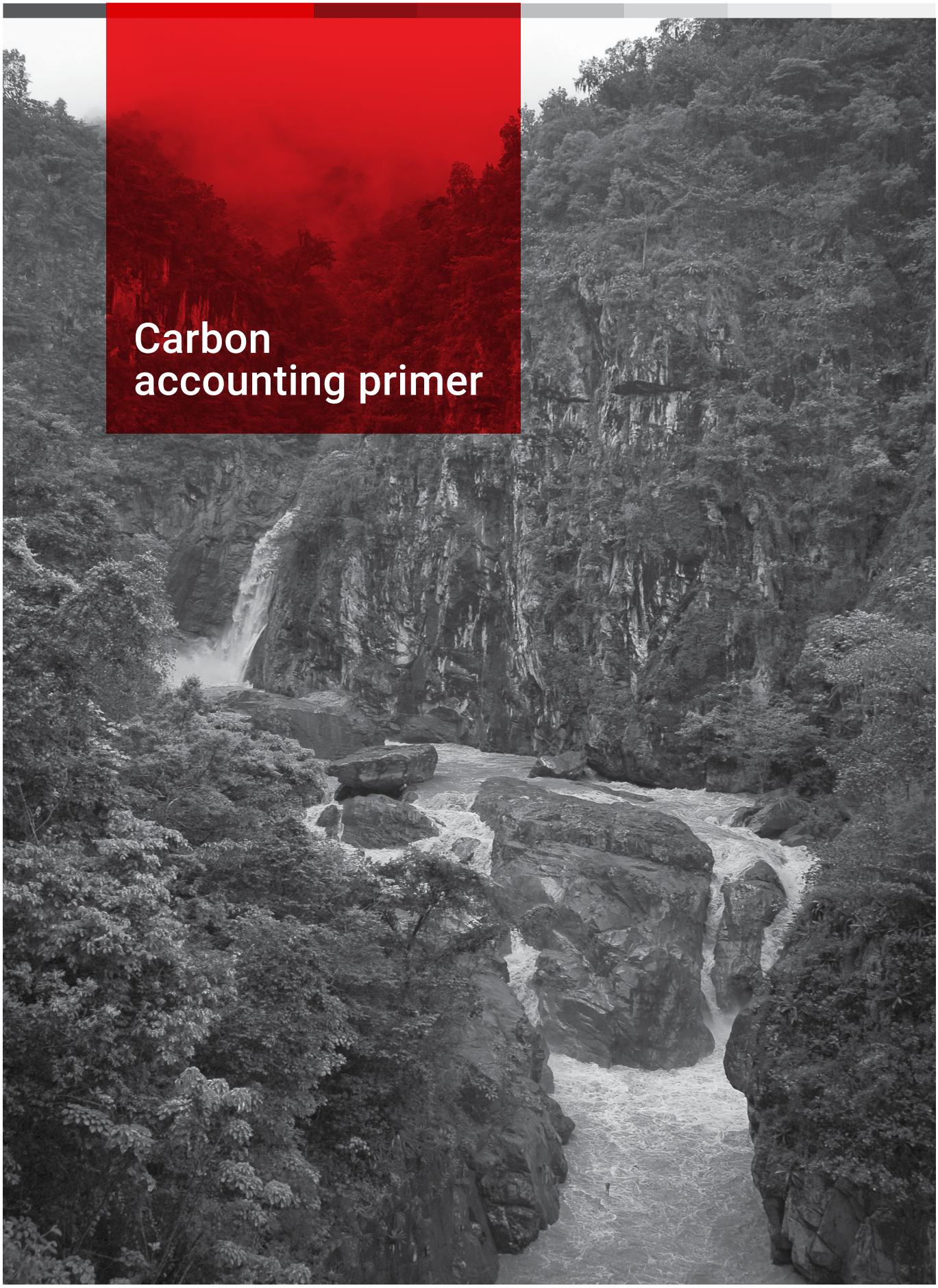
ALLANGRAY

Carbon accounting primer



What is greenhouse gas emissions accounting?

Greenhouse gas (GHG) emissions accounting – or "carbon accounting" – across industries refers to the processes employed to consistently measure the amounts of GHGs generated, avoided, or removed by an entity, allowing it to track and report these emissions over time[1]. GHGs are explained in more detail in **Appendix 1**.

The asset management industry's operational emissions, also known as scope 1 and 2 GHG emissions (see Appendix 1 for an explanation of scopes 1 to 3), are generally low due to the services-based nature of the industry. However, an asset manager's scope 3 emissions include those arising from investments made on behalf of clients, also known as financed emissions, which may be significant.

The Partnership for Carbon Accounting Financials (PCAF) and Task Force on Climate-related Financial Disclosures (TCFD), which we discuss in our Climate initiatives in the financial sector report, provide several recommendations for the measurement of financed emissions. A company's GHG emissions may be "allocated" to an investor based on the level of capital invested in that company, thereby assigning responsibility to the investor for the carbon emissions of their portfolio holdings. Essentially, the higher your percentage holding in the company, the more of its emissions you "own". This is further discussed in sections 1 and 2 that follow. Alternatively, the portfolio's carbon intensity may be calculated based on each constituent company's individual carbon intensity, as well as its materiality to the fund, as explained in section 3.

Below we look at the pros and cons of each methodology and provide case studies to demonstrate some of the challenges and complexities, particularly in terms of setting portfolio decarbonisation targets on this basis.

GHG emissions accounting for asset managers

As of 2023, there are three primary carbon accounting metrics that asset managers use in an attempt to assess portfolio-level climate risk and report to clients. These are:

1. Financed emissions
2. Economic emissions intensity, also known as relative carbon footprint or financed emissions to value invested
3. The weighted-average carbon intensity of the portfolio

Please note that Allan Gray's investment universe is listed equity and debt instruments; therefore, the methodologies detailed refer only to these asset classes. The PCAF provides calculation methodologies for other asset classes as well, such as unlisted equity, project finance and commercial real estate, but these fall outside the scope of this primer.

1. Financed emissions

This metric measures the absolute GHG emissions "owned" or financed by an asset manager, or for specific funds managed by the asset manager. This is achieved by aggregating the attributable GHG emissions of each portfolio constituent.

Financed emissions $= \sum_i \frac{\text{Equity investment in company } i}{\text{Market capitalisation}_i} * Emissions_i$ (equities only)

or

$= \sum_i \frac{\text{Investment in company } i}{EVIC_{i*}} * Emissions_i$ (equities and debt)

Where:

- Equity investment in company *i*: Market value of the investment in company *i*'s listed equity within the portfolio
- Market capitalisation$_i$: Outstanding shares multiplied by the share price of company *i*
- Emissions$_i$: Scope 1 and 2 GHG emissions of company *i* in tonnes of CO_2-equivalent[2]
- Investment in company *i*: Value of the investment in company *i*'s listed equity and corporate bonds within the portfolio, based on the market value of equity and the book value of debt
- EVIC$_i$: Enterprise value including cash of company *i*, i.e. the market capitalisation of ordinary and preferred shares plus the book values of total debt and minorities' interests[3]

1. Definition from the Global GHG Accounting and Reporting Standard for the Financial Industry, as developed by the PCAF.
2. Carbon dioxide equivalent (CO_2e) reflects the number of metric tonnes of CO_2 emissions with the same global warming potential as one metric tonne of another greenhouse gas.
3. In 2019, the EU Technical Expert Group (TEG) on Sustainable Finance recommended the exclusion of cash and cash equivalent deductions from the computation of EV to avoid rare cases of negative EVs, leading to the concept of "enterprise value including cash" (EVIC).

Note the difference in *denominators* in the above formulae. Investee companies' GHGs may be attributed to the asset manager based on equity ownership (top formula) or share of total financing, i.e. including debt (bottom formula). The market capitalisation methodology has historically been used by equity-only portfolios, as opposed to net or gross debt being used as the denominator for fixed income-only portfolios.

The PCAF and more recently the TCFD have recommended that enterprise value (EV) be used for apportioning financed emissions, as this methodology cuts across equity and fixed income holdings for more uniformity across funds.

Table 1: Pros and cons of using financed emissions methodology

Strengths	Weaknesses
It is the most literal of all the carbon metrics and serves as the starting point for the relative carbon footprint calculation, discussed next.	Portfolios cannot be compared on a like-for-like basis because the data are not normalised. Size can skew the results, i.e. bigger and faster growing asset managers will tend to have higher attributable emissions – see **Case study 1**.
It is useful if investors are managing their fund versus a specific absolute carbon budget. This absolute number can be used for carbon offsetting of funds.	Double counting can occur by aggregating the emissions of all portfolio companies[4]. For example, some of a utility company's scope 1 emissions may be another portfolio company's scope 2 (purchased electricity) emissions.
It is a useful metric to check whether portfolio-level decarbonisation targets set using intensity-based metrics are still achieving absolute carbon emission reductions, which is the ultimate goal of the Paris Agreement (an international treaty on climate change).	The ownership perspective historically meant that this was only applicable to equity portfolios, although this was broadened by the PCAF methodology to include corporate fixed income. PCAF has subsequently developed a carbon accounting methodology for sovereign bonds as well.
The metric is additive, thereby allowing for portfolio decomposition and attribution analysis, e.g. one can distinguish key constituent contributors.	
It is consistent with the GHG Protocol.	

Case study 1: Financed emissions for a large and small asset manager

Consider two portfolios in a two-company investment universe. Fund 1 is a larger portfolio than Fund 2, with a portfolio size of US$20bn versus Fund 2's assets under management (AUM) of US$1.5bn. Despite Fund 1 avoiding exposure to high-emitting company B, its portfolio-financed emissions are higher simply due to it owning a much larger position in company A as a result of its greater size. This is a simple example, but it aims to demonstrate that, when viewed in isolation, the financed emissions metric is punitive to larger asset managers and those growing quickly due to inflows or strong performance.

Table 2: Impact of financed emissions metric on larger managers

US$m, unless otherwise stated	Fund 1	Fund 2
Investment in company A	20 000	1 000
EVIC of company A	200 000	200 000
GHG emissions of company A (tCO_2e)	5 000 000	5 000 000
Financed emissions of company A	***500 000***	***25 000***
Investment in company B	-	500
EVIC of company B	50 000	50 000
GHG emissions of company B (tCO_2e)	25 000 000	25 000 000
Financed emissions of company B	-	***250 000***
Portfolio assets under management	20 000	1 500
Portfolio financed emissions (tCO_2e)	***500 000***	***275 000***

4. PCAF's attribution methods aim to minimise double counting. Double counting also does not substantially affect overall portfolio decarbonisation analysis.

2. Economic emissions intensity, also referred to as carbon footprint or financed emissions to value invested

Economic emissions intensity (EEI) calculates an investment portfolio's financed emissions, as above, per US dollar million invested (or using the asset manager's local currency). In doing so, it allows for a like-for-like comparison of portfolios of different sizes.

Economic emissions intensity $= \sum_i \frac{\frac{Investment\ in\ company\ i}{EVIC_i} * Emissions_i}{Portfolio\ value}$

$= \sum_i \frac{Investment\ in\ company\ i}{Portfolio\ value} * \frac{Emissions_i}{EVIC_i}$ (simplified expression)

Where:

- Portfolio value is the total size of the portfolio under consideration

As the PCAF notes, a shortcoming of the EEI metric is that the denominator – portfolio assets under management (AUM) – is influenced by market value fluctuations. In a bull market, where the valuations of most companies increase, all else kept equal (i.e. constituent company GHG emissions and the asset manager's ownership percentage in each), the denominator would increase and the EEI would decrease. This is demonstrated in **Case study 2**. However, this decrease is not driven by GHG reductions from portfolio constituents and therefore complicates efforts to evaluate real-world GHG emissions reductions at a portfolio level over time. The PCAF recommends applying an adjustment factor to the EEI calculation to reduce the impact of annual fluctuations in portfolio AUM. Either the current year or base year (i.e. prior year) may be adjusted by this factor to determine an adjusted carbon footprint. Asset managers that choose to use this adjustment factor are required to report both the unadjusted and adjusted EEI, as well as the adjustment factor used and further explanation of how it was applied. Please refer to the Financed Emissions Standard[5] for further detail.

Case study 2: The impact of a bull market on a portfolio's relative carbon footprint

Despite no change in portfolio holdings' emissions or in the ownership percentage thereof, this fund's EEI declined by 27% due to a general uplift in the market capitalisation of its holdings year-on-year.

Table 3: Relative carbon footprint in a bull market

Company A	2020	2021	% year-on-year
Market capitalisation (US$m)	10 000	20 000	100%
Debt	6 000	6 000	0%
EVIC	16 000	26 000	63%
Ownership % (debt and equity)	10%	10%	0
Investment amount (D)	1 600	2 600	63%
Company emissions (tCO_2e)	30 000 000	30 000 000	0%
Financed/attributable emissions (A)	3 000 000	3 000 000	0%

Company B	2020	2021	% year-on-year
Market capitalisation (US$m)	20 000	24 000	20%
Debt	5 000	5 000	0%
EVIC	25 000	29 000	16%
Ownership % (debt and equity)	5%	5%	0%
Investment amount (E)	1 250	1 450	16%
Company emissions (tCO_2e)	5 000 000	5 000 000	0%
Financed/attributable emissions (B)	250 000	250 000	0%

5. The Global GHG Accounting & Reporting Standard, Part A, Second edition, December 2022.

Case study 2, continued: The impact of a bull market on a portfolio's relative carbon footprint

Table 3, continued: Relative carbon footprint in a bull market

Company C	2020	2021	% year-on-year
Market capitalisation (US$m)	15 000	20 000	33%
Debt	5 000	5 000	0%
EVIC	20 000	25 000	25%
Ownership % (debt and equity)	5%	5%	0%
Investment amount (F)	1 000	1 250	25%
Company emissions (tCO_2e)	2 000 000	2 000 000	0%
Financed/attributable emissions (C)	100 000	100 000	0%
Portfolio financed emissions (A+B+C)	3 350 000	3 350 000	0%
Portfolio AUM (D+E+F)	3 850	5 300	38%
Economic emission intensity (emissions/AUM)	870	632	-27%

Currently, equity-only portfolios may be using market capitalisation as the denominator for their attributable financed emissions calculation, while multi-asset funds use EVIC. This would lead to differing results and an inability to compare funds more broadly, as **Case study 3** demonstrates.

Case study 3: Using market capitalisation versus EVIC as a denominator for financed emissions calculations

The investment portfolio holds a position in Company X and Company Y. When using market capitalisation as a denominator, the relative carbon footprint is higher given that market capitalisation is a smaller denominator than EVIC. It is therefore important to assess all variables when comparing portfolios.

Table 4: Portfolio relative carbon footprint using different denominators

	Company X	Company Y	Portfolio
Market capitalisation (US$m)	10 000	15 000	
Debt (US$m)	3 000	7 000	
EVIC (US$m)	13 000	22 000	
% of equity outstanding (A)	5%	1%	
Investment amount outstanding (US$m)	500	150	
% of EVIC outstanding derived (B)	3.8%	0.7%	
Company emissions (tCO_2e) (C)	4 000 000	20 000 000	
Financed emissions using market cap denominator (A x C)	**200 000**	**136 364**	**336 364**
Financed emissions using EVIC denominator (B x C)	**153 846**	**136 364**	**290 210**
Portfolio AUM (US$m)			650
Carbon footprint using market cap denominator			517
Carbon footprint using EVIC denominator			446

Table 5: Pros and cons of using relative carbon footprint for apportioning financed emissions

Strengths	Weaknesses
Normalises total carbon emissions attributable to a fund so that funds of different sizes may be compared.	Use of portfolio AUM in the denominator means that this method is sensitive to changes in market capitalisation, making year-on-year comparison difficult.
Allows for decomposition and attribution analysis.	Changes in EVIC (for example, the investee company issues more debt) would affect emission trend analysis.
Attributing responsibility for emissions on an ownership basis is intuitive.	Globally, asset managers use different currencies for this calculation. Different denominators for portfolio AUM hinder comparability.

3. Weighted-average carbon intensity

The weighted average carbon intensity (WACI) methodology was recommended by the TCFD in 2017. It can be thought of as an efficiency measure, i.e. how efficient the fund is in terms of GHG emissions per US$ million of revenue (or other currency) generated by the fund's constituent holdings.

$$\text{Weighted-average carbon intensity} = \sum_i \frac{Investment\ in\ company\ i}{Portfolio\ value} * \frac{Emissions_i}{Revenue_i}$$

Where:

- $Revenue_i$ refers to the revenue in millions generated by company *i* expressed in US$ (or another currency, at the manager's discretion)

At a sector or company level, efficiency is best measured by relevant output metrics in the denominator, such as per tonne of commodity produced or per megawatt hour of power generated, which is also referred to as the physical emissions intensity. However, at an investment portfolio level, the revenue metric is the best available measure of output for comparison across all industries. It attempts to adjust for company size and measure the carbon efficiency of output.

Table 6: Pros and cons of using the weighted average carbon intensity methodology

Strengths	Weaknesses
Revenues can be considered a proxy for production and indicate how operationally efficient investee companies are in terms of CO_2 emitted per unit of "output", i.e. sales.	Can be distorted by outliers; for example, Glencore is unique versus diversified miner peers in that it also has a high revenue-low margin trading segment. This large revenue in the denominator makes it appear much less carbon-intensive than mining peers.
Allows for comparison of funds of different sizes.	One needs to adjust for inflation and exchange rate movements in revenue so they do not distort year-on-year GHG emissions performance analysis.
Applicable across asset classes.	The revenue denominator makes it a favourable metric for companies with higher pricing levels than peers.
Not sensitive to share price movements, as it is not based on equity or total ownership.	The revenue denominator is subject to big swings for commodity-based companies, which affects year-on-year comparisons (see **Case study 4**).
Simple to understand and allows for portfolio decomposition and attribution analysis, i.e. determining the largest contributors to portfolio carbon intensity.	Despite being sector-agnostic, it is most useful for comparisons within industries given the vastly different revenue and GHG emissions profile of different sectors.
While it is sector-agnostic, it is useful for comparing companies within sectors.	

Case study 4: The impact of revenue increases on WACI

The figures in **Table 7** are based on a commodity producer in our clients' portfolios. The company's carbon intensity declined 57% in two years while GHG emissions stayed roughly flat, simply because of a boost to revenue as its commodity basket price surged over this period.

This complicates any trend analysis, as well as the conclusions that may be drawn. For example, intensity could decline by a significant percentage to 2030 because of revenue growth, while absolute emissions have not gone down over the same period. The WACI is therefore not necessarily a measure of environmental performance, as it is sensitive to non-emissions-related variables.

Adjustment factors have been recommended; for example, to account for the impact of inflation on revenue, as well as foreign exchange impacts year-on-year in relation to multinational companies. While this helps to smooth the results so that they become more meaningful, it is time-consuming and may deflect attention from real-world outcomes.

Globally, asset managers often use specialist third-party ESG data and rating providers' systems for their carbon accounting calculations, because of the complexities involved in and resource intensity of performing the calculations inhouse. This comes at a high cost for South African asset managers.

Table 7: WACI sensitivity to annual changes in revenue

	2019	2020	2021
Revenue US$m (A)	5 053	7 789	11 659
GHG emissions tCO_2e (B)	7 407 000	6 695 000	7 302 000
Carbon intensity (B/A)	1 466	860	626

Table 8: Summary of key carbon metrics

Name	Unit	Type	Methodology	Formula	Objective	Introduced by
Financed emissions	tCO_2e	Absolute (EVIC based)	Attributable GHG emissions (on an ownership basis)	$\sum_i \frac{Investment\ in\ company\ i}{EVIC_i} * Emissions_i$ or market cap as denominator for equities	Track emissions over time and set absolute baseline for GHG reduction	PCAF
Economic emissions intensity	tCO_2e / US$m invested	Intensity (EVIC based)	Attributable GHG emissions (on an ownership basis) per $m invested	$\sum_i \frac{\frac{Investment\ in\ company\ i}{EVIC_i} * Emissions_i}{Portfolio\ value}$	Compare portfolios of different sizes while permitting company-level attribution analysis	PCAF
Weighted-average carbon intensity	tCO_2e / US$m revenue	Intensity (revenue based)	Weighted average of portfolio constituents' carbon intensities	$\sum_i \frac{Investment\ in\ company\ i}{Portfolio\ value} * \frac{Emissions_i}{Revenue_i}$	Assess portfolio exposure to carbon-intensive companies	TCFD

Conclusion

Carbon metrics can be a useful tool for asset managers to identify and monitor carbon exposures and related risks in their clients' portfolios and to report to clients on carbon exposure in a more consistent way. However, there are complexities to be aware of, some of which are summarised below.

Complexities of carbon accounting metrics

- Globally, asset managers use different currencies for their portfolio assets under management (AUM) and revenue denominator used in the WACI calculation. This affects comparability across regions and global funds.
- A portfolio's carbon footprint fluctuates with changes in investee company EVICs. PCAF recommends an adjustment for these fluctuations, as discussed earlier.
- WACI calculations may be affected by fluctuations in exchange rates in terms of revenue calculations year-on-year, as well as differing rates of inflation for differing regions, which affects comparability.
- All metrics are backward-looking, so it is important that they are considered together with the climate trajectory of large portfolio emitters.
- Many underlying companies are still refining their methodologies for GHG emission measurement and reporting. We have detected multiple restatements and, in some cases, errors, within the reporting of investee companies. We have therefore also engaged with companies on climate-related disclosures.
- There is often a time lag between the financial metrics used (current market capitalisation and latest reported book value of debt) and GHG emissions reporting, which typically relates to the prior year.

As we have highlighted, it is important to bear in mind that a decline (or rise) in portfolio-level carbon metrics is not a proxy for real world outcomes. Apart from the non-climate related fluctuations that may lead to portfolio-level carbon fluctuations year-on-year, an asset manager can simply divest from material emitters to reduce the portfolio-level carbon intensity or carbon footprint. This achieves no real-world reduction in GHG emissions.

In addition, some of the largest climate-related risks to portfolio constituents are not captured in their carbon metrics. For example, while platinum group metal (PGM) miners face carbon tax risks on their GHG emissions, the key climate-related risk to PGM companies is the global transition to electric vehicles, for which PGMs are not needed. In other words, the primary risk does not emanate from their emissions at all.

We prefer to focus on real-world outcomes, which is why we prioritise qualitative engagements with companies on their climate-related strategies and risks, as well as monitoring of their related qualitative and quantitative disclosures on an annual basis.

Given the limitations of each carbon metric when viewed in isolation, we believe the pragmatic approach is to incorporate multiple carbon metrics as additional data points within our broader climate-related risk assessment. We have reported on our carbon metric calculations since 2019, while improving our methodology and scope year-on-year.

In 2023, we published our first standalone Carbon accounting report for the 2022 calendar year.

Appendix 1: What are scope 1, 2 and 3 greenhouse gas emissions?

Greenhouse gases (GHGs) are gases that absorb the sun's heat radiating from the earth's surface and trap it in the atmosphere. This creates a greenhouse effect and warms the earth. Many GHGs occur naturally in the atmosphere, but human activity has contributed to their accumulation.

There are seven main categories of GHGs. Carbon dioxide (CO_2) is the primary category, accounting for roughly 80% of GHG emissions globally, while methane (CH_4) is the second largest. The others are nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). Because CO_2 is by far the largest GHG category, the other GHGs are generally converted to and measured on a CO_2-equivalent basis.

The Greenhouse Gas Protocol of 2001 created GHG emission categories – referred to as "scopes" – to provide a global framework for measuring and managing GHG emissions for all industries. These are:

- **Scope 1:** Direct GHG emissions that occur from sources owned or controlled by the reporting company, including fuel combustion in on-site boilers or furnaces and company vehicles.
- **Scope 2:** Indirect GHG emissions that result from consuming purchased or acquired electricity, heat or steam. These emissions are generated offsite.
- **Scope 3:** All other indirect GHG emissions not included in scope 2. Also known as "value chain emissions", these can be divided into upstream and downstream emissions. The GHG Protocol lists 15 categories as falling within scope 3 (see **Table 9**), which often represent the bulk of GHG emissions generated by a company.

Upstream emissions are lifecycle emissions relating to the goods that a company purchases or services it uses, such as the extraction and production of purchased materials, as well as transport in vehicles not owned or controlled by the reporting company. Downstream emissions mainly include emissions arising from the distribution, storage, use and end-of life treatment of the reporting company's products or services. For example, the use of products is a particularly high source for the energy sector.

Table 9: Greenhouse gas emissions by scope

<table>
<tr><th>Scope 1</th><th>Scope 2</th><th colspan="2">Scope 3</th><th colspan="2">Scope 3</th></tr>
<tr><td>Reporting company (direct emissions)</td><td colspan="3">Upstream activities (indirect emissions)</td><td colspan="2">Downstream activities (indirect emissions)</td></tr>
<tr><td rowspan="4">Company assets (facilities, vehicles etc)</td><td rowspan="4">Purchased energy (electricity, steam, heating & cooling)</td><td>Purchased goods and services</td><td>Fuel & energy related activities not in scope 1 or 2</td><td>Transportation & distribution</td><td>Use of sold products</td></tr>
<tr><td>Waste from operations</td><td>Employee commuting</td><td>Leased assets</td><td>Investments</td></tr>
<tr><td>Capital goods</td><td>Transportation & distribution</td><td>Processing of sold products</td><td>End-of-life treatment of sold products</td></tr>
<tr><td>Business travel</td><td>Leased assets</td><td colspan="2">Franchises</td></tr>
</table>

Source: JP Morgan, "Understanding carbon exposure metrics", November 2021; based on the GHG Protocol Corporate Accounting and Reporting Standard.

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