UN environment programme

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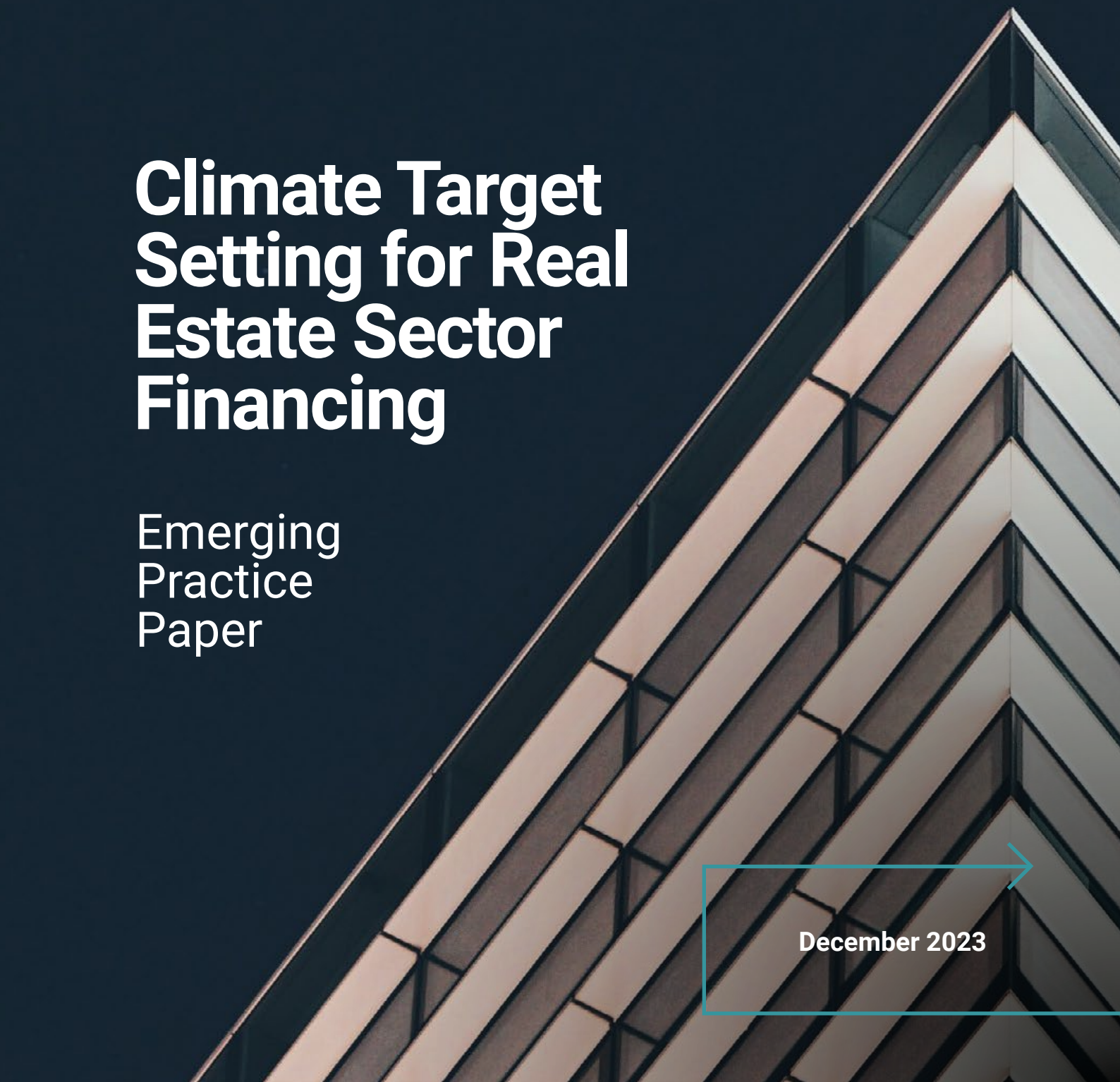
net-zero banking alliance

Climate Target Setting for Real Estate Sector Financing

Emerging Practice Paper



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Disclaimer

The content and guidance set out within this paper do not constitute advice to Members of the Net-Zero Banking Alliance (the Alliance). Further, any views expressed in this paper do not necessarily represent the views of each individual member, including those in the relevant working group that assisted in the preparation of the paper. This paper is intended as a general guide for 'effective practices' and is not prescriptive as to actions or decisions to be taken by Members. The Members of the Alliance set individual targets and make their own unilateral decisions in line with their own business goals (subject to, and consistent with, all fiduciary and contractual duties, laws and regulations). The use of papers and guidance, including the scope of participation in the Alliance, is at the discretion of each individual Member. As such, the Alliance takes no liability for actions or decisions taken by Members when applying the principles of this paper. Any references to external frameworks or organisations should not be considered an endorsement of that organisation or their work.

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Purpose of the publication

This paper is one of a series of publications developed by members of the Net-Zero Banking Alliance (NZBA) with the purpose of outlining the choices banks make when setting climate-related targets for financing in particular sectors of the real economy. The papers do this by identifying emerging practices, common challenges and policy, data, and other gaps.

Guidance and expertise for climate target setting is evolving quickly. This paper aims to increase banks' awareness and understanding of useful approaches by updating them on the latest methodologies and approaches in this space at the time of publication. It does not prescribe any particular methodology for banks to use. The document is aimed at banks financing real estate investors or assets through lending activities.

By joining NZBA, members have already chosen to commit to:

- Aligning their lending and investment portfolios with net zero emissions by 2050
- Setting intermediate targets for their highest emitting sectors for 2030 or sooner using robust, science-based guidelines consistent with limiting global warming to 1.5°C
- Developing transition plans[1] for these sectors
- Reporting annually on their approach to and progress towards meeting their targets

For many banks, this means setting sectoral decarbonisation targets for their real estate lending portfolios.

This paper's overarching goal is to assist NZBA members in formulating or refining their own targets aligned with achieving net zero emissions going forward. It does not impose any requirements on NZBA member banks over and above the ones they chose to commit to when becoming a signatory and is not prescriptive in terms of specifying when and how they are expected to decarbonise their sector-specific lending and investment portfolios.

The details of the commitment NZBA member banks sign up to are found in the NZBA Commitment Statement and Guidelines for Climate Target Setting for Banks. This series of papers on emerging practice does not change this. Only NZBA member banks can change these commitments by voting to change these key documents.

1 Banks are encouraged to use and reference credible third-party frameworks such as The Glasgow Financial Alliance for Net Zero (GFANZ) or other relevant jurisdiction-specific frameworks. The role of transition finance in the net-zero journey, NZBA core guiding principles and case studies are also available at NZBA Transition Finance Guide 2022.

Due to the rapid evolution of policy, regulation, guidance, scenarios, science, and developments in the real economy, this publication should be regarded as a review of practices current at the time of publication.

This paper focuses on decarbonisation and does not consider other important environmental and social issues.

Members of the Principles for Responsible Banking (PRB), an initiative created by the United Nations Environment Programme Finance Initiative in partnership with founding banks, have taken a commitment to set portfolio alignment targets. This document aims to also support PRB members that set climate mitigation targets as part of their commitment to PRB.

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The document reflects the work of the NZBA Real Estate Working Group and consultations with nearly 40 other banks, and industry stakeholders. Representatives from Deutsche Bank and Société Générale led the work with technical input from the NZBA Secretariat. The NZBA Real Estate Working Group includes Barclays, BBVA, BNP Paribas, Commonwealth Bank of Australia, Crédit Agricole S.A., ING, Royal Bank of Canada, TD Bank Group, and Wells Fargo.

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About the Net-Zero Banking Alliance

The industry-led, UN-convened Net-Zero Banking Alliance brings together a global group of banks, currently representing over 40% of global banking assets, which are committed to aligning their lending and investment portfolios with net zero emissions by 2050 in line with limiting global warming to 1.5°C.

Combining near-term action with accountability, this ambitious commitment sees signatory banks setting intermediate targets for 2030 or sooner using robust, science-based guidelines.

NZBA is the flagship climate initiative under the Principles for Responsible Banking to accelerate science-based climate target setting and develop common practice. As the banking alliance within the global efforts on net zero across the finance industry brought together under the Glasgow Finance Alliance for Net Zero (GFANZ), the NZBA is open to all banks globally, including banks that are not UNEP FI members and Principles for Responsible Banking signatories.

The Alliance reinforces, accelerates, and supports the implementation of decarbonisation strategies, providing an internationally coherent framework and guidelines in which to operate, supported by peer-learning from pioneering banks. It recognises the vital role of banks in supporting the global transition of the real economy to net zero emissions.

The Alliance is convened by the UN Environment Programme Finance Initiative and is a part of the Race to Zero.

Learn more here: unepfi.org/net-zero-banking/

Contents

Summary

The table below summarises the key definitions used in this document relevant for setting net-zero targets for residential and commercial real estate financing in relation to scope, metrics, and scenarios.

	Element	Residential real estate	Commercial real estate (CRE)
Scope	**Building type**	Single-family housing units or multi-family housing units (i.e. buildings with two or more housing units), condominiums for sale, and rental apartments used primarily for human dwelling. This category is limited to owner-occupied properties and small rental property portfolios but excludes multi-family dwellings that exceed four units where investors own the real estate with the intention of generating income.	Buildings used for commercial purposes where the building owner or investor leases, uses, or operates the property to conduct income generating activities (e.g. offices, industrial buildings, etc.). Any buildings that do not fall under residential real estate reporting can be reported under commercial real estate.
	Financial assets	Mortgage loans: a type of loan used to purchase or refinance a home, land, or other types of real estate. The borrower agrees to pay the lender over time, typically in a series of regular payments that are divided into principal and interest. In some jurisdictions, the property often serves as collateral to secure the loan.	Banks can consider including various types of financing in their targets, including: ▪ Loans secured by a mortgage security with collateral data available. ▪ Unsecured loans or general-purpose corporate loans to companies active in the real estate sector (i.e. building operations, but not construction). ▪ Ground-up construction and full refurbishment lending
	Emissions	Building emissions come from two sources: **operational emissions** and **embodied emissions**, which both occur throughout the whole life cycle of buildings (PCAF, CRREM, GRESB 2023). The former refers to emissions arising throughout the life of the asset by users of the building releasing emissions on-site or by the purchase of heat and electricity (including all services). The latter refers to emissions embodied in the materials used, construction, maintenance, refurbishment, repair, replacement, and end of life of the building.	

	Element	Residential real estate	Commercial real estate (CRE)
Portfolio metric	**Metric type**	Banks can report financed building operational emissions using absolute emission metrics (e.g. annual tCO_2e) and/or emission intensity metrics (e.g. annual $kgCO_2e/m^2$). Both absolute and intensity financed emissions shall be disclosed annually according to NZBA guidelines. Banks may favour monitoring residential real estate and commercial real estate separately given the different scenario pathways and frequent operational segregation.	
	Attribution	Two broad approaches are available to banks: the balance sheet approach and the portfolio weight approach. See Sections 2.3 and 3.3 for an explanation of these approaches.	
		Attribution may be based on the loan-to-value (LTV) ratio using the actual or estimated value of the building at origination, the mortgage value at origination, or the current building value (for the balance sheet approach), or the loan weight in the portfolio (for the portfolio weight approach).	Attribution for unsecured loans may be based on various metrics, such as enterprise value including cash (EVIC), total debt and equity (for the balance sheet approach), or the financing weight in the bank's total CRE portfolio (for the portfolio weight approach). For secured commercial real estate, one approach is the loan-to-value (LTV) ratio, which is the ratio of the banks' financing divided by the building's value at origination or current value.
	Input data	▪ Building emissions (or corporates' asset emissions for unsecured loans) ▪ Building surface area (or corporates' building surface for unsecured loans) ▪ Mortgage value ▪ Bank financing (for unsecured real estate only) ▪ Building actual or estimated value at origination, mortgage value at origination, or current building value (for balance sheet approach only) ▪ Counterparty[2] EVIC or total debt and equity (for unsecured commercial real estate and balance sheet approach only)	

2 "Counterparty refers to any individual enterprise that can be owned, managed, lent to, insured, or otherwise provided financial services to by a financial organization", PAT_Measuring_Portfolio_Alignment_Technical_Considerations.pdf (tcfdhub.org)

	Element	Residential real estate	Commercial real estate (CRE)
Scenario	**Scenario choice**	NZBA Guidelines direct member banks to widely accepted science-based decarbonisation scenarios to guide members when setting individual long-term and intermediate targets that are aligned with the temperature goals of the Paris Agreement. In addition, as per the Guidelines, "scenarios selected shall be "no overshoot" or "low overshoot" scenarios," and should have a >50% probability of limiting global warming to 1.5°C by the end of the century.	
	Benchmark scenario	Three approaches are available (Portfolio Alignment Team 2021): **Convergence approach** implies that all counterparties are encouraged to converge to desired industry-average emissions intensity levels. **Contraction approach or rate-of-reduction** implies that all counterparties are encouraged to reduce emissions at the same desired industry-average rate independent of their current and past performance. **Fair share approach** defines the average rate of reduction in absolute emissions for an industry but recognises that individual counterparties may be better- or worse-performing than average.	

1. Understanding the real estate sector

In this document, the Net-Zero Banking Alliance (NZBA) reviews various approaches banks could use to set individual net-zero targets for their residential and commercial real estate portfolios and measure their success in meeting them. It evaluates strengths and weaknesses of different approaches to target setting when selecting the scope of emissions, types of counterparties and financings, metrics, attribution methods and benchmarking approaches, and provides suggestions for their operationalisation.

Given wide regional variation in real estate regulations and reporting requirements, the NZBA Real Estate Working Group aimed to provide helpful examples to assist banks with benchmarking their net-zero accomplishments. However, the following information is not exhaustive, and banks must navigate data limitations at both the collateral and scenario levels by relying on the availability of national data and regional scenarios. In addition, NZBA recognises that approaches to bank target-setting in various sectors are evolving and will continue to do so. As a result, this document is a point-in-time assessment.

1.1 Structure and greenhouse gas emissions of the real estate sector

Buildings and their construction accounted for nearly 40% of global energy related CO_2 emissions and more than 34% of energy demand in 2021. About 28% of global emissions from this sector are emitted from buildings' operations and related energy usage (UNEP, Global ABC and IEA 2022).

The real estate industry is different to other industries. It requires an asset-based approach to portfolio alignment rather than an all-in-one corporate approach encompassing all assets because of the significant differences between individual assets. These differences are due to multiple factors.

Location

The real estate industry is highly local. Data collection, assessment methodologies, asset performance levels and local regulations differ by country and region. This means that the collection of uniform data for assets can be a challenge. For example, Energy Performance Certificates (EPCs) are a very useful means of assessing building performance, but the methodology varies widely by country and not every country has such a concept. Some countries do not have an equivalent to an EPC, such as the United States

of America and Australia. Also, not all public EPC databases are as complete as in some countries (e.g. France and United Kingdom).

To assess a building's performance, its energy consumption (in the form of electricity, gas, fuel, district energy and geothermal among others) should be known. Considering that the sources of electricity production vary by location, the carbon intensity of their energy use will depend on the grid energy mix in a location. Therefore, regional grid emission factors are required. Also, the energy performance of a building is coupled with its location due to climate variations. In energy reporting frameworks, such as the tertiary decree[3], the energy consumptions of buildings are "corrected" regarding the local climate.

Function

The assets' operational profiles are not uniform across different asset types. For example, a warehouse operating at refrigeration temperatures does not have the same consumption profile as an ambient temperature warehouse. A hotel that is operating 24/7 does not share the same performance pattern as an office building or a commercial centre. These differences in consumption pattern and intensity imply that in addition to considering the location of building assets, banks must also consider their function.

Modernity and technology

The modernity of building assets is also a key factor when determining their energy performance. The energy performance of a building can be greatly affected by its age and previous energy efficiency improvements (renovation). The energy systems installed in a building also have a key role in determining its energy efficiency. Therefore, two adjacent assets serving the same function may have very different consumption intensities. The age and poor energy performance of many buildings imply that massive retrofits are needed for most cities across the world.

Given that not all buildings have the same energy mix (electricity, gas, district heating, district cooling), the total operational consumption of the building alone is not a good metric for assessing their energy performance. As an example, in French regulations designed to reduce energy consumption from the services sector (tertiary sector buildings), the consumption of district heating has a multiplication factor of about 25%, due to its associated ecological benefits.

Overlap across industries

When assessing a bank's financial exposure associated to a sector, it is common practice to categorise the recipients of its financing by the Statistical Classification of Economic Activities in the European Community (NACE) code. NACE codes are defined by the main activity of a company, however, banks do not provide real estate loans solely to companies with a NACE code for real estate. Therefore, it is not possible to simply filter by NACE code without excluding buildings that are financed by non-real estate

3 The Tertiary Decree is a binding French regulation that requires reducing energy consumption in the tertiary sector in France, involving all tertiary buildings with a surface area of more than 1,000 m² including office buildings, shops, administration buildings, schools, among others.

industries. For example, when a retail multinational company like the French Carrefour receives a loan to finance a warehouse or when a non-real estate company receives a loan to finance its offices.

Another challenge exists when an asset is being taken as collateral for a loan that is aimed to finance a totally different asset or activity.

Complex stakeholder structures

Green leases are designed to allow cooperation and implementation of common objectives and are a strong illustration of a landlord commitment to an ESG agenda. In the case of a real estate asset, the owner of the building is not the sole decision maker. Depending on the financing structure and rent contracts, the prospective modifications to an asset might require the confirmation and intervention of multiple parties and potentially a building license. For example, in some cases energy efficiency improvements in a building require the tenants' agreement or sometimes even a direct financial contribution.

This is also relevant for the collection of sustainability data. The tenant should be engaged with a green clause in the contract for the owner to be able to request this data. An efficient collaboration between landlord and property/facility managers is required to make sure quality data is collected.

1.2 Monitoring residential and commercial real estate

Often one of the first decisions banks consider when setting targets in the real estate sector is whether to monitor residential and commercial real estate portfolios jointly or separately.

Advantages of monitoring residential and commercial real estate separately include:

- It is a common market practice amongst banks to view these categories separately
- The transition pathway for residential buildings is different from commercial buildings
- These activities are also typically carried out by different departments within financial institutions
- Banks tend to have differing levels of agency with residential and commercial real estate, related to regulatory constraints, data access and quality, and influence on borrowers, which can lead to distinct approaches

However, each financial institution should decide individually whether to monitor the climate performance of residential and commercial real estate separately or together. In the case of the latter, banks might consider how to tailor the chosen scenario benchmark to the distribution of their portfolio between residential and non-residential buildings.

1.3 Emissions boundaries

Building emissions come from two sources: operational emissions and embodied emissions, which both occur throughout the whole life cycle of buildings (PCAF, CRREM, GRESB 2023). The former refers to emissions arising throughout the life of the asset by users of the building releasing emissions on-site or by the purchase of heat and electricity (including all services). The latter refers to emissions embodied in the materials used, construction, maintenance, refurbishment, repair, replacement, and end of life of the building.[4]

Emissions accounting in the real estate sector can follow a whole building approach. This refers to measuring the operational GHG emissions emitted by different counterparties within the boundary of the building irrespective of the organizational boundaries or control approaches used by each stakeholder (PCAF, CRREM, GRESB 2023).

A widely used framework for reporting building´s emissions is the Greenhouse Gas Protocol. Building owners and investors applying its guidance are required to report their Scope 2 emissions (electricity use and emissions from purchased heat or cooling) using a location-based or a market-based approach. Each of the approaches has benefits and challenges. One challenge in Europe relates to privacy concerns related to General Data Protection Regulation (GDPR), which limits the access to smart meter data. It is important for banks to ensure they take a consistent approach in collecting greenhouse gas emission information across their portfolio. Banks are encouraged to check relevant publications in each jurisdiction.

Operational emissions

Operational emissions include, but are not limited to:

- Direct emissions from on-site fuel combustion for space heating, water heating, cooking, etc.; and
- Indirect emissions from purchased energy (electricity, steam, heat, and cooling) for space heating, water heating, space cooling, lighting, cooking, appliances, and miscellaneous equipment.

Operational emissions are typically included in banks' real estate portfolio targets. Operational emissions often have better data availability than embodied emissions and can be reduced through energy efficiency measures.

Embodied emissions

For many banks, embodied emissions are currently more difficult to include in targets due to limited data availability. However, as new buildings become more energy efficient and decarbonisation of electricity supply accelerates, operational emissions will fall, and

4 This guideline purposely omits scope 1, 2, and 3 designations, because counterparties may be users or owners of buildings. Depending on the counterparty's building use, their building emissions may differ from other counterparties with regards to scope designations. As a result, this guidance delineates building operations versus embodied emissions instead. However, if banks prefer to report their real estate portfolio emissions by scope, they can use PCAF, SBTi or other frameworks that delineate emissions by scope.

embodied emissions will represent a larger portion of life cycle emissions (GRESB 2023). Today, the average share of embodied GHG emissions from buildings, following current energy performance regulations, is approximately 20–25% of life cycle GHG emissions (Röck *et al.* 2020). The concepts of embodied emissions are new and evolving and have high variability depending on product manufacturers.

Responsibility for reducing embodied emissions falls first to the product manufacturers, who must provide lower emissions products. These products form the baseline of embodied emissions reductions and will limit the total emissions reductions that can be achieved. As embodied emissions data become more accessible, embodied carbon emissions can be calculated over the entire lifecycle of buildings and help to identify the most effective energy efficiency interventions for improving energy and financial performance (Bienert *et al.* 2023).

NZBA guidelines will undergo periodic review and this paper may be updated to reflect any changes in the state of data and availability of methodologies for the inclusion of embodied emissions in targets.

1.4 Target setting for real estate among NZBA banks

The first progress report of the Alliance, published in November 2022, summarised the first set of targets produced by its members (UNEP FI 2022). In the real estate sector, 65% of banks had set targets for both residential and commercial real estate. A few banks had prioritised one of the sub-sectors.

56% of banks set CRE targets using absolute metrics and 31% of banks set targets using physical intensity metrics. Only 6% used financial intensity metrics, and 6% did not disclose the metric used. In contrast, 66% of banks set physical intensity-based targets in residential real estate.

Of the banks that had set CRE targets at that time, 56% had covered their lending portfolios only, 13% covered lending and investment, 6% covered lending and capital markets and 19% covered lending, investment, and capital markets. Residential targets set at that time were mostly (78%) lending only, with 11% of targets covering lending, investment, and capital markets.

Most banks used the IEA NZE 2050 scenario for target setting and some used IEA B2DS and the NGFS NZ2050. Most banks' targets (88%) covered only clients' s Scope 1 and 2 emissions and only 6% covered clients' Scope 3 also.

In the first progress report, twenty-three banks had set real estate emissions reduction targets for 2030. As of November 2023, twenty more banks had released real estate targets (overall forty-three banks with targets in this sector). Twenty-four came from banks in Europe, nine in Latin America and the Caribbean, five in the Asia Pacific region, four in North America and one in Africa and the Middle East.

2. Residential real estate

2.1 Scope

2.1.1 Building types in scope

This publication defines residential buildings as single-family housing or multi-family housing units (i.e. buildings with two or more housing units), condominiums for sale and rental apartments used primarily for human dwelling. This category is limited to owner-occupied properties and small rental property portfolios of less than 4 housing units but excludes multi-family dwellings that exceed 4 units where investors own the real estate with the intention of generating income. [5]

This definition implies that the property is used only for residential purposes and not to conduct income-generating activities. In this document, serviced apartments, small offices, among others are included under the commercial real estate rather than residential real estate methodology.[6]

2.1.2 Financial assets in scope

Banks can include residential mortgage loans in their target-setting. A mortgage is a type of loan used to purchase or refinance a home, land, or other types of real estate. The borrower agrees to pay the lender over time, typically in a series of regular payments that are divided into principal and interest. The property often serves as collateral to

5 Basel definition linked to Art. 124 (2) a (ii): "2. A non-ADC exposure secured by an immovable property, where all the conditions laid down in paragraph 3 are met, shall be treated as follows: (a) where the exposure is secured by a residential property, the exposure shall be treated in accordance with Article 125(1) where the exposure meets any of the following conditions:
(i) the income producing immovable property securing the exposure is the obligor's primary residence, either where the immovable property as a whole constitutes a single housing unit or where the housing unit is a separated part within an immovable property;
(ii) the exposure is to a natural person and is secured by an income-producing residential housing unit, either where the immovable property as a whole constitutes a single housing unit or where the housing unit is a separated part within the immovable property, and total exposures of the institution to that natural person are not secured by more than four immovable properties, including those which are not residential properties or which do not meet any of the criteria in this point, or separate housing units within immovable properties;
(iii) the exposure secured residential property is to associations or cooperatives of natural persons that are regulated by law and solely exist to grant their members the use of a primary residence in the property securing the loans;
(iv) the exposure is secured by residential property to public housing companies or not-for-profit associations that are regulated by law and exist to serve social purposes and to offer tenants long-term housing;
(v) the exposure is a non-IPRE exposure".

6 In practice, home offices are generally not financed on a stand-alone basis and may be challenging to separate from residential real estate.

secure the loan. Banks typically hold mortgages on-balance sheet. In some jurisdictions, including France and the Netherlands, the property does not serve as collateral to secure the loan. For example, banks may face limited information availability on use of proceeds for general purpose loans. In the United States of America, mortgages are often securitised through government sponsored enterprises (e.g. Fannie Mae, Freddie Mac, and Ginnie Mae).

Given the given regional and national variations, a bank needs to decide whether to include or exclude unsecured financing in their real estate targets. The respective approach should be disclosed and explained in relation to the associated limitations and challenges. For example, banks can consider other types of financing in their targets, although these may be more difficult to include:

- Home equity loans (HELs) and home equity lines of credit (HELOCs).[7] Given that these products are typically loans for general consumer purposes, banks may prefer to exclude them from their real estate portfolio.
- Off-balance-sheet mortgages. Although not recorded on the balance sheet, off balance-sheet mortgages are still part of the assets and liabilities of banks. For example, when mortgages are securitised and sold off as investments, the secured debt if often kept off banks' books. The NZBA Guidelines do not currently require banks to include off balance sheet activity. However, if they make up a relevant and substantial part of their financed emissions, banks may wish to include off balance sheet mortgages in their real estate targets.[8]

2.2 Metric type

The NZBA Guidelines for Climate Target-Setting for Banks state that banks shall set targets on absolute emissions (e.g. annual tCO_2e) and/or sector-specific emission intensity (e.g. annual $kgCO_2e/m^2$) basis (UNEP FI 2021). Both absolute and intensity financed emissions shall be disclosed annually according to these guidelines. This paper focuses on the real estate sector in general, however for some sub-sectors of residential and commercial real estate, there may be benchmarks of better quality relevant to the specific context of banks. The section below outlines the pros and cons of each approach.

Absolute emissions: A target expressed in absolute terms includes the total emissions associated with the activities and assets that it covers. By preserving a direct link to the 1.5°C carbon budget, any target and reporting on progress towards it is less likely to over- or underestimate warming impact due to the presence of intermediate variables, such as total floor space of buildings. Absolute emissions therefore provide the most direct

7 According to the U.S. Federal Trade Commission, a home equity loan (HEL) is "a loan that's secured by [one's] home." It is sometimes referred to as a second mortgage. Home equity line of credit (HELOC), on the other hand, is "a revolving line of credit […] secured by [one's] home."

8 Net Zero Banking Alliance (2022). Frequently Asked Questions: "There are a range of off-balance sheet activities undertaken by banks, but the one that has greatest relevance to facilitating GHG emissions reductions and associated climate impacts and should be the highest priority is that of capital markets activities, both debt and equity. NZBA's firm intention and plan is for emissions associated with capital markets activities to be included as part of 2030 target-setting as methodologies become available…Other off-balance sheet activities, such as derivatives or leasing, and their associated emissions are more complex and will require further methodology development to accurately capture".

measurement of the climate impact of financing activities.

However, measuring performance in absolute terms may reflect results driven by the largest company in a portfolio and improvements caused by economic fluctuations (e.g. decline in activity) rather than actual efforts within underlying companies towards decarbonisation (Röck *et al.* 2020; Institut Louis Bachelier 2020).

Emissions intensity: Targets expressed in these terms, for example the emissions per square metre of a building surface or floor area, enable the evaluation of the climate performance of different buildings regardless of economic expansion. As such, the emission intensity metric does not disincentivise key transition activities. In addition, emissions intensity metrics show how a single building contributes to a bank's strategy for decarbonising its real estate portfolio, helping banks decide on an asset-by-asset basis whether to provide financing and whether refurbishment is needed. However, a key disadvantage of intensity metrics is that they do not preserve a direct link to the carbon budget (Portfolio Alignment Team 2021).

A target expressed in physical emission intensity is calculated by taking total building emissions divided by total building surface area, as illustrated by Equation 1. If banks do not have access to actual building emissions, one option to calculate building emissions is via the formula provided in guidance from PCAF, which is the sum product of a building's energy consumption and the specific emissions factors for each energy source.[9]

Equation 1: Building physical emission intensity

$$\text{Building emissions intensity (annual kgCO}_2\text{e/m}^2\text{/y)} = \frac{\text{Building emissions (annual kgCO}_2\text{e/y)}}{\text{Building surface (m}^2\text{)}}$$

2.3 Attribution and aggregation approaches

This section discusses approaches for the attribution of a building's emissions to the financial institution providing the mortgage, and for the aggregation of mortgage-level emissions to sector-wide portfolio emissions. Two approaches are available to banks: the balance sheet and portfolio weight approaches.

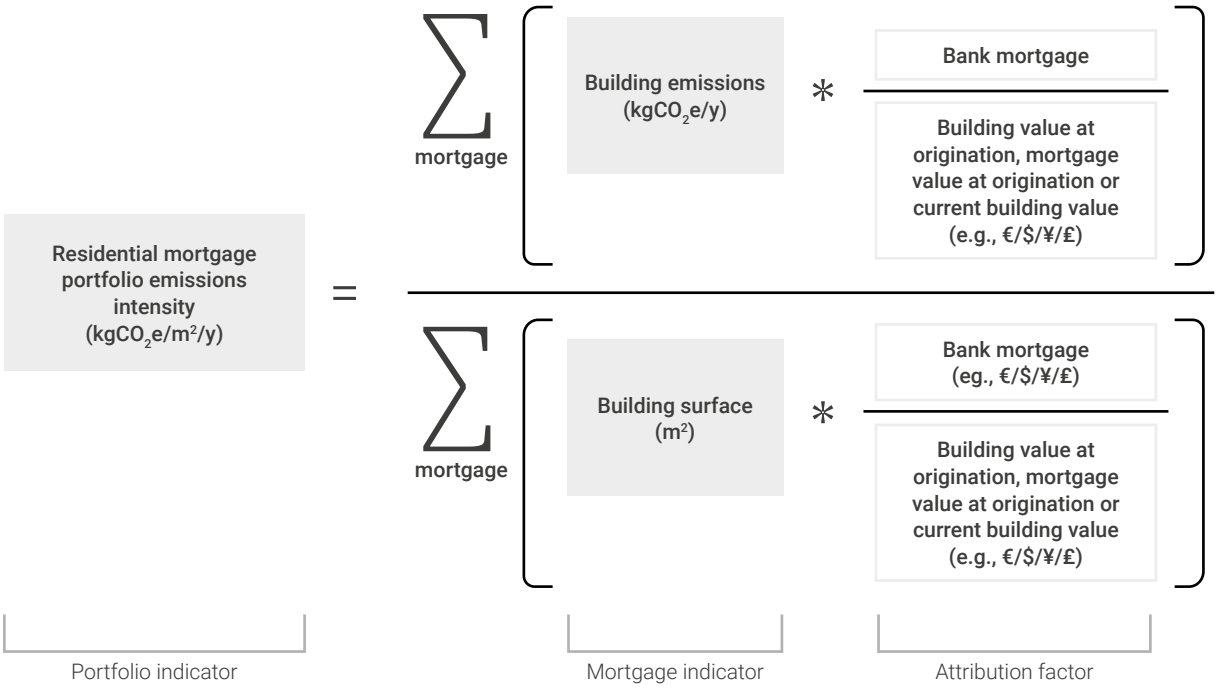
Balance sheet approach

The balance sheet approach is highly dependent on the mix of assets held by the respective bank. For residential mortgages, the balance sheet approach can facilitate aggregation across secured and unsecured portfolios and limits the bias caused by higher priced assets.

9 PCAF (2022). See Section 5.5: Mortgages, under "Equations to calculate financed emissions", p. 91: The Global GHG Accounting and Reporting Standard for the Financial Industry.

One approach to calculating what share of a building's emissions to attribute to a bank is the loan-to-value (LTV) ratio (max. 100%), which is the ratio of the bank's financing divided by the value of building at origination of the loan. This approach assumes that the residential property owner also takes ownership of the building's emissions. Fixing the original home value avoids the introduction of volatility of the LTV ratio resulting from shifting asset prices. However, this approach may face challenges regarding information availability or quality and may overestimate CO_2 attribution due to the long duration of residential mortgages and amortisation over time. Alternative options to property value at origination include estimating value at origination (such as by using the latest valuation and a Home Price Index), using the mortgage value at origination, or using the current or most recent known building value.

Equation 2: Balance sheet approach for residential mortgage



Portfolio weight approach

The portfolio weight attribution approach[10] is a simple average of the emissions intensity weighted by mortgage value. The advantage of this approach is that it is simple to implement, as it does not require information on the extent of a dwelling's surface area or the loan-to-value (LTV) ratio. However, this approach gives more weight to expensive dwellings (which are generally associated with bigger loans or linked to newly built properties), thereby introducing a significant bias. This also presents a geographical bias, as asset values vary by location. For example, a $10m^2$ studio with 10 $kgCO_2e/m^2$ emissions intensity that is worth EUR 100,000 will weigh much less on the portfolio than a studio of the same size with the same emissions intensity that is worth EUR 200,000 (located in a more expensive city) even though the absolute emissions of the two assets are the same.

10 See p.137–139: Institut Louis Bachelier 2020

The portfolio average weighting by surface area will equal 15 $kgCO_2e/m^2$. However, the portfolio value based average emissions results in a 16.6 $kgCO_2e/m^2$. In addition, the portfolio weight approach does not enable the computation of total attributed absolute emissions.

Equation 3: Portfolio weight approach for residential mortgages

$$\text{Residential mortgage portfolio emissions intensity } (kgCO_2e/m^2/y) = \sum_{\text{Mortgage}} \left[\frac{\text{Building emissions } (kgCO_2e/y)}{\text{Building surface } (m^2)} * \frac{\text{Bank mortgage (e.g., €/\$/¥/£)}}{\sum_{\text{Mortgage}} \text{Bank mortgage (e.g., €/\$/¥/£)}} \right]$$

Portfolio indicator | Mortgage indicator | Attribution factor

2.4 Building and client emission data collection

2.4.1 Data requirements

The data points required to calculate the emission intensity targets outlined above are listed in Table 1. For building surface, floor area schemes are used in the estimation of intensity-based indicators. These include, but are not limited to, Gross Floor Area (GFA), Gross Internal Area (GIA), Gross External Area (GEA), Net Internal/Lettable Area (NIA/NLA), and Gross Lettable Area (GLA). These descriptions are commonly used globally, although they differ from one another.

Most countries, as well as the Science Based Targets Initiative (SBTi), GRESB and the International Energy Agency (IEA) use GFA (SBTi 2023; GRESB). However, some countries (including Australia, New Zealand, United Kingdom, and Hong Kong-China) use Net Lettable Area (NLA) as standard practice for measuring assets. For residential buildings, this is often described as living/conditioned area or floor space. This list is not exhaustive, and the appropriate terminology may vary by region and building type. Recently, GRESB, PCAF, and CRREM recommended in their guidance the use of the International Property Measurement Standard (IPMS) to establish a globally consistent methodology for property measurement. Banks may use local and national standards to measure surface or floor space for an interim time. We encourage banks to disclose their measuring approach if they deviate from global standards.

IPMS 2: Office states: "The sum of the areas of each floor level of an office Building measured to the Internal Dominant Face and reported on a Component-by-Component basis for each floor of a Building. In many markets, but not universally, this is known as Gross Internal Area (GIA)" (IPMS 2014).

IPMS 2: Residential states: "The sum of the areas of each floor level of a Building measured to the Internal Dominant Face, which may be reported on a Component-by-Component basis for each floor of a Building. This is known in many markets as Gross Internal Area" (IPMS 2014).

IPMS 2 is very close to the definition of Gross Internal Area (GIA) according to the Royal Institution of Chartered Surveyors (RICS 2018).

It is recommended that banks stay as consistent as possible in the definition of the surface area throughout their portfolio.

Table 1: Data required for emission intensity targets

Input data required	Units
Building or client emissions	kg CO_2e
Building surface	m^2 or ft^2
Bank mortgage value	EUR, USD, JPY, etc.
Building value at origination, mortgage value at origination, or current/most recent building value (for balance sheet approach only)	EUR, USD, JPY, etc.

2.4.2 Proxies and data quality

The availability of data on energy consumption remains uneven between countries and banks do not always have access to information on properties. In those cases, financial institutions can use proxies or modelled emissions. To produce these proxies, PCAF offers a series of options to estimate financed emissions. Banks are free to use other frameworks that comply with NZBA guidelines.

Actual data and supplier-specific emissions factors tend to provide the highest level of accuracy on greenhouse gas emissions for financial institutions. PCAF assigns an average data quality score that reflects the overall data quality mix (PCAF 2022). If they are unavailable, regional electricity grid mix data or country-level emission factors can be used instead of supplier-specific emissions factors but score lower on PCAF's data quality hierarchy (PCAF 2022). As an alternative to actual building emissions data, banks can use estimated building emissions based on floor area.

Banks can also estimate energy consumption per building based on building type, the location-specific statistical data, or even the number of buildings though generally this provides the lowest data quality.

By specifying the type of data used for their calculations and the assumptions made, banks can provide transparency and context for stakeholders. NZBA's Guidelines for Climate Target Setting for Banks state that where methodologies are not publicly available and there are data challenges, banks should explain the allocation approach used, data sources and their limitations, approaches to estimation, proxies used if data is not available and key assumptions. Banks should also provide an assessment of the data quality used in their calculations.

As electric vehicle (EV) uptake increases in the future, EV charging will become a material source of energy consumption for certain buildings and will impact how emissions are allocated between the transportation and real estate sectors. To address this issue and accurately apportion emissions, high quality data will be critical.

As data quality improves over time, reporting changes in data use and/or quality and quantifying any impact on baseline financed emissions and targets as of the reporting date will improve transparency and provide context behind any changes to reported emissions or targets. New data can be included in an addendum to reporting to highlight changes from prior data.

2.4.3 Data sources by region

Buildings' energy performance and climate conditions vary across countries. As a result, a tailored approach for calculations is recommended. Table 2 gives an overview of data available in different geographies. Banks may use local national and local sources and standards. This table was compiled based on input from NZBA member banks and expert committee members; consequently, it should not be considered exhaustive.

Table 2: Data sources by regions

Country	Data points	Sources
Global	Energy emission factors[11] Pathways	CRREM GRESB
Europe		
European Union	Energy consumption Energy emission factors Energy Performance Certificates (EPCs) Number of building units and building floor area	Eurostat European Environmental Agency (EEA) German Emissions Trading Authority (DEHSt) Ipsos & Navigant (2019)
France	Building energy consumption emissions and surface	ADEME DPE database Notaries database (PERVAL, ADNOV)
Germany		German Emissions Trading Authority (DEHSt)

11 The database from PCAF provides access to building emission factors from a broad range of publicly available data sources

Country	Data points	Sources
United Kingdom		NABERS UK RICS Building Carbon Database Real Estate Environmental Benchmark | Better Buildings Partnership BRE helps build new embodied carbon data-base—BRE Group Research and Statistics- Department for Energy Security and Net Zero (DESNZ) Net Zero Whole Life Carbon Roadmap for the Built Environment—UKGBC—UK Green Building Council Non-domestic National Energy Efficiency Data Framework (ND-NEED), 2022—GOV.UK (gov.uk)
Italy		APE
Ireland		Sustainable energy authority of Ireland SEAI BER Public Search
Portugal		ADENE—Portuguese Energy Agency ADENE—Agência para Energia
Hungary		Electronic Submission System, by LECHNER (Ministry of the Interior) E-tanúsítás | E-építés portál (e-epites.hu)
Sweden		Boverket
Slovakia		INFOREG—Informačný systém na podporu rozvoja regiónov—Úvod
Americas		
United States of America	Energy consumption Energy emission factor Number of building units and building floor area	EPA EnergyStar NREL Data
Canada	Energy consumption Energy emission factor Number of building units and building floor area	US NRCan (Natural Resources Canada): Compre-hensive energy use database Energy Star Portfolio Manager (2019)

Country	Data points	Sources
Asia Pacific		
Australia	Table F (Energy consumption by fuel) Electricity and gas consumption bench-marks for residential customers 2020	Australian energy statistics Australian energy regulator NABERS National Greenhouse Accounts (NGA)
Japan		Ministry of the Environment
New Zealand		NABERSNZ

2.4.4 Matching data in energy labels with loan books

Energy labels, such as Energy Performance Certificates (EPCs) in the EU[12], are increasingly shared as open-source databases by public authorities. In its essence, EPCs are meant to provide a theoretical performance for buildings. Given that there are differences between EPCs methods in various countries, banks need to take these variations into account depending on their portfolio.

Two techniques are available to reconcile data with real estate mortgage portfolios. This assumes banks have the precise address records of their clients' residential properties stored in their loan book.

- The addresses are matched based on character strings (e.g. «10 St Martin Wolf» should be matched with «10 Street Martin Wolf»). Approximate string matching (often colloquially referred to as 'fuzzy string searching') is a technique for finding strings that approximately match a pattern. Drawbacks of this technique include manual validation of the algorithm output when the matching score is not 100 (100 being the score associated with a perfect match) and its highly time-consuming nature.
- The addresses in the residential mortgage portfolio and energy labels are geocoded (i.e. the precise GPS coordinates are found) and matched across the two databases. For an example of geocoding using the ADEME database, refer to FBF's Portfolio Alignment Measurement (FBF 2021).

2.5 Scenario benchmark

2.5.1 Scenario choice

When setting individual long-term and intermediate targets, NZBA Guidelines direct member banks to use widely accepted science-based decarbonisation scenarios that are aligned with the temperature goals of the Paris Agreement. In addition, as per the Guidelines, "scenarios selected shall be "no overshoot" or "low overshoot" scenarios" (UNEP FI 2021), and should have a >50% probability of limiting global warming to 1.5°C

12 EPCs face data quality challenges related to gaps in projected versus actual energy use in buildings, as well as evolving and varied EPC standards across Europe.

by the end of the century. If banks consider alternative regional scenarios, they should still comply with the NZBA Guidelines on these points.

The Carbon Risk Real Estate Monitor (CRREM) provides historical market values and decarbonisation pathway values through 2050, organized by various building types and regions. The data can be downloaded at the CRREM's website.[13]

The IEA also presents a 1.5°C scenario that uses an absolute emission metric. The scenario presents one single pathway globally and does not present a breakdown by asset type or country. IEA scenarios can be considered an acceptable choice if they are aligned with NZBA Guidelines (1.5°C aligned). For example, the IEA's Net Zero Emissions by 2050 Scenario (NZE Scenario) is aligned with limiting the global temperature rise to 1.5°C. For additional information on available scenarios, refer to the GFANZ guidance on the use of sectoral pathways for financial institutions (GFANZ 2022).

2.5.2 Benchmarking approaches

Decarbonisation scenarios distribute the available global carbon budget over time and allocate emissions to sectors according to different trajectories. The emissions in these macro trajectories are then distributed to create individual benchmarks for counterparties and financial institutions. Various approaches to benchmarking are possible and are described below (Portfolio Alignment Team 2021); when choosing between these designs, it is important to consider the incentives they create for the counterparties being measured. In addition, a portfolio's geographic and asset class distribution is important to consider when choosing a benchmarking approach and calibrating the benchmark.

The **convergence approach** implies that all counterparties are encouraged to converge to desired industry-average emissions levels. This metric is applicable to emission intensity metrics only.

The convergence approach disadvantages counterparties that are more carbon-intensive than their industry average, while reducing incentives for counterparties with below average emissions intensity to continue decarbonisation. A general limitation of the convergence approach is that emissions intensity convergence pathways are not always available for sectors without common physical units of production (e.g. building surface) (Portfolio Alignment Team 2021).

The **contraction approach** (also known as rate-of-reduction approach) implies that all counterparties are encouraged to reduce emissions at the same desired industry-average rate. It is applicable to metrics expressed in both intensity and absolute units. However, the contraction rate depends on the underlying metric.

The contraction approach is the reverse of the convergence approach: it disadvantages counterparties that are less carbon-intensive, while reducing incentives for counterparties that are more carbon-intensive to decarbonise. It can be considered "unfair" since the same rate of reduction is applied to all clients, regardless of their current performance and past efforts. A client with a low emission intensity today would have to reduce its emissions by the same percentage as a carbon-intensive client.

13 There is also a European website available: crrem.eu/

The fair share approach defines the average rate of reduction in absolute emissions for an industry but recognises that individual counterparties will be better- or worse-performing than average. Based on comparing the counterparty's emissions intensity to its industry average, this approach creates a counterparty-specific rate-of-reduction benchmark for absolute emissions.[14] Thus, with this approach, metrics are expressed in absolute emissions units.

The selection of one of these approaches has important implications for the data to be considered (i.e. emissions intensity, absolute emissions, or production capacity) and compatibility with forward-looking scenarios. For example, while sometimes using emissions intensity–based convergence pathways may be the preferred choice, it may not be feasible to extract an emissions intensity convergence pathway from available scenarios for sectors without standardised units of production (Portfolio Alignment Team 2021).

According to GFANZ's Workstream 1.4, the fair share approach also involves various underlying assumptions that drive uncertainty when operationalised. This is a particular challenge when attempting to account for a corporate's growth within the benchmark. Financial institutions have noted that this trade-off between the robustness of portfolio alignment methodologies and the ease of computation and/or comprehension is a key barrier to adoption.

2.5.3 Calibrating the benchmark based on the portfolio's characteristics

Because real estate portfolios can differ greatly among institutions and are not systematically representative of the market, as described above, the scenario's global average would not necessarily provide an accurate benchmark. A bank could be either largely aligned or misaligned with the baseline and therefore incentives to decarbonise could be biased. Hence, calibrating the benchmark based on an individual bank's portfolio distribution in terms of building type and regional location is an important consideration.

Equation 4 provides an example of a precise formulation for the calibration of portfolio benchmarks. Table 3 sets out the definitions used. The portfolio emissions intensity target at year can be based on the benchmark's emissions intensity at year weighted by the portfolio's attributed surface at baseline year by building type and region .

As the portfolio distribution by building type and region changes over time, recalibrating the target as needed and providing explanations for this change can improve accuracy and transparency. To improve transparency and provide context when recalibrating the benchmark and target, banks can publish comparative data from both before and after the recalibration on a single reporting date to highlight differences. Disclosing the distribution of their financed footprint (in m^2 or sq. ft.) by building type and region over time will help banks explain why their target may differ justifiably from the benchmark and

14 For more details on the calculation of the fair-share approach, refer to Appendix 2 of the Portfolio Alignment Team document: Measuring Portfolio Alignment

why it might change over time. A similar equation as Equation 4 could be applied for portfolio weight aggregation approach.

Equation 4: Benchmark calculation based on a portfolio's distribution

$$\frac{CO2_{p,s,y}}{m2_{p,s,y}} = \sum_{b \in B} \sum_{r \in R} \left(\frac{CO2_{s,b,r,yt}}{m2_{s,b,r,yt}} * \frac{m2_{p,b,r,y0}}{m2_{p,y0}} \right)$$

Table 3: Object and variable definitions

Object definition		Variable definition	
p	Portfolio	$CO2_s$	Emissions in the scenario s
s	Scenario	$m2_s$	Building surface in the scenario s
y0	Baseline year		
yt	Target year		
b	Building type		
r	Region		

3. Commercial real estate

3.1 Scope

3.1.1 Building types in scope

When considering commercial real estate (CRE) targets, banks can include financing towards property used for commercial purposes, such as, but not limited to, the property types below, where the building owner/investor leases, uses, or operates the property to conduct income generating activities. Each of the different building types has a different average energy use intensity (EUI) and different feasible alternatives to carbon emitting technologies. Divesting from high EUI assets (hospitals, schools, retail—restaurant/bars) and into lower EUI assets would reduce emissions associated with a CRE loan portfolio but could lead to other chalenges (e.g. reduced access to health care). Therefore, banks need their trajectories to be also weighted based on the assets in the portfolio.

- **Cold storage**[15]
- **Data centres**[16]
- **Healthcare:** Buildings used for the purpose of primary health care. Examples may include, but are not limited to, clinics, physical therapy centres, and mental health centres.
- **Hotel:** Includes hotels, motels, youth hostels, lodging, and resorts.
- **Industrial:** Includes logistics, warehouses, and light industrial usage.
- **Life sciences/laboratory usage**
- **Lodging, leisure, and recreation:** Includes lodging, sports club houses, gyms, sports stadia, indoor sports arenas, halls, swimming pools, theatres, and auditoria.
- **Mixed-use:** Assets that lack data availability by individual property type components but encompass several of the other property types in this list.

15 The exact methodology for the inclusion of cold storage is left to the reporting institutions' discretion, as the energy efficiency is reported on specific energy consumption (SEC)—and also on a kWh/y/m^3 basis, which differs from the traditional commercial real estate property types. In addition, given the intensive energy usage of cold storage, it can be misleading to use EPC data, as the shell of the building could be EPC A rated but the operational intensity due to cold storage usage within the building would be much higher or negate that high rating.

16 The energy efficiency of data centres is reported on a Power Usage Effectiveness (PUE) basis, which evaluates the energy performance of the data centre by calculating the ratio of the energy used as a whole compared with the energy used by just the IT equipment alone. The most efficient hyperscale data centres can have PUE values of ~1.1 (meaning 0.1 kWh is used for cooling/power provision for every 1 kWh used for IT equipment). Hyperscale data centre operators in particular lead in corporate renewable energy procurement, mainly through power purchase agreements (PPAs). Per the IEA report, "ICT companies are setting increasingly ambitious efficiency and CO_2 emissions targets, including for net zero emissions. In February 2020, the ICT industry agreed on a science-based target to reduce GHG emissions 45% between 2020 and 2030."

- **Offices:** Includes free-standing offices, office terraces, unattributed office buildings, and office parks.
- **Other residential usage:** Student housing, retirement living.
- **Residential multifamily properties that do not fall under residential real estate:** Distinction between residential and commercial multifamily properties may differ by financial institution/region, depending on the regulatory environment. As one option to ensure all units are covered in target setting, banks can capture units not under the residential reporting framework in commercial real estate.
- **Retail—Warehouse:** Refers to buildings in an unenclosed retail space, otherwise known as a strip centre or strip mall, whereby buildings are usually stand-alone and situated side-by-side with their entrance facing a main street or parking lot.
- **Retail—High street:** Retail buildings located on the high street in a particular area, usually terraced buildings located in the city centre or other high-traffic pedestrian zones.
- **Retail—Shopping centre:** Enclosed centres for retail purposes. Examples may include, but are not limited to, regional malls and shopping malls.
- **Retail—Restaurants/bars:** retail buildings used primarily for social/entertainment purposes (GRESB 2022).
- **Self-storage/parking usage:** Banks can exclude owner-occupied properties.
- **Education usage (schools, universities, libraries):** Financing of educational properties is expected to be minimal among NZBA banks, so banks can evaluate whether their own exposure is sufficiently material to include in their emissions measurements and targets.

3.1.2 Financial assets in scope

Banks may have both secured and unsecured financing in their commercial real estate portfolio. One benefit of including unsecured lending in commercial real estate target setting and reporting is ensuring that this financing is captured in banks' sectoral targets. However, there are difficulties associated with including unsecured financing. For example, banks may face limited information availability on use of proceeds for general corporate purpose loans[17]. Additionally, unavoidable double counting across multiple loans could occur, such as loans to building owners and real estate agents. Regardless of a bank's decision to include or exclude unsecured financing in their commercial real estate targets, stakeholders may appreciate disclosure and explanation of the associated limitations and challenges.

Unsecured loans to CRE-related companies used to finance properties or for general corporate purposes

For unsecured loans, the statistical classification of economic activities in the European Community (NACE) or the North American Industry Classification System (NAICS)

17 Banks may include general purpose business loans as long there is no other sector specific methodology where these loans are linked to. Rational is that there is often a data gap that banks are not able to generally state the purpose of business loans in relation to the usage of funding which is collateralised by real estate. This is, in general, also true for each real estate loans since the loan could replace own equity funding where this liquidity is used for other purpose (e.g. higher loan amount for buying a house so that also a new car can be bought).

codes can be helpful to confirm whether loans are in scope. Real Estate Investment Trusts (REITS) can also be treated similarly to financings in this category.

Banks may consider whether to include undrawn commitments to CRE-related companies. Excluding undrawn commitments aligns with the SBTi and is compatible with the balance sheet attribution approach. On the other hand, including undrawn commitments may provide a more complete picture of the total amount of financing available to clients.

Table 4 is a non-exhaustive list of codes, compiled with the Working Group to capture the main categories under the commercial real estate designation. Reporting institutions can evaluate which NACE/NAICS codes are relevant to include in their targets, depending on their business and region(s) of operation.

Table 4: Example codes used to identify unsecured real estate assets

Codification	Code	Physical asset class
GICS[18]	253010	Hotels, Restaurants and Leisure
	30101040	Hypermarkets and Super Centers
	35102020601010	Health Care Facilities
	60102010	Equity Real Estate Investment Trusts (REITs)
	60102020	Diversified Real Estate Activities
	60102040	Real Estate Operating Companies Real Estate Services
NACE	5510	Hotels and similar accommodation
	5520	Holiday and other short-stay accommodation
	5530	Camping grounds, recreational vehicle parks and trailer parks
	5590	Other accommodation
	6810	Buying and selling of self-owned real estate
	6820 6831	Rental and operating of own or leased real estate Real estate agencies
	6832	Management of real estate on a fee or contract basis
NAICS (United States of America)	623110/623210/623220/623311/623312	Senior Housing
	531110	Apartments/Multifamily
	236117	Single family residences
	721110	Hotels and Motels
	531130	Mini Warehouses/Self-Storage
	531120	Office Buildings/Shopping Center/Warehouse
	531190	Mobile Home Park
NAICS (Canada)	53	Real Estate/Rental and Leasing
	531	Subsector of 53—being Real Estate

18 Please note that the GICS structure was revised. Changes to the GICS structure that are effective as of March 2023 ca be found here.

Loans secured by CRE (mortgage security) with collateral data available.
Certain types of financing, such as loan-on-loan financing, repo financing,[19] commercial mortgage-backed securities (CMBS),[20] commercial real estate collateralized loan obligations (CLOs),[21] and warehousing for capital markets activity are not currently required to be included in targets per the NZBA Guidelines for Climate Target Setting for Banks, since they are off-balance sheet activities.

3.1.3 Emissions boundaries

The reader is referred to Section 1.3 for a discussion of emissions boundaries, whole building approach and the distinction between operational emissions and embodied emissions.

Banks may experience some difficulty including ground-up construction and full refurbishment lending in their targets due to limited data availability and poorly defined reporting metrics/pathways, depending on the country. In addition, loans for ground-up construction and full refurbishment may be subject to regulatory reporting requirements which prohibit the use of "pro-forma" post-renovation estimations by the borrower. As an example, a loan used for the full refurbishment of an asset may, per regulatory constraints, only allow the "Day 1" or "in place" energy efficiency metrics to be used until the refurbishment of the asset is fully completed. Once the new emissions data is available (i.e. a new EPC has been issued on the renovated asset), the lender may begin reporting on that basis.[22]

Lending to the construction and refurbishment industries may also be challenging to include because the building is often constructed by a third party (i.e. a construction company), contracted by the project developer. This means that the emissions of the construction are normally reported under Scope 3 of the project developer during the building's construction phase. As such, it can be impractical for the lender to measure financed emissions of a construction or renovation loan unless the project developer reports construction emissions.

3.2 Metric type

The reader is referred to Section 2.2 for a discussion of pros and cons of target setting approaches using absolute emissions and sector specific emissions intensity metrics.

19 According to the International Capital Markets Association, a repo—or a repurchase transaction—is an arrangement in which "one party sells an asset (usually fixed-income securities) to another party at one price and commits to repurchase the same or another part of the same asset from the second party at a different price at a future date or (in the case of an open repo) on demand."

20 Mortgage-backed securities "are debt obligations that represent claims to the cash flows from pools of mortgage loans." (U.S. SEC) In the case of CMBS, the securities are backed by commercial real estate mortgages.

21 A collateralized loan obligation is "a funding vehicle that buys a portfolio of diversified leveraged loans as assets and issues a series of debt obligations, including debt tranches, at various credit ratings and an unrated equity tranche" (Refinitiv LPC, Yield Book).

22 The potential issue with regulatory reporting constraints is that a lender may not be incentivized to make a refurbishment loan, as the "Day 1" metrics could negatively impact the portfolio until the refurbishment has been completed.

3.3 Attribution and aggregation approaches

This section discusses approaches for the attribution of the emissions of counterparties to the financial institution providing a financial instrument, and for the aggregation of instrument-level emissions to sector-wide portfolio emissions. The main approaches available to banks are the balance sheet approach and the portfolio weight approach.

In addition, the PCAF methodology suggests an attribution factor calculated as the ratio of the banks' financing (outstanding amount in listed equity or corporate bonds based on its market value or on the book value of the debt owed to the lender) divided by the enterprise value including cash (EVIC) or the total debt and equity (PCAF 2022). However, this approach introduces volatility, as the denominator may be subject to changes outside banks' control and unrelated to the company's emission profile.

Balance sheet approach

An important advantage of the balance sheet approach is its ability to limit the bias caused by highly priced assets. The balance sheet approach facilitates aggregation across secured and unsecured portfolios. It is also recommended by frameworks such as SBTi's SDA Tool for Commercial Real Estate and Residential Mortgages.

Unsecured commercial real estate portfolio emissions are calculated based on the sum of the companies' assets emissions attributed to the portfolio.

To attribute emissions for secured commercial real estate, one approach is the loan-to-value (LTV) ratio (max 100%), which is the ratio of the banks' financing divided by the value of the building at loan origination. This approach assumes that the commercial property owner also takes ownership of the building's emissions. As discussed in Section 2.3, however, if there are information availability or quality challenges with using building value at origination, another option is using the current or most recent known building value. Equation 5 sets out the equivalent formula.[23]

23 If banks provide both residential and commercial real estate financing for borrowers at the same address or building, emissions should be allocated to each portfolio based on the proportion of financing to each.

Equation 5: Balance sheet approach for commercial real estate

$$\text{Commercial real estate portfolio emissions intensity } (kgCO_2e/m^2/y) = \frac{\left[\sum_{\text{Company}} \left[\text{Company's total assets emissions } (kgCO_2e/y) * \frac{\text{Bank financing (eg., €/\$/¥/£)}}{\text{EVIC or company debt + equity (e.g., €/\$/¥/£)}}\right] + \sum_{\text{Mortgage}} \left[\text{Building emissions } (kgCO_2e/y) * \frac{\text{Bank mortgage (eg., €/\$/¥/£)}}{\text{Building value at origination, mortgage value at origination, or current building value (e.g., €/\$/¥/£)}}\right]\right]}{\left[\sum_{\text{Company}} \left[\text{Company's total assets surface } (m^2) * \frac{\text{Bank financing (eg., €/\$/¥/£)}}{\text{EVIC or company debt + equity (e.g., €/\$/¥/£)}}\right] + \sum_{\text{Mortgage}} \left[\text{Building surface } (m^2) * \frac{\text{Bank mortgage (eg., €/\$/¥/£)}}{\text{Building value at origination, mortgage value at origination, or current building value (e.g., €/\$/¥/£)}}\right]\right]}$$

Unsecured financing — Secured financing

While accounting for a counterparty's assets emissions, it is important for banks to understand how asset owners and investors approach the emissions calculation. Table 5 includes data points needed for estimating the emissions intensity of a commercial real estate portfolio using the balance sheet approach (Equation 5).

Table 5: Data required for emissions-intensity targets of a commercial real estate portfolio using the balance sheet approach

Input data required	Units
Building emissions (for secured loans)	kg CO_2e
Total company assets' emissions (for unsecured loans)	kg CO_2e
Building surface (for secured loans)	m^2 or ft^2
Total company assets' surface area (for unsecured loans)	m^2 or ft^2
Bank mortgage value	EUR, USD, JPY, etc.
Bank financing (for unsecured commercial real estate only)	EUR, USD, JPY, etc.
Building value at origination, mortgage value at origination, or current building value (for balance sheet approach only)	EUR, USD, JPY, etc.
Counterparty EVIC or total debt and equity (for unsecured commercial real estate and balance sheet approach only)	EUR, USD, JPY, etc.

Portfolio weight approach

The portfolio weight approach is outlined in Equation 6. The advantage of this approach is that it is simple to implement as it does not require information on the building's value or companies' debt and equity or EVIC. It is also more stable (i.e. not introducing volatility) and reflects a bank's capital allocation (Katowice Banks 2020).

While using the portfolio weight approach, it is important for banks to remain consistent in the collection of the emission intensities. Banks can use the whole building approach to ensure all the emissions and the whole surface of the building are accounted for, regardless of the organizational boundaries of the owner(s) or investor(s).

Equation 6: Portfolio weight approach for commercial real estate

$$\text{Commercial real estate portfolio emissions intensity } (kgCO_2e/m^2/y) = \sum_{\text{Counterparty}} \left[\text{Counterparty emissions intensity } (kgCO_2e/m^2/y) \text{ (whether it is secured or unsecured)} * \frac{\text{Bank secured or unsecured financing (e.g., €/\$/¥/£)}}{\sum_{\text{Counterparty}} \text{Bank secured or unsecured financing (e.g., €/\$/¥/£)}} \right]$$

Portfolio indicator | Mortgage indicator | Attribution factor

Table 6 includes data points needed for estimating the emissions intensity of a commercial real estate portfolio using the portfolio weight approach (Equation 6)

Table 6: Data required for emissions intensity targets of a commercial real estate portfolio using the portfolio weight approach

Input data required	Units
Counterparty emissions intensity (secured or unsecured)	$kgCO_2e/m^2/y$ or $kgCO_2e/ft^2/y$
Banks financing (secured or unsecured)	EUR, USD, JPY, etc.

3.4 Building and company emission data collection

3.4.1 Data requirements

To compute emission intensity targets above, the data in Tables 5 and 6 are required respectively for using the balance sheet approach (Equation 5) and the portfolio weight approach (Equation 6). For building surface, floor area schemes are used in the estimation of intensity-based indicators. These include, but are not limited to, Gross Floor Area (GFA), Gross Internal Area (GIA), Gross External Area (GEA), Net Internal/Lettable Area (NIA/NLA), and Gross Lettable Area (GLA). These descriptions are commonly used globally, although they differ from one another.

Most countries, as well as the Science Based Targets Initiative (SBTi), GRESB and the International Energy Agency (IEA) use GFA (SBTi 2023; GRESB). However, some countries (including Australia, New Zealand, United Kingdom, and Hong Kong-China) use Net Lettable Area (NLA) as standard practice for measuring assets. Banks may use local and national standards to measure surface or floor space for an interim time. We encourage banks to disclose their measuring approach if they deviate from global standards.

3.4.2 Proxies and data quality

See Section 2.4.2 for a discussion of the availability of data on energy consumption in different countries and the proxies that banks can use in its absence.

Actual data and supplier-specific emissions factors tend to provide the highest level of accuracy for financial institutions but may be more difficult to obtain (market-based emissions). Regional electricity grid mix data or country-level emission factors can be used instead of supplier-specific emissions factors but score lower on PCAF's data quality hierarchy (location-based emissions).

The Scope 2 Guidance of the GHG Protocol requires companies to report their Scope 2 emissions using both the market-based and the location-based approaches. Each of them has its advantages and challenges, banks can use any of the two approaches but should try to stay as consistent as possible in collecting counterparty emissions.

As an alternative to actual building emissions data, banks can use estimated building emissions based on floor area. Though generally the lowest data quality, institutions can also estimate energy consumption per building based on building type, the location-specific statistical data, or even the number of buildings. Banks specifying what type of data they used for their calculations and the assumptions made provides transparency and context for stakeholders. Per the NZBA Guidelines for Climate Target Setting for Banks, where methodologies are not publicly available and there are data challenges, banks should explain the allocation approach used, data sources and their limitations, approaches to estimation, proxies used if data are not available and key assumptions. Banks should also provide an assessment of the data quality used in their calculations. As for Residential Real Estate, the PCAF data quality score table in Section 2.4.2 applies equally to the Commercial Real Estate sector, where options 1 and 2 are preferable over option 3 from a data quality perspective—providing more accurate emissions results to a financial institution. The reader is referred to the afore mentioned section for a discussion on electric vehicles and data quality improvement over time.

3.4.3 Data sources by region

The reader is referred to Section 2.4.3 for a discussion on variations in buildings' energy performance and climate conditions across countries and Table 2 to see data sources by regions. Banks can use GRESB or any similar data provider that can provide the clients' assets' emissions. This will allow banks to follow the whole building approach and to exclude other emissions that are not directly related to the performance of the building.

3.4.4 Matching data in energy labels with loan books

See Section 2.4.4 for a discussion of how to match the increasing amount of open-source data on buildings' energy performance available in some markets to real estate loan books.

3.5 Scenario benchmark

3.5.1 Scenario choice

The reader is referred to Section 2.5.1 indicating resources and considerations for banks when selecting decarbonisation scenarios.

3.5.2 Benchmarking approaches

The reader is referred to Section 2.5.2 discussing the three designs of scenarios distributing the available carbon budget over time and to sectors along different trajectories: the convergence approach, the contraction approach, and the fair share approach.

3.5.3 Calibrating the benchmark based on portfolio's characteristics

The reader is referred to Section 2.5.3 for a discussion on calibrating the benchmark on a bank's portfolio distribution in terms of building type and regional location as well as an example formulation (Equation 4).

Conclusion

This paper has been developed by members of the Net-Zero Banking Alliance (NZBA) to outline the choices available to banks when setting climate-related targets in the real estate sector. This document also contributes to improving banks' awareness and understanding of useful approaches and methodologies relevant to the real estate sector at the time of publication.

There is a significant opportunity for banks to help decarbonise the built environment and contribute to the transition to a net-zero economy. This important transition requires other stakeholders´ efforts, as highlighted in this paper's call-to-action below. Banks can improve the transparency of their real estate targets by clearly stating the metrics, approaches, assumptions, and scenarios used, and by increasing the scope of emissions captured in targets.

Making these improvements can benefit banks in several ways, allowing them to:

- Better manage climate risk on their loan books
- Better meet investors and regulators' demands for higher quality and more comparable disclosures of climate strategy, targets, and progress towards targets
- Enhance relationships with customers and develop products to support them on their journey to net zero
- Deliver operational savings by contributing to standardisation of approaches across the industry
- Build their reputation with their customers

NZBA hopes that this guide will assist its members and the wider banking sector in setting and updating real estate targets and engaging with their clients on their transition to net zero.

Call-to-action for data and scenario providers, real estate companies, and governments

Commercial banks can play a key role in the transition of the real estate sector by providing finance, developing new financial products, and advising clients on how to manage their shift towards lower emissions activities aligned with net zero by 2050 pathways. However, banks do not operate in isolation and the extent to which they can support decarbonisation of the sector depends on action from other stakeholders.

The Alliance calls on other industry stakeholders to enable banks to better monitor and support the transition of the real estate sector by taking the following actions.

Policymakers and governments can take actions that include:

- Setting a clear direction and consistent and predictable policy for national net-zero transition strategies for the real estate sector as a whole.
- Harmonising energy performance measurements in an international database. In Europe, it could be based on a well-functioning Energy Performance Certificates (EPCs) system, which would need to be kept up to date with regular reviews.

Real estate owners and project developers can enable banks to better support their decarbonisation journeys by:

- Reporting their operational and embodied emissions. Improved reporting around embodied emissions is helpful to enable banks to support the move to net-zero buildings. It can be challenging for lenders to measure the financed emissions of a construction or renovation loan because project developers often contract third-party companies to construct buildings; emissions associated with a building's construction are normally reported as the project developer's Scope 3 emissions, which not all report.
- Engaging with banks on transition planning.
- Developing and deploying projects and solutions that reduce emissions.

Policymakers, energy companies, real estate companies, and banks can work together on:

- Developing data infrastructure that can enable sharing of cross-industry, assurable data while maintaining security and user control. For example, as electric vehicle (EV) uptake increases in the future, EV charging will become a material source of energy consumption for certain buildings and will impact how emissions are allocated between the transportation and real estate sectors. To address this issue and accurately apportion emissions, high quality data will be critical.

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UN environment programme

finance initiative

UNEP Finance Initiative brings together a large network of banks, insurers and investors that collectively catalyses action across the financial system to deliver more sustainable global economies. For more than 30 years the initiative has been connecting the UN with financial institutions from around the world to shape the sustainable finance agenda. We've established the world's foremost sustainability frameworks that help the finance industry address global environmental, social and governance (ESG) challenges.

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