PCAF Report 2023

Report on Financed Carbon Emissions in Aareal Bank's Commercial Real Estate Financing Portfolio

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PCAF Report 2023

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1 Introduction

Aareal Bank recognises that it has a significant responsibility in its role as a provider of finance for commercial property, given the importance of the commercial real estate sector to meeting the climate action goals set out in the Paris Agreement. This is why the Bank has voluntarily signed the Partnership for Carbon Accounting Financials (PCAF) Commitment Letter, undertaking to create transparency about the financed carbon emissions in its commercial real estate financing portfolio by the end of 2024. By publishing this report, Aareal Bank has achieved the goal it set itself in 2021 of issuing a first comprehensive report in accordance with the PCAF standard within a three-year period.

Standardised methodologies for calculating and reporting carbon emissions enable financial institutions to better understand, and then efficiently manage, the environmental impacts of their credit portfolios. Not only does this promote the transparency and comparability of climate-related data, it also helps to meet global climate goals and to achieve the transformation to a low-carbon economy.

The PCAF standard used in this report, "Global GHG Accounting and Reporting Standard Part A – Financed Emissions", has developed into a global accounting and reporting framework for greenhouse gas emissions in the financial sector. It contains requirements and recommendations for measuring financed carbon emissions in a total of seven asset classes, including the commercial real estate sector, which is particularly relevant to Aareal Bank.[1)] This has created an accounting methodology for greenhouse gas emissions that enables globally uniform, consistent measurement and reporting of greenhouse gas emissions relating to financial transactions. For Aareal Bank, the transparency this has created serves as the basis for developing a long-term decarbonisation plan for those carbon emissions that it can influence indirectly through its financing activities.

2 Methodology

The methodological principles and data foundations used in preparing the report were developed in financial years 2023 and 2024 as part of an internal project involving both internal and external stakeholder groups, with the goal of creating transparency for Aareal Bank's commercial real estate financing portfolio.

Aareal Bank has already been working together closely with its clients for several years as part of its green finance activities to gather structured ESG-related data on financed properties. This information is subjected to an organised quality assurance process and is regularly recorded in the Bank's internal IT systems. It includes both general building features such as the building type, location, year of construction and floor area, and energy-related information such as energy values, EPC (energy performance certificate) labels, the year in which energy efficiency improvements were made and green building certificates. The global focus of Aareal Bank's commercial real estate financing portfolio and the variety of international standards mean that the structure and scope of data sources and evidence are heterogeneous in some cases; as a result, it is not always possible to document or compare carbon emissions directly.

For this reason, Aareal Bank has worked together with external property and data specialists to develop a calculation model that aims to use the available data to produce a robust, maximally comparable calculation of the carbon footprint of the buildings in the Bank's commercial real estate financing portfolio. This is closely aligned with the PCAF "standard", which has been reviewed by the GHG Protocol and is in conformance with the GHG Protocol's requirements set forth in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard for Category 15 investment activities.

This calculation model enabled the available building-specific inputs to be rounded out – when combined with a range of additional, internationally recognised databases – and used together with science-based models to calculate the carbon emissions. Suitable databases and sources such as the PCAF European building emission factor database and the US Building Performance Database (BPD)

[1)] PCAF (2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second Edition. December 2022, p. 89 et seqq.

were used in all cases. The databases used contain a variety of information relating to operational carbon emissions for buildings with different types of use in both the non-residential and residential categories. These are broken down by country, region and building type, among other things.

Different emission factors are included in the calculations, depending on the scope and the degree of detail of the specific property details available (floor area, energy efficiency, energy requirements/energy consumption). The better the quality of the available inputs, the greater the accuracy of the carbon emissions calculation. This is why the best possible available input data is always used in the calculations.

The PCAF standard sets out a five-stage scale for assessing and improving the objective comparability of the data quality of calculated carbon emissions. A carbon dataset is calculated for each financed building together with a PCAF data quality score. Each carbon dataset calculated in this way is assigned a data quality score that can range from 1 (the best possible quality of the data foundation) to 5 (the lowest quality of the data foundation).

Table 1: Overview of the fundamentals of the PCAF data quality score[2)]

Available data	Calculation	Data quality score (1–5)
Carbon emissions for building in t/m²	The energy consumption for the building is calculated using the specific carbon emission factors supplied by the power company (electricity, heating, etc.).	1
Energy consumption for the building in MWh/m²	The energy consumption for the building is multiplied by the country-specific and use-specific carbon emission factors.	2
Building area in m² + EPC or comparable energy-related information	EPC-specific carbon emission factors (broken down by the country and the type of use) are multiplied by the building area.	3
Building area in m²	Average carbon emission factors per country and type of use are multiplied by the building area.	4
Number of buildings	The energy consumption estimated using the building type and location-specific statistical data is multiplied by the average emission factors per country and type of use for the entire building.	5

The following figure shows an example of the different differentiation options when selecting suitable carbon emission factors at different levels using the PCAF European building emission factor database.

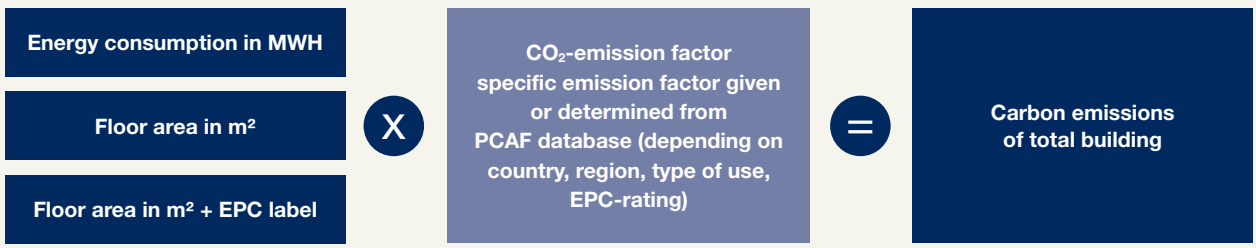


Figure 1: Illustration of methodological approach for calculating carbon footprint according to PCAF

[2)] Own presentation in accordance with the PCAF European building emission factor database methodology, September 2023, p. 6

The carbon emissions for the building are determined by calculating them. After that, the financed emissions are determined using the allocation procedure shown below:

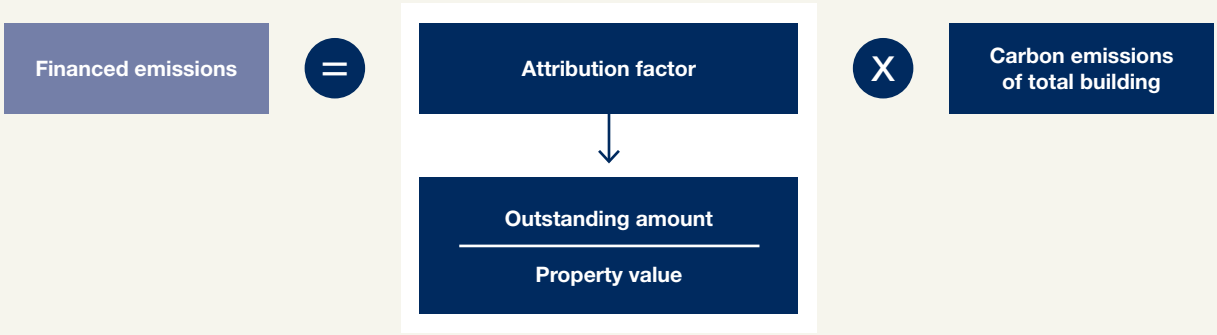


Figure 2: Illustration of the PCAF approach for calculating the financed emissions[3)]

Financed emissions are calculated using the building's annual carbon emissions, based on the ratio between the outstanding amount of the loan and the value of the property at the time the loan was originated. This is done by multiplying the building's carbon emissions by its attribution factor. The attribution factor for each building is produced by dividing the outstanding amount of the loan ("outstanding amount") in the numerator by the value of the property at the time the loan was originated ("property value at origination") in the denominator.

The PCAF standard enables the financed emissions to be assigned to different financing types and sources ("PCAF financing type & source"), with the following being used for Aareal Bank's loan portfolio:

- **PCAF: "Corporate finance" | Loans (debt) | Real Estate → Real estate Commercial real estate**
- **PCAF: "Consumer finance" | Loans (debt) | Real Estate → Real estate mortgages**

PCAF Commercial Real Estate (CRE):
If the property value cannot be determined at the time the loan is originated, financial institutions use the last available property value and predefine this value for the following years in which carbon accounting is performed, i.e. the denominator remains constant from the first year of carbon accounting onwards. If a CRE loan is modified (e.g. if the loan amount is increased, rolled over, refinanced or extended) and if a new property value is determined in the course of the transaction, the property value on origination must be updated to reflect the property value at the time of the change.[4)]

PCAF Mortgages:
When calculating the financed emissions, the annual emissions for a building are attributed to the financial institution using a loan to value ratio. In other words, the amount attributed corresponds to the ratio between the outstanding loan amount at the time of carbon accounting and the property value at origination. If the property value at origination cannot be determined, financial institutions use the last available property value and predefine this value for the following years in which carbon accounting is performed, i. e. the denominator remains constant. The attribution approach assumes the residential property owner also acquires pro rata ownership of the building's carbon emissions.[5)]

[3)] PCAF (2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second Edition. December 2022, p. 40.
[4)] The Global GHG Accounting and Reporting Standard Part A: Financed Emissions., December 2022, p. 89
[5)] PCAF Financed Emissions. The global GHG Accounting & Reporting Standard Part A, Dezember 2022, S. 96

3 Report on PCAF results for the commercial real estate financing portfolio

As at the 31 December 2023 reporting date, Aareal Bank's commercial real estate financing portfolio contained a total of 1,752 properties and borrowings of approximately € 32 billion for the purposes of the PCAF Report.[6] The list covered residential and non-residential buildings in more than 20 countries.

The PCAF data quality scores were assigned in collaboration with external property and data specialists in line with the methodological principles defined in the PCAF. Aareal Bank passed on all datasets calculated to a team of experts at external service provider **Drees & Sommer,** where they were subjected to further assessment and analysis.

According to the calculations made in line with the PCAF standard, Aareal Bank's commercial real estate financing portfolio as at the 31 December 2023 reporting date contributes **639,681 tonnes of CO_2e emissions per annum,** based on Aareal Bank's share of the finance provided. The average **PCAF data quality score** when all properties in the portfolio are weighted equally was **3.2.** No distinctions by loan volumes or floor area were made when calculating the value.

3.1 Breakdown of results by geography and type of use

The breakdown of the calculation results for financed emissions by country and types of use permits the following core statements to be made, among others:

In terms of geography, the largest proportions of financed carbon emissions, based on an independent examination of the PCAF data quality scores, are to be found in the following markets: USA (approx. 28 %, data quality score: 4.0), Poland (approx. 23 %, data quality score: 3.2) and the United Kingdom (approx. 10 %, data quality score: 3.2).

In terms of the types of use with the largest absolute proportion of financed emissions in Aareal Bank's loan portfolio, approx. 30 % of total financed carbon emissions are attributable to logistics properties (data quality score: 3.2), 29 % to hotels (data quality score: 3.6) and 19 % to retail properties (data quality score: 3.5).

Expanding the analysis to include the carbon intensity per € million loan amount shows that this is approx. 19.9 tCO_2e/€ million (score: 3.2) for the commercial real estate financing portfolio as a whole. It is above average for the portfolio as a whole in the areas of logistics (41.3 tCO_2e/€ million, score: 3.2) and retail (28.2 tCO_2/€ million, score: 3.5) due to the comparatively higher space intensity per € million loan volume. In contrast, the carbon intensity per € million loan amount is below average in the office (11.6 tCO_2e/€ million, score: 3.3) and hotel (15.3 tCO_2e/€ million, score: 3.6) property classes due to the comparatively low space intensity there.

The following graphics/tables provide a detailed overview of the breakdown of total financed carbon emissions per geography and property class, of carbon intensities per € million and of the associated PCAF data quality scores.

[6] In individual cases, properties were not included in the list, e. g. if no information was available about them and they could not be fitted into the logical structure of the PCAF.

Percentage breakdown of financed emissions (tCO_2e/year) by property type of total financed emissions

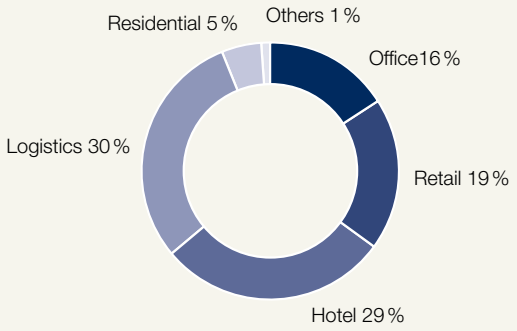


Figure 3: Percentage breakdown of financed emissions by property type

Emissions intensity by property type (tCO_2e/€ mn)

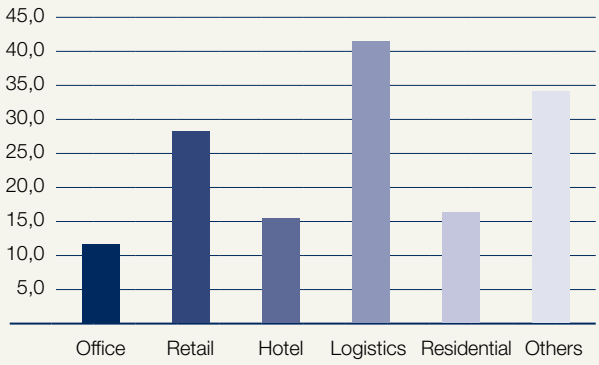


Figure 4: Emissions intensity in tonnes CO_2e/€ mn by property type

Table 2: Financed carbon emissions and PCAF data quality scores by property type

Overview by property type	Financed volume	Number of properties	Financed carbon-emissions absolute	Carbon-intensity	PCAF Data Quality Score
	€ mn		tCO_2e/a	tCO_2e/E mn	1-5
Aareal Bank AG	**32,194**	**1,752**	**639,681**	**19.9**	**3.2**
Office	9,126	175	106,222	11.6	3.3
Retail	4,306	243	121,349	28.2	3.5
Hotel	12,024	277	183,376	15.3	3.6
Logistics	4,650	361	191,874	41.3	3.2
Residential	1,929	680	31,468	16.3	2.9
Others	158	16	5,391	34.0	3.9

Breakdown of carbon intensity by countries (in tCO_2e/€ mn)

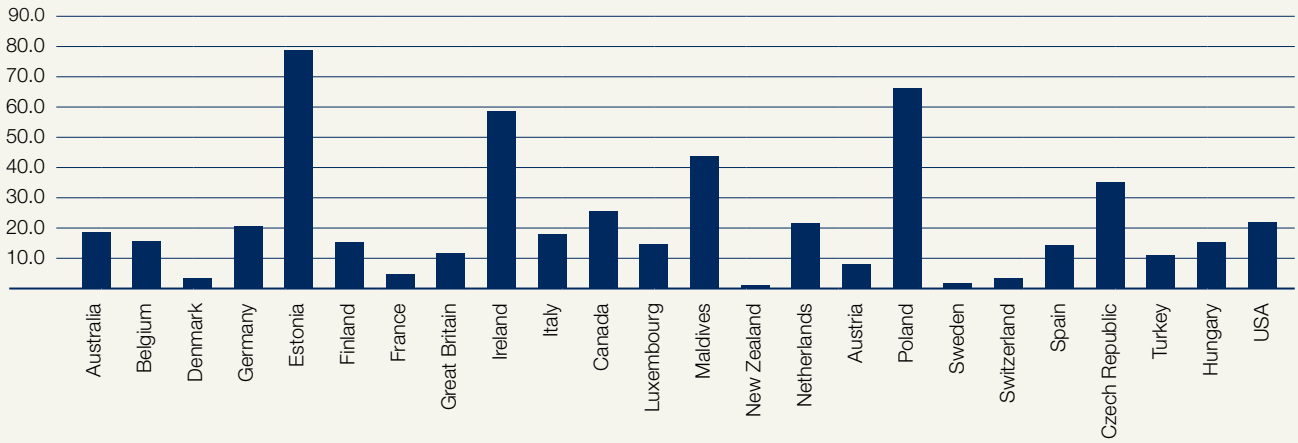


Figure 5: Carbon intensity in tonnes CO_2e/€ mn by countries

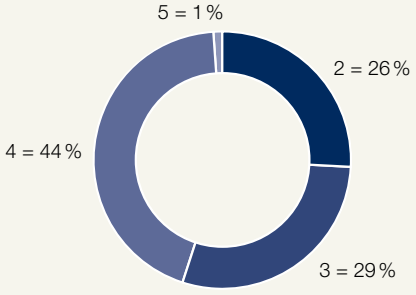
Table 3: Financed carbon emissions and PCAF data quality scores by countries

Country	Financed volume	Number of properties	Financed carbon emissions absolute	Carbon-intensity	PCAF Data Quality Score (weighted by property)
	€ mn		tCO_2e/a	tCO_2e/€ mn	1-5
Aareal Bank AG	**32,194**	**1,752**	**639,681**	**19.9**	**3.2**
Australia	1,059	60	19,634	18.5	3.9
Belgium	547	18	8,499	15.5	3.6
Denmark	263	4	875	3.3	2.8
Germany	2,213	765	44,999	20.3	2.9
Estonia	42	1	3,331	78.6	4.0
Finland	510	78	7,768	15.2	3.8
France	3,234	122	13,894	4.3	3.1
Great Britain	5,292	149	60,930	11.5	3.2
Ireland	59	1	3,473	58.4	3.0
Italy	897	63	15,823	17.6	3.4
Canada	1,258	26	31,873	25.3	4.0
Luxembourg	130	7	1,881	14.5	2.6
Maldives	484	10	20,980	43.4	4.0
New Zealand	32	1	23	0.7	5.0
Netherlands	1,841	87	39,116	21.2	3.4
Austria	349	9	2,774	7.9	3.3
Poland	2,184	99	144,439	66.1	3.2
Sweden	890	22	1,204	1.4	2.3
Switzerland	344	10	1,124	3.3	4.0
Spain	1,906	66	27,118	14.2	3.3
Czech Republic	337	8	11,785	35.0	3.3
Turkey	51	2	552	10.7	4.0
Hungary	24	1	362	15.1	2.0
USA	8,247	143	177,224	21.5	4.0

3.2 Data quality results

As described in the "Methodology" section, the PCAF data quality scores were also used when establishing the financed emissions in the commercial real estate financing portfolio. The average PCAF data quality score for the total of 1,752 properties examined was 3.2.

Share of PCAF data quality scores per property (in %)



PCAF Data Quality Score	Number	Share
		%
Aareal Bank AG	**1,752**	**100**
1	0	0
2	455	26
3	510	29
4	773	44
5	14	1

Figure 6: Percentage and absolute distribution of PCAF data quality scores 1-5

In the context of the methodology adopted, PCAF data quality scores 1 to 3 have high informative value, while scores 4 and 5 have relatively low informative value. PCAF data quality score 1 has the highest data quality. The data foundation in this case comprises carbon emissions that were calculated on the basis of the supplier-specific energy mix using specific carbon emission factors. PCAF data quality score 2 can also be said to offer a high informative value, since in this case actual metered energy consumption data for the property in question are used to calculate the emissions, together with country- and type of use-specific emission factors. In the case of PCAF data quality score 3, the EPC label (plus the country and the type of use) are decisive for calculating emissions. Since the EPC label covers a range of values, data quality in this case can only be described as high to a limited extent, although there is still a close relationship to the specific property's average energy performance. PCAF data quality score 4 is weaker in terms of quality, since in this case there is no property-based indication of energy consumption or of the carbon emissions derived from this; instead, the calculations are performed on the basis of an average value per country and type of use. PCAF data quality score 5 is the lowest data quality and basically corresponds to an estimate of a property's carbon footprint based on its type of use and location.

The informative value produced for the portfolio already has a sound quality overall, with an average PCAF data quality score of 3.2 (the individual properties are given an equal weighting, regardless of the loan volume and floor area) and 55 % of the PCAF data quality scores falling within scores 1 to 3.

3.3 Outlook and future developments

Aareal Bank has set itself the goal of successively increasing, and continuously improving, the availability and quality of the data required for climate accounting. The Bank recognises the real importance of a robust, continuously growing data pool for reliably developing long-term climate strategies and for achieving the decarbonisation targets derived from these. In coming years, extended minimum requirements for client-side data transparency and a further differentiation of energy- and climate-related data are planned. In addition to assessment instruments that are required by law such as EPCs, sources used may include building energy databases to which Aareal Bank has access, plus specialised third-party energy reports. Furthermore, Aareal Bank is working on continuing to integrate information with its internal IT systems so as to enhance the efficiency of these complex processes even further and to leverage the resulting opportunities to reach strategic targets for decarbonising its business model.

These measures will help to further enhance the quality and hence the overall informative value of the carbon intensity data for the commercial real estate financing portfolio for which transparency has been provided in this PCAF Report.

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02 / 2025