PART

C

The GLOBAL GHG ACCOUNTING & REPORTING Standard

Insurance Associated Emissions

For financial institutions measuring and reporting scope 3 category 15 emissions

PCAF®

Partnership for Carbon Accounting Financials

Second Edition

December 2025

Table of Contents

Important Note

The Partnership for Carbon Accounting Financials (PCAF) Global GHG Accounting and Reporting Standard for the Insurance Industry (Insurance-Associated Emissions Standard) is the result of contributions from two successive PCAF Insurance-Associated Emissions Working Groups (Working Groups), which respectively developed the first and second versions of the Standard.

The Working Group has, at all times, sought to ensure that the accounting methodologies and reporting requirements proposed in this Standard are compatible with applicable law, including antitrust laws. The development of the methodologies and reporting requirements set out in this Standard, including associated discussions and work undertaken by the Working Group, has been undertaken in compliance with PCAF governance procedures and applicable laws, including antitrust laws.

The methodologies and the context provided (e.g., examples of the possible use of such methodologies) in this Standard are not to be construed as prescriptive. The adoption and use of the methodologies discussed or included in this Standard are voluntary and must be determined independently by each company.

The use of such methodologies by a company is subject to applicable laws, rules and regulations in the jurisdictions in which that company operates. In case of conflict of applicable laws, rules and regulations with the methodologies or the reporting requirements described in this Standard, the applicable laws, rules and regulations shall prevail, but any deviations from the Standard should be highlighted to protect the goal and value of the Insurance-Associated Emissions Standard.

The work leading to the adoption of both versions of this Standard included two public consultations on the proposed methodologies for measuring and reporting insurance-associated emissions — one for each version of the Standard. Each consultation was open to all interested parties, including regulators, participants from across the (re)insurance industry, brokers, policymakers, data providers, consultants, academia, non-governmental organizations (NGOs), associations of insureds, and civil society as a whole. The respective Working Groups carefully considered the input and feedback received during these consultation processes, incorporating them into the Standard to the extent feasible, implementable, and compatible with applicable laws and regulations.

Acknowledgements

This Insurance-Associated Emissions Standard was developed through collaboration with over one hundred stakeholders representing the Partnership for Carbon Accounting Financials (PCAF). These stakeholders include PCAFs Global Core Team members, PCAF Working Group members, the PCAF Board and its Secretariat.

PCAF is thankful to its Global Core Team for their leadership and guidance in shaping this revised Standard. Their expertise and commitment have been essential to ensuring its integrity and alignment with PCAF's mission. The Core Team governing the updates to this Insurance-Associated Emissions Standard is comprised of individuals who work at the following financial institutions:[1]

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

PCAF acknowledges the significant contributions of all the industry experts from its signatory base who participated in working groups to develop these methods and undertake a rigorous review process following the 2024 public consultation. Their technical insights and sustained engagement throughout the two-year development cycle were critical to integrating feedback and strengthening the guidance and methodologies presented in this updated Standard.

In addition, we extend our thanks to all those who participated in the public consultation, providing valuable comments and feedback that informed and improved this Insurance-Associated Emissions Standard.

Our thanks further extend to the PCAF Board of Directors for their efforts to convene the Core Team and for providing strategic guidance in the direction of the PCAF Standard's expansion.

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

The PCAF Secretariat is operated by Guidehouse, a global consultancy firm specializing in energy, sustainability, risk, and compliance for the financial industry.

[1] The Core Team's contributions to this Standard have been made on an individual level rather than institutional level. The content set out within this Standard and any views expressed do not necessarily represent the views of each individual Core Team member or the institutions they work for.

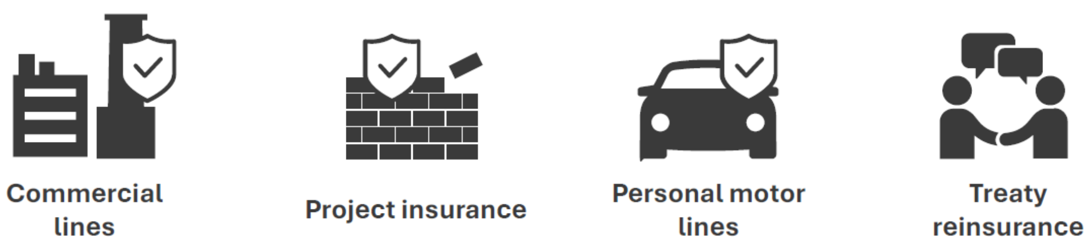
Executive summary

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 associated with their financial activities 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. By quantifying insurance-associated emissions, institutions can enhance the transparency and consistency of their GHG disclosures, improve the understanding of portfolio-level emissions exposure, and strengthen data quality for risk management and reporting purposes.

Until recently, there had not been a globally accepted standard for measuring and reporting emissions associated with (re)insurance underwriting portfolios ("insurance-associated emissions"). Responding to increasing demand from the insurance industry and other stakeholders, PCAF developed the Global GHG Accounting and Reporting Standard for Insurance-Associated Emissions. The first version of this Standard, published in November 2022 as Part C of PCAF's Global GHG Accounting and Reporting Standard for the Financial Industry, supplements the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Building on this foundation, a second (this) version was developed to expand the Standard's scope to include methodologies for project insurance and treaty reinsurance.

This document is the second version of the Insurance-Associated Emissions Standard. It provides detailed methodological guidance for the measurement and disclosure of GHG emissions associated with four segments:



The Standard provides detailed guidance for each segment to calculate the insurance-associated emissions resulting from activities in the real economy that are re/insured. Emissions are associated with (re)insurance portfolios based on robust, consistent accounting rules specific to each segment. By following the methodologies, re/insurers can measure GHG emissions for each segment and produce disclosures that are consistent, comparable, reliable, and clear. This Standard also provides recommendations and requirements for reporting. Any requirements not fulfilled must be accompanied by an explanation.

Using this Standard equips the (re)insurance industry with standardised, robust methods to measure and disclose insurance-associated emissions.

Introduction

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1. Introduction

THE ROLE OF THE (RE)INSURANCE INDUSTRY

The (re)insurance industry is one of the largest global industries and a major holder of assets under management. Total premiums written in life and non-life insurance amount to close to USD eight trillion, or 7.3% of global economic output.[2]

The (re)insurance industry plays an important role in supporting the transition to a more resilient economy. As institutional investors, re/insurers can allocate capital to innovative and lower-emission technologies and engage with investee companies to strengthen long-term resilience and operational performance. As professional risk managers, they help clients and communities understand, prevent, and mitigate environmental and physical risks. As professional risk carriers, re/insurers provide protection to businesses, households, public entities, and governments by absorbing financial losses from events such as floods, droughts, cyclones, and extreme heat. For their own operations, re/insurers can set their own policies and influence low-emissions goods and services.

To effectively fulfil these roles, re/insurers require robust tools and frameworks—particularly when it comes to measuring emissions. Demand from the (re)insurance industry and other stakeholders for tools to measure and report greenhouse gas (GHG) emissions is increasing. As such, there is a need to develop a set of global, standardized methodologies for measuring and disclosing the GHG emissions associated with (re)insurance underwriting portfolios for accounting purposes (throughout the document referred to as insurance-associated emissions). With this Part C of the Global GHG Accounting and Reporting Standard for the Financial Industry, the Partnership for Carbon Accounting Financials (PCAF) provides (re)insurance companies methodologies to calculate insurance-associated emissions.

THE ROLE AND HISTORY OF PCAF

Prior to the establishment of PCAF, financial institutions relied on varied approaches and accounting methodologies to measure financed emissions and used different reporting metrics, which led to inconsistent assessments of the industry's climate impact. This lack of standardization hampered transparency, comparability, and accountability across the financial sector.

PCAF was established to harmonize GHG accounting and disclosure across the financial sector. It provides standardized methodologies that enable financial institutions to assess the GHG emissions associated with their loans, investments, (re)insurance underwriting, and other financial products and services. Founded in 2015 by Dutch financial institutions, PCAF expanded to North America in 2018 and scaled globally in 2019.[3] Today, this industry-led initiative has grown to include more than 670 financial institutions worldwide (as of November 2025),[4] all committed to measuring and disclosing the GHG emissions of their portfolios. PCAF fosters collaboration among financial institutions to improve GHG methodologies for the financial sector, building a community focused on shared knowledge and action.

[2] *Sigma No 2/2025 - World insurance: a riskier, more fragmented world order, Swiss Re*
[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

PCAF is led by the Board of Directors which consists of Justine Bolton (FirstRand Limited), Dinesh Dulal (NMB Bank), Ivan Frishberg (Amalgamated Bank), Prajña Khanna (Nasper-Prosus Group), Tjeerd Krumpelman (former ABN AMRO), James Niven (Global Alliance for Banking on Values), Peter Sandahl (Nordea Group), and Alison Vipond (former Lloyds Banking Group).

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 in November 2020. This first edition provided 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, financial institutions called for additional methods to cover other financial activities. In response, PCAF began work on three parts under the umbrella of the Global GHG Accounting and Reporting Standard for the Financial Industry:

- Part A: development of a standard for measuring and reporting the GHG emissions associated to loans and investments ("Financed Emissions Standard – first-, second-, and third-edition")
- 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 – first-, and second-edition")

The first version of Part C of the Standard was published in 2022, introducing methodologies for calculating insurance-associated emissions in commercial and personal motor lines. Building on this foundation, the 2025 edition expands the Standard by adding methodologies for project insurance and treaty reinsurance.

THE ROLE OF GHG EMISSIONS ACCOUNTING IN REPORTING, RISK MANAGEMENT, AND FINANCIAL DECISION-MAKING

Measuring insurance-associated emissions is essential for (re)insurers seeking to enhance the accuracy and consistency of their emissions reporting. Transparent measurement and disclosures provide valuable insights into the emissions associated with their underwriting activities. Enabling institutions and stakeholders to better understand their exposure across insured assets, clients, and sectors and improve data-driven decision-making. Additionally, (re)insurers also use this information to monitor progress toward internal objectives and to strengthen transparency and accountability in reporting to stakeholders.

THE (RE)INSURANCE INDUSTRY AND INSURANCE-ASSOCIATED EMISSIONS

The (re)insurance industry is in a unique position with asset owner and underwriting activities on the same balance sheet. For their investment and asset management, re/insurers can apply the methodologies outlined in PCAF's Part A (Financed Emission Standard),[5] subject to applicable regulatory requirements. Part A provides guidance for measuring and GHG emissions associated with loans and investments, known as financed emissions.

However, a key difference exists between financed and insurance-associated emissions. This difference lies in the nature of the relationship of the financial institution with the client (see subchapter 4.2 for more details). In Property and Casualty (P&C) lines of business (LoB), (re)insurers underwrite risks related to economic activity but do not finance the activity nor imply any form of ownership. A (re)insurer holds no capital interest in the primary insurance customer's operations, and no financial or direct operational control is exerted.[6]

The lack of ownership or direct control over the customer's activity impacts the influence a (re)insurer will have on the decisions made by the customer to reduce the associated emissions. Nonetheless, even without this ownership interest, a (re)insurer may influence a customer's activities. The ability of a customer to engage in their specific business activity is limited without the support of insurance. In other words, (re)insurance enables a customer's business activities.

Next to insurance-associated emissions (covered by this standard), (re)insurers are also linked to emissions from the claims management process. While scope 1 and 2 emissions from internal operations are already captured, emissions from third parties involved in fulfilling claims—such as repair services—are not consistently reported. When a claim is approved, the insurer may pay compensation, arrange repairs, or provide services to address the damage. These downstream emissions are part of the claims process and should be measured and disclosed. Currently, there is no clear guidance on where to report these emissions. Recognizing this gap, PCAF plans to expand the methodology in the future to include emissions associated with claims management, ensuring more comprehensive and consistent reporting across the insurance value chain.

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[5] PCAF (2025): The Global GHG Accounting and Reporting Standard for the Financial Industry Third Edition

[6] Credit (re)insurers might have comparable rights under specific constellations (e.g., default of corporate loan, which is insured by the (re)insurer). That's why credit (re)insurance might be considered differently (see also Table 5.1-1).

STANDARDIZING GHG EMISSIONS ACCOUNTING FOR (RE)INSURANCE

This document is the second version of the 'Global GHG Accounting and Reporting Standard for Insurance-Associated Emissions.' Throughout this document, it will be referred to as the 'Insurance-Associated Emissions Standard', or short 'Standard'. This Standard constitutes Part C[7] of the 'Global GHG Accounting & Reporting Standard for the Financial Industry'. The purpose of this Standard is to provide re/insurers with transparent, standardized, and robust methodologies to measure and report insurance-associated emissions, as a supplement to the requirements of the GHG Protocol 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'.

Please note that the Insurance-Associated Emissions Standard does not address target setting nor underwriting, or pricing. Nor does it determine explicitly or implicitly any strategy a company may choose to follow independently as a result of adopting such methodologies.

Throughout the development of this Standard, PCAF has engaged with stakeholders to solicit feedback and discuss PCAF methodological approaches and considered their comments and suggestions. During December 2024 and March 2025, PCAF facilitated a public consultation with regulators, the (re)insurance industry, brokers, policymakers, data providers, consultants, academia, non-governmental organizations (NGOs), and insurance associations.

The Standard covers the following LoBs/segments, which are discussed in more detail in Chapter 5:

Commercial lines | **Project insurance** | **Personal motor lines** | **Treaty reinsurance**

This Standard is based on the GHG Protocol standards for corporate reporting, such as the 'GHG Protocol Corporate Accounting and Reporting Standard'[8], the 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'[9], and the supplemental 'Technical Guidance for Calculating Scope 3 Emissions'[10]. More specifically, this Insurance-Associated Emissions Standard will supplement the GHG Protocol 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard' by providing additional detailed guidance as to how (re)insurance companies can report on insurance-associated emissions.

Beyond reporting the scope 3 category 15 emissions covered by this Standard, re/insurers shall also measure and report their scope 1 and 2 emissions as well as any other relevant categories of scope 3 emissions in line with the GHG Protocol's standards.

[7] Part A is the PCAF Standard on financed emissions and Part B is the PCAF Standard on facilitated emissions.
[8] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
[9] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf
[10] https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf

HOW TO READ THIS STANDARD

This Standard uses the following language to indicate which provisions are requirements, which are recommendations, and which are allowable options that re/insurers may choose to follow. The following terms are used throughout this Standard:

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

Figure 1-2 provides the structure of this Standard and the steps for disclosing insurance-associated emissions.

Figure 1-1. Overview of the Progress Report and steps for disclosing insurance-associated emissions

1 INTRODUCTION	2 RE/INSURANCE	3 ACHIEVE GOALS
4 PRINCIPLES	5 METHODOLOGY	6 REPORTING
7 GLOSSARY	8 ACRONYMS	9 ANNEX

The importance of GHG accounting in (re)insurance

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2. The importance of GHG accounting

WHAT IS GREENHOUSE GAS (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 commonly used by governments, corporations, and other entities to measure the direct and indirect emissions that occur throughout their value chains due to organizational and business activities. According to the GHG Protocol Corporate Accounting and Reporting Standard,[11] 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 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 illustrated in Figure 2-1.

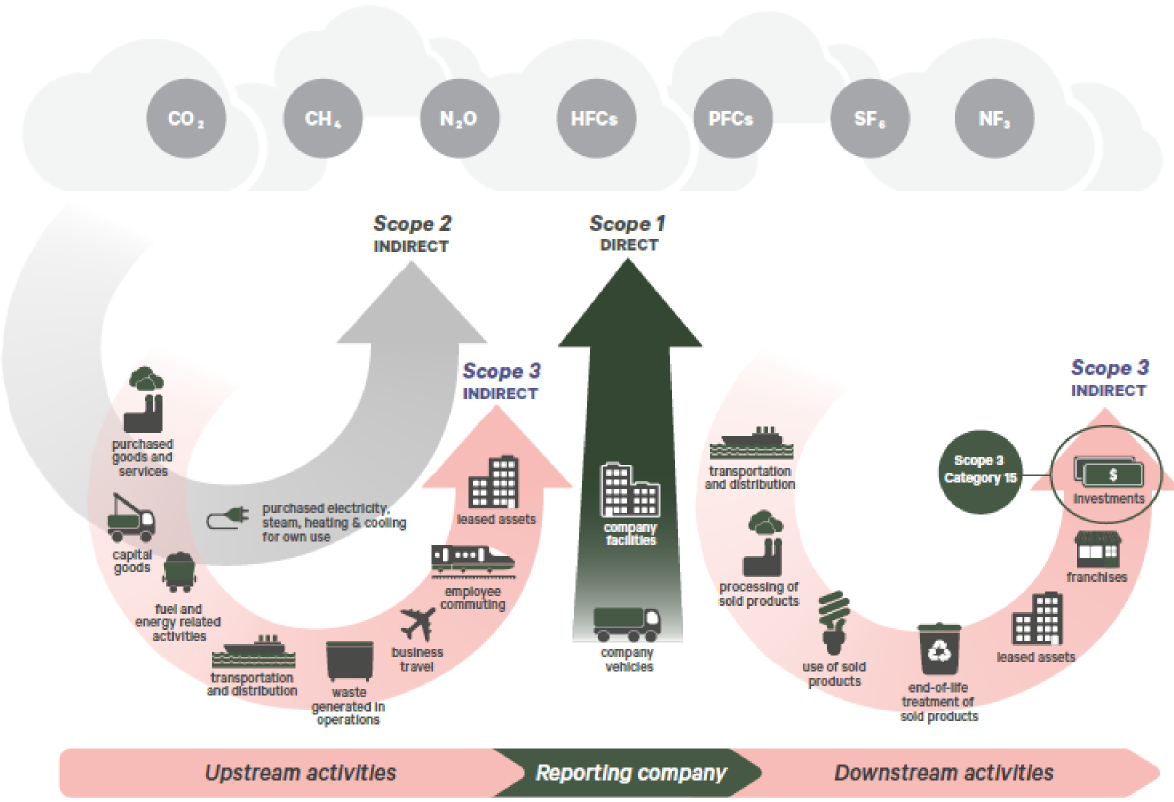
- **Scope 1:** Direct GHG emissions that occur from sources owned or controlled by the reporting company, i.e., emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.
- **Scope 2:** Indirect GHG emissions from the generation of purchased or acquired electricity, steam, heating, 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. **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'[12] categorizes scope 3 emissions into 15 categories, listed in Figure 2-1. According to the GHG Protocol, accounting and reporting on emissions associated with a reporting company's insurance underwriting activities are optional under scope 3 category 15 (investments, other investments or financial services). The Working

[11] (WRI and WBCSD, 2004)
[12] (WRI and WBCSD, 2011)

Group proposes that insurance-associated emissions are reported as a supplementary accounting note within the (re)insurers' scope 3 category 15 (Investments). Please see Chapter 6 for more details on reporting recommendations.

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



Source: (WRI and WBCSD, 2011) adapted by PCAF, 2022

THE IMPORTANCE OF GHG ACCOUNTING OF UNDERWRITING BY THE (RE)INSURANCE INDUSTRY

Measuring GHG emissions is an essential step for organizations seeking to improve transparency and strengthen their understanding of emissions exposure. For (re)insurers, scope 3, category 15 emissions — including both financed emissions and insurance-associated emissions — typically represent the largest portion of their indirect GHG inventory. Special consideration should therefore be given to how these emissions are measured and reported. Measuring insurance-associated emissions enables (re)insurers to identify and assess emissions-related underwriting and portfolio risks, uncover data-driven opportunities, and enhance overall risk management and disclosure practices.

GHG ACCOUNTING HELPS MEASURE THREE TYPES OF IMPACT: GENERATED EMISSIONS, EMISSION REMOVALS, AND AVOIDED EMISSIONS

GHG accounting of insurance-associated emissions is the annual corporate accounting and disclosure of GHG emissions associated with (parts of) the product underwriting activities of a (re)insurer at a fixed point in time and in line with financial accounting periods. Insurance-associated emissions can be measured as the amounts of GHGs generated, avoided, or removed by an insured institution. The volume of absolute emitted GHG emissions of an insured that is subsequently associated with a (re)insurance company for the purposes of GHG accounting is commonly referred to as the insured's **generated (absolute) emissions.**[13]

Not all insurance underwriting activities are associated with generated insurance-associated emissions only. (Re)insurance covers can also contribute to the deployment of emission removal solutions that absorb CO_2e from the atmosphere and store it in durable materials, terrestrial carbon sinks, or in geological reservoirs deep underground. For instance, underwriting sustainable forestry projects is likely to increase the forest carbon stock through diversification of tree species, more underbrush, and healthier forest soils. Other examples are P&C covers for machinery that filters CO_2e directly from the atmosphere and transforms it into carbonate minerals locked inside concrete blocks. The volume of CO_2e absorbed and durably stored is considered an **emission removal** that can also be quantified and reported.

This Standard does not provide guidance on how to measure and report insurance-associated emissions removals. For specific accounting guidance on calculating and reporting emissions removals PCAF refers to the forthcoming Land Sector and Removals Guidance from the GHG Protocol. [14] Future versions of this Standard may potentially include more specific guidance on emissions removals.

In some cases, emissions accounting involves comparing the actual emissions of a lower-emission project with the estimated emissions of a higher-emission alternative. The difference between these two values is referred to as **avoided emissions**. For example, project-specific loans and investments in renewable energy generation may lead to avoided emissions by displacing the emissions that would have occurred without the project's implementation. The same principle can apply to insurance-associated activities that support projects or assets resulting in measurable emissions avoidance. Recognizing the importance of consistent accounting in this area, PCAF released supplemental guidance on financed avoided emissions in 2025, as part of Part A of the Global GHG Accounting and Reporting Standard.

Reporting on avoided emissions aims to quantify the potential emissions reductions associated with specific activities or projects. However, these estimates depend on baseline assumptions that can be difficult to define with precision and may introduce significant uncertainty. In practice, tracking changes in generated (absolute) emissions over time offers a more direct and verifiable measure of progress. PCAF has not yet issued specific guidance on insurance-associated avoided emissions, recognizing the methodological challenges and the need for continued research and sector engagement before establishing standardized approaches.

(Re)insurers may report on emission removals and on avoided emissions. They shall always do so separately from the (re)insurer's scope 1, 2, and 3 GHG inventories and report their methodological

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[13] 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.
[14] The GHG Protocol's 'Land Sector and Removals Guidance' is currently being developed through a multi-stakeholder development process. The draft guidance is published for both pilot testing and review in June 2022. Final publication is expected in Q4 2025. https://ghgprotocol.org/land-sector-and-removals-guidance

formula for calculating these types of emissions (i.e., emission removals and avoided emissions) in accordance with the guidance contained in Chapter 6.

EMISSIONS METRICS IN THE CONTEXT OF INSURANCE-ASSOCIATED EMISSIONS

Different emissions metrics can be used for different purposes and some key insurance-associated emissions metrics, and their merits are discussed in Table 6-1 "Emission metrics for the context of insurance-associated emissions," in Chapter 6; this is not exhaustive.

Supporting goals through GHG accounting

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3. Supporting goals through GHG accounting

The existing PCAF Financed Emissions Standard highlights four of the major business goals that financial institutions can pursue in the context of their sustainability and climate-related strategies that GHG accounting could support (see Figure 3-1). This set of business goals is voluntary in nature and by no means exhaustive.

In this chapter, these business goals are recast in terms of (re)insurance. The effectiveness or ability of (re)insurers to put in place such business goals may be restricted by factors such as the mandatory nature of some Line of Business (LoB) in certain jurisdictions, the influence of government-backed schemes across certain LoB in certain jurisdictions, regulatory requirements, credit rating concerns, and/or the business strategies of individual (re)insurance companies.

Understanding the emissions associated with underwriting portfolios provides valuable business insights for (re)insurers. GHG accounting supports multiple objectives, including creating transparency for stakeholders, managing emissions-related financial and physical risks, developing data-informed insurance products, and tracking progress toward institutional goals.

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

The level of detail in the assessment of insurance-associated emissions can inform how well the resulting GHG inventory can support the business goals pursued by the reporting (re)insurer. For example, if a (re)insurer wishes to use the inventory to manage risk, it may consider measuring and recording sector-level insurance-associated emissions to identify the carbon-intensive industries in its underwriting portfolios. Other (re)insurers may want to structure their inventories in a way that helps them track their insurance-associated emissions reduction goals, where relevant, year over year. Ultimately, what is captured in the inventory should serve the appropriate business goals, which are determined by each (re)insurer independently.

BUSINESS GOAL 1: CREATE TRANSPARENCY FOR STAKEHOLDERS

Financial institutions increasingly recognize the importance of transparency and accountability in reporting emissions associated with their financial activities. GHG accounting enables financial institutions to produce consistent, verifiable data that can be shared with investors, regulators, and other stakeholders.

The International Sustainability Standards Board (ISSB) provides the global baseline for climate-related disclosures through its International Financial Reporting Standards (IFRS) S2 Standard, which builds upon the former Task Force on Climate-related Financial Disclosures (TCFD) recommendations. These standards emphasize consistency, comparability, and integration of sustainability information into financial reporting. Similarly, CDP has aligned its financial-sector disclosure questionnaires with the ISSB framework, incorporating financed emissions (scope 3, category 15) to enhance the completeness and reliability of data reported by financial institutions.[15]

For (re)insurers, insurance-associated emissions should be reported as a supplementary note to scope 3, category 15 (Investment) emissions, and not aggregated with financed emissions. This approach maintains clarity between investment-related and underwriting-related emissions, ensuring that disclosures remain both accurate and decision-useful.

Transparency for internal stakeholders is equally important. Measuring and disclosing insurance-associated emissions provides boards and senior management with deeper insights into portfolio exposure, operational performance, and overall risk profile. This information supports more informed governance, accountability, and long-term strategic planning within the organization. This information supports more informed governance, accountability, and long-term strategic planning within the organization.

BUSINESS GOAL 2: MANAGE EMISSIONS-RELATED FINANCIAL RISKS

(Re)insurers are increasingly focused on understanding the exposure of their underwriting portfolios to policy, regulatory, and market developments related to emissions and environmental performance. GHG accounting enables these institutions to identify segments of their underwriting activities that are concentrated in higher-emitting or emissions-sensitive sectors. Such exposures may be influenced over time by evolving regulations, carbon pricing mechanisms, or shifts in market expectations.

(Re)insurers that do not measure or disclose these exposures may face reputational or competitive risks, particularly as transparency and disclosure practices become more common across the industry. Measuring and disclosing insurance-associated emissions is a way for (re)insurers to further manage their emissions-related risk.

BUSINESS GOAL 3: DEVELOP DATA-INFORMED INSURANCE PRODUCTS

The former TCFD framework, now reflected in the ISSB's IFRS S2 Climate-related Disclosures Standard, highlights that understanding emissions exposure can also reveal business opportunities associated with environmental markets. These opportunities are often categorized around areas such as resource

[15] IFRS - Climate-related Disclosures

efficiency, energy use, products and services, markets, and resilience. For (re)insurers, opportunities exist across these categories.

By measuring insurance-associated emissions and applying relevant intensity metrics, as shown in Table 6-1, (re)insurers can identify sectors and clients with higher emissions exposure within their underwriting portfolios. As a result (re)insurers can develop innovative products and services that better support their clients in reducing their emission impact.

BUSINESS GOAL 4: TRACK PROGRESS TOWARDS INSTITUTIONAL GOALS

Each (re)insurer is responsible for independently determining the objectives and performance metrics that best align with its business strategy, regulatory environment, and operational context. Jurisdiction-specific requirements, legal considerations, and market factors will naturally influence these decisions.

Regardless of strategic priorities, establishing a consistent methodology for measuring insurance-associated emissions is essential. PCAF provides standardized approaches for calculating and reporting GHG emissions associated with both financial and underwriting portfolios. By applying these methodologies, (re)insurers can track absolute emissions over time, improve data comparability, and strengthen the integrity of their reporting.

Principles and requirements of GHG accounting for (re)insurers

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4. Principles and requirements of GHG accounting for (re)insurers

To develop this Insurance-Associated Emissions Standard, PCAF drew on the GHG accounting principles outlined in the GHG Protocol Corporate Accounting and Reporting Standard[16]and the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.[17] Based on these principles, PCAF has developed an additional set of five overarching requirements to guide accounting and reporting for insurance-associated emissions.

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

Like financial accounting and reporting, GHG accounting and reporting follow generally accepted principles to ensure that an organization's disclosure represents an accurate, verifiable 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' and the GHG Protocol 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. The GHG Protocol's five core principles are completeness, consistency, relevance, accuracy, and transparency. This Standard follows these five core principles and provides five additional requirements for the application of these principles that are directly relevant for (re)insurers wishing to assess their insurance-associated emissions (see Figure 4-1).

[16] (WRI and WBCSD, 2004)
[17] (WRI and WBCSD, 2011)

Figure 4.1-1. Additional PCAF requirements of GHG accounting and reporting are derived from the GHG Protocol's five principles

GHG Protocol principles for scope 3 inventories	Additional PCAF requirements for insurance-associated emissions
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.	**Recognition** (Re)insurance companies shall account for their insurance-associated emissions separately under scope 3 category 15,[18] [19] as defined by the GHG Protocol 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. Any limitations or restrictions shall be disclosed. **Measurement** (Re)insurance companies shall measure and report their insurance-associated emissions for specific insurance products and specific segments by "following the risk" and considering the PCAF methodologies and guidance provided in the Upcoming Standard. If data availability and methodologies allow, avoided and removed emissions can also be measured and reported. **Attribution** The (re)insurer's share of insurance-associated emissions of the insured risk shall be proportional to the absolute emissions of the customer or asset. **Data quality** (Re)insurers shall use high-quality data where available for specific insurance products and the underlying assets/companies and shall improve the quality of the data over time. Where necessary or appropriate, (re)insurers may use approximative key performance indicators (KPIs) which best reflect emissions.

[18] Category 15 of the 'Technical Guidance for Calculating Scope 3 Emissions' does not explicitly refer to underwriting activities of (re)insurers. It solely focuses on "investments" and providing such "financial services" and "client services". I.e., the reporting of any kind of insurance-associated emissions is considered to be a voluntary broadening of the interpretation of the Technical Guidance due to the (re)insurer's own ambitions and goals.
[19] As described, the reported figures in the context of insurance-associated emissions might, however, not be at all comparable with emissions being reported for the re-/insurer's own or financed emissions. Any voluntary reporting might depend on the further specifics to be defined.

Disclosure
Public disclosure of the results of the PCAF assessment is for external stakeholders, as well as (re)insurance companies using the methodology to have a clear, comparable view on how insured risks contribute to emission reduction goals.

4.2 Additional requirements for accounting and reporting insurance-associated emissions

This chapter describes the additional requirements for GHG accounting for (re)insurers' underwriting portfolios, and how these requirements guide accounting for and reporting of insurance-associated emissions. Thereafter, Chapter 5 includes details for measuring and accounting insurance-associated emissions, and Chapter 6 includes requirements and recommendations on reporting.

RECOGNITION

(Re)insurers shall account for emissions that are associated with their insurance contracts where material and where data is available. They shall be reported separately under scope 3 category 15,[20 21] as defined by the 'GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. They shall be measured and reported as a supplementary accounting note and shall not be aggregated with financed emissions. Any limitations or restrictions shall be explained and disclosed. However, they do have the flexibility to decide where they want to start measuring and disclosing their insurance-associated emissions. For instance, at a specific line of business level or by sector.

The core difference between financed and insurance-associated emissions is the nature of the relationship of the financial institution with the client.[22] For additional information on the relationship between insurers and the insured, please see Box 4.2-1.

(Re)insurance customers, including consumers, have a vital need for (re)insurance for their businesses, and this creates leverage for (re)insurance companies in discussing GHG emissions with such customers. The lack of ownership or direct control over the client activity is a key differentiation that impacts the approaches that an individual (re)insurer may take when engaging clients and supporting their actions to reduce emissions.

The differences between insurance-associated emissions and financed emissions require distinct methodologies for accounting them, and thus also separate reporting.

20 Category 15 of the 'Technical Guidance for Calculating Scope 3 Emissions' does not explicitly refer to underwriting activities of (re)insurers. It solely focuses on "investments" and providing such "financial services" and "client services". I.e., the reporting of any kind of insurance-associated emissions is considered to be a voluntary broadening of the interpretation of the Technical Guidance due to the (re)insurer's own ambitions and goals.
21 As described, the reported figures in the context of insurance-associated emissions might, however, not be at all comparable with emissions being reported for the re-/insurer's own or financed emissions. Any voluntary reporting might depend on the further specifics to be defined.
22 Credit (re)insurers might have comparable rights under specific constellations (e.g., default of corporate loan, which is insured by the (re)insurer). That's why credit (re)insurance might be considered differently (see also Table 5.1-1).

Box 4.2-1. The relationship between (re)insurers and the insureds

Living life and running businesses involves risks. To mitigate these risks, individuals and companies buy insurance. They transfer a portion of the risk they face to insurers and pay a premium. When the insured event occurs, the insurer pays out as defined in the terms and conditions of the insurance policy. Insurers then too buy insurance (reinsurance) to transfer part of the risks on their balance sheet to reinsurers.

Several characteristics differentiate the relationship between (re)insurers and their insurance clients from the relationship between investors/banks and their clients, including the following:

- Claims payments can be characterised as a money flow. However, (re)insurance proceeds are not an investment or loan, as the right to proceeds is contingent on the occurrence of a (re)insured event. While a (re)insurance policy can and does support economic expansion and growth, the specific claims payments (the money) are intended for recovery, and not expansion or enrichment.
- The (re)insurance contract relationship creates no ownership or transfer of equity/loan and results in no financial or direct operational control. (Re)insurance contracts represent an expression of commitment and trust – that is, the (re)insurer will provide the agreed coverage should the terms of the (re)insurance contract be fulfilled. While this coverage is often financial, it may also include services such as legal, security, and claims remediation in the case of, for example, environmental and cyber claims.
- A (re)insurer/insured relationship is also formed differently than the relationship between an investor/investee. That is, investors choose the client in which to make an investment. The client ultimately chooses the (re)insurer, often introduced through an intermediary such as a broker/agent.
- The length of the contractual relationship for most P&C (re)insurance lines is usually one year.

(Re)insurers are enablers in the sense that they have the opportunity to directly or indirectly influence or support another actor's capacity to operate/perform/own/dispose of a certain economic activity or product/good or service. The actions that a (re)insurer may take to possibly influence or support another actor, are subject to different variants specific to each situation/transaction, including, but not limited to, business and legal considerations. For example, if the provision of insurance for certain LoB is mandatory in a given jurisdiction, an insurer may only be able to engage with a client but not change anything about the provision of cover which is set by law. In this case, the actions a (re)insurer can take are relatively limited.

Moreover, several private companies and government activities can be characterized as enablers. For example, in the motor vehicle value chain enabling actors could be the following: the state agencies, motor vehicles manufacturers, lending institutions, (re)insurance companies, dealers, maintenance services, gas stations, or repairers. All are players in the motor value chain. Also, within the insurance industry, several actors can potentially have influence, depending on their involvement in each situation/transaction, including primary insurers, reinsurers and brokers.

MEASUREMENT

A key tenet for GHG accounting of financial assets is the "follow the money" principle. It means that the money should be followed as far as possible to understand and account for the climate impact that financial assets have in the real economy. Due to the different nature of the relationship with the client in (re)insurance underwriting (see section above on "Recognition"), we refer to the "follow the risk" rather than "follow the money" principle in the case of insurance-associated emissions.

The "follow the risk" principle implies looking at the insured whose risk is transferred to the (re)insurance industry. The "follow the risk" principle looks at the risk transfer, while the "follow the money" principle applicable to financed emissions looks at money flows. In case of "follow the risk", the entity whose emissions are in focus typically is the insured. The insured party is not necessarily the one receiving the insurance payout. In the case of third-party liability, for instance, the insurance recoverable ultimately serves to indemnify the third party that has been damaged by the policyholder.

(Re)insurers that intend to conform to this Standard shall measure and report their insurance-associated emissions using the methodologies set out in this Standard, covering the seven GHGs required under the Kyoto Protocol. As a minimum, absolute GHG insurance-associated emissions resulting from underwriting activities (scope 3 category 15 emissions) in the reporting year shall be measured and reported as a supplementary accounting note and shall not be aggregated with financed emissions. In addition, and when relevant, emission removals and avoided emissions may be measured and shall be reported separately. Absent specific guidance in the first version of this Standard on both emission removals and avoided emissions, (re)insurers shall disclose separately the methodological formula adopted in calculating emissions removed or avoided in accordance with the guidance in Chapter 6.

As a basis for reporting emissions, (re)insurers shall choose a fixed point in time to determine their underwriting positions and calculate an attribution factor. This point in time could be, for instance, the last day of their fiscal year (e.g., June 30 or December 31). The GHG accounting period shall align with the financial accounting period.

ATTRIBUTION

Assessing the attribution for financed emissions of commercial clients is relatively straightforward because the total capital of a company is known from the liability side of company's balance sheet. Conversely, this is more difficult for the (re)insurance industry when assessing the attribution of GHG emissions of both firms and households/individual customers.

The 'GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard' provides guidance for GHG emissions from loans and investments. They should be allocated to the reporting financial institutions based on the proportional share of lending or investment in the borrower or investee.[23]

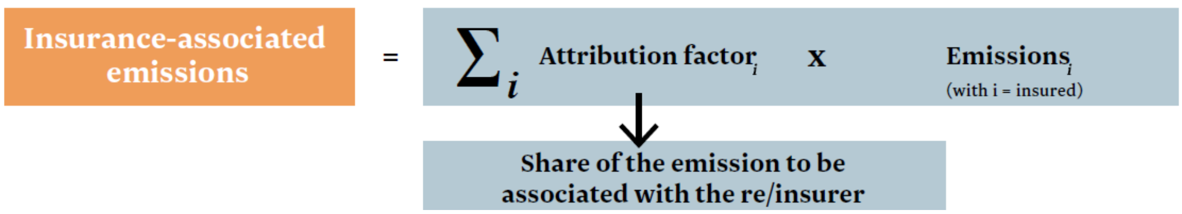
[23] (WIR and WBCSD, 2011)

A similar logic should be applied to insurance-associated emissions, amended to reflect the distinct relationship between a (re)insurer and their customer.

The methodologies presented in this Standard apply the same general logic across in-scope LoBs (Figure 4.2-1):

- Insurance-associated emissions are always calculated by multiplying an attribution factor (specific to the respective (re)insurance LoB/segment) by the absolute GHG scope 1 and 2 emissions of the (re)insured client or asset (and scope 3 emissions, where significant and where data allows in accordance with the guidance in Chapter 5).
- The attribution factor serves to determine the share of the absolute emissions of the insured customer or asset associated with the (re)insurance underwriting portfolio. In addition, the Working Group has defined five guiding principles for an adequate methodology for insurance-associated emissions: robustness and high level of independence, proportionality, comparability, feasibility and reasonableness, and materiality (see Annex 9.4).

Figure 4.2-1. The general approach to calculate insurance-associated emissions



Attribution is based on annual GHG emissions of the primary (re)insurance clients. As a result, GHG insurance-associated emissions are reported on an annual basis at least. Additional insurance segments-specific information on attribution can be found in Chapter 5.

Box 4.2-2. Insurance-associated emissions and double counting

Double counting, which occurs when GHG emissions are counted more than once in the inventory of insurance-associated emissions of one or more insurance companies, should be avoided as much as possible. Double counting of insurance-associated emissions can occur due to several reasons:

- **Double counting between insurance and asset management activities**
  Insurance companies perform both underwriting and asset management activities. Both insurance-associated emissions and financed emissions are a form of virtual accounting for real economy GHG emissions. They offer a different view on the cube of "real" GHG emissions (see Figure 5.1-1). When investing in and insuring the same company, the emissions of this company are double counted by the insurance company. This can be avoided by separately reporting financed emissions for investments and insurance-associated emissions for insurance underwriting.
- **Double counting across emission scopes**
  Insurers may offer cover to several companies along a value chain. This can lead to double counting of the insured's emissions within the insurance-associated emissions. This effect can be limited by reporting insured' scope 3 emissions separately from scope 1 and 2 emissions of insured clients as required by this Standard. However, there may still be double counting with respect to scope 1 and 2 of insured clients when insuring both power-generating companies and their clients.

- **Double counting between different insurers of the same client or between the primary insurers and reinsurers**
  As certain risks are too large to be borne by an individual (re)insurer, these risks can be spread in a complex risk-sharing system comprising many players, including insurance, reinsurance ("insurance of an insurance policy/portfolio"), and retrocession ("reinsurance of a reinsurance policy/portfolio"). The consequent risk of double counting of emissions between those players could be addressed by reporting net insurance-associated emissions (i.e., calculated based on net (re)insurance premium).

Double counting is a frequent and inherent aspect of GHG accounting. It does not need to be seen problematic, if:

- double counting does not interfere with stated decarbonization goals of getting a clear view on where portfolios are connected to their customer's and investee's emissions; and
- methodologies and limitations are stated transparently as part of the disclosure.

PCAF's objective will not be to eradicate double counting and to create a global balance sheet of absolute GHG emissions. The ambition will be to minimize double counting concerns where they impact stated principles and the delivery of a transparent and consistent approach to track and report insurance-associated emissions and their changes over time. (Re)insurance companies using the methodologies of this Standard will be subject to the same exposure to double counting and will not be more significantly affected than others.

Figure 4.2-2. Illustrative view of GHG emissions

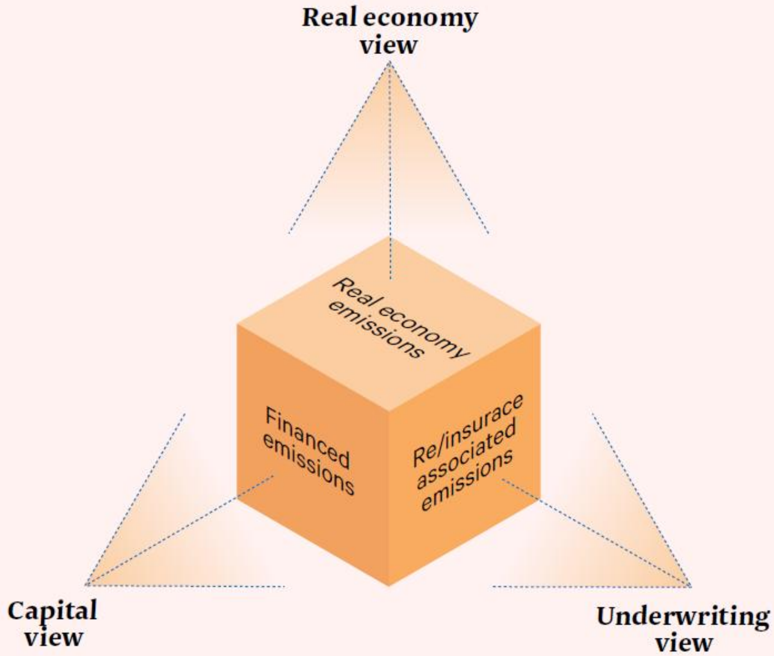


Illustration not drawn to scale

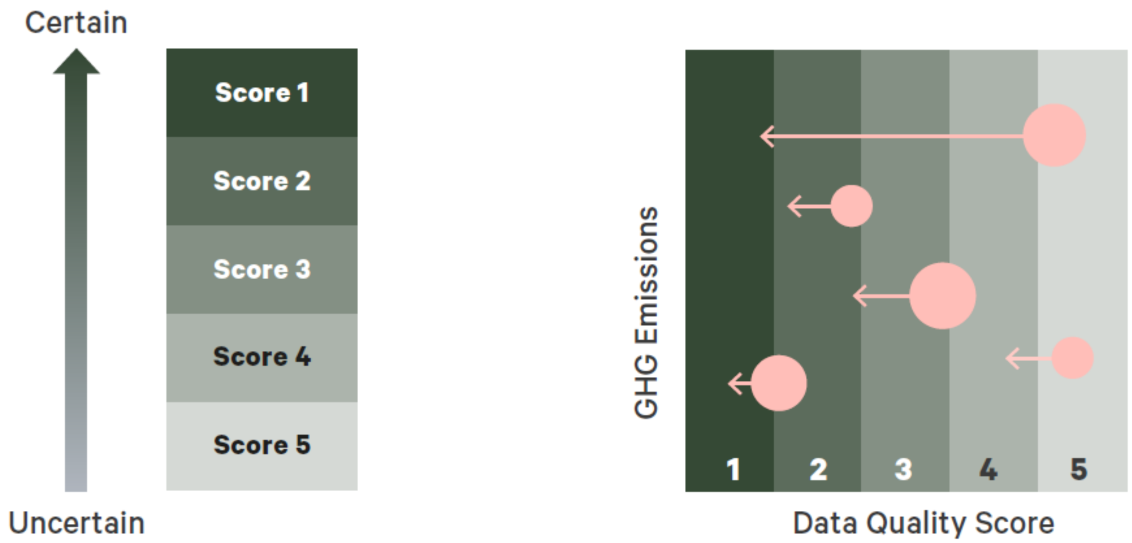
DATA QUALITY

(Re)insurers shall ensure their GHG accounting appropriately reflects the GHG emissions associated with their underwriting portfolios. To safeguard these outcomes, (re)insurers shall use the highest-quality data that is reasonably available for each LoB for calculations, and, where relevant, improve the quality of the data over time. PCAF recognizes that high-quality data can be difficult to obtain when calculating insurance-associated emissions, particularly for certain insureds, LoB or insured activities. However, data limitations should not deter (re)insurers from taking the first steps toward preparing their inventories. Even estimated or proxy data can help them identify GHG-intensive hotspots in their portfolios, which in turn can help to determine their climate strategies. Where data quality is low, (re)insurers can design approaches to improve it over time.

For measuring insurance-associated emissions in each line of business, various data inputs are needed to calculate the (re)insurer's attribution factor and the client's total emissions. The data needed to calculate an attribution factor can typically come from the (re)insurer and its clients, although the data required to calculate the client's emissions might not be readily available and must be sought out by the (re)insurer. For emissions associated with commercial lines portfolios, a simple template has been created for the purpose of capturing at source the core data required by (re)insurers for calculating emissions associated with commercial lines portfolios (see Appendix 9.5). The quality of this data can vary depending on assumptions relating to its assuredness, specificity, and other variables.

High-quality data is often not available to the (re)insurer for all insureds, LoB and coverage types. In these instances, the (re)insurer should use the best available data reasonably available in accordance with the data hierarchy shown in Figure 4.2-3.

Figure 4.2-3. General data quality scorecard



PCAF recognizes that there is often a lag between financial reporting and required data becoming available, such as emissions data for an insured client. In these instances, (re)insurers should use the most recent data available, even if it represents different years. For example, it would be expected and appropriate that a (re)insurer's reporting in 2022 for its 2021 financial year would use 2021 financial data alongside 2020 (or other most recent) emissions data.

Also where an insurer has entered joint ventures with other entities in which it does not have a controlling stake, it might not be possible to acquire sufficiently granular customer information. Insurers should strive to also account for their share of joint venture business. However, where their stake is less than 50% and they are not able to access the required information to calculate attribution factors, they are also not able nor required to report emissions.

Data quality is specific to each line of business. More information on issues related to data quality and how to employ the hierarchy for each line of business can be found in Chapter 5 and in Annex 9.2.

DISCLOSURE

The public disclosure of aggregated absolute insurance-associated emissions is important for external stakeholders and (re)insurers using the methodology to have an analogous view of the climate impact of (re)insurers. To this end, (re)insurers that intend to conform to the Standard shall report aggregated absolute insurance-associated emissions. To support their disclosures, (re)insurers 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). PCAF encourages insurers calculating insurance-associated emissions to share these results with reinsurers to allow them to calculate their respective footprints.

Methodology to measure insurance-associated emissions

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5. Methodology to measure insurance-associated emissions

This chapter describes the methods to calculate insurance-associated emissions for four segments:

- Commercial lines portfolios
- Project insurance
- Personal motor portfolios
- Treaty reinsurance

Each segment has its own section covering methodology including guidance on the following elements:

- Emission scopes covered
- Attribution of emissions
- Formulas to calculate insurance-associated emissions
- Data required
- Limitations

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

5.1 General considerations

This Standard defines attribution factors that reflect an adequate share of emissions for insurance. It is calculated based on data that is readily available, such as premiums and the costs/revenues of a company or a specific insured asset. The approaches for commercial and personal motor insurance portfolios are based on a conceptually similar idea: the attribution factor is determined based on the importance of insurance as production factor for the insured asset or company. However, this does not mean the two approaches deliver comparable absolute values and hence, the emissions for commercial lines and personal motor should be reported separately. For commercial portfolios, the ratio of premiums and revenues of a company/asset is used to determine attribution. For motor, the attribution is calculated based on the share of insurance in the total cost of ownership of running a vehicle.

If insurance cover is mandatory, it could be argued that all emissions of a company or an asset need to be allocated to the insurer, because a company could not operate without the insurance cover. However, problems could arise when taking this approach. For example, in circumstances where a company needs to take out multiple mandatory insurance covers. In addition to mandatory coverage, other prerequisites for the activity often need to be fulfilled. For example: beyond insurance also a vehicle's registration (plate) or fuel are required to operate this vehicle. These include. Ultimately, there can be multiple contributors that enable the activity to take place. The adequate shares of all contributors must therefore be considered.

Another option for an adequate attribution factor could be allocating emissions of a company or a household/individual according to the structure of its total cost of risk (i.e., measures to avoid, mitigate, retain or insure various risks). This option is not deemed practical, particularly for households/individuals, due to the lack of data. It would show that only a fraction of emissions of a company, household/individual, or an asset would be allocated to an insurance company or the whole insurance industry.

Figure 5.1-1: Total cost of risk of a company

Source: (Swiss Re Institute sigma No 05/2012)

Another options is that a company's balance sheet could be expanded to include the additional equity or debt that theoretically would be required to substitute for the insurance products purchased. Based on this calculation, the insurer's share of a company's emissions could be calculated in the same way as financed emissions. The share of debt and equity holder's financed emissions would be reduced respectively, while the insurer will take its fraction of the company's financed emissions. While this approach would be consistent with the approach for financed emissions, it is not feasible to implement.

Most of these theoretical reflections, though not feasible to be implemented, show that it is adequate that only a fraction of total emissions are allocated to the insurance sector. This is also reflected by the approaches defined. For example, as global commercial insurance premiums account for an estimated 0.5% of global gross revenues of all economic sectors,[24] this share of emissions would roughly be allocated to the insurance sector. However, the importance of personal motor insurance versus the total cost of ownership for a vehicle is higher, and at 6,99% globally.[25] Consult the PCAF personal motor industry attribution factor approach documentation for more details.

Data availability

PCAF acknowledges that obtaining data on actual emissions from clients is more challenging for (re)insurers compared to other parts of the financial sector. This issue affects all lines of business. Similarly, the entire financial sector faces data availability challenges when dealing with SME clients. Additionally, there is also the uncertainty of data and even reported data from large corporates might not always be fully reliable. Please also see Box 5.2-1 for more information on limitations around scope 3 emissions.

[24] Based on Swiss Re sigma and Oxford Economics data.
[25] https://carbonaccountingfinancials.com/files/20231211-PCAF-personal-motor-industry-attribution-factor-approach.pdf

Despite these challenges, PCAF encourages (re)insurers to begin their GHG accounting journey by using sector averages when data is lacking. An initial footprint can provide insights into emission hotspots within portfolios. The next step would be to engage with clients to identify measures for collecting better emission data. PCAF also recommends using the proposed PCAF data quality scores in disclosures to indicate the type of data used for GHG emissions footprint calculations.

SCOPE OF THIS STANDARD

The (re)insurance industry can be classified by the LoB that provide coverage for the different risks a customer faces and needs to seek protection against.

The focus of this Standard is on:

1. Commercial lines insurance (i.e., all types of insurance purchased by companies);
2. Project insurance (namely, construction all risk (CAR), erection all risk (EAR), and inherent defect insurance (IDI));
3. Personal motor insurance (the insurance of vehicles purchased by private individuals or households); and
4. Treaty reinsurance.

Insurance contracts purchased by public entities (e.g., government agencies, municipalities, etc.) are not in scope for this version of the Standard. While the products purchased by those entities are broadly identical to products available to business entities, defining the boundaries for the emissions to be associated with public entities requires additional methodological work. These will be covered in future versions of the Standard, potentially leveraging ongoing work for financed emissions from government bonds.

For the time being, this Standard also does not consider other personal lines (e.g., homeowner insurance), any life or health insurance (including corporate life and pensions), and personal accident lines. The approach for commercial insurance portfolios shall be applied to facultative/single-risk reinsurance.

Table 5.1-1 provides a more detailed list of the types of insurance covered. Chapter 5.2 to 5.5 present proposals for the different segments covered by this Standard.

Table 5.1-1. Business segments and lines of business covered by this Standard. This list may look different for each (re)insurance company

Segment	LoB	Covered in
Commercial insurance (directly insured and facultative reinsurance covers)	**Property** (e.g., fire, multi-peril)	5.2 Emissions associated with commercial lines portfolios
	Liability/Casualty (e.g., General Liability, Product Liability, Product Recall, Environmental Liability)	5.2 Emissions associated with commercial lines portfolios
	Commercial motor (all lines)	5.2 Emissions associated with commercial lines portfolios

	Marine (liability and hull)	5.2 Emissions associated with commercial lines portfolios
	Aviation (liability and hull)	5.2 Emissions associated with commercial lines portfolios
	Agriculture (excluding government schemes, arrangements)	5.2 Emissions associated with commercial lines portfolios
	Trade credit (insurance of credit risk for sold goods) and political risk – primary insurance only[26]	5.2 Emissions associated with commercial lines portfolios
	Structured trade credit (insurance of credit risk for bank loans, mortgages, or other financial instruments)	Out of scope of current version of the standard[27]
	Surety	Out of scope of current version of the standard[28]
	Engineering: insurance related to construction projects (CAR/EAR, IDI)	5.3 Emissions associated with project insurance
	All other engineering lines (e.g., any operational covers, machinery breakdown and electronic equipment)	5.2 Emissions associated with commercial lines portfolios
	Corporate life and pensions, personal accident	Out of scope of current version of the Standard
	Other/Special lines (e.g., Financial Lines [e.g., Professional Indemnity, D&O], workers compensation)	5.2 Emissions associated with commercial lines portfolios
Statutory lines of business		5.2 Emissions associated with commercial lines portfolios
Public entities	**Insurance contracts purchased by public entities** (e.g., government agencies, municipalities, etc.)	Out of scope of current version of the standard
Personal lines	**Motor (all lines)**	5.4 Emissions associated with personal motor portfolios
	Liability	Out of scope of current version of the standard
	Property	Out of scope of current version of the Standard
	Other personal lines (e.g., Travel assistance, legal assistance, pet)	Out of scope of current version of the Standard
	Life and Health	Out of scope of current version of the Standard
Treaty reinsurance (incl. treaty-like facultative reinsurance structures)	**All LoBs in scope of the primary insurance standard**	5.5 Treaty reinsurance

[26] For the facultative reinsurer, look-through information on the original insured usually not available.
[27] Out of scope of current version of the standard, due to direct link to products covered under financed emission standard. As outlined in Chapter 4.2 credit (re)insurers might have comparable rights to financing institutions under specific constellations. That's why credit & surety (re)insurance might be considered differently.
[28] Out of scope of current version of the standard, as 3-way relationship is materially different to other P&C products covered. As outlined in Chapter 4.2 credit (re)insurers might have comparable rights to financing institutions under specific constellations. That's why credit & surety (re)insurance might be considered differently.

Commercial lines

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5.2 Emissions associated with commercial lines portfolios

Please refer to the Important Note at the beginning of this document, especially with respect to solicitation of commentary and that the use of the proposed methodology is subject to the laws, rules and regulations applicable to each reporting (re)insurance company.

EMISSION SCOPES COVERED

While the ability for a customer to engage in a specific business activity is limited without risk protection cover, PCAF acknowledges that (re)insurers are not in a position to directly influence their customers' emissions. However, (re)insurers may be able to engage with customers to better **understand** their plans to reduce their scope 1, 2, and 3 emissions and overall GHG intensities over time, in line with applicable government policies as per jurisdiction.

(Re)insurers **shall** report customers' absolute scope 1 and scope 2 emissions across all sectors and **should** also report absolute scope 3 emissions to the extent that such numbers are available and represent reasonable and verifiable estimates.

If (re)insurers do not report customers' scope 3 emissions, PCAF recommends that they explain why.

Further recommendations on how customers' scope 1, 2, and 3 emissions should be reported within insurance-associated emissions are provided in Chapter 6.

Box 5.2-1. PCAF acknowledges significant limitations around scope 3 emissions

PCAF acknowledges that, to date, there are significant limitations around the provision of data. In particular, the comparability, coverage, transparency, and reliability of scope 3 data varies greatly per sector and data source. Furthermore, scope 3 data will be collected by a mixture of sources that vary per (re)insurer. The basis of collating, processing and publishing these figures will also vary by (re)insurer, and methodologies must be developed in a way that best suits the internal capabilities of each (re)insurer. PCAF also recognizes that each (re)insurer needs to independently determine a timetable by which to appropriately consider their customers' scope 3 emissions across different sectors within insurance-associated emissions, in accordance with guiding principles, applicable legislation, and reporting standards.

PCAF also recognizes that (re)insurers have different compositions of customers and LoBs within their underwriting portfolios and that they may provide coverage across the value chain. Therefore, by recommending the inclusion of customers' scope 3 emissions at this time, PCAF may inadvertently intensify the issue of double-counting emissions. Equally mono-line insurers are unlikely to be in a position to influence a reduction directly or indirectly in customers' scope 3 emissions.

PCAF recognizes that the task of reporting all customers' emissions represents a long-term challenge which is reliant on increasing customer engagements and disclosure. This task is intended to support the development by each individual (re)insurer of a set of meaningful and appropriate strategies which will support the measurement of insurance-associated emissions over time. Such measurements and reductions should in turn reflect the best-quality data available. The expectation is that with improved data capture and comparability, the measurements too will improve over time.

PCAF supports efforts by (re)insurers to improve the levels of data capture and integrity of customers' emissions over time, with the objective of increasing the level of consistency, quality and comparability throughout the industry. In alignment with the GHG Protocol, PCAF does not set a threshold above which scope 3 emissions should be included. Instead, reporting companies should develop and disclose their own significance scope 3 threshold based on their business goals. Environmentally extended input-output (EEIO) data can be used to quickly estimate the relative size of scope 3 emissions compared to scope 1 and scope 2 emissions for any sector.

ATTRIBUTION OF EMISSIONS

For commercial portfolios, the (re)insurer accounts for a portion of the annual emissions of the customer. This portion is determined by the ratio between (re)insurance premium for that customer (numerator) and revenues generated by the customer (denominator). This ratio is called the attribution factor.

Insurance products may offer cover for specific activities, locations or projects. Often these account for just a part of a company's emissions, not the overall climate impact of the insured.[29] Under the commercial lines methodology, asset-based data granularity **shall not** be used for any accounting and reporting under this version of the Standard. Instead, data at the entity level (parent or subsidiary) **shall** be used. For asset specific LoBs (e.g., construction all risk & erection all risk) the project insurance methodology shall be applied (see subchapter 5.3).

In cases where policies cover specific subsidiaries of a company, the insurance-associated emissions can be calculated to account solely for these. However, this may only be done if the relevant revenue and emission data are available at an adequate level of granularity. Data can be available on a reported or estimated basis. The use of estimated data will impact the quality score of the resulting attributed emissions. A mismatch of the organizational scope in the attribution factor and the emissions side of the equation must be avoided. See Table 5.2-1 for examples:

Table 5.2-1. Example of parent and subsidiary companies and asset level coverages

Company	Revenues (USD)	Emissions (t)
Parent A	900m	400m
Subsidiary A1	250m	50m
Subsidiary A2	300m	170m
Subsidiary A3	100m	N/A
Subsidiary A4	N/A	N/A

[29] This is particularly relevant for project-specific insurance such as cover for the construction of a specific asset. For instance, if insuring the construction of a solar power plant by a diversified energy company that also owns fossil generating plants, emissions from those fossil plants would factor into the attribution as well, even though they are not covered by the insurance policy.

Examples:

- When insuring Subsidiary A1 and A2– use reported revenue and emissions data for Subsidiary A1 and A2 respectively.
- When insuring Subsidiary A3 or A4 where subsidiary-specific revenue and emission data is not fully available, – use parent-level information for revenue and emissions, or proceed with an estimation of subsidiary emissions to use alongside reported subsidiary revenue. The use of parent-level data and/or estimated emissions data should be properly reflected in the data quality score of the resulting attributed emissions.

Formula to calculate insurance-associated emissions

$$\textbf{Insurance-associated emissions} = \textbf{Attribution factor}_i \times \textbf{Emissions}_i \textbf{ of insured company or asset}$$

$$Attribution\ factor_i = \frac{Re/Insurance\ premium_i}{Customer\ revenue_i}$$

Definitions

1. **(Re)insurance premium (numerator)**: For the purpose of this standard, (re)insurance premium is defined as gross written premium (the total amount to be paid by the insured to the (re)insurer for the policy written in the period) minus external acquisition costs (e.g., external brokerage fees)[30]. For multi-year contracts, an annualized premium value **shall** be used. Gross premium **shall** also be used for Fronting Policies.
2. **Customer revenue (denominator)**: Total amount of income generated by the customer through the sale of goods or services.

Customer revenues are automatically captured as part of the submission process for some LoBs. However, this is not the case for all LoBs, and insurers will need to develop processes to capture this data where missing. As with emissions data, using company reported revenue data directly from the client or via a third-party data provider is the preferred approach. However, when clients do not report revenue data or when getting access to this data is not reasonable, estimated revenue data based on proxy data (such as by industry type and country, or per number of employees) may be used. Such estimations may use internally developed models. Many third-party data providers also offer estimated revenues for a wide range of global companies.

Special considerations are required for statutory products if insurers do not have the option to decline customers (e.g., in some countries this may include compulsory third-party motor, mandatory third-party liability, workers compensation, environmental liability, and government-based insurance schemes). While the attribution factor is applicable to this line as well, it may be reported separately.

[30] External acquisition costs focus on the external acquisition aspect and not the administration of the insurance contract. Such acquisition costs include e.g. external brokerage fees. Other components such as insurance premium tax should be deducted. These are examples for such costs and are not exhaustive.

Co-insurance

Co-insurance follows the same methodology as described above. In case of co-insurance, usually each (re)insurer takes a share of the insurance premium. When calculating the attribution factor, each (re)insurer **shall** only take its own share of the insurance premium.

IFRS 17

PCAF is aware that the IFRS has, in their latest update IFRS 17, removed the requirement to report "gross written premium". PCAF acknowledges that as a result of this change, (re)insurers following the IFRS framework may experience data availability issues. Additional guidance on how to apply IFRS 17 in the GHG accounting context is work in progress. Until this further guidance is available (re)insurers **shall** continue to use PCAFs existing (Part C) accounting methodologies and thus calculate their insurance associated emissions on a gross written premium basis.

Aggregation approach

When insuring commercial clients, (re)insurers are likely to write more than one LoB, or participate in several layers of an insured's (re)insurance program. To get to an overall customer view of attributed emissions, the premiums from each contract can be easily aggregated, as outlined in Box 5.2-2.

Box 5.2-2. Example for calculating the customer attribution factor in a situation where one (re)insurer writes more than one LoB with the same insured

Customer with multiple LoB[31]

LoB	(Re)insurance premium	Revenue	Insurance-Associated Emissions Attribution factor
Third-party Liability	50		0.005
Property	100		0.01
Total	150	10,000	0.015

$$\textit{Customer attribution factor} = \frac{(Re)insurance\ premium_1 + \cdots + (Re)insurance\ premium_n}{Revenue}$$

$$= \frac{50 + 100}{10,000}$$

OPTIONS TO CALCULATE INSURANCE-ASSOCIATED EMISSIONS

The insurance-associated emissions from commercial lines portfolios can be calculated in different ways, depending on the availability of the insured's financial and emissions data. Overall, PCAF distinguishes – in line with the financed emissions from listed equity and bonds – three different calculation options depending on the emissions data used:

[31] The figures presented in this example are not representative of an actual attribution factor. The factor can be much smaller as a proportion of revenue.

- **Option 1: reported emissions**, where verified[32] or unverified[33] emissions are collected by the reporting (re)insurer from the insured company directly (e.g., company sustainability report) or indirectly via verified third-party data providers (e.g., CDP). These emissions are then allocated to the reporting (re)insurer using the attribution factor.
- **Option 2: physical activity-based emissions**, where emissions are estimated by the reporting (re)insurer based on primary physical activity data collected from the insured company (e.g., megawatt-hours of natural gas consumed or tons of steel produced). These emissions are then allocated to the reporting (re)insurer using the attribution factor. The emissions data should be estimated using an appropriate calculation methodology or tool with verified emission factors (EF) 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 (re)insurer based on economic activity data collected from the insured company (e.g., euro of revenues or euro of assets). These emissions are then allocated to the reporting (re)insurer 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[34] (e.g., tCO_2e/€ of revenue or tCO_2e/€ of asset).

DATA REQUIRED

PCAF distinguishes three options to calculate the insurance-associated emissions for commercial lines portfolios, depending on the emissions data used:

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

Options 1 and 2 are based on company-specific reported emissions or primary physical activity data provided by the customer or third-party data providers. Option 3 is based on region- or sector-specific average emissions or financial data, using statistics or data from public sources or third-party providers.

Options 1 and 2 are preferred over Option 3 from a data quality perspective, because they provide more accurate results of insurance-associated emissions. Due to data limitations, (re)insurers 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 5.2-2 provides data quality scores for each of the described options and sub-options (if applicable) that can be used to calculate the insurance-associated emissions for commercial lines portfolios.

[32] This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.
[33] This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third-party auditor.
[34] 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 (re)insurers in various regions in finding regional and more relevant financial or emissions data information.

Table 5.2-2. General description of the data quality score table for commercial lines insurance

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

Data quality	Options to estimate the insurance-associated emissions		When to use each option (what data should be available)		
			Attribution Factor	Emissions	
				Scope 1	*Scope 2*
Score 1	Option 1: Reported Emissions	1a	(Re)insurance Premium/ Customer Revenue	Reported - Verified	Reported Market Based - Verified
Score 2		1b		Reported - Unverified	Reported Market Based - Unverified Reported Location Based - Unverified Reported Location Based - Verified
	Option 2: Reported or physical activity - based emissions	2a		Energy Consumption x EF (Intensity per MWh of Electricity)	
Score 3		2b		Production Output x EF (Average Sector Emission Intensity per t of Production [output])	
Score 4	Option 3: Economic - activity based emissions	3	(Re)insurance Premium/Average Sector Revenue	Customer revenue or Average Sector Revenue x EF (Average Sector Emission Intensity per Revenue)	
Score 5*	N/A				

*With the update of this Standard, PCAF has removed data quality score 5 from the table. Therefore, this score is not applicable.

A detailed summary of the data quality score table, including data needs and formulas to calculate insurance-associated emissions, is provided in Annex 9.2 (Table 9.2-1). Data for all three options in Table 5.2-2 can be derived from different data sources.

Reported emissions (Option 1)

Where available, PCAF recommends Option 1, using emissions data reported by companies in official filings and environmental reports. The most recent available data should be used with mention of data source, reporting period or publication date. PCAF acknowledges that commercial insurance portfolios include listed and non-listed companies, and that availability of reported data can be limited, especially for non-listed clients. PCAF also recognises that emissions data may not be publicly reported at an entity level.

Data providers (Option 1)

For Option 1 (reported emissions), PCAF recommends either collecting emissions from the customer directly (e.g., company sustainability report) or using third-party data providers, including but not limited to CDP, Bloomberg, MSCI, Sustainalytics, S&P/Trucost, and ISS ESG. Data providers typically make scope 1 and 2 emissions data available for larger commercial companies. Scope 3 data may be available through these data providers, but perhaps not for all 15 categories of Scope 3 emissions.

Third-party 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 or does not reflect 100% of the emissions boundaries. In cases where data providers estimate emissions themselves, the calculation would be in line with Options 2 or 3, conditional to the methodology used being in line with the GHG Protocol. (Re)insurers should ask data providers to be transparent, disclose the calculation method they use, and confirm alignment with the GHG Protocol. This will enable (re)insurers to apply the appropriate data quality score to the estimate. PCAF also encourages data providers to apply the PCAF data quality 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 provider, but it recommends using data providers that use the standardized CDP framework. PCAF has observed inconsistencies across data providers for company reported Scope 1 and 2 emissions. For (re)insurers using data providers, PCAF therefore encourages using the same provider for all insured clients, where possible, and using the most recently available data. PCAF also encourages (re)insurers to mention the data source, reporting period or publication date of data.

A list of questions to provide guidance when engaging with data providers around methodology and calculation methods is available in Annex 9.1.

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 mature 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 those from revenue-based models (i.e., emission intensity per revenue) because they are less sensitive to exchange rate or commodity price fluctuations. Emission factors from production-based models in line with Option 2 are especially useful for GHG-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 (re)insurer.

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 that 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 include but are not limited to ecoinvent,[35] Defra,[36] the Intergovernmental Panel on Climate Change (IPCC),[37] GEMIS (Global Emissions Model for integrated Systems),[38] and the Food and

[35] More information can be found at: https://www.ecoinvent.org
[36] More information can be found at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conedition-factors-2019
[37] More information can be found at: https://www.ipcc-nggip.iges.or.jp/EFDB/find_ef.php
[38] More information can be found at: http://iinas.org/gemis-download.html

Agriculture Organization of the United Nations (FAO).[39] Again, the most recently 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/€ of revenue or tCO_2e/€ of asset). (Re)insurers should use emission factors as consistently as possible with the primary business activity, in so far as this is known[40], but in a way that remains feasible given the large size of commercial lines portfolios covering multiple (granular) business activities. For example, for an insurance policy to a paddy rice farmer, the (re)insurer should seek to find and use a sector-specific average emission factor for the paddy rice sector, not a general emission factor for the agricultural sector overall. Example EEIO databases that can be used to obtain such emission factors are EXIOBASE,[41] CEDA,[42] GTAP,[43] or WIOD.[44] Sector-specific emission factors can also be replaced with values from linear regression models from databases containing company revenue and emissions, by sector and geographical region.

PCAF's web-based emission factor database provides a large set of emission factors for Options 2 and 3. This can help (re)insurers get started with estimating the insurance-associated emissions of their commercial lines portfolios.

PCAF expects that the insurance-associated emissions for most commercial lines portfolios can be derived through either reported emissions (Option 1), physical activity data (Option 2), or economic activity data (Option 3). However, it allows the use of alternative options to calculate emissions if none of the three can be used or in the case that new options are developed. The reporting (re)insurer shall always explain the reasons for using an alternative option if it deviates from the three options defined before.

Data granularity

PCAF recognises that it can be more challenging to source project-level, asset-level or subsidiary level data compared to parent-company-level data. For Commercial Lines, other than the ones covered by Chapter 5.3, asset-based data granularity shall not be used for any accounting and reporting under this version of the Standard. Instead, data at the entity level shall be used. Emission and revenue data shall always by on the same level (i.e., company or subsidiary level).

Quality scoring

PCAF distinguishes three options with five sub-options to calculate the insurance-associated emissions from commercial policies depending on the data used. If a (re)insurer uses a mix of options to calculate the emissions of an insured entity (e.g., actual verified emission is known and only an average revenue/proxy is

[39] More information can be found at: http://www.fao.org/partnerships/leap/database/ghg-crops/en
[40] For business written through a managing general agent, exact splits of sectoral information may not be available. In cases where the sectoral split is not available, (re)insurers could resort to proxies such as market averages.
[41] More information can be found at: https://www.exiobase.eu
[42] More information can be found at: https://watershed.com/solutions/ceda
[43] More information can be found at: https://www.gtap.agecon.purdue.edu
[44] More information can be found at: http://www.wiod.org

used to calculate attribution factor, which means that Option 1a and Option 3 are mixed), the data score for the lower-rated option should be assumed for this insured (i.e., score 4 from Option 3).

As scope 1 and 2 emissions will be reported combined, data quality scoring will be applied to both scopes jointly. Data quality scoring will be applied separately to scope 3 emissions data separately if reported. Since scope 1 and 2 emissions can have different methods of estimation, the combined data quality score to be reported shall be the lowest of the two methods.

LIMITATIONS

Exposure to market volatility

Both (re)insurance premium and customer revenue are exposed to volatility due to insurance market cycles and general macroeconomic market movements, which can be decoupled from changes in real world GHG emissions. For example, a surge in energy prices would lead to lower insurance-associated emissions, and an increase in loss activity factored into (re)insurance premiums over time could lead to increased insurance-associated emissions, even if neither the insured's emissions nor the provided insurance cover has changed. This could lead to counterintuitive developments of insurance associated emissions, requiring extra efforts for a (re)insurer to understand and appropriately explain those dynamics in their reporting.

Estimation of asset-specific emissions

As accepted methodologies to account for asset-level emissions become available, (re)insurers are encouraged to apply these to calculate the specific GHG emissions of insured assets. Guidance provided in the Financed Emissions Standard, particularly as it pertains to Project Finance and Commercial Real Estate, can serve as a first reference for calculating GHG emissions at an asset level.

Generalised 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 client-specific data because the data is largely based on region/sector assumptions and approximation 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 (re)insurer, as the sectors may not map one-to-one and may cause emissions to be over- or understated.

Measurement inconsistencies

Inconsistencies can arise from measuring part of the portfolio with customer-specific emissions data (which may encompass scopes 1, 2, and 3) and from measuring another part with region- or sector-specific average emissions data (which often encompasses only scope 1 and 2 emissions). One mitigating factor is that using customer-specific emission data could improve the accuracy of the region- or sector-specific average data, provided that the (re)insurer has enough client-specific data points relative to the size of the portfolio in a given sector. For example, if a majority of the clients in an insurer's textile manufacturing property portfolio provide specific emissions data, these averages could be applied (instead of industry-wide sector averages) to the other clients in the sector that do not provide specific emissions data.

Project insurance

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5.3 Emissions associated with project insurance

INTRODUCTION

The purpose of this method is to provide guidance to financial institutions on how to calculate insurance-associated emissions for project insurance. Project insurance is included as 'Engineering Lines', including construction all-risk and engineering all-risk, and relates to projects which emit Greenhouse Gas (GHG) emissions over their entire life-cycle.[45] Data on these lifecycle emissions are generally not available. More so, construction covers may be characterized by a non-linear development of the exposures over the years, which further complicates the relevant allocation of emissions. Therefore, additional guidance on lifecycle emissions is out of the scope of this method. The topic may be covered in the Standard in the future.

This methodology leverages existing guidance on commercial lines insurance and personal motor insurance, and provides a recap of key points, where relevant.

LINE OF BUSINESS

Line of business overview

Project insurance encompasses specific insurance products dedicated to covering various risks linked to the construction of new physical infrastructure. The type of construction projects covered include simple buildings, large hospitals, roads and railways, underground structures, wet works, industrial plants of any sort, petrochemical plants, any type of power production plants, and all other onshore and offshore physical infrastructure projects.

For the purpose of this methodology, project insurance is defined as being related to construction and engineering lines of business and includes three main products, namely:

1. ***In-scope:*** Construction all risk (CAR) and erection all risk (EAR)), also called builder's risks or course of construction in some markets (referred to as CAR/EAR throughout this method).
2. ***In-scope:*** Inherent defect insurance (IDI), also known as latent defects or decennial insurance.
3. ***Out of scope:*** Surety (financial guarantees of the contractor securing the good completion of the project).

The purpose of these products is to cover material damages occurring during the construction of a project (CAR/EAR), material damages occurring to newly constructed structures until typically 10 years after completion and due to construction defects (IDI), all with specific extensions and exclusions. Each product has its own rules, regulations, and wordings, each charging its own premium and being exposed to its own losses, usually handled by specific teams in each insurance company.

This methodology aims to encapsulate as many of the lines of business, products, contract types, and periods of cover as possible, while streamlining the calculation process for clarity and ease of use. However, it is noted that different requirements and methodologies may be needed for some products. As such, surety is out of scope of the current version of Part C and this methodology as the three-way

[45] The Global GHG Accounting & Reporting Standard Part C, subchapter 5.1.

relationship is materially different from other Property and Casualty (P&C) products covered. As outlined in subchapter 4.2, credit (re)insurers may have comparable rights to financing institutions under specific constellations. Surety has a direct link to products covered under Part A and should thus be considered differently.

Line of business definition

The purpose of this methodology is to assess the insurance-associated emissions of each product (scope 3 emissions of the insurance activity) and propose solutions to calculate their emissions.

Having considered all relevant lines of business, this method has narrowed its definition of the project line of business to the following 2 types:

1. **Construction all risks, erection all risks, builder's risks, course of construction (CAR / EAR)**

This product covers physical damage to construction works from the first occupation of the site until handover to the owner. It covers all types of physical damage affecting the project. CAR refers to covering static structures (buildings, roads, wet works, etc.), whereas EAR refers to covering structures including a process and testing aspect (industrial plants, petrochemicals, power production infrastructures, etc.). An extension can be given for third party liability, delay in start-up, existing property, maintenance period, contractors' plants and equipment within the same insurance contract. The main parties of the construction tasks are covered: the owner/principal, the contractors, and the sub-contractors.

The cover is purchased via owner-controlled insurance program (OCIP), i.e., the owner is paying the premium, or contractor-controlled insurance program (CCIP), i.e. the contractor is paying the premium.

The cover is delivered on a project per project basis (valid for single project covers or for risk attaching programs), or on a loss occurrence basis (valid for "turnover" annually renewing contracts where no detailed list of projects is given).

2. **Inherent defect insurance, latent defect, decennial liability (IDI)**

This product covers physical damage to new-built structures caused by defects in design, workmanship, or materials for a period of (usually) 10 years from practical completion.

The limit of indemnity is usually the total construction cost of the insured structure. It is a compulsory cover in some countries and some occupancies, whereas it is a good cover to have for others.

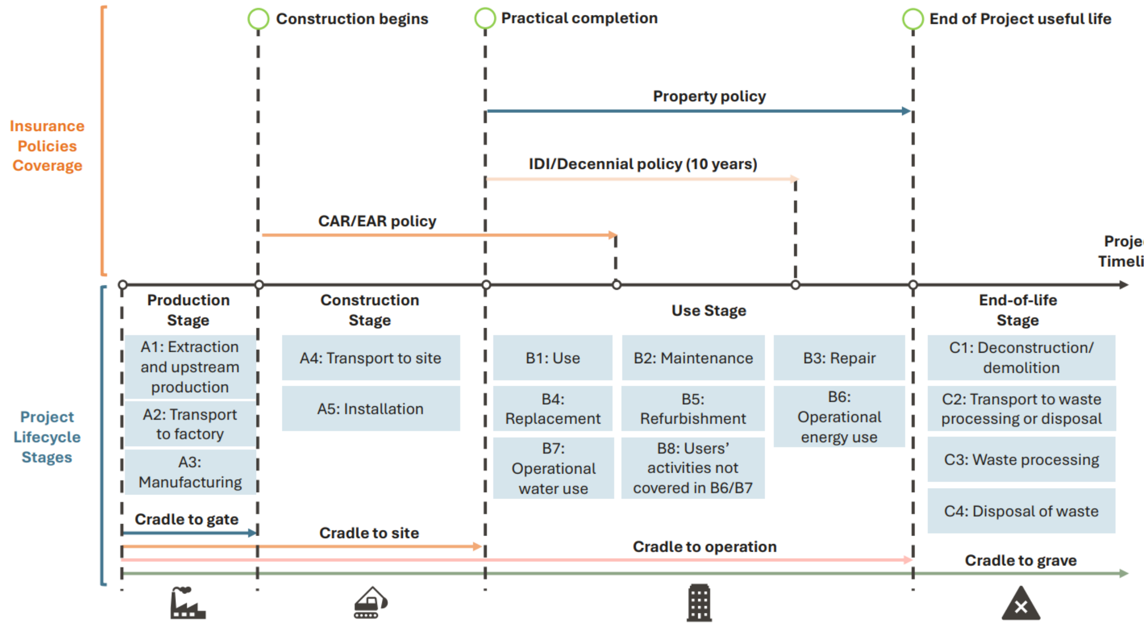
It encompasses two main types of policies:

- First-party policies (IDI, latent defect (LD), dommage ouvrage (mandatory construction project insurance), etc.) are purchased by the owner/principal or by the contractor on behalf of the owner. Such policies are purchased on a "per project" basis. Extensions can be given, for example, third-party liability as well as other extensions.
- Third-party policies (decennial liability) are only available in a limited number of countries where they are compulsory. The cover is purchased by the contractor, or occasionally by the owner on

behalf of the contractor. Such policies can be purchased on a per-project basis or, in some countries, on an annual basis.

For both CAR/EAR and IDI, the premium rate of the insurance contract is applied to the total insured value for the project and to the turnover of the activity covered for annuals.

Figure 5.3-1. Illustration of in-scope project-related insurance policies and their relationship with the overall lifecycle of a project[46]



Sources: Insurance Policies Coverage – Swiss Re

Project lifecycle stages – ISO 21930:2017 - Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

EMISSIONS SCOPES COVERED

Emissions overview

To understand the emissions that could be accounted for in this methodology, Part A and the GHG Protocol's Technical guidance for calculating scope 3 emissions were reviewed. The Project Finance asset class in Part A accounts for emissions for the lifetime of the projects if the reporting company is an initial sponsor or lender of a project. Aligning with Figure 5.3-1, lifetime is inferred as the construction stage and use stage for this methodology. The methodology states that initial sponsors or lenders should account for the total project lifetime for scope 1 and 2 emissions. As the concept of initial sponsor or lender does not translate directly into an insurance context, additional considerations were needed around which insurance products a lifecycle or construction-emission-only approach would be more appropriate. The lines of business already included in Part C were additionally considered, as the emissions emitted once a project is completed are covered under the commercial lines methodology for property and liability lines.

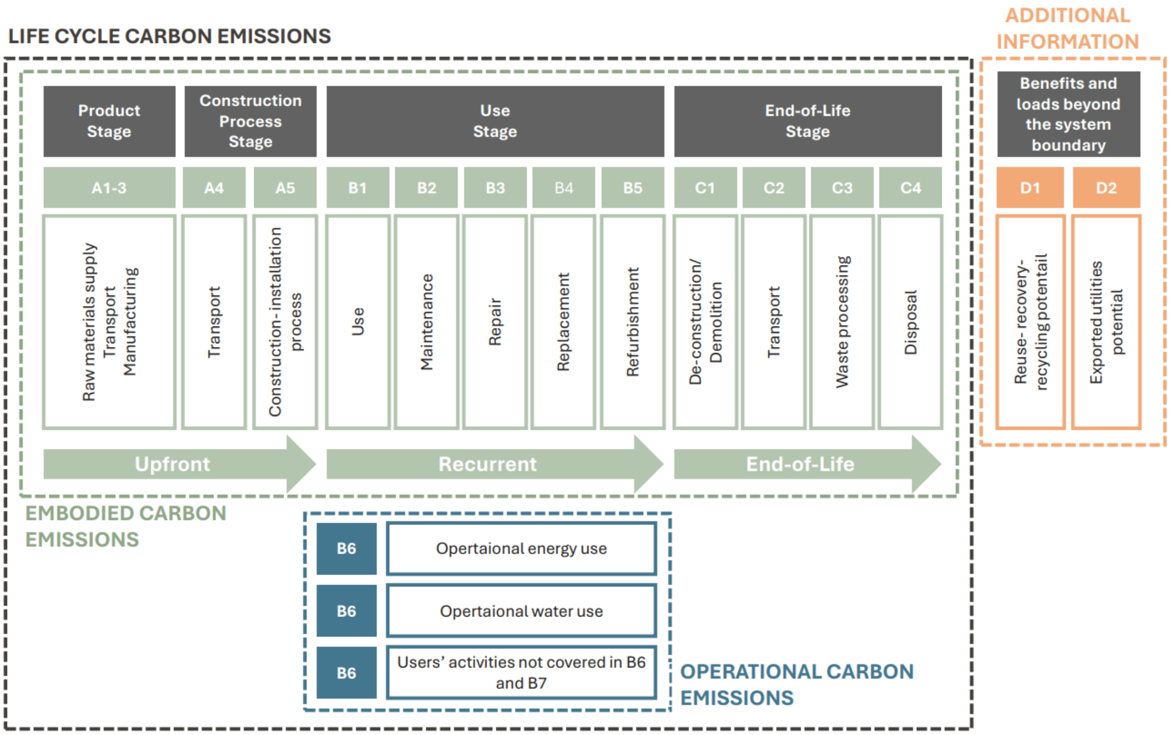
[46] Sources: Insurance Policies Coverage – Swiss Re Paper. Project Lifecycle Stages – ISO 21930:2017 Sustainability in buildings and civil engineering works https://www.iso.org/standard/61694.html

According to the project finance calculation standard of the GHG Protocol, initial sponsors/lenders only account for a share of total life-time emissions, in line with their share of total financed project costs. However, it is unclear how the “share of total project costs” would translate to an insurance context. Large infrastructure projects are usually insured by a panel of multiple insurers, with shares of premium and sums insured not necessarily known due to competitive and anti-trust considerations. Therefore, an alternative option for attribution is proposed as part of this method.

An additional consideration when accounting for emissions from the lifecycle of a project is the reporting period to which they would align. Comparing to commercial lines, the emissions for the specific contract year are used in calculating and reporting emissions, which generally aligns with the annual premium paid. However, the premiums for project insurance are not always annual—the exposures exist for much longer periods in the case of IDI polices. When comparing to project finance, the sponsor/lender would continue to receive yearly payments for their involvement in the project, which aligns with lifetime emissions and provides a connection throughout the project lifetime. However, premiums are generally agreed upon for project insurance at the outset of a project, or during the construction period, meaning revenues only occur during the construction period and are not generated throughout the lifetime of the project. This creates a misalignment between finance, insurance and the revenues generated as well as the emissions being reported.

There is also the question of how much control insurers would have over the lifetime of a project, with potential changes in use or different stages of a project lifecycle generating differing levels of emissions. This could include changes to green projects such as hydro power, that add a different perspective highlighting another topic of discussion; avoided emissions. For example, hydro power is expected to be lower emitting than traditional (fossil-fuel) electricity during its lifetime, however emissions during the construction phase can be higher than the construction of traditional gas plants. For the purpose of this methodology, calculating such avoided emissions may be undertaken in accordance with existing PCAF guidance.

Figure 5.3-2. Illustration of Life Cycle Carbon Emissions[47]



In addition to the question of lifetime emissions, consideration was given to embodied emissions. Data proves to be a challenge as separate emissions factors would likely be required and embodied emissions would not be accounted for within reported project emissions. As such, whilst their importance is recognised, a wholesale review of their calculation across all areas of finance and insurance is required. Embodied emissions are therefore out of scope of this methodology. Additional guidance may be expected in future versions of the Standards.

Emission scopes covered

Construction emissions (scope 1 and 2, reported as scope 3 of the insurance activity) **shall** be reported for all project insurance lines of business covered by this methodology. In addition, lifetime (use stage) emissions **may** be calculated. If calculated, lifetime emissions **shall** be reported separately from construction emissions. Accounting for construction (scope 1 and scope 2) emissions can be combined with other similarly calculated lines of business, for example under the commercial methodology.

[47] Source: Embodied carbon emissions in buildings: explanations, interpretations, recommendations | Buildings & Cities

ATTRIBUTION OF INSURANCE-ASSOCIATED EMISSIONS

As a basic attribution principle, the insurer accounts for a portion of the emissions associated with the insured project or client, determined by the ratio between the insurer's premium share (numerator) and the relevant financial metric (denominator). This ratio is called the attribution factor.

1. **Premium (numerator):** Gross written insurance premium written for the contract by the Insurer for its share. For multi-year contracts, the same approach as through the whole Standard should be used.
2. **Denominator:**
    a. For project specific policies: Total project cost (total insured value of project(s))
    b. For annual policies: Revenue of the insured for the contract year (total revenue of the insured contractor or construction expense of the insured principal for the year of the contract)

For project specific policies:

$$Attribution\ factor = \frac{Premium}{Total\ Project\ Cost}$$

For annual policies

$$Attribution\ factor_c = \frac{Premium_c}{Revenue_c}$$

EQUATIONS TO CALCULATE INSURANCE-ASSOCIATED EMISSIONS

Insurance-associated emissions are calculated by multiplying the attribution factor by the emissions of the insured project or client. The total emissions for a portfolio are the sum of all individual policy calculations.

Table 5.3-1. Formulas to calculate emissions associated with project insurance portfolios

Contract type	
1. Project Policies for CAR / EAR / IDI (both single project policies and policies covering a portfolio of project); and 3. project-specific IDI.	2. Annual Policies for CAR / EAR; and 3. Annual basis IDI based on Insured Turnover.
Construction stage emissions	
$IAE = \frac{Premium}{Total\ Project\ Cost} \times Emissions_{Project,Construction}$	$IAE = \frac{Premium}{Revenue_{Insured,Year}} \times Emissions_{Insured,\ Year}$
Use stage emissions	
$IAE = \frac{Premium}{Total\ Project\ Cost} \times (Emissions_{Project,Use})$	Not feasible for annual covers
Definitions:	
$\boldsymbol{Premium}$	Gross written insurance premium written for the contract by the Insurer for its share. For multi-year contracts, the same approach as through the whole Standard should be used.
$\boldsymbol{Total\ Project\ Cost}$	Total insured value of project(s)
$\boldsymbol{Revenue_{Insured,Year}}$	Total revenue of the insured contractor or construction expense of the insured principal for the year of the contract
$\boldsymbol{Emissions_{Insured,\ Year}}$	Total emissions of the insured client for the year of the contract
$\boldsymbol{Emissions_{Project,Construction}}$	Emissions of individual project or portfolios of projects over their entire Construction stage.
$\boldsymbol{Emissions_{Project,Use}}$	Emissions of individual project or project portfolio over its entire Use stage. For multi-year annual contracts that require an annualization of premium value, construction and use stage emission shall be annualized over the same contract period as the premium.

1. Project-specific policies (CAR / EAR)[48]

Policies where premium is related to a specific project, meaning the insurer will (generally) have information on the individual project being undertaken. For project policies, the construction emissions of the insured project can be assumed to correspond to the emissions of the project over its entire construction stage.

2. Annual premium policies (CAR / EAR)

Annual premium policies do not cover specific, named, projects but any construction activities the insured undertakes during the contract period. The insurer will therefore have limited information on the individual projects the insured is undertaking. This type of policy can hence be equated to investments without

[48] Risk attaching is not included as it is proposed to be a sum of the insurance-associated emissions of individual projects following the project methodology.

known use of proceeds, which require different accounting methods than instruments where the use of proceeds is known.

The GHG Protocol's Technical guidance for calculating scope 3 emissions chapter 15 states:
"Calculating emissions from debt investments where the use of proceeds is not specified should use the methods described for equity investments".

For annual policies, the construction emissions of the insured can be assumed to correspond to their annual reported emissions.

3. **Inherent defects insurance (IDI)**

The premiums for IDI policies can either be project-specific or on an annual basis. Annual premium policies do not cover specific, named, projects but any construction activities the insured undertakes during the contract period. The insurer will therefore have limited information on the individual projects the insured is undertaking. This type of policy can again be equated to investments without known use of proceeds, which require different accounting methods than instruments where the use of proceeds is known. The GHG Protocol chapter 15 states "Calculating emissions from debt investments where the use of proceeds is not specified should use the methods described for equity investments".

4. **When the formulas used to calculate emissions associated with project insurance portfolios cannot be applied**

When the formulas stated in Table 5.3-1 cannot be applied, for example through lack of data availability, the emission calculation defined within subchapter 5.2 on emission associated with commercial lines portfolios can be used.

5. **Formula applicable to all contract types.**

Examples

All examples included are applicable to EAR / CAR and IDI lines of business. All values are illustrative for the purpose of the example.

Example 1: Single project and portfolio of projects policies

Project	Construction emissions of project	Total project cost	Premium of project (re)insurance
Project A	X_A	Y_A	Z_A
Project B	X_B	Y_B	Z_B
Project C	X_C	Y_C	Z_C
Total	X_{TOTAL}	Y_{TOTAL}	Z_{TOTAL}

Single project policy:
When the (re)insurance policy covers only a single construction project, the IAE of the policy is calculated as:

$$\boldsymbol{IAE_{Project\ A} = \frac{Premium}{Total\ project\ cost} \times Emissions_{Project,Construction} = \frac{Z_A}{Y_A} \times X_A}$$

$$\boldsymbol{IAE_{Project\ A} = \frac{Premium}{Total\ valueproject\ cost} \times Emissions_{Project,Construction} = \frac{Z_A}{Y_A} \times X_A}$$

Portfolio of projects – with breakdown:
When the (re)insurance policy covers multiple specific projects, whenever possible, the IAE of the policy should be calculated as the sum of the IAEs of the individual projects:

$$IAE_{Portfolio\ of\ A+B+C} = IAE_{Project\ A} + IAE_{Project\ B} + IAE_{Project\ C} = \frac{Z_A}{Y_A} \times X_A + \frac{Z_B}{Y_B} \times X_B + \frac{Z_C}{Y_C} \times X_C$$

Portfolio of projects – aggregated (disallowed):
In cases where a single policy covers multiple individual projects, while the calculation of IAE by aggregation of inputs on a portfolio level may lead to distortions in the IAE values:

$$IAE_{Portfolio\ of\ A+B+C} = \frac{Premium_{Portfolio\ of\ A+B+C}}{Total\ project\ cost_{Portfolio\ of\ A+B+C}} \times Emissions_{Portfolio\ of\ A+B+C}$$

An extreme example of this can be found illustrated below with a portfolio of 2 projects. Using the individual project method, the total portfolio IAE is calculated as the sum of individual projects IAEs giving a portfolio IAE of 36. However, when aggregating emissions, project costs, and premium across the portfolio, the IAE of the portfolio is calculated as 100 / 200 x 120 = 60. This results in a higher estimated IAE compared to what it should be.

Project	Construction emissions of project	Total project cost	Premium of project (re)insurance	Project IAE
Project A	100	100	20	20 = 20 / 100 x 100
Project B	20	100	80	16 = 80 / 100 x 20
Portfolio Total	120	200	100	Breakdown method: 36 = 20 + 16 Aggregated method: 60 = 100/200 x 120

Therefore, PCAF does not allow for the aggregation of different projects in this method. This is also because typically (re)insurers know at least the premium and project cost of the individual projects, and when these data are available, the IAE of each individual project can be estimated using the average emissions intensity per revenue of a similar construction project.

Example 2: Annual policies
When the (re)insurance policy is an annual policy covering a client for a year of operations, the IAE calculation method is the same as the one used for other commercial lines.

Policy	Emissions of client	Revenue of client	Premium of project (re)insurance
Policy A	X_A	Y_A	Z_A

The IAE of the Policy A is calculated as:

$$IAE_{Policy\ A} = \frac{Premium}{Revenue_{Insured,Year}} \times Emissions_{Insured,\ Year} = \frac{Z_A}{Y_A} \times X_A$$

Example 3: Steering a portfolio (annual policies)

Below is an example of how a (re)insurer could compare clients with differing carbon emissions. This is illustrated using three different clients in the construction industry with different emissions intensities of their operations. The ratio of annual premium to revenue is kept constant assuming all risk factors except the carbon emissions and size of the client are kept constant.

Client	Scope 1 and 2 emissions (tCO_2e)	Revenue (mil $)	Emissions intensity (tCO_2e /mil $)	Total annual policy premium ($)
Client A	81,000	67,500	12	20,250,000
Client B	1,900,000	42,222	45	12,666,667
Client C	2,100,000	70,000	30	21,000,000

Given the above clients, a (re)insurer could decide to take any combination of shares of the annual policies. Below are two example portfolios. By taking a higher share of one client, and correspondingly taking a lower share of another client, the (re)insurer can calculate and steer the portfolio.

	Portfolio 1			Portfolio 2		
Client	**(Re)insurer share (%)**	**(Re)insurer premium ($)**	**IAE (tCO_2e)**	**(Re)insurer share (%)**	**(Re)insurer premium ($)**	**IAE (tCO_2e)**
Client A	4.94%	1,000,000	1.2	1.24%	250,000	3
Client B	1.97%	250,000	11.3	7.90%	1,000,000	45
Client C	3.57%	750,000	22.5	3.57%	750,000	22.5
Total		**2,000,000**	**24.9**		**2,000,000**	**67.8**

A similar method can be used for project specific contracts, the only difference being the intensity of the client will be calculated using the estimated emissions of the project instead of the emissions of the client.

Aggregation approach

Given the in-scope lines of business for the project insurance methodology, insurers are likely to write more than one line of business or participate on several layers of an insured's (re)insurance program. Therefore, to obtain an overall customer view of the construction stage attributed emissions, the premiums from each contract can be easily aggregated, as outlined in Box 5.3-1.

Box 5.3-1. Example for calculating the customers attribution factor in a situation where one (re)insurer writes more than one line of business with the same insured

Customers with multiple project-specific policies

The aggregation of project specific policies shall be calculated by totalling the insurance-associated emissions of all the individually calculated projects and/or policies. Similarly, the emissions intensity shall be calculated by totalling the individual insurance-associated emissions and dividing by the total of the individual premiums.

For more details on the aggregation approach for project-specific policies, please refer to example 1 in the examples section.

Customers with multiple annual policies[49]

Line of business	(Re)insurance premium	Revenue	Insurance-associated emissions attribution factor
CAR	50		0.005
IDI	100		0.01
Total	150	10,000	0.015

$$\boldsymbol{Customer\ attribution\ factor} = \frac{\boldsymbol{Premium_1 + Premium_2 + \cdots Premium_n}}{\boldsymbol{Revenue}}$$

DATA REQUIRED

Overall, PCAF distinguishes three different calculation options based on the emissions data used, in line with the financed emissions from general purpose asset classes:

- **Option 1: reported emissions**, where verified[50] or unverified[51] emissions are collected by the reporting (re)insurer from the insured company directly (e.g., company sustainability report or Environmental Impact Assessment) or indirectly via verified third-party data providers (e.g., CDP). These emissions are then allocated to the reporting (re)insurer using the attribution factor. This follows the existing approach for commercial lines of business.
- **Option 2: physical activity-based emissions**, where emissions are estimated by the reporting (re)insurer based on primary physical activity data collected from the insured company (e.g., gross internal floor area or kilometres of road constructed)[52]. These emissions are then allocated to the reporting (re)insurer 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., $tCO_2e/m2$ or tCO_2e/km constructed) issued or approved by a credible independent

[49] The figures presented in this example are not representative of an actual attribution factor. The factor can be much smaller as a proportion of revenue.
[50] This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.
[51] This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third-party auditor.
[52] More information can be found at: Construction CO_2e Measurement Protocol

body. PCAF recognises that there are few such sources for project specific emission factors at this time, and the applicability of this option to project calculation is limited.

- **Option 3: economic activity-based emissions**, where emissions are estimated by the reporting (re)insurer based on economic activity data collected from the insured company (e.g., euro of revenues, euro of assets or project or insured value/costs). These emissions are then allocated to the reporting (re)insurer 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[53] (e.g., tCO_2e/€ of revenue or tCO_2e/€ of asset). PCAF recognises that there are few such sources for project specific emission factors at this time, and the applicability of this option to project calculation is limited.

Data quality scoring

Tables 5.3-2 provides data quality scores for each of the described options and sub-options (if applicable) that can be used to calculate the insurance-associated emissions for project policies and annual premium policies respectively.

Table 5.3-2. Construction emissions: project policies (CAR / EAR and IDI)

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

Data Quality Score	Options to estimate insurance-associated emissions		When to use each option (what data should be available)		
			Attribution factor	Emissions tCO_2e	
				Scope 1	Scope 2
Score 1	Option 1: Reported emissions	1a	(Re)insurance premium / Total Project Cost	Reported – Verified	Reported Market Based - Verified
Score 2		1b		Reported – Unverified	Reported Market Based - Unverified Reported Location Based - Unverified Reported Location Based - Verified
	Option 2: Reported or physical activity-based emissions	2a		Energy Consumption x EF (Intensity per MWh of Electricity)	
Score 3		2b		Declared construction quantities of project x EF (Average Sector Emission Intensity per unit of quantity) [54]	
Score 4	Option 3: Economic activity-based emissions	3a		Total Project Cost x EF (Construction project average emission intensity per revenue)	
Score 5		3b		Total Project Cost x Customer's emissions intensity[55]	

[53] 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 (re)insurers in various regions in finding regional and more relevant financial or emissions data information.
[54] Examples of quantities include but are not limited to materials implemented (e.g., concrete, timber), energy consumed, and floor area being built.
[55] This is the existing commercial lines methodology as an alternative when project level data is not available.

For a portfolio of projects, the ideal methodology is to add the individual projects IAE. If this method is used, the scoring will be the same as the individual project calculation. However, if individual project calculation is not possible, then any other methodology will be classified as score 4.

Table 5.3-3. Construction emissions: annual premium policies (CAR / EAR and IDI)

Data Quality Score	Options to estimate insurance-associated emissions	When to use each option (what data should be available)		
		Attribution factor	Emissions tCO_2e	
			Scope 1	*Scope 2*
For annual premium policies (CAR / EAR and IDI) please refer to the existing Commercial Lines Data Quality Score Table in subchapter 5.2 as annual policies are essentially the same as other commercial lines' policies				

Reported emissions (Option 1)
Where available, PCAF recommends Option 1, using emissions data reported by companies in official filings and environmental reports. The most recently available data should be used with mention of the data source, reporting period or publication date. PCAF acknowledges that project insurance includes listed and non-listed companies, and that availability of reported data can be limited, especially for non-listed clients. PCAF also recognises that emissions data may not be publicly reported at individual project level as requested within the construction emissions: project policies table above.

For project specific emissions information additional reporting sources can be considered, such as Environmental Impact Assessments, which are required by multilateral banks for larger infrastructure projects.

Data providers (Option 1)
Emission accounting under this methodology will require data on:

- Emissions associated with the construction activities
- Annual emissions of the insured contractor

Generally, there is a lack of publicly available or free-to-use data sources for construction projects.

Where available for Option 1, PCAF recommends either collecting emissions from the customer directly (e.g., company sustainability report or Environmental Impact Assessments) or using third-party data providers, including but not limited to CDP, Bloomberg, MSCI, Moody's, Sustainalytics, S&P/Trucost, and ISS ESG. Data providers typically make scope 1 and 2 emissions data available for larger commercial companies.

Currently information available from data providers does not cover individual project emissions as required under the project methodology. Until there is sufficient market demand and providers start to develop data products which capture project emissions, insurers will need to rely on public information captured directly from the client or published as part of financing frameworks such as the IFC, EBRD & the Equator Principles.

Third-party data providers collect emissions data as reported by the companies themselves, either through a standardised 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 or does not reflect 100% of the emissions boundaries. In cases where data providers estimate emissions themselves, the calculation would be in line with Options 2 or 3, conditional to the methodology used being in line with the GHG Protocol. (Re)insurers should request data providers to be transparent, disclose the calculation method they use, and confirm alignment with the GHG Protocol. This will enable (re) insurers to apply the appropriate data quality score to the estimate. PCAF also encourages data providers to apply the PCAF data quality scoring method to their own data, which would allow them to share the data quality scores directly with their clients.

PCAF recommends using data providers that use the standardised CDP framework for annual emissions. PCAF has observed inconsistencies across data providers for company reported scope 1 and 2 emissions. For (re)insurers using data providers, PCAF therefore encourages using the same provider for all insured clients, where possible, and using the most recently available data. PCAF also encourages (re)insurers to mention the data source, reporting period or publication date of data. A list of questions to provide guidance when engaging with data providers around methodology and calculation methods is available in Annex 9.1

Estimation models (Option 2 and 3)

Not all companies will 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 for annual premium policies, or models relating to the relevant construction project type. Emission factors from production-based models (i.e., emission intensity per physical activity) are preferred over those from revenue-based models (i.e., emission intensity per revenue) because they are less sensitive to exchange rate or commodity price fluctuations. Emission factors from production-based models in line with Option 2 are especially useful for GHG-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 (re)insurer.

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 that 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 include but are not limited to ecoinvent,[56] Defra,[57] the Intergovernmental Panel

[56] More information can be found at: https://www.ecoinvent.org
[57] More information can be found at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022

on Climate Change (IPCC),[58] GEMIS (Global Emissions Model for integrated Systems),[59] and the Food and Agriculture Organization of the United Nations (FAO).[60] Again, the most recently 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/€ of revenue or tCO_2e/€ of asset). (Re)insurers should use emission factors as consistently as possible with the primary business activity, in so far as this is known,[61] but in a way that remains feasible given the large size of project insurance portfolios which cover multiple (granular) business activities. For example, for an insurance policy to a company primarily engaged in the construction of roads, the (re)insurer should seek to find and use a specific average emission factor for road projects, not a general emission factor for the construction sector overall, if this level of granularity is available.

Example EEIO databases that can be used to obtain such emission factors are EXIOBASE,[62] CEDA,[63] GTAP,[64] or WIOD.[65] Sector-specific emission factors can also be replaced with values from linear regression models from databases containing company revenue and emissions, by sector and geographical region. This can help (re)insurers get started with estimating the insurance-associated emissions of their project insurance portfolios. PCAF expects that the insurance-associated emissions for most project insurance portfolios can be derived through either reported emissions (Option 1), physical activity data (Option 2), or economic activity data (Option 3). However, it allows the use of alternative options to calculate emissions if none of the three can be used or in the case that new options are developed. The reporting (re)insurer shall always explain the reasons for using an alternative option if it deviates from the three options defined above.

Data granularity

PCAF recognises that it can be more challenging to source project-level, asset-level or subsidiary-level data compared to parent-company-level data. For project lines of business insuring individual projects, which are an asset-specific line of business, asset-based data granularity shall be used for any accounting and reporting under this version of the Standard. For annual premium policies the entity level shall be used. Emission and revenue data shall always be on the same level (i.e., company, subsidiary or project level).

PCAF acknowledges that using data at an entity level (parent or subsidiary) to measure the insurance-associated emissions of specific insured activities, locations, or projects may lead to a less accurate or specific measurement of emissions. To reflect this, when using parent-company-level data or data related to a higher entity relative to the insured project, asset or subsidiary, the resulting insurance-associated

[58] More information can be found at: https://www.ipcc-nggip.iges.or.jp/EFDB/find_ef.php
[59] More information can be found at: https://iinas.org/en/
[60] More information can be found at: http://www.fao.org/partnerships/leap/database/ghg-crops/en
[61] For business written through a managing general agent, exact splits of sectoral information may not be available. In cases where the sectoral split is not available, (re)insurers could resort to proxies such as market averages
[62] More information can be found at: https://www.exiobase.eu
[63] More information can be found at: https://watershed.com/solutions/ceda
[64] More information can be found at: https://www.gtap.agecon.purdue.edu
[65] More information can be found at: http://www.wiod.org

emissions will be assigned a lower quality score. An example of this is using parent-company-reported verified emissions data and revenue to estimate emissions associated with an insured project or asset: this will be awarded score 4 instead of score 1. Similarly, if company verified emissions and production output is known and used to estimate the emissions associated with the insured asset or project, this will be awarded score 4 instead of score 3.

Data quality scoring

PCAF distinguishes three options with six sub-options to calculate the insurance-associated emissions from project insurance policies depending on the data used. If a (re)insurer uses a mix of options to calculate the emissions of an insured entity (e.g., actual verified emission is known and only an average revenue/proxy is used to calculate attribution factor, which means that Option 1a and Option 3b are mixed), the data score for the lower-rated option should be assumed for this insured (i.e., score 5 from Option 3b). As scope 1 and 2 emissions will be reported combined, data quality scoring will be applied to both scopes jointly. Data quality scoring will be applied separately to scope 3 emissions data if reported. Since scope 1 and 2 emissions can have different methods of estimation, the combined data quality score to be reported shall be the lowest of the two methods.

LIMITATIONS

Data quality

PCAF recognises that high-quality data can be difficult to obtain when calculating insurance-associated emissions, particularly for certain insureds, line of business, or insured activities. However, data limitations should not deter (re)insurers from taking the first steps toward preparing their inventories. Even estimated or proxy data can help identify GHG-intensive hotspots in their portfolios, which in turn can help to determine their climate strategies. Where data quality is low, (re)insurers can develop approaches to improve it over time.

Lifetime emissions

PCAF acknowledges that, to date, there are significant limitations around the provision of data. In particular, the comparability, coverage, transparency, and reliability of lifetime emissions data varies greatly per sector and data source. Furthermore, data will be collected by a mixture of sources that vary per (re)insurer. The basis of collating, processing, and publishing these figures will also vary by (re)insurer, and methodologies must be developed in a way that best suits the internal capabilities of each (re)insurer.

(Re)insurers may report on lifetime emissions however PCAF also recognises that each (re)insurer needs to independently determine where they consider it to be appropriate to calculate lifetime emissions, within insurance-associated emissions in accordance with guiding principles, applicable legislation, and reporting standards. PCAF also recognises that (re)insurers have different compositions of customers and lines of business within their underwriting portfolios and that they may provide coverage across the value chain. Therefore, by recommending the inclusion of customers' lifetime emissions at this time, PCAF may inadvertently intensify the issue of double-counting emissions. Equally mono-line insurers are unlikely to be in a position to influence a reduction directly or indirectly in customers' scope 3 emissions.

PCAF recognises that the task of reporting all customers' emissions represents a long-term challenge that is reliant on increasing customer engagement and disclosure. This task is intended to support the development by each individual (re)insurer of a set of meaningful and appropriate strategies that will support the measurement of insurance-associated over time. Such measurements and reductions should in turn reflect the best-quality data available. The expectation is that with improved data capture and comparability, the measurements too will improve over time.

PCAF supports efforts by (re)insurers to improve the levels of data capture and integrity of customers' emissions over time, with the objective of increasing the level of consistency, quality, and comparability throughout the industry. In alignment with the GHG Protocol, PCAF does not set a threshold above which lifetime emissions should be included. Instead, reporting companies should develop and disclose their own significance lifetime threshold based on their business goals.

Exposure to market volatility

Both (re)insurance premiums and revenues are exposed to volatility due to insurance market cycles and general macroeconomic market movements, which can be decoupled from changes in real-world GHG emissions. For example, a surge in energy prices would lead to lower insurance-associated emissions, and an increase in loss activity factored into (re)insurance premiums over time could lead to increased insurance-associated emissions, even if neither the insured's emissions nor the provided insurance cover has changed. This could lead to counterintuitive developments of insurance-associated emissions, requiring extra efforts for a (re)insurer to understand and appropriately explain those dynamics in their reporting.

Measurement inconsistencies

Inconsistencies can arise from measuring part of the portfolio with customer-specific emissions data (which may encompass scopes 1, 2, and 3) and from measuring another part with region or sector-specific average emissions data (which often encompasses only scope 1 and 2 emissions). One mitigating factor is that using customer-specific emission data could improve the accuracy of the region or sector-specific average data, provided that the (re)insurer has enough client-specific data points relative to the size of the portfolio in a given sector. For example, if a majority of the clients in an insurer's CAR portfolio provide specific emissions data, these averages could be applied (instead of industry-wide sector averages) to the other clients in the sector that do not provide specific emissions data.

Personal motor lines

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5.4 Emissions associated with personal motor portfolios

Please refer to the Important Note at the beginning of this document, especially with respect to solicitation of commentary and that the use of the proposed methodology is subject to the laws, rules and regulations applicable to each reporting (re)insurance company.

The term "personal motor portfolios" refers to insurance contracts made to reimburse owners of different types of personal motor vehicles in the case the owner incurs losses related to the vehicle.

Insurance companies provide financial protection from potential risks like damages, theft and vandalism, as well as from natural causes such as floods and earthquake. Insurance companies provide this protection for various types of motor vehicles. Therefore, one insurance company may offer coverage to motorcycles and passenger cars, while another may offer cover for trucks and buses.

(Re)insurers shall report on all vehicle types within the segment. If specific vehicle types are excluded from reporting, an explanation should be provided. It is the responsibility of each insurer to define the vehicle types that they include in their respective inventories of insurance-associated emissions.

The following vehicle types may fall under the segment of motor vehicle insurance products. This list is not exhaustive. This segment does not cover any vehicles used for commercial purposes and covered under a commercial insurance policy. Only private-use vehicles are within scope.

- Passenger car
- Motorcycle/Motorbike/Moped
- Passenger van
- Passenger truck
- Motorhome

For assistance in identifying or clarifying this scope within a risk carrier's specific portfolio, Annex 9.6 provides guidance for a few markets. This shows the defined in-scope vehicle types based on the typical classification of axle number for the US and on the EU classification of vehicle types.

EMISSION SCOPES COVERED

Risk carriers **shall** calculate and report the insurance-associated emissions of the annual scope 1 and scope 2 emissions of the vehicles being insured:

- Scope 1: Direct emissions from fuel combustion in vehicles
- Scope 2: Indirect emissions from electricity generation consumed in plug-in hybrid vehicle and electric vehicles

ATTRIBUTION OF EMISSIONS

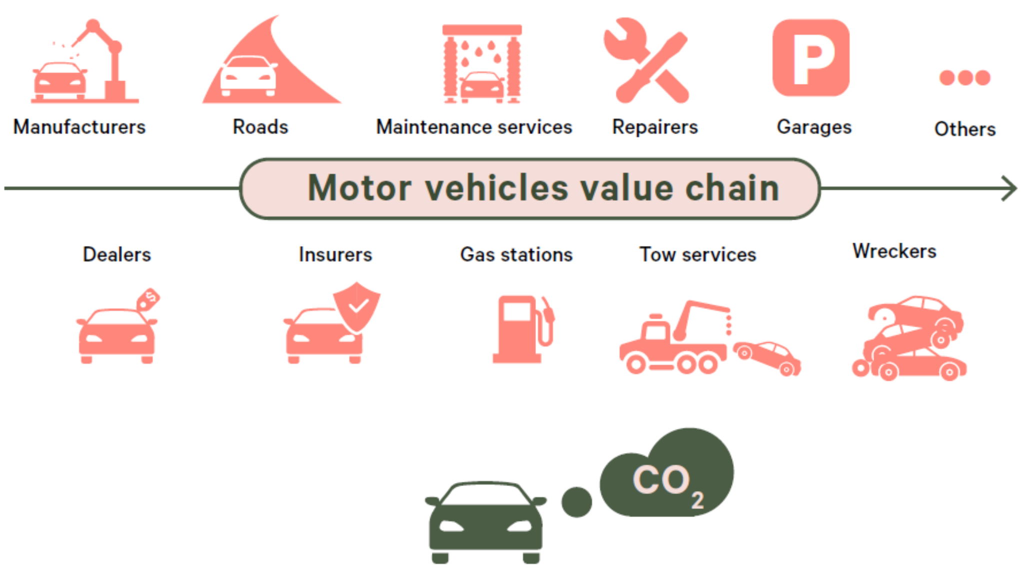
One philosophy behind calculating insurance-associated emissions for personal motors is that of an "enabler". (Re)insurers are not alone in making it possible for vehicles to be on the road, but they are a significant stakeholder. The difference in philosophy compared to financed emissions explains the difference in calculating the attribution factor. Lending institutions (with the philosophy of an "owner") will use the values of the outstanding loan amount divided by the value of the vehicle at origination to calculate the attribution factor. In contrast, (re)insurers need values that relate to the vehicle's use throughout its operational life while being insured.

The "enabler" philosophy is more encompassing than the "follow the risk" principle. By adequately abating the risks for the insured, the insured activities are also enabled, that is, the ability to operate the vehicle. There are other activities of (re)insurers which enable the insured client to continue the covered activity, such as risk engineering services, claims services, etc. These are not relevant per se for personal motor and not in-scope in this Standard.

PCAF acknowledges that insurance companies are not alone in this role of enabler. Several private companies' and governments' activities either contribute to the existence and use of each motor vehicle, such as through transportation policies and infrastructure, or government subsidies. Examples of enabling actors include the following: motor vehicles manufacturers, dealers, maintenance services, gas stations and repairers. All are players within the value chain of motor vehicles.

Accounting of GHG emissions associated with insurance activities should therefore entail the usage of a proper attribution factor that associates an appropriate share to (re)insurers, while also recognizing the role of the others mentioned. This is related to the economic participation of (re)insurance within the entire value chain of motor vehicles (see Figure 5.4-1).

Figure 5.4-1. Motor vehicle value chain



This participation is reflected more concretely by the amount of premium paid by a vehicle owner compared to all other costs associated with owning that vehicle. The most commonly cited elements for a vehicle's total cost of ownership include:

- Vehicle depreciation costs – the car owner, manufacturers and dealers may be represented by these costs
- Fuel costs – gas stations may be represented by these costs
- Maintenance – tow services, wreckers, repair shops, etc. may be represented by these costs
- Registrations/taxes – roads and government infrastructure may be represented by these costs
- Parking, tolls, etc. – more relevant in some jurisdictions versus others

The entire range of perils considered within personal motor insurance contracts may be used to calculate the emission attribution factor. Perils include compulsory perils in some jurisdictions such as mandatory third-party liability (MTPL) and non-compulsory perils such as motor own-damage (MOD), road assistance or driver accidents. Using the full range of perils for defining the attribution factor simplifies and facilitates the data collection process.

A potential use of the attribution factor is to encourage actions by vehicle owners to reduce GHG emissions. There are several ways that policyholders can lower their vehicle-associated emissions, for example through choice of vehicle, driving habits (not speeding) or driving distance. An attribution factor which recognizes individual policyholder actions would be ideal.[66]

Formula to calculate insurance-associated emissions

As an attribution principle, the insurance-associated emissions are determined by the ratio of the insurer's revenue received from the insured (i.e., the insurance premium) to the revenues of all other factors that are part of a vehicle's ownership. For simplification of calculation, this value is approximated by the cost of insurance related to the annual running costs of a passenger vehicle. The formula for the calculation of this method for insurance-associated motor emissions for an underwriting portfolio is:

$$\text{Insurance-associated emissions} = \text{Attribution factor}_i \times \text{Emissions}_i \text{ of insured company or asset}$$

$$(Industry) Attribution\ factor_P = \frac{Insurance\ industry's\ total\ premium\ from\ the\ motor\ line\ of\ business}{Total\ costs\ associated\ with\ vehicle\ ownership\ of\ all\ vehicles}$$

or (for cases where risk carriers are unable to use the industry attribution factor above)

$$(Individual)\ Attribution\ factor_P = \frac{Insurer\ specific\ premium\ from\ the\ motor\ line\ of\ business}{Total\ costs\ associated\ with\ vehicle\ ownership\ of\ the\ portfolio\ P\ vehicles}$$

[66] PCAF recognizes that there are other considerations beyond emissions that also influence or dictate policyholder actions, such as the availability and/or affordability of vehicles to a specific policyholder, infrastructure such as public transportation or available vehicle charging stations, and governmental policies that either support or limit vehicle choices, fuel options, etc.

Definitions

1. **(Industry) Attribution factor$_P$**: Attribution factor of portfolio P, which will be calculated and provided by PCAF using publicly available information and open-source research from markets globally.
2. **(Individual) Attribution factor$_P$**: Individual insurer's attribution factor of portfolio P.
3. **Insurance industry's total premium from the motor line of business (numerator)**: represents the insurance industry's total premium from the motor line of business for all insurance covers (monetary amount).
4. **Total costs associated with vehicle ownership (denominator)**: includes insurance as well as depreciation, fuel expenses, maintenance, repairs, taxes, registrations, tolls, parking expenses and potentially others (monetary amount).
5. **Emissions of insured vehicles within portfolio P:** can be calculated in a variety of ways depending on available data regarding the insured vehicles. Further details on calculating this value can be found in the sections on "Data Quality" and "Data Required".

The industry attribution factor as explained above will be calculated and provided by PCAF using publicly available information and open-source research from markets globally. PCAF will then validate and publish a value at the highest level of granularity possible, citing all sources of information. If data and research allow, the attribution factor shall be calculated at the state/provincial level or country level. Where data is unavailable, a regional and/or global value will be available for those markets where the greater level of granularity is not possible. PCAF calculated a share of insurance cost on a global level at 6.99% of total costs associated with vehicle ownership.[67] Consult the PCAF personal motor industry attribution factor approach documentation for more details.

The PCAF-provided value would be used by all personal motor risk carriers in those markets, with PCAF updating the attribution factor at least once every five years. Risk carriers may present updates and/or more granular level attribution factors to PCAF for validation and inclusion in the database, to be used by all risk carriers in future reporting. Risk carriers shall use the highest level of granularity available at the time of reporting. In instances where data challenges prevent a risk carrier from reporting the highest level of granularity available, a different level may be used with explanation.

In markets where risk carriers are unable to use the PCAF-provided total cost of ownership attribution factor, (re)insurers are able to follow the methodology below to calculate their own attribution factor value based on the total cost of ownership approach. They will provide PCAF with details of sources used for the calculation.[68]

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[67] https://carbonaccountingfinancials.com/files/20231211-PCAF-personal-motor-industry-attribution-factor-approach.pdf
[68] Please refer to the Important Note at the beginning of this document, especially with respect to solicitation of commentary and that the use of the proposed methodology is subject to regulations or governmental or supervisory practice or final judicial decision in the jurisdictions in which that company operates.

METHODOLOGY FOR (RE)INSURER CALCULATION OF TOTAL COST OF OWNERSHIP ATTRIBUTION FACTOR

Initial research[69] into this attribution factor reveals the five main elements which make up the total cost of ownership, along with a sixth category for other items:

- Depreciation
- Fuel costs
- Insurance premiums
- Maintenance
- Registrations/taxes
- Others – parking fees, tolls, etc.

For the purpose of this standard, (re)insurance premium is defined as gross written premium (the total amount to be paid by the insured to the (re)insurer for the policy written in the period) minus external acquisition costs (e.g., agent fees). For multi-year contracts, an annualized premium value shall be used. Where (re)insurers do not have the external acquisition costs, gross written premium may be used.

The PCAF database will provide risk carriers that perform the calculation individually with the information and/or source for each element included in the industry attribution factor provided by PCAF. When using PCAF or other full market-based information, a risk carrier will need to adjust values to represent the same portion as its own share of the market. That is, if a risk carrier has a 20% market share, the full market-based value will need to be adjusted to 20%. In instances where there is insufficient data for a risk carrier to include their individually performed calculation, the lack of inclusion of an element will be disclosed. The absence of any element category will result in a higher value for the insurance related portion of the total cost of ownership. This approach is in-line with existing precautionary principles of PCAF.

Where risk carriers perform their own calculation, the six elements above shall be included to ensure consistency with the total cost of ownership approach being applied by other risk carriers using the Standard. For each element a clear reference shall be provided to the data and/or source used for the value. And a detailed description of the calculation performed shall be provided, to enable third-party validation.

When reporting the insurance-associated emissions, full disclosure by the risk carrier shall be provided specifying whether the PCAF provided or a risk-carrier calculated attribution factor was used. When a risk carrier calculated attribution factor is used, the disclosure shall include references to sources, any assumptions or deviations in the calculation, and the resulting attribution factor. Carrier-specific confidential or sensitive information should never be provided as part of the disclosure.

[69] Countries in the initial research: USA, Australia, Germany, Japan, UK, Brazil, and South Korea.

DATA QUALITY

The insurance-associated emissions from motor vehicle policies can be calculated in several ways depending on the availability of data to derive the emissions of the insured vehicle. (Re)insurers shall respect the respective data privacy regulation in collecting client related data. Overall, PCAF distinguishes three options to calculate the insurance-associated emissions from motor vehicle policies:[70]

- **Option 1: actual vehicle-specific emissions,**[71] where emissions are calculated based on actual vehicle fuel consumption or actual vehicle distance travelled, and on the emission intensity of the actual vehicle or emission intensity derived from the vehicle's make and model.
  - Option 1a: Vehicle emissions are calculated based on primary data on actual vehicle fuel consumption.
  - Option 1b: Vehicle emissions are calculated based on the actual vehicle's emission intensity[72] or emission intensity derived from the vehicle's make and model,[73] and actual vehicle distance travelled.
- **Option 2: estimated vehicle-specific emissions and local distance driven averages**, where emissions are calculated based on estimated vehicle distance travelled from province/state/country-level official statistics and on the emission intensity of the actual vehicle or emission intensity derived from the vehicle's make and model.
  - Option 2a: Vehicle emissions are calculated based on the emission intensity of the actual vehicle or emission intensity derived from the vehicle's make and model, and estimated distance travelled of an average vehicle type (e.g., cars, vans, motorcycles) from province/state/country-level statistical data.
  - Option 2b: Vehicle emissions are calculated based on the emission intensity of the actual vehicle or emission intensity derived from the vehicle's make and model, and estimated distance travelled of an average vehicle from province/state/country-level statistical data.
- **Option 3: estimated vehicle-unspecific emissions and continental distance driven averages**, where emissions are calculated based on estimated vehicle distance travelled from continental-level [74] official statistics and on the emission intensity of an unspecified vehicle (emission intensity for the actual vehicle or vehicle's make and model is unknown).
  - Option 3a: Vehicle emissions are calculated based on the emission intensity of an average vehicle type and/or fuel type[75] (e.g., plug-in hybrid passenger car, diesel van, motorcycle) and estimated vehicle distance travelled from continental-level statistical data.
  - Option 3b: Vehicle emissions are calculated based on the emission intensity of an average vehicle (where the emission intensity for the vehicle type is unknown) and estimated vehicle distance travelled from continental-level statistical data.

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[70] For all options the attribution factor is calculated in the same way; the only thing changing is the way vehicle emissions are calculated.
[71] For motor vehicle insurance to consumers, this approach seems rather unrealistic as consumers are unlikely to report their actual fuel consumption or distance travelled to a (re)insurer. However, for motor vehicle insurance to businesses (in particular for insurance of company-owned staff cars), companies often collect information on actual fuel consumption or distance travelled and could share such information with (re)insurers.
[72] Emission intensity of a vehicle is either declared/collected from the customer or matched in a country-specific vehicle emission database using a vehicle identification number (VIN) or a country vehicle registration/ identifier.
[73] 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.
[74] Statistics or proxy scope is bigger or outside the country
[75] Fuel type granularity is optional but highly recommended. Other attributes that can refine the vehicle type emission intensity such as cubic capacity / size for motorcycles, can be used to replace fuel type.

Data required

Options 1b, Option 2a, and Option 2b above are dependent on the availability of emission data of the actual vehicle or derived from the make and model of the vehicle. However, the data used for vehicle distance travelled 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. Hence, there are several options to calculate insurance-associated emissions, but the quality of the results is not the same for each.

For this reason, PCAF gives a higher score to results obtained with a higher data quality and a lower score to results obtained with a lower data quality (score 1 = highest data quality; score 5 = lowest data quality). If a (re)insurer uses a mix of options to calculate the emissions of an insured vehicle (e.g., mixing Options 1b and 3a, whereby actual distance travelled and vehicle type is known, but vehicle make and model is unknown), the data score for the lower-rated option should be assumed for this insured (i.e., score 4 from Option 3a).

Table 5.4-1 provides data quality scores for each of the described options that can be used to calculate the insurance-associated emissions for motor vehicle policies.

Table 5.4-1. General description of the data quality score table for motor vehicle insurance

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

<table>
<tr><th rowspan="3">Data Quality</th><th rowspan="3" colspan="2">Options to estimate insurance-associated emissions</th><th colspan="2">When to use each option (what data should be available)</th></tr>
<tr><th colspan="2">Emission Data / Calculation</th></tr>
<tr><th>Vehicle Usage Data</th><th>Emission Intensity</th></tr>
<tr><td rowspan="2">Score 1</td><td rowspan="2">Option 1: actual vehicle-specific emissions</td><td>1a</td><td>Actual fuel consumption</td><td rowspan="2">Emission intensity of the fuel type</td></tr>
<tr><td>1b</td><td>Actual distance traveled</td></tr>
<tr><td>Score 2</td><td rowspan="2">Option 2: estimated vehicle-specific emissions and local distance driven averages</td><td>2a</td><td>Estimated distance traveled of an average vehicle type (cars, vans, motorcycles) in the province/state/country</td><td rowspan="2">Emission intensity of the actual vehicle or of the vehicle's make and model</td></tr>
<tr><td>Score 3</td><td>2b</td><td>Estimated distance traveled of an average vehicle in the province/ state / country</td></tr>
<tr><td>Score 4</td><td rowspan="2">Option 3: estimated vehicle-unspecific emissions and continental distance driven averages</td><td>3a</td><td rowspan="2">Estimated distance traveled of an average vehicle on the subcontinent / continent</td><td>Emission intensity of an average vehicle type (cars, vans, motorcycles) and/or fuel type (fossil fuel, hybrid, electric)</td></tr>
<tr><td>Score 5</td><td>3b</td><td>Emission intensity of an average vehicle</td></tr>
</table>

A detailed summary of the data quality score table, including data needs and formulas to calculate insurance-associated emissions, is provided in Annex 9.2 (Table 9.2-3).

Data for all three options can be derived from different data sources. Emission intensity data of a particular vehicle is usually sourced from a local (country) data provider using a vehicle identification number (VIN) or an equivalent unique key. Emission intensity derived from vehicle make and model can be sourced from official statistical data sources such as the US EPA's Federal Test Procedure[76] and the European Energy Agency's (EEA) Worldwide Harmonised Light Vehicles Test Procedure (WLTP).[77] To achieve better comparability, (re)insurers should aim to report based on a single testing standard per geographical area, by applying conversion factor between different testing standards, whenever available. Both data sources provide vehicle emission intensity by make and model. Option 1b, Option 2a, and Option 2b require such information. If make and model are unknown to the reporting (re)insurer (Option 3), vehicle emission intensity can be estimated on the vehicle type level and/or fuel type level using averages derived from the sources mentioned above, or using the International Council on Clean Transportation's (ICCT's) Transportation Roadmap, or the International Transport Forum at the Organization for Economic Co-operation and Development (ITF OECD).

If no actual distance travelled is known to the reporting (re)insurer, data on vehicle distance travelled 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 travelled. For the US and Canada, state- or province-level distance travelled per year can be retrieved from car insurance.com and the Canadian Office of Energy Efficiency.

PCAF's web-based emission factor database provides emission factors per vehicle type (e.g., passenger car) and per vehicle make and model for a large set of geographies. These motor vehicle emission factors are widely based on the sources mentioned above.

PCAF expects that the insurance-associated emissions for motor vehicle insurance can be derived through either actual vehicle-specific emissions (Option 1), estimated vehicle-specific emissions and local distance driven averages (Option 2), or estimated vehicle-unspecific emissions and continental distance driven averages (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 (re)insurer shall always explain the reasons for using an alternative approach.

DATA LIMITATIONS

Data availability

Information regarding actual vehicle distance travelled may not be easily available or reliable. Actual data (fuel consumption or distance travelled) is recommended to be sourced from telematics or should be substantiated, such as through use of odometer photo/reading. Self-declared distance travelled can also

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[76] 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.

[77] 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-21.

be used as actual distance travelled if self-declared data is subject to fraud checks or/and used for pricing/claims purposes. Applying calibration factors may be used to make data more accurate. If actual data is unavailable, PCAF proposes using geographical averages on vehicle distance travelled by state, province, country or region. (re)insurers should explain the basis for obtaining and/or calculating relevant data.

Publicly available vehicle emission factor databases usually use the make and model of a vehicle as a proxy to derive the emissions of a particular vehicle. As there is no industry standard on naming vehicles, vehicle matching using make and model as a proxy can give rise to inconsistencies. Hence, PCAF recommends that (re)insurers collect the actual vehicle make and model and other vehicle information such as engine type and efficiency to determine the exact vehicle to match in emission factor database. If the (re)insurer does not track the vehicle make and model, PCAF recommends that the (re)insurer falls back to a generic vehicle type (e.g., passenger car, motorcycle, light commercial truck) or to an average vehicle as a last resort (where emission intensity is determined by the weighted average vehicle efficiency in the respective geography).

Electric vehicles and electricity grid estimates

For electric vehicles, emission intensity can be derived using the electricity consumption intensity (using the same data sourcing methods as emission intensity) and the electricity grid emission factor. Exact electricity source data will not be known for each vehicle in a (re)insurer's portfolio as it is not possible to ascertain how each (re)insured sources their electricity. Where possible, the most common local or regional electricity grid mix emission factor for the insured's location should be used. If unavailable, the most common electricity grid mix emission factor in the respective region for the (re)insurer's branch should be used (i.e., location of the (re)insurer where the policy was issued). If also unavailable, country-level electricity grid mix emissions data should be used.

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 recommends either applying an average geography-specific usage split. If that is also not available, PCAF recommends applying the conservative assumption that the combustion engine (e.g., gasoline) is used 100% of the time.

Treaty reinsurance

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5.5 Emissions associated with treaty reinsurance portfolios

LINE OF BUSINESS SCOPE

Treaty reinsurance contracts cover large primary insurance portfolios of similar insurable risks (e.g. properties, cars, liability risks, etc). The reinsurer agrees to automatically accept all risks from the primary insurer (also known as cedent or ceding company) that conform with the conditions set out in the contract (i.e., line of business (LoB), jurisdiction, industry, sum insured, etc.). Treaty reinsurance contrasts with facultative reinsurance, where each insurable asset is underwritten and accepted or declined individually.

Treaty reinsurers are one step further down the value chain from the insured risks than the primary insurer. Therefore, reinsurers tend to have less influence over the original insured risks and their associated emissions. However, the competitiveness of the reinsurance market and the extent to which the primary insurer relies on reinsurers determines the reinsurer's level of influence. The ability of a treaty reinsurer to control the business lies mostly on the level of the whole treaty as there is limited potential to negotiate specific terms (or to exclude certain individual reinsured risks, etc.). A treaty reinsurer typically has less data and transparency on the reinsured portfolio than the underlying cedent. Therefore, it is reasonable to allocate emissions on the level of the whole treaty, rather than for each of the individual risks covered by a treaty.

This treaty reinsurance methodology shall only be applied to the lines of business covered by the PCAF methodology for primary insurance (as per Table 5.1-1). All treaty reinsurance structures are in scope (e.g., quota shares, surplus, excess of loss per event or per risk, stop loss). In the case of reinsurance of government entities (i.e., natural catastrophe pools), only non-governmental underlying insured risks are in scope (public entities are out of scope of the PCAF methodology for primary insurance

EMISSION SCOPE COVERED

The scope of the covered emissions **shall** follow the guidelines for the respective portfolio for primary insurance (see subchapter 5.2 for commercial lines[78], subchapter 5.3 for project-related insurance, and subchapter 5.4 for personal motor.)[79] In the context of the primary insurance company, greenhouse gas emissions or GHG emission intensity solely refers to the insurance-associated emissions by the respective company.

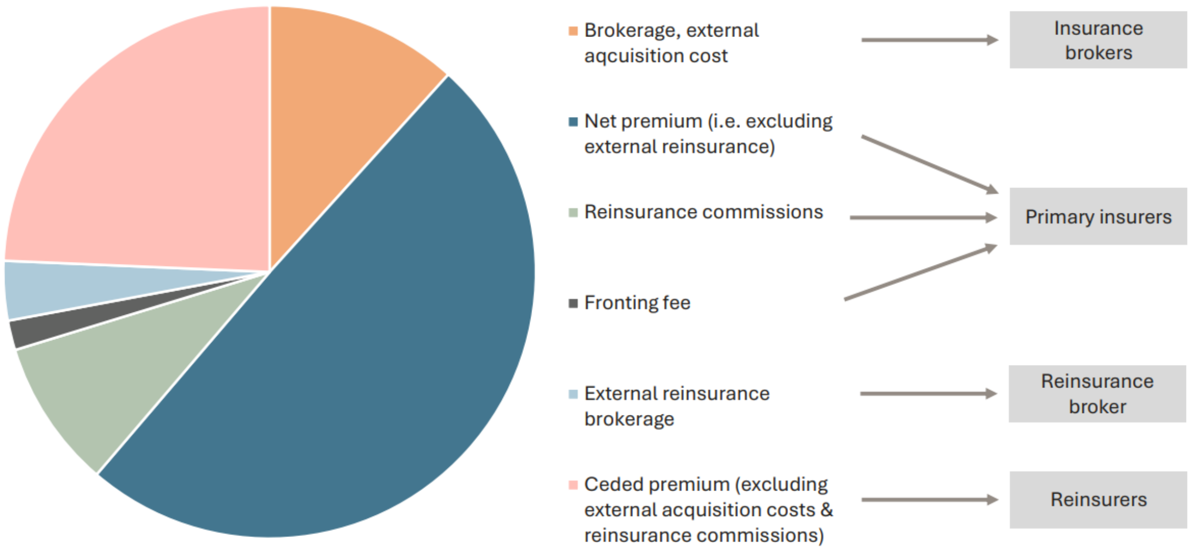
ATTRIBUTION OF EMISSIONS

The treaty reinsurance methodology follows the same guiding principles as primary insurance, see Annex 9.4. By obeying the "follow the risk principle", absolute insurance-associated emissions are allocated to reinsurers according to the respective risk they carry. The share of risk transferred is approximated by the premium charged to cover the risks of a treaty reinsurance contract. Therefore, the premium received by the reinsurer (i.e. ceded premium) and the premium collected by the primary insurer, are used to determine the insurance-associated emissions of the reinsurer. This approach could be used to allocate

[78] (Re)insurers shall take into account customers' absolute scope 1 and scope 2 emissions across all sectors, and should also take into account absolute scope 3 emissions to the extent that such numbers are available and represent reasonable and verifiable estimates.
[79] Annual scope 1 and scope 2 emissions of the vehicles.

insurance-associated emissions among all the parties in the (re)insurance value chain. Figure 5.5-1 depicts how the premium paid by an insured entity is distributed to the providers of insurance services.

Figure 5.5-1. Breakdown of premium paid by an insured company across the (re)insurance value chain can be used as a basis to consistently allocate emissions



Remarks:

1. The relative shares are only for illustrative purposes reflecting a portfolio with a large share of reinsurer participation. On a market level, actual retentions by Property & Casualty (P&C) primary insurers are typically higher.
2. Reinsurance commissions are a payment of the reinsurer to the primary insurer to contribute to the latter's acquisition cost.
3. The fronting fee is similar to the reinsurance commission. It's paid in case of a fronting arrangement[80]

Error! Reference source not found.

The role of brokers/agents

Reinsurance brokers/agents - like primary insurance brokers/agents - can be characterized as enablers of (re)insurance business. They may have an influence on the underlying business depending on their role in a transaction. Within a treaty reinsurance transaction, risk transfer costs (e.g., broker fee) will likely apply, reducing the premium ceded to reinsurers for a given treaty. Brokers/agents are not in scope of this standard. However, as enablers, they should leverage their role in data sharing between cedants and reinsurers to share the emissions of treaties.

[80] Fronting is a business solution whereby an insurance company (Fronting Company) issues an insurance policy (Fronting Policy) on behalf of another risk carrier (which assumes the role of a reinsurer), such as another primary insurer, a reinsurance company, or a captive. The Fronting Company cedes such risk (usually 100%) to the reinsuring risk carrier. Although the actual exposure insured in the fronting policy is simply passed to the reinsuring risk carrier, the Fronting Company remains the legal risk carrier. The Fronting Company charges a fee for their fronting services and the assumption of the legal and some credit risk. Gross premium shall be used for the Fronting Policy because the Fronting Company as the legal risk carrier must disclose this business as part of its gross insurance activities. Insurer internal fronting arrangements should only be considered to the extent that the underlying emissions are only attributed once in order to avoid double counting between different entities of the same (re)insurer.

Rationale

Assuming full transparency and complete data (e.g., incl., insured name, premium, limit for each policy ceded) on the reinsured portfolio, a reinsurer could theoretically calculate absolute emissions associated with commercial reinsurance portfolios for certain treaty reinsurance types. For example, for a proportional reinsurance treaty, where premiums and claims for each risk in a portfolio are shared with the same pre-defined ratio, the required data may be available to the reinsurer. Absolute emissions could be calculated using the reinsurers' share of premiums per risk which could be aggregated for the whole portfolio. For non-proportional per-risk reinsurance treaties[81] a bottom-up calculation is theoretically still feasible. For more complex structures, such as event-based or company-wide reinsurance covers, a bottom-up calculation would require a method to allocate premiums to individual policies, making the approach very complex and not feasible.

Since a treaty reinsurer considers business mainly on the level of whole treaties, it is consistent to allocate absolute emissions based on the total premium received for covering the risk of a treaty in a top-down approach. An aggregate calculation is also simpler, less data-intense, avoids the duplication of calculations efforts, and ensures consistency of reporting of the primary insurer and the reinsurer. Consequently, such an aggregate approach relying on the calculations of the primary insurer is advisable.

The attribution methods are based on premiums to determine the share of emissions associated with the reinsurer following the approach for commercial insurance in this Standard. There are two methods available:

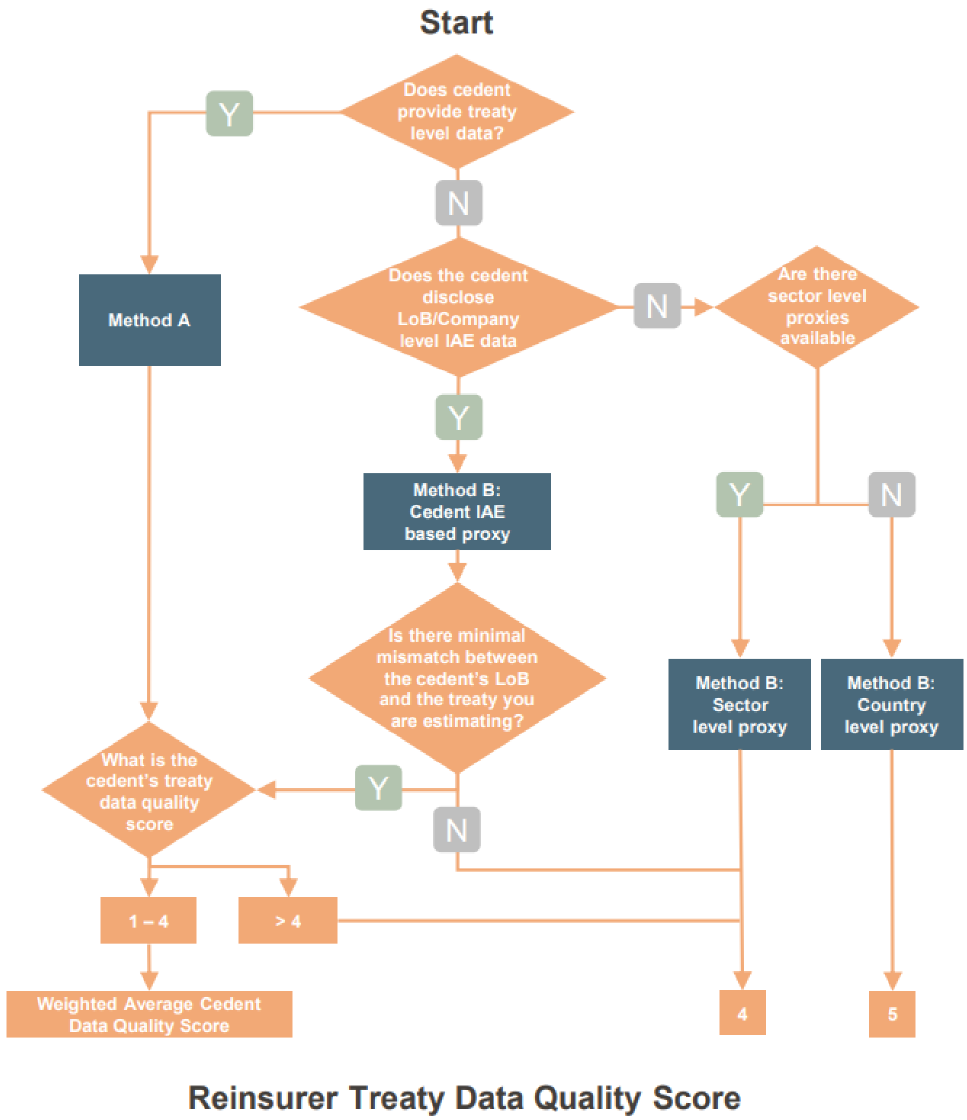
- Reinsurers shall use Method A if insurance-associated emissions data are available from their cedents.
- Method B should be used to estimate the emissions of treaties when no emissions data is available from their cedents.

If feasible, Method A can be applied to all lines of business, once further primary insurance methodologies have been developed.

Method B should only be used when Method A is not possible, for example due to lack of data.

[81] In such structures there is not a fixed or pre-determined split of premiums and losses for each asset covered.

Figure 5.5-2. Process and options to calculate reinsurance associated emissions and related data quality scores



Limitations

The limitations of the methods used to calculate insurance-associated emissions for the business in scope of a reinsurance treaty also apply to the treaty reinsurance methods ((see subchapter 5.2 for commercial lines , subchapter 5.3 for project-related insurance, and subchapter 5.4 for personal motor).

Reinsurance market volatility

Both the primary insurance premium and the premium paid by the primary insurer to the reinsurers are exposed to volatility of pricing in the (re)insurance markets. The attributed GHG emissions will therefore not only depend on the degree of risk transfer and changes in real world GHG emissions. For example, if prices in the reinsurance markets increase, while primary insurance pricing remains unchanged, the emissions associated with reinsurance will increase. However, the approach is still aligned to the underlying principle in this Standard to associate emissions based on the importance of (re)insurance in the value creation of the (re)insured company.

METHOD A: TREATY-LEVEL GHG EMISSION DATA AVAILABLE FROM CEDENT (ALL LOBS IN SCOPE OF THE PCAF METHODOLOGY FOR PRIMARY INSURANCE)

Rationale

Insurance-associated emissions calculated by the primary insurer (i.e. cedents) are used directly for calculating emissions associated with reinsurance treaties. This ensures consistency of calculations of primary insurers and reinsurers and reduces overall efforts. The treaty reinsurance methodology **shall** only be applied to lines of business for which a PCAF methodology for primary insurance exists.

The LoB agnostic formula to calculate insurance-associated emissions of a treaty reinsurance contract is as follows:

$$RIAE_r = AF_r * IAE_r$$

(where r is the reinsured portfolio)

ATTRIBUTION OF EMISSIONS

$$AF_r = \frac{CPW_r}{PW_r}$$

Definitions

$RIAE_r$	Emissions associated with reinsured portfolio r.
AF_r	Attribution factor for reinsured portfolio r. The attribution factor is limited to 1.
IAE_r	Insurance-associated emissions of reinsured portfolio r.
CPW_r	Ceded written premiums: premium ceded to reinsurer for the reinsured portfolio r.
PW_r	Gross written premiums received by the primary insurer for risks in reinsured portfolio r.

1. **Treaty reinsurance:** reinsurance arrangements, where the reinsurer is obliged to accept all the risks ceded within a pre-defined portfolio. Facultative reinsurance facilities **shall** also be included if there is an obligation of the reinsurer to accept all risks, and there is no individual assessment of each risk ceded.
2. **Emissions associated with the treaty reinsurance portfolio:** Insurance-associated emissions of the reinsured portfolio of the primary insurer. If emission data are unavailable for a portfolio, proxy data of the primary insurer can be used. Such proxy data[82] may be the GHG emissions of the respective LoB or the total insurance-associated emissions of the primary insurer. For proxy data the respective gross written premiums **shall** be used to calculate the AF_r. However, it is important to note that since proxy data is generally less reliable and less representative of the Cedent's decarbonization efforts, using it results in a lower data quality score for the final calculated emissions value. This is explained in greater detail below in the data quality score sections of each methodology.

[82] See also Table 5.5-1 on Examples of data proxies for Method B.

3. **Ceded written premium$_r$:** This is the amount paid by the insurance company (=cedent) to a reinsurer to receive reinsurance coverage for a portfolio r, net of external reinsurance brokerage. Reinsurance commissions the primary insurer receives from the reinsurer are deducted. For multi-year contracts an annualized premium value **shall** be used. The premiums are on an ex-ante costed basis. The premium calculation should exclude any elements contingent on losses, like reinstatement premiums or profit commissions.
4. **Gross written premium$_r$:** This is the amount paid by all insureds within a reinsured portfolio to receive primary insurance coverage. It is gross of any external reinsurance or retrocession but net of brokerage and external commissions. For multi-year contracts an annualized premium value **shall** be used. The premiums are on an ex-ante costed basis.
5. **Attribution factor:** If the information is available, the attribution factor **should** be calculated as the ratio of ceded and gross premium only for the business within the scope of the standard. If the split of ceded and gross premium across types of business is not known, the attribution factor can be calculated using the overall ratio of ceded/gross premium.

Aggregation approach

- The approach can be used with multiple overlaying reinsurance structures. For example, a portfolio that is covered with proportional reinsurance in combination with a per risk non-proportional structure and a further event-based non-proportional catastrophe cover.
- The reinsurance company needs to aggregate the total premium received for the covered portfolios and the respective emissions. The overall ratio defines the reinsurers' share of absolute emissions.

ADVANTAGES

- Easy to calculate due to the aggregate approach building on metrics that are already available and shared between cedent and reinsurer (i.e., primary insurance premium, ceded premium). Furthermore, the insurance-associated emissions calculated by the primary insurer are reused.
- Can be universally applied to different lines of business and to complex reinsurance structures (proportional and non-proportional structures). It can also be applied to fronting solutions.
- Applying the principle to pass-down data along the value chain will ensure consistent emission calculations within the value chain while being cost-efficient and simple to apply.
- Top-down aggregation allows for same results as the bottom-up approach without duplication of efforts (see Example 1 below).

LIMITATIONS

- Reinsurers are dependent on their primary insurers being able and willing to provide insurance-associated emissions data aggregated for each reinsured portfolio. It will take several years until this becomes common market practice.
- Limited comparability of insurance-associated emissions of individual treaties, because insurers, may use different methodologies, data and estimation methods.
- There will be an additional time lag between the reporting year of the insurance-associated emission data by the insurer and the year the reinsurance treaty applies to, as outlined in

subchapter 4.2 of the Standard. In these instances, (re)insurers should use the most recent data available, even if it represents different years.

- Using the overall premium of a reinsurance treaty to determine the share of emissions that is allocated to the reinsurer can lead to understatement or overstatement of emissions of the reinsurer compared to a bottom-up approach, depending on the structure of the treaty portfolio, as seen in Example 1.
- Exclusions or sub-limits for specific industry sectors set in a reinsurance treaty can lead to overestimations, as the emissions of affected companies will be included in the emissions reported by the primary insurers.

Examples

The examples below show that biases in emission estimates are possible. A typical reinsurer's portfolio, however, will contain many treaties covering a large number of policies and it is to be expected that many distortions average out.

Example 1: Consistent ceded insurance-associated emissions

Scenario: risks with high and low emissions have similar risk profiles. The insurer has the same appetite for both risk classes and cedes the same fraction of premium.

Bottom-up calculation

Risk	Emissions (tCO_2e) (a)	Revenues ($) (b)	Gross written premium ($) (c)	Insurance associated emissions (tCO_2e) (d = a*c/b)	Ceded written premium ($) (e)	Reinsurance-associated emissions (tCO_2e) (f = d*e/c)
1	100	100	50	50	10	10
2	20	100	50	10	10	2
Treaty total	120	200	100	60	20	12

Treaty level calculation	based on row 'Treaty Total'
Attribution factor (= e/c)	20%
Insured emissions (d)	60
Ceded emissions	20% x 60 = 12

Example 2: Understated ceded insurance-associated emissions

Scenario: Risks with high emissions are less risky and pay, in comparison to revenues, a lower premium than risks with lower emissions. However, an insurer has less appetite for these risks and cedes a higher fraction of the premium.

Bottom-up calculation

Risk	Emissions (tCO_2e) (a)	Revenues ($) (b)	Gross written premium ($) (c)	Insurance associated emissions (tCO_2e) (d = a*c/b)	Ceded written premium ($) (e)	Reinsurance-associated emissions (tCO_2e) (f = d*e/c)
1	100	100	20	20	10	10
2	20	100	80	16	10	2
Treaty total	120	200	100	36	20	12

Treaty level calculation	based on row 'Treaty Total'
Att. factor (= e/c)	20%
Insured emissions (d)	36
Ceded emissions	20% x 36 = 7.2

Example 3: Overstated ceded insurance-associated emissions

Scenario: Risks with high emissions are riskier and pay, in comparison to revenues, higher premium than risks with lower emissions. However, an insurer has appetite for these risks and cedes a lower fraction of premium.

Bottom-up calculation

Risk	Emissions (tCO_2e) (a)	Revenues ($) (b)	Gross written premium ($) (c)	Insurance associated emissions (tCO_2e) (d = a*c/b)	Ceded written premium ($) (e)	Reinsurance-associated emissions (tCO_2e) (f = d*e/c)
1	100	100	80	80	5	5
2	20	100	20	4	15	3
Treaty Total	120	200	100	84	20	8

Treaty level calculation	based on row 'Treaty Total'
Att. factor (= e/c)	20%
Insured emissions (d)	84
Ceded emissions	20% x 84 = 16.8

METHOD B – NO TREATY-LEVEL EMISSION DATA AVAILABLE FROM CEDENT: COMMERCIAL LINES INCLUDING PROJECT INSURANCE

Rationale

The primary insurers are only beginning to measure, analyse and report their insurance-associated emissions. Progress in reporting is likely to vary between countries and regions. It will, therefore, take several years until the insurance-associated emissions for the reinsured treaty portfolios will become available to enable reinsurers to calculate their emissions.

To bridge the data gap to apply Method A, reinsurers **should** apply Method B. This top-down option is based on the commercial lines portfolios attribution factor (see subchapter 5.2). To calculate treaty insurance-associated emissions (treaty IAE), the economic GHG emission intensity (i.e., GHG emissions divided by revenue of the (re)insured portfolio) and the premium received by the reinsurer are needed.

The formula to calculate emissions associated with treaty reinsurance portfolios for commercial lines and project insurance is as follows:

$$RIAE_r = CPW_r * RCI_r$$

(where r is the reinsured portfolio)

Definitions

$RIAE_r$ Emissions associated with reinsured portfolio r

CPW_r Ceded written premiums (see Method A)

RCI_r Revenue based economic emission intensity for reinsured portfolio r

For commercial (re)insurance portfolios the formula is consistent with Method A as can be seen:

$$RIAE_r = AF_r * IAE_r$$

$$AF_r = \frac{CPW_r}{PW_r}$$

$$RIAE_r = \frac{CPW_r}{PW_r} * IAE_r = \frac{CPW_r}{PW_r} * PW_r * RCI_r = CPW_r * RCI_r$$

$$\text{Because } IAE_r = \frac{PW_r}{R_r} * E_r = \frac{PW_{ri}}{R_r} * RCI_r * R_r = PW_r * RCI_r$$

Where:

PW_r Gross written premiums of the primary insurer for risks in reinsured portfolio r (see also Method A). Only the premiums for LoBs with PCAF methodologies for insurers **should** be considered. However, reporting companies may also consider the full premium of a portfolio to limit complexity.

R_r Revenue of companies in reinsured portfolio r

E_r Absolute emissions of the reinsured portfolio r

The economic emission intensity RCI_r can be estimated using different approaches depending on the composition of the specific portfolio and the LoB. Since some reinsurance treaties cover a broad range of risks in one or several countries, using a country level emission intensity is a fair approximation for GHG emissions. For portfolios with a specific industry composition, industry-specific estimates should be used.

Method B can be applied to all methodologies for attribution factors that are based on the ratio of premiums to revenues.

Table 5.5-1. Examples of data proxies for Method B

LoB	Type of primary insurer	Emission intensity proxy
Property **Liability** **Non-life accident, Workers' comp** **Trade credit** **Cyber** **Multi-lines**	Nationally active	Gross output emission intensity[83] of the country where the primary insurance company is active.
	Present in multiple markets	Premium weighted gross output emission intensity of the locations of assets/risks in the treaty portfolio.
	Primary insurers disclosing portfolio insurance-associated emissions	Emissions intensity of the cedent overall, by LoB or by occupancy/industry.
Agriculture	Nationally active	Revenue based emission intensity of the agriculture sector of the country where the primary insurance company is located.
	Regionally and globally active	Premium weighted emission intensity of sector specific revenue-based emission intensity by country of (re)insurance.
Marine / Aviation	All	Global emission intensity of the marine / aviation sector.
Project insurance covers (i.e., engineering EAR, CAR)	All	Revenue-based emission intensity of the construction sector.

Aggregation approach

- The approach can be used with multiple overlaying reinsurance structures. For example, a portfolio that is covered with proportional reinsurance in combination with a per risk non-proportional structure and a further event-based non-proportional catastrophe cover.
- For this, the reinsurance company needs to aggregate the total premium received for the covered portfolios and the respective emissions. The overall ratio defines the reinsurers' share of absolute emissions.

ADVANTAGES

- External and internal data required should be readily available.
- Reinsurer remains in control of the emission calculation method.
- Emissions estimates possible in absence of cedent's data

[83] To ensure consistency with industry specific emission intensities, the emission intensity for a country should be based on gross output (i.e., total emissions of a country / gross output of the country), rather than Gross Domestic Product (GDP). GDP is measuring value added, gross output minus cost of intermediary purchased goods and services, and therefor lower than gross output. Nevertheless, using GDP emission intensities could be more readily available and would still be a fair proxy to use to come up with a first estimate for treaty-related IAE. Such estimates would overestimate absolute emissions.

LIMITATIONS

- May not reflect underlying real economy emissions of insureds within portfolio.
- Volatility of sectoral emission intensity data.
- Similar to Method A, even with high quality emissions data, the top-down method in Method B will differ from a bottom-up calculation that considers the details of each policy ceded into the treaty.

Examples

Example 4: Nationally active and globally active cedents

Cedent	Area(s) of coverage	Area Scope 1 Emissions	Area weight of coverage in %	Area GDP	Area Gross output / GDP ratio	Cedent Ceded Premium
Cedent 1	Area A	V_1	100%	X_1	Y_1	Z_1
Cedent 2	Area A	V_1	W_1	X_1	Y_1	Z_2
	Area B	V_2	W_2	X_2	Y_2	

Cedent 1 scope 1+2 insurance-associated emissions = $Z_1 \times \frac{V_1}{X_1 \times Y_1}$

Cedent 2 scope 1+2 insurance-associated emissions = $Z_2 \times \left(W_1 \times \frac{V_1}{X_1 \times Y_1} + W_2 \times \frac{V_2}{X_2 \times Y_2}\right)$

Example 5: Cedent which shares treaty occupancy/industry data with the reinsurer

Treaty	Occupancy	Occupancy Weight in Treaty in %	Treaty Ceded Premium	Average Occupancy Scope 1+2 Emissions intensity
Treaty A	Occupancy 1	W_1	X_1	Y_1
	Occupancy 2	W_2		Y_2
	Occupancy 3	W_3		Y_3
Treaty B	Occupancy 1	W_4	X_2	Y_1
	Occupancy 2	W_5		Y_2
	Occupancy 3	W_6		Y_3
	Occupancy 4	W_7		Y_4

Treaty A scope 1+2 insurance-associated emissions = $X_1 \times (W_1 \times Y_1 + W_2 \times Y_2 + W_3 \times Y_3)$

Treaty B scope 1+2 insurance-associated emissions = $X_2 \times (W_4 \times Y_1 + W_5 \times Y_2 + W_6 \times Y_3 + W_7 \times Y_4)$

Example 6: Primary insurers disclosing their portfolio insurance-associated emissions by their lines of business

Cedent	Treaty	Treaty / Cedent LoB	Cedent LoB Emissions Intensity	Cedent Company-Wide Portfolio Scope 1+2 Emissions Intensity	Treaty Ceded Premium
Cedent 1	Treaty A	Property	X_1	Y_1	Z_1
Cedent 1	Treaty B	Cyber	X_2		Z_2
Cedent 2	Treaty C	Property	N/A	Y_2	Z_3
Cedent 2	Treaty D	Cyber			Z_4

Treaty A scope 1+2 insurance-associated emissions: Method B-minimal mismatch = $X_1 \times Z_1$ or Method B-Significant mismatch = $Y_1 \times Z_1$

Treaty B scope 1+2 insurance-associated emissions: Method B-minimal mismatch = $X_2 \times Z_2$ or Method B-Significant mismatch = $Y_1 \times Z_2$

Treaty C scope 1+2 insurance-associated emissions = $Y_2 \times Z_3$

Treaty D scope 1+2 insurance-associated emissions = $Y_2 \times Z_4$

Please note that for Treaties A and B, while both methods are valid, they could potentially result in different data quality scores depending on the type of treaty and the data quality scores of the cedent. PCAF recommends that the more granular method (be used when there is sufficient data available. Doing so is also likely to result in a better data quality score.

(Re)insurers may be able to find the LoB emissions and/or emissions intensities in the sustainability reports, annual reports, universal registration documents or other similar reports published by the cedent if they are disclosing their insurance-associated emissions. Initially, the extent and granularity of disclosure is expected to vary across cedents. However, PCAF expects the disclosures to become more aligned as more data becomes available, and reporting becomes more standardised. In the future, third party data aggregators/providers may be able to collect and aggregate this information.

METHOD B – NO TREATY-LEVEL EMISSION DATA AVAILABLE FROM CEDENT: PERSONAL MOTOR

Rationale

The rationale outlined for Method A also applies to personal motor insurance. The approach is amended to ensure consistency with the primary insurance methodology for personal motor. The calculation **should** be done on a country level using the global personal motor portfolios attribution factor (see subchapter 5.4).

Formula

For each country and portfolio, the formula to calculate insurance-associated emissions of personal motor treaty reinsurance contract is as follows:

$$RIAE_r = CR_r * AF_m * E_r$$

(where r is the reinsured portfolio)

Definitions

$RIAE_r$	Emissions associated with reinsured portfolio r
AF_m	Atribution factor for global personal motor portfolios (see Chapter 5.4)
E_r	Emissions of insured vehicles within portfolio r
CR_r	Cession rate for treaty r is the ratio of CPW_r and PW_r
CPW_r	Ceded written premiums: premium ceded to reinsurer to cover the risks of reinsured portfolio r
PW_r	Gross written premiums of the primary insurer for risks in reinsured portfolio r

- **Emissions of insured vehicles within portfolio r: Should** be calculated based on the guidance provided under the 'Data Quality' section in subchapter 5.4. Since the amount of insurance-associated emissions is (strongly) dependent on the underlying type of vehicle and type of fuel/electricity, more detailed information should be used. Option 3: estimated vehicle-unspecific emissions and continental distance driven (see subchapter 5.3), is the most practical approach to apply, but "Option 2: estimated vehicle-specific emissions and local distance driven averages" (see subchapter 5.3) could also be applied, in case more detailed information on the reinsured portfolio is available. For applying data quality scores, the guidance in Table 5.4-1 shall be followed.

ADVANTAGES

- By using detailed market information, the mismatch between the outcomes on an aggregate level compared to the aggregation of individual emissions can be reduced.
- Public information on statistics for the country on cars and greenhouse gas emissions and cedent information on the composition of their portfolio should be readily available.
- The reinsurer remains in control of the emission calculation methodology.

LIMITATIONS

- The varying availability of detailed market information between sectors and/or countries may limit comparability.
- Making more detailed assumptions could lead to higher volatility in the resulting emissions.

DATA REQUIRED – COMMERCIAL LINES AND PROJECT-RELATED INSURANCE

- **Option 1:** reported emissions
- **Option 2:** physical activity-based emissions **(not applicable at the moment)**
- **Option 3:** sector specific and sector agnostic economic activity-based emissions

Reported emissions directly from cedent (Option 1)
Method A requires Option 1 data, i.e., emissions data reported by the cedent in official filings, environmental reports or through brokers/cedent when underwriting the treaty. Cedents should make treaty specific insurance-associated emissions available to their reinsurers, or the closest categorization of available emissions data. The most recent available data should be used. The data sources used and the reporting period should be disclosed. The granularity and reporting period of the emissions data will be dependent upon the level of disclosure of the cedent.

PCAF acknowledges that commercial insurance portfolios include listed and non-listed cedents, and that availability of reported data can be limited, especially for non-listed cedents. PCAF recognises that emissions data may not be publicly reported at an entity level and is less likely to be reported at the treaty or LoB level. A list of questions to provide guidance when engaging with cedents regarding methodology and calculation methods is available in Annex 9.1.

Physical activity-based emissions (Option 2; not applicable)
In contrast to direct insurance and facultative reinsurance, treaty reinsurance portfolios are unlikely to contain the physical output metrics required to use a physical activity-based emissions approach (Option 2). Hence, this methodology focuses on emission factors building on revenue-based models (e.g., intensity-based, or environmental input-output models) as these have the advantage of requiring less detailed data from the (re)insurer.

Sector specific economic activity-based estimation models (Option 3)
Method B requires revenue-based emission intensity data. Such data can be sourced from cedents. Some may not share treaty level emissions and quality score data with reinsurers, but provide emission intensities for the entire business, per LoB or per portfolio. Reinsurers should use such data for Method B. To maximize the coverage of emissions data, gaps may be filled with estimations. If no data is available, estimation models consistent with the emissions from the primary business activity may be used.

For sector-specific level proxies, PCAF recommends using official statistical data or acknowledged Environmental Extended Input-Output (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). Reinsurers should use emission factors which are as consistent as possible with the primary business activity of the reinsured assets, as far as this is known, but in a way that remains feasible given the large size of commercial lines portfolios covering multiple business activities.

Examples of EEIO databases that can be used to obtain such emission factors are EXIOBASE, the CEDA dataset, the Global Trade Analysis Project (GTAP), or the World Input-Output Database (WIOD). Sector-specific emission factors can also be replaced with values from linear regression models from databases containing company revenue and emissions, by sector and geographical region.

PCAF's emission factor database provides a large set of sector specific emission factors. This can help (re)insurers get started with estimating the insurance-associated emissions of their commercial lines portfolios.

Sector-agnostic economic activity-based estimation models (Option 3)
Where information on the underlying industry of a given portfolio is not available and cannot be reasonably assumed based on occupancy codes, industry classifications or line of business, then country level proxies should be used. These proxies should be production based GHG emissions within a country's territory, consistent with the requirements of national inventories submitted to the UNFCCC. Alternatively, sector agnostic emissions factors may be taken from linear regression models from databases containing company revenue and emissions and geographical region.

Country level emissions economic intensity factors typically use GDP as a denominator (i.e., tCO_2e/GDP). These factors should be adjusted for economic inflation, as appropriate. Such factors should be scaled to reflect the gross output using the ratio of gross output to GDP of a given territory in line with the consideration of corporate emissions factors that consider gross input in the form of revenues. To avoid double counting between entities within a given territory, PCAF recommends considering only Scope 1 emissions.

The use of sector agnostic economic emissions factors assumes that the emissions intensity of economic output for a given country can be used as a proxy for the emissions intensity of an insurance portfolio with geographical scope within that country. Whilst corporate emissions factors consider sector specific averages, country level emissions factors consider production from individuals, corporate entities, and government entities. Based on this assumption, country level emissions intensity factors should only be used in the absence of any reasonable indicators of the underlying industries within a treaty reinsurance portfolio.

PCAF expects that the insurance-associated emissions for most commercial lines portfolios can be derived through either reported emissions from cedents (Option 1), occupancies/industry level proxies, or country level GDP proxies (Option 3). However, reporters may use alternative options to calculate emissions to fill data gaps. The reporting reinsurer shall explain the reasons for using an alternative option if it deviates from the three options defined above.

Data granularity and availability

This methodology encourages to share data along the (re)insurance value chain. Data can be most efficiently gathered, and insurance-associated emissions calculated, where the transparency on the insured risk is highest. This is typically the case at the level of the primary insurance agent/broker or the primary insurance company. The insurer or reinsurance broker should share the total emissions associated with a reinsurance treaty. There is no need to share more detailed data by insured risk, that could be subject to contractual restrictions of data providers. Insurers already share data for underwriting purposes with their reinsurers. These existing processes should be leveraged for sharing emissions data and assurance processes by external auditors.

PCAF recognises it can be more challenging to source treaty-level data compared to data on the level of a portfolio, LoB, occupancy, or another appropriate category. The data granularity of insurance-associated emissions disclosed by the cedent will be dependent upon their internal categorizations. The reinsurer should then determine the most appropriate selection of categories provided to align them most appropriately with the treaty's composition.

Data quality scoring (Commercial Lines including project-related insurance)

Table 5.5-2 provides data quality scores for each of the described data options and sub-options (if applicable) that can be used to calculate the insurance-associated emissions for treaty reinsurance portfolios for commercial lines.

Table 5.5-2. General description of the data quality score table for treaty commercial lines insurance

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

Data Quality Score	Options to estimate IAE	Method	When to use each option (what data should be available)		
			Attribution factor	Emissions (tCO_2e) Scope 1 and 2	Comments
Score 1 to Score 4	**Option 1: Reported Emissions**	A	Ceded written premium/ Treaty gross written premium	Treaty emissions sourced from client directly	Primary insurer weighted average quality score between 1 and 4 (inclusive)
		B: Cedent		Treaty gross written premium x EF (Cedent IAE based proxy)	Minimal mismatch
Score 4		A		Treaty emissions sourced from client directly	Primary insurer weighted average quality score greater than 4
		B: Cedent		Treaty gross written premium x EF (Cedent IAE based proxy)	Non-minimal mismatch[84]
	Option 3: Economic - activity based emissions	B: Sector		Treaty gross written premium x EF (Average Sector Emission Intensity per Revenue) Sector average emissions factor	When reinsurer receives occupancy/ industry breakdown from broker/cedents
Score 5		B: Country		Treaty gross written premium x EF (Average Country Emission Intensity per gross output)	When reinsurer has no direct source of emission data

As can be seen in Table 5.5-2, the data quality score of a treaty reinsurance portfolio cannot be directly compared with the data quality score of a commercial insurance/facultative reinsurance portfolio. This is the case because the country level data is not used in the commercial methodology. Since emissions calculated with country level proxies are given the worst data quality score of 5, there is a small miss-alignment of data quality scores as compared to the commercial insurance/facultative reinsurance methodology. This is done to give greater credit to reinsurers for using information from their cedents.

A detailed summary of the data quality score table, including data needs and formulas to calculate insurance-associated emissions, is provided in Annex 9.2. Data for all three options in Tables 9.2-4 and 9.2-5 can be derived from different data sources.

[84] The portfolio composition ceded under a treaty might differ significantly from the cedent's overall portfolio under the line of business that was used as proxy for the emission intensity. In that case, PCAF requires reinsurers to assign it a quality score of 4 to account for this mismatch. Please see Box 5-4 for more details.

Box 5.5-1. Examples of minimal and significant mismatches LoB of a treaty and the LoB of the emission intensity data

PCAF acknowledges the fact that the composition of a treaty may not be aligned with the LoB cedent's emission intensity data. Hence PCAF proposes that reinsurers account for treaties with a different data quality score when the degree of mismatch becomes significant. It is up to every reinsurer individually to ultimately determine, on an independent basis, what is considered a significant or minimal mismatch. However, PCAF has provided some examples which could illustrate common examples of good and bad matches between sources of cedent data and the treaty being measured.

Minimal mismatch examples

Underlying source of cedent emissions data	Treaty being measured
The emissions/emissions intensity of the property LoB of a cedent.	A general property treaty.
The emissions/emissions intensity of the company-wide portfolio of a cedent that only does property covers.	A general property treaty.
The emissions/emissions intensity of the property LoB of a cedent.	A natural catastrophe property cover treaty (global cat cover aligned to the activities of the cedent)
The emissions intensity of the property LoB of a cedent.	A property treaty with a significant amount of personal property coverage within the treaty (at the time of the standard, personal lines property contracts are not included within PCAF's scope).

Significant mismatch examples

Underlying source of cedent emissions data	Treaty being measured
The emissions/emissions intensity of the property LoB of a cedent.	A natural catastrophe property cover treaty (e.g., regional or sector specific coverages)
The emissions/emissions intensity of the property LoB of a cedent.	A property treaty with a focus on the power sector.
The emissions/emissions intensity of the company-wide portfolio of a cedent that is involved in multiple lines of businesses.	A general LoB specific treaty (e.g., property, aviation, marine, etc.)
The absolute emissions of the property LoB of a cedent.	A property treaty with a significant amount of personal property coverage within the treaty (at the time of the standard, personal lines property contracts are not included within PCAF's scope).

DATA REQUIRED – PERSONAL MOTOR

The guidance provided for the primary insurance methodology for personal motor should be followed.

Data quality scoring

Table 5.5-3. General description of the data quality score table for treaty motor lines insurance (score 1 = highest data quality; score 5 = lowest data quality)

Data Quality Score	Options to estimate IAE	Method	Vehicle usage data	Emission intensity
Score 1 to Score 4	Option 1: Actual treaty-specific emissions (received directly from cedent)	A	Total emissions per what is disclosed/shared by the cedent.	
Score 4	Option 3: Estimated vehicle-unspecific emissions and continental distance driven averages	B	**Estimated** distance travelled of **an average vehicle** on the **subcontinent / continent**	Emission intensity of an **average vehicle type** (cars, vans, motorcycles) and/or **fuel type** (fossil fuel, hybrid, electric)
Score 5				Emission intensity of an **average vehicle**
			Total GHG emissions in Motor industry x (number of cars insured / total number of cars in the country)	

LIMITATIONS IN THE USE OF TREATY REINSURANCE ASSOCIATED EMISSIONS

Given the nature of the reinsurance industry, and the many difficulties associated with the availability, collection, and sharing of data, PCAF acknowledges that there are limitations to the methodology to calculate treaty IAE.

The accuracy of the calculated reinsurance associated emissions will be influenced by the various factors mentioned under each of the methods. For example, a decoupling of the insurance and reinsurance price cycles, usage of proxy data that do not reflect cedents portfolio, time lags in the reporting dates of the data used or non-homogeneous cession shares.

In addition, differences in data granularity and quality, both between reinsurers and over time, make it difficult or even unfeasible to compare IAE over time or for different reinsurers.

Finally, the relationship between reinsurers, their cedents, brokers, and the companies in the real economy whose risks are being covered results in limited capacity of reinsurers to influence cedents and covered companies to decarbonise.

These issues limit the usefulness of the calculated reinsurance treaty IAE. PCAF provides guidelines on the appropriate use of the IAE treaty, including what it should and should not be applied to.

The IAE of a treaty portfolio should **NOT** be used:

- For planning decarbonization ambitions/trajectories given the potential variance in the accuracy of the calculated IAE figure from year to year.
- For comparison across different reinsurers given the potential difference in data sources, data quality, and calculation methods used.

Overall, while PCAF acknowledges that there are limitations to the proposed treaty IAE methodology, it still believes there is merit in the process of calculating the IAE of a treaty portfolio:

- As an initial way to better understand what the main drivers of GHG emissions within a reinsurer's treaty portfolio are
- As a process to engage with cedents and get a better understanding of where they stand in their decarbonization journey.

Most importantly, the existence of a common methodology will limit the emergence of different inconsistent methodologies. Companies reporting IAE that are asking for data may also lead to more data being made available in the long term. And eventually as more data becomes available, the methodology may be modified to better accommodate the new data and the evolving needs of the industry.

Reporting requirements, recommendations, and metrics

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6. Reporting requirements, recommendations, and metrics

A global, standardized methodology to measure and disclose the GHG emissions associated with insurance and reinsurance underwriting portfolios is intended to create consistency and comparability in reporting.

Rather than creating a new framework, PCAF has developed these reporting requirements and recommendations to complement existing frameworks such as TCFD, Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), generally accepted accounting principles (GAAP), and the International Sustainability Standards Board (ISSB). The requirements and recommendations are supplementary to and build upon the reporting requirements set out by the 'GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard'.

All (re)insurers that decide to adopt and use the Upcoming Standard when published shall follow the requirements therein when publicly disclosing their insurance-associated emissions. They have the flexibility to decide where they want to start by measuring and disclosing their insurance-associated emissions, for instance, at a specific line of business level or by sector. Flexibility in reporting is allowed largely as a consequence of limitations in data availability and quality. PCAF recognizes that data for many insureds may not be available to (re)insurers and that insureds may not consistently disclose their emissions or emissions arising from an insured activity.

The requirements for disclosure of insurance-associated emissions describe a minimum disclosure level with flexibility for (re)insurers to report more. Any requirements not fulfilled must be explained. 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. An allowed option is indicated using the word "may".

The public disclosures to be made by (re)insurers concerning commercial line portfolios is limited to the information included in Tables 9.3-1 and 9.3-2 in Annex 9.3 only. In particular, the data used in the emissions calculations, the associated workings and the relevant attribution factors will not be publicly disclosed nor disclosed amongst (re)insurers.

INSURANCE-ASSOCIATED EMISSIONS VERSUS FINANCED EMISSIONS

Background

PCAF's flagship GHG Accounting and Reporting Standard covers methodologies for measuring the GHG emissions associated with loans and investments, known as financed emissions. However, there is no equivalent global standard for measuring emissions associated with insurance and reinsurance underwriting portfolios, as insurance business differs from banking and investing activities. To appropriately differentiate the GHG accounting and reporting associated with (re)insurance underwriting from that of financed emissions, PCAF proposes calling these insurance-associated emissions.

PCAF explains the differences and similarities between financed emissions and insurance-associated emissions in Chapter 4. For the avoidance of doubt, insurance-associated emissions and financed emissions are not, and are not intended to be, directly comparable. Insurance-associated emissions and financed emissions shall be reported separately and not, under any circumstance, aggregated under the GHG Protocol scope 3 category 15 (Investments). Insurance-associated emissions are a supplementary accounting note to the GHG Protocol scope 3 category 15 (Investments). This is further considered in the illustrative example in Box 6-1.

Box 6-1. Illustrative example of the incompatibility of aggregating financed emissions and insurance-associated emissions

(Re)insurance companies are exposed to the emissions associated with their investment portfolios (as asset managers), and emissions associated with their (re)insurance portfolios (as (re)insurers).

The relationship between a (re)insurer and their client is fundamentally different from the relationship between an investor and their investee. Insurers lack ownership of, or direct control over, the activities of insureds. The attribution factors applied across the financed emissions and insurance-associated emissions workstreams therefore necessarily differ to reflect the difference in the underlying relationship.

Although for the purposes of their GHG inventories, both financed emissions and insurance-associated emissions are "downstream" scope 3 emissions of a (re)insurance company, the output of financed emissions and insurance-associated emissions calculations are not aligned and will diverge significantly. There is a real risk that, in aggregating the output of financed emissions and insurance-associated emissions, (re)insurers risk: (i) double counting their attributed emissions impact; and (ii) misleading the end-user of their reporting. Where reported separately, this distinction can be clearly drawn and the disclosures appropriately caveated. It is therefore recommended that insurance-associated emissions be reported as a supplementary accounting note to scope 3 category 15 (Investments).

The following examples demonstrate the difference between the “Follow the money” and “Follow the risk” principles for a (re)insurer when separately considering the emissions associated with its investment and (re)insurance relationships:

"Follow the money":

1. Insured A pays premium to the insurer
2. Insurer issues a policy of insurance to Insured A
3. Insurer invests a proportion of premium in Company B
4. Company B has direct scope 1 and indirect scope 2 GHG emissions
5. Insurer is required to account for the financed Scope 1 and Scope 2 emissions of Company B in its scope 3 category 15 emissions by applying an attribution factor

6. The attribution factor depends on the financing type and source, but represents the principle that the insurer has the potential to benefit economically from the activities of Company B

"Follow the risk":

1. Insured A pays premium to insurer
2. Insurer issues a policy of insurance to Insured A
3. Insurer reserves a proportion of premium to pay valid claims made by Insured A
4. Insured has direct scope 1 and indirect scope 2 emissions
5. Insurer is required to account for the insurance-associated scope 1 and scope 2 emissions of Insured A as a supplementary note to its scope 3 category 15 emissions by applying an attribution factor given that the reserves have been invested by the insurer
6. The attribution factor depends on the insurance being offered, but represents the "enabling effect" that the provision of contingent capital (claims payment) may have on Insured A's operations in the event of a claim under the policy of insurance

The following example demonstrates the potential scale of the difference in output between financed emissions calculations and insurance-associated emissions calculations.

Scenario: A (re)insurer both invests in, and provides insurance coverage to Company A.

- Equity investment in Company A is [$1m]
- Company A's Enterprise Value Including Cash (EVIC) is [$900m], and it has annual revenues of [$300m]
- Total premiums (GWP) earned by the (re)insurer from the provision of insurance to Company A are [$1m] for the policy period. The policy carries a [$70m] limit of liability.
- Company A's total scope 1 and 2 emissions are [20,000 tCO_2e]. It does not currently report scope 3 emissions.

For both calculations, the formula is as follows (with "c" being the investee or borrower for financed emissions, and the insured for insurance-associated emissions):

$$\sum_{c} \textit{Attribution factor}_{c} \times \textit{Company emissions}_{c}$$

The "attribution factor" will vary between the financed emissions and insurance-associated emissions (commercial insurance) calculations:

By way of example:

Financed emissions calculation:

$$\sum \frac{\textit{Outstanding amount}}{\textit{Enterprise Value Including Cash}} \times \textit{Company emissions}$$

Insurance-associated emissions calculation:

$$\sum \frac{\textit{Premium}}{\textit{Revenue}} \times \textit{Company emissions}$$

$$\sum \frac{[\mathbf{1,000,000}]}{[\mathbf{900,000,000}]} \times [\mathbf{20,000}]$$
$$= [22.22\ tCO_2e]$$

$$\sum \frac{[\mathbf{1,000,000}]}{[\mathbf{300,000,000}]} \times [\mathbf{20,000}]$$
$$= [66.67\ tCO_2e]$$

As demonstrated above, the attribution factors for financed and insurance-associated emissions attribution differ materially. Even where the numerators remain constant (unlikely). The reporting of insurance-associated emissions remains a supplementary note to the financed emissions.

GHG EMISSION SCOPE COVERED

Following the logic of the GHG Protocol, the GHG accounting methodology for insurance-associated emissions **shall** at least focus on the scope 1 and scope 2 emissions of the clients of (re)insurers.

For integrating clients' scope 3 emissions, PCAF acknowledges that, to date, the comparability, coverage, transparency, and reliability of customers' scope 3 data still varies greatly per sector and data source. By supporting the disclosure of scope 3 emissions of clients over time, PCAF seeks to make the reporting of scope 3 emissions more common by improving data availability and quality.

To avoid double counting, the insurance-associated emissions relating to client scope 1 and 2 emissions **shall** be disclosed separately from the customers' scope 3 emissions; where the data allows for an accurate and fair account of insurance-associated emissions over time, and where reporting in this manner is not unreasonably burdensome. If (re)insurers do not report scope 3 emissions of their customers, PCAF recommends that (re)insurers should explain why.

PCAF acknowledges the challenges and limitations of GHG accounting metrics, including that such metrics should not necessarily be interpreted as risk metrics. Nevertheless, PCAF views the reporting of absolute insurance-associated emissions and weighted average carbon intensity (WACI) as a first step. PCAF tries to be aligned with the ISSB and TCFD in that it expects disclosure of this information to prompt important advancements in the development of decision-useful, climate-related metrics.

PCAF recognizes that some (re)insurers may be able to report the metrics on only a portion of their portfolio given data availability and methodological issues. Nonetheless, increasing the number of organizations reporting this type of information should help speed the development of better climate-related metrics.

In the years to come, PCAF will monitor the data availability and will provide additional guidance on the associated reporting requirements.

Overall reporting requirements and recommendations

- **Principles**: GHG accounting and reporting of insurance-associated emissions, (re)insurers **shall** be based on the following principles: relevance, completeness, consistency, transparency and accuracy.
- **Purpose**: A (re)insurers' reporting **should** align with its specific business goals; for instance, for identifying and assessing climate-related transition risks and opportunities.

- **Frequency**: (Re)insurers **shall** disclose at least annually and at a fixed point in time in line with the financial accounting cycle. (Re)insurers **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**: (Re)insurers **shall**, in line with the 'GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard' requirement (page 104 [85]), establish a baseline recalculation policy to define under which circumstances a recalculation of (base line) insurance-associated 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, (re)insurers **shall** establish and disclose the significance threshold[86] that triggers the base year emissions recalculation. Guidance from the GHG Protocol notes that companies are required to recalculate base year emissions when the following changes occur and significantly impact the inventory:
    - Structural changes in the reporting (re)insurer, such as mergers, acquisitions, divestments, outsourcing and insourcing;
    - Changes in calculation methodologies, improvements in data accuracy, or discovery of significant errors; and
    - Changes in the categories or activities (i.e., LoB) included in the scope 3 inventory.

  Where a recalculation occurs as a result of changes discussed above, which are not anticipated to be a regular occurrence, (re)insurers **should** provide qualitative narrative to accompany the recalculation. (Re)insurers **should** establish significance thresholds in line with applicable financial reporting requirements.
- **Form of reporting**: (Re)insurers **shall** disclose in publicly available reports such as (semi) annual reports, website articles or other publicly available sources as deemed appropriate by the (re)insurer. Table 9.3-1 in Annex 9.3 provides an example template for how (re)insurers can disclose their insurance-associated emissions.
- **Past performance**: Where appropriate and relevant for their business goals, (re)insurers **should** disclose their insurance-associated emissions for multiple comparable time periods (e.g., years), with an exception for the first year of disclosure. Table 9.3-2 in Annex 9.3 provides an example template for how (re)insurers could disclose current year relative insurance-associated emissions as against the relative insurance-associated emissions in the baseline year.

EMISSIONS METRICS FOR THE CONTEXT OF INSURANCE-ASSOCIATED EMISSIONS

Different emissions metrics can be used for different purposes and some key insurance-associated emissions metrics and their merits are discussed in Table 6-1. This list is not exhaustive.

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[85] (WRI and WBCSD, 2011)
[86] 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."

Table 6-1. Emission metrics for the context of insurance-associated emissions[87]

Metric	Purpose	Description[88]	Key benefit
Absolute insurance-associated emissions	To understand the climate impact of underwriting and set a baseline for climate action	The share of an insured's absolute emissions that is attributed to the (re)insurer, expressed in tCO_2e	Useful for GHG accounting and for setting science-based targets (SBTs)
Relative insurance-associated emissions	To understand the effect growth/decline of an insurer's business size via normalization of the absolute insurance-associated emissions at the portfolio or sub-portfolio level	Absolute insurance-associated emissions divided by a monetary unit reflecting the insurer's size of business, expressed in tCO_2e/€M of (re)insurer's revenue, or total gross written premium, or other (re)insurance exposure measure	Useful for GHG accounting and for comparing different portfolios or parts of portfolios and for managing climate transition risks by normalizing the absolute emissions (see Box 6-2)
Economic emissions intensity	To understand the efficiency of insureds (or portfolios/sub-portfolios) in terms of total GHG emissions per common monetary unit, reflecting the insured's size of business or asset value	(Re)insured's absolute emissions divided by a monetary unit reflecting the insured's size of business, expressed in tCO_2e/€M of insured's revenue or asset value	Useful for internal comparison and qualitative understanding of changes within or between different portfolios or parts of portfolios between sectors where a common economic indicator is applied Used predominately to estimate an insured's absolute emissions where self-reported emissions data is missing
Physical emissions 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	(Re)insured's absolute emissions divided by a physical output value, expressed in tCO_2e/MWh, or tCO_2e/ton product produced	Useful for internal comparison and qualitative understanding of changes within or between different portfolios or parts of portfolios where a common output unit is applied Used predominately to estimate an insured's absolute emissions where self-reported emissions data is missing

[87] Adapted from (CRO Forum, 2020); please note that not all of the emission metrics may be readily applicable to emissions associated with personal motor portfolios

[88] Where applicable applying currency as aligned to the (re)insurer's annual financial statements reporting.

Weighted average carbon intensity (WACI)[89]	To understand exposure to carbon-intensive insureds (commercial clients/ companies[90]) at the portfolio or sub-portfolio level	Average economic emission intensity, weighted by premium, expressed in tCO_2e/€M of (re)insured's revenue A physical WACI could also be calculated	Useful for GHG accounting and to understand a portfolio's exposure to carbon-intensive commercial companies

- In addition to reporting on absolute insurance-associated emissions, (re)insurance companies **should** consider reporting emission intensities, in particular WACI, if these values are relevant to their business goals (see chapter 3).
- Economic emission intensities **may** be expressed on any portfolio, sub-segment or sector level in metric tonnes of CO_2e per million euro, dollar or equivalent of revenue (aligning to the reporting currency in the (re)insurer's financial statement): tCO_2e /M€ or tCO_2e/M$.
- When relevant to their business goals, (re)insurance companies **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).

Box 6-2. Illustrative example on the benefits of reporting relative together with absolute insurance-associated emissions

"Absolute insurance-associated emissions" refer to the volume of GHG emissions of an insured that are subsequently associated with a (re)insurance company for the purposes of GHG accounting. Calculation of absolute emissions provides (re)insurers with a necessary baseline from which they can set their decarbonization trajectories. Absolute emissions are independent of diluting business metrics, and reflect real-world changes in emissions. There is an expectation that absolute emissions data will become more readily available over time as reporting requirements increasingly require its disclosure. This should help improve data quality over time.

"Relative insurance-associated emissions" refer to absolute emissions that have been normalised (i.e., divided) by another variable, such as revenue. The primary benefit of relative emissions is that they more effectively enable comparison between two or more (re)insurers, lines of business, sectors portfolios or regions, where absolute emissions would not otherwise take into account relevant variables such a value of output or relative size. The reporting of relative emissions may also help end-users of reports disclosing GHG emissions understand relative change against baseline emissions – see Table 9.3-2 for further information.

[89] (TCFD, 2017)
[90] The word company refers to the (re)insurer's customers.

Below is an example to demonstrate the benefits of reporting relative insurance-associated emissions in addition to absolute emissions. The figures quoted are illustrative only.

Example:

- (Re)Insurer A and (Re)Insurer B both report absolute insurance-associated emissions of 20 $MtCO_2e/y$ in both year one and year two.
- (Re)Insurer A's revenue for year one was US$10bn and US$11bn in year two.
- (Re)Insurer B's revenue for year one was US$10bn and US$9bn in year two.

On an "absolute insurance-associated emissions" basis:

- There are no material changes in emissions, which could lead an end-user of the emissions report to deduce that both (Re)Insurer A and (Re)Insurer B have made no effort to reduce their GHG emissions across the portfolio.

However, on a "relative insurance-associated emissions" basis:

- (Re)Insurer A has grown its business by 10%, whilst retaining the same insurance-associated emissions. Per dollar of revenue, the (re)insurer has become less GHG intensive, which indicates that their customers (taken as an average) are decarbonizing (assuming that the business mix as such has remained unchanged);

  Year 1: 2 tCO_2e per $1 of revenue

  Year 2: 1.81 tCO_2e per $1 of revenue

  whereas,

- (Re)Insurer B has shrunk its business by 10%, whilst retaining the same insurance-associated emissions. Per dollar of revenue, the (re)insurer has become more GHG intensive, which indicates that their customers (taken as an average) are releasing more emissions into the atmosphere.

  Year 1: 2 tCO_2e per $1 of revenue

  Year 2: 2.22 tCO_2e per $1 of revenue

The above example demonstrates that the underlying principles of relevance, completeness, consistency, transparency and accuracy may be better reflected though the reporting of relative emissions in addition to absolute emissions. To do so would also be in the interests of (re)insurers that may be growing their business whilst still reducing the underlying emissions associated with their underwriting portfolio(s).

COVERAGE

- (Re)insurers **shall** disclose aggregated absolute insurance-associated emissions for all of the relevant LoBs or sectors[91] covered in Chapter 5 and justify any exclusions. Potential justification criteria for exclusion could include, by way of example:
    - Business goals and strategy of the (re)insurance adopting the proposed methodology.
    - Applicable legal and regulatory requirements.
    - Data availability: required data is not available to (re)insurers.
    - Methodology: there is no recognized methodology to quantify the insurance-associated emissions of specific activities (i.e., LoBs not currently covered in this Progress Report).
- (Re)insurers **may** disclose the absolute emissions for statutory or compulsory classes of (re)insurance separately from non-statutory classes of business in their insurance-associated emissions inventories.
- (Re)insurers **should** disclose the absolute emissions for personal lines[92] of motor vehicles in their insurance-associated emissions inventories, separately from commercial lines reported insurance-associated emissions.
- (Re)insurers **should** separate out the disclosure of aggregated absolute insurance-associated emissions by relevant lines of business, where the (re)insurer is unable to negotiate specific terms and/or rates as a result of government-based insurance schemes in place.
- (Re)insurers **shall** disclose the percentage of their total (re)insurance portfolios covered in their insurance-associated emissions inventories for the LoBs or sectors covered in Chapter 5.
- (Re)insurers **should** separate out the disclosure of insurance-associated emissions by public and private companies, where there is a perceived benefit in doing so.
- (Re)insurers **should** separate out the disclosure of insurance-associated emissions by client-reported and (re)insurer estimated or proxy emissions, where there is a perceived benefit in doing so.
- (Re)insurers **should** separate out the disclosure of insurance-associated emissions by direct insurance and facultative reinsurance, where there is a perceived benefit in doing so.

Recommendations for reporting insurance-associated emissions before external reinsurance is purchased (gross), and after external reinsurance is purchased (net), will be included in a future version of the Standard, once a methodology for Treaty Reinsurance has been developed and published.

GASES AND UNITS

- (Re)insurers **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), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

[91] In addition, (re)insurers can choose to report by sector or line of business, however in both cases (re)insurers should only disclose the aggregated absolute insurance-associated emissions per line of business or sector and shall not disclose details of the underlying calculations.

[92] (Re)insurers looking to set business goals including targets against the insurance-associated emissions should consider doing so where it does not expose the (re)insurer to fines, penalties, enforcement action, or other legal liability under applicable laws. This may be the case for personal lines or compulsory insurance or government-based insurance schemes/arrangements.

- 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[93] or the IPCC's most recently published assessment report.[94]
- (Re)insurers **shall** express their insurance-associated 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, (re)insurers **should** consider a separate disclosure of these emissions.

ABSOLUTE EMISSIONS

- (Re)insurers **shall** disclose the absolute emissions (scope 1 and 2 combined) associated with their (re)insurance portfolios. If it serves the (re)insurers' business goals, the absolute scope 1 and scope 2 emissions associated with their (re)insurance portfolios **should** be reported separately from each other.
- (Re)insurers **shall** also measure and report their own scope 1 and 2 emissions and should report any other relevant scope 3 emissions categories in line with the GHG Protocol 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'.
- (Re)insurers reporting the absolute scope 3 emissions of their customers **should do this** separately from their client's reported scope 1 and scope 2 emissions, and in line with the considerations covered in subchapter 5.2.

DISCLAIMERS

Further to guidance issued by the UK Climate Financial Risk Forum on managing legal risk[95], any disclaimer applied by a (re)insurer **should** accurately reflect the area of concern and should be tested by (re)insurers to ensure that it is neither too narrow nor too wide. The location, font size and formatting of the disclaimer **should** also be considered carefully so that it is not presented in the form of legal boilerplate.

The disclaimer **should** be reviewed in the context of the disclosure as a whole. Information as to methodology or metrics may be an effective part of limiting the risk of stakeholders misunderstanding the information or relying on information without a clear appreciation of its purpose, gaps and limitations.

DOUBLE COUNTING

Insurance demands for corporate entities and individuals are structured in various different insurance lines. Because certain risks are too large to be borne by an individual (re)insurer, they are spread in a complex risk-sharing system comprising many players, including insurance, reinsurance ("insurance of an insurance"), and retrocession ("reinsurance of a reinsurance"). This setup potentially causes double counting in different areas:

- Double counting of insurance-associated emissions within a (re)insurer, across different lines of business or between insurance and risk management services.
- Double counting between different (re)insurers of the same client.

[93] (GHG Protocol, 2014)
[94] The IPCC reports can be found at: https://www.ipcc.ch/.
[95] See page 18 on: https://www.fca.org.uk/publication/corporate/climate-financial-risk-forum-guide-2021-disclosures-legal-risk.pdf

- Double counting could occur across scopes. This effect can be limited by reporting scope 3 separate from scope 1 and 2.
- Associating the same emissions to the primary insurers and reinsurers.

With investors/asset owners also accounting for the full scope 1, 2 and, where applicable, scope 3 emissions of a company as their financed emissions, it is clear that the same emissions are double counted between insurance-associated and financed emissions. With (re)insurers sometimes insuring and investing in the same companies, this translates into double counting across the investment and insurance portfolios of a (re)insurance company as well.

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

- Double counting does not interfere with the goal of getting a clear view on where portfolios are connected to their customer's and investee's emissions, in order to facilitate managements toward stated decarbonization goals.
- Methodologies and limitations are made transparent as part of the disclosure.

PCAF's objective will not be to eradicate any double counting and to create a global balance sheet of absolute GHG emissions, but to minimize double counting concerns where they impact stated principles, and the delivery of a transparent and consistent approach to track and report insurance-associated emissions and their changes over time.

INTERPRETATION AND COMMUNICATION OF INSURANCE-ASSOCIATED EMISSIONS

With the synthetic nature of any insurance-associated emissions methodology and inherent double counting, correctly communicating insurance-associated emissions will be critical to avoid misinterpretation of disclosures by stakeholders.

Characteristics that are relevant for the correct interpretation of absolute emission figures are:

- Insurance-associated emissions cannot be compared or added up with financed emissions, even within the same company. They need to be reported separately.
- Double counting or under counting of emissions among (re)insurers prevents a meaningful industry total from being calculated.
- A base number is, as such, not necessarily important as insurance-associated emissions or financed emissions will not add up to a global GHG balance sheet.

INSURANCE-ASSOCIATED EMISSION REMOVALS AND AVOIDED EMISSIONS

- In addition to absolute emissions, (re)insurers:
    - **May** report emission removals where relevant to their (re)insurance portfolios when appropriate methodologies become available.

  - **May** report avoided emissions, for example emissions avoided as a result of (re)insurer support for renewable power projects.
- Where a (re)insurer reports on emission removals and/or avoided emissions, it **shall** disclose the methodological formula adopted in calculating such emissions. The methodological formula adopted, and any accompanying narrative, **should** reflect the principles of relevance, completeness, consistency, transparency and accuracy. Where a (re)insurer discloses details of a methodological formula that has not been developed and published, or endorsed by PCAF, the (re)insurer shall alone be responsible for satisfying itself that the approach and any associated disclosures comply with applicable laws.
- If a (re)insurer chooses to report emission removals or avoided emissions, it **shall** report absolute emission removals or avoided emissions separately from its scope 1, scope 2, and scope 3 inventories (see Annex 9.3 for an example).

DATA AND DATA QUALITY

- (Re)insurers **shall** use the most recent or otherwise appropriate data reasonably available to them. PCAF recognises there is often a lag between financial reporting and required emissions data. In these instances, it is acceptable that the data represents different years.
- (Re)insurers **should** provide a description of the types and sources of data, including activity data, assumptions, emissions factors, and all relevant publication dates, used to calculate emissions. The descriptions **should** be written to create transparency.
- (Re)insurers **should** publish a weighted score by outstanding premium of the data quality of reported emissions data or **should** explain why they are unable to do so. An example is provided in Box 6-2.
- Where (re)insurers report scope 3 emissions, the weighted data quality score **shall** be reported separately from scopes 1 and 2.
- The data hierarchy tables provided in Chapter 5 **should** be used as a guide for disclosing data quality. (Re)insurers should explain how data quality is assessed.
- (Re)insurers **should** be able to demonstrate that data quality has improved over time (with an exception for the first year of disclosure). Where (re)insurers are unable to evidence an improvement in data quality, they **should** explain why they are unable to do so.
- (Re)insurers **should** reconcile the premium figures in the insurance-associated emissions reporting with the premium figures cited in the annual accounts. (Re)insurers should **consider** whether to reconcile figures on an absolute basis or as a percentage. Where (re)insurers are unable to reconcile the premiums reported in the insurance-associated emissions disclosure and annual accounts, they **should** explain why they are unable to do so.
- There are numerous factors extraneous to emissions that may drive volatility in the insurance-associated emissions reported on a year-by-year basis. Where a factor is deemed to be material, (re)insurers **should** provide a clarification of how the factor has influenced the reported insurance-associated emissions. It **should** also provide an indication of the relative strength of influence that the factor has had on the reported insurance-associated emissions figures.

Box 6-3. Illustrative example for calculating weighted data quality scores

It is likely that data quality will differ across lines of business, sectors, companies and emission scopes. To disclose the best representation of data quality, the Standard requires that (re)insurers normalize the data quality scores for each line of business or sector to the total premium.

The formula for calculating weighted averages for a line of business or sector is:

$$= \frac{\sum_{i=1}^{n} \boldsymbol{Premium_i} \times \boldsymbol{Data\ quality\ score_i}}{\sum_{i=1}^{n} \boldsymbol{Premium_i}}$$

$$\boldsymbol{with\ i = insured}$$

An illustrative example of a (re)insurers provision of insurance is provided below:

Line of Business	Sector	Company	[Premium]	Attributed Scope 1/2 absolute emissions (tCO_2e)	Data quality score (1 = High, 5 = Low)
Property	Oil and Gas	Company A	X_1	Y_1	Z_1
Property	Power	Company B	X_2	Y_2	Z_2
Property	Transport	Company C	X_3	Y_3	Z_3
Casualty	Oil and Gas	Company D	X_4	Y_4	Z_4
Casualty	Power	Company E	X_5	Y_5	Z_5
Casualty	Transport	Company F	X_6	Y_6	Z_6

Weighted data score for Property and Casualty lines of business Scope 1 and 2 emissions:

$$= \frac{((\boldsymbol{X1} \times \boldsymbol{Z1}) + (\boldsymbol{X2} \times \boldsymbol{Z2}) + (\boldsymbol{X3} \times \boldsymbol{Z3}) + (\boldsymbol{X4} \times \boldsymbol{Z4}) + (\boldsymbol{X5} \times \boldsymbol{Z5}) + (\boldsymbol{X6} \times \boldsymbol{Z6}))}{(\boldsymbol{X1} + \boldsymbol{X2} + \boldsymbol{X3} + \boldsymbol{X4} + \boldsymbol{X5} + \boldsymbol{X6})}$$

Weighted data score for the Oil and Gas sector Scope 1 and 2 emissions:

$$= \frac{(\mathbf{X1} \times \mathbf{Z1}) + (\mathbf{X4} \times \mathbf{Z4})}{(\mathbf{X1} + \mathbf{X4})}$$

Box 6-4. Illustrative examples for calculating weighted data quality scores for treaty reinsurance

It is likely that data quality will differ across lines of business, sectors, companies, and emission scopes. To disclose the best representation of data quality, the Standard requires that (re)insurers normalise the data quality scores for each LoB or sector to the total premium.

The formula for calculating weighted averages for a LoB or sector is:

$$\frac{\sum_{i=1}^{n}[\boldsymbol{Ceded\ premium}]_i \times \boldsymbol{Data\ quality\ score}_i}{\sum_{i=1}^{n}[\boldsymbol{Ceded\ premium}]_i}$$

$$\boldsymbol{with\ i\ =\ insured}$$

An illustrative example of a (re)insurers provision of reinsurance where all cedents share treaty emissions data with the reinsurer is provided below:

Line of Business	Company	[Ceded premium]	Attributed scope 1/2 absolute emissions (tCO_2e)	Data quality score (1 = High, 5 = Low)
Property	Cedent A	X_1	Y_1	Z_1
Property	Cedent B	X_2	Y_2	Z_2
Property	Cedent C	X_3	Y_3	Z_3
Casualty	Cedent A	X_4	Y_4	Z_4
Casualty	Cedent B	X_5	Y_5	Z_5
Casualty	Cedent C	X_6	Y_6	Z_6

Weighted data score for the Property and Casualty lines of business scope 1 and 2 emissions:

$$\frac{(\boldsymbol{X_1} \times \boldsymbol{Z_1}) + (\boldsymbol{X_2} \times \boldsymbol{Z_2}) + (\boldsymbol{X_3} \times \boldsymbol{Z_3}) + (\boldsymbol{X_4} \times \boldsymbol{Z_4}) + (\boldsymbol{X_5} \times \boldsymbol{Z_5}) + (\boldsymbol{X_6} \times \boldsymbol{Z_6})}{(\boldsymbol{X_1} + \boldsymbol{X_2} + \boldsymbol{X_3} + \boldsymbol{X_4} + \boldsymbol{X_5} + \boldsymbol{X_6})}$$

Another illustrative example of a (re)insurers provision of reinsurance where cedents A and B share treaty emissions data with the reinsurer, but cedent C does not is provided below.

Cedent ceded treaty quality scores

LoB	Cedent A	Cedent B	Cedent C
Property	2.6	3.9	Cedent C does not share treaty level info. Reinsurer has used country level proxy to estimate its insurance-associated emissions.
Casualty	4.5	1.6	

Reinsurer quality score calculation

LoB	Company	[Ceded premium]	Attributed scope 1/2 absolute emissions (tCO_2e)	Data quality score (1 = High, 5 = Low)
Property	Cedent A	X_1	Y_1	2.6
Property	Cedent B	X_2	Y_2	3.9
Property	Cedent C	X_3	Y_3	5
Casualty	Cedent A	X_4	Y_4	4
Casualty	Cedent B	X_5	Y_5	1.6
Casualty	Cedent C	X_6	Y_6	5

Weighted data score for the Property and Casualty lines of business scope 1 and 2 emissions:

$$\frac{(2.6X_1) + (3.9X_2) + (5X_3) + (4X_4) + (1.6X_5) + (5X_6)}{(X_1 + X_2 + X_3 + X_4 + X_5 + X_6)}$$

Glossary

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7. Glossary

Absolute emissions: Volume of greenhouse gas (GHG) emissions expressed in tonnes CO_2e.

Attribution factor: Share of the total annual GHG emissions from insured assets, activities, and companies that can be associated with (re)insurance underwriting portfolios.

Carbon dioxide-equivalent (CO_2e) emissions: 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 GHGs or mixture of GHGs. Conversion factors vary based on the underlying assumptions and as science advances. As a baseline, PCAF recommends using 100-year global warming potentials without climate-carbon feedback from the most recent IPCC Assessment report.

Cedent or ceding company: The company or primary insurer which transfers risks to the insurer or reinsurer in exchange for premium.

Ceded emissions: ceded insurance-associated emissions from the primary insurer that are associated with the reinsurer (or another insurance entity), as part of the obligatory reinsurance portfolio or on an individual basis via facultative reinsurance.

Ceded written premium: Gross written premium of a customer, primary insurer or reinsurer, who has passed on shares of its insured or reinsured risks to an insurer or reinsurer in exchange for premium.

Commercial lines: Commercial lines insurance includes property and casualty insurance products/coverages for businesses that cover potential losses from certain risks

Construction-all-risk (CAR): Construction all risk (CAR) and erection all risk (EAR), also called builder's risks or course of construction in some markets, cover material damages occurring during the construction of a project.

Enabler: An institution that have the opportunity to directly or indirectly influence or support another actor's capacity to operate/perform/own/dispose of a certain economic activity or product/good or service. The actions that a (re)insurer' may take to possibly influence or support another actor, are subject to different variants specific to each situation/transaction, including, but not limited to, business and legal considerations. For example, if the provision of insurance for certain LoB is mandatory in a given jurisdiction, an insurer may only be able to engage with a client but not change anything about the provision of cover which is set by law. In this case, the actions a (re)insurer can take are relatively limited.

Emission Factor: The average mass of CO_2 emitted by an entity in one year usually expressed in tCO_2/year.

Emission Intensity (of a vehicle): The average mass of GHG of CO_2 emitted by a vehicle when it drives one unit of measure, usually expressed in gCO_2/km.

Emissions - Project Construction / Portfolio construction: Emissions of individual project(s) / portfolio(s) of projects over their entire construction stage.

Emissions - Insured year: Total emissions of the insured client for the year of the contract.

Emissions - Project / Portfolio, operating and dismantling: Emissions of individual project(s) / portfolio(s) of projects over their entire Operating and Dismantling stages.

Emissions - Project, Operating contract period: Estimated operating emissions of the project(s) over the contract period.

Emissions - Project, Lifetime: Estimated operating emissions of the project(s) over the operating period.

Erection-all-risk (EAR): Construction all risk (CAR) and erection all risk (EAR), also called builder's risks or course of construction in some markets, cover material damages occurring during the construction of a project.

Estimated revenue: Projected operational revenue of insured project(s) Estimated total revenue of the project(s) over their entire lifetime.

Facultative reinsurance: Participation on the part of the reinsurer in a particular individual risk assumed by the direct insurer. This is in contrast to obligatory reinsurance (also: treaty reinsurance).

Financed emissions: Absolute emissions that banks and investors finance through their loans and investments.

GHG emissions accounting: GHG emissions 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 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).

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). These typically refer to the underlying emissions produced by the client or assets in the real economy that are covered by an insurance contract.

Inherent defects insurance (IDI): also known as latent defects or decennial insurance, cover material damages occurring to newly constructed structures until typically 10 years after completion and due to construction defects.

Insurance: Insurance is a contract, represented by a policy, in which an individual or entity receives financial protection or reimbursement against losses from an insurance company.

Insurance-associated emissions: GHG emissions in the real economy, which are associated with specific (re)insurance policies aggregated in the (re)insurance portfolio. This definition is for accounting purposes only. It is not intended, and should not be interpreted as, an admission of liability by any (re)insurer for any emissions caused, or contributed to, by an insured or an insured activity.

Insurance-associated emission removal: Removed GHG emissions in the real economy, i.e., emissions that are captured from the air and stored durably, which are associated with specific (re)insurance policies aggregated in the (re)insurance portfolio.

Insurance-associated avoided emissions: Avoided GHG emissions in the real economy, i.e., the difference between project and baseline emissions, which are associated with specific (re)insurance policies aggregated in the (re)insurance portfolio.

Layers: Insurers often specialize in underwriting to different exposure attachment and exit levels, some preferring to insure where there is a higher probability of claims but a commensurately higher level of premium (primary layer) and others where there is a lower probability of claims for a lower premium (excess layers). Layering of insurances can affect pricing.

Lifetime: Lifetime emissions refer to those emitted whilst the project is being built or used for its intended function, e.g. it is inferred as the construction stage and use stage.

Lifecycle: Lifecycle emissions refer to those emitted throughout the life of the project e.g. it is inferred as the production stage, construction stage, use stage, and end-of-life stage.

Personal lines: Personal lines insurance refers to any kind of insurance that covers individuals against loss that results from death, injury, or loss of property.

Property & Casualty (P&C): Property and casualty lines of business.

Relative emissions: Absolute (GHG) emissions normalized (i.e., divided) by another variable such as revenue, or enterprise value, or m^2 for example.

(Re)insurance: Refers collectively to both insurance and reinsurance.

Reinsurance structures: reinsurance structure refers to the organized setup of reinsurance agreements that an insurer puts in place to transfer portions of its risk to reinsurers. Reinsurance structures can generally be divided into two main categories:

a. proportional reinsurance, where the insurer and reinsurer share premiums and losses in agreed proportions (e.g., quota share, surplus).
b. non-proportional reinsurance, where the reinsurer only covers losses that exceed a certain threshold (e.g., excess of loss, stop loss).

(Re)insurance premium: Total insurance premium written for the contract by the Insurer for its share

Surety: covers financial guarantees of the contractor securing the good completion of the project.

Revenue: Construction Annual Revenue / Expenditure of Project Contractors / Principal

Total revenue of the insured contractor or construction expense of the insured principal for the year of the contract.

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 that occur in the supply chain (for example, from production or extraction of purchased materials) and downstream emissions that occur as a consequence of using the organization’s products or services.

Treaty reinsurance: Reinsurance treaty under which the reinsurer participates in a > cedant's total, precisely defined insurance portfolio. This is in contrast to > facultative reinsurance.

Treaty reinsurance contract (also: treaty wording): the written agreement between insurer and reinsurer regarding terms & conditions that will be applied on the risks that have been transferred via reinsurance.

Total project cost: Total insured value of project(s) insured.

Underwriting: The means by which insurers evaluate the risks posed by the individual, company, events, or transaction to decide whether to cover the risk and if so to set the contract terms and a fair price for the insurer to accept this risk; also known as the insured liability.

Acronyms

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8. Acronyms

CAR	Construction-all-risk
CDP	Carbon Disclosure Project
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CRE	Commercial real estate
EAR	Erection-all-risk
EEA	European Environment Agency
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
FIT	Forum for Insurance Transition Net Zero
FSB	Financial Stability Board
GAAP	Generally accepted accounting principles
GEMIS	Global Emissions Model for integrated Systems
GHG	Greenhouse gas
GRI	Global Reporting Initiative
GTAP	Global Trade Analysis Project
HFC	Hydrofluorocarbon
ICCT	International Council on Clean Transportation
IDI	Inherent defects insurance
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
ISSB	International Sustainability Standards Board
ITF OECD	International Transport Forum at the Organization 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
N_2O	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	Sulphur 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

Annex

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9. Annex

9.1 Due diligence for third-party data providers

DATA COLLECTION

- Is the methodology adopted to collect data transparent?
- Does the data provider report the number of dedicated staff collecting and processing GHG data? Does the data provider use automated data collection tools, web-scrapping or artificial intelligence?
- Is collected data reviewed and cross-checked? Are plausibility checks performed to ensure comparability, consistency and completeness of data?
- If a company reports both location- and market-based scope 2 emissions, which is collected? Is this difference clearly labelled in the database?
- If any sources (e.g., facilities, specific GHGs, activities, geographies, etc.) of scope 1 and 2 emissions that are within the reporting boundary selected by the company are not included in the reported data, is this clearly labelled in the database? And is there an estimated percentage of total scope 1 and 2 emissions this excluded source represents?
- How often is the data updated (update frequency)?
- How soon after new data is reported by the company is it updated in the provider's database (data timeliness)?
- Does the data provider indicate the assurance/verification status of reported emissions?
- Does the data provider compare year-on-year trends, using this to highlight where step-changes have occurred, potentially indicating data quality issues?
- Does the data provider update its database to account for data corrections reported by the company? If so, is this done only for the last reporting year?
- Does the data provider have a process in place for companies to verify their data and submit data correction requests?
- Does the data provider have a data quality assurance process in place for identifying and correcting data errors? Is the quality assurance process certified?
- Does the data provider make the reporting boundaries clear? I.e., Financial Control, Operational Control, Equity Share
- Is it clear which scope 3 emission categories are included?

DATA COVERAGE

- What is the coverage of the GHG data?
- Does this coverage vary in terms of emission scopes?

ESTIMATED DATA

- Does the data provider provide estimated data if reported data is not available?
- Does the data provider indicate whether data is reported or estimated?
- Does the data provider deliver a data quality score for estimated data?
- Is the estimation methodology clear and transparent?
- How often are estimation models fine-tuned and updated?
- If the data provider uses sectoral proxies where specific reported data is not available, does a clear taxonomy of sector classification exist to reduce the risk of overlaps?
- How does the estimation for companies differ to that for "projects", e.g., opening a new mining site?

9.2 Detailed data quality score tables per line of business

Table 9.2-1. Detailed description of the data quality score table for commercial lines insurance[96]

Option	Description					Data Quality
	Attribution		Emission Factor		Insurance-associated emissions calculations	Highest to lowest
	Financial Data		Emission Data		Equations	
Option 1a	(Re) insurance Premium	Revenue	Verified GHG emissions data from the company/ asset in accordance with the GHG Protocol		*Scope 1:* $\sum_{c} \frac{Re/insurance\ Premium}{Revenue_c}\ x\ Verified\ Emissions_c$ *Scope 2:* $\sum_{c} \frac{Re/insurance\ Premium}{Revenue_c}\ x\ Verified\ Market\ Based\ Reported\ Emissions_c$	Score 1
Option 1b			Unverified GHG emissions data from the company/ asset in accordance with the GHG Protocol		*Scope 1:* $\sum_{c} \frac{Re/insurance\ Premium}{Revenue_c}\ x\ Unverified\ Emissions_c$ *Scope 2:* $\sum_{c} \frac{Insurance\ Premium}{Revenue_c}\ x\ Unverified\ Market\ Based\ Reported\ Emissions_c$ *or* $\sum_{c} \frac{Insurance\ Premium}{Revenue_c}\ x\ Location\ Based\ Reported\ Emissions_c$	Score 2
Option 2a			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)	$\sum_{c,r} \frac{Insurance\ Premium}{Revenue_c}\ x\ Energy\ Consumption_c\ x\ Emission\ factor_r$	Score 2
Option 2b			Primary physical activity data for the company's production (e.g., tons of rice produced)	Emission factors specific to that primary data (e.g., emission factor per ton of rice)	$\sum_{c,s,r} \frac{Insurance\ Premium}{Revenue_c}\ x\ Production_c\ x\ Emission\ factor_{s,r}$	Score 3
Option 2c		Revenue or average sector revenue	Client revenue or average sector revenue	GHG emissions per sector	$\sum_{c,s,r} \frac{Insurance\ Premium}{Average\ Revenue_{s,r}}\ x\ Average\ Revenue_{s,r}\ x\ Emission\ factor_{s,r}$	Score 4
Option 3[97]	N/A					

[96] Where c= company or asset insured; s=sector of the company insured; r=region(province/state/country).
[97] With the update of this Standard, PCAF has removed data quality score 5 from the table. Therefore, this score is not applicable.

Table 9.2-2. Detailed description of the data quality score table for project insurance[98]

Option	Description: Attribution – Financial Data		Description: Emission Factor – Emission Data		Description: Insurance-associated emissions calculations – Equations	Data Quality: Highest to lowest
Option 1a	(Re) insurance Premium	Total Project Cost	Verified GHG emissions data from the company/ asset in accordance with the GHG Protocol		*Scope 1:* $\sum_{c} \frac{Re/insurance\ Premium}{Total\ Cost}\ x\ Verified\ Emissions_c$ *Scope 2:* $\sum_{c} \frac{Re/insurance\ Premium}{Total\ Cost}\ x\ Verified\ Market\ Based\ Reported\ Emissions_c$	Score 1
Option 1b	(Re) insurance Premium	Total Project Cost	Unverified GHG emissions data from the company/ asset in accordance with the GHG Protocol		*Scope 1:* $\sum_{c} \frac{Re/insurance\ Premium}{Total\ Cost}\ x\ Unverified\ Emissions_c$ *Scope 2:* $\sum_{c} \frac{Re/Insurance\ Premium}{Total\ Cost}\ x\ Unverfied\ Market\ Based\ Reported\ Emissions_c$ *or* $\sum_{c} \frac{Re/Insurance\ Premium}{Total\ Cost}\ x\ Location\ Based\ Reported\ Emissions_c$	Score 2
Option 2a	(Re) insurance Premium	Total Project Cost	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)	$\sum_{c,r} \frac{Insurance\ Premium}{Total\ Cost}\ x\ Energy\ Consumption_c\ x\ Emission\ factor_r$	Score 2
Option 2b	(Re) insurance Premium	Total Project Cost	Primary physical activity data for the company's production (e.g., tons of concrete used)	Emission factors specific to that primary data (e.g., emission factor per ton of concrete)	$\sum_{c,s,r} \frac{Insurance\ Premium}{Total\ Cost}\ x\ Production_c\ x\ Emission\ factor_{s,r}$	Score 3
Option 3a	(Re) insurance Premium	Total Project Cost *or* Average Total Project Cost	Total Project Cost *or* Average Total Project Cost	Construction project average emission intensity per revenue	$\sum_{c} \frac{Insurance\ Premium}{(Average_{s,r})\ Total\ Cost}\ x\ (Average_{s,r})\ Total\ Value\ x\ Emission\ Intensity_c$	Score 4
Option 3b	(Re) insurance Premium	Total Project Cost *or* Average Total Project Cost	Total Project Cost *or* Average Total Project Cost	Customer's emission intensity	$\sum_{c} \frac{Insurance\ Premium}{(Average_{s,r})\ Total\ Cost}\ x\ (Average_{s,r})\ Total\ Value\ x\ Emission\ Intensity_c$	Score 5

[98] Where c= company or asset insured; s=sector of the company insured; r=region(province/state/country). If the data used is not on the same entity level as the insured (e.g., company revenue is used for an insured asset), the data quality score given will be score 5 regardless of the equation used.

Table 9.2-3. Detailed description of the data quality score table for motor vehicle insurance[99]

Option	Description				Data Quality
	Attribution	Highest to lowest		Equations	Highest to lowest
		Vehicle Usage (Fuel Consumption or Distance Driven)	Emission Intensity		
Option 1a	TBD by PCAF	Actual fuel consumption	Emission intensity of the fuel type	$\sum_{v,r} \text{Attribution Factor}_r \text{ x Fuel Consumption}_v \text{ x Emission Intensity}_f$	Score 1
Option 1b		Actual distance travelled	Emission intensity of the actual vehicle or of the vehicle's make & model	$\sum_{v,r} \text{Attribution Factor}_r \text{ x Distance Travelled}_v \text{ x Emission Intensity}_v$	
Option 2a		Estimated distance traveled of an average vehicle type (cars, vans, motorcycles) on the province/state /country		$\sum_{v,vt,r} \text{Attribution Factor}_r \text{ x Distance Travelled}_{vt,r} \text{ x Emission Intensity}_v$	Score 2
Option 2b		Estimated distance traveled of an average vehicle on the for the province/state/country		$\sum_{v,va,r} \text{Attribution Factor}_r \text{ x Distance Travelled}_{va,r} \text{ x Emission Intensity}_v$	Score 3
Option 3a		Estimated distance traveled of an average vehicle on the subcontinent / continent	Emission intensity of an average vehicle type (cars, vans, motorcycles) and/or fuel type (fossil fuel, hybrid, electric)	$\sum_{vt,f,r} \text{Attribution Factor}_r \text{ x Distance Travelled }_{vt,r} \text{ x Emission Intensity}_{vt,f,r}$	Score 4
Option 3b			Emission intensity of an average vehicle	$\sum_{v,va,r} \text{Attribution Factor}_r \text{ x Distance Travelled}_{va,r} \text{ x Emission Intensity}_{va,r}$	Score 5

[99] Where v=actual/insured vehicle; r=region (province/state/country/continent); f=fuel and/or propulsion type (e.g., petrol, HEV, PHEV); vt= vehicle type (e.g., passenger car); va= average vehicle

Table 9.2-4. Detailed description of the data quality score table for treaty commercial lines insurance[100]

Option	Method	Description					Data Quality
		Attribution		Emission Factor		Insurance-associated emissions calculations	Highest to lowest
		Financial Data		Emission Data		Equations	
Option 1	A	Ceded written premium *(CPW)*	Treaty gross written premium *(PW)*	Treaty emissions sourced from client directly		$\sum_r \frac{\text{Ceded written premium}_r}{\text{Gross written premium}_r}\ x\ \text{Portfolio Associated Emissions}_r$	Score 1-4
	B *Cedent*	Ceded written premium *(CPW)*		Treaty gross written premium	Revenue-based economic emission intensity for reinsured portfolio (minimal mismatch)	$\sum_r \text{Ceded written premium}_r\ x\ \text{Emission Intensity}_r$	Score 1-4
	A	Ceded written premium *(CPW)*	Treaty gross written premium *(PW)*	Treaty emissions sourced from client directly (primary insurer weighted average data quality score greater than 4)		$\sum_r \frac{\text{Ceded written premium}_r}{\text{Gross written premium}_r}\ x\ \text{Portfolio Associated Emissions}_r$	Score 4
	B *Cedent*	Ceded written premium *(CPW)*		Treaty gross written premium	Revenue-based economic emission intensity for reinsured portfolio (significant mismatch)	$\sum_r \text{Ceded written premium}_r\ x\ \text{Emission Intensity}_r$	Score 4
Option 3	B *Sector*			Treaty gross written premium	Sector-average revenue-based economic emission intensity applied to reinsured portfolio	$\sum_r \text{Ceded written premium}_r\ x\ \text{Average Emission Intensity}_s$	Score 4
	B *Country*			Treaty gross written premium	Country-average economic activity-based economic emission intensity applied to reinsured portfolio	$\sum_r \text{Ceded written premium}_r\ x\ \text{Average Emission Intensity}_c$	Score 5

[100] Where r=reinsured portfolio; s=sector of the portfolio insured; c=country.

Table 9.2-5. Detailed description of the data quality score table for treaty motor lines insurance[101]

Option	Method	Description					Data Quality
		Attribution		Emission data		Insurance-associated emissions calculations	Highest to lowest
		Financial Data		Vehicle Usage	Emission Intensity	Equations	
Option 1	A	Cession Rate: Ceded written premium/ Gross written premium	Attribution factor for global personal motor portfolios *(6.99)* *or* Regional attribution factor	Total emissions per what is disclosed/shared by the cedent		$\sum_{r} Cession\ Rate_{r} x\ Attribution\ Factor_{c}\ x\ Emissions_{r}$	Score 1-4
Option 3	B			Estimated distance travelled of an average vehicle on the subcontinent / continent	Emission intensity of an average vehicle type (cars, vans, motorcycles) and/or fuel type (fossil fuel, hybrid, electric)	$\sum_{r} Cession\ Rate_{r}\ x\ Attribution\ Factor_{c}\ x\ Distance\ Travelled_{va,c}\ x\ \ Emission\ Intenisty_{vt,f,c}$	Score 4
					Emission intensity of an average vehicle	$\sum_{r} Cession\ Rate_{r}\ x\ Attribution\ Factor_{c}\ x\ Distance\ Travelled_{va,c}\ x\ \ Emission\ Intenisty_{va,c}$	Score 4
				Total GHG emissions in Motor industry x (number of cars insured / total number of cars in the country)		$\sum_{r} Cession\ Rate_{r}\ x\ Attribution\ Factor_{c}\ x\ (Emissions\ Motor\ Industry_{c}\ x\ \frac{Vehicles_{r}}{Total\ vehicles_{c}}$	Score 5

[101] Where r=reinsured portfolio; c=region (country/sub-continent/continent); f=fuel and/or propulsion type (e.g., petrol, HEV, PHEV); vt=vehicle type (e.g., passenger car);

9.3 Sample table templates displaying reported emissions for a given fiscal year

Table 9.3-1. Example reporting of Insurance-Associated Emissions Note 1

Activity	Total Gross Written Premium (x € 1,000)	Scope 1 + Scope 2 emissions (tCO_2e) Absolute	Scope 3 emissions (tCO_2e) Absolute Note 4	Emission intensity (e.g., weighted average carbon intensity (WACI) - tCO2e/€M of (re)insured's revenue)	Relative insurance-associated emission (tCO_2e/€M per GWP) Note 5	Weighted data quality score (High Quality = 1 Low Quality = 5)
Emissions per line of business (if reporting by LoB) Note 2						
Property						
Sector 1, e.g., Oil & Gas						
Sector 2, e.g., Power & Utilities						
Sector 3 e.g., Mining						
...						
Liability						
Product 1, e.g., General Liability						
Product 2, e.g., Directors & Officers						
Product 3, e.g., Product Liability						
...						
Total						
Emissions per sector (if reporting by sector) Note 3						
Aluminum						
Apparel and footwear						
Aviation						
Buildings						
Chemicals						
Cement						
Financial Institutions						
Forest, Land and Agriculture						
Information and Communication Technology						
Oil and Gas						
Power						
Steel						
Transport						
[Others]						
Total						

Note 1: Insurance-associated emissions are reported as a sub-category of the GHG Protocol scope 3 category 15 (Investments). They are distinct and different from financed emissions. Insurance-associated emissions and financed emissions shall not be aggregated. The insurance-associated emissions would be a supplementary accounting note to scope 3 category 15 (Investments).

Note 2: Where (re)insurers report by line of business, they should align their disclosures on insurance-associated emissions to the financial accounting regime(s) that is/are applicable to them, for consistency.

Note 3: The sectors above correlate with those sectors adopted by the Science Based Targets initiative (SBTi). The list of sectors is not intended to be restrictive, and may change over time. Where a (re)insurer chooses to adopt different sector groupings for the purposes of their reporting that diverge from the SBTi sectors, it is recommended that the (re)insurer provides definitions that will allow users of the report to understand the sector compositions.

Note 4: For integrating clients' scope 3 emissions, PCAF acknowledges that, to date, the comparability, coverage, transparency, and reliability of clients' scope 3 data still varies greatly per sector and data source. By supporting the disclosure of client scope 3 reporting over time, PCAF seeks to make scope 3 emissions reporting more common by improving data availability and quality.

To avoid double counting, the insurance-associated emissions relating to client scope 1 and 2 emissions shall be reported separately from the clients' scope 3 emissions; where the data allows for an accurate and fair account of insurance-associated emissions over time.

Note 5: Policies in force can be used in place of gross written premium in the calculation of relative insurance-associated emissions and the unit would therefore reflect appropriately.

Table 9.3-2. Example reporting of insurance-associated emissions (scope 1 and 2) as an intensity metric for the current year as against the baseline year

	Baseline Year Emissions / [Denominator] (i.e., tCO_2e / £m)	Current Year Emissions / [Denominator] (i.e., tCO_2e / £m)	% Change in relative emissions between the Baseline Year and Current Year (± %)
[Line of Business]			
[Sector]			
[Total]			

9.4 Guiding principles for developing the GHG accounting methodology for (re)insurance underwriting

Box 9.4-1. Guiding principles for developing the GHG accounting methodology for (re)insurance underwriting

- **Robustness and high level of independence:**
  - The GHG accounting methodology should be as robust and agnostic as possible of any other changes not being associated with changes in actual emissions and (re)insurance structure. This helps to fairly apply measurements and limit/avoid volatility on the outcomes. The methodology should avoid randomness and arbitrage, whenever possible.

- **Proportionality:**
  Assuming all other relevant (insurance-related) parameters are equal.
  "Insurance-associated emissions" versus "actual emissions" of different insurance clients:
  - The calculation method of insurance-associated emissions based on actual emissions of one insurance client should be consistently applied across a portfolio segment. This follows the logic of high "actual emissions" leading to high insurance-associated emissions.

  Changes of insurance-associated emissions versus changes of "actual emissions":
  - Changes of insurance-associated emissions should proportionally reflect the changes in actual emissions of an insurance client. I.e., if the actual emissions are reduced by x%, the insurance-associated emissions should be reduced by the same percentage.
  - The extent of an insurer's level of involvement should be adequately reflected in the resulting insurance-associated emissions. I.e., a 20% insurance participation should double the insurance-associated emissions relative to a 10% share of the same insurance client.

- **Comparability:**
  - Between (i) insurance clients within a portfolio; (ii) insurance portfolios within a company; (iii) companies of a same group; and (iv) independent companies based on publicly available information: Given similar actual original emissions and at the same time assuming similar insurance coverages, the GHG accounting methodology should lead to similar insurance-associated emissions. Details regarding the application to different lines of business need to be further discussed. Due to diverse business models, care should be given when making a peer-to-peer comparison of insurance-associated emissions.
  - Over time and between the periods being reported, i.e., once the reporting standards have been established, insurance-associated emissions output should be comparable over time if improved or changing underlying data does not distort such an effort.

- **Feasibility and reasonableness:**
  - Simplicity: The GHG accounting methodology should be simple enough to be manageable and at the same time precise and technically sound enough to provide accurate output over time.

  - Communicable: It shall be as understandable as possible to serve as a basis for engagement with clients and internal stakeholders and to avoid misperception by external stakeholders and the public.
  - Data availability: GHG accounting methodologies shall take into consideration data limitations (including the lack of availability of emissions data) and data dependencies (including the costs associated with obtaining third party data). For such cases where the required data is not readily available and cannot be obtained with reasonable effort, a feasible fallback calculation methodology should be allowed to be used.

- **Materiality:**
  - As a starting point, it is proposed that the accounting methodology should be applied to the most significant emissions per sector in the (re)insurer's portfolio. Further guidance on how this principle is to be interpreted is under development.

9.5 Commercial insurance – Template to capture attribution data at the source

The template is intended to support customer engagement on disclosure, to enhance capture of the most accurate and timely data, to reduce the risk of attributing emissions inappropriately and reduce the need to rely on proxies and estimates (e.g., sector or country intensity data). Today, the required data is not seldom routinely captured (revenue) or availability is still limited (e.g., emissions data). The template is therefore encouraged to be used at the point of underwriting to help procure the data components needed.

The template does not include proxies that would be required from insureds in case actual data points for the insured are not available. Based on the actual data provided by customers as well as other data sources, each insurer will use calculations, approximations and estimation methodologies that could lead to different values of the data points required to calculate insurance-associated emissions (and different data quality scores).

A similar template for motor personal lines has not yet been created, due to the assumption that some key attribution data requirements are publicly available and/or already captured, for example as part of routine submissions.

Company name*	Name of the company/asset
Level of reporting*	Group level, subsidiary level, asset level
Reporting year*	Year the data refers to (all data needs to be from same reporting year)
Scope 1 absolute emissions*	In tonnes, based on reported figures
Scope 2 absolute emissions*	See Scope 1
Scope 3 absolute emissions by category	See Scope 1, shall be requested if material
Revenue*	In millions
Currency*	ISO code
Is absolute emissions data Third party verified?*	Yes/No

** Mandatory field*

9.6 Sample classifications for vehicle types in the EU and US

EU CLASSIFICATION OF VEHICLE TYPES / EUROPEAN ALTERNATIVE FUELS OBSERVATORY (EUROPA.EU)

Table 9.6-1. Guiding principles for developing the GHG accounting methodology for (re)insurance underwriting

Category	Examples / Common Name	Definition	Wave 1 Scope proposal
Category M		Motor vehicles having at least four wheels and for the carriage of passengers.	
M1	Cars/ Vans	Vehicles used for the carriage of passengers and comprising not more than eight seats in addition to the driver's seat.	Yes
M2	Minibuses	Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tonnes.	No, since it has >8 seats and is therefore probably used mainly for commercial purposes
Category N		Power-driven vehicles having at least four wheels and for the carriage of goods	
N1	Vans	Vehicles for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes.	Yes
Category L	Mopeds, Motorcycles, Motor Tricycles and Quadricycles	Motor vehicles with less than four wheels and some lightweight four-wheelers.	
L1	Mopeds, Electric bicycle	A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm3 and whatever the means of propulsion a maximum design speed not exceeding 50 km/h.	Yes
L2	Auto Rickshaw	A three-wheeled vehicle of any wheel arrangement with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm3 and whatever the means of propulsion a maximum design speed not exceeding 50 km/h.	Yes
L3	Motorcycles	A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h.	Yes
L4	Motorcycles with sidecar	A vehicle with three wheels asymmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h (motorcycles with sidecars).	Yes

US VEHICLE CLASSIFICATION CODE

https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/13091/002.cfm

9.7 Additional inputs for emissions associated with projects insurance

Table 9.7-2. Emissions considerations

Emissions type	Pros	Cons
Lifetime emissions	• More appropriately reflects emissions for projects that emit less carbon over their entire lifetime e.g., renewable energy power plants. • Could potentially be estimated using a proxy on project value, type, material used, average lifespan. • Aligned with existing project finance PCAF methodology if insurance is considered equivalent to a project sponsor or initial lender	• Unlikely to be readily available from clients/3rd party data providers. • Harder to estimate lifetime emissions (useful life may change, non-energy infrastructure like highways or bridges would be difficult to estimate) • Less comparable with other lines of business, would require reporting the figure separately. • High chance of overlap in emissions with Property line of business • Leads to more complexities when calculating emissions for treaty portfolios that include construction contracts. • Might not be aligned with the insurance period and the insured activities e.g., insurers receive premium only for the construction stage, not the lifetime of the construction
Construction stage	• Emissions may be available from clients. • More comparable with other lines of business, if using annual emissions • Less overlap with property line of business • Depending on policy type aligned with insured risk and policy period. • Could potentially be estimated using a proxy on project value, type, material used. • Could potentially be incentivizing as well if IAE from "transition" related projects are disclosed alongside total IAE. • Aligned with existing project finance PCAF methodology if insurance is not considered equivalent to a project sponsor or initial lender	• Can provide a misleading footprint for projects which may emit more carbon during construction but less over their entire lifetime e.g., hydro dam. • Difficult to find a source for construction emissions if clients are unwilling to share additional data.
Embodied emissions	• Emissions may be available from clients. • More comparable with other lines of business, if using annual emissions • Less overlap with property line of business	• Can provide a misleading footprint for projects which may emit more carbon during construction but less over their entire lifetime e.g., hydro dam. • No consistent methodology to capture this type of emission. • Likely only available for a few large projects

	• Could potentially be estimated using a proxy on project value, type, material used. • Could potentially be incentivizing as well if IAE from "transition" related projects are disclosed alongside total IAE. • May be more representative of the bulk of the emissions associated with construction projects	• Will require large amounts of additional information from customers. • Scope of embodied carbon may differ between different data providers e.g., "cradle-to-gate" vs "up-front carbon." • Difficult to find a proxy for embodied emissions if clients are unwilling to share additional data. • Proxies for embodied carbon are available but most require detailed information about materials used that are generally not provided to (re)insurers

DATA CONSIDERATIONS

There was found to be a lack of publicly available or free-to-use data sources for construction projects, with a range of sources and tools considered.

Firstly, annual company emissions were reviewed however whilst standards and data availability are available for larger companies, there is a lack of data for construction projects. Secondly, multilateral banks require the disclosure of annual, on-site, operational emissions albeit only above a given threshold. This is consistent across the IFC, EBRD & the Equator Principles, however the threshold used differs. Additionally, emissions data within underwriting submissions were investigated but not found to be disclosed and rarely available for the projects insured. Another consideration was voluntary emissions disclosure standards, which exist as part of wider sustainability certifications/disclosure standards (i.e. BREEAM), however there is a lack of project-specific reporting requirements by regulators.

The GLOBAL GHG ACCOUNTING & REPORTING Standard

PART C

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