Partnership for Carbon Accounting Financials

Enabling financial institutions to measure emissions associated with financial activities

PCAF Partnership for Carbon Accounting Financials

LSFI Luxembourg Sustainable Finance Initiative

What words come to mind when you hear ‘GHG accounting’?

Agenda

- THE VALUE OF MEASURING FINANCED EMISSIONS
- INTRODUCTION TO PCAF
- PCAF DRIVING TANGIBLE BUSINESS OUTCOMES
- GHG ACCOUNTING IMPLEMENTATION
- DEEP DIVE
- PCAF PROJECT:
  FINANCING TOWARDS NET-ZERO BUILDINGS
- BENEFITS OF JOINING PCAF
- Q&A

The value of measuring emissions associated with financial activities

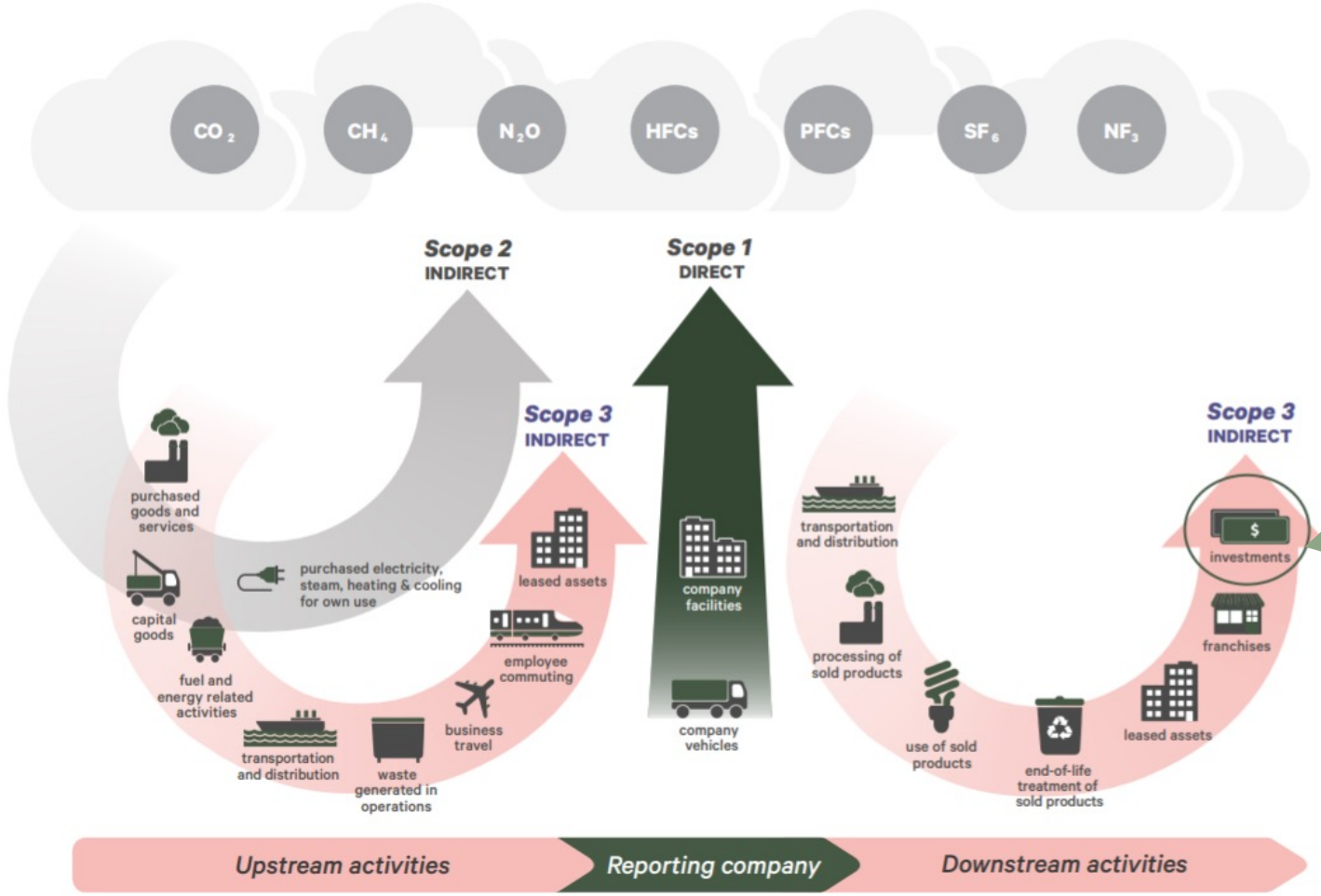
PCAF
Partnership for
Carbon Accounting
Financials

Intro to GHG accounting for financial institutions

Greenhouse gas (GHG) accounting for financial institutions is the annual accounting and disclosure of **GHG emissions** associated with **financial activities** at a fixed point in time in line with financial accounting periods.

What gets measured gets managed.

Financial institutions indirectly create a climate impact through their financial activities

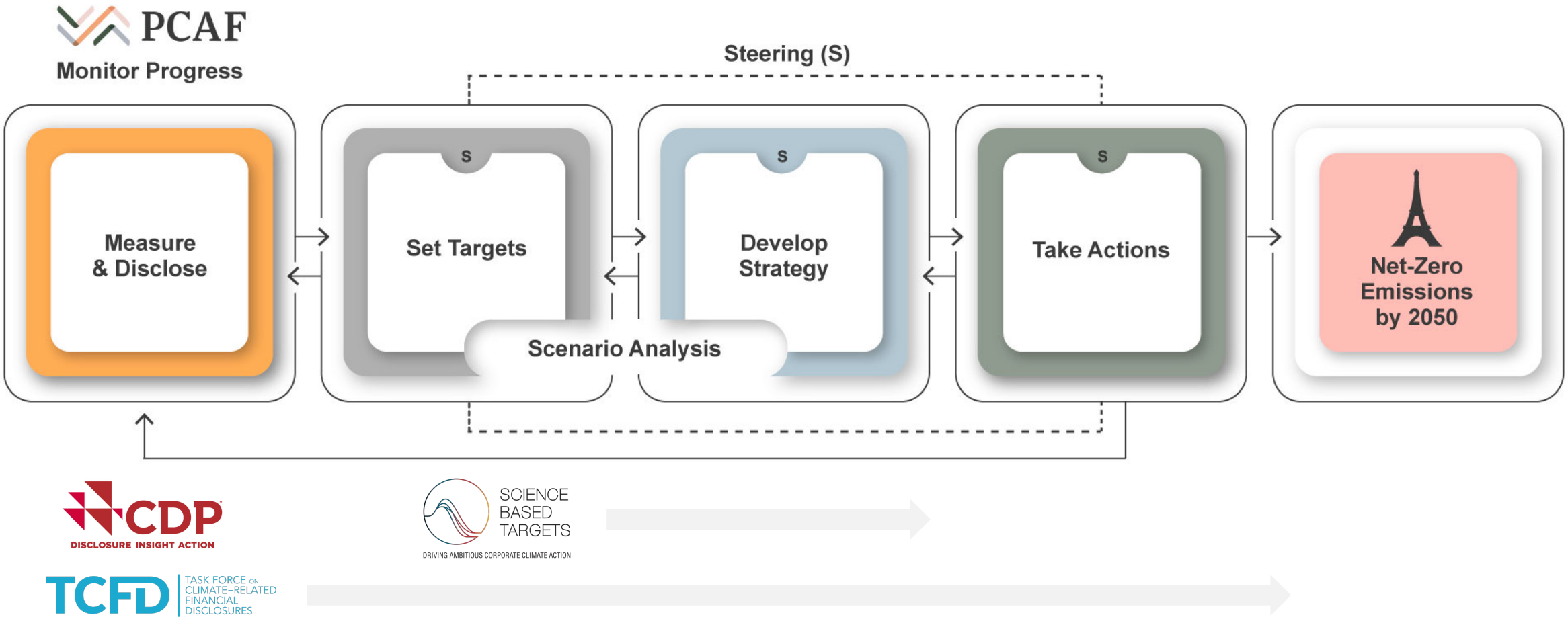


In alignment with the GHG Protocol, PCAF enables financial institutions to measure and report Scope 3, Category 15 emissions.

Portfolio emissions of global financial institutions are on average **700x larger** than direct emissions.[1]

[1] *Source: CDP, 2020:* https://www.cdp.net/en/research/global-reports/financial-services-disclosure-report-2020

GHG accounting exists as a discrete action in a sequence that allows banks and investors to measure, disclose and align



Introduction to PCAF

PCAF Partnership for Carbon Accounting Financials

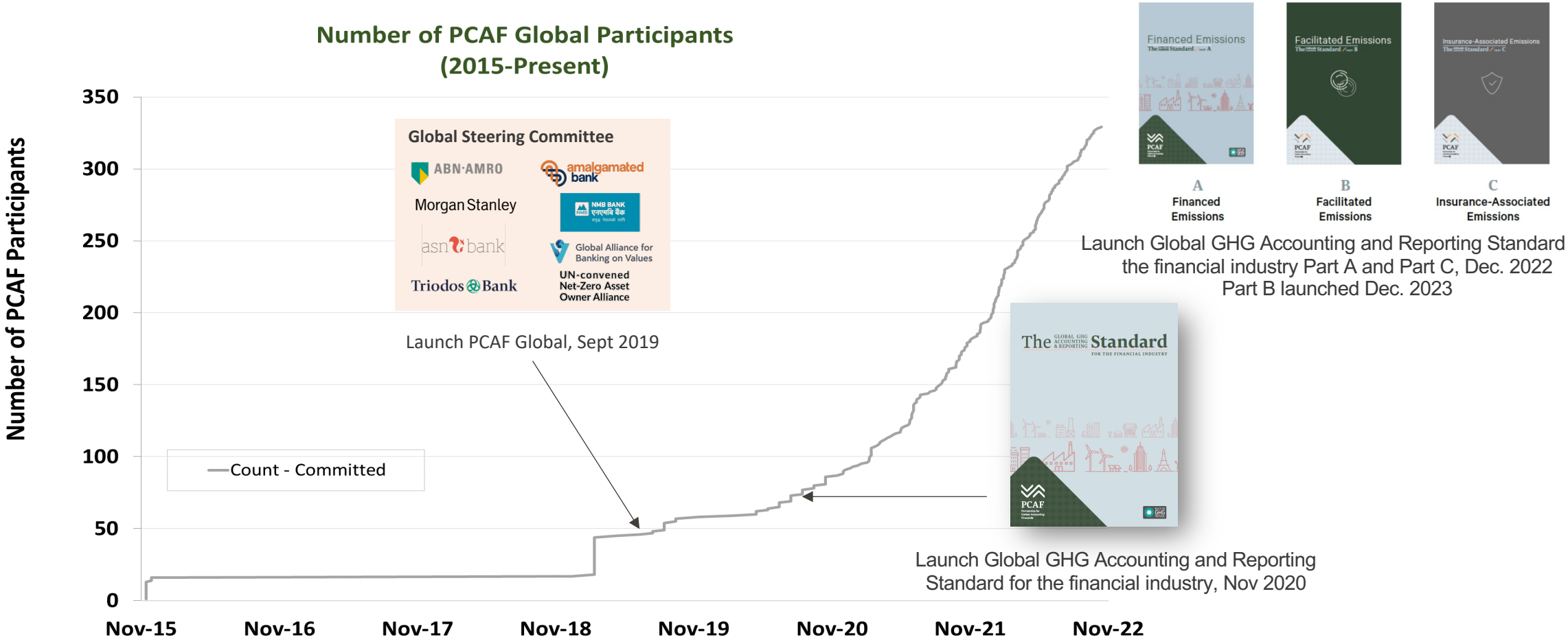
How familiar are you with PCAF?

1. We have never heard of PCAF prior to this event
2. We have heard of PCAF but are not a signatory
3. We are using the PCAF Standard(s) but are not a signatory
4. We are a PCAF signatory but have not applied the Standard(s) to measure financed emissions/insurance-associated emissions
5. We are a PCAF signatory, and we are currently using/have used the Standard measure financed emissions/insurance-associated emissions

How familiar are you with measuring emissions associated with financial activities calculation?

1. We have not started to calculate the financed emissions/insurance-associated emissions.
2. We are about to start / or have started the calculation and looking for standards, methodology and support.
3. We have calculated/disclosed the financed emissions/insurance-associated emissions focusing on key sectors in our portfolio.

PCAF's goal is to further develop the Global GHG Accounting and Reporting Standard for the Financial Industry and reach +1,000 signatories by 2025



The standard contains three distinct parts: Financed Emissions, Facilitated Emissions and Insurance-Associated Emissions

The Standard is divided into three parts

Each part of the Standard focuses on a different financial activity

Part A – Financed Emissions

- Provides methodological guidance **to measure and disclose GHG emissions** associated with seven asset classes as well as guidance on emission removals.
- The **seven asset classes** are: 1) listed equity and corporate bonds, 2) business loans and unlisted equity, 3) project finance, 4) commercial real estate, 5) mortgages, 6) motor vehicle loans, and 7) sovereign debt.

Part B – Facilitated Emissions

- Provides methodological guidance for measuring and reporting the GHG emissions associated with **the capital markets transactions**
- Launched on **1st December 2023**.

Part C – Insurance-Associated Emissions

- Provides methodological guidance for measuring and reporting the GHG emissions associated with **re/insurance underwriting for two segments**.
- **The two segments** are: 1) commercial lines, and 2) personal motor lines.

476 financial institutions in 74 countries are part of PCAF, 173 disclosed

PCAF OBJECTIVES

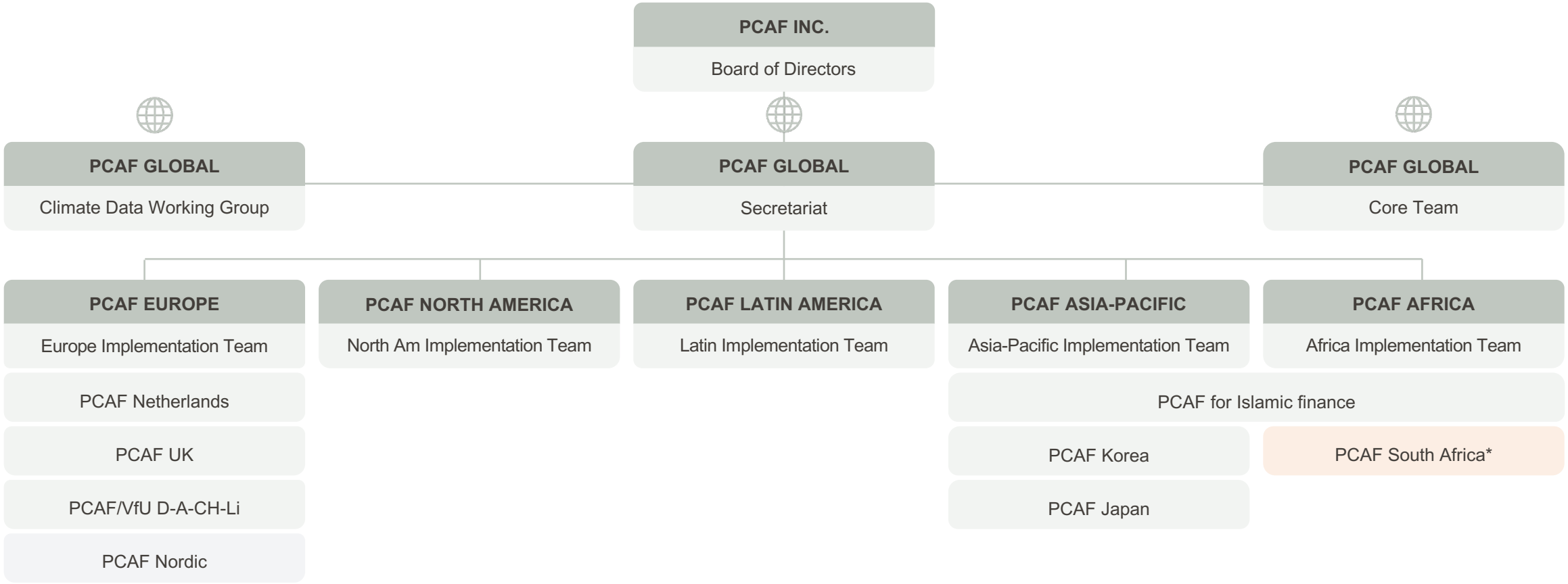
Develop the Global GHG Accounting and Reporting Standard for the Financial Industry

Increase the number of financial institutions that use the Standard and disclose financed emissions to over 1,000 institutions worldwide by year-end 2025

CHECK THE FULL LIST OF PCAF SIGNATORIES HERE

DOWNLOAD THE GLOBAL GHG ACCOUNTING AND REPORTING STANDARD HERE

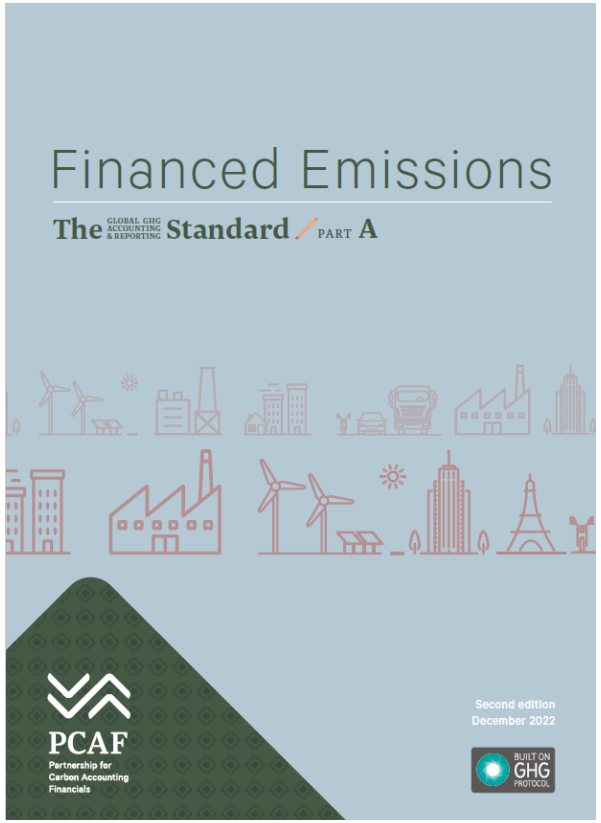
PCAF drives implementation through regional and national collaborations



* Under consideration. Additional national chapters can be created upon demand.

Ready to use – second edition of the PCAF Standard Financed Emissions

CLICK HERE TO DOWNLOAD THE PCAF STANDARD

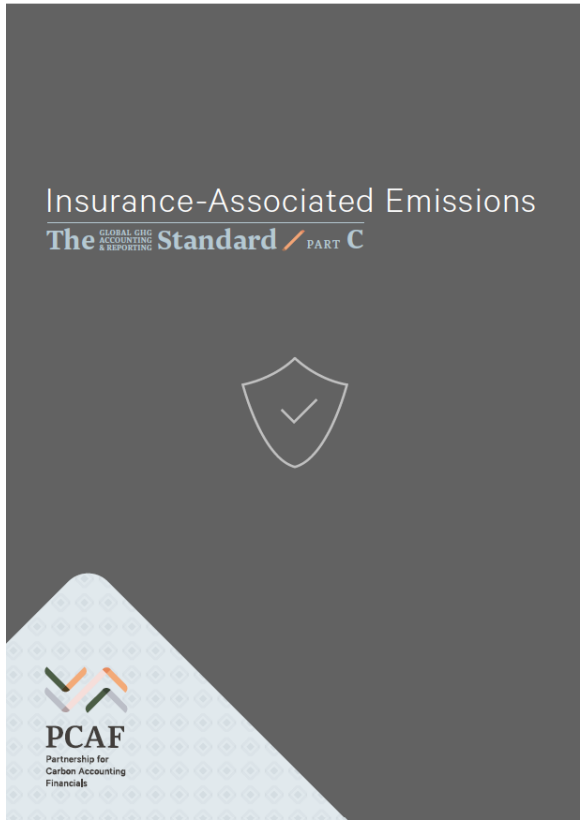


- LISTED EQUITY AND CORPORATE BONDS
- BUSINESS LOANS AND UNLISTED EQUITY
- PROJECT FINANCE
- COMMERCIAL REAL ESTATE
- MORTGAGES
- MOTOR VEHICLE LOANS
- SOVEREIGN DEBT

EMISSION REMOVAL GUIDANCE

Ready to use – first edition of the PCAF Standard Insurance-Associated Emissions

CLICK HERE TO DOWNLOAD THE PCAF STANDARD



Commercial lines

COMMERCIAL LINES

Personal motor lines

PERSONAL MOTOR LINES

2024 Standard Development Workplan*

Methodology development 2024

Following a rigorous process, in which the PCAF Core Team used criteria such as materiality and demand to filter from a long list provided by PCAF signatories, the following priority areas were identified for methodology development in 2024:

- Transition finance and green finance
- Securitized and structured products
- Inventory fluctuations (resulting from changes over time to the financial attribution metrics, such as EVIC)
- **Additional insurance products**
  - Treaty reinsurance
  - Project insurance (construction-all-risk/erection-all-risk)

Additional Core Team Activities

In addition, during 2024, further exploratory work will be conducted across the following areas for future standard development cycles:

- Additional consumer finance products
- Additional facilitated emissions products including derivatives, hedge funds and others
- Embodied carbon from real estate
- Municipal bonds / sub-sovereigns

* For more details, please also see press release PCAF announces areas for standard development in 2024 from 16th January 2024.

PCAF works with various global partners and collaborators

All Global Net-Zero Alliances and Net-Zero Initiatives

UN-convened Net-Zero Asset Owner Alliance

Paris Aligned Investment Initiative

Reporting, Target-Setting and Sector Alignment initiatives

CDP
DISCLOSURE INSIGHT ACTION

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Center for Climate Aligned Finance

CRREM

GRESB

Joint Impact MODEL

Leading local Sustainable Finance networks and actors

KOSIF Korea Sustainability Investing Forum

VFU

General Council for Islamic Banks and Financial Institutions
CIBAFI
المجلس العام للبنوك والمؤسسات المالية الإسلامية

Many regulations and legislations already require GHG accounting and reporting (1/2)

REGULATIONS	REPORTING REQUIREMENT			VOLUNTARY/ MANDATORY
	SCOPE 1	SCOPE 2	SCOPE 3	
EU Taxonomy Regulation	✓	✓	✓	**Mandatory** for public interest entities (PIEs)* with 500+ employees
Sustainable Finance Disclosure Regulation (SFDR)	✓	✓	✓	**Mandatory** for all FMPs and Pas in the EU with 500+ employees
Accounting Directive & Non-Financial Reporting Directive (NFRD)[1]	*No specific disclosure requirements[1]*			**Mandatory** in all EU Member States for public interest entities (PIEs)* with 500+ employees
Corporate Sustainability Reporting Directive (CSRD)	✓	✓	✓	**Mandatory** for undertaking in scope of NFRD plus entities with 250+ employees and all listed companies
Capital Requirements Regulation (CRR) & Capital Requirements Directive (CRD)	✓	✓	✓	**Mandatory** for large FIs with issued securities on an EU market

[1] Does NOT impose detailed disclosure requirements; GHG accounting and reporting, for instance, is NOT required. Allows for non-disclosure of information if this is made transparent and reasons are given.

* Public interest entities (PIEs), i.e. entities established in the EU whose securities are admitted to trading on an EU regulated market, as well as licensed credit institutions and insurance companies having their registered office in the EU and entities designated by a Member State as such

Many regulations and legislations already require GHG accounting and reporting (2/2)

REGULATIONS	REPORTING REQUIREMENT			VOLUNTARY/ MANDATORY
	SCOPE 1	SCOPE 2	SCOPE 3	
Securities and Exchange Commission (SEC) Proposed Rule on the Enhancement and Standardization of Climate-Related Disclosures for Investors	✓	✓	*Specific requirements*[1]	**Mandatory** for domestic and foreign registrants in the US
Task Force on Climate-related Financial Disclosures (TCFD)	✓	✓	✓	**Voluntary** but part of regulatory framework in multiple countries
International Sustainability Standards Board on Climate Disclosure	✓	✓	✓	**Voluntary**

PCAF enables financial institutions to comply with these regulations and legislations by providing a standardized methodology to measure and report financed emissions.

[1] Only required if scope 3 emissions are either material to the company or if the company has set a scope 3 emission targets

PCAF Driving Tangible Business Outcomes

PCAF Partnership for Carbon Accounting Financials

Measuring and disclosing financed emissions furthers climate-related business goals and aligns with other initiatives

Business Goal 1
Create transparency for stakeholders

Business Goal 2
Manage climate-related transitions risks

Business Goal 3
Develop climate-friendly financial products

Business Goal 4
Align financial flows with the Paris Agreement

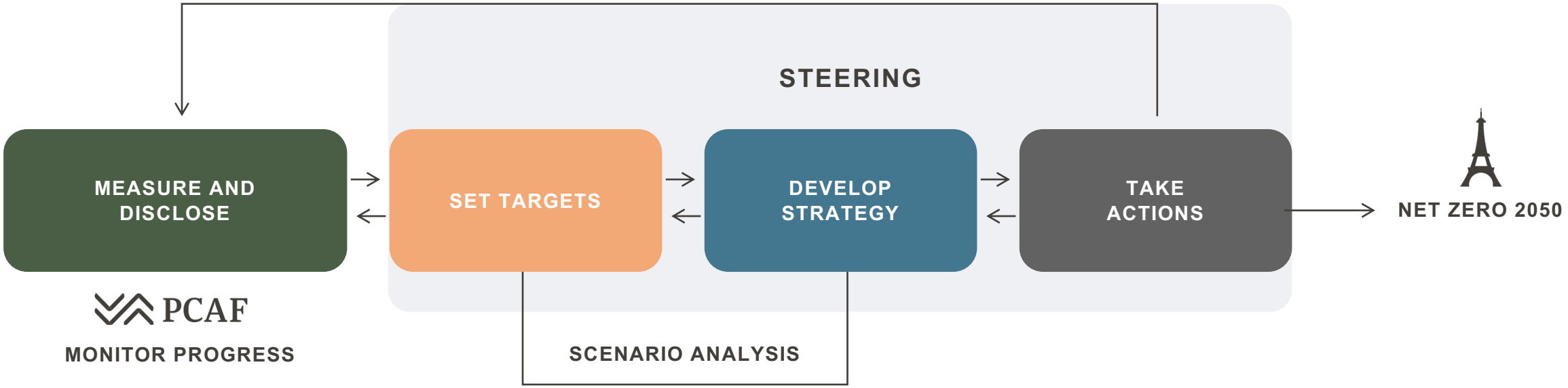
MEASUREMENT OF FINANCED EMISSIONS

CDP DISCLOSURE INSIGHT ACTION

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

GHG accounting exists as a discrete action in a sequence that allows financial institutions to measure, disclose and align



DOWNLOAD THE STRATEGIC FRAMEWORK (PDF, 2.1 MB)

GHG Accounting Implementation

PCAF Partnership for Carbon Accounting Financials

In (max) three words, what are the key challenges that you have faced or anticipate to face when calculating financed emissions/insurance-associated emissions?

Emissions are attributed to financial institutions based on robust and consistent accounting rules

FINANCED EMISSIONS

$$= \sum_{i} \frac{\text{Investment}_i}{\text{Investee equity}_i + \text{Investee debt}_i} \quad x \quad \text{Emissions of investee}_i$$

(with i = investee)

Attribution Factor

- The attribution factor is used to show the FI's share of the borrow or investee's emissions
- A borrower or investee is a general term and could represent a company, property, project or motor vehicle (asset class dependent)

Emissions are attributed to financial institutions based on robust and consistent accounting rules

FINANCED EMISSIONS

$$= \sum_{i} \frac{\text{Investment}_i}{\text{Investee equity}_i + \text{Investee debt}_i} \times \text{Emissions of investee}_i$$

(with i = investee)

Hierarchy of preference

- Reported emissions$_i$
- Physical activity-based emissions$_i$
- Economic activity-based emissions$_i$

Emissions are attributed to financial institutions based on robust and consistent accounting rules

FINANCED EMISSIONS

$$= \sum_{i} \frac{\text{Investment}_i}{\text{Investee equity}_i + \text{Investee debt}_i} \times \text{Emissions of investee}_i$$

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Hierarchy of preference

1. Reported emissions$_i$
2. Physical activity-based emissions$_i$
3. Economic activity-based emissions$_i$

Reporting recommendations and requirements: Data and data quality

- FIs **shall** use the most recent or otherwise appropriate data available to them.
- FIs **should** provide a description of the ***types*** and ***sources*** of data used to calculate emissions. Descriptions **should** be written to create transparency.
- 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.

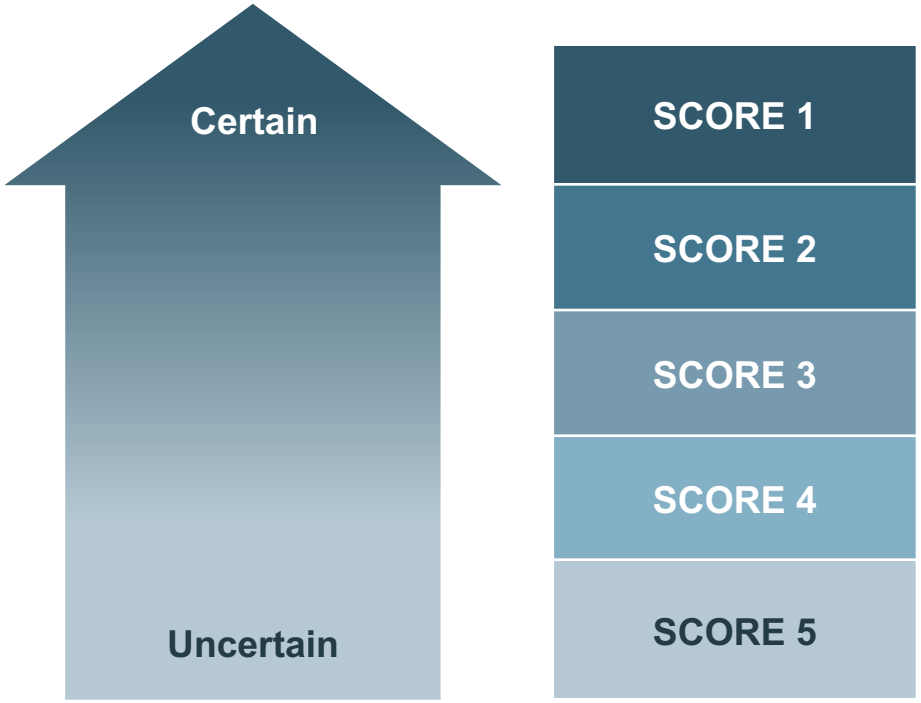
GENERAL DESCRIPTION OF THE DATA QUALITY SCORE TABLE FOR BUSINESS LOANS AND UNLISTED EQUITY

Hierarchy of preference: Highest → Lowest

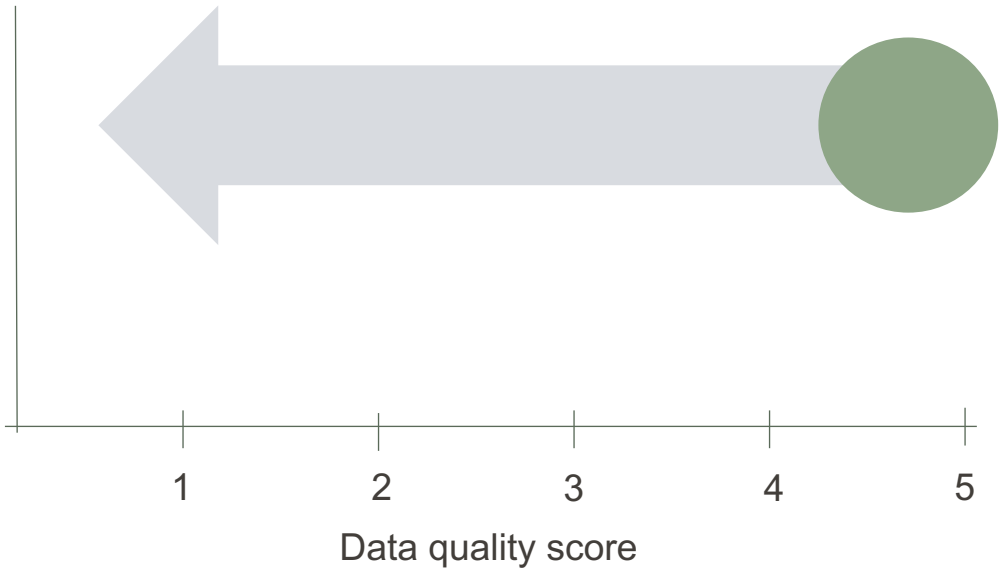
Data quality	Options to estimate		When to use each option
Score 1	Option 1: Reported emissions	1a	• Outstanding amount in the company and EVIC are known. • **Verified emissions** of the company are available.
Score 2	Option 1: Reported emissions	1b	• Outstanding amount in the company and EVIC are known. • **Unverified emissions** calculated by the company are available.
Score 2	Option 2: Physical activity-based emissions	2a	• 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 specific to that primary data. • Relevant process emissions are added.
Score 3	Option 2: Physical activity-based emissions	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** are known. • Emission factors for the sector per unit of revenue are known (e.g., tCO_2e per euro of revenue earned in a sector).
Score 5	Option 3: Economic activity-based emissions	3b	• Outstanding amount in the company is known. • Emission factors for the sector per unit of asset (e.g., tCO_2e per euro of asset in a sector) are known.
Score 5	Option 3: Economic activity-based emissions	3c	• Outstanding amount in the company is known. • Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

PCAF introduces quality score tables per asset class to enable financial institutions to improve data over time

DATA QUALITY SCORING FROM 1 TO 5....

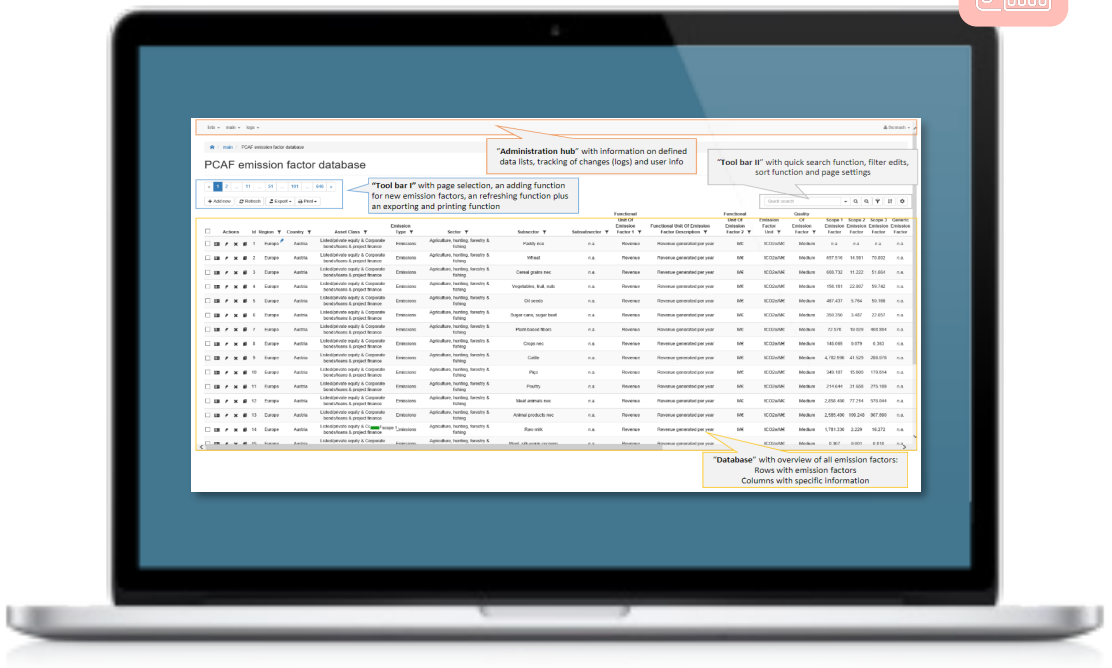


...ENABLES FINANCIAL INSTITUTIONS TO DEVELOP STRATEGIES TO IMPROVE DATA QUALITY OVER TIME



PCAF's open-source database enables financial institutions to start with GHG accounting at asset class level

- Directly based on the PCAF methods to kick-start assessment of emissions associated with financial activities
- Including emission factors for the IAE LoBs
- Hotspot the most emissions intensive parts attributed to the bank, investor or re/insurer
- Link to register: https://db.carbonaccountingfinancials.com/register.php



Available for PCAF signatories

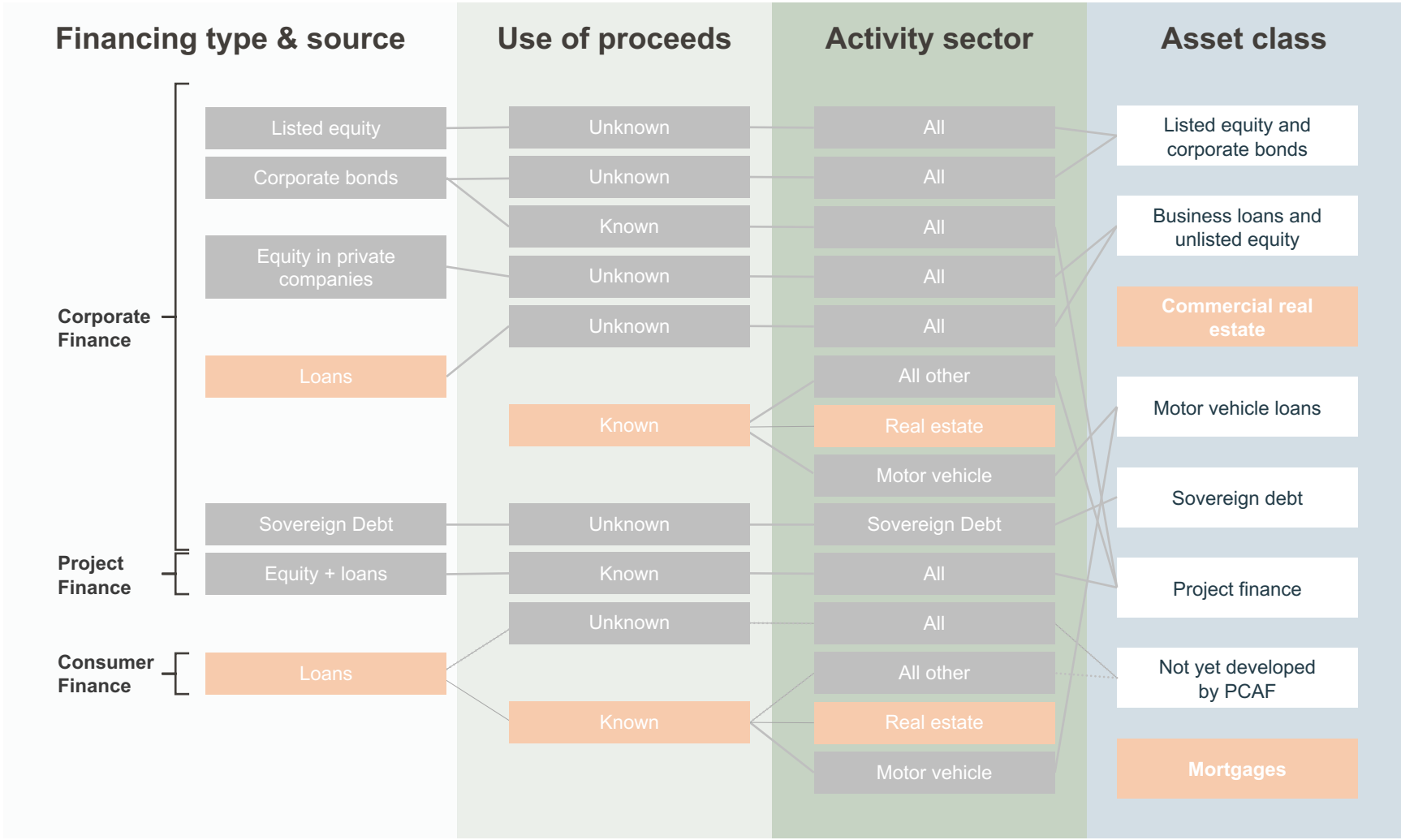
Set of publicly available emission factors across geographies and asset classes

Transparent

Includes data quality score card

Deep dive: Commercial real estate and mortgages

Part A Financed Emissions provides guidance for choosing an asset class-specific approach to calculate financed emissions



Financing type & source:

- "Loans (debt)"

Use of proceeds:

- "Known"

Activity sector:

- "Real estate"

Examples:

- A bank provides a loan to a company to purchase an office space
- A mortgages bank provides a mortgages to a family to buy a house

Commercial Real Estate: Coverage

What is covered?

- Purchase and refinance of **CRE**
- On-balance sheet investments when financial institution has **no operational control over the property**

Commercial real estate

Inclusions

- **Properties used for commercial purposes** where the owner of the building uses the property to **conduct income-generating activities** (e.g. retail, hotels, office space, industrial, or large multifamily rentals)
- CRE investments where the financial institution **does not have operational control**

Exclusions

- CRE investments listed in the stock market → **Listed Equity**
- Loans secured by CRE for other purposes than CRE or unsecured loans to CRE companies → **Business loans**

Mortgages: Coverage

What is covered?

- Purchase and refinance of **residential property**
- **On-balance sheet loans** for specific consumer purposes, defined as the purchase and/or refinance of a residential property

Mortgages

Inclusions

- Properties used only for residential purposes **and not for commercial purposes**. This means income-generating activities are not conducted on-premise (individual homes and multifamily housing with a small number of units)
- 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

Exclusions

- **Home equity loans and home equity lines of credit** → **Not required at this moment**
- Emissions from **construction or renovation** → **Not required at this moment**

Calculating financed emissions for CRE and mortgages follows the same general equation

FINANCED EMISSIONS $= \sum$ **Attribution factor$_b$** x **Building Emissions $_b$**

(with b = building)

- The attribution factor is used to show the FI's share of the borrower or investee's emissions
- An investee is a general term and could represent a company, property, project etc. (asset class dependent)

$$\frac{\text{Outstanding amount}_b}{\text{Property value at origination}_b}$$

Hierarchy of preference

1. **Actual building emissions**

or

2. **Estimated building emissions based on floor area**

or

3. **Estimated building emissions based on number of buildings**

Understanding the inputs to the attribution factor equation

Attribution Factor

$$\frac{\text{Outstanding amount}_b}{\text{Property value at origination}_b}$$

(with b = building)

Outstanding Amount

The monetary value of the loan or investment on the financial institution's balance sheet

Property Value at Origination

- The **monetary value of a property** when a loan is secured, including the value of the land, the property, and any building improvements
- When the property value at origination **cannot be obtained**, use the latest property value available and fix this value for the following years of GHG accounting

Understanding the inputs to the building emissions equation

Building Emissions $= \sum$ **Energy consumption**$_{b,e}$ **x** **Emission factor**$_{e}$

(with b = building and e = energy source)

Definition

- Unit of energy consumed by a property
  - kWh or MWh of electricity
  - BTUs or cubic meters of natural gas
  - Gallons or liters of fuel oil
- 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 properties.

Definition

- The quantity of CO2 or CO2 equivalent produced from each unit of energy consumed
  - Kg of CO2e / kWh
  - Tons of CO2e / MWh
- Regional electricity grid mix data for a property's location should be used. If unavailable, country-level electricity grid mix emissions data should be used.

PCAF provides three options to calculate financed emissions from CRE and mortgages

Highest

Hierarchy of preference

Lowest

Data quality	Options to estimate		When to use each option
Score 1	Option 1: Actual building emissions	1a	• Primary data on actual building energy consumption is available • Emissions are calculated using supplier-specific emission factors
Score 2		1b	• Primary data on actual building energy consumption is available. • Emissions are calculated using average emission factors.
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.
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.
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.

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: CRE and Mortgages

Option 1A – Actual building emissions, supplier specific emission factor available

Option 1A example: Office building in Chicago, USA
Outstanding invested amount per 31/12: 50 EURM

- Property value at origination: 100 EURM
- Annual electricity consumption: 300 MWh
- Annual gas consumption: 40,000 m^3
- Electricity emission factor: 853 kgCO2e /MWh
- Gas emission factor: 2 kgCO2e /MWh

Data Quality Score 1

FICTIVE AND INDICATIVE FIGURES USED

1 $$\text{Financed Emissions}_b = \frac{\text{Outstanding Amount}_b}{\text{Property value at origination}_b} \times \text{Energy Consumption}_{b,e} \times \text{Emission Factor}_{b,e}$$

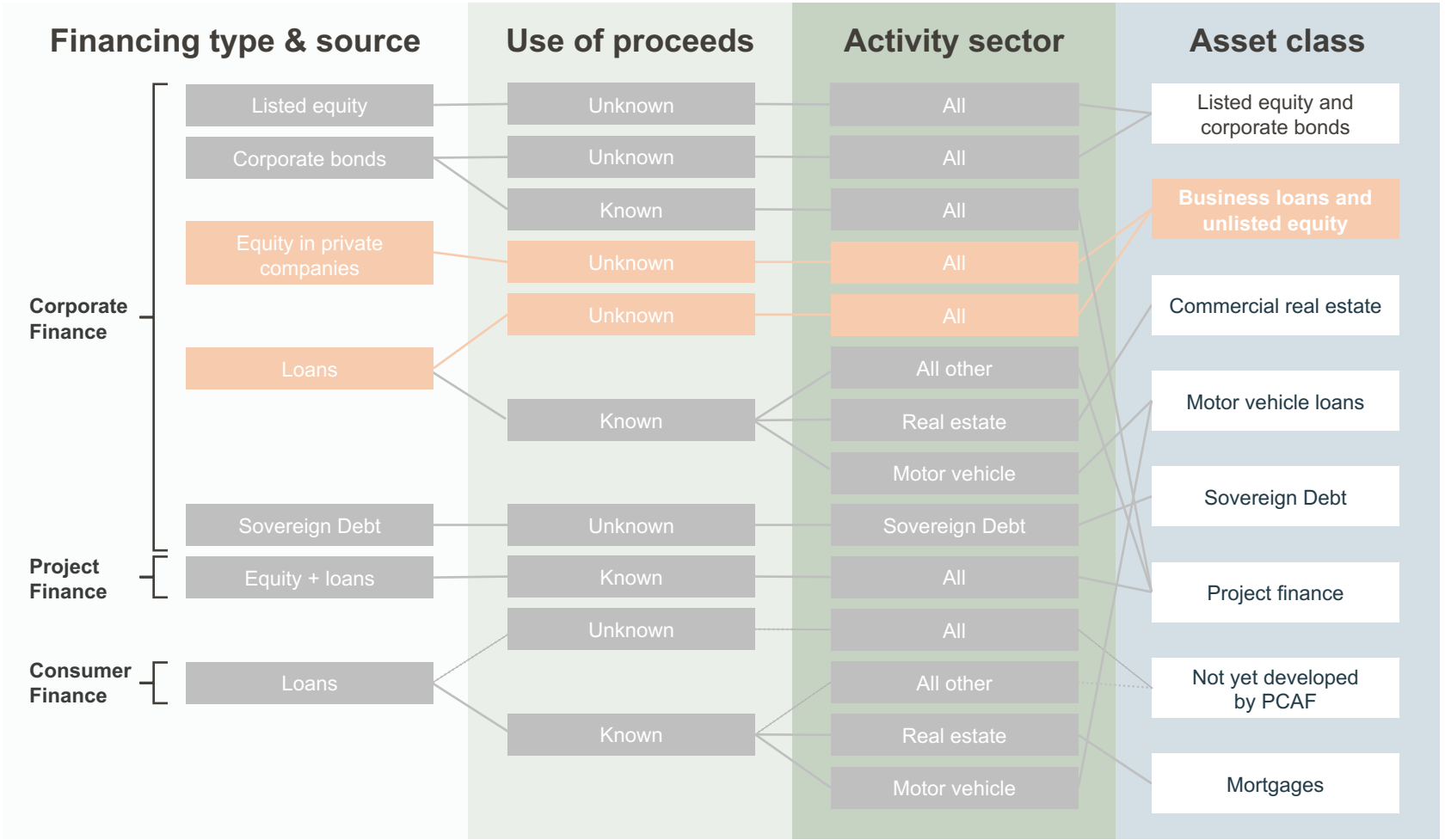
2 $$\text{Property Emissions}_{b,\text{ electricity}} = 300\ \text{MWh} \times 853 \frac{\text{kg } CO_2e}{\text{MWh}} = 255{,}900\ \text{kg } CO_2e \text{ emissions}$$

3 $$\text{Property Emissions}_{b,\text{ natural gas}} = 40{,}000\ m^3 \times 2.0 \frac{\text{kg } CO_2}{m^3} = 80{,}000\ \text{kg } CO_2e \text{ emissions}$$

4 $$\text{Financed emissions}_b = \frac{50}{100} \times (255{,}900 + 80{,}000) = \mathbf{145{,}448\ kg\ CO_2e}$$

Deep dive: Business loans and unlisted equity

Part A Financed Emissions provides guidance for choosing an asset class-specific approach to calculate financed emissions



FINANCING TYPE & SOURCE:

- "Business loans"
- "Unlisted equity"

USE OF PROCEEDS:

- "Unknown"

ACTIVITY SECTOR:

- "All"

EXAMPLE:

- A bank provides a loan to a private company which uses this loan for general corporate purposes
- A bank holds shares in a company that is not traded on the market

Business loans & unlisted equity: Coverage

What is covered?

- For **general corporate purposes** (i.e., *unknown use of proceeds*)
- **On the balance sheet** of the financial institution

NOTE: indirect investments (funds) that incorporate BL/UE should follow the same approach

BUSINESS LOANS

Inclusions

- All lines of **credits <u>not</u> trade on the market**
- Revolving credit facilities, overdraft facilities and business loans secured by real estate (e.g. CRE-secured lines)
- RCF, bridge loans and letters of credit: only loans outstanding on year end balance sheet of FI

Exclusions

- Any **<u>off-balance sheet</u> loans and lines of credits**

UNLISTED EQUITY

Inclusions

- All lines of credits **<u>not</u> traded on the market**
- Equity investments in private companies

Exclusions

- **Private equity to investment funds**

Calculating financed emissions for business loans and unlisted equity follows the same calculation method

FINANCED EMISSIONS $= \sum$ **Attribution factor**$_c$ **x** **Emissions** $_c$

(with c = borrower or investee company)

- The attribution factor is used to show the FI's share of the investee's emissions
- An investee is a general term and could represent a company, property, project etc. (asset class dependent)

$$\frac{\text{Outstanding amount}_c}{\text{Total book value of equity}_c + \text{debt}_c}$$

or

$$\frac{\text{Outstanding amount}_c}{\text{Enterprise value including cash (EVIC)}}$$

1. **Reported emissions**$_c$

or

2. **Physical activity-based emissions**$_c$

or

3. **Economic activity-based emissions**$_c$

Hierarchy of preference

However, the attribution factor is different for listed and private companies

$$\text{Financed emissions} = \sum_{c} \text{Attribution factor}_c \times \text{Company emissions}_c$$

For business loans and equity investments to/ in private companies

The **outstanding book value of equity** that the financial institution holds in the private company

$$\text{Attribution factor}_c = \frac{\text{Outstanding amount}_c}{\text{Total equity+debt}_c}$$

(With c = borrower or investee company)

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

$$\frac{\#\text{shares of financial institutions}}{\#\text{total shares}_c} \times \text{Total equity}_c$$

For business loans to listed companies

The **actual outstanding amount** in listed equity

- **Listed equity**: value is based on market value (market price * number of shares)

$$\text{Attribution factor}_c = \frac{\text{Outstanding amount}_c}{\text{Enterprise value including cash}_c}$$

(With c = borrower or investee company)

EVIC (Enterprise Value Including Cash) is a sum of:

- the **market capitalisation** of ordinary shares at fiscal year-end, the market capitalisations of preferred shares at fiscal year-end, and the book values of total debt and minorities interest
- No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values

For more information about EVIC, see page 52 onwards of Part A – Financed emissions

PCAF provides three options to calculate financed emissions for business loans and unlisted equity

Hierarchy of preference: Highest → Lowest

Data quality	Options to estimate		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	Option 1: Reported emissions	1b	• Outstanding amount in the company and total company equity plus debt are known. • **Unverified emissions** calculated by the company are available.
Score 2	Option 2: Physical activity-based emissions	2a	• 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 of the **company's energy consumption** and emission factors specific to that primary data. Relevant process emissions are added.
Score 3	Option 2: Physical activity-based emissions	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 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, total company equity plus debt, and the **company's revenue** 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	Option 3: Economic activity-based emissions	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.
Score 5	Option 3: Economic activity-based emissions	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.

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: Business loans & unlisted equity

Option 1A – Reported emissions available

$$\text{Financed Emissions}_b = \frac{\text{Outstanding Amount}_c}{\text{Total } equity + debt_c/EVIC} \times \text{Verified company emissions}_c$$

(with c = company)

Outstanding corporate bond amount per 31/12: 2 EURM

- Total debt + equity: 10 EURM
- Scope 1&2 Emissions reported by the company: 9.7 tCO_2e

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{Total equity} + \text{debt}_c} \times \text{Verified company emissions}_c$
2. $\text{Financed emissions}_c = \frac{2\text{m}}{10\text{m}} \times 9.7\ tCO_2e$
3. $\text{Financed emissions}_c = 0.2 \times 9.7\ tCO_2e$
4. $\text{Scope 1\&2 Financed emissions}_c = 1.94\ tCO_2e$

Outstanding invested amount per 31/12: 0.8 EURM

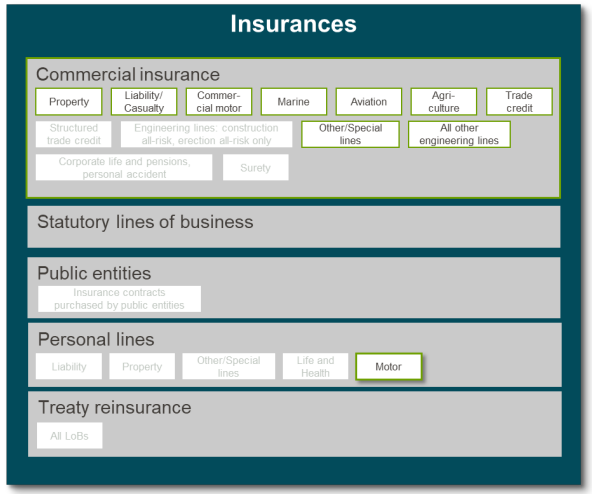
- EVIC: 1.2 EURM
- Scope 1&2 Emissions reported by the company: 3.5 tCO_2e

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{EVIC}_c} \times \text{Verified company emissions}_c$
2. $\text{Financed emissions}_c = \frac{0.8\text{m}}{1.2\text{m}} \times 3.5\ tCO_2e$
3. $\text{Financed emissions}_c = 0.67 \times 3.5\ tCO_2e$
4. $\text{Scope 1\&2 Financed emissions}_c = 2.33\ tCO_2e$

Deep dive:
Commercial Lines

Commercial Lines: Coverage



Commercial lines

What is included

- Property (e.g., fire, multi peril)
- Liability/Casualty (e.g., General Liability, Product Liability)
- Commercial Motor (all lines)
- Marine (liability and hull)
- Aviation (liability and hull)
- Agri-culture (excl. government schemes)
- Trade credit (insurance of credit risk for sold goods)
- All other engineering lines (e.g., machinery breakdown)
- Other/special lines (e.g., Financial Lines)
- Statutory lines of businesses

What is excluded

- Structured trade credit (insurance of credit risk for bank loans, etc.)
- Surety
- Engineering lines: construction all-risk, erection all-risk only
- Corporate life and pensions, personal accident
- Public entities

Calculating financed emissions for business loans and unlisted equity follows the same calculation method

INSURANCE-ASSOCIATED EMISSIONS $= \sum$ **Attribution factor**$_c$ **x** **Emissions** $_c$

(with c = insured client)

- The attribution factor is used to show the share of the emission to be associated with the re/insurer

$$\frac{Re/insurance\ premium_i}{\text{Customer revenue}_i}$$

1. **Reported emissions**$_c$

or

2. **Physical activity-based emissions**$_c$

or

3. **Economic activity-based emissions**$_c$

or

4. **Estimated emissions**$_c$

Hierarchy of preference

PCAF provides three options to calculate insurance-associated emissions for commercial lines insurance

Data quality | **Options to estimate** | **When to use each option**

Highest

Hierarchy of preference

Lowest

			Attribution factor	Scope 1 Emissions	Scope 2 Emissions
Score 1	Option 1: Reported Emissions	1a	Re/Insurance Premium / Customer Revenue	▪ Reported - Verified	▪ Reported Market Based - Verified
Score 2	Option 1: Reported Emissions	1b	Re/Insurance Premium / Customer Revenue	▪ Reported - Unverified	▪ Reported Market Based – Unverified ▪ Reported Location Based – Verified ▪ Reported Location Based - Unverified
Score 2	Option 2: Reported or physical activity-based emissions	2a	Re/Insurance Premium / Customer Revenue	▪ Energy Consumption x EF (Intensity per MWh of Electricity)	
Score 3	Option 2: Reported or physical activity-based emissions	2b	Re/Insurance Premium / Customer Revenue	▪ Production Output x EF (Average Sector Emission Intensity per t of Production [output])	
Score 4	Option 3: Economic-activity based emissions	3a	Re/Insurance Premium / Customer Revenue not aligned with insured entity	▪ Reported Emissions/Energy Consumption/Production Output Data not aligned with insured entities	
Score 5	Option 3: Economic-activity based emissions	3b	Re/insurance Premium / Average Sector Revenue	▪ Average Sector Revenue x EF (Average Sector Emission Intensity per Revenue)	

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.

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: Commercial lines

A simple exercise to calculate insurance-associated emissions using reported emissions

Scenario context

- We are considering a **dairy farm** in the Netherlands
- **Re/insurance premium**: EUR 1 million
- **Revenue** (€) = EUR 10 million
- **Emissions reported** by the farm: 3,500 t CO_2e*
- **No emission factor** necessary

FICTIVE AND INDICATIVE FIGURES USED

Step-by-step approach: Insurance-associated emissions (IAE)

1. $\text{Attribution factor}_i = \frac{Re/Insurance\ premium_i}{\text{Customer revenue}_i}$

   $\text{IAE} = \text{Attribution factor}_i \ x \ Emissions$

2. $IAE_c = \underbrace{\frac{1\ M€}{10\ M€}}_{Attribution} \times \underbrace{3{,}500\ t\ CO_2e}_{Emissions}$

3. $IAE_c = 10\% \times 3{,}500\ t\ CO_2e$

4. $IAE_c = \mathbf{350\ t\ CO_2e}$

PCAF Project: Financing towards net-zero buildings

PCAF Partnership for Carbon Accounting Financials

PCAF launched a new project in 2021/2022: Financing towards net-zero buildings

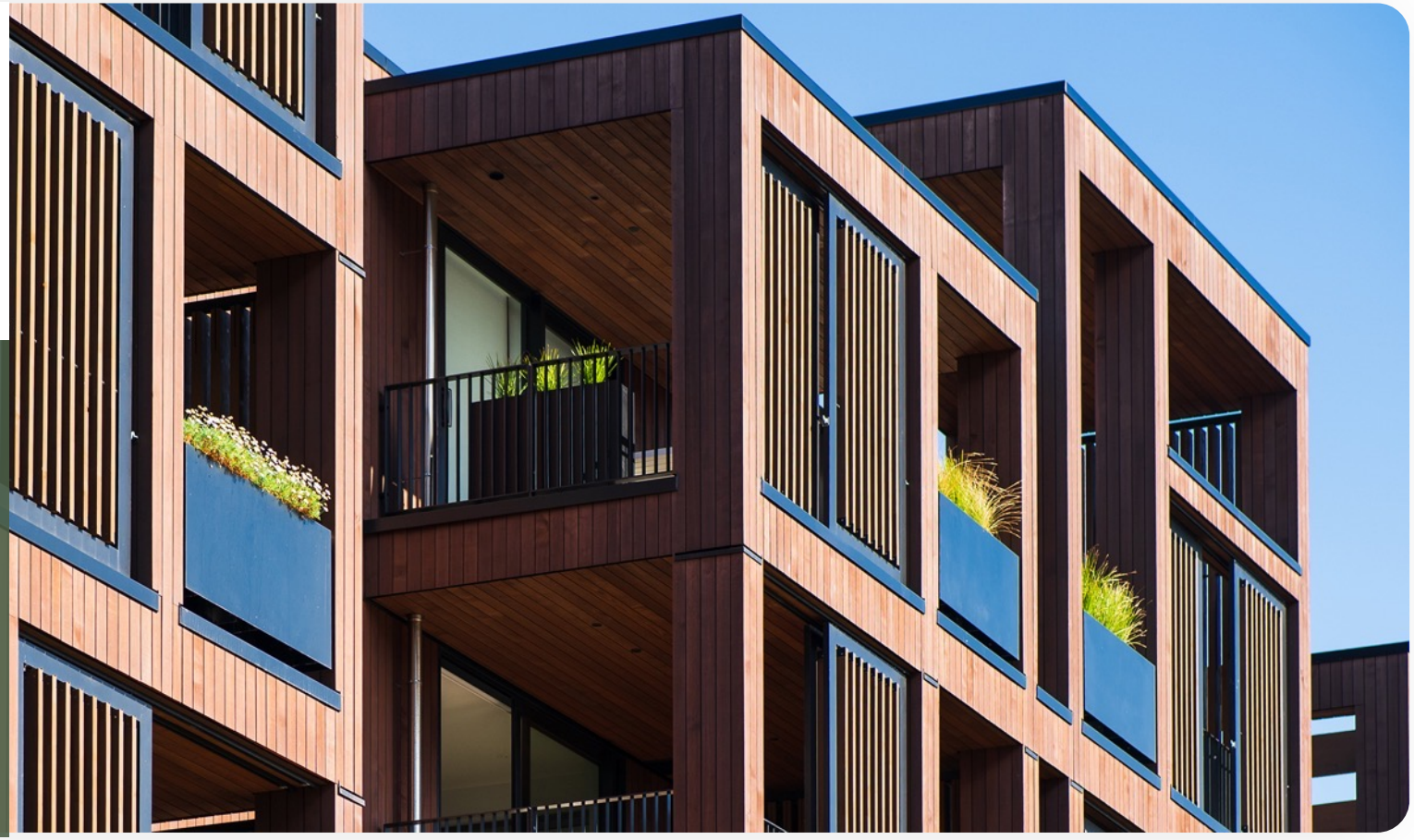
Financing towards net-zero buildings

a PCAF project

Addressing the need to mobilize the financial industry to accelerate the transition of European buildings to net zero

Developed a European buildings emission factor database (publicly available)

Read more on our website



Mobilizing the financial industry to decarbonize buildings in Europe

Mobilizing the financial industry to accelerate their actions to transition European buildings to net zero and make the impact of those actions transparent via clear carbon accounting

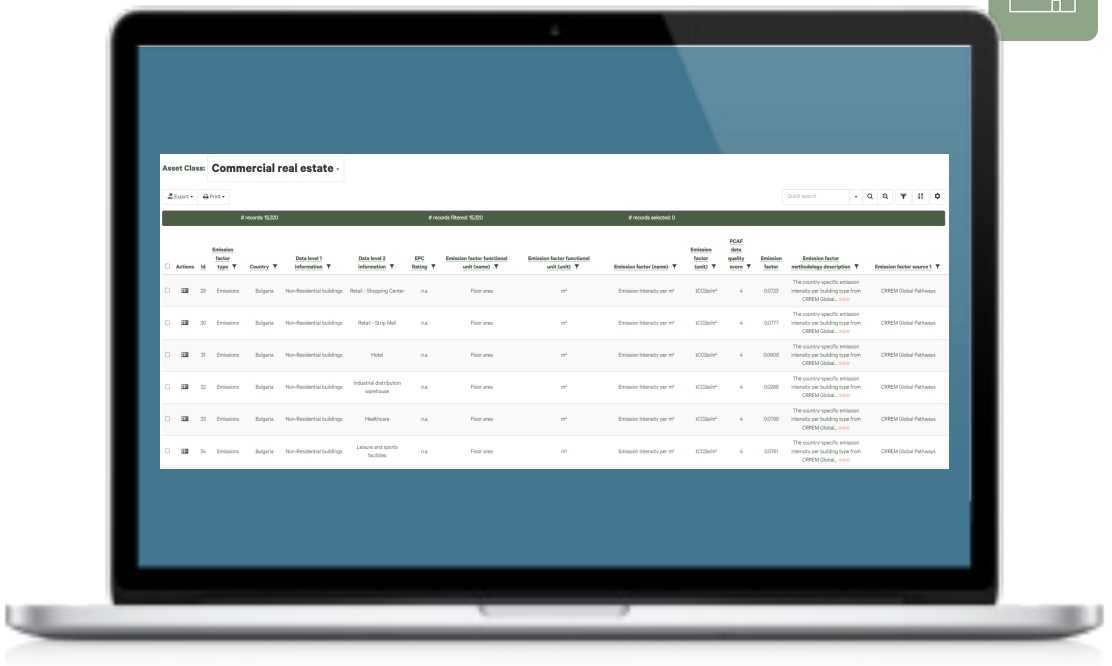
Establishing a core project team and creating and implementing a communication strategy

Enabling financial institutions to measure and track the climate impact of their mortgage and real estate portfolios and their actions towards net zero

Understanding the challenge towards net zero and creating of a good practice guideline on financing the European building transition to net zero

PCAF's European building emission factor database

- It provides a diverse set of emission and energy factors for residential and non-residential building types
- Covers all countries in the European Union, Bosnia-Herzegovina, Kosovo, Norway, Serbia, Switzerland, Türkiye and the United Kingdom
- Link to register: https://building-db.carbonaccountingfinancials.com/

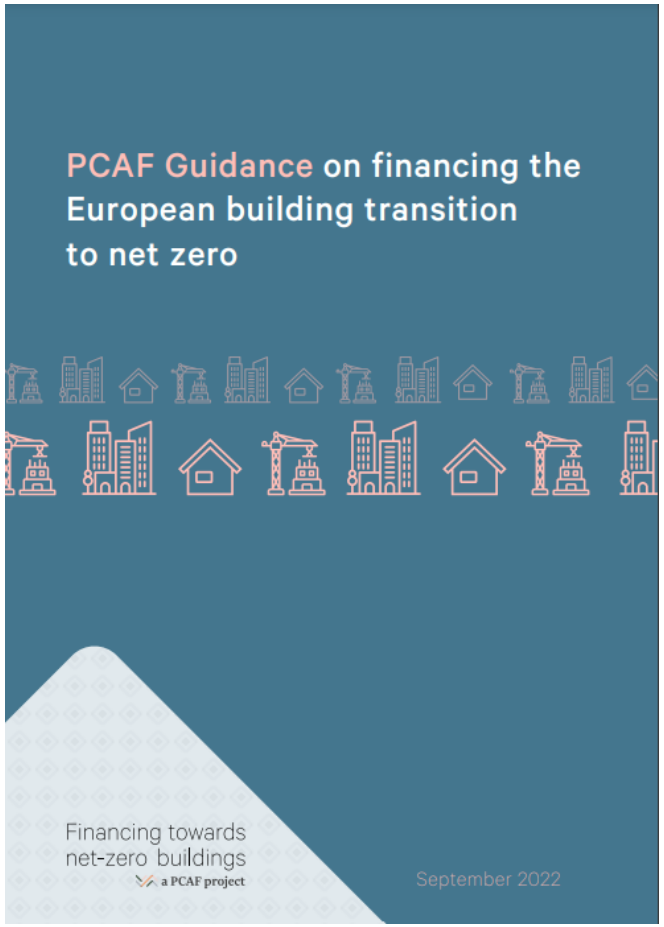


Available for free to all financial institutions

Based on publicly available sources (CRREM Global Pathways)

Transparent

Includes data quality score card



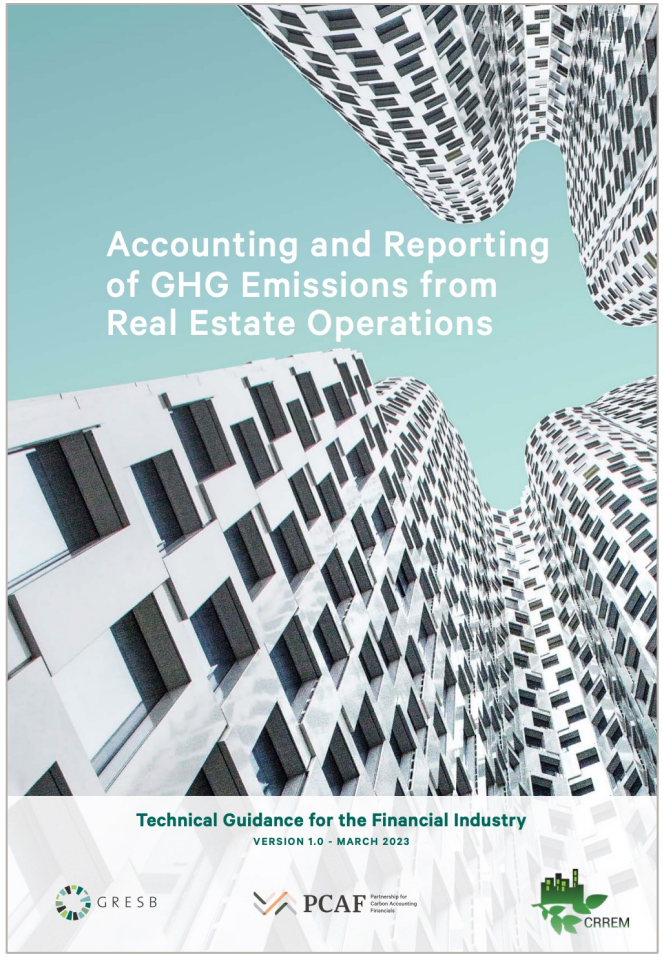
Guidance on financing the European building transition to net zero

Aim to provide clear guidance to financial institutions how to initiate the net-zero journey and decarbonize their building portfolios along a stepwise approach

Review by Core Project Team, Expert Advisory Group and further stakeholders

Launched in September 2022

Link to the Guidance



Technical Guidance by PCAF, CRREM and GRESB for Real Estate Operations

Aim to provide financial institutions and related stakeholders with transparent, consistent and harmonized guidance

Additional specifications to PCAF's Global GHG Accounting and Reporting Standard for the Financial Industry on a range of technical, data and standards issues relating to GHG from real estate

Launched in March 2023

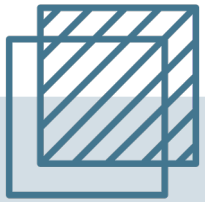
Link to the Technical Guidance

Benefits of PCAF

PCAF Partnership for Carbon Accounting Financials

Financial institutions join PCAF to contribute to transparency and harmonization, as well as to prepare for the future

WHY JOIN PCAF?

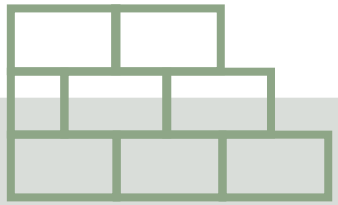


TRANSPARENCY

- Interact with data providers and clients to understand data quality and approaches used
- Manage stakeholders that increasingly demand transparency

HARMONIZATION

- Measure consistently to have a better understanding of portfolios climate impact and climate risks



GROUNDWORK

- Manage risks, steer on emissions reduction goals and take action based on transparent and harmonized emissions accounting
- Prepare for regulation

Joining PCAF also brings multiple additional benefits

NETWORK EXPANSION

- Investors, banks and experts globally
- Link to SBTi-FIs, UNEP FI's NZAOA, NZBA, GFANZ, TCFD and CDP

DECISION-MAKING AUTHORITY

- The Global GHG Accounting and Reporting Standard (when joining the PCAF core team)
- Local-tailored guides
- Best practices

LEADERSHIP RECOGNITION

- Global and regional events on climate finance
- Social media via PCAF marketing channels

TECHNICAL SUPPORT

- Workshops and trainings
- Technical guides and case studies
- Access to PCAF Academy

PCAF participants commit to assess and disclose the greenhouse gas emissions of its financial portfolio

COMMITMENT IN SHORT:

Measure and disclose the portfolio GHG emissions within **three years** of signing the commitment letter (portfolio coverage is up to the institution)

Commitment letter

All financial institutions involved in the Partnership for Carbon Accounting Financials ("PCAF") pledged and adhere to the following commitment. By joining PCAF, our financial institution also commits to adhere to this:

Addressing the urgent challenge of climate change, and decarbonizing our economy, is more pressing now than ever. That is why we have committed to measure and disclose the greenhouse gas (GHG) emissions associated with our portfolio of loans, investments, (re)insurance underwriting, and other financial products and services* within a period of three years using jointly developed GHG accounting methodologies, in order to ultimately enable the alignment of our portfolio with the Paris Climate Agreement.

We want to share and learn from credible GHG accounting practices to find solutions to shared challenges. We hope this will encourage and stimulate the adoption of GHG accounting and target setting in the financial sector on a larger and mainstream scale.

We will contribute to the overall objective of PCAF, which is to secure the public commitment (via signed commitment letters) of at least 1,000 participating financial institutions globally to measure and disclose the GHG emissions of their loans, investments, (re)insurance underwriting, and other financial products and services within a period of three years. Together we will collaborate to achieve transparency and uniformity in GHG accounting.

We will pay the PCAF signatory fee associated with our sector categorization on an annual basis per PCAF payment terms in effect at the time of signing this letter. Our contribution will support the inclusive growth and expansion of the initiative and the development of new methods, guidance, and other resources that can assist financial institutions on their GHG accounting journey.

We acknowledge that our commitment will be recognized on the PCAF website and social media accounts, as well as at other communication activities such as events where the initiative is showcased.

* *Other financial products and services include for example capital market instruments. PCAF signatories will be able to measure emissions related to these products when the methodology becomes available.*

Thank you.

carbonaccountingfinancials.com

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@pcafglobal

Annex

PCAF Partnership for Carbon Accounting Financials

PCAF supports CDP in creating transparency for stakeholders

Business Goal 1
Create transparency for stakeholders

Business Goal 2
Manage climate-related transition risks

Business Goal 3
Develop climate-friendly financial products

Business Goal 4
Align financial flows with the Paris Agreement

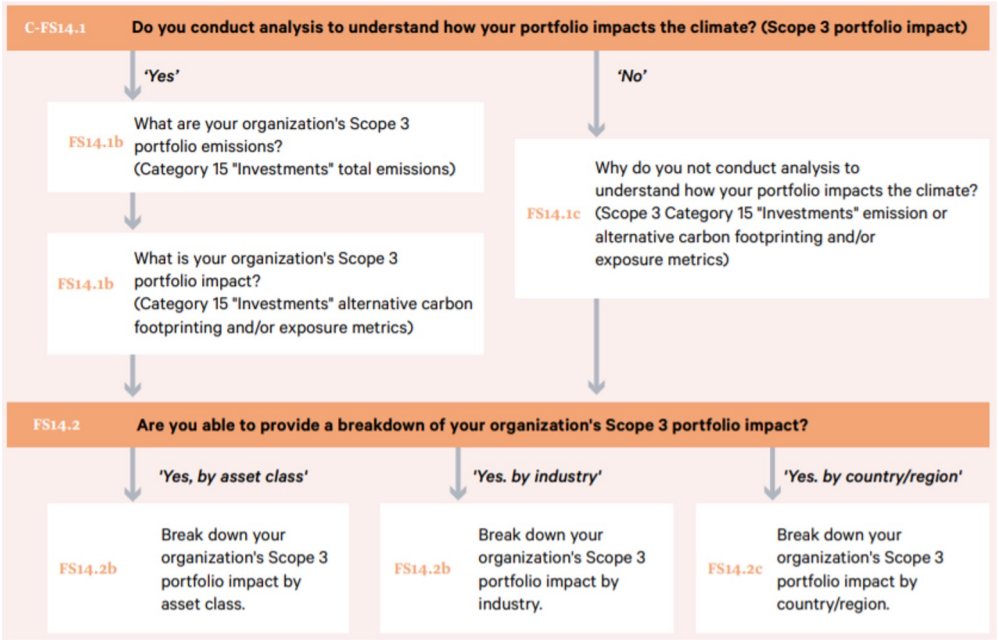
Aim of the business goal:
Create transparency for stakeholders

Activities to achieve the goal:
Disclose financed emissions, along with a breakdown of these emissions by asset class, sector, and geography

Main organization:
CDP helps organizations disclose their environmental impact

CDP
DISCLOSURE INSIGHT ACTION

Using PCAF to calculate financed emissions to enable a successful completion of the CDP Questionnaire



Snapshot of the CDP questionnaire from 2020; please refer to CDP for any updates

Financed emissions are a key metric to understand climate-related transition risks as per the TCFD

Business Goal 1	**Business Goal 2**	Business Goal 3	Business Goal 4
Create transparency for stakeholders	Manage climate-related transition risks	Develop climate-friendly financial products	Align financial flows with the Paris Agreement

Aim of the business goal:
Understand and manage climate-related transition risks

Activities to achieve the goal:
Measure financed emissions and as a result of financed emissions assessments, financial institutions can identify GHG-intensive hotspots that could be subject to higher transition risk

Main organization:
TCFD provides a framework to measure and disclose the transition risks posed to organizations by climate-related policies and regulations

TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

TCFD officially recommends that banks, asset owners and asset managers measure and disclose financed emissions in line with the PCAF Standard

Financed emissions inform climate strategies to develop products that support the transition toward net-zero

Business Goal 1	Business Goal 2	Business Goal 3	Business Goal 4
Create transparency for stakeholders	Manage climate-related transition risks	Develop climate-friendly financial products	Align financial flows with the Paris Agreement

Aim of the business goal:
develop climate-friendly financial products

Activities to achieve the goal:
Measuring financed emissions helps financial institutions understand whether their climate-friendly products are having the desired effect on their portfolio emissions

Examples:

Special mortgage to improve the energy efficiency of houses	Funding and affordable financing for clean vehicles	Green loan to fund green energy and sustainability projects	Commercial real estate tools to improve buildings energy efficiency
A dedicated financial product with a lower interest to customers that renovate their homes and aim to improve energy efficiency (B, A, A+)	Providing grants and affordable financing to help income-qualified citizens purchase or lease a new or used hybrid or electric vehicle	Enabling clients to fund projects with a positive climate impact or that help reduce climate impact. Including harnessing and storing solar and wind energy, or upgrading to eco-friendly machinery	Enabling real estate clients to increase the energy efficiency of buildings and associated carbon emissions. Using a sustainable investment tool, the financial institutions can assess the assets and recommend improvement measures along with special financing offerings

Measuring financed emissions sets the baseline for science based targets using the SBTi's methodologies

Business Goal 1	Business Goal 2	Business Goal 3	Business Goal 4
Create transparency for stakeholders	Manage climate-related transition risks	Develop climate-friendly financial products	Align financial flows with the Paris Agreement

Aim of the business goal:
Align financial flows with the Paris Agreement

Activities to achieve the goal:
Measuring financed emissions is necessary to establish a baseline from which science-based emission reduction targets can be set

Main organization:
Science Based Targets Initiative (SBTi)

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Net-zero emissions by 2050

Net-zero/ Paris alignment commitments
- The percentage of a portfolio with net-zero commitments is a measure of total portfolio alignment

Benchmark-divergence models
- Measure present-day performance and forward-looking forecasts of counterparty emissions against a reference pathway drawn from a climate scenario
- One example is **temperature warming metrics** where the 'temperature' of a portfolio is estimated and compared with a Paris benchmark of 1.5 °C

The Standard addresses data quality issues and advises on which data can give the most robust results for each asset class

Data quality scorin

Certain
(5-10% error margin in estim

SCORE 1
SCORE 2
SCORE 3
SCORE 4
SCORE 5

Uncertain
(40-50% error margin in estima

velop a strategy to

4 5

ore

Simple example to calculate asset class Data Quality Scores

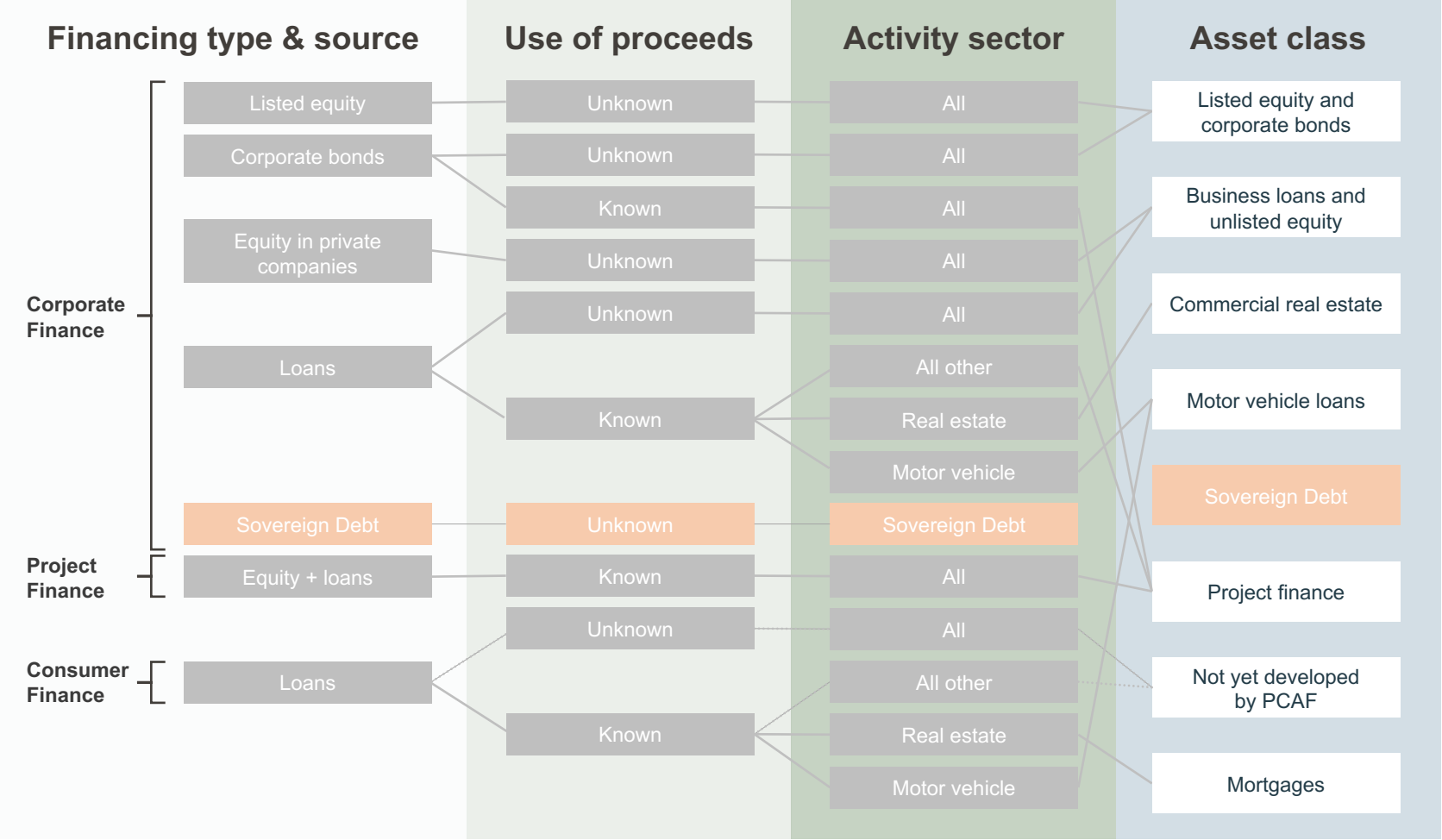
Investment	Asset Class	Portfolio Weighting	Data Quality Score (DQS)
PortCo A	Listed Equity	23%	1
PortCo B	Listed Equity	13%	1
PortCo C	Listed Equity	6%	3
PortCo D	CRE	10%	4
PortCo E	CRE	22%	5
PortCo F	Unlisted Equity	12%	2
PortCo G	Unlisted Equity	14%	3

Per asset class: calculate the sum product of the investment with the DQS and divide it by the asset class portfolio weight

Listed Equity DQS	**1.3**
CRE Equity DQS	**4.7**
Unlisted Equity DQS	**2.5**

Deep dive:
Sovereign debt

Part A Financed Emissions provides guidance for choosing an asset class-specific approach to calculate financed emissions



FINANCING TYPE & SOURCE:

- "Sovereign debt"

USE OF PROCEEDS:

- "Unknown"

ACTIVITY SECTOR:

- "Sovereign debt"

EXAMPLE:

- *A bank has sovereign bonds from a national government*

Sovereign debt: Coverage

What is covered?

- Debt issued by the **central government** or **treasury**
- Debt issued by **supranationals**
- **Central banks debt** when issuing **on behalf of the sovereign**

RULE OF THUMB: only include debt issued by or on behalf of the sovereign or an entity that supersedes a single sovereign

WHAT IS INCLUDED

Debt issued by the central government or treasury

- Both sovereign loans and bonds lead to the **transfer of funds** to the country, which creates a debt obligation to be paid (e.g., to France)

Debt issued by supranationals

- The balance sheet of supranationals should represent the **aggregated balance sheets** of their members (e.g., EU bonds)

Central banks debt when issuing on behalf of the sovereign

- Debt issued by central banks **on behalf of** the sovereign should be assigned the emissions of the respective sovereign

WHAT IS EXCLUDED

Debt issued by sub-sovereigns

- Sub-sovereigns like **provinces or states** are not directly subject to international GHG emissions inventory standards (e.g., UNFCCC)

Debt issues by municipal counterparties

- **Municipal counterparties** are not directly subject to international GHG emissions inventory standards (e.g., UNFCCC)

General exposure to central banks

- Investor's **exposure to central banks** that typically consists of cash, foreign exchange, and derivative (repo) transactions

Scope 1, 2, and 3 emissions for sovereign debt follow the definitions of the GHG Protocol accounting and reporting standard for cities

The main definition of scopes[1]

Emissions	Description
Scope 1	• Production emissions in line with the UNFCCC definition of domestic emissions: Domestic GHG emissions from sources located within the country's territory, including emissions from exported goods and services. This **shall** be reported.
Scope 2	• 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
Scope 3	• Emissions attributable to nonenergy imports as a result of activities taking place within the country territory

[1]Scope definitions based upon the Global Protocol for Community-Scale Greenhouse Gas Inventories

Financial institutions shall report sovereign borrower's absolute scope 1 emissions and should report scope 2 and 3 emissions

Further reporting scope recommendations

Shall report emissions including and excluding LULUCF

- Countries treat land use, land-use change, and forest (LULUCF) emissions differently in their mitigation targets and investors might have diverging views on the potentially offsetting role

Country	Emissions incl. LULUCF	Emissions excl. LULUCF	Δ
Finland	48,072 $ktCO_2e$	56,282 $ktCO_2e$	+17%
Austria	73,501 $ktCO_2e$	78,628 $ktCO_2e$	+7%

Should include consumption-emissions

- Consumption emissions reflect the demand side of sovereign emissions where the emissions from export should be extracted
- Consumption emissions = Production emissions + imported emissions – exported emissions
- Consumption emissions = Scope 1,2,3 – exported emissions

Calculating the attribution factor for sovereign debt

$$\text{Financed emissions} = \sum_{s} \text{Attribution factor}_s \text{ x Sovereign's emissions}_s$$

Attribution factor

Ratio of financial institution's exposure to sovereign bond over PPP-adjusted GDP of sovereign

$$\text{Attribution factor}_s = \frac{\text{Exposure to Sovereign Bond (USD)}}{\text{PPP} - \text{adjusted GDP(international USD)}}$$

(With s = sovereign)

What is PPP-adjusted GDP

- The value of a country's output as a proxy adjusted by the purchasing power parity (PPP) to improve comparability

Rationale for using GDP

- A country's output production (GDP) is closely tied to the generated emissions by that production
- Funds from financial institutions spur economic growth and therefore GDP

The different options correspond with a data quality score that reflects the accuracy in the financed emissions calculations

Highest

Hierarchy of preference

Lowest

Data quality	Options to estimate		When to use each option
Score 1	Option 1: Reported emissions	1a	▪ **Verified GHG emissions** of the country are available. Emissions are available for 'Annex I countries, from the UNFCCC. The GHG inventories follow a standardized template and are verified.
Score 2		1b	▪ **Unverified emissions** of the country are available. The data quality of unverified emissions varies significantly between countries.
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 (generated/imported) and specific emission factors
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	*Alternative option outside of 1, 2, and 3*	3b	▪ Country GHG emissions are estimated by **taking a proxy**. GHG emissions from similar climate (zones) and wealth (GDP) countries are taken to estimate the country's GHG emissions

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: Investment in a sovereign bond

OPTION 1A DQS 1 – REPORTED EMISSIONS

Exercise – using option 1a to calculate financed emissions for production emissions

Scenario context

- Sovereign bond from the French government
- Outstanding investment amount per 31/12:
  10 B EUR = 11 B int. $
- Total PPP-adjusted GDP: 2,500 B int. $
- France production emissions, UNFCCC:
  - excl. LULUCF: 396 Mt CO_2e
  - incl. LULUCF: 342 Mt CO_2e
- No emission factor necessary

Step-by-step approach

FICTIVE AND INDICATIVE FIGURES USED

1 $$\text{Financed emissions} = \sum_S \frac{\text{Outstanding amount}}{\text{PPP} - \text{adjusted GDP}} \times \text{Reported emissions}_S$$

Attribution | Emissions

Excluding LULUCF

2 $$\text{Financed emissions} = \frac{11\text{ B int. \$}}{2{,}500\text{ B int. \$}} \times 396\text{ Mt } CO_2e$$

Attribution | Emissions

3 $$\text{Financed emissions} = 0.0044 \times 396\text{ Mt } CO_2e$$

Attribution | Emissions

4 $$\text{Financed emissions} = \mathbf{1.74\text{ Mt } CO_2e}$$

Including LULUCF

$$= \frac{11\text{ B int. \$}}{2{,}500\text{ B int. \$}} \times 342\text{ Mt } CO_2e$$

Attribution | Emissions

$$= 0.0044 \times 342\text{ Mt } CO_2e$$

Attribution | Emissions

$$= \mathbf{1.50\text{ Mt } CO_2e}$$

[2] *Calculation receives data quality score 1 if reported emissions are verified and 2 if they are unverified.*

Sample calculation: Investment in a central bank bond

OPTION 3A DQS 4 – ECONOMIC ACTIVITY-BASED EMISSIONS

Exercise – using option 3a to calculate financed emissions for consumption emissions

Scenario context

- Bond issued by the German Central Bank on behalf of the German government
- Outstanding investment amount per 31/12: 16 M EUR = 17.6 M int. $
- Consumption emission factor (from PCAF Database, OECD): 138 tCO2e/M int. $

Step-by-step approach

FICTIVE AND INDICATIVE FIGURES USED

1. $$\text{Financed emissions} = \underbrace{\sum_{S} \frac{\text{Outstanding amount}}{\text{PPP} - \text{adjusted GDP}}}_{\text{Attribution}} \times \underbrace{\text{Emission factor}_S}_{\text{Emissions}}$$

2. $$\text{Financed emissions} = \text{Outstanding amount} \times \text{Emission factor}_S$$

3. $$\text{Financed emissions} = 17.6\ \text{M int.\$} \times 138\ \frac{\text{tCO}_2\text{e}}{\text{M int.\$}}$$

4. $$\text{Financed emissions} = \mathbf{2,428.8\ tCO_2e}$$

Sample calculation: Investment in a supranational bond

ALTERNATIVE OPTION DQS 5 – PROXY EMISSION FACTOR

Exercise – using an alternative option to calculate financed emissions

Scenario context

- Supranational bond from the European Union
- Outstanding investment amount per 31/12:
  20 M EUR = 22 M int. $

EU proxy emission factor:
115.35 tCO2e/M int. $

Step-by-step approach

FICTIVE AND INDICATIVE FIGURES USED

	PPP-adjusted GDP (B int. $)	Emission factor (tCO2e/M int. $)	Emissions (MtCO2e)
France	2,500	79	197,500
Germany	3,125	138	431,250
Spain	1,890	126	238,140
Total	**7,515**		**866,890**

1 $$\text{EU proxy emission factor} = \frac{866{,}890\ \text{MtCO}_2\text{e}}{7{,}515\ \text{B int.\$}} = 115.35\ \frac{\text{MtCO}_2\text{e}}{\text{B int.\$}} = 115.35 \frac{\text{tCO}_2\text{e}}{\text{M int.\$}}$$

Sample calculation: Investment in a supranational bond

ALTERNATIVE OPTION DQS 5 – PROXY EMISSION FACTOR

Exercise – using an alternative option to calculate financed emissions

Scenario context

- Supranational bond from the European Union
- Outstanding investment amount per 31/12:
  20 M EUR = 22 M int. $

EU proxy emission factor:
115.35 tCO2e/M int. $

Step-by-step approach

FICTIVE AND INDICATIVE FIGURES USED

1. $$\text{Financed emissions} = \underbrace{\sum_S \frac{\text{Outstanding amount}}{\text{PPP} - \text{adjusted GDP}}}_{\text{Attribution}} \times \underbrace{\text{Emission factor}_S}_{\text{Emissions}}$$

2. $$\text{Financed emissions} = \text{Outstanding amount} \times \text{Emission factor}_S$$

3. $$\text{Financed emissions} = 22\ \text{M int.}\$ \times 115.35 \frac{\text{tCO}_2\text{e}}{\text{M int.}\$}$$

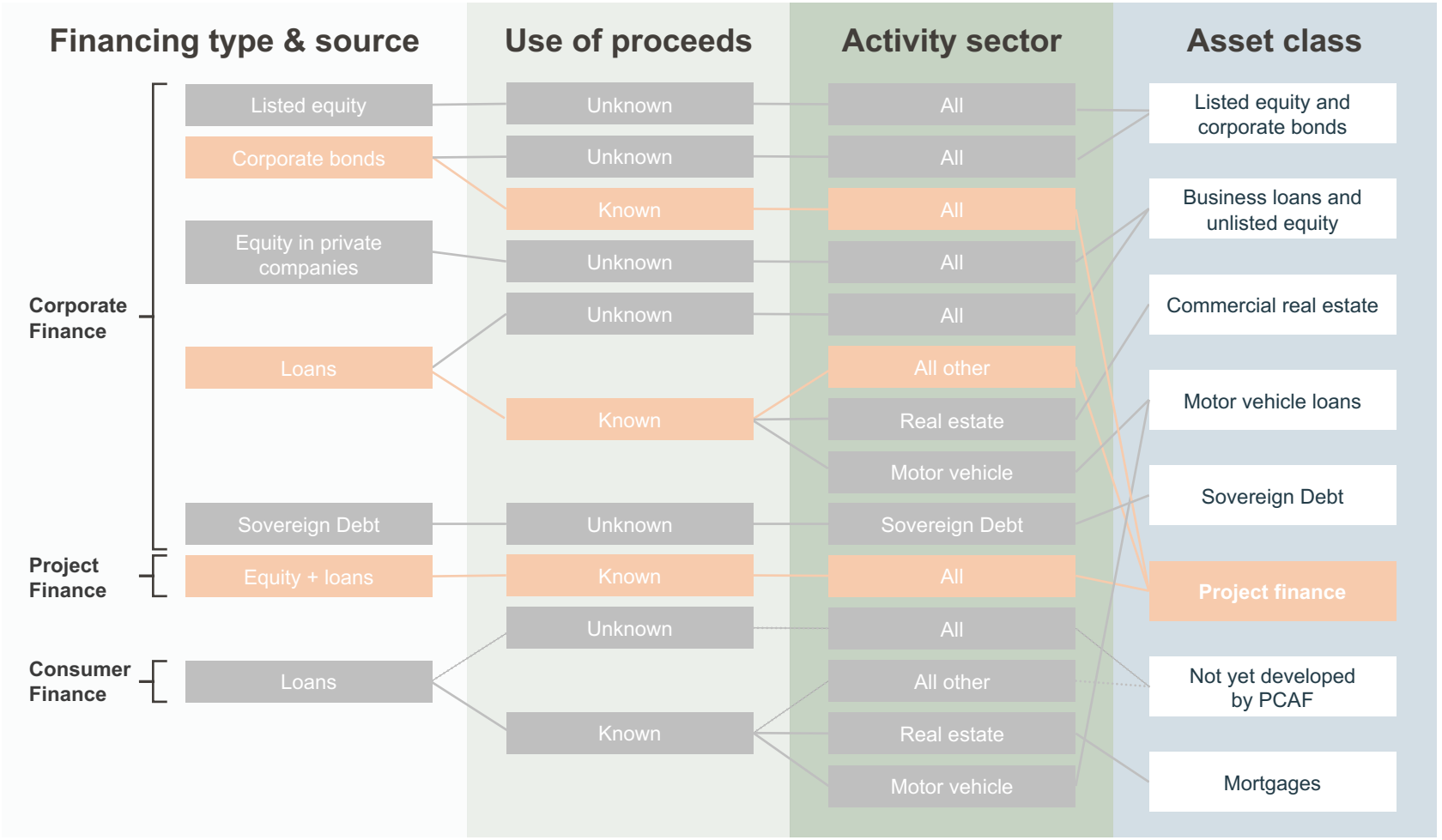
4. $$\text{Financed emissions} = \mathbf{2,537.8\ tCO_2e}$$

Which data is not required to calculate sovereign emissions?

1. Total equity + debt of sovereign
2. Production emissions of sovereign
3. PPP-adjusted GDP of the sovereign
4. Outstanding amount
5. All of above

Deep dive:
Project Finance

Part A Financed Emissions provides guidance for choosing an asset class-specific approach to calculate financed emissions



Financing type & source:

- "Corporate bonds"
- "Loans"
- "Equity & loans"

Use of proceeds:

- "Known"

Activity sector:

- "All"

EXAMPLE:

- *The reporting financial institution provides funding to a project developer/ company that uses that fund to set up a solar power project*

Project Finance: Coverage

What is covered?

- For specific purposes (i.e., known use of proceeds)
- On the balance sheet of the financial institution

PROJECT FINANCE

Inclusions

- All **on-balance sheet loans** or **equities for specific purposes**
- Only financed **(ring-fenced) activities** are included, e.g., Loan provided to Company A to purchase a power plant (known use of proceed).

Exclusions

- Any **off-balance sheet loans and equities**
- Emissions/financials related to **activities outside the financed project but within the financed organizations**, e.g., loan provided to Company B for general corporate purposes (unknown use of proceed)

Emission Scopes Covered

Shall cover:

- Absolute Scope 1 and 2 emissions of the project

Should cover:

- Scope 3 emissions
- Avoided emissions
- Lifetime emissions
- Emissions removed

Calculating financed emissions for project finance follows the outlined general equation

FINANCED EMISSIONS $= \sum$ **Attribution factor**$_p$ **x** **Emissions** $_p$

(with p = project)

- The attribution factor is used to show the FI's share of the investee's emissions
- An investee is a general term and could represent a company, property, project etc. (asset class dependent)

$$\frac{\text{Outstanding } amount_p}{\text{Total project } equity_p + \text{Total project } debt_p}$$

or

*Use: **Outstanding amount**

1. **Reported emissions**$_p$

or

2. **Physical activity-based emissions**$_p$

or

3. **Economic activity-based emissions**$_p$

Hierarchy of preference

PCAF

*Use this option when project's equity+ debt is not available – for options 3b and 3c

PCAF provides three options to calculate financed emissions from project finance

Highest

Hierarchy of preference

Lowest

Data quality	Options to estimate		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	Option 1: Reported emissions	1b	• Outstanding amount in the project and total project equity plus debt are known. • **Unverified emissions** of the project are available.
Score 2	Option 2: Physical activity-based emissions	2a	• 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 energy consumption** and emission factors specific to that primary data.
Score 3	Option 2: Physical activity-based emissions	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** 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** are known. • Emission factors for the sector per unit of revenue are known.
Score 5	Option 3: Economic activity-based emissions	3b	• Outstanding amount in the project is known. • Emission factors for the sector per unit of asset (e.g., tCO_2e per euro of asset in a sector) are known.
Score 5	Option 3: Economic activity-based emissions	3c	• Outstanding amount in the company is known. • Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

Projects in a FI's portfolio should report on emission removals as part of their GHG footprinting

Projects in a FI's portfolio should report on emission removals

Projects in an FI's portfolio should report on emission removals as part of their GHG reporting. Reporting should follow existing GHG Protocol guidance

According to the GHG Protocol guidance:
Emission removals **shall** be reported **separately from both absolute emissions** and **any carbon credits retired and generated**

- Carbon credits **generated: *should*** be reported
- Carbon credits **retired: *may*** be reported

Emission removals can be calculated using the following equation:

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

(with p=project)

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: Project Finance

NOTE: Same calculation approach for scope 2 and 3 emissions but use different emission

Option 1 – Reported emissions available

Option 1a example: Renewable energy plant in Sweden
Outstanding invested amount per 31/12: 0.9 EURM

- Total equity and debt of the project: 3.2 EURM
- Verified reported emissions: 6,500 tCO_2e

FICTIVE AND INDICATIVE FIGURES USED

1 $$\sum \frac{\text{Outstanding amount}_p}{\text{Total equity and debt}_p} \times \text{Verified project emissions}_p$$ (with p = project)

2 $$\text{Financed emissions}_p = \frac{0.9 \text{ EURM}}{3.2 \text{ EURM}} \times 6{,}500 \text{ tCO}_2\text{e}$$

3 $$\text{Financed emissions}_p = 0.28 \times 6{,}500 \text{ tCO}_2\text{e}$$

4 $$\text{Financed emissions}_p = \mathbf{1{,}828.12 \text{ tCO}_2\text{e}}$$

Data score 1 as verified emissions used.

Sample calculation: Project Finance

Option 2 – Reported emissions not available

Option 2a example: Natural gas power plant in the Netherlands
Outstanding invested amount per 31/12: 5 EURM

- Total debt + equity of the project : 17 EURM
- Annual energy consumption: 30,000 MWh
- Scope 1 emission factor: 0.51 tCO2e /MWh

FICTIVE AND INDICATIVE FIGURES USED

1 $$\sum_{c} \frac{\text{Outstanding amount}_p}{\text{Total equity and debt}_p} \times \text{Energy consumption}_p \times \text{Emission factor}_p$$ (with p = project)

2 $$\text{Financed emissions}_p = \frac{5 \text{ EURM}}{17 \text{ EURM}} \times 30{,}000 \text{ MWh} \times 0.51 \text{ tCO}_2\text{e/MWh}$$

3 $$\text{Financed emissions}_p = 0.29 \times 15{,}300 \text{ tCO}_2\text{e}$$

4 $$\text{Financed emissions}_p = \mathbf{4{,}500 \text{ tCO}_2\text{e}}$$

Option 2b example: Renewable energy plant in France
Outstanding investment amount per 31/12: 0.5 EURM

- Total debt + equity of the project:1.2 EURM
- Capacity of the plant: 1,000 MWh
- Scope 1 emission factor: 0.01 tCO2e /MWh

FICTIVE AND INDICATIVE FIGURES USED

1 $$\sum_{c} \frac{\text{Outstanding amount}_p}{\text{Total equity} + \text{debt}_p} \times \text{Production}_p \times \text{Emission factor}_p$$ (with p = project)

2 $$\text{Financed emissions}_p = \frac{0.5 \text{ EURM}}{1.2 \text{ EURM}} \times 1{,}000 \text{ MWh} \times 0.01 \text{ tCO}_2\text{e/MWh}$$

3 $$\text{Financed emissions}_p = 0.42 \times 10.00 \text{ tCO}_2\text{e}$$

4 $$\text{Financed emissions}_p = \mathbf{4.20 \text{ tCO}_2\text{e}}$$

Sample calculation: Project Finance

Option 3 – Reported emissions not available

Option 3a example: Toll bridge in the Netherlands
Outstanding invested amount per 31/12: 3 EURM

- Total equity and debt of a project: 7 EURM
- Revenue of the project:10 EURM
- Scope 1 emission factor (sectoral revenue based): 74.42 tCO2e/EURM

FICTIVE AND INDICATIVE FIGURES USED

1. $$\sum_{c} \frac{\text{Outstanding amount}_p}{\text{Total equity + debt}_p} \times \text{Revenue}_p \times \frac{\text{GHG emissions}_s}{\text{Revenue}_s}$$ (with p = project, s = sector)
2. $$\text{Financed emissions}_p = \frac{3\ \text{EURM}}{7\ \text{EURM}} \times 10\ \text{EURM} \times 74.42\ \text{tCO}_2\text{e/EURM}$$
3. $$\text{Financed emissions}_p = 0.43 \times 10\ \text{EURM} \times 74.42\ \text{tCO}_2\text{e/EURM}$$
4. $$\text{Financed emissions}_p = \mathbf{318.94\ tCO_2e}$$

Option 3b example: Power plant in Turkey
Outstanding investment amount per 31/12: 7 EURM

- Scope 1 emission factor (sectoral asset based): 128 tCO2e/EURM

FICTIVE AND INDICATIVE FIGURES USED

1. $$\sum_{c} \text{Outstanding amount}_p \times \frac{\text{GHG emissions}_s}{\text{Assets}_s}$$ (with p = project, s = sector)
2. $$\text{Financed emissions}_p = 7\ \text{EURM} \times 128\ \text{tCO}_2\text{e/EURM}$$
3. $$\text{Financed emissions}_p = \mathbf{896\ tCO_2e}$$

If emission factor for specific country is not available, how can emissions be estimated?

If emission factor for specific country is not available, how can emissions be estimated?

PCAF recommends the following alternatives:

- Use a proxy country (with similar economic climate, production activities or similar grid comparisons)
- Use regional emission factor to make an estimate

Deep dive: Commercial real estate and mortgages

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: CRE and Mortgages

Option 1A – Actual building emissions, supplier specific emission factor available

$$\textbf{Financed Emissions}_b = \frac{\textbf{Outstanding Amount}_b}{\textbf{Property value at origination}_b} \times \textbf{Energy Consumption}_{b,e} \times \textbf{Emission Factor}_{b,e}$$

FICTIVE AND INDICATIVE FIGURES USED

1. $\text{Attribution Factor}_b = \frac{\text{USD}50{,}000{,}000}{\text{USD}100{,}000{,}000} = 0.5$
2. $\text{Property Emissions}_{b,\text{ electricity}} = 300\ \text{MWh} \times 853 \frac{\text{kg } CO_2e}{\text{MWh}} = 255{,}900\ \text{kg } CO_2e \text{ emissions}$
3. $\text{Property Emissions}_{b,\text{ natural gas}} = 40{,}000\ m^3 \times 2.0 \frac{\text{kg } CO_2}{m^3} = 80{,}000\ \text{kg } CO_2e \text{ emissions}$
4. $\text{Property Emission}_b = \text{Property Emissions}_{b,\text{ electricity}} + \text{Property Emissions}_{b,\text{ natural gas}} = 335{,}900 \text{kg } CO_2e$
5. $\text{Financed emissions}_b = 0.5 \times 335{,}900 = \mathbf{167{,}950\ kg\ CO_2e}$

Sample calculation: CRE and Mortgages

Option 2A – Estimated based on floor area and energy label

Data Quality Score 3

FICTIVE AND INDICATIVE FIGURES USED

- Single Family Home in Belgium with EPC rating of A+

- Outstanding loan amount: EUR 150,000
- Property value at origination: EUR 1,000,000

- Floor area: 100 m^2

- Emission factor for a single-family home in Belgium, with an EPC rating of A+
  - Scope 1: 0.002 tCO_2e / m^2
  - Scope 2: 0.0076 tCO_2e / m^2

* Emission factor is specific to a single-family home (or residential property) in Belgium with an EPC rating of A+

Sample calculation: CRE and Mortgages

Option 2A – Estimated based on floor area and energy label

$$\textbf{Financed Emissions}_{b} = \frac{\textbf{Outstanding Amount}_{b}}{\textbf{Property value at origination}_{b}} \times \textbf{Energy Consumption}_{b,e} \times \textbf{Emission Factor}_{b,e}$$

(with b = building and e = energy source)

FICTIVE AND INDICATIVE FIGURES USED

1. $\text{Attribution Factor}_{b} = \frac{\text{EUR150,000}}{\text{EUR1,000,000}} = 0.15$

2. $\text{Property Emissions}_{b,\text{ scope 1}} = 100\ m^2 \times 0.002\ {}^{tCO_2e}/_{m^2} = 0.20\ tCO_2e \text{ emissions}$

3. $\text{Property Emissions}_{b,\text{ scope 2}} = 100\ m^2 \times 0.0076\ {}^{tCO_2e}/_{m^2} = 0.76\ tCO_2e \text{ emissions}$

4. $\text{Property Emission}_{b} = \text{Property Emissions}_{b,\text{ scope 1}} + \text{Property Emissions}_{b,\text{ scope 2}} = 0.96 tCO_2e$

5. $\text{Financed emissions}_{b} = 0.15 \times 0.96 = \mathbf{0.14\ tCO_2e}$

Sample calculation: CRE and Mortgages

Option 3 – Estimated emissions per building

Data Quality Score 5

FICTIVE AND INDICATIVE FIGURES USED

Food Service building in California

- Outstanding loan amount: USD 780,000
- Property value at origination: USD 780,000

- Emission factor, scope 1: 22.98 tCO_2e/building
- Emission factor, scope 2: 35.96 tCO_2e/building

Sample calculation: CRE and Mortgages

Option 3 – Estimated emissions per building

$$\textbf{Financed Emissions}_{b} = \frac{\textbf{Outstanding Amount}_{b}}{\textbf{Property value at origination}_{b}} \times \textbf{Energy Consumption}_{b,e} \times \textbf{Emission Factor}_{b,e}$$

FICTIVE AND INDICATIVE FIGURES USED

1. $\text{Attribution Factor}_{b} = \frac{\text{EUR780,000}}{\text{EUR780,000}} = 1$
2. $\text{Property Emissions}_{b,\text{ scope 1}} = 22.98\ tCO_2e$
3. $\text{Property Emissions}_{b,\text{ scope 2}} = 35.96\ tCO_2e$
4. $\text{Property Emission}_{b} = \text{Property Emissions}_{b,\text{ scope 1}} + \text{Property Emissions}_{b,\text{ scope 2}} = 58.94tCO2e$
5. $\text{Financed emissions}_{b} = 1 \times 58.94 = \mathbf{58.94\ tCO_2e}$

Deep dive: Business loans and unlisted equity

Calculation Examples

PCAF Partnership for Carbon Accounting Financials

Sample calculation: Business loans & unlisted equity

Option 2A – Reported emissions not available

$$\text{Financed Emissions}_b = \frac{\text{Outstanding Amount}_c}{\text{Total } equity + debt_c / EVIC} \times \text{Energy consumption}_c \times \text{Emission factor}_c$$

(with c = company)

Option 2a example: Brewery in the Netherlands

Outstanding corporate bond amount per 31/12: 2.5 EURM

- Total debt + equity: 6 EURM
- Energy consumption: 15 MWh
- Scope 1&2 emission factor: 0.51 tCO2e/MWh

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{Total equity} + \text{debt}_c} \times \text{Energy consumption}_c \times \text{Emission factor}_c$
2. $\text{Financed emissions}_c = \frac{2.5\text{m}}{6\text{m}} \times 15 \text{ MWh} \times 0.51 \text{tCO}_2\text{e/MWh}$
3. $\text{Financed emissions}_c = 0.416667 \times 7.65 \text{ tCO}_2\text{e}$
4. $\text{Scope 1\&2 Financed emissions}_c = 3.2 \text{ tCO}_2\text{e}$

Option 2a example: Transport company in the Netherlands.

Outstanding invested amount per 31/12: 3 EURM

- EVIC: 7 EURM
- Energy consumption: 15 MWh
- Scope 1&2 emission factor: 0.51 tCO2e/MWh

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{EVIC}_c} \times \text{Energy consumption}_c \times \text{Emission factor}_c$
2. $\text{Financed emissions}_c = \frac{3\text{m}}{7\text{m}} \times 15 \text{ MWh} \times 0.51 \text{ tCO}_2\text{e/MWh}$
3. $\text{Financed emissions}_c = 0.428571 \times 7.65 \text{ tCO}_2\text{e}$
4. $\text{Scope 1\&2 Financed emissions}_c = 3.3 \text{ tCO}_2\text{e}$

Sample calculation: Business loans & unlisted equity

BUSINESS LOANS TO LISTED COMPANIES

Option 3a example: Manufacture company in the Netherlands

Outstanding invested amount per 31/12: 3 EURM

- EVIC: 7 EURM
- Revenue company: 10 EURM
- Total scope 1&2 manufacturing sector GHG emissions in the Netherlands: 353,614 tCO2e
- Revenue sector: 4,189 EURM

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{EVIC}_c} \times \text{Revenue}_c \times \frac{\text{GHG emissions}_s}{\text{Revenue}_s}$
2. $\text{Financed emissions}_c = \frac{3\text{m}}{7\text{m}} \times 10\text{m} \times \frac{353{,}614\ \text{tCO}_2\text{e}}{4{,}189\text{m}}$
3. $\text{Financed emissions}_c = 0.428571 \times 10\text{m} \times 84.41\ \text{tCO}_2\text{e/EURM}$
4. Scope 1&2 $\text{Financed emissions}_c = 361.8\ \text{tCO}_2\text{e}$

BUSINESS LOANS & EQUITY INVESTMENTS TO PRIVATE COMPANIES

Option 3a example: Wholesale company in the Netherlands

Outstanding invested amount per 31/12: 3 EURM

- Total debt + equity: 7 EURM
- Revenue company: 10 EURM
- Total scope 1&2 wholesale sector GHG emissions in the Netherlands: 2000 tCO2e
- Revenue sector: 10 EURM

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_c \frac{\text{Outstanding amount}_c}{\text{Total debt + equity}_c} \times \text{Revenue}_c \times \frac{\text{GHG emissions}_s}{\text{Revenue}_s}$
2. $\text{Financed emissions}_c = \frac{3\text{m}}{7\text{m}} \times 10\text{m} \times \frac{2000\ \text{tCO}_2\text{e}}{10\text{m}}$
3. $\text{Financed emissions}_c = 0.428571 \times 10\text{m} \times 200\ \text{tCO}_2\text{/EURM}$
4. Scope 1&2 $\text{Financed emissions}_c = 857.1\ \text{tCO}_2\text{e}$

Sample calculation: Business loans & unlisted equity

BUSINESS LOANS TO LISTED COMPANIES

Option 3b example: Manufacture company in the Netherlands

Outstanding invested amount per 31/12: 5 EURM

- Total scope 1&2 manufacturing sector GHG emissions in the Netherlands: 353,614 tCO_2e
- Assets sector: 7,418 EURM

FICTIVE AND INDICATIVE FIGURES USED

1 $$\sum_c = \text{Outstanding amount}_c \times \frac{\text{GHG emissions}_s}{\text{Assets}_s}$$

2 $$\text{Financed emissions}_c = 5\text{m} \times \frac{353{,}614\ tCO_2e}{7{,}418\text{m}}$$

3 $$\text{Financed emissions}_c = 5\text{m} \times 47.67\ \ tCO_2e$$

4 $$\text{Scope 1\&2 Financed emissions}_c = 238.3\ tCO_2e$$

Sample calculation: Business loans & unlisted equity

BUSINESS LOANS & EQUITY INVESTMENTS TO PRIVATE COMPANIES & LISTED COMPANIES

Option 3c example: Manufacture company in the Netherlands

Outstanding invested amount per 31/12: 5 EURM

- Asset turnover ratio: 1.6
- Total scope 1&2 manufacturing sector GHG emissions in the Netherlands: 353,614 tCO2e
- Revenue sector: 5,000 EURM

FICTIVE AND INDICATIVE FIGURES USED

1. $\sum_{c} = \text{Outstanding amount}_c \times \text{Asset turnover ratio}_s \times \frac{\text{GHG emissions}_s}{\text{Revenue}_s}$
2. $\text{Financed emissions}_c = 5\text{m} \times 1.6 \times \frac{353{,}614\text{m}}{5{,}000\ \text{EURM}}$
3. $\text{Financed emissions}_c = 5\text{m} \times 1.6 \times 70.7\ \ \text{tCO}_2\text{e}$
4. $\text{Financed emissions}_c = 5\text{m} \times 113.12$
5. $\text{Scope 1 \& 2 Financed emissions}_c = 565.6\ \text{tCO}_2\text{e}$