Securitised Credit

Estimating Carbon Emissions

May 2024

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Today, we and many of our customers contribute to greenhouse gas emissions. This is why HSBC Asset Management (AM), together with other asset managers, have an important role to play in supporting the transition to a net zero economy. Step by step, we are developing strategies to reduce our own emissions and to help our customers reduce theirs. For more information visit https://www.assetmanagement.hsbc.com/about-us/net-zero

HSBC Asset Management

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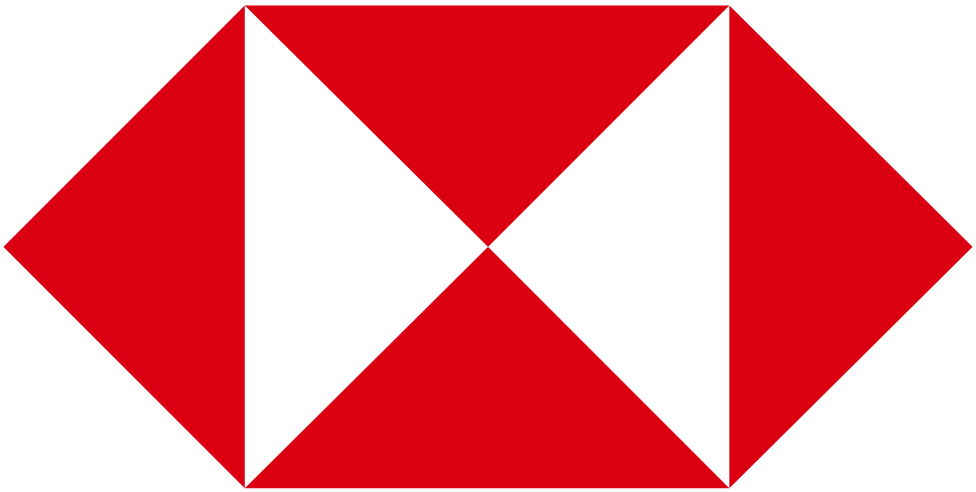

To limit the global average temperature rise to 1.5C this century and to avoid the catastrophic effects from climate change, it is estimated that a global investment of US$2.7 trillion per annum is required (Wood Mackenzie: World needs $2.7 trillion annually for net zero emissions by 2050, Wood Mackenzie report says | Reuters). The financial industry has a critical role to play to facilitate the transition to net zero by channeling capital towards less emission-intensive investment and green solutions.

Asset owners and asset managers recognise the importance to climate risk. There is a growing demand to measure, assess and manage climate risks in their portfolios. In contrast to traditional asset classes where carbon emission data has improved in quality in the past decade, carbon emission data for securitised credit remains a work in progress despite the market being an estimated US$4 trillion in size (HSBC Understanding Securitised Credit).

Carbon data for securitised credit remains scarce for most asset types. Despite the Partnership for Carbon Accounting Financials (PCAF) providing guidance to account for financed emissions owned by financial institutions for limited security types, reported and third party data for securitised credit is limited and difficult to assess systematically for asset managers and asset owners.

Our approach to address this challenge

We are exploring how to collect and estimate scope 1 & 2 carbon data for our key securitised credit markets: Residential Mortgage Backed Securities (RMBS), Commercial Mortgage Backed Securities (CMBS) and Collateralised Loan Obligations (CLO), in an effort to provide improved carbon data for our portfolios. We also want to share the work we are doing so that we can contribute to wider discussions on best practice in carbon performance for securitised credit investments. Lastly, we aspire to expand this methodology to other securitised asset types (e.g. autos) if they are material in our portfolio.

We refer to the PCAF's guidance on financed emission and carbon accounting for RMBS and CMBS, where we can identify appropriate emission factors to further estimate an RMBS or CMBS carbon impact based on our assumptions and the data available for each investment. An emission factor is a coefficient that describes the rate at which a given activity releases greenhouse gases (GHG) into the atmosphere. For example, one key emission factor associated with RMBS and CMBS is the "floor area" of the property (with larger properties tending to have higher carbon emissions) but the emission factor normalizes the rate of emissions by the size of the property so that collateral property of different sizes can be compared. Where actual reported data is available, typically for CMBS deals, we intend to use such data where possible.

For CLOs it is challenging to look through to the underlying assets given many are private companies with little to no public disclosure. As a result, CLO emissions will be assessed using the financed emission intensity of the applicable sub-industry or sector related to the underlying assets to estimate its financed emission intensity.

Our estimations and assumptions set out above for CLOs will lead to the reporting of financed emissions (in tonnes Carbon Dioxided equivalent – tCO2e) and financed emission intensity (in tCO2e/ US$m invested) and the coverage of such assets. The financed emission and financed emission intensity can be converted to one another using market values. These reporting items are similar to the European Union SFDR (Sustainable Finance Disclosure Requlation) PAI (Principle Adverse Indicator) 1 (GHG Emission) and PAI (Principle Adverse Indicator) 2 (Carbon Footprint) reporting requirement.

	Similar glossary in SFDR	**Unit**	**Calculation formula in SFDR**
Carbon or Financed Emission	GHG Emission (PAI 1)	tCO2e	$\sum_{n}^{i}\left(\frac{current\ value\ of\ investment_i}{investee\ company's\ enterprise\ value_i} \times investee\ company's\ Scope(x)\ GHG\ emissions_i\right)$
Financed Emission Intensity	Carbon Footprint (PAI 2)	tCO2e/ US$m invested	$\frac{\sum_{n}^{i}\left(\frac{current\ value\ of\ investment_i}{investee\ company's\ enterprise\ value_i} \times investee\ company's\ Scope\ 1,2\ and\ 3\ GHG\ emissions_i\right)}{current\ value\ of\ all\ investments\ (€M)}$

Source: HSBC AM; Sustainable Finance Disclosure Regulation (SFDR). The GHG emission scopes covered in this methodology are only Scope 1 and 2 and the above formulas are snapshots only from SFDR regulation.

However, carbon accounting at a portfolio level for securitised credit is still at the exploration stage. As such, we continue to test the robustness of our assumptions and market best practices while applying this methodology to limited portfolios for testing purposes.

Estimating financed emissions for RMBS and CMBS

The operation of buildings accounts for 30% of global energy consumption and 26% of global energy-related emissions according to the IEA (Buildings - Energy System - IEA). Measuring, tracking, and improving the environmental footprint of buildings is therefore essential to asset owners to meet their net zero commitment and contribute to global climate transition. Despite the existence of readily available information on energy efficiency for some buildings, due to the different energy labels (e.g. EPC ratings) and disclosure requirements in different regions, emissions data is not always accessible for RMBS and CMBS investors.

Choosing the appropriate emission factor for RMBS and CMBS

The PCAF European building emission factor database, provides financial institutions with a specific set of emission factors for residential and commercial real estate for all European countries as well as Norway, Switzerland and the United Kingdom, with an objective to enable the financial industry to measure and track the financed emissions of their European building portfolios.

The key emission factor that is relevant in our estimation will be tCO2e per unit (household) or tCO2e per floor area (e.g. square meter). Apart from countries and regions, other key factors to select the right emission factor for estimation purposes includes whether the emission factor is energy-label dependent and building type (single-family home or multi-family home as an example for RMBS; or office or retail-high street for CMBS).

Table: Our considerations in using emission factors from PCAF database

Emission factor characteristic	Comment
Country /State	
EPC (in)dependent	◆ Prioritize EPC dependent emission factors (e.g. EPC labels) per household; where EPC dependent emission is unavailable, we may use overall average
Building Types	◆ We consider only single-family home as building type as our underlying collateral is mostly in this category ◆ Engagement with PCAF will be needed to understand its building type categorization and further align our categorization with PCAFs for better emission estimations
Year	◆ We use latest available year of GHG emission

Source: HSBC AM

Table: example of the PCAF emission factors we use

PCAF data			Key variables		Key emission factor value		
Year	Data Quality Score	Emission factor unit	Country	EPC Rating	Building category (level 1)	Building type (level 2)	Value
2023	3	tCO2e/#	United Kingdom	A	Residential	Single-family home	0.5748
2023	3	tCO2e/#	United Kingdom	B	Residential	Single-family home	1.7424
2023	3	tCO2e/#	United Kingdom	C	Residential	Single-family home	2.9639

Source: PCAF European building emission factor database

For the other key developed markets where we have the most exposure in RMBS (United States and Australia), we are able to estimate the emission factor based on information on the scope 1 direct energy consumption emissions and scope 2 indirect electricity consumption for the majority of the states within the respective countries. The energy and electricity consumption is converted to GHG emissions data based on the states' reported residential GHG emission or emission conversion factors.

Table: US RMBS emission factor calculations

	Data source	Data
Scope 1 Direct Emissions	US EIA – State energy related carbon dioxide emission by sector Dataset (residential sector selected)	(A) Total state direct emission (tCO2e)
Scope 2 Electricity Consumption	US EIA – Electricity retail data set (select residential sector)	(B) Total State electricity consumption for residential sector (MWh)
	US EPA – eGrid data set (emission factor)	(C) Per state emission factor lb CO2e/MWh converted to CO2e/KWh
Others	US Census Bureau – National State and Country housing Units Total	(D) Number of housing units by state

HSBC US RMBS emission factor calculation:

Total State residential emission (scope 1 & 2) = (A) + (B) x (C)

Emission factor: Per household residential emission by state =

$$\frac{(A)+(B)x\ (C)}{D}$$

Source: HSBC AM

Table: Australia RMBS emission factor calculations

							Key emission factor used		
State	Average Household Annual Electricity Consumption (kWh) (Source: AER 2020 Data)	Emissions Factor (Source: Australian National Greenhouse Accounts Factors)	Average Household Emissions from Electricity Consumption (kg CO2-e)	Average Household Annual Gas Use (GJ) (Source: AER 2020 Data)	Emissions Factor (kg CO2-e/GJ) (Source: Australian National Greenhouse Accounts Factors)	Average Annual Household Emissions from Gas Consumption (kg CO2-e)	Average Household Emissions from energy consumption (kg CO2-e)	Average Household Square Metres (ABS)	kg CO2-e per square metre
	A	B	C = A x B	D	E	F = D x E	G = C + F	H	G/H
ACT	6,407.00	0.79	5,061.53	34.93	64.63	2,257.33	**7,318.86**	232.30	**31.50**
NSW	5,981.00	0.79	4,724.99	18.38	64.63	1,188.16	**5,913.15**	232.30	**25.50**
VIC	5,023.00	0.92	4,621.16	49.80	55.53	2,765.34	**7,386.50**	232.30	**31.80**
SA	4,950.00	0.33	1,633.50	16.20	62.23	1,008.06	**2,641.56**	232.30	**11.40**
QLD	5,588.00	0.88	4,917.44	7.24	60.33	436.67	**5,354.11**	232.30	**23.00**
TAS	8,619.00	0.18	1,551.42	34.93	55.53	1,939.50	**3,490.92**	232.30	**15.00**
Average (for WA and NT):			3,751.67			1,599.18	**5,350.85**		**23.03**

Source: HSBC AM; AER 2020 Data; Australian National Greenhouse Accounts Factors

Once an appropriate emission factor is selected, we apply our assumptions and data available to the emission factor to estimate the emission of the underlying properties to the RMBS and CMBS.

Emission Factor Units	Sector Application	Data source
tCO2e per m2	CMBS	PCAF (where actual reportable emission not available); US Building Performance Database, US local building benchmarking databases
tCO2e per household	RMBS (Europe, UK, Australia, US)	PCAF, HSBC estimated emission factor for US, Australia based on available data

Source: HSBC AM

There are limitations on the emission factors selected in our emission calculations. The selection of emission factor used in PCAF is subject to our understanding of the PCAF building type categorisation and the mapping to available building categorisations of our invested deals. We understand that there are attempts to add more assumptions on average household sizes to seek more granular emission factors (tCO2e per floor area) for RMBS. However, we are cautious of the additional assumptions because we believe they will be difficult to verify and may lead to lower estimates.

Using reported data for CMBS emissions

CMBS is an asset class where reportable data is more often available for certain developed markets. The US and the UK, for example, have extensive databases that capture reported emission intensity per floor area and/or total emissions. Where reported data is not available or the transaction has multiple EPCs associated with it (more than three for practicality of data collection), we will use estimates based on the PCAF European Building Emissions Database for commercial real estate or the US Building Performance Database, which then multiplies by the floor area as reported or estimated.

Example of reported emissions - UK EPC database for commercial buildings

Harrods Store
87/135 Brompton Road
Knightsbridge
London
SW1X 7XL

Energy rating
D

Valid until
17 November 2032

Certificate number
0551-3106-6819-8067-7175

Property type	Retail/Financial and Professional Services
Total floor area	121.475 square metres

Breakdown of this property's energy performance

Main heating fuel	Natural Gas
Building environment	Air Conditioning
Assessment level	5
Building emission rate (kgCO2/m2 per year)	29.11
Primary energy use (kWh/m2 per year)	217

Source: Gov.UK

Example of reported emissions - New York Local law 84 database

Property Name	Year Ending	Address 1	City	Postal Code	Primary Property Type - Self Selected	Total GHG Emissions (Metric Tons CO2e)	Total GHG Emissions Intensity (kgCO2e/ft²)
280 Park Avenue	31/12/2021	280 Park Avenue	New York	10017	Financial Office	10,546	8.4

Source: NYC OpenData: Energy and Water Data Dislcosure for Local Law 84 2022

From emission factors to financed emission for RMBS and CMBS

We propose a 3 step calculation to identify the RMBS and CMBS financed emissions and the financed emission intensity attributable to our portfolio.

Step 1: identify emissions of collateral based on emission factors or reported emissions

$$\text{Emission}_{\text{collateral}}\left[\frac{\text{tCO2e}}{\text{year}}\right] = \text{Number of assets (\#)} * \text{Emission Factor}_{\text{country, state, property type}}\left[\frac{\frac{\text{tCO2e}}{\text{household}}}{\text{year}}\right]$$

OR

$$\text{Emission}_{\text{collateral}}\left[\frac{\text{tCO2e}}{\text{year}}\right] = \text{Property size (m}^2\text{)} * \text{Emission Factor}_{\text{country, state, property type}}\left[\frac{\frac{\text{tCO2e}}{\text{m2}}}{\text{year}}\right]$$

Step 2: estimating the actual emissions of the deal (LTV at origination)

$$\text{Emission}_{\text{pool}}\left[\frac{\text{tCO2e}}{\text{year}}\right] = \sum(\text{LTVorigination} * \text{armortized factor} * \text{Emission}_{\text{collateral}}\left[\frac{\text{tCO2e}}{\text{year}}\right])$$

Step 3: Financed emissions attributable to portfolio pool or position

$$\text{Financed emission intensity}_{\text{position}}\left[\frac{\text{tCO2e}}{\text{year}}\right] = \frac{\text{Outstanding amount [mUSD]} * \text{Emission}_{\text{pool}}\left[\frac{\text{tCO2e}}{\text{year}}\right]}{\text{Total outstanding amount}_{\text{pool}}[\text{mUSD}]}$$

Estimating financed emissions for CLOs

Collateralised Loan Obligations (CLOs) represent a portfolio of leveraged loans to private companies across different industries. There is no agreed sustainability standards or carbon accounting methodology for CLOs, which makes it challenging for the industry to confidently estimate the carbon exposures of CLOs. Without detailed disclosures of the underlying private companies' carbon performance or other environmental KPIs, we rely on industry averages as an approximation.

An estimation or approximation provides a basic view of carbon performance of our CLO investments and enables us to track and discuss emissions data with the originators. This engagement in turn should drive further industry demand for carbon data for CLOs and encourages further work to improve data collation.

We have a 4 step approach to measure a CLO's financed emission intensity:

1. We use the average financed emission intensity (t CO2e/US$m invested) per GICS sub-industry or GICS sector as a proxy to assess carbon performance of the underlying companies in the CLO. Developed market sector simple averages are used (i.e. Emerging market is excluded) as they are the most relevant to our investable universe.
2. We determine the % weighting of each CLO's portfolio to each rating agency industry.
3. We map the rating agency industry to the comparable GICS sub-industry. Where a rating agency industry classification does not have direct map to GICS sub-industry, the GICS sector average applies. Where sector information is not available, we would consider that loan as not covered for carbon performance.
4. The overall CLO financed emission intensity is the weighted average of financed emission intensity for each rating agency industry and the % weighting of the CLO to that rating agency industry. Our financed emission on the CLO will be the market value of the CLO multiplied by the CLO's financed emission intensity.

The final financed emission intensity of the CLO for each pool can be given by the formula below:

Financed emission intensity of the CLO_{pool} $= \sum_i Financed\ emissions\ intensity\ sector * CLO\ \%\ outstanding\ Balance$ **where the** $Financed\ emissions\ intensity\ sector$ **is the tCO2e per $m EVIC of the mapped CLO sector**

The data quality for CLOs is more uncertain based on this estimation methodology than RMBS and CMBS as we have very limited ability to look-through to the underlying corporate's carbon performance given the lack of disclosure from these private companies. Our mapping from rating agency industry to GICS sub-industry and sector is subject to our best efforts and might influence our CLO financed emission.

Portfolio level financed emission and emission intensity aggregations

Using the methodology above, we are able to obtain estimates of the financed emissions and the financed emission intensity attributable to investments in RMBS, CMBS and CLO sectors. As described above, there may be a small proportion of some assets where financed emissions cannot be estimated under the methodology. In such cases, the carbon data coverage will be below 100%. The financed emission and financed emission intensity calculated is only representative of the percentage of assets covered. Most of the underlying data in CLOs, RMBS and CMBS asset types is covered through proxy data but may still be less than 100%. Cash, and investments in other asset types outside of RMBS, CMBS and CLOs, are currently considered uncovered, or having no data coverage lowering the percent of covered assets further.

Table: an illustrative example of financed emission and financed emission intensity on a theoretical portfolio

	Instrument	Weight	Carbon data coverage of the instrument	Financed Emissions	Market value	Financed emission intensity
				(tCO2e)	USD $m	(tCO2e/US$m invested)
CLO	A	15%	100%	360	4.5	80.0
CLO	B	10%	50%	90	3.0	30.0
RMBS	C	20%	100%	50	6.0	8.3
RMBS	D	15%	0%	1,200	4.5	266.7
CMBS	E	20%	100%	60	6.0	10.0
CMBS	F	15%	50%	10	4.5	2.2
Cash or others	G	5%	0%	0	1.5	0.0
Total Portfolio				1,770	30.0	62.1

Souce: HSBC AM

The final financed emission with be the portfolio's financed emission divided by the market value of our portfolio adjusted for carbon coverage, given by the formula below:

$$\text{Financed emission intensity of the portfolio} = \frac{\sum_i \text{Financed emissions (i)}}{\sum_i \text{Market value (i)} * coverage\ ratio} \text{ where } coverage\ ratio = (1 - weight\ of\ cash\ or\ others)\%$$

i = pools in our portfolio

Disclaimer

Securitised Carbon Emissions Estimation

Data provided related to carbon emissions are estimates only and we do not guarantee the accuracy of the data provided. Information provided in this document highlights some of our initial work in estimating the carbon emissions of our securitised credit portfolios. Our developing capabilities and the limitations of the data and methodology have led to outcomes that we believe are directionally indicative, but they are estimates with a wide degree of uncertainty. Nevertheless, we think setting a starting point for carbon measurement will help develop our understanding of the carbon impact of securitised credit investments and help extend our client's net zero strategy and coverage to securitised credit.

Currently we are evaluating the methodology for assessment of carbon emissions for securitised credit investments from MSCI and may seek to use their estimations in the future. Due to the nature of some securitised portfolios, portfolio assets can change frequently making data collection and reporting difficult. Consequently, we rely on sector averages, approximate governmental data and/or industry data to develop a carbon emissions approximation. Assumptions on the sector, industry and/or building-type to derive carbon emission data are dependent on our understanding of the database and data availability for our invested assets on a reasonable efforts basis. Granular data and systematic ways of tracking the carbon footprint of these assets is required to increase the accuracy of estimation.

Improving securitised carbon data and reporting is a joint effort that is being advanced by asset managers, originators and industry bodies like the PRI, for which we are a signatory. We are exploring further data sources and estimation techniques and are exploring industry best practices that may improve the accuracy of these estimations. We follow the PCAF standards with limitations of data availability and data accuracy. Potential changes of the carbon accounting standards may influence our methodology and estimations. We will continue monitoring market developments on carbon reporting and will seek to refine our methodology accordingly.

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