part of the process that banks and investors take when aligning their lending and investment portfolios with the goals of the Paris Agreement. This process has five non-linear stages:

- Measuring and disclosing financed emissions
- Setting science-based targets (SBTs)
- Scenario analysis
- Designing strategies to reach the targets
- Implementing concrete actions to achieve the targets

Financial institutions also measure financed emissions to evaluate their progress against their emissions-based targets.

Relationship with other financial sector climate initiatives

Multiple climate initiatives for financial institutions have been launched which closely relate to the measurement of financed emissions including high-level commitments, scenario analysis, target setting, and concrete climate action and reporting. High-level commitments, policies and regulatory requirements endorsed by C-suite executives drive financial institutions to address climate change. Measuring financed emissions provides the base year emissions for scenario analysis and target setting, informs climate actions, and enables reporting (Figure 1-1).

Figure 1-1. Measuring financed emissions as the foundation for other initiatives

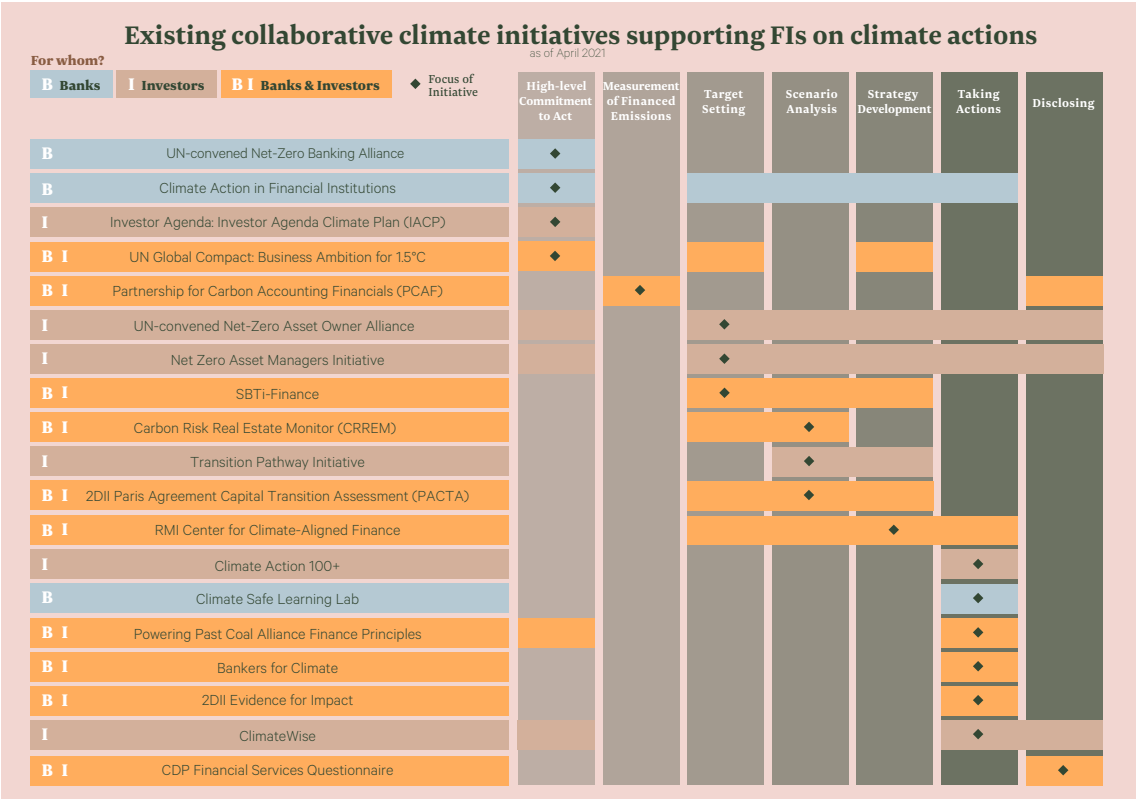
Source: (PCAF, 2020)

Figure 1-2 maps 19 of the most prominent open, global, collaborative climate initiatives for financial institutions against the technical elements of PCAF's Strategic Framework for Paris Alignment. The graphic indicates where each initiative is active, their respective audiences (banks, investors, or both), and their areas of focus.

PCAF focuses on measuring financed emissions, complementing the work and services that other initiatives offer to financial institutions. Building synergies is core to PCAF's work, which has led to collaborations with several initiatives, as indicated on the PCAF website. Notable collaborations with other initiatives include:

- United Nations Environment Programme Finance Initiative (UNEP FI) Principles for Responsible Banking and its Collective Commitment to Climate Action
- United Nations-convened Net-Zero Asset Owner Alliance
- Task Force on Climate-related Financial Disclosures (TCFD)
- Science Based Targets initiative for Financial Institutions (SBTi-FIs)
- RMI's Center for Climate-Aligned Finance
- CDP
- European Commission Technical Expert Group on Sustainable Finance (EU TEG)
- The Institutional Investors Group on Climate Change (IIGCC)
- Paris Aligned Investment Initiative (PAII)

Figure 1-2. Cluster of climate initiatives



Source: (PCAF, 2021)

Standardizing GHG accounting for financial institutions

This document is the second edition of the Global GHG Accounting and Reporting Standard for the Financial Industry. Throughout this document, the Global GHG Accounting and Reporting Standard is commonly referred to as the Financed Emissions Standard. The purpose of the Financed Emissions Standard is to provide financial institutions with transparent, harmonized methodologies to measure and report the emissions they finance through loans and investments in conformance with the requirements of the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

The first edition of the Global GHG Accounting and Reporting Standard was developed by an original PCAF global core team, a heterogeneous group of banks and investors of varied sizes and from different global regions, which has since expanded. This latest and larger PCAF Global Core Team has wide experience in GHG accounting and consists of: ABN AMRO, AIMCo, Amalgamated Bank, Banco Pichincha, Bank of America, Barclays, Blackrock, Boston Common Asset Management, CDC, CTBC Holding, Deutsche Bank, Federated Hermes, FirstRand Ltd., FMO, Hannon Armstrong, HSBC, Landsbankinn, Morgan Stanley, Produbanco, Robeco, Triodos Bank, and the UN-convened Net-Zero Asset Owner Alliance.

At the end of October 2019, the original PCAF global core team kicked off its activities by selecting a set of asset classes that are typical for banks, asset owners, and asset managers globally. These asset classes were the focus of the first edition of the Global GHG Accounting and Reporting Standard. In 2021, the now expanded PCAF Global Core Team continued by developing

additional asset class methods and guidance, which are now included in this second edition of the Financed Emissions Standard. As the Financed Emissions Standard and PCAF evolve, additional asset classes will be added. The second version of the Financed Emissions Standard covers the following asset classes:

The exact definitions of these asset classes are provided in Chapter 5, Figure 5-1 illustrates how to choose the right methodology for different asset classes.

The Financed Emissions Standard also covers guidance on measuring financed emissions associated with loans and investments in GHG emission removal activities.

Throughout the development of the Financed Emissions Standard, PCAF engaged with multiple stakeholders to consider their ideas, discuss PCAF methodological approaches, and receive feedback. During November and December 2021, PCAF also held a public consultation with financial institutions, policymakers, data providers, consultants, and nongovernmental organizations (NGOs) to solicit feedback for the methods added to this second edition of the Financed Emissions Standard. More than 200 stakeholders were reached via targeted webinars and 50 stakeholders provided direct feedback to the Financed Emissions Standard.

Built on the GHG protocol

The methodologies for listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, and motor vehicle loans build on the GHG Protocol standards for corporate reporting such as the GHG Protocol Corporate Accounting and Reporting Standard,[5] the Corporate Value Chain (Scope 3)[6] Accounting and Reporting Standard, and the supplemental Technical Guidance for Calculating Scope 3 Emissions.[7] Specifically, this Financed Emissions Standard supplements the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard[8] by providing additional detailed guidance per asset class.

In 2020 the GHG Protocol reviewed and approved the methodologies for listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages, and motor vehicle loans. These methodologies are in conformance with the requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting

5 (WRI and WBCSD, 2004)
6 (WRI and WBCSD, 2011)
7 (WRI and WBCSD, 2011) and (WRI and WBCSD, 2013)
8 (WRI and WBCSD, 2011)

Standard for Category 15 investment activities. The sovereign debt methodology and the guidance on emission removals are pending GHG Protocol review and approval.

Beyond reporting the scope 3 category 15 emissions covered by this Financed Emissions Standard, financial institutions abiding by this Financed Emissions Standard shall also measure and report their scope 1 and 2 emissions as well as any other relevant scope 3 emissions categories in line with the GHG Protocol's Standards as mentioned above.

Expected users of this Financed Emissions Standard

This Financed Emissions Standard is written primarily for financial institutions that wish to measure and disclose the GHG emissions associated with their loans and investments, including but not limited to:

- Commercial banks
- Investment banks
- Development banks
- Asset owners/managers (mutual funds, pension funds, closed-end funds, investment trusts)
- Insurance companies

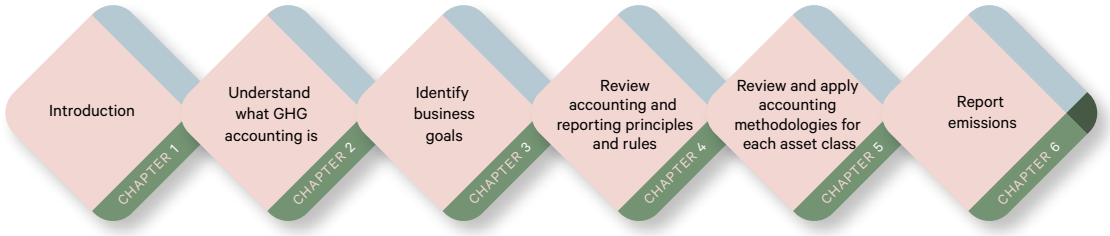
How to read this Financed Emissions Standard

The Global GHG Accounting and Reporting Standard uses precise language to indicate which provisions are requirements, which are recommendations, and which are allowable options that financial institutions may choose to follow. The following terms are used throughout this Financed Emissions Standard::

- "Shall" or "required": indicates what is required for a GHG inventory to conform with this Financed Emissions Standard
- "Should": indicates a recommendation but not a requirement
- "May": indicates an allowed option
- "Needs," "can," and "cannot": may be used to provide guidance on implementing a requirement or to indicate when an action is or is not possible

Figure 1-3 provides the structure of this Financed Emissions Standard and the steps for disclosing financed emissions.

Figure 1-3. Overview of the Financed Emissions Standard and steps for disclosing financed emissions



2. The importance of GHG accounting

What is GHG accounting?

GHG accounting refers to the processes required to consistently measure the amount of GHGs generated, avoided, or removed by an entity, allowing it to track and report these emissions over time. The emissions measured are the seven gases mandated under the Kyoto Protocol and are to be included in national inventories under the United Nations Framework Convention on Climate Change (UNFCCC): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). For ease of accounting, these gases are usually converted to and expressed as carbon dioxide equivalents (CO_2e).

GHG accounting is most commonly used by governments, corporations, and other entities to measure the direct and indirect emissions that occur throughout their value chains as a result of organizational and business activities. According to the GHG Protocol Corporate Accounting and Reporting Standard,[9] direct emissions are generated by sources owned or controlled by the reporting company. Indirect emissions occur as a consequence of the operations of the reporting company but that are generated by sources owned or controlled by another company.

Direct and indirect emissions are further categorized by scope and distinguished according to the source of the emissions and the activity in an organization's value chain in which the emissions occur. The three scopes defined by the GHG Protocol—scope 1, scope 2 and scope 3—are briefly described below and are illustrated in Figure 2 1.

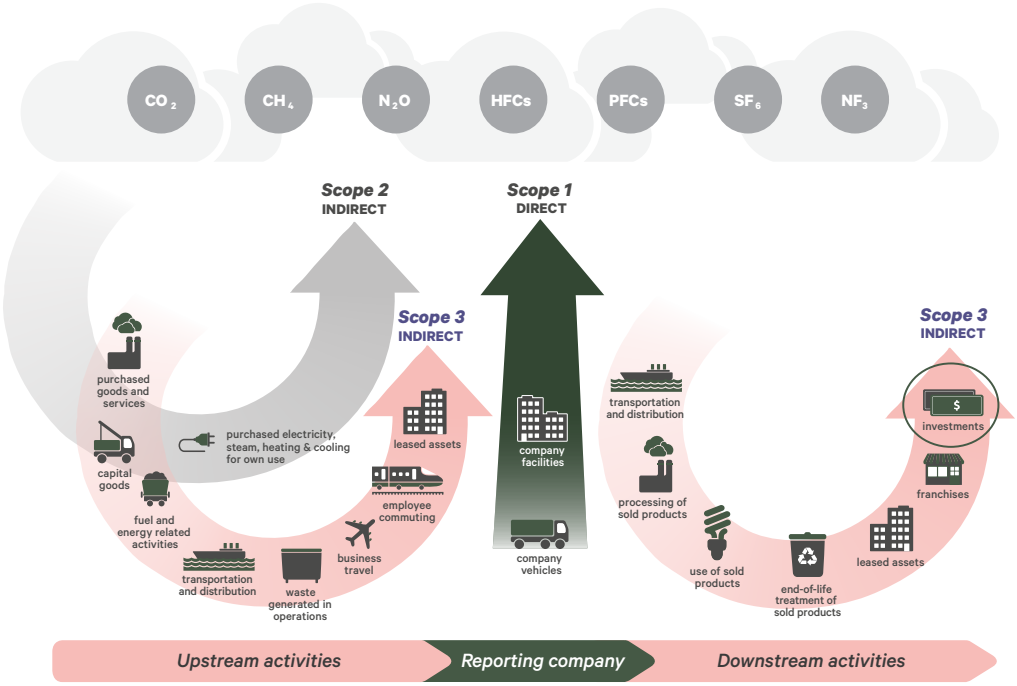
- **Scope 1**: Direct GHG emissions that occur from sources owned or controlled by the reporting company, i.e., emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.
- **Scope 2**: Indirect GHG emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company. Scope 2 emissions physically occur at the facility where the electricity, steam, heating, or cooling is generated.
- **Scope 3:** All other indirect GHG emissions (not included in Scope 2) that occur in the value chain of the reporting company. Scope 3 can be broken down into upstream emissions and downstream emissions. **Upstream emissions** include all emissions that occur in the life cycle of a material/product/service up to the point of sale by the producer, such as from the production or extraction of purchased materials.[10] **Downstream emissions** include all emissions that occur as a consequence of the distribution, storage, use, and end-of-life treatment of the organization's products or services.

The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard[11] categorizes scope 3 emissions into 15 categories, which are listed in Figure 2-1. As the figure shows, the emissions resulting from a reporting company's loans and investments fall under scope 3 downstream emissions, specifically under scope 3 category 15 (investments).

9 (WRI and WBCSD, 2004)
10 (WRI and WBCSD, 2013)
11 (WRI and WBCSD, 2011)

GHG accounting of financial portfolios is the annual accounting and disclosure of scope 3 category 15 emissions at a fixed point in time in line with financial accounting periods.

Figure 2-1. Overview of GHG Protocol scopes and emissions across the value chain



Source: (WRI and WBCSD, 2011)

The importance of GHG accounting of loans and investments

To limit dangerous global warming and achieve the goals of the Paris Agreement, global GHG emissions must be cut drastically. GHG accounting is a necessary step for organizations to better manage their emissions and align with the Paris Agreement. For a financial institution, scope 3 category 15 emissions, i.e., financed emissions, are often the most significant part of its GHG emissions inventory. As a result, special consideration must be made regarding how these emissions are measured. The Global GHG Accounting and Reporting Standard aims to provide a standardized approach to account for financed emissions, ensuring that the approach used by financial institutions is robust, transparent, and comparable over time and across asset classes. This is crucial because measuring financed emissions is an important step financial institutions take to assess climate-related risks and opportunities, set targets in line with the Paris Agreement, and develop effective strategies to support the decarbonization of society.

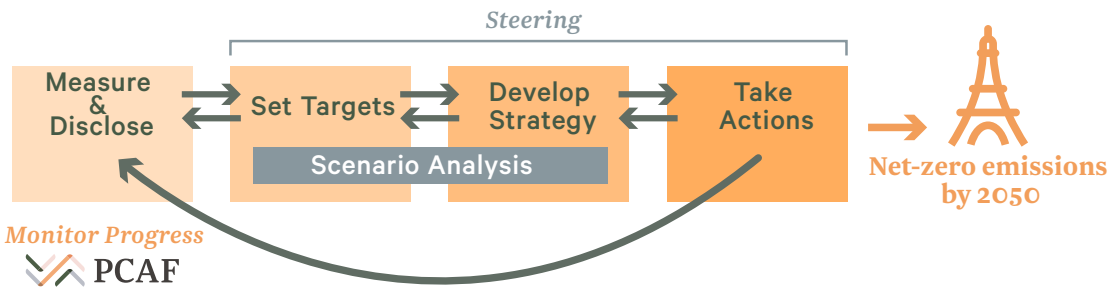
As shown in Figure 1-1, measuring financed emissions is central to activities that enable financial institutions to embed climate action throughout their lending and investment activities. Reporting financed emissions is important for showing stakeholders the climate impact of a financial institution's activities. Furthermore, the act of making a public disclosure shows that the organization holds itself accountable for these impacts.

Financed emissions are a necessary input for climate scenario analysis. As such, financed emissions are a key metric for financial institutions that want to understand and manage climate-related transition risks and opportunities. As countries strive to meet the commitments defined

in their nationally determined contributions (NDCs),[12] governments will strengthen their national climate policies. Efforts will also increase to develop policies that support decarbonization and potentially price emission-intensive activities through carbon pricing.[13] These policies could have material impacts on the viability of certain loans and investments in emission-intensive industries. Measuring financed emissions can help financial institutions uncover emission-intensive hotspots in their portfolios. This enables them to take the necessary actions to minimize their exposure to riskier assets and encourages them to develop climate-friendly products such as low carbon funds, green bonds, sustainability-linked bonds, green mortgages, and more.

Figure 2-2 illustrates the five stages financial institutions follow to align with the Paris Agreement, as explained in further detail in PCAF's Strategic Framework for Paris Alignment. Measuring financed emissions allows financial institutions to establish an emissions baseline for scenario analysis and target setting. Without measuring a clear baseline, financial institutions do not have the knowledge necessary to assess scenarios and define their climate targets, let alone gauge their progress in aligning with the Paris Agreement. A robust, transparent, and harmonized approach to measuring financed emissions helps financial institutions make informed decisions on target setting, strategy development, and the actions required to decarbonize the economy.

Figure 2-2. The Paris alignment value chain for financial institutions



As described in Chapter 1, multiple climate initiatives support the financial sector in decarbonizing their portfolios. Each initiative plays a key role in the Paris Alignment process. For instance:

- PCAF focuses on standardizing the measurement and reporting of emissions associated with loans, investments, insurance liabilities and other financial products and services.
- TCFD and CDP provide a framework for disclosure.
- SBTi guides target setting through its Financial Sector Science-Based Targets Guidance.
- Other initiatives, such as Climate Action 100+ and Climate Safe Lending Network, support financial institutions on defining concrete climate strategies and actions.

12 The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive NDCs that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

13 (World Bank Group, 2020)

GHG accounting helps measure three types of climate impact: generated emissions, emission removals, and avoided emissions

GHG accounting is the annual corporate accounting and disclosure of GHG emissions financed by loans and investments in the portfolio of a financial institution at a fixed point in time in line with financial accounting periods. Financed emissions can be measured as amounts of GHGs generated, avoided, or removed by an institution. The volume of GHG emissions emitted and financed by an institution is commonly referred to as its **generated emissions**. To limit climate change and meet the goals of the Paris Agreement, financiers must actively seek out actions that reduce generated emissions in absolute terms, i.e., absolute emissions.[14]

Not all loans and investments result in GHG emissions. Some may result in mitigating activities. For instance, project-specific loans and investments in the forestry and land use sector, direct air carbon capture and storage, or bioenergy with carbon capture and storage can result in CO_2 being sequestered or removed from the atmosphere and stored in solid or liquid form, removing its harmful global warming effect. Investments in afforestation projects can directly result in newly planted trees absorbing CO_2 from the air. The volume of CO_2 absorbed is considered an emission removal that can also be quantified and reported, demonstrating a type of positive contribution toward decarbonization.

Similarly, project-specific loans and investments in renewable energy projects can result in emissions being avoided as they displace the emissions that would have otherwise occurred without the project's implementation. These emissions are referred to as avoided emissions and reporting them is a way to demonstrate a quantifiable positive contribution to decarbonization. For the financial sector, which finances projects that lead to avoided emissions, quantifying this effect is relevant.

Reporting on emission removals and avoided emissions shall always be done separately from that of the financial institution's scope 1, 2, and 3 GHG inventories.

GHG accounting enables benchmarking

Measuring financed emissions in absolute terms, i.e., absolute emissions, provides financial institutions with the necessary baseline for climate action to align with the Paris Agreement. However, normalized data is often useful for banks and investors to manage climate transition risk, set targets, or create new products. Normalizing the data means translating the absolute financed emissions to an emission intensity metric (emissions per a specific unit). Different intensity metrics can be used for different purposes: a wide array of intensity metrics is applied in the market, each with its own merits. Table 2-1 lists the most common emission intensity metrics.

All the intensity metrics shown in Table 2-1 can be useful for steering. As the table shows, economic emission intensity is the absolute emissions of a loan or investment divided by the loan and investment volume in EUR or USD, expressed as tCO_2e/€M or tCO_2e/$M loaned or invested. It can be useful for comparing different portfolios or parts of portfolios and for managing climate

14 The GHG Protocol often refers to generated emissions as absolute emissions. In this Financed Emissions Standard, where the term "absolute emissions" is used, it is referring to generated emissions and not values relating to avoided emissions or emission removals.

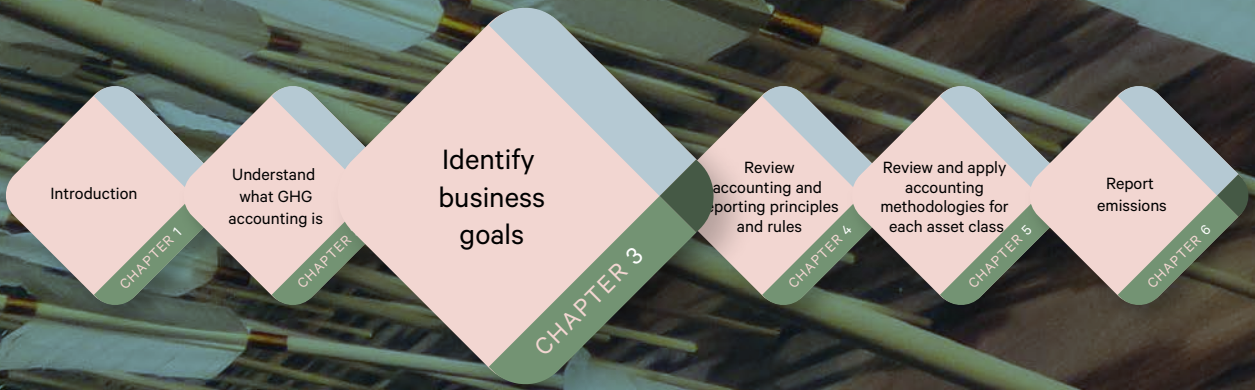
transition risks. Physical emission intensity is the absolute emissions of a loan or investment divided by a value of physical activity or output, expressed as, e.g., tCO_2e/MWh generated or consumed or tCO_2e/tonne product produced. It can be useful for setting science-based targets and for comparing the emission intensity of companies operating in the same sector. The weighted average carbon intensity (WACI)[15] is expressed as tCO_2e/€M or $M company revenue[16] and can be used to understand a portfolio's exposure to emission-intensive companies.

Table 2-1. Financed emissions metrics[17]

Metric	Purpose	Description
Absolute emissions	To understand the climate impact of loans and investments and set a baseline for climate action	The total GHG emissions of an asset class or portfolio
Economic emission intensity	To understand how the emission intensities of different portfolios (or parts of portfolios) compare to each other per monetary unit	Absolute emissions divided by the loan or investment volume in EUR or USD, expressed as tCO_2e/€M or tCO_2e/$M loaned invested
Physical emission intensity	To understand the efficiency of a portfolio (or parts of a portfolio) in terms of total GHG emissions per unit of a common output	Absolute emissions divided by a value of physical activity or output, expressed as, e.g., tCO_2e/MWh, tCO_2e/tonne product produced
Weighted average carbon intensity (WACI)[18]	To understand exposure to emission-intensive companies	Portfolio's exposure to emission-intensive companies, expressed as tCO_2e/€M or $M company[19] revenue

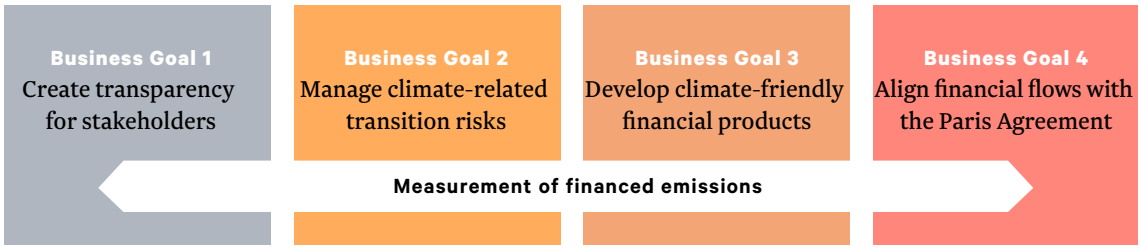
15 (TCFD, 2017)
16 The word company refers to the financial institution's borrower or investee.
17 Adapted from (CRO Forum, 2020)
18 (TCFD, 2017)
19 The word company refers to the financial institution's borrower or investee.

3. Using GHG accounting to set and achieve business goals



Understanding the climate impact of financial portfolios makes good business sense for financial institutions. GHG accounting can help financial institutions achieve multiple objectives, such as creating transparency for stakeholders, managing financial risks associated with climate policies and regulations, creating new financial products to further the transition to net zero, and aligning financial flows with the goals of the Paris Agreement (Figure 3-1). Financial institutions cite these business goals as the key reasons for assessing financed emissions, but this list is by no means exhaustive. This chapter will elaborate on these goals in greater detail.

Figure 3-1. GHG accounting can help financial institutions meet multiple business goals



The level of detail captured in the assessment of financed emissions could dictate how well the inventory can meet the business goals of the financial institution. For example, if a financial institution wishes to use the inventory to manage risk, it may consider measuring and recording sector-level emissions from its borrowers or investees to identify emission-intensive industry investments in its portfolios. Other financial institutions may want to structure their inventory in a way that helps them track their financed emissions reduction goals year over year. In the end, what is captured in the GHG inventory should serve the business goals of the financial institution.

Business goal 1: Create transparency for stakeholders

Financial institutions motivated to be more transparent about their climate impact can use GHG accounting to measure the financed emissions associated with their loans and investments. Since the economic crisis of 2007-2009, a wide range of stakeholders has demanded more transparency around how their money is invested. In response to demand and the consensus that climate change poses a considerable threat to the global economy, the Financial Stability Board (FSB) launched the industry-led Task Force on Climate-related Financial Disclosures (TCFD). The remit of the TCFD was to develop recommendations for "consistent, comparable, reliable, clear and efficient climate-related disclosures by companies."[20] The TCFD framework[21] has expanded since the first recommendations were launched in 2017 to be the global guidance on how companies should disclose their climate-related risks and opportunities. At the time of the publication of this edition of the Financed Emissions Standard, TCFD-recommended disclosures are voluntary.[22] However, with strong backing from the central banks, the Supervisors Network for Greening the Financial System, and the industry itself, companies will likely be faced with new regulatory requirements in this arena.

20 More information about FSB can be found at: https://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/climate-related-financial-disclosures/

21 (TCFD, 2017)

22 Except in New Zealand, where the government introduced mandatory TCFD disclosures in September 2020: https://bit.ly/2TWUxwm. The UK also hopes to enshrine mandatory climate disclosures in line with TCFD recommendations in a new law which would take effect as soon as April 2022, subject to Parliamentary approval. https://bit.ly/35B0rwF

For financial institutions, a key facet of TCFD disclosure relates to their lending and investment activities. This facet is recognized by CDP, which—in aligning with the TCFD framework—adapted its 2020 climate questionnaire for the financial sector to include a section on the reporting of scope 3 category 15 (investment) emissions. The first step of this disclosure is measurement. Information on how the PCAF methodologies support CDP in creating transparent reporting can be found in Box 1.

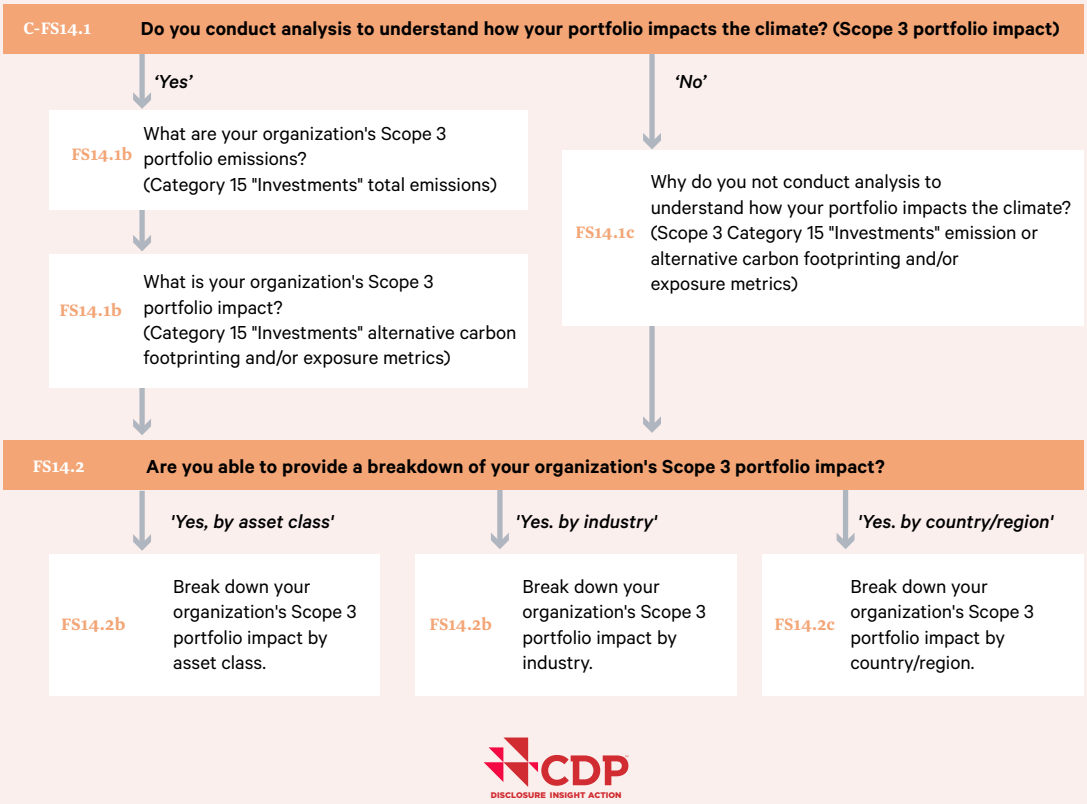
Creating transparency for internal stakeholders can also be a business goal for financial institutions. Assessing financed emissions allows the board members and senior management of financial institutions to get a better picture of their organization's impact on the climate and how to steer activities toward the goals of the Paris Agreement. By measuring and disclosing financed emissions, and thereby creating opportunities for climate disclosure, financial institutions can internally align on their role, as well as the financial sector's responsibility as a whole, in the transition to a net-zero economy.

Box 1. PCAF supports CDP in creating transparency for stakeholders

Since its inception in 2000, CDP has evolved to become the globally accepted disclosure system for investors, companies, cities, states, and regions to report and manage their environmental impacts. In response to the TCFD's recommendations highlighting the importance of indirect financing impacts (alongside the disclosed operational impacts), CDP adapted its climate change questionnaire for the financial services sector to include questions about financed emissions. From 2020 onward, CDP asks financial institutions to disclose their scope 3 category 15 (investments) emissions, along with the breakdown of these emissions by asset class, sector, and geography. The Global GHG Accounting and Reporting Standard directly supports financial institutions in answering these questions by providing asset class-specific methodologies and guidance for calculating financed emissions that allow for disclosures on these levels. In its questionnaire, CDP names PCAF as a key standard that can be used for measuring and reporting.

PCAF and CDP collaborate closely to enable financial institutions to provide transparent disclosures for stakeholders. These disclosures in turn help stakeholders to better understand financial institutions' portfolio alignment with global climate goals and their exposure to emission-intensive industries.

Figure 3-2. Extract from the CDP climate change 2020 questionnaire



Note: This is a snapshot of the questionnaire from 2020; the questionnaire might be updated in the future. For the most recent information consult with CDP.
Source: (CDP, 2020)

Business goal 2: Manage climate-related transition risks

Financial institutions are increasingly inclined to understand the exposure of their portfolios to risks posed by climate-related policies and regulations. GHG accounting helps these institutions screen and identify areas of their lending and investment activities that fall under emission-intensive assets. Such lending and investment activities could suffer setbacks resulting from the introduction of carbon prices and policies and regulations that are strict on fossil fuels.

Understanding the exposure to risk is at the heart of TCFD's mission. TCFD's guidance notes that financial institutions that provide loans to or invest in companies with direct exposure to climate-related risks may accumulate climate-related risks through their credit and equity holdings.[23] Examples of such companies include fossil fuel producers, fossil fuel-based utilities, property developers and owners, or agricultural and food companies.

Additionally, financial institutions that do not disclose their climate-related risks could face reputational risk, especially when peers are increasingly doing so. Measuring and disclosing financed emissions according to the Financed Emissions Standard and reporting according to TCFD recommendations is a way for financial institutions to manage their climate-related reputational risk. In its 2021 Annex, which updates and supersedes its 2017 recommendations, the

23 (TCFD, 2017)

TCFD officially recommends that banks, asset owners and asset managers measure and disclose financed emissions in line with the PCAF Financed Emissions Standard.[24]

Applying the GHG accounting methods in this Financed Emissions Standard, financial institutions can identify areas of significant exposure to emission-intensive assets across their lending and investment portfolios and use this information as the basis to assess climate risk scenarios. By disclosing in line with the requirements and recommendations in Chapter 6 of this Financed Emissions Standard and the TCFD framework, financial institutions can show that they are serious about climate action. Box 2 describes how the Financed Emissions Standard aligns with and adds value to the TCFD framework.

Box 2. PCAF supports the TCFD framework in identifying and managing climate risk

One of the goals of the TCFD framework is to measure and disclose the risks posed to organizations by climate-related policies and regulations that are implemented to further the transition to a net-zero economy. PCAF directly supports this objective by providing financial institutions with methodologies to measure financed emissions, resulting in a total value for the absolute emissions associated with asset classes in their loan and investment portfolios. As a result of emission assessments, financial institutions can identify emission-intensive hotspots that could be subject to higher transition risk.

TCFD officially recommends that banks, asset owners and asset managers measure and disclose financed emissions in line with the PCAF Financed Emissions Standard. The quantification of financed emissions, the expected trajectory of these emissions, and the ability of banks and investors to reduce emissions over time are important metrics to estimate the impact of transition risks. Once identified, these risks may be mitigated by steering portfolios in line with the transition to a net-zero economy.

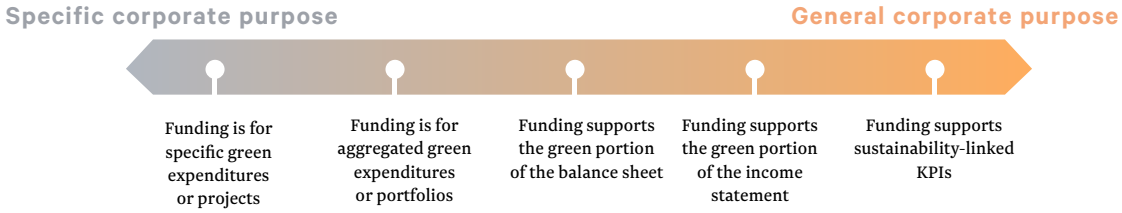
TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Business goal 3: Develop climate-friendly financial products

Included in the TCFD framework is disclosure related to business opportunities associated with the transition to a low carbon economy.[25] According to the framework, opportunities are categorized as resource efficiency, energy source, products and services, markets, and resilience. For financial institutions, significant opportunities exist in each category, especially relating to sustainable finance products. For example, as Figure 3-3 shows, sustainable finance products such as bonds have evolved: from green bonds issued to finance a specific corporate purpose, e.g., green-eligible projects such as wind farms, to bonds that are solely focused on general corporate sustainability purposes, such as sustainability-linked bonds. In such sustainability-linked bonds, the full business of the issuer commits to a sustainable target, meaning the bond is connected to the sustainable transition of the business.

24 (TCFD, 2021)
25 (TCFD, 2017)

Figure 3-3. Evolution of green products in the bond market



With the transition to a low carbon economy, financial institutions can develop innovative products and services that enable their clients to decarbonize their business activities. By measuring financed emissions and using the intensity metrics listed in Table 2-1, financial institutions can see which sectors and businesses require the most help in their decarbonization efforts and how best to support them in their transition to a net-zero future.

Business goal 4: Align financial flows with the Paris Agreement

Financial institutions' commitments to set science-based targets,[26] transition their investment portfolios to net-zero GHG emissions by 2050 (e.g., Net-Zero Asset Owner Alliance[27]), and align their lending with the objectives of the Paris Agreement (e.g., Net-Zero Banking Alliance[28]) are examples of this business goal.

Financial institutions that want to align their financial flows with the goals of the Paris Agreement implement portfolio GHG accounting to understand the absolute emissions they finance in the real economy. These institutions use this information as the basis for analyzing decarbonization scenarios and setting emission-based targets at the asset class or sector level. While other climate initiatives focus on scenario analysis and target setting (see Chapter 1), PCAF has been established to focus solely on the GHG accounting of financial portfolios. Undertaking GHG accounting equips financial institutions with a metric that can help track absolute emissions year over year and compare it with their financed emissions goals.

Box 3 shows how the PCAF GHG accounting methods offered in this Financed Emissions Standard align with SBTi's framework for setting science-based emission reduction targets. Version 1.0 of SBTi's target-setting guidance for financial institutions was published in February 2022[29] and includes case studies of banks and investors using PCAF GHG accounting methods as a precursor to science-based targets.[30]

Next to setting targets, aligning financial flows with the Paris Agreement means that financial institutions take concrete actions to transition their portfolio to net-zero financed emissions by 2050. In this process, banks and investors could identify opportunities to develop new products that help borrowers and investees reduce their own emissions.

26 Information about SBTs for financial institutions can be found at: https://sciencebasedtargets.org/financial-institutions
27 Information about the Net Zero Asset Owner Alliance can be found at: https://www.unepfi.org/net-zero-alliance
28 Information about the Net-Zero Banking Alliance can be found at https://www.unepfi.org/net-zero-banking
29 (SBTi, 2020)
30 More information about the SBTi for financial institutions can be found at: https://sciencebasedtargets.org/financial-institutions

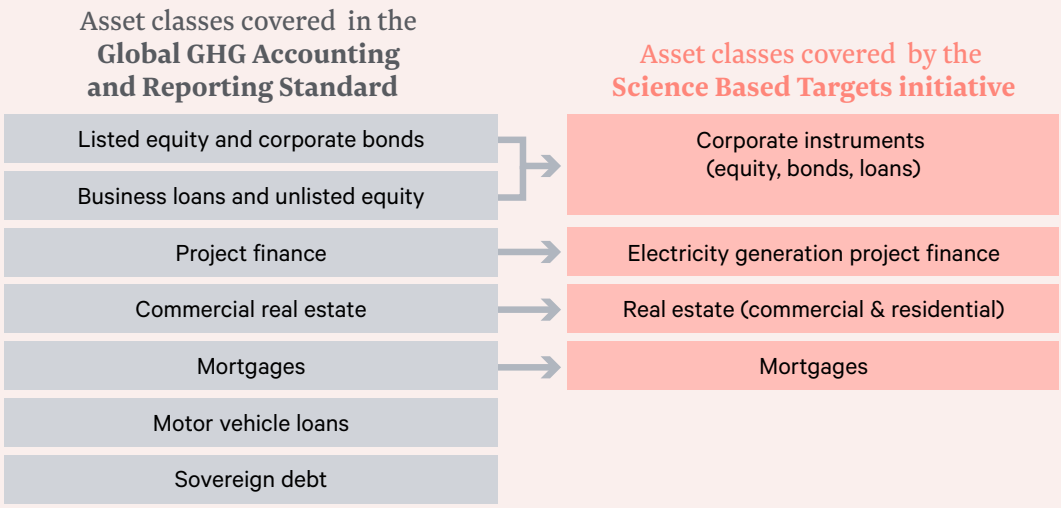
Box 3. Steering decarbonization: from GHG accounting to setting science-based targets

Financial institutions that decide to set science-based targets using SBTi's Sectoral Decarbonization Approach (SDA) need to measure their financed emissions to identify the baseline from which targets would be established and to measure progress against the targets.

The SBTi framework for the financial sector enables financial institutions to align lending and investment portfolios with the goals of the Paris Agreement. Financial institutions that set science-based targets and work toward attaining those targets act on opportunities to finance the net-zero emission transition.

The SDA is a science-based target setting method that involves setting emissions-based targets, in which GHG accounting is a fundamental step of the process. The asset classes covered in the Global GHG Accounting and Reporting Standard match the four asset classes included in the SBT framework.

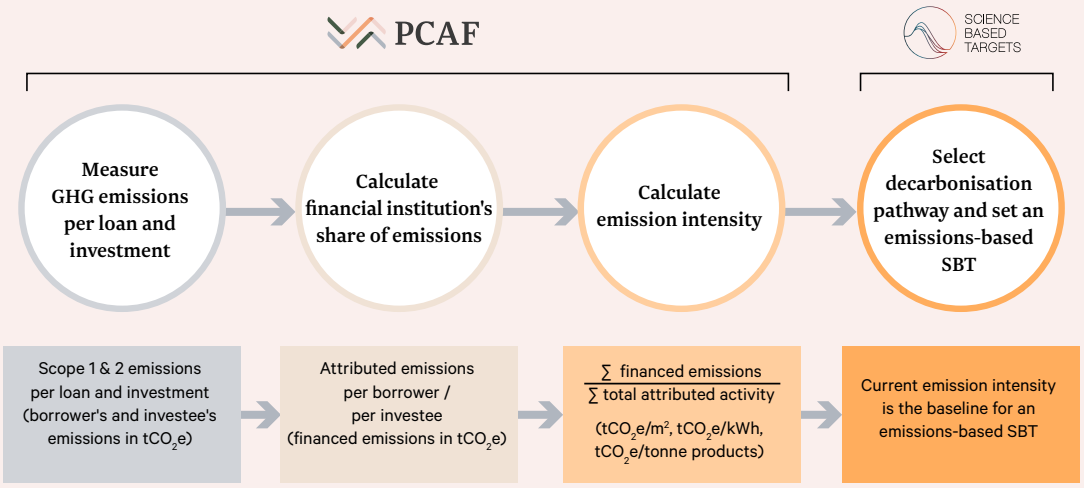
Figure 3-4. Asset classes covered by PCAF and SBTi



Financial institutions may use GHG accounting to screen and prioritize the parts of the portfolio that would be the focus for target setting (i.e., asset classes and sectors). Additionally, financial institutions measure financed emissions to determine the emission baselines from which emission-based science-based targets are set. To track progress against the emission-based target, financial institutions must therefore measure and disclose their financed emissions annually.

Determining sector-specific emission intensity at the asset class or sector level is the starting point to apply the SDA for target setting. Sector-specific emission intensity refers to financed emissions per unit of activity data, e.g., $kgCO_2e/m^2$, gCO_2e/kWh, $tonCO_2e/tonne$ cement. Three steps are taken to derive emission intensities, as Figure 3-5 shows:

Figure 3-5. From GHG accounting to setting science-based targets



For the latest Financial Sector Science-Based Targets Guidance, consult the Science Based Targets initiative at https://sciencebasedtargets.org/financial-institutions

In addition to setting targets, aligning financial flows with the Paris Agreement means that financial institutions take concrete actions to transition their portfolio to net-zero financed emissions by 2050.

Net zero financed emissions by 2050

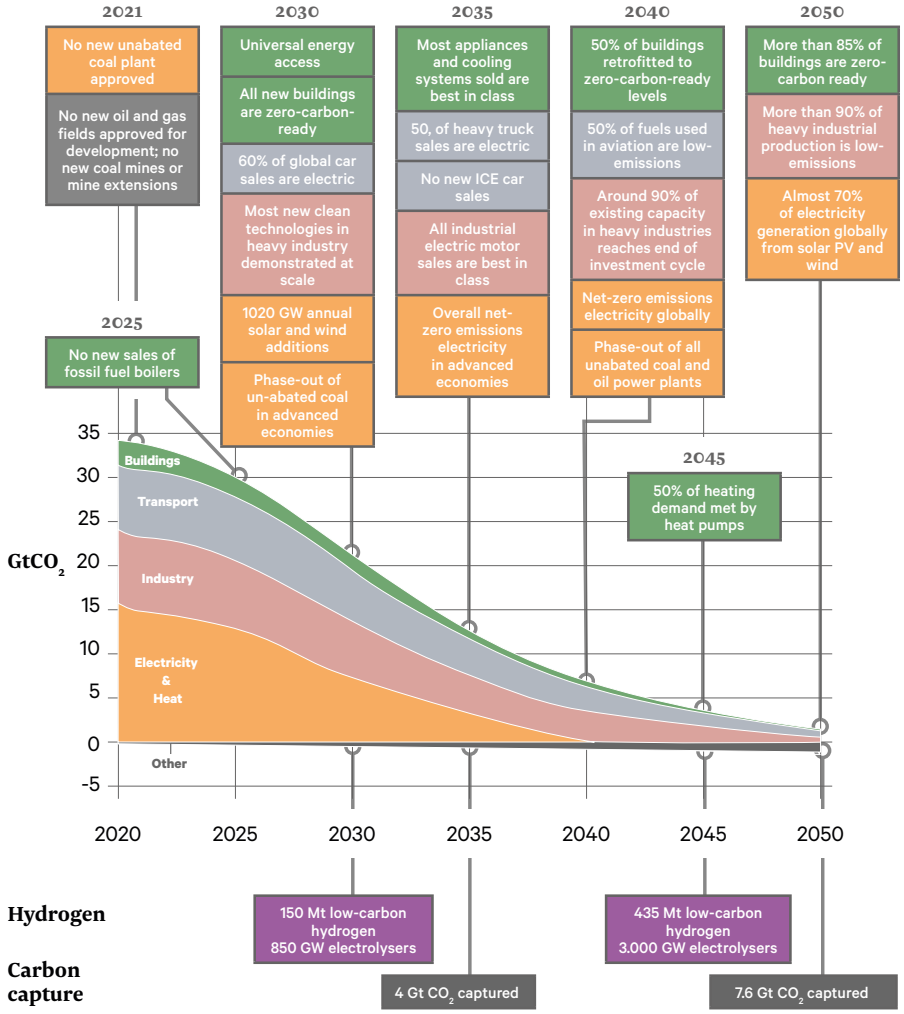
The Paris Agreement was reached in 2015 with the express aim of pursuing efforts to limit the global temperature increase to 1.5°C above pre-industrial levels.[31] Achieving this goal requires global emissions to decline by about 50% by 2030 relative to 2010 levels and to reach net zero by 2050.[32] 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 this transition by facilitating the allocation of capital flows toward net-zero goals. A critical component of net zero initiatives in the financial sector is decarbonizing lending and investment portfolios following a 1.5°C scenario with low or no overshoot in the global average 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).

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

32 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.

Figure 3-6. 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 in both mitigation solutions (avoided emissions) and carbon removal solutions (emission 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 emission removals 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.

The distinction between avoided emissions and emission removals is important from an accounting perspective. The differences are illustrated in the figure below:

Figure 3-7: Avoided emissions and emission removals

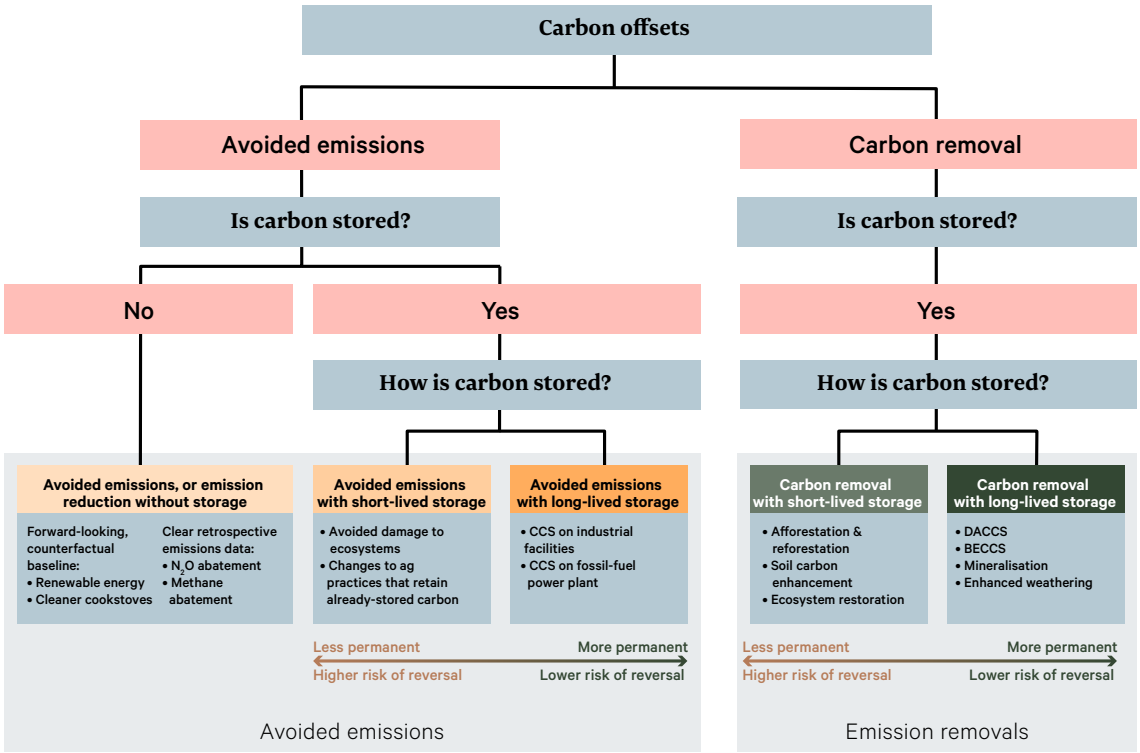


Figure adapted from the Oxford Offsetting Principles.[33]

The global transition to net-zero requires increased lending to and investment in activities that drive deep decarbonization, as well as technology and nature-based emission removals solutions. Measuring and reporting both generated emissions and emission removals enables FIs to track progress toward net zero.

FIs can finance emission removals via three ways:

- **Credit purchases**: FIs can buy and retire carbon removal credits[34] 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 Financed Emissions Standard. For more information, FIs should refer to the GHG Protocol on how to include carbon credits in their accounting.[35]

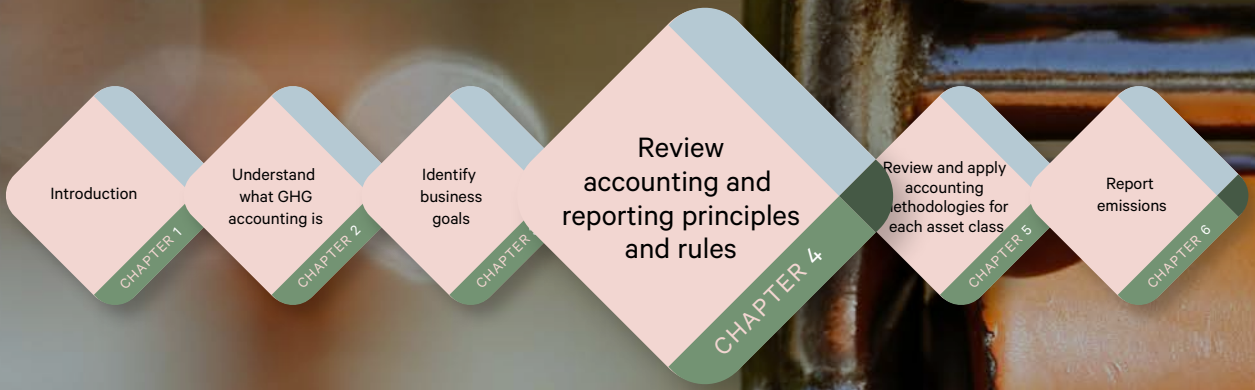
33 Oxford offsetting principles, accessed at https://www.smithschool.ox.ac.uk/research/oxford-offsetting-principles

34 Reporting around the use of carbon credits may need to evolve because it does not yet consistently distinguish between avoidance and removal credits.

35 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.

- **Business Loans and Unlisted Equity**: FIs can lend to or invest in companies such as forestry companies that have emission removals within their organizational boundaries. They can also lend to or invest in companies that purchase and retire carbon removal credits. For more information on the financed emissions accounting of these lending and investment activities, see the methodology chapter on Listed Equity & Corporate Bonds and the methodology chapter on Business Loans & Unlisted Equity.
- **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 and retire carbon removal credits. For more information on the financed emissions accounting of these lending and investment activities, see the methodology chapter on Project Finance.

4. Principles and requirements of GHG accounting for financials



To create this Financed Emissions Standard, PCAF harnessed the GHG accounting principles from the GHG Protocol Corporate Accounting and Reporting Standard[36] and the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.[37] Based on these principles, PCAF developed an additional set of five overarching rules to guide accounting and reporting for financial institutions.

4.1 GHG accounting requirements derived from the GHG Protocol's principles

Like financial accounting and reporting, GHG accounting and reporting follows generally accepted principles to ensure that an organization's disclosure represents an accurate, veritable, and fair account of its GHG emissions. The core principles of GHG accounting are set out in the GHG Protocol Corporate Accounting and Reporting Standard[38] and the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.[39] The GHG Protocol's five core principles are completeness, consistency, relevance, accuracy, and transparency. The Global GHG Accounting and Reporting Standard for the Financial Industry follows these five core principles and provides additional requirements on the application of these principles that are directly relevant for financial institutions wishing to assess their financed emissions (Figure 4-1).

36 (WRI and WBCSD, 2004)
37 (WRI and WBCSD, 2011)
38 (WRI and WBCSD, 2004)
39 (WRI and WBCSD, 2011)

Figure 4-1. Additional PCAF requirements of GHG accounting and reporting are derived from the GHG Protocol's five principles

GHG Protocol principles for scope 3 inventories

Completeness
Account for and report on all GHG emission sources and activities within the inventory boundary. Disclose and justify any specific exclusions.

Consistency
Use consistent methodologies to allow for meaningful performance tracking of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.

Relevance
Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users — both internal and external to the company

Accuracy
Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information.

Transparency
Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.

Additional PCAF requirements

Recognition
Financial institutions shall account for all financed emissions under Scope 3 category 15 (Investment) emissions, as defined by the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Any exclusions shall be disclosed and justified.

Measurement
Financial institutions shall measure and report their financed emissions for each asset class by "following the money" and using the PCAF methodologies. As a minimum, absolute emissions shall be measured. However, avoided and removed emissions may be measured if data is available and methodologies allow.

Attribution
The financial institution's share of emissions shall be proportional to the share of its exposure relative to the total (company, project, asset) value of the borrower or investee.

Data quality
Financial institutions shall use the highest quality data available for each asset class and improve the quality of the data over time.

Disclosure
Public disclosure of the results of PCAF assessments is crucial for external stakeholders and financial institutions using the methodology to have a clear, comparable view of how the investments of financial institutions contribute to the Paris climate goals.

4.2 Additional requirements for accounting and reporting financed emissions

This subchapter describes the additional requirements for GHG accounting for financials and how these requirements guide the accounting and reporting of financed emissions regardless of the type of loan and investment. Chapter 6 includes additional details on reporting requirements and recommendations.

Recognition

According to the GHG Protocol Corporate Accounting and Reporting Standard,[40] organizations can choose from three approaches when defining their organizational boundaries and consolidating the GHG emissions measured and reported in their inventories:

- Equity share approach
- Financial control approach
- Operational control approach

The selection of one of these approaches affects which activities in the company's value chain are categorized as direct emissions (i.e., scope 1 emissions) and indirect emissions (i.e., scope 2 and scope 3 emissions).[41]

For consistency in reporting across organizations and reporting periods, this Financed Emissions Standard requires financial institutions to measure and report their GHG emissions using either the operational or financial control approach. As explained in Box 4, this means that emissions from financial institutions' loans and investments (without operational or financial control[42]) will be reported under their scope 3 category 15 (investments) emissions, as defined by the GHG Protocol Value Chain (Scope 3) Accounting and Reporting Standard.[43] This requirement eliminates inconsistencies in accounting that could arise from using the equity share approach, which would require scope 1 and 2 emissions from all equity investments to be reported under the financial institution's scope 1 and 2 emissions (according to its share of equity in the operation).

As a result, the Financed Emissions Standard provides a harmonized approach that can be used by financial institutions wishing to account for and disclose their scope 3 category 15 (investments) emissions (otherwise known as their financed emissions), and these are the sole focus of this Financed Emissions Standard. Financial institutions following the Financed Emissions Standard are required to report all financed emissions under scope 3 category 15 and disclose and justify any exclusions.

40 (WRI and WBCSD, 2004)

41 (WRI and WBCSD, 2004)

42 Only in cases that a financial institution has control (operational or financial, depending on the approach chosen) over the operations of the borrower, or investee will 100% of their emissions be included within the organizational boundaries of the financial institution. As a result, these emissions will be included under the scope 1 and 2 emissions of the financial institution. This can occur when a financial institution holds a controlling equity share in the investee. In general, however, most of the financial sector's loans and investments are not held to gain control over their borrower or investee.

43 (WRI and WBCSD, 2011)

Beyond reporting the scope 3 category 15 emissions covered by this Financed Emissions Standard, financial institutions shall also measure and report their own scope 1 and 2 emissions and any other relevant scope 3 emissions categories in line with the GHG Protocol's standards.

Box 4 details consolidation approaches as applied to the financial sector.

Box 4. Why the Global GHG Accounting and Reporting Standard requires financial institutions to measure and report financed emissions using the operational or financial control approach

The GHG Protocol Corporate Accounting and Reporting Standard[44] presents three consolidation approaches when preparing GHG emission inventories: the equity share approach, the financial control approach, and the operational control approach. These consolidation approaches are intended to define the organizational boundaries of the company for the purposes of accounting and reporting GHG emissions. The selection of one of these approaches affects which activities in the company's value chain are categorized as direct emissions (i.e., scope 1 emissions) and indirect emissions (i.e., scope 2 and scope 3 emissions).

Under the **equity share approach**, an organization accounts for GHG emissions from operations according to its share of equity—or ownership—in the operation. So, holding a 15% equity share in another organization would require including 15% of its emissions across all its emission scopes: scope 1, 2, and 3.

Alternatively, an organization can report using the **control approach**, whereby the company reports 100% of the GHG emissions over which it has control as if these emissions were its own (i.e., 100% of direct emissions are reported under scope 1 and 100% of indirect emissions are reported under scope 2 or 3, respectively). Where the company owns an interest but does not have control, it does not account for GHG emissions from operations as part of its scope 1 and 2 emissions. However, emissions from such operations will be reported under scope 3 emissions according to its relative share of ownership.[45]

Box continues on next page –>

44 (WRI and WBCSD, 2004)

45 In practice, using a control approach means that when a company has control over an operation 100% of the scope 1 and 2 emissions of this operation are also reported under the companies' scope 1 and 2 footprint.

A control approach can be subclassified as either financial control or operational control, and companies using the control approach must pick between these two options for reporting. Using the **financial control approach**, the organization shall report 100% of emissions for all activities in the company where it can directly influence financial and operational policies and has the potential to benefit economically from the company's activities. Using the **operational control approach**, an organization shall account for 100% of emissions from operations over which it or one of its subsidiaries has control and the authority to introduce and implement operational policies. In most cases, whether an operation is controlled by the company or not does not differ between the financial control or operational control approach.

The consolidation approach used by a financial institution has a significant impact on how it accounts for its financed emissions. Choosing the equity share approach would require scope 1 and 2 emissions from all equity investments to be reported under the financial institution's scope 1 and 2 emissions (according to its share of equity in the operation), whereas financed emissions from other asset classes would end up in scope 3.

However, when choosing a control approach, only emissions from those operations where the financial institution, through its investments, holds a controlling interest would end up in its scope 1 and 2 emissions. In all other cases financed emissions end up in scope 3 category 15. As financial institutions' investments in equity or debt are typically not intended to hold a controlling interest, this Financed Emissions Standard requires financial institutions to measure and report their GHG emissions using either the operational or financial control approach. This requirement allows for consistent reporting of financed emissions in scope 3 emission category 15.

Measurement

"Follow the money" is a key tenet for GHG accounting of financial assets, meaning that the money should be followed as far as possible to understand and account for the climate impact in the real economy, i.e., emissions caused by the financial institution's loans and investments.

Financial institutions shall measure and report their financed emissions for each asset class using the methodologies set out in this Financed Emissions Standard and covering the seven GHGs required under the Kyoto Protocol. As a minimum, financial institutions shall measure the absolute GHG emissions resulting from loans and investments (scope 3 category 15 emissions) in the reporting year. When relevant, emission removals should be measured and reported separately. Avoided emissions from renewable power projects may also be measured and reported separately.

As a basis for reporting emissions, financial institutions shall choose a fixed point in time to determine their lending and investment positions, such as the last day of its fiscal year (e.g., June 30 or December 31), to calculate an attribution factor. The GHG accounting period shall align with the financial accounting period.

Attribution

According to the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, GHG emissions from loans and investments should be allocated to the reporting financial institutions based on the proportional share of lending or investment in the borrower or investee.[46] Attribution is based on the annual emissions of the borrower and investee; as a result, GHG emissions are reported on at least an annual basis.

The methodologies in the Financed Emissions Standard apply the same general attribution principles across all asset classes (Figure 4-2):

1. Financed emissions are always calculated by multiplying an attribution factor (specific to that asset class) by the emissions of the borrower or investee.
2. 2.The attribution factor is defined as the share of total annual GHG emissions of the borrower or investee that is allocated to the loan(s) or investment(s).
3. 3.The attribution factor is calculated by determining the share of the outstanding amount of loans and investments of a financial institution over the total equity and debt of the company, project, etc. to which the financial institution has lent money or in which it has invested capital.

The use of this common denominator, including both equity and debt funding, is important for three reasons:

1. It ensures the use of one common denominator across all asset classes, which is in line with leading practices in the financial sector.
2. It does not differentiate between equity and debt. Both contribute to the total financing of the borrower or investee (and indirectly their emissions) and are therefore deemed equally important.
3. It ensures 100% attribution of emissions over equity and debt providers and avoids double counting of emissions between equity and debt providers as much as possible. This is specifically important for financial institutions that hold both equity and debt positions within the same companies or projects.

Figure 4-2. The general approach to calculate financed emissions

$$\text{Financed emissions} = \sum_i \text{Attribution factor}_i \times \text{Emissions}_i$$

(with i = borrower or investee)

$$\text{Attribution factor}_i \rightarrow \frac{\text{Outstanding amount}_i}{\text{Total equity + debt}_i}$$

46 (WRI and WBCSD, 2011)

Double counting, which occurs when GHG emissions are counted more than once in the financed emissions calculation of one or more institutions, should be minimized as much as possible. Double counting occurs between the different scopes of emissions from loans and investments when a financial institution lends to or invests in companies or projects in the same value chain.[47] This form of double counting cannot be avoided, but it can be made more transparent by reporting the scope 1 and 2, emissions of loans and investments separately from their scope 3 emissions (see requirements on this in Chapter 6 of this Financed Emissions Standard).

Double counting can take place at five levels:

- Between financial institutions
- In co-financing the same entity or activity
- Between transactions within the same financial institutions
- Across different asset classes
- Within the same asset class

Double counting between co-financing institutions and between transactions within the same asset class of a financial institution can be avoided by using the appropriate attribution rules consistently. PCAF defines attribution rules for each method described in this Financed Emissions Standard. By using the correct attribution method, double counting of emissions between financial institutions can be minimized. Additional asset class-specific information on attribution can be found in Chapter 5.

Data quality

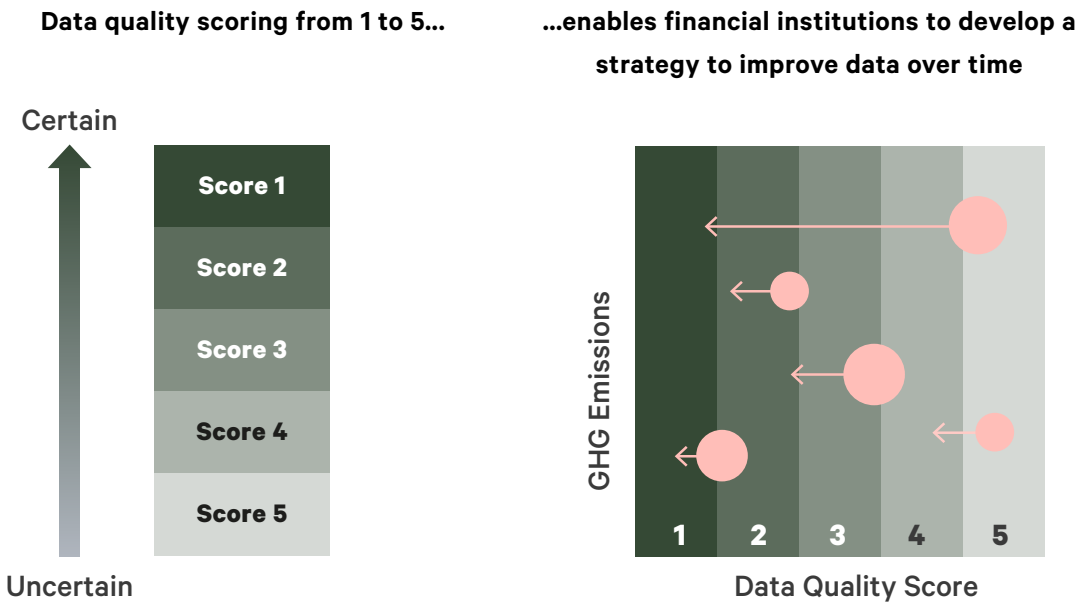
Financial institutions shall ensure that their GHG accounting appropriately reflects the GHG emissions of their loans and investments and serves the decision-making needs of internal and external stakeholders. To safeguard these outcomes, financial institutions should use the highest quality data available for each asset class for calculations and, where relevant, improve the quality of the data over time. PCAF recognizes that high-quality data can be difficult to come by when calculating financed emissions, particularly for certain asset classes. However, data limitations should not deter financial institutions from taking the first steps toward preparing their inventories. Even estimated or proxy data can help them identify emission-intensive hotspots in their portfolios, which can inform their climate strategies. Where data quality is low, financial institutions can develop approaches to improve it over time.

For measuring financed emissions in each asset class, various data inputs are needed to calculate the financial institution's attribution factor and the borrower's or investee's total emissions. The data needed to calculate an attribution factor can typically come from the financial institution itself and its borrower or investee. However, the data required to calculate the borrower or investee. However, the data required to calculate the emissions of the borrower or investee might not be readily available and must be sought out by the financial institution. The quality of this data can vary depending on assumptions relating to its assuredness, specificity, and other variables.

47 The scope 1 emissions of one company can be the upstream scope 2 or 3 emissions of its customer. For example, scope 1 emissions from a utility providing energy to a company would end up in the scope 2 inventory of that company. If both companies are receiving funding from the same financial institution, these emissions would be double counted within its inventory.

High-quality data is often not available to the financial institution for all asset classes. In these instances, the institution should use the best available data per the data hierarchy shown in Figure 4-3. Data quality scorecards specific to each asset class are presented in Chapter 5 and Annex 10.1.

Figure 4-3. General data quality scorecard



PCAF recognizes that there is often a lag between financial reporting and the reporting of required emissions-related data for the borrower or investee. In these instances, financial institutions should use the most recent data available even if it is representative of different years, with the intention of aligning as much as possible. For example, it would be expected and appropriate that a financial institution's reporting in 2020 for its 2019 financial year would use 2019 financial data alongside 2018 (or other most recent) emissions data.

Data quality scoring is specific to each asset class. More information on issues related to data quality and how to employ the hierarchy for each asset class can be found in Chapter 5 and Annex 10.1.

Disclosure

The public disclosure of absolute financed emissions is crucial for external stakeholders and financial institutions using the methodology to have an analogous view of the climate impact of financial institutions. To this end, financial institutions shall disclose absolute financed emissions. To support their disclosures, financial institutions shall follow the requirements and recommendations listed in Chapter 6 on how to report information relating to methodology, calculations, timeframes, and data quality (as scored using the hierarchies provided in Chapter 5).

5. Methodology to measure financed emissions

This chapter describes the methods to calculate financed emissions for seven asset classes.

Each asset class has its own section covering methodological guidance on the following elements: [48]

- Asset class definition
- Emission scopes covered
- Attribution of emissions
- Equations to calculate financed emissions
- Data required
- Other considerations
- Limitations

Guidance for calculating absolute emissions is covered in each asset class method. Guidance for calculating avoided emissions is provided in the project finance method only. Methods for calculating emission removals are provided in three asset classes: listed equity and corporate bonds, business loans and unlisted equity, and project finance.[49]

This is an initial list of asset classes covered by PCAF. The initiative, with guidance from PCAF participants and users, intends to both update the methodologies over time and add additional ones. Developing an accurate, comparable, feasible, and broad-based standard covering numerous asset classes will be an iterative process.

How to choose the right asset class method?

How financed emissions are measured may vary by the type of financing provided to the borrower and investee and what is known about the flow of the money. Financial institutions should use Figure 5-1 and the guidance that follows to select the appropriate asset class method.

48 These are the core elements in each asset class method. Some chapters include additional information, where relevant and specific to the asset class..

49 Definitions of absolute emissions, avoided emissions, and emission removals can be found in Chapter 2 and in the glossary (Chapter 7).

Figure 5-1 intends to help financial institutions select the appropriate asset class method for measuring financed emissions. The flowchart should be read from left to right, with each column representing a choice to be made by the financial institution before ultimately determining the appropriate asset class method.

Beginning with the far-left side of the figure, financial institutions should select the type and source of financing provided.[50] The choices are:

- **Corporate finance:** Finance provided to companies, such as listed equity, corporate bonds, and business loans and equity investments in private companies (i.e., unlisted equity).
- **Project finance:** Financing provided to projects—such as energy, power, industrial, infrastructure, and agricultural projects— that rely primarily on the project's cash flow for repayment.
- **Consumer finance:** Finance provided to individual and household consumers, such as mortgages and motor vehicle loans.

As described in Chapter 4, "follow the money" is a key tenet for GHG accounting of financial assets. The money should be followed as far as possible to understand and account for the climate impact of lending and investments. The next columns in Figure 5-1 relate to how much is known about how the borrower or investee used the money and the activity for which the financing was used. The "Use of proceeds" column, a term defined by the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, distinguishes between investments and loans with known and unknown use of proceeds.

Known use of proceeds relates to investments and loans for specific (corporate or consumer) purposes, i.e., the financial institution knows for what activity the money is used. On the other hand, unknown use of proceeds refers to investments and loans for general (corporate or consumer) purposes, i.e., the financial institution does not know exactly for what activity the money is used, which holds for general-purpose loans. Both terms will be used throughout the following subchapters.

For the column labeled "Use of proceeds" the financial institution should select "Known" or "Unknown" depending on whether information is held on how the borrower or investee uses the money provided. If the use of proceeds is "Unknown," the tile option in the next column, "Activity sector," will default to "All." If the use of proceeds is "Known," the financial institution will be required to select the specific activity sector to which the loan or investment was provided.

Loans and investments can be used to finance different products and activities in various sectors. The specific methodology for calculating financed emissions in these sectors can differ, as described in the methods for commercial real estate (CRE), mortgages, and motor vehicle loans. Financed emissions in all other sectors are treated the same way-see "All other" in Figure 5-1. This may change over time if financial institutions solicit PCAF to develop additional accounting rules and guidance for other sectors, e.g., financial products for shipping or aviation.

50 Equity is defined as ownership in the company or project. Debt is defined as a financing instrument that requires repayment by the borrower.

By following the guidance in Figure 5-1 thus far, financial institutions should know the appropriate asset class method(s) to use to start estimating the financed emissions of their portfolio.

Each asset class method currently only covers financial products that are on the balance sheet of the financial institution and or managed by asset managers at the fiscal year-end. This means that financed emissions from products such as revolving credit facilities, bridge loans, and letters of credit are only considered if there is outstanding finance on the balance sheet of the financial institution at financial year-end. In a similar fashion, assets held for short durations or designated as held for sale are not included in the Financed Emissions Standard. PCAF will discuss on how to treat such financing in the future and will provide more guidance in later editions of the Standard.

The Financed Emissions Standard only provides guidance on the seven asset classes mentioned before. Table 5-1 defines these asset classes, including information on the financial products being covered by the respective asset class and the location in the document where specific guidance can be found.

The Financed Emissions Standard does not provide explicit guidance on methods to calculate financed emissions for every financial product including the following: private equity that refers to investment funds, green bonds, loans for securitization, exchange traded funds, derivatives (e.g., futures, options, swaps), initial public offering (IPO) underwriting, and more. More detailed guidance on such financial products will be considered and potentially published in later editions of the Financed Emissions Standard.

Table 5-1. List of asset classes

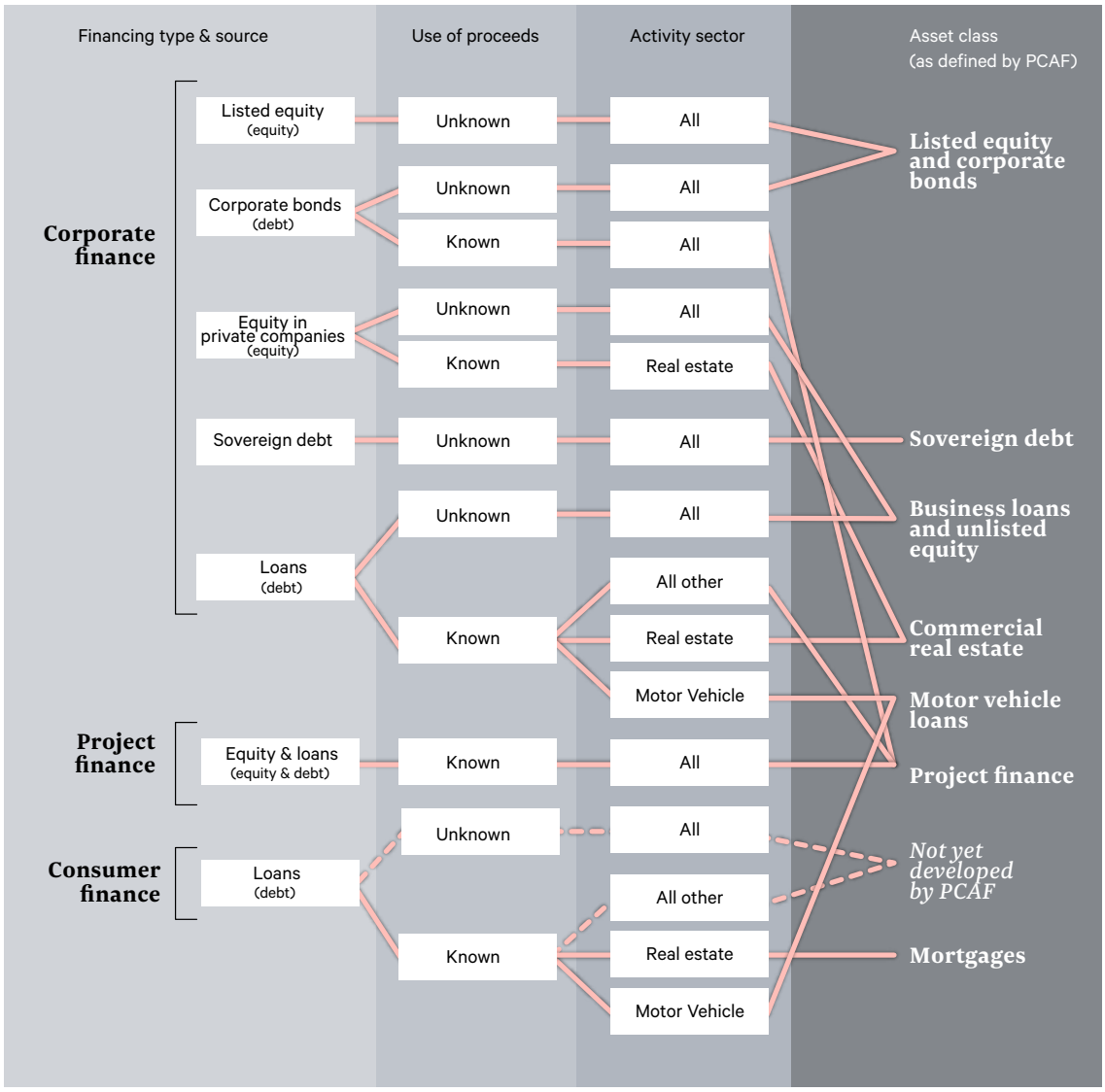
Asset class	Definition	Further guidance
Listed equity and corporate bonds	This asset class includes all on-balance sheet listed corporate bonds and all on-balance sheet listed equity[51] that are traded on a market and are for general corporate purposes, i.e., unknown use of proceeds as defined by the GHG Protocol.	Subchapter 5.1
Business loans and unlisted equity	This asset class comprises business loans and equity investments in private companies, also referred to as unlisted equity. **Business loans** include all on-balance sheet loans and lines of credit to businesses, nonprofits, and any other structure of organization[52] that are not traded on a market and are for general corporate purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol. **Unlisted equity** includes all on-balance sheet equity investments to businesses, nonprofits, and any other structure of organization that are not traded on a market and are for general corporate purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol.	Subchapter 5.2
Project finance	This asset class includes all on-balance sheet loans or equities to projects or activities that are designated for specific purposes, i.e., with known use of proceeds as defined by the GHG Protocol. The financing is designated for a defined activity or set of activities, such as the construction and operation of a gas-fired power plant, a wind or solar project, or energy efficiency projects.	Subchapter 5.3
Commercial real estate	This asset class includes on-balance sheet loans for specific corporate purposes, namely the purchase and refinance of commercial real estate (CRE), and on-balance sheet investments in CRE when the financial institution has no operational control over the property. This definition implies that the property is used for commercial purposes, such as retail, hotels, office space, industrial, or large multifamily rentals. In all cases, the owner of the building uses the property to conduct income-generating activities.	Subchapter 5.4
Mortgages	This asset class includes on-balance sheet loans for specific consumer purposes - namely the purchase and refinance of residential property, including individual homes and multi-family housing with a small number of units. This definition implies that the property is used only for residential purposes and not for commercial activities.	Subchapter 5.5
Motor vehicle loans	This asset class refers to on-balance sheet loans and lines of credit to businesses and consumers for specific (corporate or consumer) purposes - namely the finance one or several[53] motor vehicles.	Subchapter 5.6
Sovereign debt	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.	Subchapter 5.7

51 Listed equity refers to equity that is traded on a stock exchange or another securities exchange.

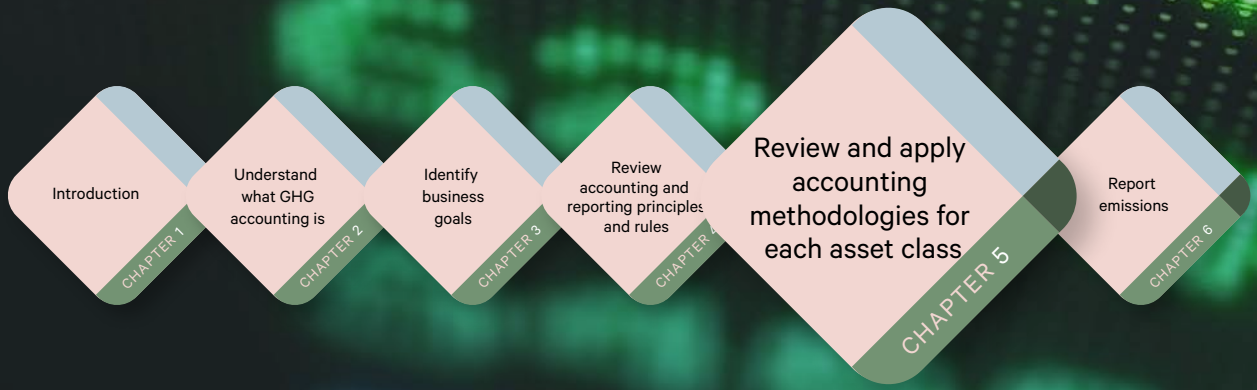
52 This also includes governmental-owned enterprises (e.g., state-owned companies such as municipal energy or public transport providers), while loans to governments themselves are excluded. Loans to governments will be covered in a later edition of the Standard.

53 A single loan might cover the purchase of several vehicles or fleets. In any case, the methodology presented in this chapter should be used.

Figure 5-1. Guidance for choosing an approach to calculate financed emissions



5.1 Listed equity and corporate bonds



Asset class definition

This asset class includes all on-balance sheet listed corporate bonds and all on-balance sheet listed equity[54] that are traded on a market and are for general corporate purposes (i.e., unknown use of proceeds as defined by the GHG Protocol).

These include:

- All types of corporate bonds for general corporate purposes
- Common stock
- Preferred stock

For indirect investments (e.g., investments in funds) that incorporate listed equity and bonds, the methodological approach is the same provided the information on the individual holdings is available.

Green bonds, sovereign debt, and derivative financial products (e.g., futures, options, swaps) are not covered by this asset class. The same holds for short and long positions or special cases of underwriting such as IPO underwriting. Guidance on such financial products are still under development and will be published in later editions of the Financed Emissions Standard.

Assets held for short durations and designated as held for sale are not in scope. These assets may include, but not be limited to, trading account assets and debt securities carried at fair value.

Equity investments in private companies are not covered by this asset class because that is finance not traded on a market. For more information on equity investments in private companies, please refer to the business loans and unlisted equity asset class.

Emission scopes covered

Financial institutions **shall report the absolute scope 1 and scope 2 emissions of borrowers and investees** across all sectors.

For reporting the scope 3 emissions of borrowers and investees, PCAF follows a phase-in approach which requires scope 3 reporting for lending to and making investments in companies depending on the sector in which they are active, i.e., where they earn revenues. For sectors where scope 3 emissions reporting is required, the financial institutions **shall separately disclose these absolute scope 3 emissions**, including the specific sectors covered. Separate reporting allows for full transparency while acknowledging potential double counting issues when adding these to the scope 1 and 2 emissions of borrowers and investees.

PCAF acknowledges that, to date, the comparability, coverage, transparency, and reliability of scope 3 data still varies greatly per sector and data source. By requiring scope 3 reporting for selected sectors over time, PCAF seeks to make scope 3 emissions reporting more common by improving data availability and quality over time.

54 Listed equity refers to equity that is traded on a stock exchange or another securities exchange.

Financial institutions **shall** explain if they are not able to report the required scope 3 emissions because of data availability or uncertainty. For all sectors where PCAF does not yet require scope 3 emissions reporting, financial institutions should follow the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard and only account for scope 3 emissions where relevant.

PCAF provides a sector list detailing where scope 3 emissions of borrowers and investees are required to be reported (see Table 5-2). The sector list of PCAF aligns with the scope 3 phase-in approach as defined by the EU TEG, which was included in Article 5 of the Commission Delegated Regulation (EU) 2020/1818 of 17 July 2020 Supplementing the Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks.

In practice, this means that financial institutions **shall start reporting scope 3 emissions for the oil, gas, and mining sectors from 2021** onward and additional sectors will be added from 2023. In the years toward 2023, PCAF will monitor the data availability and impact for these additional sectors and will provide additional guidance on the reporting requirements.

The above requirement for all FIs to start reporting on the scope 3 emissions of borrowers or investees in the referenced sectors is a PCAF requirement. The legislation on which this phase-in approach is based currently applies legally only to the methodology of EU climate benchmarks.

Table 5-2. List of sectors with required scope 3 emissions inclusion as defined by the EU TEG[55]

Phase-in period	NACE Level 2 (L2) sectors considered
For reports published in 2021 onwards	At least energy (oil & gas) and mining (i.e., NACE L2: 05-09, 19, 20)
For reports published in 2023 onwards	At least transportation, construction, buildings, materials, and industrial activities (i.e., NACE L2: 10-18, 21-33, 41-43, 49-53, 81)
For reports published in 2025 onwards	Every sector

Attribution of emissions

As a basic attribution principle, the financial institution accounts for a portion of the annual emissions of the financed company determined by the ratio between the institution's outstanding amount (numerator) and the value of the financed company (denominator). This ratio is called the attribution factor.[56]

55 NACE is the abbreviation for the Statistical Classification of Economic Activities in the European Community. The NACE sector codes provided in the table are identical to the codes of the International Standard Industrial Classification of All Economic Activities (ISIC) of the UN (see ISIC REV. 4). Non-European financial institutions are referred to the ISIC classification if this classification better serves their needs.

56 The attribution factor calculation is, in principle, only possible for listed equity and corporate bonds where financial data specific to the borrower or investee is available. For listed equity and corporate bonds where such data is unavailable, the attribution factor cannot be calculated, but rough estimations on attribution can still be made based on region- and sector-specific average financial data and the outstanding amount. This is explained in more detail in the Equations to calculate financed emissions and Data required sections below (see Option 3b and Option 3c).

1. **Outstanding amount (numerator)**: This is the actual outstanding amount in listed equity or corporate bonds. It should be defined in line with the denominator. Therefore, the value of outstanding listed equity is defined based on its market value (i.e., market price times number of shares), and the value of outstanding corporate bonds is defined based on the book value of the debt that the borrower owes to the lender. Financial institutions should either use the calendar or financial year-end outstanding amount, provided the approach is communicated clearly and used consistently.
2. **Company value (denominator)**: For all listed companies, this is the enterprise value including cash (EVIC) of the respective company. **Only** for traded bonds to private companies is this the sum of total company equity[57] and debt,[58] which can be found on the client's balance sheet, as no market value for equity is available.[59]

For listed companies:

$$Attribution\ factor_c = \frac{Outstanding\ amount_c}{Enterprise\ Value\ Including\ Cash_c}$$

For bonds to private companies:

$$Attribution\ factor_c = \frac{Outstanding\ amount_c}{Total\ equity + debt_c}$$

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

57 In cases where the total company equity value according to the client's balance sheet is negative, the financial institution 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—e.g., this often holds for startups that have high negative profits during their first years of operation. By this approach, for those companies that are doing well (i.e., they have high retained earnings), financial institutions attribute more emissions to equity providers; for those companies doing poorly (i.e., they have high retained losses), financial institutions attribute more emissions to debt providers. This is in line with the attribution factor rationale for listed companies, where the equity part of EVIC (i.e., market capitalization) also implicitly reflects retained earnings and losses (e.g., if retained earnings increase, the share price and market capitalization generally also increase).

58 Total debt includes both current and long-term debt on the balance sheet.

59 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), financial institutions are allowed to 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.

EVIC is defined as: The sum of the market capitalization of ordinary shares at fiscal year-end, the market capitalization of preferred shares at fiscal year-end, and the book values of total debt[60] and minorities' interests. No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values.[61]

PCAF chose to align the definition of EVIC with the definition provided by the:

1. EU TEG in its *Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks' ESG Disclosure*[62]
2. ***Commission Delegated Regulation (EU) 2020/1818 of 17 July 2020*** *Supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks*, which says EVIC should be used to determine the GHG intensities for the benchmarks.

Box 5 further clarifies the rationale for using EVIC in the attribution factor of listed equity and corporate bonds.

60 In its EVIC definition, the EU TEG refers to "the book values of **total** debt," including all debt as listed on the company balance sheet. This is different from some accounting definitions of book value of debt, which exclude some elements like non-interest-bearing debt (also see next footnote on precautionary principle).

61 This is the standard definition of EVIC as provided by the EU TEG. For consistency reasons, PCAF decided to align with this definition to ensure maximum alignment on metrics in the market, which also enables data providers to collect data in a consistent way. In reality, specific elements of EVIC might not be readily available because data providers are still working on aligning their data with this definition. For cases where data is missing, the EU TEG (pg. 16 in its handbook of climate-related benchmarks) recommends conducting corporate GHG data estimations based on the UN's (1992) precautionary principle: "If in doubt, err on the side of the planet not the side of the company." Following this precautionary approach for EVIC calculations, financial institutions can decide to exclude elements of the EVIC (e.g., minority interests or certain elements of the book value of debt) as this would lead to a slightly lower EVIC and higher attribution of financed emissions to their own outstanding amount. These slight deviations from the standard EVIC definition are allowed as long as: (1) they are in line with this precautionary principle, and (2) the basis of the EVIC definition still includes the market value of equity (market capitalization) plus the total book value of debt of any given company.

62 (EU Technical Expert Group on Sustainable Finance, 2019)

Box 5. 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 asset 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 incl. cash	50 + 50 = 100	50 / 100 = 50%	50 / 100 = 50%	100%

Exceptions

If a financial institution only invests in equity and undertakes GHG accounting from a risk perspective, emissions could also be attributed to the total market capitalization (market value of a company's outstanding shares) of the company. Please note, however, that the Financed Emissions Standard is aiming to standardize and harmonize GHG accounting across financial institutions and has a clear preference for using EVIC. To enable a smooth transition from market capitalization to using EVIC, the exception to use total market capitalization will remain possible for a maximum of 2 years (ending in 2023).

Equations to calculate financed emissions

The financed emissions of a loan or investment in a company are calculated by multiplying the attribution factor by the emissions of the respective borrower or investee company. The total financed emissions of a listed equity and corporate bonds portfolio are calculated as follows:[63]

$$Financed\ emissions = \sum_{c} Attribution\ factor_c \times Company\ emissions_c$$

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

The attribution factor represents the proportional share of a given company—that is, the ratio of the outstanding amount to EVIC for listed companies and the total equity and debt for bonds to private companies:

For listed companies:

$$Financed\ emissions = \sum_{c} \frac{Outstanding\ amount_c}{Enterprise\ Value\ Including\ Cash_c} \times Company\ emissions_c$$

For bonds to private companies:

$$Financed\ emissions = \sum_{c} \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Company\ emissions_c$$

The financed emissions from listed equity and corporate bonds can be calculated in different ways depending on the availability of financial and emissions data specific to the borrower and investee. Overall, PCAF distinguishes three different options to calculate the financed emissions from listed equity and corporate bonds depending on the emissions data used:

63 Wherein a financial institution is lending to or investing in a subsidiary of a larger entity, the attribution should be accounted at the subsidiary level according to the "follow the money" principle, if the financial institution has balance sheet information on the subsidiary. If the subsidiary's balance sheet is unavailable, the financial institution should calculate the attribution factor based on the total balance sheet of the entity to whom the financial institution has recourse for repayment of the loan.

- **Option 1: reported emissions**, where verified[64] or unverified[65] emissions are collected from the borrower or investee company directly (e.g., company sustainability report) or indirectly via verified third-party data providers (e.g., CDP) and then allocated to the reporting financial institutions using the attribution factor.
- **Option 2: physical activity-based emissions**, where emissions are estimated by the reporting financial institution based on primary physical activity data collected from the borrower or investee company (e.g., megawatt-hours of natural gas consumed or tons of steel produced) and then allocated to the reporting financial institution using the attribution factor. The emissions data should be estimated using an appropriate calculation methodology or tool with verified emission factors expressed per physical activity (e.g., tCO_2e/MWh or tCO_2e/t of steel) issued or approved by a credible independent body.
- **Option 3: economic activity-based emissions**, where emissions are estimated by the reporting financial institution based on economic activity data collected from the borrower or investee company (e.g., euro/dollar of revenue or euro/dollar of sectoral assets) and then allocated to the reporting financial institution using the attribution factor. The emissions data should be estimated using official statistical data or acknowledged environmentally extended input-output (EEIO) tables providing region- or sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/€ or $ of revenue or tCO_2e/€ or $ of sectoral assets).[66]

Data required

PCAF distinguishes three options to calculate the financed emissions from listed equity and corporate bonds depending on the emissions data used:

- Option 1: reported emissions
- Option 2: physical activity-based emissions
- Option 3: economic activity-based emissions

While Options 1 and 2 are based on company-specific reported emissions or primary physical activity data provided by the borrower or investee or third-party data providers, Option 3 is based on region- or sector-specific average emissions or financial data obtained from public data sources such as statistics or data from other third-party providers.[67]

Options 1 and 2 are preferred over Option 3 from a data quality perspective because they provide more accurate emissions results to a financial institution. Due to data limitations, financial institutions might use Options 1 or 2 for certain companies and Option 3 for others. The data quality mix shall be reflected in the average data quality score, as Chapter 6 illustrates.

64 This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.

65 This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third-party auditor. Unverified reported emissions can be calculated by either an external party or by the borrower or investee company itself.

66 Sampling tests based on actual data on the company level extrapolated to the portfolio level can help to test the accuracy of calculations based on this data from statistics or EEIO tables. This may also be used to refine the data for specific sectors or regions if the reporting financial institution has a strong presence in and specific knowledge of the respective sector or region. National agencies and regional data providers or statistical offices in individual regions may assist reporting financial institutions and investee companies in various regions in finding regional and more relevant financial or emissions data information.

67 Option 1 and Option 2 were called "Approach 1: company specific approach" and Option 3 was called "Approach 2: Sector/region average approximation" in the report produced by the PCAF Dutch team: (PCAF, 2019).

Table 5-3 provides data quality scores for each of the described options and sub-options (if applicable) that can be used to calculate the financed emissions for listed equity and corporate bonds.

Table 5-3. General description of the data quality score table for listed equity and corporate bonds[68]

(score 1 = highest data quality; score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Reported emissions**	**1a**	Outstanding amount in the company and EVIC are known. **Verified emissions** of the company are available.
Score 2		**1b**	Outstanding amount in the company and EVIC are known. **Unverified emissions** calculated by the company are available.
	Option 2: Physical activity-based emissions	**2a**[69]	Outstanding amount in the company and EVIC are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data of the **company's energy consumption** and emission factors[70] specific to that primary data. Relevant process emissions are added.
Score 3		**2b**	Outstanding amount in the company and EVIC are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data of the **company's production** and emission factors specific to that primary data.
Score 4	**Option 3: Economic activity-based emissions**	**3a**	Outstanding amount in the company, EVIC, and the **company's revenue**[71] are known. Emission factors for the sector per unit of revenue are known (e.g., tCO_2e per euro or dollar of revenue earned in a sector).
Score 5		**3b**	Outstanding amount in the company is known. Emission factors for the sector per unit of asset (e.g., tCO_2e per euro or dollar of asset in a sector) are known.
		3c	Outstanding amount in the company is known. Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro or dollar of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-1). Data for all three options in Table 5-3 can be derived from different data sources.

68 For bonds to private companies, EVIC is defined as the total equity and debt of the respective company.

69 The quality scoring for the Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

70 Supplier-specific emission factors (e.g., from electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

71 If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

Official company filings

Where available, PCAF recommends using emissions data reported by companies, given the data fully covers a company's emissions-generating activities disclosed in official filings and environmental reports. The most recent available data should be used with mention to the data source, reporting period, or publication date. Using this data is in line with Option 1.

Data providers (Option 1)

For Option 1 (reported emissions), PCAF recommends either collecting emissions from the borrower or investee company directly (e.g., company sustainability report) or third-party data providers, such as CDP, Bloomberg, MSCI, Sustainalytics, S&P/Trucost, and ISS ESG. Data providers typically make scope 1 and 2 emissions data available. PCAF encourages using the most recent available data and to mention the data source, reporting period, or publication date.

Data providers collect emissions data as reported by the companies themselves, either through a standardized framework such as CDP or through a company's own disclosures in official filings and environmental reports. They often have their own methodologies to estimate/calculate companies' emissions, especially if this data is not reported. In this case, the calculation would be in line with Options 2 or 3, assuming the methodology used is in line with the GHG Protocol. Financial institutions should ask data providers to be transparent, disclose the calculation method they use, and confirm alignment with the GHG Protocol. This will enable financial institutions to apply the proper score to the data. PCAF also encourages data providers to apply the PCAF scoring method to their own data, which would allow them to share the data quality scores directly with their clients.

PCAF does not recommend a preferred data vendor. PCAF recommends using data providers that use the standardized CDP framework and suggests data providers disclose the data quality score according to the scoring hierarchy in Table 5-3.[72] When using data providers, PCAF recommends using the same provider for all equity and bonds due to variability of scope 1 and 2 emissions observed by providers.

Estimation models (Option 2 and 3)

Not all companies disclose their emissions data in official filings or through data providers. Reporting in emerging markets often lags that of developed markets. To maximize the coverage of emissions data, the remaining gaps are often filled with estimates.

If no data is available, estimation models consistent with the emissions from the primary business activity may be used. Emission factors from production-based models (i.e., emission intensity per physical activity) are preferred over emission factors from revenue-based models (i.e., emission intensity per revenue) because the former are less sensitive to fluctuations in exchange rates or commodity prices. Emission factors from production-based models in line with Option 2 are especially useful for emission-intensive industries like utilities, materials, energy, and industrials. Emission factors from revenue-based models in line with Option 3 (e.g., intensity-based or environmental input-output models) have the advantage of requiring less detailed data from the financial institution.

72 More information about CDP can be found at: https://www.cdp.net/en

For Option 2 (physical activity-based emissions), PCAF recommends using actual energy consumption (e.g., megawatt-hours of natural gas consumed) or production (e.g., tons of steel produced) data reported by companies, given the data fully covers the company's emissions-generating activities. The emission factors expressed per physical activity used should be based on appropriate and verified calculation methodologies or tools issued or approved by a credible independent institution. Example data sources for retrieving emission factors are ecoinvent,[73] Defra,[74] Intergovernmental Panel on Climate Change (IPCC),[75] GEMIS (Global Emissions Model for integrated Systems),[76] and Food and Agriculture Organization of the United Nations (FAO).[77] The most recent available data should be used, including a mention of the data source, reporting period, or publication date.

For Option 3 (economic activity-based emissions), PCAF recommends using official statistical data or acknowledged EEIO tables providing region- or sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/€ or $ of revenue or tCO_2e/€ or $ of sectoral assets). Financial institutions should use emission factors that are as consistent as possible with the primary business activity financed. For example, for a business loan to a paddy rice farmer, the financial institution should seek to find and use a sector-specific average emission factor for the paddy rice farmer, the financial institution should seek to find and use a sector-specific average emission factor for the paddy rice sector and not an emission factor for the agricultural sector in general. Example EEIO databases that can be used to obtain such emission factors are EXIOBASE,[78] Global Trade Analysis Project (GTAP),[79] or World Input-Output Database (WIOD).[80]

PCAF's web-based emission factor database provides a large set of emission factors for Options 2 and 3. The database, which is currently available only to PCAF signatories, can help financial institutions get started with estimating the financed emissions of their investments.

PCAF expects that the financed emissions for most listed equity and corporate bonds can be derived through either reported emissions (Option 1), physical activity data (Option 2), or economic activity data (Option 3). However, PCAF allows the use of alternative options to calculate emissions if none of the specified options can be used or in the case that new options are developed. The reporting financial institution shall always explain the reasons for using an alternative option if it deviates from the three options defined above.

73 More information can be found at: https://www.ecoinvent.org/
74 More information can be found at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conedition-factors-2019
75 More information can be found at: https://www.ipcc-nggip.iges.or.jp/EFDB/find_ef.php
76 More information can be found at: http://iinas.org/gemis-download.html
77 More information can be found at: http://www.fao.org/partnerships/leap/database/ghg-crops/en
78 More information can be found at: https://www.exiobase.eu
79 More information can be found at: https://www.gtap.agecon.purdue.edu
80 More information can be found at: http://www.wiod.org

Emission removals

Companies in an FI's portfolio should report on emission removals, whether nature- or technology-based,[81] as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance, and emission removals shall be reported separately from both absolute emissions and any carbon credits retired and generated.

Carbon credits generated by companies should be reported and carbon credits retired may be reported. These figures can provide transparency and context for the financed emissions and removals. Ultimately, the goal of the PCAF Financed Emissions Standard is to transparently report the total emissions impacts of lending and investments, not diluted by credits retired or generated.

FIs can calculate attribution of companies' reported emission removals using the existing attribution logic set out in this chapter (see formula below); this same logic applies to any attribution of companies' reported credits retired or generated.

$$\textit{Emission removals} = \sum_{c} \frac{\textit{Outstanding investment}_c}{\textit{EVIC or Total company equity+debt)}_c} \times \textit{Company emission removals}_c$$

(with c = borrower or investee company)

Example accounting – a portfolio of different companies

An FI invests into multiple companies with different emissions profiles as illustrated in the following table. All numbers are in tCO_2e for the reporting year 2020 and are dummy data for the purpose of this example.

Table 5-4: Example of data input for calculating a portfolio of different companies

	Scope 1	Scope 2	Scope 3	Emission removals	Carbon credits retired	Carbon credits generated	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 retired by clients is optional.

81 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. Where necessary, the PCAF Global Standard will be updated in line with the final version of the new GHG Protocol guidance.

Table 5-5: Calculation example portfolio of different companies

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
Emission removals	20,000 x 10% + 1,000 x 20%	2,200
Carbon credits retired	25,000 x 25% + 5,000 x 20%	7,250
Carbon credits generated	5,000 x 10% + 500 x 20%	600

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits retired may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal")[82] 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 emission removals, for example. Nonetheless, for the purposes of this Financed Emissions Standard, the fundamental requirement is that reporting should at a minimum include separate numbers for absolute emissions and emission removals, in addition to any 'net' numbers.

Example tool to calculate emission 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 emission removals. The FRESCOS tool is open for other FIs and interested parties to use.

Limitations

Market value fluctuations

When using EVIC as the denominator, calculated financed emissions might change as a result of fluctuating market prices. Applying corrections to EVIC could address this issue; however, the application of inconsistent approaches can influence and reduce the comparability of results between different financial institutions. In addition, corrections could theoretically be applied to many other variables, like exchange rates, inflation, and emerging versus developed markets, further reducing comparability. For that reason, all financial institutions shall report their unadjusted absolute financed emissions in accordance with the calculations required by the PCAF standard. However, financial institutions may optionally report their adjusted absolute financed emissions with the requirement that such amounts must be disclosed separately along with a description of the methodology, inputs and models utilized to calculate the corrections to EVIC. Both unadjusted and adjusted absolute finance emissions will be required for all periods disclosed in the financial reports being presented.

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

When asset owners and asset managers convert absolute financed emissions into economic emissions intensity by assets under management, market price fluctuations also influence the denominator. Correcting this fluctuation can be approached as illustrated in the example below. This approach was tested by asset owners and asset managers. Further research is needed to evaluate whether this adjustment factor is also applicable for banks when using an economic emissions intensities over total loan exposure.

An approach for asset owners and managers to correct economic emissions intensity

For asset owners and managers, the economic emission intensity is a commonly used metric for reporting and target setting purposes. The economic emission intensity is shown in the equation below and reflects absolute emissions associated with investments normalized for the total size of the portfolio or assets under management.

$$\text{Economic emission intensity} = \sum_i \frac{\frac{\text{Outstanding amount}_i}{\text{Investee company's EVIC}_i} \times \text{Investee company's emissions}_i}{\text{Total outstanding amount or assets under management (AuM)}}$$

When using this metric, especially the denominator is influenced by market value fluctuations. In a bull market where valuation would increase, all else kept equal (GHG emissions and ownership unchanged), the denominator would increase and as a result the economic emission intensity would decrease. Under the influence of these fluctuations, an objective to reduce the economic emission intensity by a certain percentage becomes a moving target. This undermines the utility of the metric to make comparisons from one time period to the next.

To address this limitation regarding the economic emission intensity, the EU TEG and EU regulation on benchmarks suggest that asset owners/managers correct EVIC over time by applying an inflation correction. Building on the EU inflation correction, PCAF recommends that asset owners/managers adjust the economic emission intensity with the following adjustment factor. The adjustment factor should be calculated as:

$$ADJ_{b,T} = \sum_i w_T \times \frac{EVIC_b}{EVIC_T}$$

(With b = base year and T = current year and WT = benchmarks weights at time T)

There are two options for adjusting the economic emission intensity (backward or current):

1. The economic emission intensity can be adjusted in the base year (backward). Benefits of adjusting the base year are that current reported carbon figures remain unadjusted. Moreover, EVIC inflation correction applied to the baseline can be combined with other adjustments that may be required, for example for data improvements or a changing universe composition.

To calculate adjusted economic emission intensity in the base year (b):

$$\text{Economic emission intensity}^{adjusted}\ (b) = \text{Economic emission intensity}\ (b) \times ADJ_{b,T}$$

2. The economic emission intensity can also be adjusted for the current reporting year. Benefits of adjusting the current year are intuitiveness for annual reporting, where the focus is usually on the metrics associated with the current year. Similarly, when assessing progress against an objective to reduce the economic emission intensity by a certain percentage, it is intuitive to keep the base emission intensity consistent.

To calculate adjusted economic emission intensity in current reporting year (T):

$$\textit{Economic emission intensity}^{adjusted}\ (T) = \textit{Economic emission intensity}\ (T) \times \frac{1}{ADJ_{b,T}}$$

If asset owners/managers decide to apply this adjustment factor, PCAF requires them to report both the unadjusted as adjusted economic emissions intensity separately. For transparency, ideally the adjustment factor used and an explanation of how this was constructed and applied would also be included.

Calculation example of applying the adjustment factor

Base year b						
Company	Emissions (tCO_2eq)	Market cap (M$)	Debt (M$)	EVIC (M$)	Weight	Emissions/ EVIC (tCO_2eq/M$)
A	60,000	800	400	1200	40%	50
B	100,000	600	400	1000	30%	100
C	120,000	400	400	800	20%	150
D	120,000	200	400	600	10%	200
Current year T						
Company	Emissions (tCO_2eq)	Market cap (M$)	Debt (M$)	EVIC (M$)	Weight	Emissions/ EVIC (tCO_2eq/M$)
A	60,000	960	400	1360	40%	44
B	100,000	720	400	1120	30%	89
C	120,000	480	400	880	20%	136
D	120,000	240	400	640	10%	188
Backward/base year adjustment						
	Plain (tCO_2eq/M$)	Adjusted (tCO_2/M$)		EVIC_b/ EVIC_T		Adjustment
Carbon footprint b	100	89.6		0.88		0.896
Carbon footprint T	90			0.89		
				0.91		
				0.94		
Current year adjustment						
	Plain (tCO_2eq/M$)	Adjusted (tCO_2/M$)		EVIC_b/ EVIC_T		Adjustment
Carbon footprint b	100			0.88		0.896
Carbon footprint T	90	100.9		0.89		
				0.91		
				0.94		
Decarbonization Adjust T	0.914%					
Decarbonization Adjust b	0.914%					

Organization identifiers

For larger listed equity and corporate bond portfolios, organization identifiers should be in place to combine information from various sources. Examples of such identifiers include the Stock Exchange Daily Official List, Legal Entity Identifier (LEI), International Securities Identification Number (ISIN), and Committee on Uniform Security Identification Procedures numbers (CUSIP). For large portfolios, matching external data sources can be a challenge when two companies merge; the organization identifiers will be adjusted immediately while emissions data providers might only update such information on an annual basis.

5.2 Business loans and unlisted equity

Asset class definition

This PCAF asset class comprises:

- Business loans
- Equity investments in private companies, also referred to as unlisted equity

Business loans

Business loans include all on-balance sheet loans and lines of credit to businesses, nonprofits, and any other structure of organization[83] that are not traded on a market and are for general corporate purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol.[84] Revolving credit facilities, overdraft facilities, and business loans secured by real estate such as CRE-secured lines of credit are also included. Any off-balance sheet loans and lines of credit are excluded.

For financing products such as revolving credit facilities, bridge loans, and letters of credit, which are commonly provided by financial institutions, only those loans outstanding on the year-end balance sheet of the financial institution are covered by this asset class.[85]

Methods for financed emissions from business loans for specific corporate purposes (i.e., with known use of proceeds) are not included in this asset class but are instead covered by the project finance asset class, even if they may not be structured as project finance per se (see subchapter 5.3). Business loans to finance commercial real estate or motor vehicles are also considered separate asset classes—i.e., CRE (see subchapter 5.4) and motor vehicle loans (see subchapter 5.6), respectively.[86]

Unlisted equity

Unlisted equity includes all on-balance sheet equity investments to businesses, nonprofits, and any other structure of organization that are not traded on a market and are for general corporate purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol. Unlisted equity is also referred to as equity investments in private companies (i.e., the financial institution obtains shares of the company) throughout the Financed Emissions Standard.

Private equity that refers to investment funds is not included in this asset class; guidance on such private equity will follow in later editions of the Financed Emissions Standard.

83 This also includes governmental-owned enterprises (e.g., state-owned companies such as municipal energy or public transport providers), while loans to governments themselves are excluded. Loans to governments (i.e., governmental lending) will be covered in a later edition of the Standard.

84 The term "company" is used throughout this subchapter but can refer to any type of organization, including nonprofits.

85 More detailed guidance on such financing is under development and will be published in later editions of the Standard; this guidance will elaborate further on how to account for the significant interannual fluctuations of such financial products that may not be captured appropriately when only considering the year-end balance sheet of a financial institution. For now, financial institutions should be transparent on any major last minute increases or decreases at fiscal year-end because this can increase or decrease the financed emissions from business loans significantly.

86 Financial institutions can still report their financed emissions from such business loans for specific corporate purposes (i.e., with known use of proceeds) under an asset class called "business loans" if that is the name commonly used or preferred by the financial institution (e.g., when reporting internally or externally).

Emission scopes covered

Financial institutions **shall report the absolute scope 1 and scope 2 emissions of borrowers and investees** across all sectors.

For reporting the scope 3 emissions of borrowers and investees, PCAF follows a phase-in approach which requires scope 3 reporting for lending to and making investments in companies depending on the sector in which they are active, i.e., where they earn revenues. For sectors where scope 3 emissions reporting is required, the financial institutions **shall separately disclose these absolute scope 3 emissions**, including the specific sectors covered. Separate reporting allows for full transparency while acknowledging potential double counting issues when adding these to the scope 1 and 2 emissions of borrowers and investees.

PCAF acknowledges that, to date, the comparability, coverage, transparency, and reliability of scope 3 data still varies greatly per sector and data source. By requiring scope 3 reporting for selected sectors over time, PCAF seeks to make scope 3 emissions reporting more common by improving data availability and quality over time.

Financial institutions **shall** explain if they are not able to report the required scope 3 emissions because of data availability or uncertainty. For all sectors where PCAF does not yet require scope 3 emissions reporting, financial institutions should follow the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard and only account for scope 3 emissions where relevant.

PCAF provides a sector list detailing where scope 3 emissions of borrowers and investees are required to be reported (see Table 5-6). The sector list of PCAF aligns with the scope 3 phase-in approach as defined by the EU TEG, which was included in Article 5 of the Commission Delegated Regulation (EU) 2020/1818 of 17 July 2020, *Supplements the Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks*.

In practice, this means that financial institutions **shall start reporting scope 3 emissions for the oil, gas, and mining sectors from 2021** onward and additional sectors will be added from 2023. In the years toward 2023, PCAF will monitor the data availability and impact for these additional sectors and will provide additional guidance on the reporting requirements.

The above requirement for all FIs to start reporting on the scope 3 emissions of borrower/investee companies in the referenced sectors is a PCAF requirement. The legislation on which this phase-in approach is based currently applies legally only to the methodology of EU climate benchmarks.

Table 5-6. List of sectors with required scope 3 emissions inclusion as defined by the EU TEG[87]

Phase in period	NACE L2 sectors considered
For reports published in 2021 onwards	At least energy (oil & gas) and mining (i.e., NACE L2: 05-09, 19, 20)
For reports published in 2023 onwards	At least transportation, construction, buildings, materials, and industrial activities (i.e., NACE L2: 10-18, 21-33, 41-43, 49-53, 81)
For reports published in 2025 onwards	Every sector

Attribution of emissions

As a basic attribution principle, the financial institution accounts for a portion of the annual emissions of the borrower and investee, as determined by the ratio between the outstanding amount (numerator) and the value of the financed company (denominator). This ratio is called the attribution factor.[88]

1. **Outstanding amount (numerator)**: This is the actual outstanding loan amount.
   a For business loans, this is defined as the value of the debt that the borrower owes to the lender (i.e., disbursed debt minus any repayments). It will be adjusted annually to reflect the correct exposure, resulting in the attribution to decline to 0 at the end of the lifetime of the loan (i.e., when it is fully repaid).
   b For unlisted equity (i.e., equity investments in private companies), the outstanding amount is the outstanding value of equity that the financial institution holds in the private company. It is calculated by multiplying the relative share of the financial institution in the respective investee[89] by the total equity of the respective investee according to its balance sheet. Financial institutions should either use the calendar or financial year-end outstanding amount, provided the approach is communicated and used consistently.

87 NACE is the abbreviation for the Statistical Classification of Economic Activities in the European Community. The NACE sector codes provided in the table are identical to the codes of the ISIC of the UN (see ISIC REV. 4). Non-European financial institutions are referred to the ISIC classification if this classification better serves their needs.

88 The attribution factor calculation is, in principle, only possible for business loans and unlisted equity where client-specific financial data is available. For business loans and unlisted equity where such data is unavailable, the attribution factor cannot be calculated but rough estimations on attribution can still be made based on region- and sector-specific average financial data and the actual outstanding amount. This is explained in more detail in the Equations to calculate financed emissions and Data required sections below (see Option 3b and Option 3c).

89 The relative share of the financial institution in the respective investee is calculated by dividing the number of shares that the financial institution holds in the respective investee by the total number of shares of the investee.

2. **Company value (denominator)**:
   a. For business loans and equity investments to/in private companies, this is the sum of total company equity[90] and debt,[91] which can be found on the client's balance sheet.[92]
   b. For business loans to listed companies, this is the company enterprise value including cash (EVIC) of the respective client.

For business loans and equity investments to/in private companies:

$$Attribution\ factor_c = \frac{Outstanding\ amount_c}{Total\ equity + debt_c}$$

For unlisted equity,the outstanding amount is calculated as follows:

$$\frac{\#\ shares\ of\ financial\ institution_c}{\#\ total\ shares_c} \times Total\ equity_c$$

For business loans to listed companies:

$$Attribution\ factor_c = \frac{Outstanding\ amount_c}{Enterprise\ Value\ Including\ Cash_c}$$

(with c=borrower or investee company)

EVIC is defined as: The sum of the market capitalization of ordinary shares at fiscal year-end, the market capitalization of preferred shares at fiscal year-end, and the book values of total debt[93] and minorities' interests. No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values.[94]

90 In cases where the total company equity value according to the client's balance sheet is negative, the financial institution 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—e.g., this often holds for startups that have high negative profits during their first years of operation. By this approach, or those companies that are doing well (i.e., they have high retained earnings), financial institutions attribute more emissions to equity providers; for those companies doing poorly (i.e., they have high retained losses), financial institutions attribute more emissions to debt providers. This is in line with the attribution factor rationale for listed companies, where the equity part of EVIC (i.e., market capitalization) also implicitly reflects retained earnings and losses (e.g., if retained earnings increase, the share price and thus the market capitalization generally also increase).

91 Total debt includes both current and long-term debt on the balance sheet.

92 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), financial institutions are allowed to 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.

93 In its EVIC definition, the EU TEG refers to "the book values of total debt," including all debt as listed on the company balance sheet. This is different from some accounting definitions of book value of debt, which exclude some elements like non-interest-bearing debt (also see next footnote on precautionary principle).

94 This is the standard definition of EVIC as provided by the EU TEG. For consistency reasons, PCAF decided to align with this definition to ensure maximum alignment on metrics in the market, which also enables data providers to collect data in a consistent way. In reality, specific elements of EVIC might not be readily available because data providers are still working on aligning their data with this definition. For cases where data is missing, the EU TEG (pg. 16 in its handbook of climate-related benchmarks) recommends conducting corporate GHG data estimations based on the UN's (1992) precautionary principle: "If in doubt, err on the side of the planet not the side of the company." Following this precautionary approach for EVIC calculations, financial institutions can decide to exclude elements of the EVIC (e.g., minority interests or certain elements of the book value of debt) as this would lead to a slightly lower EVIC and higher attribution of financed emissions to their own outstanding amount. These slight deviations from the standard EVIC definition are allowed as long as they are: (1) in line with this precautionary principle, and (2) the basis of the EVIC definition still includes the market value of equity (market capitalization) plus the total book value of debt of any given company.

PCAF chose to align the definition of EVIC with the definition provided by the:

1. EU TEG in its *Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmark and Benchmarks' ESG Disclosure*[95]
2. ***Commission Delegated Regulation (EU) 2020/1818 of 17 July 2020*** *Supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks*, which says EVIC should be used to determine the GHG intensities for the benchmarks.

Further clarification on the rationale for using EVIC for the attribution of listed companies is provided in the asset class subchapter on listed equity and corporate bonds.

Equations to calculate financed emissions

The financed emissions from business loans and unlisted equity are calculated by multiplying the attribution factor by the emissions of the borrower or investee company and then taking the sum of these emissions:[96]

$$Financed\ emissions = \sum_{c} Attribution\ factor_c \times Company\ emissions_c$$

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

The attribution factor represents the proportional share of a given company—that is, the ratio of the outstanding amount to total equity and debt for private companies and EVIC for listed companies:

For business loans and equity investments to/in private companies:

$$Financed\ emissions = \sum_{c} \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Company\ emissions_c$$

For business loans to listed companies:

$$Financed\ emissions = \sum_{c} \frac{Outstanding\ amount_c}{Enterprise\ Value\ Including\ Cash_c} \times Company\ emissions_c$$

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

The financed emissions from business loans and unlisted equity can be calculated in different ways depending on the availability of financial and emissions data specific to the borrower or

95 (EU Technical Expert Group on Sustainable Finance, 2019)

96 Wherein a financial institution is lending to or investing in a subsidiary of a larger entity, the attribution should be accounted at the subsidiary level according to the "follow the money" principle, if the financial institution has balance sheet information on the subsidiary. If the subsidiary balance sheet is unavailable, the financial institution should calculate the attribution factor based on the total balance sheet of the entity to whom the financial institution has recourse for repayment of the loan.

investee. Overall, PCAF distinguishes three different options to calculate the financed emissions from business loans and unlisted equity depending on the emissions data used.

- **Option 1: Reported emissions**, where verified[97] or unverified[98] emissions are collected from the borrower or investee company directly (e.g., company sustainability report) or indirectly via verified third-party data providers (e.g., CDP) and then allocated to the reporting financial institution using the attribution factor.
- **Option 2: Physical activity-based emissions**, where emissions are estimated by the reporting financial institution based on primary physical activity data collected from the borrower or investee (e.g., megawatt-hours of natural gas consumed or tons of steel produced) and then allocated to the reporting financial institution using the attribution factor. The emissions data should be estimated using an appropriate calculation methodology or tool with verified emission factors expressed per physical activity (e.g., tCO_2e/MWh or tCO_2e/t of steel) issued or approved by a credible independent body.
- **Option 3: Economic activity-based emissions**, where emissions are estimated by the reporting financial institution based on economic activity data collected from the borrower or investee company (e.g., euro/dollar of revenue or euro/dollar of asset) and then allocated to the reporting financial institution using the attribution factor. The emissions data should be estimated using official statistical data or acknowledged EEIO tables providing region- or sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/€ or $ of revenue or tCO_2e/€ or $ of sectoral assets).[99]

Data required

As described, PCAF distinguishes three options to calculate the financed emissions from business loans and unlisted equity depending on the emissions data used:

- Option 1: reported emissions
- Option 2: physical activity-based emissions
- Option 3: economic activity-based emissions

While Options 1 and 2 are based on company-specific reported emissions or primary physical activity data provided by the borrower or investee company or third-party data providers, Option 3 is based on region- or sector-specific average emissions or financial data obtained from public data sources such as statistics or data from other third-party providers.[100]

Options 1 and 2 are preferred over Option 3 from a data quality perspective because they provide more accurate emissions results to a financial institution. Due to data limitations, financial

97 This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.

98 This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third party-auditor. Unverified reported emissions can be calculated by either an external party or by the borrower or investee company itself.

99 Sampling tests based on actual data on the company level extrapolated to the portfolio level can help to test the accuracy of calculations based on this data from statistics or EEIO tables. This may also be used to refine the data for specific sectors or regions if the reporting financial institution has a strong presence in and specific knowledge of the respective sector or region. National agencies and regional data providers or statistical offices in individual regions may assist reporting financial institutions and investee companies in various regions in finding regional and more relevant financial or emissions data information.

100 Option 1 and Option 2 were called "Approach 1: company specific approach" and Option 3 was called "Approach 2: Sector/region average approximation" in the report produced by the PCAF Dutch team: (PCAF, 2019).

institutions might use Options 1 or 2 for certain companies and Option 3 for others. The data quality mix shall be reflected in the average data quality score, as Chapter 6 illustrates.

Table 5-7 provides data quality scores for each of the described options and sub-options (if applicable) that can be used to calculate the financed emissions for business loans and unlisted equity.

Table 5-7. General description of the data quality score table for business loans and unlisted equity[101]

(score 1 = highest data quality; score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Reported emissions**	**1a**	Outstanding amount in the company and total company equity plus debt are known. **Verified emissions** of the company are available.
Score 2		**1b**	Outstanding amount in the company and total company equity plus debt are known. **Unverified emissions** calculated by the company are available.
	Option 2: Physical activity-based emissions	**2a[102]**	Outstanding amount in the company and total company equity plus debt are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data for the company's energy **consumption** and emission factors[103] specific to that primary data. Relevant process emissions are added.
Score 3		**2b**	Outstanding amount in the company and total company equity plus debt are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data for the company's **production** and emission factors specific to that primary data.
Score 4	**Option 3: Economic activity-based emissions**	**3a**	Outstanding amount in the company, total company equity plus debt, and the **company's revenue[104]** are known. Emission factors for the sector per unit of revenue are known (e.g., tCO_2e per euro or dollar of revenue earned in a sector).
Score 5		**3b**	Outstanding amount in the company is known. Emission factors for the sector per unit of asset (e.g., tCO_2e per euro or dollar of asset in a sector) are known.
		3c	Outstanding amount in the company is known. Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro or dollar of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-2). Data for all three options in Table 5-7 can be derived from different data sources.

101 For business loans to listed companies, total company equity and debt is defined as the EVIC of the respective company.

102 The quality scoring for Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

103 Supplier-specific emission factors (e.g., from an electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

104 If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

Data providers (Option 1)

For Option 1 (reported emissions), PCAF recommends either collecting emissions from the borrower or investee company directly (e.g., company sustainability report) or third-party data providers, such as CDP, Bloomberg, MSCI, Sustainalytics, S&P/Trucost, and ISS ESG. Data providers typically make scope 1 and 2 emissions data available. PCAF encourages using the most recent available data and to mention the data source, reporting period, or date of publication.

Data providers collect emissions data as reported by the companies themselves, either through a standardized framework such as CDP or through a company's own disclosures in official filings and environmental reports. They often have their own methodologies to estimate/calculate companies' emissions, especially if emissions are not reported. In this case, the calculation would be in line with Options 2 or 3, assuming the methodology used is in line with the GHG Protocol. Financial institutions should ask data providers to be transparent, disclose the calculation method they use, and confirm alignment with the GHG Protocol. This will enable financial institutions to apply the proper score to the data. PCAF also encourages data providers to apply the PCAF scoring method to their own data, which would allow them to share the data quality scores directly with their clients.

PCAF does not recommend a preferred data vendor. PCAF recommends using data providers that use the standardized CDP framework and suggests data providers disclose the data quality score according to the scoring hierarchy in Table 5-7.[105] When using data providers, PCAF recommends using the same provider due to variability of scope 1 and 2 emissions observed by providers.

Estimation models (Option 2 and 3)

Not all companies disclose their emissions data in official filings or through data providers. Reporting in emerging markets often lags that of developed markets. To maximize the coverage of emissions data, the remaining gaps are often filled with estimates.

For Option 2 (physical activity-based emissions), PCAF recommends using actual energy consumption (e.g., megawatt-hours of natural gas consumed) or production (e.g., tons of steel produced) data reported by companies, given the data fully covers the company's emissions-generating activities. The emission factors expressed per physical activity used should be based on appropriate and verified calculation methodologies or tools issued or approved by a credible independent institution. Example data sources for retrieving emission factors are ecoinvent,[106] Defra,[107] IPCC,[108] GEMIS,[109] and FAO.[110] The most recent available data should be used, including a mention of the data source, reporting period, or publication date.

For Option 3 (economic activity-based emissions), PCAF recommends using official statistical data or acknowledged EEIO tables providing region- or sector-specific average emission factors

105 More information about CDP can found at: https://www.cdp.net/en
106 More information can be found at: https://www.ecoinvent.org/
107 More information can be found at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
108 More information can be found at: https://www.ipcc-nggip.iges.or.jp/EFDB/find_ef.php
109 More information can be found at: http://iinas.org/gemis-download.html
110 More information can be found at: http://www.fao.org/partnerships/leap/database/ghg-crops/en

expressed per economic activity (e.g., tCO_2e/€ or $ of revenue or tCO_2e/€ or $ of sectoral assets). Financial institutions should use emission factors that are as consistent as possible with the primary business activity financed.[111] For example, for a business loan to a paddy rice farmer, the financial institution should seek to find and use a sector-specific average emission factor for the paddy rice sector and not an emission factor for the agricultural sector in general. Example EEIO databases that can be used to obtain such emission factors are EXIOBASE,[112] GTAP,[113] or WIOD.[114]

PCAF's web-based emission factor database provides a large set of emission factors for Option 2 and Option 3 above. The database, which is currently available only to PCAF signatories, can help financial institutions get started with estimating the financed emissions of their investments.

PCAF expects that the financed emissions for most business loans and unlisted equity can be derived through either reported emissions (Option 1), physical activity data (Option 2), or economic activity data (Option 3). However, PCAF allows the use of alternative options to calculate emissions if none of the specified options can be used or in the case that new options are developed. The reporting financial institution shall always explain the reasons for using an alternative option if it deviates from the three options defined above.

Emission removals

Companies in an FI's portfolio should report on emission removals, whether nature- or technology-based,[115] as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance, and emission removals shall be reported separately from both absolute emissions and any carbon credits retired and generated.

Carbon credits generated by companies should be reported and carbon credits retired may be reported. These figures can provide transparency and context for the financed emissions and removals. Ultimately, the goal of the PCAF Financed Emissions Standard is to transparently report the total emissions impacts of lending and investments, not diluted by credits retired or generated.

FIs can calculate attribution of companies' reported emission removals using the existing attribution logic set out in this chapter (see formula below); this same logic applies to any attribution of companies' reported credits retired or generated.

$$\textit{Emission removals} = \frac{\textit{Outstanding investment}_c}{(\textit{EVIC or Total company equity} + \textit{debt})_c} \times \textit{Company emission removals}_c$$

(with c=borrower or investee company)

111 For conglomerates, financed emissions from a mix of activities can be estimated if data (e.g., revenue split) is available. If not, the primary revenue-generating activity should be chosen.

112 More information can be found at: https://www.exiobase.eu

113 More information can be found at: https://www.gtap.agecon.purdue.edu

114 More information can be found at: http://www.wiod.org

115 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. Where necessary, the PCAF Global Standard will be updated in line with the final version of the new GHG Protocol guidance.

Example accounting – a portfolio of different companies

An FI invests into multiple companies with different emissions profiles as illustrated in the following table. All numbers are in tCO_2e for the reporting year 2020 and are dummy data for the purpose of this example.

Table 5-8: Example of data input for calculating a portfolio of different companies

	Scope 1	Scope 2	Scope 3	Emission removals	Carbon credits retired	Carbon credits generated	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 retired by clients is optional.

Table 5-9: Calculation example of a portfolio of different companies

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
Emission removals	20,000 x 10% + 1,000 x 20%	2,200
Carbon credits retired	25,000 x 25% + 5,000 x 20%	7,250
Carbon credits generated	5,000 x 10% + 500 x 20%	600

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits retired may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal")[116] 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 emission removals, for example. Nonetheless, for the purposes of this Financed Emissions Standard, the fundamental requirement is that reporting should at a minimum include separate numbers for absolute emissions and emission removals, in addition to any 'net' numbers.

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

Example tool to calculate emission 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 emission removals. The FRESCOS tool is open for other FIs and interested parties to use.

Limitations

Generalized nature of Option 3

One limitation of Option 3 is the generalized nature and necessary assumptions made in applying region- or sector-specific average values (both for emissions and financial data). This makes calculations less robust and more uncertain than those based on data specific to the borrower or investee, as the data for this option largely depends on assumptions and approximations derived from region and sector averages. In addition, statistical data or acknowledged EEIO tables for a given region need to be critically mapped to the sector classification used by the reporting financial institution, as the sectors may not map one-to-one and may cause financed emissions to be over- or understated in the end.

Measurement inconsistencies

Inconsistencies can arise from measuring part of the portfolio with borrower- or investee-specific emissions data (which may encompass scopes 1, 2, and 3 emissions) and from measuring the other part with region- or sector-specific average emissions data (which often encompasses only scope 1 and 2 emissions). One mitigating factor is that using borrower- or investee-specific emission data could improve the accuracy of the region- or sector-specific average data if the reporting financial institution had enough borrower- or investee-specific data points relative to the size of the portfolio in a given sector. For example, if a majority of the borrowers in a lender's textile manufacturing loan portfolio provide specific emissions data, these averages could be applied (instead of industrywide sector averages) to the remainder of the borrowers in the sector that did not provide specific emissions data.

Timing of emissions

Another limitation of the described options stems from the use of year-end outstanding balances. For a portfolio that includes loans and equity investments to businesses in industries with high seasonal variability or temporal volatility, using year-end outstanding balances may not capture the activity occurring during seasons that do not overlap with the end of the year. Similarly, reporting financial institutions using different fiscal calendars may be less comparable with each other. A solution could be that financial institutions opt to conduct GHG accounting using an average monthly balance for the year instead of a year-end balance. However, this would put more burden on the reporting financial institutions. If financial institutions decide to apply such average monthly balances, they should report these results separately and make the method and assumptions transparent.

Market value fluctuations

When using EVIC as the denominator for business loans to listed companies, assets under management change as a result of fluctuating market prices. Under the influence of this fluctuation, an objective to reduce relative financed emissions (also referred to as emission intensities) by a certain percentage becomes a moving target. Using normalized assets under management may help overcome this, as prices are held constant over the target period. For example, the EU TEG and EU regulation on benchmarks require the application of an inflation correction to changes in EVIC over time.

Applying corrections for market price fluctuations can highly influence the results and heavily reduce the comparability of results between different financial institutions when applied inconsistently. In addition, corrections could theoretically be applied to many other variables (like exchange rates, inflation, emerging versus emerging markets, etc.), further reducing comparability. For that reason, PCAF requires all financial institutions to report their uncorrected absolute emissions as a minimum. Corrected results may optionally be reported separately. If the financial institution decides to apply such adjustments, they should be made transparent. In the future, PCAF will also investigate the challenges linked to steering on financed emissions and describe the metrics in use by investors as emerging practices.

5.3 Project finance

Asset class definition

This asset class includes all on-balance sheet loans or equities to projects or activities that are designated for specific purposes, i.e., with known use of proceeds as defined by the GHG Protocol. The financing is designated for a defined activity or set of activities, such as the construction and operation of a gas-fired power plant, a wind or solar project, or energy efficiency projects. 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.

Emission scopes covered

Financial institutions shall report the absolute scope 1 and 2 emissions of the project. Scope 3 emissions should be covered if relevant.[117] Avoided and removed emissions may be reported if relevant but must be reported separately from absolute emissions.

Attribution of emissions

As a basic attribution principle, the financial institution accounts for a portion of the annual emissions of the financed project. This portion is determined by the attribution factor, which is the ratio between the institution's outstanding amount (numerator) and the total equity and debt of the financed project (denominator).[118]

$$Attribution\ factor_p = \frac{Outstanding\ investment_p}{Total\ equity + debt_p}$$

For equity, the outstanding amount is calculated as follows:

$$\frac{\#shares\ of\ financial\ institution_p}{total\ shares_p} \times total\ equity_p$$

(with p=project)

The outstanding amount in the numerator is the amount of debt or equity provided by the individual financier. In the case of debt, the outstanding amount is defined as the value of the debt the borrower owes to the lender (i.e., disbursed debt minus any repayments[119]). In the case of equity, the outstanding amount is the outstanding value of equity the financial institution holds in the project. It is calculated by multiplying the relative share of the financial institution in the respective project[120] by the total equity of the respective project according to its balance sheet. Guarantees have no attribution until they are called and turned into a loan. Financial institutions should either use the calendar or financial year-end outstanding amount, provided the approach is communicated and used consistently.

117 Examples of projects where scope 3 emissions are relevant include but are not limited to nuclear power plants, hydroelectric power plants, infrastructure projects (airports, highways), and oil and gas exploration.

118 The attribution factor calculation is, in principle, only possible for project finance where project-specific financial data is available. For project finance where such data is unavailable, the attribution factor cannot be calculated but rough estimations on attribution can still be made based on region- and sector-specific average financial data and the outstanding amount. This is explained in more detail in the "Equations to calculate financed emissions" and "Data required" sections below (see Option 3b and Option 3c).

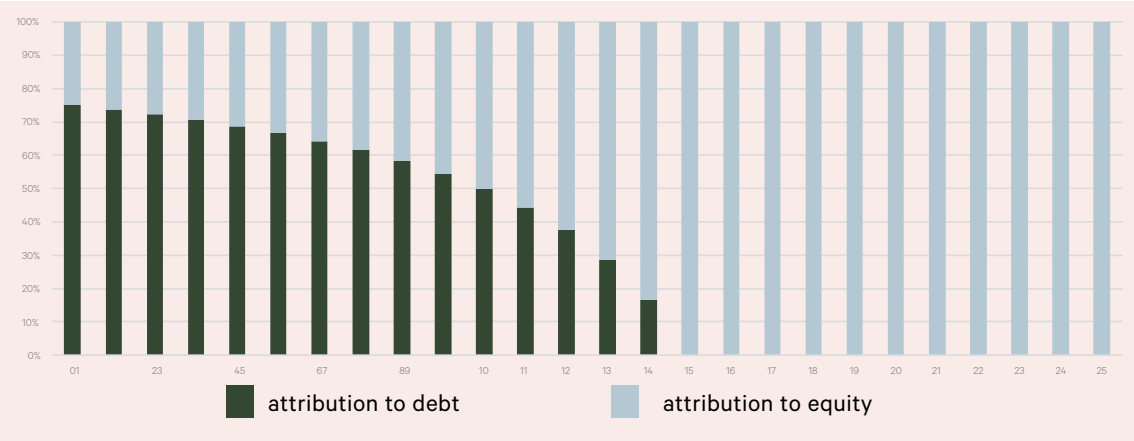
119 It should be emphasized that the outstanding of a debt position does not include interest accrued by the borrower. This value should only represent the amount disbursed by the financial institution minus any repayments on the principal because this more accurately reflects the impact of the loan in the real economy.

120 The relative share of the financial institution in the respective project is calculated by dividing the number of shares the financial institution holds in the respective project by the total number of shares of the investee.

At the start of the project, the total equity[121] and debt[122] in the denominator is the total financing available for the project (total debt plus equity to realize the project).[123] In subsequent years, it is expected that projects will report annually on their financials, including balance sheet information, i.e., the total equity and debt within the project. The value of total equity and debt in the denominator can then be used to calculate the attribution factor.

Figure 5-2 illustrates the attribution rule, where initially most of the emissions or avoided emissions from the project are attributed to debt, but as debt is repaid more and more of the emissions become attributable to the equity providers.

Figure 5-2. Illustration of changes in equity/debt attribution over time



Equations to calculate financed emissions

The financed emissions from a single project are calculated by multiplying the attribution factor by the emissions of the respective project. The total financed emissions from multiple projects are calculated using the following equation:

$$Financed\ emissions = \sum_{p} Attribution\ factor_p \times Project\ emissions_p$$

$(with\ p = project)$

In this asset class, the sum represents all projects in a financial institution's portfolio, and the attribution factor represents the proportional share of a given project—that is, the ratio of the outstanding amount to total equity and debt:

121 In cases where the total project equity value according to the project's balance sheet is negative, the financial institution shall set total equity to 0; this means that all emissions are attributed to debt only, while no emissions are attributed to equity investments. This 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 project. By this approach, for those projects that are doing well (i.e., they have high retained earnings), financial institutions attribute more emissions to equity providers; for those projects doing poorly (i.e., they have high retained losses), financial institutions attribute more emissions to debt providers. This is in line with the attribution factor rationale for listed companies, where the equity part of EVIC (i.e., market capitalization) also implicitly reflects retained earnings and losses (e.g., if retained earnings increase, the share price and market capitalization generally also increase).

122 Total debt includes both current and long-term debt on the balance sheet.

123 If total debt or total equity cannot be obtained from a project's balance sheet for whatever reason (e.g., for some it might be difficult to obtain these values), financial institutions are allowed to fall back to the total balance sheet value (i.e., the sum of total equity and liabilities, which is equal to the project's total assets) with the intention of improving this data quality in the future.

$$Financed\ emissions = \sum_{p} \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Project\ emissions_p$$

$(with\ p = project)$

Overall, PCAF distinguishes three different options to calculate project emissions depending on the availability of project-specific data:

- **Option 1: reported emissions**, where verified[124] or unverified[125] emissions are collected from the project directly or indirectly through independent third parties.
- **Option 2: physical activity-based emissions**, where emissions are estimated based on primary physical activity data collected from the project (e.g., fuel consumed or megawatt-hours of electricity produced). The emissions data should be estimated using an appropriate calculation methodology or tool with verified emission factors expressed per physical activity (e.g., tCO_2e/MWh) issued or approved by a credible independent body such as the International Energy Agency (IEA).
- **Option 3: economic activity-based emissions**, where emissions are estimated based on economic activity data collected from the project (e.g., revenue or assets). The emissions data should be estimated using official statistical data or acknowledged EEIO tables providing region- or sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/€ of revenue or tCO_2e/€ of asset).[126]

Data required

Within the due diligence and monitoring of a project finance transaction, the availability and quality of project-specific data is generally good. Project-specific reported emissions (Option 1) ranks highest in quality and consistency but will not always be available. Physical activity-based data (Option 2) such as megawatt-hours produced is generally available from a previous year or as an estimate (e.g., P50 estimations for renewable energy projects).[127] The lowest data quality applies when there is no project-specific physical data and only financial data is available (Option 3).

The data quality scorecard in Table 5-10 is recommended for project finance. Financial institutions can refine or further specify this generic data quality table per project type, as long as these refined data quality tables are disclosed transparently.

124 This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.

125 This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third-party auditor. Unverified reported emissions can be calculated by either an external party or by the borrower or investee itself.

126 Sampling tests based on actual data on the company level extrapolated to the portfolio level can help to test the accuracy of calculations based on this data from statistics or EEIO tables. This may also be used to refine the data for specific sectors or regions if the reporting financial institution has a strong presence in and specific knowledge of the respective sector or region. National agencies and regional data providers or statistical offices in individual regions may assist reporting financial institutions and borrower or investee companies in various regions in finding regional and more relevant financial or emissions data information.

127 For renewable energy projects it is customary to have experts calculate percentile production predictions based on an analysis of historic data resource data (wind, irradiation, hydraulic flow, etc.). The P50 value is the predicted annual production for which there is a 50% probability it will be exceeded in a given year. The P90 value is the predicted value that has a 90% probability of being exceeded in a given year (the 1-year P90) or of being exceeded in an average year over a 10-year period (the 10-year P90). PCAF proposes using the P50 predicted production.

Table 5-10. General description of the data quality score table for project finance

(score 1 = highest data quality; score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Reported emissions**	**1a**	Outstanding amount in the project and total project equity plus debt are known. **Verified emissions** of the project are available.
Score 2		**1b**	Outstanding amount in the project and total project equity plus debt are known. **Unverified emissions reported** by the project are available.
	Option 2: Physical activity-based emissions	**2a**[128]	Outstanding amount in the project and total project equity plus debt are known. Project emissions are not known but calculated using primary physical activity data for the project's energy **consumption** and emission factors[129] specific to that primary data. Relevant process emissions are added.
Score 3		**2b**	Outstanding amount in the project and total project equity plus debt are known. Project emissions are not known. Emissions are calculated using primary physical activity data for the project's **production**[130] and emission factors specific to that primary data.
Score 4	**Option 3: Economic activity-based emissions**	**3a**	Outstanding amount in the project, total project equity plus debt, and the **project's revenue**[131] are known. Emission factors for the sector per unit of revenue or from similar projects is known (e.g., tCO_2e per euro or dollar of revenue earned in a sector).
Score 5		**3b**	Outstanding amount in the project is known. Emission factors for the sector per unit of asset or economic activity-based emission factors from similar projects (e.g., tCO_2e per euro or dollar of asset in a sector) are known.
		3c	Outstanding amount in the project is known. Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro or dollar of revenue earned in a sector) and **asset turnover ratios** for the sector or from similar projects are known.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-3).

PCAF expects that the financed emissions for most projects can be derived through either reported emissions (Option 1), physical activity data (Option 2), or economic activity data (Option 3).

128 The quality scoring for Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

129 Supplier-specific emission factors (e.g., from an electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

130 Production can refer to both the production of physical outputs such as steel as well as the production of electricity.

131 If revenue is not deemed a suitable financial indicator for estimating the emissions of a project, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

Avoided emissions

Avoided emissions related to renewable power projects are the reduction in emissions of the financed project compared to what would have been emitted in the absence of the project (the baseline emissions). They are calculated based on the GHG Protocol for Project Finance and are a separate category compared to the calculation of absolute emissions based on the GHG Protocol for Corporate Accounting.

Calculating the annual avoided emissions from a financial institution's renewable power project portfolio at a fixed point in time and in line with the financial reporting cycle is a complex process. The (estimated) annual power production of these projects over the reporting period must be compared with the power mix per country over the same period. In this comparison, it is assumed that the production of renewable power (over the reporting period) might have avoided the need to run certain fossil fuel power plants.

The power mix and associated grid emission factors can be derived using various approaches and assumptions, as illustrated in Table 5-11.

Table 5-11. Emission factors per type of power mix

Preferred options	Type of mix	Description of emission factors
1	Operating margin[132]	The operating margin, represents the marginal generating capacity in the existing dispatch hierarchy in a country/region that will most likely be displaced (i.e., the generation from the power plants with the highest variable operating costs in the economic merit order dispatch of the electricity system).
2	Fossil fuel mix traded	Emission factors based on the emissions of all fossil fuel power (including or excluding nuclear) traded (i.e., produced and imported minus exported) in a country or region.
3	Fossil fuel mix produced	Emission factors based on the emissions of all fossil fuel power (including or excluding nuclear) produced in a country or region.
4	Average electricity mix	Emission factors based on 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 emission factors (e.g., International Energy Agency (IEA), US Environmental Protection Agency (EPA), European Environment Agency (EEA)).

PCAF prefers to use the operating margin emission factor for the accounting of the avoided emissions of renewable power project portfolios over the reporting period. The International Finance Institution (IFI)-harmonized GHG accounting standards and approaches calculated these operating margin emission factors for various countries using the methodology published by the IFI Technical Working Group on Greenhouse Gas Accounting.[133]

132 The operating margin is a term defined under the UNFCCC Clean Development Mechanism for grid-connected electricity generation from renewable sources and represents the cohort of existing power plants whose operation will be most affected (reduced) by the project.

133 (IFI, 2020)

If the operating margin is not available, financial institutions 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 IFI methodology but also allows the inclusion of nuclear as most data sources include nuclear power under the fossil fuel mix.

Emission removals

Emission removals can be relevant for project finance. Sequestered emissions (which is one form of emission removals) account for carbon sinks where carbon is absorbed from the atmosphere.

Projects in an FI's portfolio should report on emission removals, whether nature- or technology based,[134] as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance, and emission removals shall be reported separately from both absolute emissions and any carbon credits retired and generated.

Carbon credits generated by projects should be reported and carbon credits retired may be reported. These figures can provide transparency and context for the financed emissions and removals. Ultimately, the goal of the PCAF Financed Emissions Standard is to transparently report the total emissions impacts of lending and investments, not diluted by credits retired or generated.

FIs can calculate attribution of projects' reported emission removals using the existing attribution set out in this chapter (see formula below); this same logic applies to any attribution of projects' reported credits retired or generated.

$$\textit{Emission removals} = \sum_{p} \frac{\textit{Outstanding investment}_p}{\textit{Total project equity+debt}_p} \times \textit{Project emission removals}_p$$

(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 tCO_2e for the reporting year 2020 and are dummy data for the purpose of this example.

Table 5-12: Example of data input for calculating a portfolio of different companies

	Scope 1	Scope 2	Scope 3	Emission removals	Carbon credits retired	Carbon credits generated	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%

134 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. Where necessary, the PCAF Global Standard will be updated in line with the final version of the new GHG Protocol guidance.

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 power 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 retired by clients is optional.

Table 5-13: Calculation example of a portfolio of different companies

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
Emission removals	20,000 x 10% + 1,000 x 20%	2,200
Carbon credits retired	25,000 x 25% + 5,000 x 20%	7,250
Carbon credits generated	5,000 x 10% + 500 x 20%	600

FIs may further subdivide these overall reporting categories into subcategories. For example, carbon credits retired may be further reported separately by specific type of credit (e.g., emissions "avoidance" versus "removal")[135] 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 emission removals, for example. Nonetheless, for the purposes of this Financed Emissions Standard, the fundamental requirement is that reporting should at a minimum include separate numbers for absolute emissions and emission removals, in addition to any 'net' numbers.

Example tool to calculate emission 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 emission removals. The FRESCOS tool is open for other FIs and interested parties to use.

Lifetime emissions

Portfolio accounting of emissions occurring in the reporting year does not consider lifetime emissions insofar as these emissions happen before or after the reporting year. For example, emissions related to future disposal of a wind park are not reported in the current reporting year.

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

Nevertheless, this principle is problematic for construction projects. For example, in the case of a gas-fired power plant, construction emissions would be accounted during the construction phase and operational emissions during the operational phase. However, if the loan is repaid shortly after operation starts, the portfolio emissions for that investment would only reflect a small portion of the total emissions impact created during the lifetime of that gas-fired power plant.

As the power plant is often constructed by a third party (i.e., a construction company) contracted by the project developer, the emissions of the construction and purchased goods and services are normally reported under scope 3 of the project developer. These scope 3 emissions are usually not significant enough to report or they might be unavailable, in which case no emissions will be reported. When these scope 3 emissions are relevant, they should be reported.

To address the above, a financial institution should, if they are an initial sponsor or lender, assess the total projected lifetime scope 1 and 2 emissions for projects that were financed during the reporting year. Those emissions should be reported separately in the year of contracting. If a financial institution would be an initial lender for the above example of a gas-fired power plant, it should report in the year of contracting the total projected lifetime scope 1 and 2 emissions based on the installed capacity of the plant, the expected load factor of the plant, the expected lifetime of the plant, and the expected carbon content of the gas used.

Portfolio vs. (annualized) lifetime emissions

Various (multilateral) development banks have been working on harmonizing GHG accounting of new projects under the IFI Framework for a Harmonized Approach to Greenhouse Gas Accounting.[136] These financial institutions developed a methodology to calculate the expected emissions of newly signed contracts for specific projects in the reporting year.[137] In the IFI methodology, avoided emissions are assessed using emission factors (called combined margin) that incorporate future greening of the electricity grid. These avoided emissions are annualized and reported in the year of loan/equity origination.

Unlike the IFI methodology, PCAF's portfolio GHG accounting involves calculating the annual emissions linked to the financial institution's balance sheet and using emission factors (operating margin) that are based on the existing fossil fuel power plants in a country or region whose operation will be most affected (reduced) by the project.

PCAF considers portfolio and (annualized) lifetime GHG accounting to be complementary. Portfolio GHG accounting better lends itself to target setting compared to a global carbon budget, whereas (annualized) lifetime GHG accounting can be used to reflect the generated emissions or avoided emissions over the operational lifetime. Portfolio GHG accounting is more suited to guide strategic developments on a portfolio level, while lifetime GHG accounting can be used to make investment-level decisions (e.g., to avoid investments with carbon lock-in).

136 (UNFCCC, 2015). Additional information can be found at: https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting

137 The emission factors can be found at: https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-methodologies

5.4 Commercial real estate

Asset class definition

This asset class includes on-balance sheet loans for specific corporate purposes, namely the purchase and refinance of commercial real estate (CRE), and on-balance sheet investments in CRE when the financial institution has no operational control over the property. This definition implies that the property is used for commercial purposes, such as retail, hotels, office space, industrial, or large multifamily rentals. In all cases, the owner of the building uses the property to conduct income-generating activities.

In case of no operational control, CRE investments by asset owners are also included in this method. These investments consist of deals where the asset owner partially owns the building in a joint venture, joint operation, or in joint ownership, but doesn't have the full authority to introduce and implement operating policies at the property.

CRE investments listed in the stock market are classified as listed equity. In this case, financial institutions shall use the method for listed equity (subchapter 5.1).

Loans secured by CRE for other purposes than CRE and loans to CRE companies that are unsecured are classified as business loans if the loans are for general corporate purposes (i.e., with unknown use of proceeds as defined by the GHG Protocol). In these cases, financial institutions shall use the method for business loans (subchapter 5.2).

Loans for construction and renovation of CRE are optional. As the building is often constructed by a third party (i.e., a construction company) contracted by the project developer, the emissions of the construction are normally reported under scope 3 of the project developer during the building's construction phase. As such, it can be impractical for the lender to measure the financed emissions of a construction or renovation loan unless the project developer reports construction emissions. The following section on emission scopes covered provides further explanation.

Emission scopes covered

For property already built, financial institutions shall cover the absolute scope 1 and 2 emissions related to the energy use of financed buildings during their operation. Energy use includes the energy consumed by the building's occupant and shared facilities.

Reporting financed emissions from construction or renovation of buildings is optional. When measuring these emissions, financial institutions should refer to the GHG Protocol's guidance to account for construction emissions.[138] If the property developer is a company that measures and reports construction emissions, financial institutions should account for the related financed emissions during the building's construction phase. If the property developer does not measure and report construction emissions, financial institutions should engage with the property developer to encourage the practice of measuring and reporting these emissions.

While reporting financed construction emissions is not yet required, PCAF acknowledges that

138 (ENCORD, 2012)

construction emissions, notably building's embodied GHG emissions, are important and should not be neglected. PCAF will continue to monitor guidance developments[139] on the subject. When robust approaches and data to measure the embodied emissions of buildings are available, PCAF could expand its coverage to include these emissions.

Attribution of emissions

When calculating the financed emissions, a building's annual emissions are attributed based on the ratio between the outstanding amount and the property value at the time of loan or equity origination. This ratio is called the attribution factor:

$$Attribution\ factor_b = \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b}$$

$$(with\ b = building)$$

For loan providers, the numerator is the outstanding loan amount,[140] whereas for investors, it is the outstanding investment amount. In both cases, the outstanding amount is the value of the loan or investment on the financial institution's balance sheet.

When the property value at loan or equity origination is not feasible to obtain, financial institutions shall use the latest property value available and fix this value for the following years of GHG accounting, i.e., the denominator remains constant from the first year of GHG accounting onward.[141] The property value should include the value of the land, the building, and any building improvements. When a CRE loan is modified (e.g., loan amount is increased, renewed, refinanced, or extended) and a new property value is obtained as part of the transaction, the property value at origination shall be updated to the property value at the time of the modification.

When asset owners invest in CRE, they either fully finance the property or partially finance it through joint ventures, joint operation, or in joint ownership with other asset owners. When CRE is fully financed by an asset owner and the asset owner doesn't have operational control over the building, 100% of the building's emissions are attributed to the asset owner's financed emissions. When CRE is jointly financed by a group of asset owners, the attribution is based on the share invested by each asset owner.

139 For example, the World Business Council for Sustainable Development (WBCSD) is working on creating an approach for the embedded carbon of constructions. At this point, they are defining a theoretical approach with a working group consisting of real estate developers, building material producers, construction companies, and technical consultants. The key in this approach is to use a life cycle assessment to obtain average values of embedded carbon per square meter of building, which will differ per climate zone and building typology.

140 For loan providers, the outstanding amount in the numerator is defined as the value of the debt that the borrower owes to the lender (i.e., disbursed debt minus any repayments). It will be adjusted annually to reflect the correct exposure, resulting in the attribution to decline to 0 at the end of the lifetime of the loan (i.e., when it is fully repaid).

141 Availability of property value at origination varies by country. In some countries, financial institutions can easily retrieve the property value at origination from their books and do not typically update it to the current property value. In other countries, regulators require financial institutions to update the property value year over year.

Equations to calculate financed emissions

Financed emissions of a CRE loan or investment are calculated by multiplying the attribution factor by the emissions of the building. Thus, financed emissions are calculated as follows:

$$Financed\ emissions = \sum_{b} Attribution\ factor_b \times Building\ emissions_b$$

$$(with\ b = building)$$

The emissions of buildings are calculated as the product of a building's energy consumption and specific emission factors for each source of energy consumed. The total energy use of the building includes the energy consumed by the occupants of the building.

$$Financed\ emissions = \sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Energy\ consumption_{b,e} \times Emission\ factor_e$$

$$(with\ b = building\ and\ e = energy\ source)$$

Data required

Actual building energy consumption is preferred but may not be widely available. In the absence of metered data, energy use can be estimated based on building characteristics and publicly available data.

Various sources and commercial databases are available and divide energy consumption by characteristics like energy label, type of property, and floor area of property. When applying these data on a large sample of financed properties, it is possible to get a reasonable approximation of the emissions. Similarly, supplier-specific emission factors[142] for specific energy sources should be used if they are available. If they are not, average emission factors[143] may be used. PCAF's web-based emission factor database provides emission factors by building type, floor area, and number of buildings for a large set of geographies. In March 2022, PCAF also launched a publicly available database of emission factors for European buildings as part of its project, Financing towards net-zero buildings.

To improve building energy use estimation, financial institutions should collect data on building characteristics (e.g., size, building use, climate zone, and year constructed). Based on the data available, the following data hierarchy is proposed in order of preference:

142 In the case of electricity, supplier-specific emission factors are the same as market-based emission factors.

143 In the case of electricity, average emission factors, which are non-supplier-specific emission factors, are the same as location-based emission factors.

Table 5-14. General description of the data quality score table for CRE

(score 1 = highest data quality; score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Actual building emissions**	**1a**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **supplier-specific emission factors**[144] specific to the respective energy source.
Score 2		**1b**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **average emission factors** specific to the respective energy source.
Score 3	**Option 2: Estimated building emissions based on floor area**	**2a**	**Estimated building energy consumption per floor area based on official building energy labels AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 4		**2b**	**Estimated building energy consumption per floor area based on building type and location-specific statistical data AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 5	**Option 3: Estimated building emissions based on number of buildings**	**3**	**Estimated building energy consumption per building based on building type and location-specific statistical data AND the number of buildings** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-4).

Other considerations

Emission factors specific to energy source

Consumed energy can be converted to CO_2e using emission factors. When converting building energy use to emissions, care should be taken to use emission factors that are appropriate to the energy type used in the building, e.g., electricity, natural gas, fuel oil, steam, etc. These factors should be specified according to the type of energy consumed.

144 Supplier-specific emission factor is an emission rate provided by the energy supplier (e.g., utility) to its customers reflecting the emissions associated with the energy it provides (e.g., electricity, gas, etc.). Average emission factors represent the average emissions of the respective energy sources occurring in a defined boundary (e.g., national or subnational).

Building characteristics

Various building characteristics can be taken into consideration to provide additional resolution to average energy consumption and emissions when actual data is unavailable. Many countries conduct surveys to publicly provide building type and location-specific statistical data on average energy consumption by characteristics such as floor space,[145] principal building activity, region, number of floors, and year constructed. Other national surveys might provide tables on emissions and energy source or end use by industry and region.

Where possible, the most common regional electricity grid mix data for the building's location should be used. If this is unavailable, country-level electricity grid mix emissions data should be used.

Limitations

Country-specific assumptions

Many countries lack widespread use of building energy labels, and it may be challenging for financial institutions to access a borrower's measured energy consumption data. As such, limited actual data will require financial institutions to estimate building energy use. Institutions may find that the data they have available in the existing portfolio requires using average values. Collecting additional building data at loan or investment origination may improve future estimations of energy use. Some municipal governments are collecting building energy data, and this could prove useful for some financial institutions.

Some country-specific adjustments will need to be made to make the calculation applicable depending on the data availability and standards in each country. The variations across countries in their systems of categorizing the energy efficiency of buildings require a tailored approach for optimal accuracy in calculations.

Property value

This Financed Emissions Standard requires financial institutions to use the property values determined at loan or equity origination in relation to the original value of the property. Thus, using the outstanding amount to the original value provides a consistent estimate of the proportion of the project attributable to the loan and investment. Nevertheless, PCAF recognizes that the availability of property value at loan or equity origination varies globally. In some countries, financial institutions can easily retrieve the property value at origination from their books and do not typically update it on an annual basis. In other countries, regulators require financial institutions to update property values annually.

Considering these differences, and to ensure as much consistency as possible in the calculations, when financial institutions do not have the property value at origination, they shall use the latest property value available. In addition, they shall fix this value for the following years of GHG accounting, i.e., the denominator remains constant from the first year of GHG accounting onward.

The property value includes the value of the land, the building, and any building improvements.

145 When selecting an emission factor based on floor space, financial institutions should make sure that the unit of the emission factor matches the type of floor area, e.g., net floor area, usable floor, etc.

5.5 Mortgages

Asset class definition

This asset class includes on-balance sheet loans for specific consumer purposes—namely the purchase and refinance of residential property, including individual homes and multifamily housing with a small number of units. This definition implies that the property is used only for residential purposes and not for commercial activities.

If the loan is used to refinance a mortgage and this loan is provided by the original mortgage provider, the new loan supersedes the original mortgage. If the refinancing is done by an institution other than the original loan provider, the new loan and associated building's emissions are attributed to the institution providing the loan for refinancing.

Home equity loans (HELs) and home equity lines of credit (HELOCs) are not required under this methodology given that these products are generally consumer loans for general consumer purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol.[146]

Mortgages used to construct or renovate a house are not required at this point given that the homeowner does not directly account for construction emissions. As a home is often constructed or renovated by a third party (i.e., a home builder) contracted by the homeowner, the emissions of the construction would normally be accounted by the third party during the building's construction phase.[147]

Nevertheless, PCAF acknowledges that construction emissions, notably building's embodied GHG emissions, are important and should not be neglected. PCAF recommends financial institutions to find opportunities in the due diligence process to influence the homeowner into making low-carbon choices. PCAF will continue to monitor guidance developments[148] on the subject. When robust approaches and data to measure the embodied emissions of buildings are available, PCAF could expand its coverage to include these emissions.

Emission scopes covered

Financial institutions shall cover the absolute scope 1 and 2 emissions related to the energy use of the property financed through the mortgage. Energy use includes the energy consumed by the building occupants. If the mortgage is used to purchase a multifamily home with shared facilities, scope 1 and 2 emissions of the whole property should be covered. If the mortgage is used to buy a single apartment or house, emissions related to the apartment or house should be covered.

146 If the consumer loan is to purchase motor vehicles, financial institutions shall use the motor vehicle loans asset class method (subchapter 5.6).

147 Theoretically, these emissions would be categorized under scope 3 of the homeowner, but in practice homeowners do not report emissions; thus, it is impractical for financial institutions to measure financed emissions of a construction or renovation mortgage.

148 For example, the WBCSD is working on creating an approach for the embedded carbon of constructions. At this point, they are defining a theoretical approach with a working group consisting of real estate developers, building material producers, construction companies, and technical consultants. The key in this approach is to use a life cycle assessment to obtain average values of embedded carbon per square meter of building, which will differ per climate zone and building typology

Attribution of emissions

When calculating financed emissions, a building's annual emissions are attributed to the mortgage provider using a loan-to-value approach. Thus, the attribution is equal to the ratio of the outstanding amount at the time of GHG accounting to the property value at the time of loan origination.

$$Attribution\ factor_b = \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b}$$

$(with\ b = building)$

When the property value at loan origination is not feasible to obtain, financial institutions shall use the latest property value available and fix this value for the following years of GHG accounting, i.e., the denominator remains constant.[149]

The attribution approach assumes the residential property owner also takes ownership of the building's emissions.

Equations to calculate financed emissions

Financed emissions of mortgages are calculated by multiplying the attribution factor by the emissions of the building. Thus, financed emissions are calculated as follows:

$$Financed\ emissions = \sum_b Attribution\ factor_b \times\ Building\ emissions_b$$

$(with\ b = building)$

The emissions of buildings are calculated as the product of a building's energy consumption and specific emission factors for each source of energy consumed. The total energy use of the building includes the energy consumed by the building's occupant. The equation below is the result.

$$Financed\ emissions = \sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Energy\ consumption_{b,e} \times Emission\ factor_e$$

$(with\ b = building\ and\ e = energy\ source\ )$

149 Availability of property value at loan origination varies by country. In some countries, financial institutions can easily retrieve the property value at loan origination from their books and do not typically update it to the current property value. In other countries, regulators require financial institutions to update the property value year over year..

Data required

The availability of data on the energy consumption of properties is still limited in many countries; in others, it has improved considerably due to policy regulations within the built environment, such as the introduction of energy performance certificates and energy labels. In such countries, the available data is usually anonymized by averaging data over several households in the same peer group. Often, buildings' energy data is available by energy label, type of household or sector, and type of property. When applying these data on many financed properties, it is possible to get a reasonable approximation of the emissions.

As more data sources become available, financial institutions are expected to move up the data hierarchy. Easily accessible data for many countries is currently between score 4 and 5 of the data quality score table provided below.

Some financial institutions may not collect information on property size, in which case they can use the average energy consumption by building and geographic region. Financial institutions should use the highest quality dataset available and evaluate new data sources on a regular basis.

Supplier-specific emission factors[150] for specific energy sources should be used if they are available. If they are not, average emission factors[151] may be used. PCAF's web-based emission factor database[152] provides emission factors by building type (e.g., single-family house and multifamily house), floor area, and number of buildings for a large set of geographies.

150 In the case of electricity, supplier-specific emission factors are the same as market-based emission factors.

151 In the case of electricity, average emission factors, which are non-supplier-specific emission factors, are the same as location-based emission factors.

152 The PCAF web-based emission factor database is currently only available to financial institutions that have committed to PCAF.

The following data hierarchy is proposed in order of preference:

Table 5-15. General description of the data quality score table for mortgages

(score 1 = highest data quality; score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Actual building emissions**	**1a**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **supplier-specific emission factors**[153] specific to the respective energy source.
Score 2		**1b**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **average emission factors** specific to the respective energy source.
Score 3	**Option 2: Estimated building emissions based on floor area**	**2a**	**Estimated building energy consumption per floor area based on official building energy labels AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 4		**2b**	**Estimated building energy consumption per floor area based on building type and location-specific statistical data AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 5	**Option 3: Estimated building emissions based on number of buildings**	**3**	**Estimated building energy consumption per building based on building type and location-specific statistical data AND the number of buildings** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-5).

Financial institutions should work with actual data on the energy consumption of properties, if available. The consumed energy at the household level (e.g., gas, electricity, heating oil, wood, etc.) can be converted to CO_2e-emissions using supplier-specific emission factors or average emission factors if no emissions data is provided in the chosen data sources. Some data sources report only energy use whereas others report CO_2e emissions.

As an intermediate step, financial institutions could start collecting building size data, in addition to geographic location and building type, and energy labels, where available, to more accurately capture the financed emissions of their mortgages.

153 Supplier-specific emission factor is an emission rate provided by the energy supplier (e.g., utility) to its customers reflecting the emissions associated with the energy it provides (e.g., electricity, gas, etc.). Average emission factors represent the average emissions of the respective energy sources occurring in a defined boundary (e.g., national or subnational).

Other considerations

Obtaining data on energy consumption

Actual energy consumption data specific to a certain mortgage portfolio is preferred because this will be more accurate than working with average energy consumption data. In some markets with clear government partnerships on climate action, financial institutions might attempt to work at the policy level to obtain actual data directly from grid operators or government agencies. For example, in 2020 seven Dutch financial institutions in PCAF collaborated with the Dutch Central Bureau of Statistics to measure the emissions of their mortgage portfolios.

Almost all grids are reducing their emissions over time, resulting in gradually reduced emissions for mortgage portfolios. Where possible, the most common regional electricity grid mix data for the building's location should be used; if unavailable, country-level electricity grid mix emissions data should be used. If actual consumption data is unavailable, financial institutions should start collecting building size, geographic location, and building type data to more accurately capture the associated emissions of their mortgages.

If actual energy consumption data is used, it may be unclear if all the energy consumption is applicable solely for the house or, for instance, also for an electric vehicle (EV). If possible, the actual energy consumption data can be further disaggregated to differentiate the electricity used in the home from the electricity used for charging the vehicle.

Off-balance mortgages and subsidiaries

The scope of this methodology is on-balance sheet mortgages. Off-balance sheet mortgages are not included. If relevant and substantial, off-balance sheet mortgages can be reported separately.

Distinguishing between private and corporate mortgages

No distinction is made between private or corporate mortgages.

Improving a home's energy performance

The attribution approach assumes the residential property owner also takes ownership of the building's emissions. During the mortgage period, financial institutions may have the opportunity to work with the property owner to lower the building emissions by offering additional financial services that are used to improve the energy performance of the building. Green mortgages, low carbon mortgages, or energy efficient mortgages are some of the existing products in various markets around the globe.

Limitations

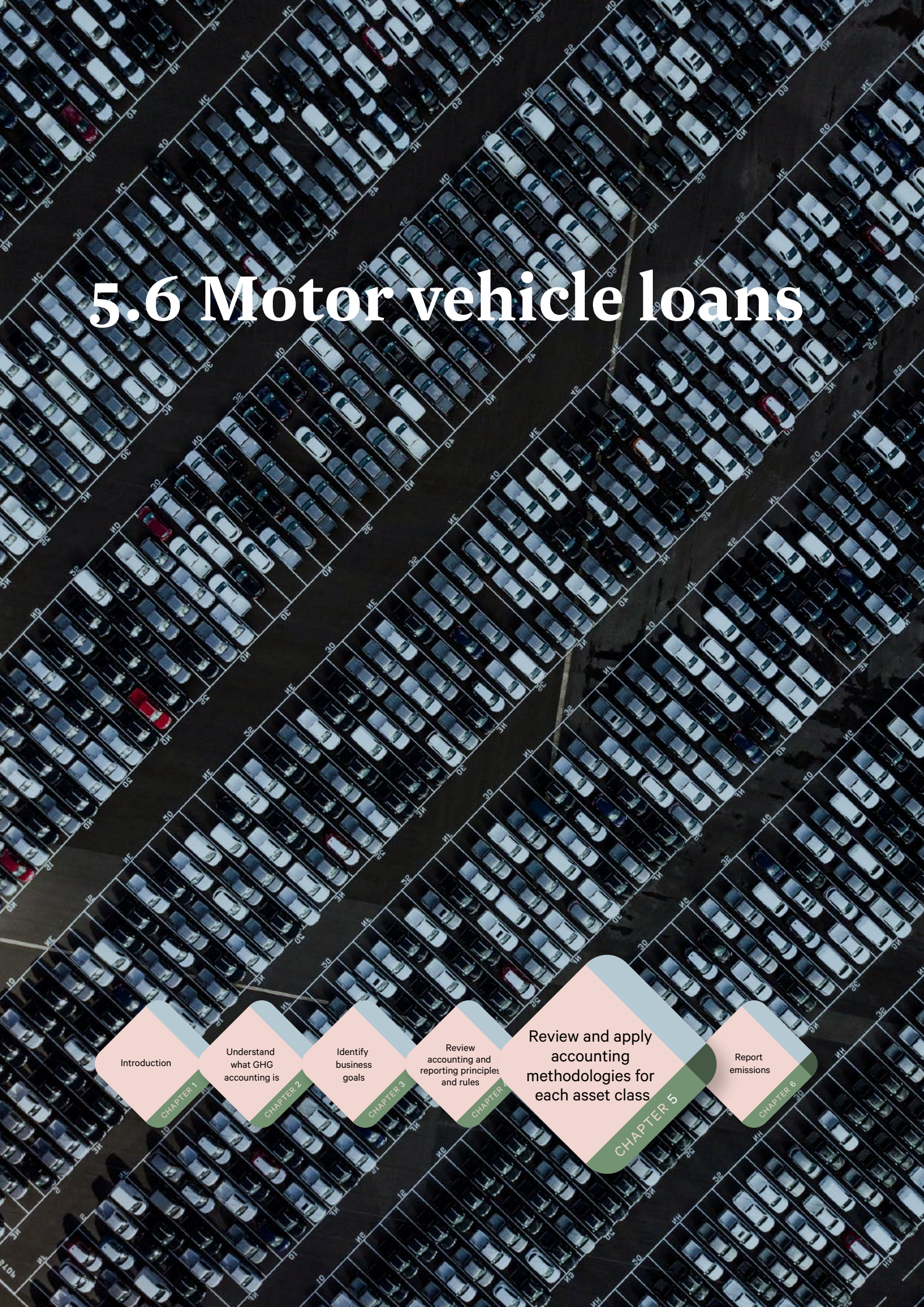
Results depend on data quality

Many assumptions must be made to calculate the emissions of mortgages as data is often difficult to retrieve for privacy reasons. Even though the calculation method does not differ greatly, the data sources used can yield different results—for instance, when average consumption data is replaced by actual consumption data from grid operators.

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. The variations across countries in their systems of categorizing the energy efficiency of houses require a tailored approach for optimal accuracy in calculations.

5.6 Motor vehicle loans



Asset class definition

This asset class refers to on-balance sheet loans and lines of credit to businesses and consumers for specific (corporate or consumer) purposes - namely the finance of one or several[154] motor vehicles.

Financial institutions will finance different vehicle types and will also use different internal definitions and categories for the motor vehicle types being financed by their investments. For example, one financial institution may have a portfolio mainly of passenger cars and motorcycles, while another financial institution may have a strong share of buses and heavy-duty trucks.

This methodology does not prescribe a specific list of vehicle types falling within this asset class. Instead, it leaves it open for financial institutions to decide and define what vehicle types to include in their inventory of financed emissions. It is the responsibility of each financial institution to define the vehicle types included in their respective inventories of financed emissions and, in the case of leaving a specific vehicle type out of the GHG accounting exercise, to provide a transparent explanation of why a vehicle type is excluded.

The following non-exhaustive list provides examples of the vehicle types that may fall under the asset class of motor vehicle loans:

- Passenger car
- Motorcycle
- Light commercial truck (e.g., vans)
- Medium/heavy commercial truck
- Recreational vehicles
- Bus
- Snowmobiles/all-terrain vehicles
- Boats, including outboard motors[155]
- Yellow equipment (i.e., earth-moving vehicles for mining and construction)

Financial institutions typically finance motor vehicle loans through consumer lending or business lending. Consumer lending for motor vehicles includes financing the purchase of a motor vehicle for a private person, whereas business loans for motor vehicles typically includes financing a fleet of motor vehicles for a business.[156]

154 A single loan might cover the purchase of several vehicles or fleets. In any case, the methodology presented in this chapter should be used.

155 Depending on the portfolio of some financial institutions, it may be appropriate to differentiate between the vehicle and the propulsion system of that vehicle. In this case, it is possible to apply the methodology for the vehicle as a whole but also to the propulsion system on its own. An example of this are financial institutions that have boats on their portfolio. In this case, it is common to have loans for boats and also loans for outboard motors alone.

156 Note that the term “fleet” does not necessarily refer to multiple vehicles only. It can also refer to a single business vehicle.

Emission scopes covered

Financial institutions shall calculate and report the annual scope 1 and scope 2 emissions of the vehicles being financed:

- Scope 1: Direct emissions from fuel combustion in vehicles
- Scope 2: Indirect emissions from electricity generation consumed in EVs (hybrid and fully EVs)

Scope 3 emissions related to the production of vehicles, delivery of vehicles to buyers, or decommissioning of vehicles after use do not need to be covered because these emissions are difficult to obtain and can be considered rather marginal. However, if a financial institution seeks to account for the production emissions of new vehicles (i.e., embodied emissions), they should report the emissions as follows:

- In the initial financing year, the financial institution shall report the production emissions of the respective vehicle as a lump sum under scope 3 emissions, while the operation emissions in the respective year shall be reported under scope 1 or 2 emissions.
- In the following financing years, the financial institution shall not report any production emissions of the respective vehicle; they shall only report the operation emissions under scope 1 or 2 emissions.

This approach on scope 3 emissions only holds for new vehicles, not used vehicles.

Attribution of emissions

As a basic attribution principle, the financial institution accounts for a portion of the borrower's annual motor vehicle emissions as determined by the ratio between the outstanding amount (numerator) and the value of the motor vehicle at loan origination (denominator). This ratio is called the attribution factor:

1. **Outstanding amount (numerator)**: This is the actual outstanding motor vehicle loan amount, defined as the value of the debt that the debtor owes to the creditor. It will be adjusted annually to reflect the correct exposure, resulting in the attribution to decline to 0 at the end of the lifetime of the loan (i.e., when it is fully repaid). Financial institutions should either use the calendar or financial year-end outstanding loan, provided the approach is communicated and used consistently.

2. **Total value at origination (denominator)**: This is the total value of the motor vehicle at loan origination, which corresponds to the price of the vehicle at the time of the transaction, i.e., equity plus debt at origination.

$$Attribution\ factor_v = \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v}$$

$$(with\ v = vehicle\ or\ vehicle\ fleet)$$

If the total value of the motor vehicle at origination (i.e., the denominator) is unknown, financial institutions should take a conservative approach and assume 100% attribution. As soon as the motor vehicle loan is repaid, the financed emissions associated to that loan are equal to 0.

Equations to calculate financed emissions

The financed emissions from a motor vehicle loan are calculated by multiplying the attribution factor by the emissions of the motor vehicle. The total financed emissions from multiple motor vehicle loans are calculated as follows:

$$Financed\ emissions = \sum_{v} Attribution\ factor_v \times Vehicle\ emissions_v$$

$$(with\ v = vehicle\ or\ vehicle\ fleet)$$

The emissions can, in principle, be calculated by multiplying the distance traveled by the vehicle (e.g., km) by the fuel efficiency of the vehicle (e.g., l diesel/km, kWh electricity/km) and an emission factor specific to the fuel type of the vehicle (e.g., kg CO_2e/l diesel, kg CO_2e/kWh electricity). The total financed emissions from multiple motor vehicle loans are calculated as follows:

$$Financed\ emissions = \sum_{v} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Vehicle\ emissions_v$$

$$Financed\ emissions = \sum_{v,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_v\ x\ Efficiency_{v,f} \times Emission\ factor_f$$

$$(with\ v{=}vehicle\ or\ vehicle\ fleet,\ f{=}fuel\ type)$$

The financed emissions from motor vehicle loans can be calculated in several ways depending on the availability of data to derive the emissions of the financed vehicle. Overall, PCAF distinguishes three options to calculate the financed emissions from motor vehicle loans depending on the data used:[157]

- **Option 1: actual vehicle-specific emissions**,[158] where emissions are calculated based on actual vehicle fuel consumption or actual vehicle distance traveled for a known vehicle make and model with data directly collected from the borrower.
    - **Option 1a**: Vehicle emissions are calculated based on primary data on **actual vehicle fuel consumption**.
    - **Option 1b**: Vehicle emissions are calculated based on vehicle efficiency and fuel type (fossil or electricity) from **known vehicle make and model**[159] and primary data for **actual vehicle distance traveled**.

157 For all options the attribution factor is calculated in the same way; the only thing changing is the way vehicle emissions are calculated.

158 For motor vehicle loans to consumers, this approach seems rather unrealistic as consumers are unlikely to report their actual fuel consumption or distance traveled to a financial institution. However, for motor vehicle loans to businesses (in particular for financing of company-owned staff cars), companies often collect information on actual fuel consumption or distance traveled and could share such information with financial institutions.

159 Vehicle make and model refers to the name of the company that manufactures the vehicle and the product name of the vehicle. For example, Toyota Prius.

- **Option 2: estimated vehicle-specific emissions**, where emissions are calculated based on estimated vehicle distance traveled for a known vehicle make and model with data collected from official statistics.
    - **Option 2a**: Vehicle emissions are calculated based on vehicle efficiency and fuel type (fossil or electricity) from **known vehicle make** and **model and estimated vehicle distance traveled** derived from **local statistical data**.[160]
    - **Option 2b**: Vehicle emissions are calculated based on vehicle efficiency and fuel type (fossil or electricity) **from known vehicle make and model** and **estimated vehicle distance** traveled derived from **regional statistical data**.[161]
- **Option 3: estimated vehicle-unspecific emissions**, where emissions are calculated based on estimated vehicle distance traveled for an unspecified vehicle with data collected from official statistics.
    - **Option 3a**: Vehicle emissions are calculated based on vehicle efficiency and fuel type (fossil or electricity) from **known vehicle type**[162] (vehicle make and model are unknown) and **estimated vehicle distance traveled** derived from **local or regional statistical data**.
    - **Option 3b**: Vehicle emissions are calculated based on vehicle efficiency and fuel type (fossil or electricity) from an **average vehicle** (vehicle make and model and vehicle type are unknown)[163] and **estimated vehicle distance traveled** derived from **local or regional statistical data**.

Data required

PCAF distinguishes three options with six sub-options to calculate the financed emissions from motor vehicle loans depending on the data used. Although Option 1b, Option 2a, and Option 2b are all based on known vehicle characteristics of vehicle efficiency and fuel type, the data used for vehicle distance traveled is of higher quality for Option 1b than it is for Option 2a, and it is of higher quality for Option 2a than it is for Option 2b. In this sense, while there are several options to calculate financed emissions, the quality of the results is not the same for all these options. For this reason, PCAF gives a higher score to results obtained with higher data quality and a lower score to results obtained with lower data quality (score 1 = highest data quality; score 5 = lowest data quality). If a financial institution uses a mix of options to calculate the emissions of a borrower, the data score for the lower-rated option should be assumed for this borrower (i.e., score 4 from Option 3a). Take for instance a line item for which actual distance traveled and vehicle type are known, while vehicle make and model are unknown. This means that Option 1b and Option 3a are mixed, and therefore, the highest possible data quality score this line item could receive is score 4. This is because that is the score of the lowest-rated option in the mix, Option 3a.

Table 5-16 provides data quality scores for each of the described options that can be used to calculate the financed emissions for motor vehicle loans.

160 Local statistical data refers to statistical data at the province/state or small country level.
161 Regional statistical data refers to statistical data at the large country or a subcontinental level.
162 Vehicle type refers to an overall vehicle class such as passenger car, bus, or light commercial truck.
163 If it is not possible to know the vehicle type, then an average vehicle can be assumed.

Table 5-16. General description of the data quality score table for motor vehicle loans

(score 1 = highest data quality; score 5 = lowest data quality)[164], [165]

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Actual vehicle-specific emissions**	**1a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Primary data on **actual vehicle fuel consumption** is available. Emissions are calculated using actual fuel consumption and fuel type-specific emission factors.
		1b	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model.**[166] Primary data on **actual vehicle distance** traveled is available. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 2	**Option 2: Estimated vehicle-specific emissions**	**2a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model. Distance traveled is estimated based on local statistical data.**[167] Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 3		**2b**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model. Distance traveled is estimated based on regional statistical data.**[168] Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 4	**Option 3: Estimated vehicle-unspecific emissions**	**3a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are estimated from **known vehicle type** (vehicle make and model are unknown).[169] **Distance traveled is estimated based on local or regional statistical data**. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 5		**3b**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are estimated for an **average vehicle** (vehicle make and model and vehicle type are unknown).[170] **Distance traveled is estimated based on local or regional statistical data**. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-6).

164 Fuel type in the case of electric or hybrid vehicles can also refer to electricity.

165 For all options shown in the table, supplier-specific emission factors (e.g., from electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors (i.e., also sometimes referred to as average emission factors).

166 Vehicle make and model refers to the name of the company that manufactures the vehicle and the product name of the vehicle. For example, Toyota Prius.

167 Local statistical data refers to data at the province/state or small country level.

168 Regional statistical data refers to data at the large country or a subcontinental level.

169 Vehicle type refers to a passenger car, bus, or light commercial truck.

170 If it is not possible to know the vehicle type, an average vehicle can be assumed.

Data for all three options can be derived from different data sources. Data on vehicle efficiency and fuel type per vehicle make and model can be derived from official statistical data sources such as the US EPA's Federal Test Procedure[171] and the EEA's Worldwide Harmonized Light Vehicles Test Procedure (WLTP).[172] Both data sources provide detailed vehicle efficiency and fuel type information by make and model. Option 1b, Option 2a, and Option 2b require such information. If make and model are unknown to the reporting financial institution (Option 3), vehicle efficiency and fuel type can be estimated on the vehicle type level (e.g., passenger car) using the International Council on Clean Transportation's (ICCT's) Transportation Roadmap[173] or the International Transport Forum at the Organisation for Economic Co-operation and Development (ITF OECD).[174]

If no actual distance traveled is known to the reporting financial institution, data on vehicle distance traveled can be estimated based on data sources such as the ICCT Transportation Roadmap or the ITF OECD. Several local statistical data sources provide geography-specific vehicle distances traveled. For the US and Canada, state- or province-level distance per year can be retrieved from carinsurance.com[175] and the Canadian Office of Energy Efficiency.[176]

PCAF's web-based emission factor database, which is currently available only to financial institutions that have committed to PCAF, provides emission factors per vehicle type (e.g., passenger car) and per vehicle make and model (e.g., VW Polo) for a large set of geographies. These motor vehicle emission factors are widely based on the sources mentioned above.

PCAF expects that the financed emissions for motor vehicle loans can be derived through either actual vehicle-specific emissions (Option 1), estimated vehicle-specific emissions (Option 2), or estimated vehicle-unspecific emissions (Option 3). However, PCAF allows the use of alternative approaches to calculate emissions if none of the specified options can be used or in the case that new approaches are developed. The reporting financial institution shall always explain the reasons for using an alternative approach if it deviates from the options defined above.

171 The US EPA's Federal Test Procedure is a series of drive cycle tests to measure the tailpipe emissions and fuel efficiency of passenger cars. Because these tests are used to verify that cars sold in the US meet EPA regulatory standards, their results reflect the road performance of passenger cars in the US. The results for more than 4,000 makes and models are publicly available on fueleconomy.gov, downloadable in .csv format.

172 The WLTP is a global, harmonized standard of drive cycle tests to determine the tailpipe emissions and fuel efficiency of passenger cars. It was developed by the United Nations Economic Commission for Europe to replace the old New European Driving Cycle (NEDC) as the European vehicle homologation procedure. The NEDC was shown to be flawed, enabling manufacturers to meet EU environmental standards during lab tests but not on the road (Dieselgate). The WLTP was conceived to rectify this. The WLTP final version was published in 2015. Hence, even though it will become a truly international standard in time, it is only used in the EU for now, and its results only reflect the performance of cars sold within the EU. These results are published by the EEA in .csv format and can be downloaded at https://www.eea.europa.eu/data-and-maps/data/co2-cars-emission-16.

173 The ICCT's Transportation Roadmap has been a global reference for environmental performance data on all major transportation modes, fuel types, and vehicle technologies since 2012. Over the past decade, the ICCT has extended its roadmap model to cover 11 of the largest vehicle markets (Australia, EU, Brazil, Canada, China, India, Japan, Mexico, South Korea, Russia and the US) and five aggregate regions (Africa, Other Asia-Pacific, Other Europe, Other Latin America, and the Middle East). The most recent results of the model (2017) are downloadable in .xlsx format on the ICCT website: https://theicct.org/transportation-roadmap#about.

174 The OECD iLibrary maintains a database of transport statistics collected by the ITF on the transport of freight (maritime, air, and surface) and passengers (car, rail, and air) in its member states https://www.oecd-ilibrary.org/transport/data/itf-transport-statistics_trsprt-data-en.

175 More information can be found at: https://www.carinsurance.com/Articles/average-miles-driven-per-year-by-state.aspx

176 More information can be found at: http://oee.nrcan.gc.ca/publications/statistics/cvs08/appendix-1.cfm?graph=6&attr=0

Limitations

Data availability

Information regarding actual vehicle distance traveled may not be easily available. If actual data is unavailable, PCAF proposes using local or regional averages on vehicle distance traveled by state, province, country, or region.

PCAF proposes that financial institutions collect the actual vehicle make and model to determine the exact vehicle efficiency and fuel type. If the financial institution does not track the vehicle make and model, PCAF proposes that the financial institution fall back to a generic vehicle type (e.g., passenger car, motorcycle, light commercial truck, medium/heavy commercial truck, bus) or to an average vehicle as a last resort. For average vehicles, the vehicle efficiency is determined by the weighted average vehicle efficiency in the respective geography.

Dual fuel vehicles

For dual fuel vehicles, the percentage of usage per fuel (e.g., gasoline vs. electricity) may be unknown. If the vehicle make and model is known, PCAF recommends assuming an average usage split for the respective hybrid vehicle based on information from national agencies or the vehicle manufacturer. If such information is not available, PCAF proposes either applying an average geography-specific usage split, or, if that is also not available, the conservative assumption that the combustion engine (e.g., gasoline) is used 100% of the time.

Electricity grid estimates

Exact electricity source data will not be known for each vehicle in a financial institution's portfolio (e.g., where does the borrower source electricity? Does the borrower source gray or green electricity?). Where possible, the most common local or regional electricity grid mix emission factor for the borrower's location should be used. If unavailable, the most common local or regional electricity grid mix emission factor for the financial institution's branch should be used (i.e., location of the financial institution where the loan was issued). If also unavailable, country-level electricity grid mix emissions data should be used.

5.7 Sovereign debt

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. Financial institutions' 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 this methodology 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.

In terms of covering supranationals – these 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 sum of the emissions of its members. Practically, this would lead to double counting. However, the aggregated view can be useful for engagement with respective bodies.

Emissions covered

Financial institutions shall report sovereign borrowers' absolute scope 1 and should report scope 2 and 3 in line with the proposed scope definitions below.

Scope definition:

The GHG Protocol's definition of scope 1, 2, and 3 emissions was initially developed for classification of corporate emissions. Next to the corporate emissions, the GHG Protocol also published a Global Protocol for Community-Scale Greenhouse Gas Inventories (i.e. an Accounting and Reporting Standard for Cities)[177], which translated the scope definitions to cities. PCAF has attempted to mirror this approach for sovereign debt.

The table below represents the PCAF scope definition for sovereign debt. Ideally financial institutions follow this breakdown in their reporting.

177 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

Table 5-17: PCAF scope definition for Sovereign Debt

Scope 1	Scope 2	Scope 3
Domestic GHG emissions from sources located within the country territory *This aligns with the UNFCCC definition of domestic territorial emissions, including emissions from exported goods and services*	GHG emissions occurring as a consequence of the domestic use of grid-supplied electricity, heat, steam and/or cooling which is imported from another territory	Emissions attributable to non-energy imports as a result of activities taking place within the country territory

Under this approach, a sovereign is seen primarily as a national territory, and its direct (scope 1) GHG emissions are attributable to emissions generated within its boundaries. Similar to emissions classification of cities, scope 2 are emissions attributable to the purchase, in this case import, of electricity, steam, heat and cooling from outside the country territory. Finally, scope 3 emissions are related to all other (non-energy) imports from goods or services from outside the country territory as a result of activities taken place in the country territory.

The classification allows to account for a holistic view of a sovereign's responsibility in generating emissions within and outside its boundaries. In particular, the approach allows to account for:

- Production emissions as defined by UNFCCC national emissions inventory (scope 1)
- Holistic view of a sovereign's emissions activity (scope 1 + 2 + 3) as requested by the EU Sustainable Finance Disclosure Regulation (SFDR)

This approach also allows for GHG accounting of emissions of sovereign debt taking the consumption-based view. For consumption-based accounting, the emissions related to export should be subtracted:

$$\textit{Consumption Emissions} = \textit{Production emissions} - \textit{Exported emissions} + \textit{Imported emissions.}$$

So according to our scope definition, this would be:

$$\textit{Consumption Emissions} = \textit{scope } 1 + 2 + 3 - \textit{Exported emissions.}$$

Our 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. 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).[178] 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.

178 Quality assurance/Quality control and verification, IPCC Guidelines for National Greenhouse Gas Inventories, 2006. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_6_Ch6_QA_QC.pdf

As countries treat LULUCF emissions differently in their mitigation targets and investors might have diverging views on the potentially offsetting role of land-use and forestry emissions, financial institutions shall report scope 1 emissions including and excluding LULUCF.

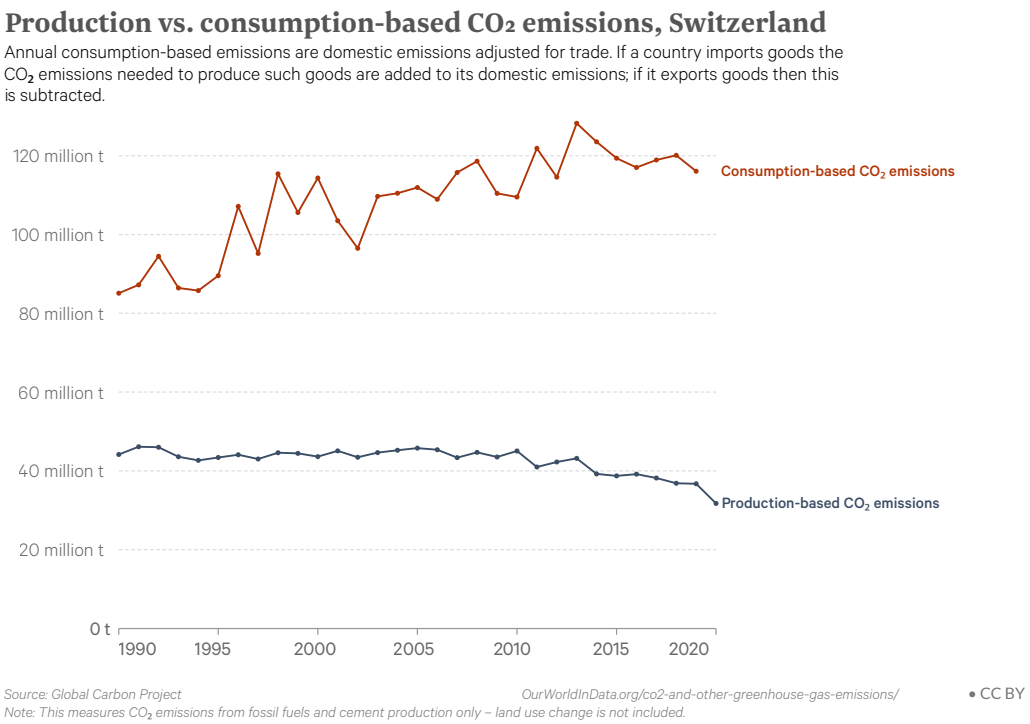
Table 5-18: Example of Country Production Emissions including and excluding LULUCF

Country	Production Emissions incl. LULUCF ($ktCO_2eq$, 2018)	Production Emissions excl. LULUCF ($ktCO_2eq$, 2018)
Netherlands	191,029.65	186,394.47
Canada	736,886.99	728,475.89
Finland	48.071,9	56,281.8
Austria	73,500.8	78,627.6

Source: https://di.unfccc.int/ghg_profile_annex1

Although Production Emissions is currently frequently the key metric to account for sovereign GHG emissions, PCAF also recommends that financial institutions track the GHG emissions of countries more holistically and report Consumption Emissions as described above.

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 and services 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 GHG reduction targets, their consumption emissions might follow a different trend, which can be seen in the example below:[179]



179 Production vs. consumption-based CO_2 emissions, Switzerland, Our World in Data, 2021. 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, financial institutions can use this metric for a more holistic assessment of a sovereign's GHG 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

Attribution of emissions

PCAF requires using the following approach for attribution of emissions for Sovereign debt:

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

Rationale:

According to the general logic in this Financed Emissions Standard, the financial institution'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 in the real economy.

For a listed company, total value is measured by Enterprise Value Including Cash (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. Therefore, using outstanding national debt levels only (not including a measurement for equity) as the denominator for attribution 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 scope 1 emissions *(here excl. LULUCF, source: EDGAR)* 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 debt of both entities) with significant GHG emissions in Hong Kong compared with Singapore.

The attribution for this example is computed as follows

$$\frac{\textit{Exposure to Sovereign Bond (USD)}}{\textit{Debt of Country (USD)}} \times \textit{Scope 1 Emissions } (tCO_2e)$$

Table 5-19: Example of (volatility of) attribution based on national debt

Country	Scope 1 emissions (tCO_2e)	Debt ($ Millions USD)	Exposure ($ Millions USD)	Debt Approach (tCO_2e)
Singapore	61,451,586	312,935	1	196
Hong Kong	42,654,105	159	1	268,264

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

These effects are also present in corporate emissions accounting, where emissions attributed to financial institutions 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.

Given the issue described above, this methodology uses an alternative approach to emissions attribution for sovereign debt 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:

$$\textit{Attributed Emissions} = \frac{\textit{Exposure to Sovereign Bond (USD)}}{\textit{PPP – adjusted GDP (international USD)}} \times \textit{Scope 1 Emissions } (tCO_2e)$$

Table 5-20: Comparison of attribution based on national debt versus the PPP-adjusted GDP approach

Country	Emissions (tCO_2e)	Debt ($ Millions USD)	PPP-adjusted GDP ($ Millions USD)	Exposure ($ Millions USD)	Debt approach (tCO_2e)	PPP-adjusted GDP approach (tCO_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 financed emissions in financial portfolios.

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.

Table 5-21: Example of difference in ranking by national debt and PPP-adjusted GDP approach

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.

The examples above demonstrate attribution of production emissions. However, the same logic can apply to attribution of consumption emissions – only that the total Absolute Emissions will account for domestic and imported sources of emissions that ultimately contribute to the GDP of the respective sovereign.

PCAF admits that there is not a 1:1 relationship between a financial institution's investment and a sovereign's GDP, in contrast to a more straightforward relationship between a financial

institution'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, financial institutions' funds would typically spur economic growth and therefore GDP,[180] implying impact on production processes and therefore emissions.

Therefore, financial institutions shall use the attribution by PPP-adjusted GDP for sovereign debt emissions.

Equations to calculate financed emissions

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

$$\textit{Financed emissions} = \sum_{S} \textit{Attribution factor}_s \times \textit{Sovereign Emissions}_s$$

(with s=sovereign borrower)

Attribution factor:

$$\textit{Financed emissions} = \sum_{S} \frac{\textit{Outstanding amount}_s}{\textit{PPP-adjusted GDP}_s} \times \textit{Sovereign Emissions}_s$$

(with s=sovereign borrower)

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 / 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):

180 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).

Table 5-22: Example of difference between nominal and PPP-adjusted GDP

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:

Table 5-23: Example of difference between nominal and PPP-adjusted GDP by production emissions intensity

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.

Table 5-24: Example different intensity metrics Sovereign Debt

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 financial institutions 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 with the most current and comprehensive data coverage per data category. However, this list is not exhaustive, and financial institutions 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).

Table 5-25: Overview required data and potential sources

Data category	Description	Source	Scope	Limitations
Scope 1 -Absolute emissions	Domestic Emissions (UNFCCC) Including LULUCF / Excluding LULUCF	UNFCC | Annex I countries and Non-Annex I countries (https://di.unfccc.int)	GHG and CO_2e emissions, global country coverage	No data available for the following non-Annex 1 parties: Andorra, Equatorial Guinea, Libya, Sierra Leone, Somalia.
		World | Total including LUCF | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)	Global coverage (CO_2)	CO_2 emissions only Most recent GHG emissions data available in 2018
		EDGAR - The Emissions Database for Global Atmospheric Research (europa.eu)	Global coverage (GHG)	Time-lag of 4 years (GHG emissions 1970-2018 series)
	Emissions of Exports of Goods and Services	OECD – Carbon dioxide emissions embodied in international trade (2021 ed.) (https://stats.oecd.org)	Global coverage (CO_2)	CO_2 emissions only Time- and data lags regarding non-Annex I countries
Scope 2 – Absolute emissions	Grid-supplied electricity, steam and cooling imports	OECD – Carbon dioxide emissions embodied in international trade (2021 ed.) (https://stats.oecd.org)	Global coverage (CO_2)	CO_2 emissions only Industry code: D35 Electricity, gas, steam, and air conditioning supply is defined broader as scope 2 definition Time-lag of 4 years (CO_2 emissions 1995-2018 series) Data unavailable for some specific countries (e.g. Cuba, Egypt, Sierra Leone)
Scope 3 -Absolute emissions	Non-energy imports	OECD – Carbon dioxide emissions embodied in international trade (2021 ed.) (https://stats.oecd.org)	Global coverage (CO_2)	CO_2 emissions only Time-lag of 4 years (CO_2 emissions 1995-2018 series) Data unavailable for some specific countries (e.g. Cuba, Egypt, Sierra Leone)
PPP-adjusted GDP	GDP adjusted by PPP	GDP, PPP (current international $) | Data (worldbank.org)	Global coverage, 2020 data	Data unavailable for some specific countries (i.e. Cuba, Eritrea, Monaco)
Nominal GDP, Population	Standard macro-economic metrics	World Bank/ International Monetary Fund (IMF) (worldbank.org), (www.imf.org)	Global coverage, 2020 data	

Similar to other asset classes, PCAF distinguishes for sovereign debt also three options to calculate the financed emissions:

- Option 1: reported emissions
- Option 2: physical activity-based emissions
- Option 3: economic activity-based emissions

Table 5-26 provides data quality scores for each of these options and sub-options (if applicable) that can be used to calculate the financed emissions for sovereign debt.

Table 5-26: General description of the data quality score table for Sovereign Debt

(score 1 = highest data quality score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	Option 1: Reported emissions	1a	Verified GHG emissions of the country are available. These GHG emissions are reported by the country itself and can be extracted from UNFCCC[181]
Score 2		1b	Unverified emissions of the country are available.
Score 3	Option 2: Physical activity based emissions	2a	Reported GHG emissions of the country are not known. Emissions are calculated using primary physical activity data of the country's energy consumption (domestic generated and imported) and emission factors specific to that primary data.
Score 4	Option 3: Economic activity based emissions	3a	Reported GHG emissions of the country are not known. Emissions are calculated using sectoral revenue data of the country's production and emission factors specific to that revenue data.
Score 5		3b	Country GHG emissions are estimated by taking a proxy. GHG emissions from (a) similar (climate (zones), wealth, GDP) country are taken to estimate the country GHG emissions.

A detailed summary of the data quality score table, including data needs and equations to calculate financed emissions, is provided in Annex 10.1 (Table 10.1-7).

181 This refers to UNFCCC reporting requirements. For the purposes of verification, Annex I Parties should compare their national estimates of CO_2 emissions from fuel combustion with those estimates obtained using the IPCC reference approach, as contained in the 2006 IPCC Guidelines, and report the results of this comparison in the NIR.

Limitations

Emissions scope

The presented approach to classify scope 1, 2, and 3 emissions of sovereigns is an attempt to mirror the approach developed and adopted for corporates and cities and can't be compared 1:1.

Double counting

Double counting occurs in two dimensions:

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

This represents a challenge for a financial institution with investment portfolios in multiple asset classes. However, doubling counting within the GHG emissions reports of financial institutions 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. Double counting of emissions of other sovereigns when accounting for emissions beyond scope

The issue is not different from the one with corporate emissions and should be resolved/treated consistently, i.e. double-counting accepted when accounting for emissions beyond scope 1.

Attribution Factor

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 1:1. There are however reasons as stated above that justify the usability of this attribution factor.

Alternative attribution factors might still emerge, and PCAF is ready to review these. For example, Total capital stock (IMF)[182] - a measure of total value of gross fixed capital formation in the economy - has also been briefly reviewed. The concept is comparable to total capital and EVIC for corporates. Though a reasonable theoretical concept, the metric has multiple limitations. Most importantly, this is not a readily available and reported metric, but the once calculated based on IMF Methodology, which involves assumptions, exclusion of certain sources of investments, and data availability limitations. PCAF does not recommend this metric at the current stage.

182 Estimating Public, Private, and PPP Capital Stocks, Annex to IMF Board Paper "Making Public Investment More Efficient"

6. Reporting requirements and recommendations

To manage financial and reputational risk and steer in line with the Paris Agreement, it is crucial that the financial sector reports GHG emissions of loans and investments for transparency and accountability. The following reporting requirements and recommendations guide financial institutions to disclose the GHG emissions associated with their loans and investments. Rather than creating a new framework, PCAF developed these reporting requirements and recommendations to complement existing frameworks such as TCFD, GRI, Sustainability Accounting Standards Board (SASB), generally accepted accounting principles (GAAP), and International Financial Reporting Standards (IFRS). It adheres to and builds upon the reporting requirements set out by the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

All financial institutions that commit to using this Financed Emissions Standard shall fulfil certain requirements when disclosing their financed emissions publicly. However, they do have the flexibility to decide where they want to start with measuring and disclosing their financed emissions—for instance, at a specific asset class level or for a specific sector within a certain asset class. Flexibility in reporting is allowed largely because of recognized limitations in data availability and quality. PCAF recognizes that data for many asset classes may not be available to financial institutions and that a financial institution may not be able to disclose 100% of its portfolio. However, financial institutions shall be transparent in their coverage and justify any exclusions.

The requirements for disclosure of financed emissions describe a minimum disclosure level with room for financial institutions to report beyond this level. Any requirements not fulfilled must be accompanied by an explanation. Minimum reporting requirements are described in this chapter using the word "shall." Where certain aspects of reporting are not required but encouraged as best practice, the word "should" is used.

Report using the operational or financial control consolidation approach [183]

The asset class methods in this Financed Emissions Standard are used to calculate the scope 3 category 15 emissions from financial investments. According to the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard,[184] three consolidation approaches can be applied by financial institutions to account for their scope 1, 2, and 3 emissions—namely equity share, operational control, and financial control. For PCAF reporting, financial institutions **shall** use the operational control approach or the financial control approach; as a result, all financed emissions **shall** be accounted for in their scope 3 category 15 reporting.

183 Additional information on consolidation approaches can be found in Chapter 4.
184 (WRI and WBCSD, 2011)

Overall Reporting Requirements and Recommendations

- **Principles**: GHG accounting and reporting of financial institutions **shall** be based on the following principles: relevance, completeness, consistency, transparency, and accuracy.
- **Purpose**: A financial institution's reporting **should** align with its specific business goals; for instance, for identifying and managing climate-related transition risks or for steering toward a specific emissions reduction target.
- **Frequency**: Financial institutions **shall** disclose at least annually and at a fixed point in time in line with the financial accounting cycle. Financial institutions **shall** ensure that the chosen point in time provides a representative view on the emissions for that reporting year and **shall** transparently disclose if large changes close to (before/after) the reporting date affected the results.
- **Recalculation and significance threshold**: Financial institutions **shall**, in line with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard requirement (pg. 104[185]), establish a baseline recalculation policy to define under which circumstances a recalculating of (base year) financed emissions is necessary to ensure the consistency, comparability, and relevance of the reported GHG emissions data over time. As part of this base year emissions recalculation policy, financial institutions **shall** establish and disclose the significance threshold[186] that triggers base year emissions recalculations.
- **Form of reporting**: Financial institutions **shall** disclose in publicly available reports such as (semi) annual reports, website articles, or other publicly available sources as deemed appropriate by the financial institution. Annex 10.2 provides an example template for how financial institutions can disclose their financed emissions.
- **Past performance**: Where appropriate and relevant for their business goals, financial institutions **should** disclose their financed emissions for multiple comparable time periods, e.g., years.

Coverage

- Financial institutions **shall** disclose all absolute emissions for all relevant asset classes or sectors[187] covered in Chapter 5 and justify any exclusions. Potential justification criteria for exclusion include:
    - Data availability: Required data is not available to the financial institutions.
    - Size: The activities are insignificant to the institution's total anticipated financed emissions.
    - Methodology: There is no global methodology to quantify the financed emissions of specific activities (i.e., asset classes not covered in this Financed Emissions Standard).
- Financial institutions **shall** disclose the percentage of their total loans and investments covered in their financed emissions inventories for the seven asset classes covered in Chapter 5, e.g. a financial institution's total outstanding loans and investments by asset class noting any limitations and exclusions.

185 (WRI and WBCSD, 2011)

186 Definition according to the GHG Protocol: "A significance threshold is a qualitative and/or quantitative criterion used to define any significant change to the data, inventory boundaries, methods, or any other relevant factors."

187 Financial institutions can choose to report by sector rather than asset class.

Gases and units

- Financial institutions **shall** account for the seven gases under the Kyoto Protocol that are also mandated under the UNFCCC to be included in national inventories if they are emitted in the value chain. These are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).
- These seven gases **shall** be converted to carbon dioxide equivalents (CO_2e) using the 100-year time horizon global warming potentials published by the IPCC—**either** the AR5 values published by the GHG Protocol[188] or the IPCC's most recently published assessment report.[189]
- Financial institutions **shall** express their financed emissions in metric tonnes of carbon dioxide equivalents (tCO_2e) or another appropriate metric conversion—e.g., kilotonnes ($ktCO_2e$), megatonnes ($MtCO_2e$). When emissions from a specific GHG (e.g., methane emissions) are material and relevant, financial institutions **should** consider a separate disclosure of these emissions.
- Biogenic CO_2 emissions that occur in the value chain shall not be included in the scopes but **shall** be included and separately reported in the public report.

Absolute emissions

- Institutions **shall** disclose the absolute emissions (scope 1 and 2 combined) of their loans and investments. If it serves the business goals of the financial institutions, absolute scope 1 and scope 2 emissions of loans and investments should be reported separately from each other.
- Beyond the reporting of scope 3 category 15 emissions covered by this Financed Emissions Standard, financial institutions **shall** also measure and report their scope 1 and 2 emissions and any other relevant scope 3 emissions categories in line with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (see Annex 10.2 for an example).
- Where required by the relevant methodology in Chapter 5, financial institutions **shall** separately disclose the absolute scope 3 emissions of their loans and investments, including the specific sectors covered. Financial institutions **shall** explain if they are not able to provide any required scope 3 information because of data availability or uncertainty.
- Financial institutions **shall** disaggregate and disclose absolute emissions data at the asset class or at the sector level, particularly for the most emission-intensive sectors (e.g., energy, power, cement, steel, automotive).
- When a financial institution is an initial sponsor or lender of a specific project, the institution **should** also assess and report the absolute lifetime scope 1 and 2 emissions of the project that was financed during the reporting year.
- Absolute emissions **shall** be reported without taking into account carbon credits retired by clients to offset these emissions. Carbon credits retired by clients may be reported, and if so, shall be reported separately.

188 (GHG Protocol, 2014)

189 The IPCC reports can be found at: https://www.ipcc.ch

Box 6. Double counting in reporting absolute emissions

Double counting—which occurs when GHG emissions are counted more than once in the financed emissions calculation of one or more institutions—should be avoided as much possible. Double counting occurs between the different scopes of emissions from loans and investments when a financial institution invests in stakeholders that are in the same value chain.[190] This form of double counting cannot be avoided, but it can be made more transparent by reporting the scope 1 and 2 emissions of loans and investments separately from their scope 3 emissions. Apart from this, double counting can take place at five levels:

- Between financial institutions
- In co-financing the same entity or activity
- Between transactions within the same financial institutions
- Across different asset classes
- Within the same asset class

PCAF recognizes that double counting of GHG emissions cannot be avoided completely; however, it should be minimized. Double counting between co-financing institutions and between transactions within the same asset class of a financial institution are avoided by using the appropriate attribution rules defined by PCAF consistently.

By using the correct attribution method, double counting of emissions between institutions can be minimized. Financial institutions using the methodologies in the Financed Emissions Standard will be subject to the same exposure to double counting so that one financial institution will not be more significantly burdened than another.

Avoided emissions and emission removals[191]

- In addition to absolute emissions, financial institutions:
  - **Should** report emission removals where relevant to their loans and investments when appropriate methodologies become available.
  - **May** report avoided emissions of their renewable power projects.
- If financial institutions choose to disclose emission removals or avoided emissions, they **shall** disclose absolute emission removals or avoided emissions separately from the financial institution's scope 1, scope 2, and scope 3 inventories (see Annex 10.2 for an example).
- Avoided emissions and emission removals **shall** be reported without taking into account carbon credits generated for these same emissions. Carbon credits generated by clients **should** be reported, and if so, shall be reported separately.

190 The scope 1 emissions of one company can be the upstream scope 2 or 3 emissions of its customer. For example, scope 1 emissions from a utility providing energy to a company would end up in the scope 2 inventory of that company. If both companies are receiving funding from the same financial institution these emissions would be double counted within its inventory.

191 As defined in Chapter 3, removed emissions are those related to projects or technologies that can result in CO_2 being sequestered by trees or removed from the atmosphere and stored in solid or liquid form.

Emission intensity

- Financial institutions **should** report economic emission intensities if these values are relevant to their business goals.
- Economic emission intensities **shall** be expressed on a portfolio, asset class, or sector level in metric tonnes of carbon dioxide equivalents per million euro or dollar invested or loaned: tCO_2e/€M or tCO_2e/$M
- When relevant to their business goals, financial institutions **should** consider reporting physical emission intensities per sector using sector-specific activity (e.g., tCO_2e/m^2 for real estate, tCO_2e/MWh for power utilities, tCO_2e/tonne of steel produced for steel companies, etc.).

Box 7. Financed emission metrics and comparability

Measuring financed emissions in absolute terms, i.e., absolute emissions, provides financial institutions with the necessary baseline for climate action to align with the Paris Agreement. When banks and investors aim to benchmark or compare companies, sectors, or portfolios to each other, normalization is required. Absolute financed emissions at a portfolio level are not a good metric to compare or benchmark financial institutions on their performance due the potential differences between financial institutions in terms of size, product portfolio, exposure to sectors and regions, etc. For comparability and benchmarking, the absolute financed emissions need to be translated into an emission intensity metric (emissions per a specific unit).[192]

A wide array of intensity metrics is applied in the market and each has its own merits. The table below includes a list of the most common metrics.

Metric	Purpose	Description
Absolute emissions	To understand the climate impact of loans and investments and set a baseline for climate action	The total GHG emissions of an asset class or portfolio
Economic emission intensity	To understand how the emission intensities of different portfolios (or parts of portfolios) compare to each other per monetary unit	Absolute emissions divided by the loan or investment volume in EUR or USD, expressed as tCO_2e/€M or tCO_2e/$M loaned invested
Physical emission intensity	To understand the efficiency of a portfolio (or parts of a portfolio) in terms of total GHG emissions per unit of a common output	Absolute emissions divided by a value of physical activity or output, expressed as, e.g., tCO_2e/MWh, tCO_2e/tonne product produced
Weighted average carbon intensity (WACI)[193]	To understand exposure to emission-intensive companies	Portfolio's exposure to emission-intensive companies, expressed as tCO_2e/€M or $M company[194] revenue

192 Actual performance benchmarking or target setting for financial institutions is not covered by this Standard. For this type of assessment, other initiatives exist that build on the accounting requirements set forth in this Standard but that further rely on their own methodologies and approaches. Examples include the SBTi or RMI's Center for Climate-Aligned Finance.

193 (TCFD, 2017)

194 The word company refers to the financial institution's borrower or investee.

Data and data quality

- Financial institutions **shall** use the most recent or otherwise appropriate data available to them. PCAF recognizes there is often a lag between financial reporting and required emissions data, such as emission factors or emissions data from borrowers or investees. In these instances, it is acceptable that the data represents different years.
- Financial institutions **should** provide a description of the types and sources of data—including activity data, assumptions, emission factors, and all relevant publication dates—used to calculate emissions. Descriptions **should** be written to create transparency.
- Financial institutions **should** publish a weighted score by outstanding amount of the data quality of reported emissions data or **should** explain why they are unable to do so. An example is provided in Box 8.
- Where financial institutions are reporting scope 3 emissions, the weighted data quality score of these emissions **shall** be reported separately from that of scopes 1 and 2.
- The data hierarchy tables provided in each asset class method in Chapter 5 **should** be used as a guide for disclosing data quality. Financial institutions **should** explain how data quality is assessed, acknowledging that it will improve over time.
- Over time and where possible, data should be verified to at least a level of limited assurance. Financial institutions **should** disclose whether data is verified and to what level.

Box 8. An illustrative example for calculating weighted data quality scores

It is likely that data quality will differ across asset classes, sectors, companies, and emission scopes. To disclose the best representation of data quality, the Financed Emissions Standard requires that financial institutions normalize the data quality scores for each asset class and sector to the total outstanding loan or investment amount.

The equation for calculating weighed averages for an asset class or sector is:

$$= \frac{\sum_{i=1}^{n} \; Outstanding\ amount_i \times Data\ quality\ score_i}{\sum_{i=1}^{n} Outstanding\ amount_i}$$

(with i=borrower or investee)

An illustrative example of a financial institution's lending is provided below:

Asset class	Sector	Company	Outstanding loan	Attributed scope 1 and 2 absolute emissions (kton CO_2e)	Data quality score (1=high, 5=low)
Business loans	Oil & Gas	Company A	522,425	15	3
Business loans	Oil & Gas	Company B	187,449	7	5
Business loans	Cattle farming	Company C	82,778	8	1
Business loans	Cattle farming	Company D	108,997	11	1
Business loans	Cattle farming	Company E	67,556	7	2
Business loans	Cattle farming	Company F	54,762	5	5

Weighted data score for business loans scope 1 and 2 emissions:

$$\frac{(522{,}425 \times 3)+(187{,}449\times 5)+(82{,}778\times 1)+(108{,}997\times 1)+(67{,}556\times 2)+(54{,}762\times 5)}{(522{,}425+187{,}449+82{,}778+108{,}977+67{,}556+54{,}762)} = \mathbf{3.03}$$

Weighted data score for oil & gas sector scope 1 and 2 emissions:

$$\frac{(522{,}425 \times 3)+(187{,}449\times 5)}{(522{,}425+187{,}449)} = \mathbf{3.53}$$

7. Glossary

Absolute emissions	Emissions attributed to a financial institution's lending and investing activity. Expressed in tonnes CO_2e. *See financed emissions.*
Asset class	A group of financial instruments that have similar financial characteristics.
Attribution factor	The share of total greenhouse gas (GHG) emissions of the borrower or investee that are allocated to the loan or investments.
Avoided emissions	Emission reductions that the financed project produces versus what would have been emitted in the absence of the project (the baseline emissions). In the context of the Financed Emissions Standard, avoided emissions are only from renewable power projects.
Biogenic carbon dioxide (CO_2) emissions	Emissions from a stationary source directly resulting from the combustion or decomposition of biologically based materials other than fossil fuels.
Borrower	A person or company that borrows money from a bank.
Business loan	On-balance sheet loans and lines of credit to businesses, nonprofits, and any other structure of organization that are not traded on a market and are for general corporate purposes (i.e., with unknown use of proceeds as defined by the GHG Protocol). *For detail information on this asset class, see subchapter 5.2.*
Climate impact	In the context of this Financed Emissions Standard, climate impact refers to the emissions financed by loans and investments.
Climate risk	The potential for adverse effects on lives, livelihoods, health status, economic, social and cultural assets, services (including environmental), and infrastructure due to climate change.
CO_2-equivalent (CO_2e)	The amount of CO_2 that would cause the same integrated radiative forcing (a measure for the strength of climate change drivers) over a given time horizon as an emitted amount of another GHG or mixture of GHGs. Conversion factors vary based on the underlying assumptions and as the science advances. As a baseline, PCAF recommends using 100-year Global Warming Potentials without climate-carbon feedback from the most recent IPCC Assessment report.
Commercial real estate (CRE)	This asset class includes on-balance sheet loans for specific corporate purposes, namely the purchase and refinance of CRE, and on-balance sheet investments in CRE. This definition implies that the property is used for commercial purposes, such as retail, hotels, office space, industrial, or large multifamily rentals. In all cases, the owner of the building (the borrower or investor) uses the property to conduct income-generating activities. This includes using the property for their own business as well as renting or leasing the property to tenants who use the property for either commercial or residential purposes. *For detailed information on this asset class see subchapter 5.4.*
Consolidation approach	Refers to how an organization sets boundaries for GHG accounting. Types include equity share approach, financial control, and operational control.
Consumer finance	Finance provided to individual and household consumers, such as mortgages and motor vehicle loans.
Corporate debt	Money that is owed by companies rather than by governments or individual people.
Debt	A financing instrument that requires repayment by the borrower. In the context of this Financed Emissions Standard, debt refers only to the principal amount owed by the borrower and excludes interest.
Direct emissions	Emissions from sources that are owned or controlled by the reporting entity or the borrower or investee.
Double counting	Occurs when GHG emissions (generated, avoided, or removed) are counted more than once in a GHG inventory or toward attaining mitigation pledges or financial pledges for the purpose of mitigating climate change.

Embodied emissions in buildings	The GHG emissions associated with the non-operational phase of the project. This includes emissions cause by extraction, manufacture, transportation, assembly, maintenance, replacement, deconstruction, disposal and end of life aspects of the materials and systems that make up a building.
Emission intensity metric	Emissions per a specific unit, for example: tCO_2e/€M or $M invested, tCO_2e/MWh, tCO_2e/tonne product produced, tCO_2e/MWh, tCO_2e/ton product produced, tCO_2e/€M or $M company revenue.
Emission removals	The action of removing GHG emissions from the atmosphere and store it through various means, such as in soils, trees, underground reservoirs, rocks, the ocean, and even products like concrete and carbon fiber.
Emission scopes	The GHG Protocol Corporate Accounting and Reporting Standard classifies an organization's GHG emissions into three scopes. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting organization, including both upstream and downstream emissions.
Enterprise Value Including Cash (EVIC)	The sum of the market capitalization of ordinary shares at fiscal year end, the market capitalization of preferred shares at fiscal year-end, and the book values of total debt and minorities' interests. No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values.
Environmentally extended input-output (EEIO) data	EEIO data refers to EEIO emission factors that can be used to estimate scope 1, 2, and upstream scope 3 GHG emissions for a given industry or product category. EEIO data is particularly useful in screening emissions sources when prioritizing data collection efforts.
Equity	The ownership of banks or investors in a company or project. There are various types of equity, but equity typically refers to shareholder equity, which represents the amount of money that would be returned to a company's shareholders if all company assets were liquidated and all company debt were paid off.
EXIOBASE	A global, detailed multi-regional environmentally extended supply-use table and input-output table. It was developed by harmonizing and detailing supply use tables for a large number of countries, estimating emissions, and resource extractions by industry.
Federal Test Procedure	The US Environmental Protection Agency's Federal Test Procedures are a series of drive cycle tests to measure the tailpipe emissions and fuel efficiency of passenger cars.
Financed emissions	Absolute emissions that banks and investors finance through their loans and investments. *See absolute emissions.*
Financial institution	A company engaged in the business of dealing with financial and monetary transactions such as deposits, loans, investments, and currency exchange. Financial institutions encompass a broad range of business operations within the financial services sector, including commercial banks, investment banks, development banks, asset owners/managers (mutual funds, pension funds, close-end funds, investment trusts), and insurance companies.
Greenhouse gas (GHG) emissions	The seven gases mandated under the Kyoto Protocol and to be included in national inventories under the United Nations Framework Convention on Climate Change (UNFCCC)—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).
GHG accounting	A means of measuring the direct and indirect emissions to the Earth's biosphere of CO_2 and its equivalent gases from industrial activities.
GHG accounting of financial portfolios	The annual accounting and disclosure of GHG emissions associated with loans and investments at a fixed point in time in line with financial accounting periods. This is also called portfolio GHG accounting.

GHG Protocol	Comprehensive global standardized frameworks to measure and manage GHG emissions from private and public sector operations, value chains, and mitigation actions. The GHG Protocol supplies the world's most widely used GHG accounting standards. The Corporate Accounting and Reporting Standard provides the accounting platform for virtually every corporate GHG reporting program in the world.
Global Trade Analysis Project (GTAP) database	GTAP is a global network of researchers and policy makers conducting quantitative analysis of international policy issues. GTAP is coordinated by the Center for Global Trade Analysis in Purdue University's Department of Agricultural Economics. The centerpiece of the GTAP is a global database describing bilateral trade patterns, production, consumption, and intermediate use of commodities and services
Home equity line of credit (HELOC)	A revolving line of credit usually with an adjustable interest rate, which allows homeowners to borrow up to a certain amount over a period of time. HELOCs work in a manner similar to credit cards, where the homeowner can continuously borrow up to an approved limit while paying off the balance.
Home equity loan (HEL)	Sometimes referred to as a second mortgage, usually allows homeowners to borrow a lump sum against their current home equity for a fixed rate over a fixed period of time. Usually, home equity loans are used to finance large expenditures, such as home repairs or college tuition.
Indirect emissions	Emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity.
Investment	The term investment (unless explicitly stated otherwise) is used in the broad sense: "Putting money into activities or organizations' with the expectation of making a profit." Most forms of investment involve some form of risk taking, such as investment in equities, debt, property, projects, and even fixed interest securities which are subject to inflation risk, among other risks.
Investee company or investee project	A company or project in which an investor makes a direct investment.
Known use of proceeds	Known use of proceeds relates to investments and loans for specific (corporate or consumer) purposes, i.e., the financial institution knows for what activity the money is used.
Listed equity and corporate bonds	This asset class includes all on-balance sheet listed corporate bonds and all on-balance sheet listed equity that are traded on a market and are for general corporate purposes, i.e., unknown use of proceeds as defined by the GHG Protocol. *For detailed information on this asset class see subchapter 5.1.*
Mortgages	This asset class includes on-balance sheet loans for specific consumer purposes—namely the purchase and refinance of residential property, including individual homes and multi-family housing with a small number of units. This definition implies that the property is used only for residential purposes and not for commercial activities. *For detailed information on this asset class see subchapter 5.5.*
Motor vehicle loans	This asset class refers to loans and lines of credit to businesses and consumers for specific (corporate or consumer) purposes—namely the finance of one or several motor vehicles. *For detailed information on this asset class see subchapter 5.6.*
Paris Agreement	The Paris Agreement, adopted within the UNFCCC in December 2015, commits participating countries to limit global temperature rise to well-below 2°C above preindustrial levels and pursue efforts to limit warming to 1.5°C, adapt to changes already occurring, and regularly increase efforts over time.
Project finance	This asset class includes all on-balance sheet loans or equities to projects for specific purposes, i.e., with known use of proceeds as defined by the GHG Protocol. The financing is designated for a defined activity or set of activities, such as the construction and operation of a gas-fired power plant, a wind or solar project, or energy efficiency projects. *For detailed information on this asset class see subchapter 5.2.*

Scenario analysis	A process of analyzing future events by considering alternative possible outcomes.
Science-based reduction targets (SBTs)	Targets adopted by companies to reduce GHG emissions are considered science-based if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement—to limit global warming to well-below 2°C above preindustrial levels and pursue efforts to limit warming to 1.5°C.
Scope 1 emissions	Direct GHG emissions that occur from sources owned or controlled by the reporting company—i.e., emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.
Scope 2 emissions	Indirect GHG emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company. Scope 2 emissions physically occur at the facility where the electricity, steam, heating, or cooling is generated.
Scope 3 emissions	All other indirect GHG emissions (not included in Scope 2) that occur in the value chain of the reporting company. Scope 3 can be broken down into upstream emissions and downstream emissions: **Upstream emissions** include all emissions that occur in the life cycle of a material/product/service up to the point of sale by the producer, such as from the production or extraction of purchased materials.[195] **Downstream emissions** include all emissions that occur as a consequence of the distribution, storage, use, and end-of-life treatment of the organization's products or services.
Scope 3 category 15 (investments) emissions	This category includes scope 3 emissions associated with the reporting company's loans and investments in the reporting year, not already included in scope 1 or scope 2.
Sequestered emissions	Refers to atmospheric CO_2 emissions that are captured and stored in solid or liquid form, thereby removing their harmful global warming effect.
Sovereign debt	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.
Total balance sheet value	A balance sheet is a financial statement that reports a company's assets, liabilities, and shareholders' equity. The balance sheet value refers to the sum of total equity and liabilities, which is equal to the company's total assets.
Unknown use of proceeds	Unknown use of proceeds refers to investments and loans for general (corporate or consumer) purposes, i.e., the financial institution does not know exactly for what activity the money is used, which holds for general-purpose loans.
Unlisted equity	All on-balance sheet equity investments to businesses, nonprofits, and any other structure of organization that are not traded on a market and are for general corporate purposes, i.e., with unknown use of proceeds as defined by the GHG Protocol. Unlisted equity is also referred to as equity investments in private companies (i.e., the financial institution obtains shares of the company).
Vehicle make	The name of the company that manufactures the vehicle.
Vehicle model	The product name of the vehicle.
World Input-Output Database (WIOD)	World Input-Output tables and underlying data, covering 43 countries, and a model for the rest of the world for 2000-2014. Data for 56 sectors are classified according to the International Standard Industrial Classification revision 4 (ISIC REV. 4).
World Harmonized Light-duty Vehicles Test Procedure (WLTP)	The WLTP is a global, harmonized standard of drive cycle tests to determine the tailpipe emissions and fuel efficiency of passenger cars.

195 (WRI and WBCSD, 2013)

8. Acronyms

CDP	Carbon Disclosure Project
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CRE	Commercial real estate
EEIO	Environmentally extended input-output
EU	European Union
EU TEG	European Commission Technical Expert Group on Sustainable Finance
EV	Electric vehicle
EVIC	Enterprise value including cash
FAO	Food and Agriculture Organization of the United Nations
FSB	Financial Stability Board
GAAP	Generally accepted accounting principles
GEMIS	Global Emissions Model for integrated Systems
GHG	Greenhouse gas
GTAP	Global Trade Analysis Project
HFC	Hydrofluorocarbon
HEL	Home equity loan
HELOC	Home equity line of credit
ICCT	International Council on Clean Transportation
IEA	International Energy Agency
IFI	Internal Financial Institution
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
IPO	Initial public offering
ISIC	Industrial Classification of All Economic Activities
ITF OECD	International Transport Forum at the Organisation for Economic Co-operation and Development
$ktCO_2e$	kilotonnes of carbon dioxide equivalent
L2	Level 2 (NACE)
$MtCO_2e$	megatonnes of carbon dioxide equivalent
MWh	Megawatt-hour
N2O	Nitrous oxide
NACE	Statistical Classification of Economic Activities in the European Community
NDC	Nationally determined contribution
NEDC	New European Driving Cycle
NF_3	Nitrogen trifluoride
NGO	Nongovernmental organization
PCAF	Partnership for Carbon Accounting Financials
PFC	Perfluorocarbon
SASB	Sustainability Accounting Standards Board
SBT	Science-based targets
SBTi-FI	Science Based Targets initiative for Financial Institutions
SDA	Sectoral Decarbonization Approach
SF_6	Sulfur hexafluoride

TCFD	Task Force on Climate-related Financial Disclosures
tCO_2e	Metric tonnes of carbon dioxide equivalent
UNEP FI	United Nations Environment Programme Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
WACI	Weighted Average Carbon Intensity
WBCSD	World Business Council for Sustainable Development
WIOD	World Input-Output Database
WLTP	Worldwide Harmonized Light Vehicles Test Procedure

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10. Annex

10.1. Detailed data quality score tables per asset class

LISTED EQUITY AND CORPORATE BONDS – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-1. Detailed description of the data quality score table for listed equity and corporate bonds[194]

Option	Description					Data quality
	Attribution		Emission factor		Financed emissions calculation	Highest to lowest
	Financial data		Emission data		Equations	
Option 1a	Outstanding amount in the company	EVIC for listed companies and total equity plus debt for bonds to private companies	Verified GHG emissions data from the company in accordance with the GHG Protocol		**For listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Verified\ company\ emissions_c$ **For bonds to private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Verified\ company\ emissions_c$	**Score 1**
Option 1b			Unverified GHG emissions data calculated by the company in accordance with the GHG Protocol		**For listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Unverified\ company\ emissions_c$ **For bonds to private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Unverified\ company\ emissions_c$	**Score 2**
Option 2a[195]			Primary physical activity data for the company's energy consumption by energy source (e.g., megawatt-hours of electricity) plus any process emissions	Emission factors specific to that primary data (e.g., energy source-specific emission factors)[196]	**For listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Energy\ consumption_c$[197] $\times Emission\ factor$ **For bonds to private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Energy\ consumption_c$[198] $\times Emission\ factor$	**Score 3**
Option 2b			Primary physical activity data for the company's production (e.g., tonnes of rice produced)	Emission factors specific to that primary data (e.g., emission factor per tonne of rice)	**For listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Production_c \times Emission\ factor$ **For bonds to private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Production_c \times Emission\ factor$	**Score 3**
Option 3a		EVIC for listed companies and total equity plus debt for bonds to private companies Revenue of the company	GHG emissions per sector	Revenue per sector[199]	**For listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Revenue_c \times \frac{GHG\ emissions_s}{Revenue_s}$ **For bonds to private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Revenue_c \times \frac{GHG\ emissions_s}{Revenue_s}$	**Score 4**
Option 3b		N/A	GHG emissions per sector	Assets per sector	**For listed companies and bonds to private companies:** $\sum_c Outstanding\ amount_c \times \frac{GHG\ emissions_s}{Assets_s}$	**Score 5**
Option 3c		Asset turnover ratio per sector	GHG emissions per sector	Revenue per sector	**For listed companies and bonds to private companies:** $\sum_c Outstanding\ amount_c \times Asset\ turnover\ ratio_s \times \frac{GHG\ emissions_s}{Revenue_s}$	

[194] Where c = borrower or investee company and s = sector.

[195] The quality scoring for Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

[196] Supplier-specific emission factors (e.g., from an electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

[197] Where this option is used, process emissions must be added to the calculated energy consumption emissions before multiplying by the attribution factor.

[198] Where this option is used, process emissions must be added to the calculated energy consumption emissions before multiplying by the attribution factor.

[199] If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

BUSINESS LOANS AND UNLISTED EQUITY – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-2. Detailed description of the data quality score table for business loans and unlisted equity[200]

Option	Description					Data quality
	Attribution		Emission factor		Financed emissions calculation	Highest to lowest
	Financial data		Emission data		Equations	
Option 1a	Outstanding amount in the company	Total equity plus debt for business loans and equity investments to/in private companies, and EVIC for business loans to listed companies	Verified GHG emissions data from the company in accordance with the GHG Protocol		**For business loans and equity investments to/in private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Verified\ company\ emissions_c$ **For business loans to listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Verified\ company\ emissions_c$	**Score 1**
Option 1b			Unverified GHG emissions data calculated by the company in accordance with the GHG Protocol		**For business loans and equity investments to/in private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Unverified\ company\ emissions_c$ **For business loans to listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Unverified\ company\ emissions_c$	**Score 2**
Option 2a[201]			Primary physical activity data for the company's energy consumption by energy source (e.g., megawatt-hours of electricity) plus any process emissions	Emission factors specific to that primary data (e.g., energy source-specific emission factors)[202]	**For business loans and equity investments to/in private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Energy\ consumption_c^{203} \times Emission\ factor$ **For business loans to listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Energy\ consumption_c^{204} \times Emission\ factor$	
Option 2b			Primary physical activity data for the company's production (e.g., tonnes of rice produced)	Emission factors specific to that primary data (e.g., emission factor per tonne of rice)	**For business loans and equity investments to/in private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Production_c \times Emission\ factor$ **For business loans to listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Production_c \times Emission\ factor$	**Score 3**
Option 3a		Total equity plus debt for business loans and equity investments to/in private companies, and EVIC for business loans to listed companies Revenue of the company	GHG emissions per sector	Revenue per sector[205]	**For business loans and equity investments to/in private companies:** $\sum_c \frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Revenue_c \times \frac{GHG\ emissions_s}{Revenue_s}$ **For business loans to listed companies:** $\sum_c \frac{Outstanding\ amount_c}{EVIC_c} \times Revenue_c \times \frac{GHG\ emissions_s}{Revenue_s}$	**Score 4**
Option 3b		N/A	GHG emissions per sector	Assets per sector	$\sum_c Outstanding\ amount_c \times \frac{GHG\ emissions_s}{Assets_s}$	**Score 5**
Option 3c		Asset turnover ratio per sector	GHG emissions per sector	Revenue per sector	$\sum_c Outstanding\ amount_c \times Asset\ turnover\ ratio_s \times \frac{GHG\ emissions_s}{Revenue_s}$	

[200] Where c = borrower or investee company and s = sector.

[201] The quality scoring for Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

[202] Supplier-specific emission factors (e.g., from an electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

[203] Where this option is used, process emissions must be added to the calculated energy consumption emissions before multiplying by the attribution factor.

[204] Where this option is used, process emissions must be added to the calculated energy consumption emissions before multiplying by the attribution factor.

[205] If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

PROJECT FINANCE – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-3. Detailed description of the data quality score table for project finance[206]

Option	Description					Data quality
	Attribution		Emission factor		Financed emissions calculation	Highest to lowest
	Financial data		Emission data		Equations	
Option 1a	Outstanding amount in project	Total project equity and debt	Verified GHG emissions data of the project in accordance with the GHG Protocol		$\sum_p \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Verified\ project\ emissions_p$	**Score 1**
Option 1b			Unverified GHG emissions data calculated by the project in accordance with the GHG Protocol		$\sum_p \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Unverified\ project\ emissions_p$	**Score 2**
Option 2a[207]			Primary physical activity data for the project's energy consumption by energy source (e.g., megawatt-hours of electricity) plus any process emissions	Emission factors specific to that primary data (e.g., energy source-specific emission factors)[208]	$\sum_p \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Energy\ consumption_p$[209] $\times Emission\ factor$	
Option 2b			Primary physical activity data for the project's production (e.g., tonnes of rice produced)	Emission factors specific to that primary data (e.g., emission factor per tonne of rice)	$\sum_p \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Production_p \times Emission\ factor$	**Score 3**
Option 3a		Total project equity and debt Revenue of the project	GHG emissions per sector	Revenue per sector[210]	$\sum_p \frac{Outstanding\ amount_p}{Total\ equity + debt_p} \times Revenue_p \times \frac{GHG\ emissions_s}{Revenue_s}$	**Score 4**
Option 3b		N/A	GHG emissions per sector	Assets per sector	$\sum_p Outstanding\ amount_p \times \frac{GHG\ emissions_s}{Assets_s}$	**Score 5**
Option 3c		Asset turnover ratio per sector	GHG emissions per sector	Revenue per sector	$\sum_p Outstanding\ amount_p \times Asset\ turnover\ ratio_s \times \frac{GHG\ emissions_s}{Revenue_s}$	

[206] Where c = borrower or investee company and s = sector.

[207] The quality scoring for Option 2a is only possible for/applicable to scope 1 and scope 2 emissions as scope 3 emissions cannot be estimated by this option. Other options can be used to estimate the scope 3 emissions, however.

[208] Supplier-specific emission factors (e.g., from electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

[209] Where this option is used, process emissions must be added to the calculated energy consumption emissions before multiplying by the attribution factor.

[210] If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

COMMERCIAL REAL ESTATE – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-4. Detailed description of the data quality score table for commercial real estate[211]

Option	Description				Data quality
	Attribution	Emission factor		Financed emissions calculation	Highest to lowest
	Financial data	Emissions data		Equations	
Option 1a	Outstanding amount and property value at origination	Supplier-specific emission factors specific to the energy source	Primary data on actual building energy consumption	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Actual\ energy\ consumption_{b,e} \times Supplier\ specific\ emission\ factor_e$	**Score 1**
Option 1b		Average emission factors specific to the energy source	Primary data on actual building energy consumption	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Actual\ energy\ consumption_{b,e} \times Average\ emission\ factor_e$	**Score 2**
Option 2a			Estimated building energy consumption per floor area based on official building energy labels and floor area financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ energy\ labels_{b,e} \times Floor\ area_b \times Average\ emission\ factor_e$	**Score 3**
Option 2b			Estimated building energy consumption per floor area based on building type and location-specific statistical data and floor area financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ statistics_{b,e} \times Floor\ area_b \times Average\ emission\ factor_e$	**Score 4**
Option 3			Estimated building energy consumption per building based on building type and location-specific statistical data and number of buildings financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ statistics_{b,e} \times Number\ of\ buildings_b \times Average\ emission\ factor_e$	**Score 5**

[211] Where b = building and e = energy source.

MORTGAGES – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-5. Detailed description of the data quality score table for mortgages[212]

Option	Description				Data quality
	Attribution	Emission factor		Financed emissions calculation	Highest to lowest
	Financial data	Emissions data		Equations	
Option 1a	Outstanding amount and property value at origination	Supplier-specific emission factors specific to the energy source	Primary data on actual building energy consumption	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} x\ Actual\ energy\ consumption_{b,e} \times Supplier\ specific\ emission\ factor_e$	**Score 1**
Option 1b		Average emission factors specific to the energy source	Primary data on actual building energy consumption	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Actual\ energy\ consumption_{b,e} \times Average\ emission\ factor_e$	**Score 2**
Option 2a			Estimated building energy consumption per floor area based on official building energy labels and floor area financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ energy\ labels_{b,e} \times Floor\ area_b \times Average\ emission\ factor_e$	**Score 3**
Option 2b			Estimated building energy consumption per floor area based on building type and location-specific statistical data and floor area financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ statistics_{b,e} \times Floor\ area_b \times Average\ emission\ factor_e$	**Score 4**
Option 3			Estimated building energy consumption per building based on building type and location-specific statistical data and number of buildings financed	$\sum_{b,e} \frac{Outstanding\ amount_b}{Property\ value\ at\ origination_b} \times Estimated\ energy\ consumption\ from\ statistics_{b,e} \times Number\ of\ buildings_b \times Average\ emission\ factor_e$	**Score 5**

[212] Where b=building and e=energy source.

MOTOR VEHICLE LOANS – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-6. Detailed description of the data quality score table for motor vehicle loans[213]

Option	Description				Data quality
	Attribution	**Emission factor**		**Financed emissions calculation**	**Highest to lowest**
	Financial data	Emissions data		Equations	
Option 1a	Outstanding amount and total value of vehicle or vehicle fleet at origination	Emission factors[214] specific to the fuel type	Primary data on actual vehicle fuel consumption	$\sum_{v,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Fuel\ consumption_v \times Emission\ factor_f$	**Score 1**
Option 1b			Primary data on actual vehicle distance traveled plus vehicle's fuel efficiency and fuel type from known vehicle make and model	$\sum_{v,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_v\ x\ Efficiency_{v,f} \times Emission\ factor_f$	
Option 2a			Local statistical data for distance traveled plus vehicle's fuel efficiency and fuel type from known vehicle make and model	$\sum_{v,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_l \times Efficiency_{v,f} \times Emission\ factor_f$	**Score 2**
Option 2b			Regional statistical data for distance traveled plus vehicle's fuel efficiency and fuel type from known vehicle make and model	$\sum_{v,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_r \times Efficiency_{v,f} \times Emission\ factor_f$	**Score 3**
Option 3a			Local or regional statistical data for distance traveled plus vehicle's fuel efficiency and fuel type from known vehicle type	$\sum_{t,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_s \times Efficiency_{t,f} \times Emission\ factor_f$	**Score 4**
Option 3b			Local or regional statistical data for distance traveled plus vehicle fuel's efficiency and fuel type from average vehicle	$\sum_{a,f} \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v} \times Distance\ traveled_s \times Efficiency_{a,f} \times Emission\ factor_f$	**Score 5**

[213] Where v = vehicle or vehicle fleet with known make and model for that vehicle, t = vehicle or vehicle fleet with known vehicle type, a = assumed average vehicle or vehicle fleet, l = local estimation of distance traveled, r = regional estimation of distance traveled, s = local or regional estimation of distance traveled, f = fuel type (fuel type in the case of electric or hybrid vehicles can also refer to electricity).

[214] Of all options shown in the table, supplier-specific emission factors (e.g., from an electricity provider) for the respective primary activity data are always preferred over non-supplier-specific emission factors.

SOVEREIGN DEBT – DETAILED SUMMARY OF DATA NEEDS AND EQUATIONS TO CALCULATE FINANCED EMISSIONS

Table 10.1-7. Detailed description of the data quality score table for sovereign debt

Option	Description					Data quality
	Attribution		Emission factor		Financed emissions calculation	Highest to lowest
	Financial data		Emission data		Equations	
Option 1a	Outstanding amount (loan or bond) to the sovereign	PPP[215]-adjusted Gross Domestic Product (GDP)	Verified GHG emissions of the country, reported by the country to UNFCCC		$\sum_c \frac{Outstanding\ amount_c}{PPP-adjusted\ GDP_c} \times Verified\ country\ emissions_c$	**Score 1**
Option 1b			Unverified GHG emissions of the country		$\sum_c \frac{Outstanding\ amount_c}{PPP-adjusted\ GDP_c} \times Unverified\ country\ emissions_c$	**Score 2**
Option 2a			Primary physical activity data of the country's energy consumption (domestic generated and imported) by energy source (e.g., megawatt-hours of electricity) plus any process emissions	Emission factors specific to that primary data (e.g., energy source-specific emission factors)	$\sum_c \frac{Outstanding\ amount_c}{PPP-adjusted\ GDP_c} \times Energy\ consumption_c \times Emission\ factor$	**Score 3**
Option 3a			GHG emissions per sector revenue	Revenue per sector[216]	$\sum_c \frac{Outstanding\ amount_c}{PPP-adjusted\ GDP_c} \times Revenue_{s,c} \times \frac{GHG\ emissions_{s,c}}{Revenue_{s,c}}$	**Score 4**
Option 3b			GHG emissions per ppp-adjusted GDP of proxy country	PPP-adjusted GDP of the country	$\sum_c \frac{Outstanding\ amount_c}{PPP-adjusted\ GDP_c} \times PPP-adjusted\ GDP_c \times \frac{GHG\ emissions_{proxy}}{PPP-adjusted\ GDP_{proxy}}$	**Score 5**

[215] Purchasing power parity (PPP)

[216] If revenue is not deemed a suitable financial indicator for estimating the emissions of a company in a certain sector, one can apply other suitable financial indicators as a proxy. If an alternative indicator is used, the reasoning for the selection of this alternative indicator should be made transparent. The data quality score will not be affected.

10.2. Sample table templates displaying reported emissions for a given fiscal year

Table 10.2-7. Example of a GHG accounting report for scopes 1, 2, and 3

Scopes and categories	Baseline year emissions (tCO_2e) (if relevant)	Current reporting year emissions (tCO_2e)
Scope 1 emissions		
Total scope 1		
Scope 2 emissions		
Total scope 2		
Upstream scope 3 emissions		
Category 1: Purchased goods		
Category 2: Capital goods		
Category 3: Fuel- and energy-related activities		
Category 4: Upstream transportation and distribution		
Category 5: Waste generated in operations		
Category 6: Business travel		
Category 7: Employee commuting		
Category 8: Upstream leased assets		
Downstream scope 3 emissions		
Category 9: Downstream transportation and distribution		
Category 10: Processing of sold products		
Category 11: Use of sold products		
Category 12: End-of-life treatment of sold products		
Category 13: Downstream leased assets		
Category 14: Franchises		
Category 15: Investments**		
Total emissions all scopes		
Scope 1 total emissions		
Scope 2 total emissions		
Scope 3 total emissions		
Overall total emissions		

See Table 10.2-8 and Table 10.2-9 for examples how to report scope 3 category 15 (investments) emissions.

Table 10.2-8. Example reporting of absolute financed emissions—scope 3, category 15 (investments)

Activity	Total outstanding loan and investments covered (x € 1,000)	Scope 1+ Scope 2 emissions (tCO_2e)	Scope 3 emissions (tCO_2e)	Emission intensity (tCO_2e/€M)	Weighted data quality score (High Quality = 1 Low Quality = 5)
Absolute emissions per asset class (if reporting by asset class)					
Listed Equity & Bonds					
Business Loans					
-Sector 1, e.g., Cement					
-Sector 2, e.g., Cattle					
Project Finance					
Mortgages					
Commercial Real Estate					
Motor Vehicle Loans					
Sovereign Debt					
Total					
Absolute emissions per sector (if reporting by sector)					
Oil & Gas					
Agriculture					
Total					

Table 10.2-9. Example reporting of financed emission removals and avoided emissions—scope 3, category 15 (investments)

Activity	Total outstanding loan and investments covered (x € 1,000)	Emissions (tCO_2e)	Emission intensity (tCO_2e/€M)	Weighted data quality score (High Quality = 1 Low Quality = 5)
Avoided emissions from renewable power projects				
Wind				
Solar				
Total				
Emissions removals from forestry projects				
Carbon credits generated				
Total				
Carbon credits retired				
Total				

PCAF

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Financed Emissions

The GLOBAL GHG ACCOUNTING & REPORTING Standard / PART A

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