FINANCE DENMARK

Insurance & Pension Denmark

Framework for Financed Emissions Accounting

Principles and methods

Version 3 · December 2022

Preface

In December 2019, the advisory Forum for Sustainable Finance handed over 20 recommendations to Finance Denmark. One of the recommendations was the following: Based on best international practices, Finance Denmark should, as quickly as possible, develop a quantitative model to be used voluntarily by Danish banks, mortgage lenders, investment funds and asset managers to determine the carbon footprint of the activities that they finance – both lending and investment activities.

During 2020, Finance Denmark developed a model for carbon emissions in cooperation with participants from member institutions, and during the year, Insurance & Pension joined the work, in cooperation with participants from Insurance & Pension member institutions. A first CO_2 model for the Danish financial sector was published in November 2020. The model is revised when needed, based on national and international developments.

When developing and revising the Danish CO2 model, Finance Denmark has been in continuous dialogue with several stakeholders and experts from Denmark and abroad. These include Statistics Denmark, the Danish Business Authority, the Danish Energy Agency, and Partnership for Carbon Accounting Financials (PCAF), whose global standards have been used to develop the Danish CO_2 model. PCAF originates from the Netherlands where, for several years, focus has been on standardising and expanding the use of a method to determine the CO_2 footprint of the financial sector's lending and investment activities.

The Danish model consists of a set of fundamental principles on how to determine the carbon footprint as well as a specific methodology at a detailed level for different asset classes. The model has now been revised for the second time and its third edition is available here in English.

The model provides credit institutions, investment funds, asset managers and pension firms with a better foundation in their efforts to reduce the carbon footprint of their lending and investments. At the same time, the model can support the dialogue with individual clients – private customers and enterprises – on how to reduce their footprint. This is a first and important step in our common goal of making Denmark and the world greener.

Ulrik Nødgaard
Administrerende direktør, Finans Danmark

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Principles

The following contains the main principles for how members of Finance Denmark on a voluntary basis can measure and publish the emissions on financed activities where financed activities are defined as loans and investments. The Danish principles are in alignment with the Partnership for Carbon Accounting Financials (PCAF), yet in a few selected areas adjustments and deviations are allowed to accommodate Danish circumstances and specificities.

The goal of the reporting is primarily to give an overview of the greenhouse gas emissions in carbon dioxide equivalents (CO_2e)[1] for activities financed by the Danish financial sector. Members can choose also to use and disclose other methods for calculating CO_2 emissions which are better suited for e.g., risk management or dialogue with individual clients.

The principles will be revised when needed considering national and international developments.

1 The CO_2 emissions on financed activities should be published at least annually. For future reporting, past performances should also be disclosed where possible. Disclosed emissions should cover total annual emissions, and the value of loans and investments are calculated at the end of the year.[2]

2 The emissions generated on financed activities should cover scope 1 and 2 emissions calculated as CO_2-equivalents according to the Green House Gas Protocol (GHG). The Total carbon emissions expressed in tonnes CO_2 and the carbon footprint (tonnes CO_2/million DKK financed) should be published from each of the 4 areas outlined in principle 5 below where relevant. In addition, members are free to publish scope 3 emissions separately where possible and relevant. However, inclusion of scope 3 at portfolio level can lead to inappropriate double counting of emissions, for further information, please refer to annex 1, "Double counting". Avoided or removed CO_2 emissions can be disclosed as a supplementary information applying the method developed for this. The same applies for the use of CO_2 credits.

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[1] In this CO_2 model, CO_2 is used as synonym for CO_2e.

[2] However, given that especially investment portfolios are dynamic and can change frequently through the year, financial institutions can correct with a flow variable. The flow variable is the proportion of days the investors held a company share e.g., in its book during the year. The institutions that use the flow variable should factor it into the attributed emissions.

3 It should be disclosed which asset classes are covered. Furthermore, the portfolio coverage in per cent of included asset classes and of total assets should be disclosed. While full coverage in all asset classes is not possible at present, it should be a clear ambition to gradually increase the number of included asset classes as well as the coverage within each asset class as far as possible. Focus should be on the financing of activities in sectors with high emissions of most relevance for the member. Where no data is available, a possibility can be to use a best estimate, taking best possible account of expected emission differences.

4 The quality and composition of data should be disclosed. For each asset class, the CO2 model adds a data hierarchy that makes it possible to assign the data a quality score between 1 and 5. The score shows the quality of the data used in the estimation of the financed emissions. Score 1 is the highest score and 5 is the lowest.

5 Financed emissions are measured and published for the following areas:

1. Loans (business and mortgage loans, ship finance, project finance and motor vehicle loans for private customers)
2. Investments (institutions' own portfolio of securities)
3. Investments on behalf of customers (total for investment funds and asset management services)
4. Investments on behalf of pension savings.

Cash holdings are considered as having zero emissions.

6 The CO_2-emissions from members' own holdings of securities are disclosed separately. Holdings of securities issued by the institution or subsidiaries will be included. This also accounts for mortgage bonds. The institutions can disclose the size of the portfolio of own mortgage bonds to avoid double counting, where relevant. Furthermore, volatile holdings such as assets in the trading book are excluded from the calculations.

7 Mortgage loans are loans secured by mortgages on real property. This includes all mortgage loans from Danish mortgage banks and loans granted against a mortgage on real properties from commercial retail banks. For properties with manufacturing etc. purposes and agricultural properties above 10 hectares, the method for calculating CO_2 emissions follows the Business loans asset class. If relevant, the method used to calculate CO_2 emissions for multipurpose commercial premises can be used for loans granted specifically to office buildings (e.g., headquarter facilities) even when the main activity of the company is in other sectors, e.g., manufacturing. Investors in Danish mortgage bonds can use the data for CO_2 emissions from mortgage banks to measure emissions on the investment.

8 Only on-balance sheet lending is covered. CO_2 emissions on mortgage loans are attributed to the credit institution having the loan on its balance sheet. When a commercial retail bank is only handling the loan (i.e., it is not on the balance sheet), it can voluntarily disclose the CO_2 emission on the loan separately,

9 For mortgage loans, attribution of emissions is done using the most recent loan-to-value (LTV) ratio.

10 Emissions on lending activities can cover both domestic and cross-border lending from Denmark and from the institutions' subsidiaries and branches abroad. Members disclose the coverage of the lending activities.

11 Enterprise value as measure of the company's value is preferred for all asset classes where available. It is recommended to use the definition of enterprise value in the delegated act to the EU Climate Benchmark Regulation (called EVIC). Enterprise value excluding cash (EV) or total balance sheet should be used if data for EVIC is not readily available.

12 Methodological deviations from the principles should be clearly disclosed.

13 The carbon footprint of packaged products such as investment funds, Special Purpose Vehicles (SPVs) and Exchange Traded Facilities (ETFs) can be calculated applying the asset-class methodology of the underlying assets or the indirect investment asset class.

The principles will be supplemented with manuals for the following asset classes:

1. Listed equities and corporate bonds
2. Covered bonds
3. Private equity
4. Project finance
5. Real estate, directly owned
6. Mortgages
7. Business loans
8. Shipping finance
9. Motor vehicle loans (and leasing vehicles) to private customers
10. Reporting of avoided CO_2 emissions and of CO_2 removal

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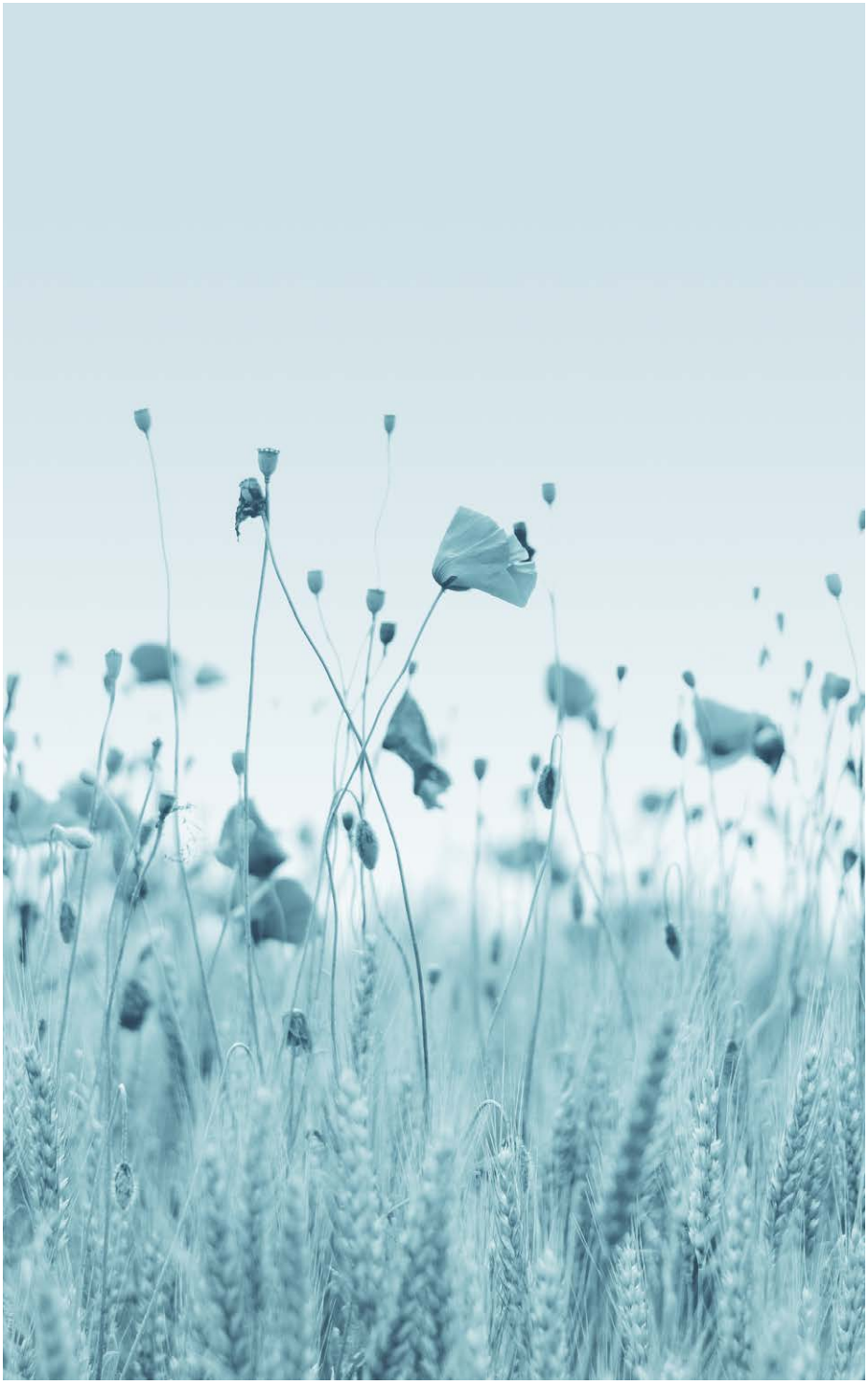


Methods

Introduction

This manual contains a description of methods for measuring carbon emissions of the following asset classes:

1. Listed equity and corporate bonds
2. Covered bonds
3. Private equity
4. Project finance
5. Real estate, directly owned
6. Mortgages
7. Business loans
8. Shipping finance
9. Motor Vehicle Loans (private customers)
10. Reporting of avoided CO_2 emissions and of CO_2 removal

1. Listed Equity and Corporate Bonds

This asset class includes listed equity and corporate bonds with unknown use of proceeds and combined products, e.g., SPVs (special purpose vehicles), based on corporate bonds.

Corporate bonds with known use of proceeds can use the same method as project finance.

Green bonds with known use of proceeds can use the same method as listed equity and corporate bonds, as covered bonds or as project finance.

Scopes covered

Scope 1 and 2. Scope 3 can also be included as a supplement if possible and relevant.

Portfolio coverage

Ideally, 100 % of the portfolio should be covered. The portfolio coverage of greenhouse gas emissions should be disclosed in percentage terms.

If full emission data coverage is not possible, a best estimate can be used for the uncovered part of the portfolio. The estimate can be based on an average of the covered part, where appropriate per sector and continent. Distinction can made between developed and less developed countries (e.g., OECD/non-OECD member countries) when considering both data coverage and data quality.[3] If assessed that there is not a sufficient amount of reported CO_2 data available for the asset class, proxy data based on relevant indexes can be used.

Subsidiaries may use data of their parent or holding company.

When choosing the calculation method, it is recommended to choose a method taking into account the weight of the asset class in the portfolio, and the chosen calculation method should be disclosed.

Short positions can be ignored.

Attribution

Emissions should be proportionally distributed to the providers of the company's total capital. To prevent double counting from this perspective, emissions are attributed proportionally to the exposure divided by the enterprise value including cash (EVIC) or, if this key figure is not available the total balance, Total financed emissions are defined as:

$$Financed\ emissions\ = \sum Attribution\ factor\ investee_c \times\ Company\ emissions_c$$

(c = investee company)

Data

Due to the potentially large universe of listed equity and corporate bonds portfolios, the data sources will likely be a designated data vendor. No preferred data vendor is recommended. It is encouraged to use the most recent available data and to mention the data source and the reporting period or time stamp of these data. Disclosed emissions should cover total annual emissions, and the value of the investments are calculated at the end of the year[4]

[3] Annex 3 explains the recommended distinction between these categories of countries.

[4] However, given that investment portfolios are dynamic and can change frequently through the year, financial institutions can correct with a flow variable. The flow variable is the proportion of days the investors held a company share, e.g., in its book during the year. The institutions that use the flow variable should factor it into the attributed emissions.

Sometimes, it is required to go through more steps to get the emission data for the individual issuances of corporate bonds/SPVs, than for listed equity because some data vendors link company emissions to the company's listed equity. A way to get CO_2 data for corporate bonds/SPVs is through the identification of the ultimate issuer of the listed equity and the debt and then attribute a part of the emissions equivalent to the financed part of the debt. This corresponds to the described use of enterprise value.

Moreover, the universe of corporate bonds is dynamic. Companies usually have multiple issuances of bonds, and these bonds are often issued with different maturities, e.g., 5 or 10 years etc. Thus, new bonds are being issued at the same time as other bonds reach maturity, and a corresponding dynamic approach to match the company's bonds with the company's emissions has not yet been developed. Disclosed emissions should cover total annual emissions, and the value of the investments is calculated at the end of the year.

Regarding the financial figures needed to do the carbon footprint of the absolute and relative emissions for corporate debt/bonds, this information can be found via traditional financial-data providers.

Equations to calculate financed emissions

It is recommended to disclose the absolute and relative emissions, using respectively the TCFD method total carbon emissions and carbon footprint.

Total carbon emissions are calculated in accordance with the following formula:

$$\sum_i \frac{Current\ value\ of\ investment_i}{Investee\ company's\ EVIC_i} \times Investee\ company\ emissions_i$$

Carbon footprint is calculated in accordance with the following formula:

$$\sum_i \frac{\frac{Current\ value\ of\ investment_i}{Investee\ company's\ EVIC_i} \times Investee\ company\ carbon\ emissions_i}{Current\ value\ of\ all\ investments\ in\ listed\ equity}$$

for corporate bonds, carbon footprint is calculated in accordance with the following formula:

$$\sum_i \frac{\frac{Current\ value\ of\ investment_i}{Investee\ company's\ EVIC_i} \times Investee\ company\ carbon\ emissions_i}{Current\ value\ of\ all\ corporate\ bonds\ investments}$$

In cases where emission data at company level are not available and sector averages are used instead, it is recommended to use the method for carbon footprinting described in the business loans asset class.

In cases where the financial institution only invests in equity, emissions can also be attributed to the total market capitalization. In that case, the formula for financed absolute and relative emissions are respectively:

$$\sum_c \frac{Current\ value\ of\ investment_c}{Investee\ company's\ market\ cap_c} \times investee\ company\ emissions_c$$

and

$$\sum_c \frac{\frac{Current\ value\ of\ investment_c}{Investee\ company's\ market\ cap_c} \times investee\ company\ emissions_c}{Current\ value\ of\ all\ investments\ in\ listed\ equity}$$

Asset class specific considerations

Due to the frequent use of issuance of debt-instruments through special purpose vehicles (SPVs), several technical challenges arise in relation to identifying the ultimate debtor with the carbon emissions.

Furthermore, additional challenges arise, when the corporate bonds are issued by a financial company, such as is predominantly the case in the investment grade universe. Here, data providers can report the financial company's own emissions as scope 1 and 2 and not the financed emissions, while in the case of issuances by e.g., a manufacturing company, the investor gets a more accurate picture of the company's total scope 1 and 2 emissions. This challenge should decrease when financial institutions to a larger extend publish financed CO_2 emissions on loans and investments.

Market price fluctuations

When using EVIC as the denominator, assets under management change as a result of fluctuating market prices. Under the influence of this fluctuation, an objective to reduce relative financed emissions by a certain percentage becomes a moving target. A possibility to overcome this would be to use normalized assets under management, whereby prices are held constant over the target period. The EU TEG and EU Regulation on benchmarks require, for example, the application of an inflation correction to changes in EVIC over time. In case the financial institution makes such adjustments, these should be made transparent.

Data quality

There are three different options to calculate the financed emissions from listed equity and corporate bonds depending on the emission data used, see Table 1:

- Reported emissions
- Physical activity-based emissions
- Economic activity-based emissions

Option 1: Reported emissions (score 1 and 2)

Verified or unverified emission data reported by the company is available either directly from the company or indirectly from an independent third-party data provider.

Option 2: Physical activity-based emissions (score 2 and 3)

Emissions are estimated by the reporting financial institution based on primary physical activity data collected from the borrower or investee company (e.g., megawatt-hours for produced electricity). The emission data should be estimated using an appropriate calculation methodology or tool with verified emission factors expressed per physical activity (e.g., tCO_2e/MWh) issued or approved by a credible independent body like the International Energy Agency (IEA).

Option 3: Economic activity-based emissions (score 4 and 5)

Emissions are estimated by the reporting financial institution based on economic activity data collected from the company (e.g., revenue og asset). The emission data should be estimated using official statistical data or acknowledged environmentally extended input-output tables providing region- or sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/EUR revenue or tCO_2e/EUR assets.

TABLE 1. DATA QUALITY SCORE FOR LISTED EQUITY
(1= highest data quality; 5 = lowest data quality)

Data quality	Options		Variables
1	Reported emissions	1a	Verified emission data is reported by the company and EVIC is known
2		1b	Emission data is reported by the company and EVIC is known
	Physical activity-based emissions	2a	Emission data based on the energy consumption of the company and EVIC is knownt
3		2b	Emission based on the production of the company and EVIC is known

>> continued next page

>> CONTINUED: TABLE 1. DATA QUALITY SCORE FOR LISTED EQUITY
[1 = highest data quality; 5 = lowest data quality]

Datakvalitet	Beregningsmetode		Variable
4	Economic activity-based emissions	3a	Emissions based on the revenue of the company and EVIC is known
5		3b	Emission data is based on emission factors for the sector per unit of asset
		3c	Emission data is based on emission factors for the sector per unit of revenue

When using data providers such as CDP, Bloomberg, MSCI, Sustainalytics, S&P/Trucost, ISS ESG Solutions, financial institutions should ask the providers to be transparent, to disclose the sources and the calculation methods that they use.

For corporate bonds, the same approach is used as for listed equity and where the company is the borrower. If the borrower is a subsidiary e.g., a SPV with a guarantee from the parent company, the borrower should be replaced by the group.

Limitations

Side effects of using Enterprise value (EVIC)

There is a potentially undesired side-effect related to attributing the issuer's absolute emissions to its total equity plus debt (here EVIC as defined above). While lower emissions would typically be achieved by encouraging issuers to reduce their absolute emissions (numerator), the recommended calculation methods imply that a similar effect could be achieved by increasing the denominator (either the issuer's equity or debt position or increasing equity prices, please refer to Market price fluctuations above).

Green bonds or fixed income that serve a specific climate-friendly purpose can be handled under the corporate bonds and covered bonds methodology. If specific data for the emissions and EVIC of the issuances of green bonds is available, they can be handled under the project finance methodology.

Supplementary reporting of the carbon footprints of green bond portfolios can be made. Specific assumptions can e.g., be made as to the carbon footprint of green bonds. In this case, to achieve transparency, the chosen assumptions and calculation methodologies should be disclosed.

Next steps

The next step will be to further develop the carbon footprint calculation methodology for green bonds. To achieve this, green bond issuers must be transparent about the CO_2 emissions and the total financing available for the projects financed by green bonds. Furthermore, it should be made possible to distinguish the CO_2 emissions and the total financing available for the project from the remaining part of the company's CO_2 emissions and EVIC.

2. Covered Bonds

This asset class includes all types of covered bonds including green covered bonds and Danish mortgage bonds.[5]

Covered bonds with known use of proceeds at the level of economic activity can, however, be accounted for using the method described under the project finance asset class.

Scopes covered

Investors should report the carbon footprint of mortgage bonds including the emissions from the mortgage banks underlying activities i.e., both the mortgage banks scope 1, 2 and 3 emissions. For mortgage banks issuances, scope 3 covers the underlying activities (e.g. buildings) scope 1 and 2 emissions.

Portfolio coverage

Ideally, investors total investments in covered bonds should be covered.

Attribution

The attribution rule for Danish mortgage bonds is based on emission data at the level of the capital center as per the mortgage asset class. Thus, the investor should be attributed emissions corresponding to the share of the capital center's cover pool, which the investor

[5] A Danish mortgage bond is a covered bond – funding mortgage loans granted against a mortgage on real property – and issued by a Danish mortgage bank.

finances by buying the bond. Green mortgage bonds can be attributed less CO_2 emissions. If this methodology is used, the remaining bonds from the same capital center should be attributed higher CO_2 emissions to secure that all CO_2 emissions will be attributed as if all used this methodology. Investor should disclose how green bonds are handled.

For other categories of covered bonds, the issuer's emissions should also be proportionally attributed to the investors.

Data

Generally, Danish mortgage banks disclose CO_2 emissions at capital center level. Often, full emission data coverage is not possible. In this case, investors can use an estimate for the uncovered share of the portfolio or a part of it. This estimate should take into account if the uncovered part of the investment portfolio is expected to have a higher carbon footprint than the data covered part of the portfolio. In Denmark, new buildings generally have low CO_2 emissions and good data coverage. Thus, covered bonds with no data coverage must be expected to have a higher average carbon footprint than the data covered part.

Data quality

The same approach as for listed equity where the company is replaced by the borrower.

When the use of proceeds is known, please refer to the chapter on data quality for project finance.

Data quality scores of investments in Danish mortgage bonds should reflect the data quality scores of mortgages.

Equations to calculate financed emissions

For investors in covered bonds, the absolute financed emissions are found by using an adapted version of the formula for corporate bonds:

$$\sum_i \frac{Value\ of\ investment\ in\ the\ covered\ bond}{The\ bond\ issuer's\ EVIC_i} \times Emissions\ financed\ by\ bond\ issuer_i$$

(i = bond issuer)

For investors in covered bonds, the relative financed emissions are found using an adapted version of the formula for corporate bonds, namely:

$$\sum_i \frac{\frac{Value\ of\ investment\ in\ the\ covered\ bond}{The\ bond\ issuer's\ EVIC_i} \times Emissions\ financed\ by\ bond\ issuer_i}{Current\ value\ of\ all\ covered\ bonds\ investments}$$

(i = bond issuer)

For investors in Danish mortgage bonds, the absolute financed emission from investing in this type of covered bonds issued against the cover pool are:

$$\sum_i \frac{Value\ of\ investment\ in\ the\ covered\ bond}{Total\ value\ of\ the\ cover\ pool_i} \times Emissions\ financed\ by\ the\ cover\ pool_i$$

(i = cover pool)

For investors in Danish mortgage bonds, the relative financed emissions are:

$$\sum_i \frac{\frac{Value\ of\ investment\ in\ the\ covered\ bond}{Total\ value\ of\ the\ cover\ pool_i} \times\ Emissions\ financed\ by\ the\ cover\ pool_i}{Current\ value\ of\ all\ covered\ bonds\ investments}$$

(i = cover pool)

Limitations

Green bonds, or fixed income that serve a specific sustainability purpose often related to combatting climate change, are presently handled under the corporate bond and covered bond methodology.

The carbon footprint of Danish mortgage bonds can, over time, be affected by property price developments.

Covered bonds with known use of proceeds at the level of economic activity can, however, and as mentioned in the above, be accounted for using the method described under the project finance asset class.

Next steps

The next step will be to look at possible solutions to the challenges regarding carbon footprinting of green bonds in the future.

3. Private Equity

About this asset class

Private equity includes investments in private companies through funds,[6] possibly in a fund of funds structure. A fund manager (general partner) is responsible for the dialogue with the portfolio companies and likewise for the collection of relevant data, while investors, having invested through the fund, do not have the possibility to collect data directly from the companies.

Scopes covered/boundary setting

A private equity investment entity is a fund, and it is this fund's emissions that need to be calculated, including the emissions of the fund manager/GP which can be attributed to the administration of the fund. In principle, GHG emissions are therefore reported as the manager's/GP's scope 1, 2 and 3 emissions, the scope 3 emissions consisting mainly of the underlying portfolio companies' scope 1 and 2 emissions (with the possibility of also adding scope 3 emissions).

As a rule, it can be assumed that the fund manager's/GP's activities generating GHG emissions are negligible compared to the GHG emissions of the underlying portfolio companies. For this reason – and unless there is a reason to assume otherwise – the fund manager's/GP's emissions can be disregarded to focus solely on the calculation of the portfolio companies' emissions.

Scope 1 and 2 emissions of the underlying companies are calculated, and the organizational boundaries follow the common principles that activities controlled by the portfolio company in question are included in this company's scope 1 and scope 2 emissions respectively.

The underlying portfolio companies' scope 3 emissions can be included as supplementary information if the data quality is considered to be sufficiently high. Also in this case, common principles of organizational boundaries are followed so that each portfolio company calculates emissions from up-stream and down-stream activities. The underlying portfolio companies calculate scope 3 emissions of relevant categories (GHG scope 3 inventories).

[6] Can also include investments in private funds, including real estate funds and real estate investment companies.

Portfolio coverage

Ideally, 100 % of the portfolio should be covered. It is recommended to disclose the proportion of the fund's investments that are included in the reported emission data.

Furthermore, it is recommended, if possible, to disclose how much of the report that is based on data obtained from the underlying investments and the proportion that is based on an estimate of emissions, e.g., considering geography, sector, or other things. However, in most cases, the fund manager/GP will be the only one capable of supplying this kind of data division.

Attribution

In principle, the emissions of a private equity fund (PE fund) are calculated in the same way as those of listed equity investments. The emissions are distributed between the fund and other investors in accordance with their investments and considering the company's Enterprise value (EVIC). The fund's total emissions consist of the fund's share of portfolio companies' emissions. In case of several layers of funds, additions are made considering emissions of all underlying funds.

Only emissions corresponding to realized financing are calculated. Thus, commitments that have not been realized are not included in the calculations and the PE fund's cash holdings are also considered as having zero emissions where relevant.

Data

In practice, it is difficult to obtain sufficient data concerning the CO_2 emissions of private companies. Unlisted companies - as well as companies of the size in which PE funds tend to invest - calculate and disclose less information about their CO_2 emissions than listed companies. Another obstacle may be that fund managers/GPs do not collect sufficient data from the portfolio companies even if the portfolio companies make these CO_2 emissions calculations.

It is recommended that emissions of PE funds - to the greatest extent possible – are disclosed, based on the portfolio companies disclosed emission data.

In the absence of portfolio company-specific emission data or if fund managers/GPs do not collect data and thus do not make data available to investors, it is recommended to use estimated emission data based on either:

- a bottom-up approach, if possible
- a top-down approach
- a combination of the two above mentioned approaches.

A bottom-up approach is an estimate of each portfolio company's emissions based on data concerning the company's economic activities, geographical location, use of technology, etc.

A top-down approach is an estimate of each fund's emissions based on data concerning the fund's investments in different sectors, geographies, etc.

Equations to calculate financed emissions

For calculating absolute and relative emissions of PE investments, it is recommended to use the same method as listed equity.

Below are shown the formulas for PE funds with direct investments in portfolio companies and for PE funds based on fund of funds respectively.

Absolute emissions

Financed emissions of a PE fund with direct investments in portfolio companies (i) are denoted CO_{2f}:

$$CO_{2f} = \sum_{i} CO_{2i}$$

and

$$CO_{2i} = \frac{market\ value\ of\ investment\ in\ campany\ (i)}{EVIC_i}\ x\ investee\ company\ emissions\ (i)$$

Financed emissions of a PE fund with investments in PE funds (f) are denoted CO_{2F}:

$$CO_{2F} = \sum_{f} CO_{2f}$$

Relative emissions

Relative emissions of a PE fund with direct investments in portfolio companies (i) are denoted $RelCO_{2f}$:

$$RelCO_{2f} = \sum_{f} \frac{CO_{2i}}{V_f}$$

and CO_{2i} is defined as above.

Relative emissions of a PE fund with investments in PE funds are denoted $RelCO_{2F}$ and are calculated as the weighted value of the relative emissions of the underlying funds. Each underlying fund's share of the total PE fund of funds portfolio is used as weights:

$$RelCO_{2F} = \sum RelCO2f \; x \; \frac{V_f}{V_F}$$

Asset class specific considerations

It is recommended to prioritize the collection of data to measure a PE fund's emissions e.g., based on the following criteria:

- **Energy intensity:** Portfolio companies with a high energy intensity should be prioritized over companies with a low intensity. Data concerning the companies' economic activities, geography, etc. can be used as input
- **Size of investment:** Companies which constitute a large part of the fund's investments should be prioritized
- **Share of ownership:** It can be recommended to prioritize companies in which the fund holds a large share of ownership and therefore has a more direct influence
- **Exit date:** Portfolio companies expected to stay in the portfolio can be prioritized over portfolio companies that the fund expects to sell within a relatively short period (e.g., 1-2 years)
- **Regulatory requirements:** Portfolio companies which are required to report their emission data can be prioritized.

Data quality

The used data quality hierarchy is described in Table 2 below. Generally, it is difficult to secure access to portfolio companies' emission data, corresponding to data of quality score 1a and 1b. On the contrary, emission calculations for private equity will often be based on data of the portfolio companies' physical and economic activities, corresponding to data of quality score 2 and 3. In this case, the activity data are combined with emission factors with relevant geographical (as a minimum OECD/non-OECD) or sectoral divisions (2a and 2b) or emission data disclosed through stock indexes (3a-3c) such as MSCI, an index providing several applicable emission indexes.

TABLE 2. DATA QUALITY SCORE FOR PRIVATE EQUITY
(1= highest data quality; 5 = lowest data quality)

Data quality	Options		Variables
1	Reported emissions	1a	The portfolio company's verified emission data
2		1b	The portfolio company's disclosed emission data
	Physical activity-based emissions	2a	Emission data based on the portfolio company's energy consumption
3		2b	Emission data based on the portfolio company's production measured in quantities
4	conomic activity-based emissions	3a	Emission data based on the portfolio company's revenue
5		3b	Emission data based on the emission factors for the sector per unit of asset, the sector being the sector in which the portfolio company is operating
		3c	Emission data based on emission factors for the sector per unit of revenue, the sector being the sector in which the portfolio company is operating

4. Project finance

This asset class includes project finance with known use of proceeds. More specifically, it includes on-balance sheet loan or equity with known use of proceeds at the level of economic activity, such as, the construction of a gas-fired power plant, a wind or solar project, or energy efficiency projects. For the calculation of emissions, only the financed (ring-fenced) activities are included. Emissions and financials related to existing activities outside the financed project but within the financed organization are not considered.

Scopes covered

Scope 1 and 2. Scope 3 can also be included as a supplement if possible and relevant.

Portfolio coverage

Ideally, 100 % of the project portfolio should be covered. The coverage of the project portfolio should be clearly indicated. The coverage of security types should also be stated clearly, this includes packaged products.

Attribution

The attribution for project finance is defined as the outstanding amount divided by the project size or total balance sheet of the project in question. The attribution can be based on data availability. If the debt structure cannot be easily mapped, the attribution can be based on proportion of ownership in the project.

At the start of the project, the project size is the total financing available for the project, i.e., total debt plus equity to realize the project. It is expected that in subsequent years, projects will report annually on their financials including balance sheet information (i.e., the total assets or total debt plus equity within the project). The total balance sheet can then be used as the attribution factor.

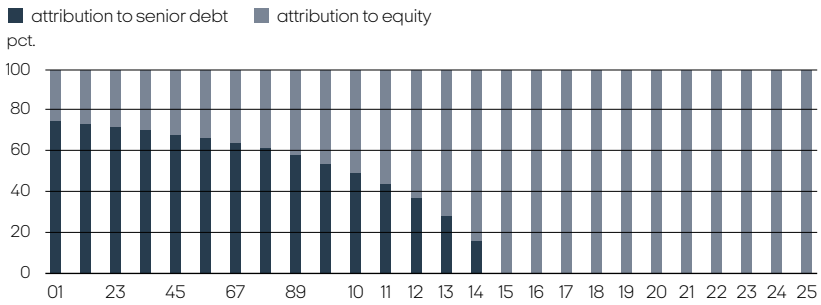
The outstanding amount is the amount of debt and/or equity provided by the individual investor.

Guarantees have no attribution, until they are called and turned into a loan.

This specific attribution rule is based on the practical experience of financial institutions participating in PCAF who have also tested alternative attribution rules.

The attribution rule is illustrated by the figure below, where initially most of the emissions from the project are attributed to debt, but as debt is repaid, then still more of the emission impact becomes attributed to the equity providers.

FIGURE 1. THE ATTRIBUTION RULE



Source: Global carbon accounting standard, November 2020

Data

Within the due diligence and monitoring of a project finance transaction, the availability of project-specific data is generally good.

Project finance is being applied to a broad range of sectors, activities, project sizes, and geographies, and there is not one broadly accepted and universally applicable set of source data and calculations available. One can, however, distinguish a hierarchy of preference, thus, providing guidance in selecting the highest quality level within the limitations of availability. This is in preferred order (as per the 2020 PCAF global standard):

1. **Reported emissions**, where audited[7] or unaudited[8] emissioner indhentes fra projektet direkte eller indirekte gennem en uafhængig tredjepart.
2. **Physical activity-based emissions**, where emissions are estimated based on primary physical activity data collected from the project (e.g., MWh of electricity produced). The emission data should be estimated using an appropriate calculation methodology or tool with verified emission factors expressed per physical activity (e.g., tCO_2e/MWh), issued or approved by a credible independent body such as the IEA.

[7] This refers to reported emissions being calculated in line with the GHG Protocol and verified by a third-party auditor.

[8] This refers to reported emissions being calculated in line with the GHG Protocol without verification by a third-party auditor (unverified emissions). Unaudited reported emissions can be wither calculated by an external party or by the investee project itself.

- **Economic activity-based emissions**, where emissions are estimated based on economic activity data collected from the project (e.g., turnover or assets). The emission data should be estimated using official statistical data or acknowledged Environmentally Extended Input Output (EEIO) tables providing region/sector-specific average emission factors expressed per economic activity (e.g., tCO_2e/EUR of revenue or tCO_2e/EUR of asset)[9]

Equations to calculate financed emissions

It is recommended to calculate the absolute emissions using this formula:

$$\sum \frac{Outstanding\ financing\ (debt\ +\ equity)_p}{Total\ project\ size\ or\ total\ assets_p} \times Project\ emissions$$

(p = project)

It is recommended to calculate the relative emissions using this formula:

$$Financed\ emissions \sum_p \frac{\Sigma\ \frac{Outstanding\ financing\ (debt\ +\ equity)_p}{Total\ project\ size\ or\ total\ assets_p} \times Project\ emissions_i}{Current\ value\ of\ the\ project\ finance\ portfolio}$$

(p = project)

Asset class specific considerations

Emission data

Although in project finance the availability of relevant project-specific data is high, relative to some of the other asset classes, expert GHG emission reports specific to the project will often not be available. Instead, the emission data will be based on project-specific source data, being calculated into emission data using sector and country specific factors.

Practicalities and insights

The International Finance Institution's (IFI's) Technical Working Group (TWG) for GHG Accounting Harmonization (IFI GHG TWG) remains the most important peer initiative regarding the accounting of GHG emissions for project finance.

[9] Sampling tests based on actual data on company level, which is extrapolated to portfolio level can help to test the accuracy of calculations based on this data from statistical and/or EEIO tables. This may also be used to refine the data for specific sectors or regions if the reporting financial institution has a strong presence in and specific knowledge of the respective sector and/or region. National agencies and regional data providers or statistical offices and more relevant financial and/or emission data information.

Particularly, their work on electricity-grid emissions (the baseline to compare power project with) is important for renewable energy finance.

Data quality

Project-specific reported and verified emissions rank highest in quality but are not always known. It is recommended to rank the data quality as specified below in Table 3.

TABLE 3. DATA QUALITY SCORE FOR PROJECT FINANCE
(1 = highest data quality; 5 = lowest data quality)

Data quality	Options		Variables
1	Reported emissions	1a	Outstanding amount and total project equity plus debt are known and verified emissions of the project is available
2		1b	Outstanding amount and total project equity plus debt are known and unverified emissions of the project is available
	Physical activity-based emissions	2a	Outstanding amount and the total project equity plus debt are known. Project emissions are based on the energy consumption of the project
3		2b	Outstanding amount and the total project equity plus debt are known. Project emissions are based on physical activity data for the project's production
4	Economic activity-based emissions	3a	Outstanding amount and the total project equity plus debt are known. Project emissions are based on physical activity data for the project's revenue
5		3b	Outstanding amount is known. Project emissions are based on data from similar projects
		3c	Outstanding amount is known. Emissions are based on data for tCO2e per euro of revenue from similar projects

Limitations

The proposed methods do not include guidance on avoided emissions and carbon sequestration, which is directly aimed at project financing. Reference is made to section 10 on reporting on avoided emissions and emission removals.

Next steps

The next step will be to try to identify solutions to the above-listed asset class specific considerations and limitations.

5. Real estate, directly owned

The asset class comprises directly owned real estate/property whether legally owned by the investor (i.e., the investor owns the property's title deed) or held by the investor via a subsidiary, SPV or otherwise.

Real estate investments in which the investor participates via e.g., real estate funds or public (or private) real estate investment companies are not included in this asset class. Real estate under construction and/or financed by loans are also exempt from the asset class.

Scopes covered

Scope 1 and 2. Scope 3 can also be included as a supplement if possible and relevant.

Portfolio coverage

Ideally, 100 % of real estate investments in line with the definition of the asset class should be covered. Depending on data availability, some part of the portfolio may be covered by best estimate figures. The percentage of the portfolio covered by estimates shall be disclosed.

Attribution

The asset owners' share of emissions corresponds to the current value of the investment in the property divided by the current value of the property.

Data

Where the asset owner has access to the real estate asset's CO2 emissions – e.g., on basis of actual utility billings/consumption data - such data in conjunction with actual or estimated data on emissions stemming from energy production (scope 2) may be used for calculating emissions from the asset.

Where actual utility billings/consumption data is not available, emissions shall be estimated.

If the real estate asset is a Danish building, the calculation of the emissions may follow the data hierarchy and methods described for the mortgage asset class.

More generally, estimates may be based on e.g.:

- Requirements regarding energy efficiency pertaining to the building regulation. Such data will typically be available for new construction in Denmark.
- Estimated consumption of energy based on thorough examination of buildings. Such data will often be available for existing buildings.
- Estimated consumption of energy based on Energy Performance Certificates; in the case of Danish EPCs (energimærker), this can be estimated as per the mortgage asset class.
- Other estimates, e.g., based on use and geographical location in combination with relevant grid emission factors (e.g., carbonfootprint.com).

In order to achieve transparency, investors should disclose the data sources used for calculations.

Equations to calculate financed emissions

It is recommended that the asset owner calculates absolute emissions from a real estate property using the following formula for financed absolute emissions:

$$\sum_b \frac{Current\ value\ of\ investment\ in\ the\ building_b}{Current\ property\ value_b} \times\ building\ emissions_b$$

(b = building)

and the following formula for financed relative emissions (adapted carbon footprint):

$$\sum_b \frac{\frac{Current\ value\ of\ investment\ in\ the\ building_b}{Current\ property\ value_b} \times building\ emissions_b}{Total\ value\ of\ real\ estate\ portfolio}$$

(b = building)

Asset class specitif considerations

For calculating absolute and relative emissions, it is suggested to use current property value.

Data quality

TABLE 4. DATA QUALITY SCORE FOR REAL ESTATE
(1 = highest data quality; 5 = lowest data quality)

Data quality	Beregningsmetode		Variable
1	Actual building emissions	1a	Primary data on actual building energy consumption (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and supplier-specific emission factors specific to the respective energy source
2		1b	Primary data on actual building energy consumption (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and average emission factors specific to the respective energy source
3	Estimated building emissions on floor area	2a	Estimated building energy consumption per floor area based on official building energy labels (1) or other relevant energy label and the floor area are available. Emissions are calculated using estimated building energy consumption and average emission factors specific to the respective energy source
4		2b	Estimated building energy consumption per floor area based on building type and location-specific statistical data (2) and the floor area are avilable. Emissions are calculated using estimatedbuilding energy consumption and average emission factors specific to the respective energy source
5	Estimated building emissions based on number og buildings	3a	Estimated building energy consumption per building type and locationspecific statistical data and the number of buildings are available. Emissions are calculated using estimated building energy consumption and average emission factors specific to the respective energy source

(1) Official Danish building energy label or other relevant energy labeling of the property. See also "Mortgages".
(2) Cf. e.g www.carbonfootprint.com

Limitations

Data availability on energy consumption of a property is still limited in many countries. In others, it has increased, e.g., due to policy regulations. As more data sources become available, it is expected that financial institutions will make use of improved data sources.Also, currently, grid emission factors may be of low quality in some places and are expected to improve over time.

Next steps

The scope of the asset class should be extended to include directly owned property with external financing. Further, the asset class should be extended to specifically account for buildings under construction, refurbishing, etc.

6. Mortgages

Asset class definition

This asset class covers mortgage loans, which are loans secured by mortgages on real property. This includes all mortgage loans granted by Danish mortgage banks and loans granted against a mortgage on real properties from commercial retail banks. Ship finance is covered by the ship finance asset class or the business loans asset class.

Property types covered are:

- Owner occupied dwellings
- Private rental housing and cooperative housing
- Subsidized housing
- Properties for social purposes
- Multipurpose commercial premises, e.g., offices and trade
- Agriculture
- Manufacturing etc.

Scopes covered

Scope 1 and 2.

Portfolio coverage

Ideally, 100 % mortgages should be covered. The financial institution should report the portfolio coverage, e.g., mortgage banks report portfolio coverage on cover pool level. If full emission data coverage is not possible, it is recommended that the institution is transparent, discloses the calculation method used, and reports which part of the portfolio is not covered and why.

Attribution

When calculating the financed emissions, it is recommended that a building's annual emissions are scaled with current loan-to-value (LTV).[10] Financed emissions may in separate statements be calculated using alternative methods e.g., by attributing 100 % of a building's annual emissions to the financial institution.

[10] "Current" meaning the time when calculating and reporting the emissions.

It is recommended that the lender calculates:

- LTV scaled total emissions
- Relative carbon emissions (carbon footprint)
- Portfolio coverage

Using two attribution factors in separate statements has several advantages. Firstly, LTV scaled total emissions illustrates the financial institution's financed emissions. Secondly, it reduces the risk of double-counting, due to the property finance system in Denmark.

Mortgage loans granted by mortgage banks have an LTV limit of 80 % for e.g., owner-occupied properties, and the limit varies across property types. On top of this, the property can be financed through mortgages granted by commercial retail banks. In many cases, a property is financed using mortgages from different financial institutions, both mortgage banks and commercial retail banks.

The model assumes that current LTV cannot be larger than 100. Hence, mortgage banks disclose LTV scaled total emissions using LTV which equals:

$$LTV_{mortgage\ bank} = min[Current\ LTV,\ 100]$$

and commercial banks disclose LTV scaled total emissions using LTV which equals:

$$LTV_{commercial\ bank} = Current\ LTV - LTV_{mortgage\ bank}$$

If Current LTV is larger than 100, then

$$LTV_{mortgage\ bank} = 0$$

Calculation of financed emissions

The annual financed emissions on portfolio level are, respectively, given by:

$$\begin{aligned} Financed\ emissions_i &= \sum_{B_i} Emission\ of\ building_{b_i} \times LTV_{b_i,t} \\ &= \sum_{B_i} Energy\ consumption_{b_i} \times LTV_{b_i,t} \times Emission\ factor_b \end{aligned}$$

where B_i are the assets in portfolio *i*, b_i isbuilding *b* i B_i, and *t* is the time of carbon accounting. The carbon footprint, or relative emissions, is given by:

$$Carbon\ footprint\ = \sum_{I} \frac{Financed\ emissions_i}{Total\ value\ of\ portfolio_i}$$

where I is the set of the financial institution's relevant portfolios.

Data quality

The availability of data on measured energy consumption or emissions of Danish buildings are limited. However, Denmark has a well-developed system for producing energy performance certificates (EPCs/"Energimærker") for building. Therefore, a large share of emissions will be based on average expected energy consumption, reflected by the EPCs, of a building funded by a mortgage loan. Conditioned on the property type, different data sources and methods can be used to calculate emissions on mortgages. It is recommended to score data quality as illustrated below in Table 5.

TABLE 5. DATA QUALITY SCORE FOR MORTGAGE LENDING
(1 = highest data quality; 5 = lowest data quality)

Data quality	Options		Variables
1	Measured energy consumption of the building	1a	The building's measured energy consumption converted to CO_2 emissions calculated using energy supply-specific emission factors.
2		1b	The building's measured energy consumption converted to CO_2 emissions calculated using average national emission factors.
3	Estimated energy consumption of the building	2a	The building's average calculated energy consumption based on official building energy labels that are valid or have been invalid in maximum five years and the floor area and converted to CO_2 emissions calculated using average national emission factors.
4		2b	The building's average calculated energy consumption based on valid official building energy labels and the floor area converted to CO_2 emissions calculated using average national emission factors.
5	Estimated average energy consumption of the building	3a	The building's average calculated energy consumption based on property type and converted to CO_2 emissions calculated using average national emission factors.

If energy supply-specific emission factors are available for buildings of data quality score 3-5, these emission factors should be used instead of using average national emission factors.

Data quality score 3-5 do not take into account the building's energy consumption for other purposes than primary heating e.g., lightning, ventilation systems and standby consumption. As data quality improves and actual consumption figures are applied, the building's energy consumption for other purposes than primary heating will be included in the calculations.

It follows from the model's principle 4 that information on data quality should be stated. Also, as it is recommended that the lender accounts for which proportion of the portfolio that CO_2 emissions are calculated, the lender can inform about the data quality for the portfolio, e.g., a cover pool. If several different data quality scores are used for the same building or property, the lowest score is disclosed.

Calculating emissions

Energy consumption can be converted to CO_2 emissions using emission factors. The Danish Energy Agency publish emission factors,[11] which are recommended to be used.[12] Thus, the annual emissions of a building can be expressed by the following:

$$Building\ emissions\ = Energy\ consumption \times\ Emission\ factor$$

Thus, the annual emissions of a property are calculated by adding the emissions of all buildings on the property.

Method 1a and 1b

It is recommended that if data with measured energy consumption or emissions is available, it is used to calculate financed emissions. Furthermore, it is recommended to use energy supply-specific emission factors if they are available (data quality score 1a):

$$Building\ emissions\ = Measured\ energy\ consumption \times\ Energy\ supply - specific\ emission\ factor$$

If energy supply-specific emission factors are not available, it is recommended to use average national emission factors (data quality 1b).

$$Building\ emissions = \ Measured\ energy\ consumption \times\ \ average\ emission\ factor$$

[11] www.hbemo.dk/haandbog-for-energikonsulenter-hb2019-gaeldende/bilag-4-energimaerkning-af-eksisterende-bygninger/vejledende-tekniske-bilag-og-tabeller/braendsel/braendvaerdier-og-co2-emissionsfaktorer

[12] Gas supplied in pipelines to buildings (pipeline gas) is composed of a mixture of natural gas and biogas. It the Danish Energy Agency publishes the emission factors for pipeline gas, this factor can be used.

Method 2a

The EPC scores for buildings in Denmark are retrieved from the Danish Energy Agency. Data are retrieved for all buildings in Denmark with a valid EPC score. The EPC score is valid for ten years. If the EPC score is known, emissions can be calculated in accordance with the following formula:

$$Building\ emissions = \frac{Need\ for\ supplied\ energy}{Energy\ factor} \times Emission\ faktor$$

The ECP score describes the expected energy consumption of a building. The ECP score takes into account both the energy supply option and the energy source used in the building. The ECP scores are illustrated in Table 6 and 7 below:

TABLE 6. EPC SCORES SINGLE-FAMILY AND MULTI-FAMILY HOUSES

EPC score	kWh/m² pr. year	EPC score	kWh/m² pr. year
A2020	27	D	< 150 + 4,200/ m²
A2015	< 30.0 + 1,000/m²	E	< 190 + 5,200/ m²
A2010	< 52.5 + 1,650/ m²	F	< 240 + 6,500/ m²
B	< 70.0 + 2,200/ m²	G	> 240 + 6,500/ m²
C	< 110 + 3,200/ m²		

Source: The Danish Energy Agency

TABLE 7. EPC SCORES FOR MULTIPURPOSE COMMERCIAL PREMISES (OFFICES AND TRADE) AND PUBLIC BUILDINGS

EPC score	kWh/m² pr. year	EPC score	kWh/m² pr. year
A2020	33	D	< 175 + 4,200/ m²
A2015	< 41 + 1,000/m²	E	< 215 + 5,200/ m²
A2010	< 71.3 + 1,650/ m²	F	< 265 + 6,500/ m²
B	< 95.0 + 2,200/ m²	G	> 265 + 6,500/ m²
C	< 135 + 3,200/ m²		

Source: The Danish Energy Agency

If a building has several valid EPCs, the most recent EPC is used. EPCs may cover several buildings of a property, and thus a building may have several valid EPCs. In such cases, the most recent EPC of each building is used.

To calculate the energy consumption of a building, the method uses the average of the minimum and maximum consumption for a given EPC score. The calculations are based on a building's calculated energy consumption based on its EPC. As the EPC score G does not have an upper limit and, thus, an average cannot be calculated, it is recommended to use 360 kWh/m² for single-family and multi-family houses and 460 kWh/m² for multipurpose commercial premises (offices and trade) and public buildings.

The energy factors used to calculate EPCs have been changed as of 30 June 2018.

TABLE 8. ENERGY FACTORS

EPC date	Heating source	
	Electricity	District Heating
Before 30-6-2018	2.5	0.8
After 30-6-2018	1.9	0.85

Energy consumption calculations based on the building's EPC can be adjusted in accordance with below formula, thus taking energy factor changes into account:

EPC date before 30-06-2018:

$$Energy\ consumption\ (kWh) = \frac{EPC\ \left(\frac{kWh}{m2}\right) x\ floor\ area\ (m2)}{Energy\ factor_{old}}$$

EPC date after 30-06-2018:

$$Energy\ consumption\ (kWh) = \frac{EPC\ \left(\frac{kWh}{m2}\right) x\ floorarea\ (m2)}{Energy\ factor_{new}}$$

EXAMPLE 1.

CO_2 emissions for a detached house, heated floor area is 100 m², EPC score 'A2015' after 30-06-2018 and heating source is district heating:

$$Calculated\ energy\ consumption = \left(0.5 \times \left(27 + 30 + \frac{1000}{100}\right)\right) \times 100 = 3350\ kWh/year,$$

And using the energy factor (0.85) and emission factor (0.065 kg CO_2/kWh) for district heating yields:

$$CO_2\ emissions\ = \frac{3350\ kWh/year}{0.85} \times 0.065\ kg\ CO_2/kWh\ = 256.2\ kg\ CO_2\ /year.$$

If the building's heated floor area is unknown, the building's total housing and commercial area is used.

Method 2b

The method estimates an EPC score for a building based on a distribution of EPC scores made from buildings with valid EPC scores. The distributions are calculated based on building type, area, year of construction and primary heating source. The categories can be found in Annex A. If sufficient information is not available, some factors can be omitted from the calculation.

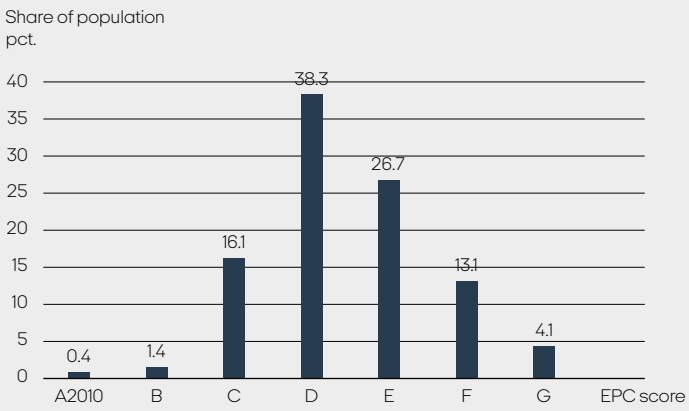
A building with no EPC score or an EPC score which has been non-valid for more than five years is assigned with a distribution of EPC scores. Using the same principle as in other methods, the method uses the average of the minimum and maximum consumption for a given EPC score.

EXAMPLE 2.

CO_2 emissions for a detached house, heated floor area is 100 m2, unknown EPC score, house situated in an urban municipality, year of construction is 1955 and primary heating source is natural gas.

The distribution of EPC scores for buildings of same characteristics is illustrated in figure 2 below.

FIGURE 2. Distribution of EPC scores for detached houses, situated in an urban municipality, constructed between 1951 and 1960 and with primary heating source 'natural gas'.



Source: The Danish Energy Agency and Finance Denmark

Using figure 2 yields:

$$
\begin{aligned}
&Calculated\ energy\ consumption\ per\ m^2 \\
&= 0\,\% \times 0.5 \times (0 + 27) \\
&+ 0\,\% \times 0.5 \times \left(27 + 30 + \frac{1000}{100}\right) \\
&+ 0.4\,\% \times 0.5 \times \left(30 + \frac{1000}{100} + 52.5 + \frac{1650}{100}\right) \\
&+ 1.4\,\% \times 0.5 \times \left(52.5 + \frac{1650}{100} + 70 + \frac{2200}{100}\right)
\end{aligned}
$$

continued next page >>

>> CONTINUED: EXAMPLE 2.

$$+ 16.1\,\% \times 0.5 \times \left(70 + \frac{2200}{100} + 110 + \frac{3200}{100}\right)$$
$$+ 38.3\,\% \times 0.5 \times \left(110 + \frac{3200}{100} + 150 + \frac{4200}{100}\right)$$
$$+ 26.7\,\% \times 0.5 \times \left(150 + \frac{4200}{100} + 190 + \frac{5200}{100}\right)$$
$$+ 13.1\,\% \times 0.5 \times \left(190 + \frac{5200}{100} + 240 + \frac{6500}{100}\right)$$
$$+ 4.1\,\% \times 360 = 192.7\ kWh/m^2/year$$

and hence:

$$Calculated\ energy\ consumption\ =\ 192.7\ kWh/(m^2 \times \text{år}) \times 100\ m^2 = 19270\ \ kWh/year$$

Using the emission factor for natural gas (0.204) yields:

$$CO_2 - emissions\ =\ 19270\ kWh/year\ \times 0.204\ kg\ CO_2/kWh\ = 3931.1\ kg\ CO_2\ /year$$

The methodology results in both absolute emissions per building, and also emissions relative to loan size and property value. In addition, both total emissions and carbon footprint are measured.

The absolute emissions are calculated in tCO_2 and is the sum of a financial institution's financed emissions for all relevant portfolios, e.g., cover pools for mortgage banks. Carbon footprint, or relative emissions, can also be calculated based on total value of a financial institution's portfolios, e.g., the market value of a mortgage bank's cover pool, i.e., the total outstanding covered bonds. Both absolute and relative emissions will be determined by the portfolio coverages.

Asset class specific considerations

Mortgages cover loans secured on real property. The method to calculate emissions and data availability is dependent on the property type. This section covers specific considerations for relevant property types.

Owner-occipied dwellings

For owner occupied dwellings, the method for calculating CO_2 emissions follows the recommendations in the Data quality section using table 6. If the EPC scores of owner-occupied dwellings cover the building, the distribution of CO_2 emissions are calculated based on each dwelling's area, provided by The Central Register of Buildings and Dwellings (BBR) in Denmark.

Holiday houses are a subgroup of owner-occupied dwellings. However, there exist only few EPC scores for holiday houses since owners are not obligated to show a valid EPC score when selling the house. When calculating the CO_2 emissions for holiday houses, it is recommended to use average numbers produced by the Danish Energy Agency and Danish Building Research Institute.[13] On average, the energy consumption per holiday house is approximately 1917 kWh per year not including energy consumption used for appliances. Most holiday houses have electricity as heating source, thus using the energy factor for electricity, the estimated net energy consumption per year per holiday house is on average 1009 kWh. The use of average emissions based on property type, in this case holiday houses, will result in a data score of 5. If better data is available for individual holiday houses, it is recommended that this data is used.

Private rental housing and cooperative housing

For private rental housing and cooperative housing, the method for calculating CO2 emissions follows the recommendations in the Data section using table 6. The same method is recommended for cooperative housing, where the loan is granted against the legal rights to use a specific share of the property (andelsbevis).

Subsidized housing

For subsidized housing, the method for calculating CO_2 emissions follows the recommendations in the Data section using table 6. Also, it is recommended that LTV scaled total emissions using LTV which equals 100 are used for subsidized housing.

Properties for social purposes

For properties for social purposes the method for calculating CO_2 emissions follows the recommendations in the Data section using table 7.

Multipurpose commercial premises e.g., offices and trade

For multipurpose commercial premises, e.g., office buildings and trade, the method for calculating CO_2 emissions follows the recommendations in the Data section using table 7. For funding of other business activities within the multipurpose premises, the method for calculating CO_2 emissions follows the business loans asset class.

Agriculture

For agricultural properties below 10 hectares the method for calculating CO_2 emissions follows the recommendations in the Data section using table 6. For agricultural properties above 10 hectares the method for calculating CO_2 emissions follows the business loans asset class.

[13] www.sparenergi.dk/forbruger/boligen/sommerhus/skal-du-koebe-sommerhus

Manufacturing etc.

For loans granted to commercial customers in properties with manufacturing etc. purposes, the method for calculating CO_2 emissions follows the business loans asset class. If relevant, the method used to calculate CO_2 emissions for multipurpose commercial premises can be used for loans granted specifically to office buildings (e.g., headquarter facilities) even when the main activity of the company is in other sectors, e.g., manufacturing. For loans granted to private customers, the method for calculating CO_2 emissions follows the recommendations for multipurpose commercial premises.

Properties with mixed purposes

In some cases, a property may have several purposes, e.g., both residential and commercial. Depending on data availability, it is recommended that different methods are used to calculate the CO_2 emissions using the share of different purposes for a given property, e.g., 80 % is calculated using the method for owner-occupied dwellings and 20 % is calculated using the method for multipurpose commercial premises. If it is not possible to make a split, it is recommended to use the method which covers the largest share of purposes, e.g., to use the method for owner-occupied dwelling for the entire property.

Properties without energy consumption

For all properties without a direct heating source, the carbon emissions will be set at 0. This includes for instance unheated warehouses or parking facilities.

Limitations

In Denmark, mortgage loans are granted where the borrowers' use of the proceeds is not known to the lender. Besides loans granted to purchase a house or other property, it can be loans granted to finance a house extension or other consumption spending with unknown emissions. These loans are covered in all cases by this manual, and the emissions for the financed activity will therefore reflect the mortgage, i.e., of the emissions of the property, independently of how the borrower ultimately uses the proceeds of his loan.

Denmark has a well-developed system for producing EPCs for buildings. However, the EPCs reflect the expected energy consumption of a building and not the actual energy consumption, which might under- or overestimate consumption for some buildings. Methods using EPCs are based on a building's net energy consumption. The model only includes the part of a building's energy consumptions, which ensures a standard temperature, decided by the Danish Energy Agency, inside the property. The methods do not consider what temperature individual households set, as well as it does not include energy consumption used for appliances.

Most privately owned properties do not have a valid EPC, and the EPC is estimated using the method described above. Looking at an individual building, the estimated energy con-

sumption may be too low or high, however, on a portfolio level, the approach is reasonable.

Emissions of greenhouse gasses from production of electricity and heating is almost entirely CO_2. Thus, using the methods described, only CO_2 emissions and not emissions from other greenhouse gasses are calculated.

Next steps

The guidelines and recommended methodology will be further developed, aiming for increasing portfolio coverage and higher data quality.

Mortgages - Appendix A

The method to estimate an EPC score for a building is based on a distribution of EPC scores made from buildings with valid EPC scores. The distributions are calculated based on building type, area, year of construction and primary heating source.

In the distribution of EPCs for properties in portfolios without a valid EPC, the following categories are used:

Building type	Area	Year of construction	Primary heating source
Detached houses	Urban municipalities	< 1890	Biogas
Terraced, linked or semi-detached houses	Intermediate municipalities	1891-1930	Electricity
Multi-dwelling houses	Rural- and outlying municipalities	1931-1950	District heating
Multipurpose commercial premises		1951-1960	Coal
Farmhouses		1961-1972	Natural gas
Properties for social purposes		1973-1978	Oil
		1979-1998	
		1999-2006	
		2007-2010	
		> 2010	

Building type

The building type is determined by the code for use of buildings provided by the Central Register of Buildings and Dwellings (BBR) in Denmark:[14]

Use of EPC score	Building type	Code of use
Single-family and multi-family houses	Detached houses	[120 ; 122], [185; 190]
Single-family and multi-family houses	Terraced, linked or semi-detached houses	[130 ; 132]
Single-family and multi-family houses	Multi-dwelling houses	[140 ; 160]
Single-family and multi-family houses	Farmhouses	110
Multipurpose commercial premises (offices and trade) and public buildings	Multipurpose commercial premises	[320 ; 390] , [410 ; 490]
Multipurpose commercial premises (offices and trade) and public buildings	Properties for social purposes	[520 ; 539]

Area

The area is determined by the municipality code and is categorized using the following table:

Urban municipality	Intermediate municipality	Rural or outlying municipality
101	183	306
147	185	326
151	260	360
153	316	376
155	320	390
157	329	400
159	330	420
161	336	430
163	340	440
165	370	450
167	410	479
169	607	480
173	615	482

Urban municipality	Intermediate municipality	Rural or outlying municipality
175	630	492
187	710	510
190	727	530
201	740	540
210		550
217		561
219		563
223		573
230		575
240		580
250		657
253		661

continued next page >>

[14] teknik.bbr.dk/kodelister/0/1/0/BygAnvendelse

>> continued

Urban municipality	Intermediate municipality	Rural or outlying municipality
259		665
265		671
269		706
270		707
350		730
461		741
621		756
746		760
751		766
851		773
		779

Urban municipality	Intermediate municipality	Rural or outlying municipality
		787
		791
		810
		813
		820
		825
		840
		846
		849
		860

Primary heating source

The primary heating source is determined by the codes provided by BBR in Denmark and the EPC data provided by the Danish Energy Agency. "Heatsupply" is a variable distributed when calculating the EPC of a building.

The table below shows a hierarchy which means that the first category that fits the observation should be used.

If a field in a row is empty, the definition is valid despite all other information. If several fields in a row are filled, all criteria must be met.

Coal and coke are not included in the table below, as they cannot be used as primary heating source for private use.

BUILDINGS WITH EPC

Heating installation	Heating	Heating supply	Definition
District heating/ Block heating (1)			District heating
		District heating	District heating

>> continued next page

>> CONTINUED: BUILDINGS WITH EPC

Heating installation	Heating	Heating supply	Definition
Heat pump,Electric heating (5.7)			Electricity
	Electricity (1)		Electricity
		Electricity	Electricity
	Natural gas (7)		Natural gas
	Liquid fuel (3)		Oil
	Solid fuel (4)	Biogas, Briquettes, Corn, Wood, Wood Chips, Wood Pellets, Straw, Straw Pellets, Rape Oil	Biofuel
	Straw (6)		Biofuel
		Biogas, Briquettes, Corn, Wood, Wood Chips, Wood Pellets, Straw, Straw Pellets, Rape Oil	Biofuel
		City gas, Natural gas	Natural gas
		Fuel gas oil, Fuel oil	Oil
	Solid fuel (4)		Biofuel
All not defined above			Not defined

BUILDINGS WITHOUT EPC

Heating installation	Heating	Heating supply	Definition
District heating/ Block heating (1)			District heating
Heat pump / Electric heating (5,7)			Electricity
	Electricity (1)		Electricity
	Natural gas (7)		Natural gas
	Liquid fuel (3)		Oil

>> continued next page

>> CONTINUED: BUILDINGS WITHOUT EPC

Heating installation	Heating	Heating supply	Definition
	Solid fuel (4)		Biofuel
	Straw (6)		Biofuel
All not defined above			Not defined

7. Business loans

Asset class definition

This asset class covers commercial loans. Business loans for ring-fenced activities are covered by the project finance asset class. Furthermore, loans secured by mortgages on real properties or by large vessels are mainly covered by the respective asset classes for Mortgages[15] and Ship Finance.

Scopes covered

Scope 1 and 2. Scope 3 can also be included as a supplement if possible and relevant.

Portfolio coverage

The coverage of the portfolio should be disclosed by the financial institution. Emissions from business-lending activities can cover both domestic and cross-border lending from Denmark and from the financial institutions' subsidiaries and branches abroad. Off-balance credit products are not necessarily covered nor small and highly volatile exposures (e.g., credit facilities linked to current accounts). Revolving credit facilities can also be excluded.

Attribution of emission

The lender accounts for a portion of the emissions of the financed company determined by the ratio between the lender's exposure and value of the company (attribution factor). The value of the exposure shall be end of year.

[15] Except for properties with manufacturing etc. purposes as for agricultural properties above 10 hectares and funding of other business activities within multipurpose premises.

Equations to calculate financed emissions

If several data sources are available, data with the highest quality according to the following hierarchy should be used, unless specific reasons suggest otherwise. In the latter case, such reasons should be disclosed.

If financial institutions have data on scope 1 and 2 emissions from the company, the financed emissions are calculated by multiplying the attribution factor by the emissions of the borrower company. The total financed emissions are calculated as follows:

For absolute emissions this is:

$$\sum_{c} \frac{Outstanding\ amount_t}{EVIC\ or\ Total\ balance_c} \times\ Company\ emissions_c$$

(c = company)

For relative emissions this is:

$$\sum_{c} \frac{\frac{Outstanding\ amount_t}{EVIC\ or\ Total\ balance_c} \times\ Company\ emissions_c}{All\ business\ loans}$$

(c = company)

For business loans to listed companies, the denominator of the attribution factor is defined as EVIC of the respective companies if available. For unlisted companies, the denominator is total balance sheet.

In case the company does not directly report its scope 1 and 2 emissions, the absolute financed emissions can be estimated with the approach using company specific revenue data and data on emissions and revenue for the relevant sector:

$$\sum_{c} Sector\ absolute\ emissions \times \frac{Revenue\ company_c}{Revenue\ sector} \times \frac{Oustanding\ amount_c}{EVIC\ or\ Total\ balance_c}$$

(c = company)

An alternative to company revenue is to use a measure of the company's physical output in a variant of the above formula in combination with the relevant emission factor.

Alternatively, when company data is not readily available on specific emissions, physical output or revenue, then average emission data can be used for the sector (or the

relevant sub sample of the sector). In this case, the recommended formula for using sector data for the attribution of total emissions is:

$$\sum Sector\ absolute\ emissions \times \frac{Outstanding\ amount\ sector_s}{Total\ balance\ sector_s}$$

(s = sector)

The relative emission is total financed emission divided by the total amount lent to the business.

The financial institution should disclose what percentage of its financed emissions through business loans relates to:

- Company specific data on its scope 1 and 2 emissions
- Physical output and/revenue company data and emission factors on its scope 1 and 2 emissions
- Total sectoral balance sheet and emission factors on its scope 1 and 2 emissions

Data

There are several possible sources, including:

- Company reports (CSR reports)
- Third-party providers (data vendors) of ESG data on companies
- EU's Emission Trading System (EU ETS) covers big emitters of greenhouse gas emissions, and data on these companies are available from the authorities (www.ens.dk/ansvarsomraader/co2-kvoter/stationaere-produktionsenheder/co2-rapportering-og-returnering): These data only cover scope 1 emissions, however
- The Climate Compass (www.klimakompasset.dk): Can calculate scope 1, 2 and 3 emissions.

Data quality

The financed emissions are calculated from the available data for the specific company. The quality of data will be improved as information about the specific company increases. There are three different options to calculate the financed emissions from business loans:

- Reported emissions (score 1 and 2)
- Physical activity-based emissions (score 2 and 3)
- Economic activity-based emissions (score 4 and 5)

Reported emissions (score 1 and 2)

The reported emissions are collected by lender og investor directly (e.g., company sustainability report) or indirectly via verified third-party data providers (e.g., CDP). Also unverified emissions are part of this category with a data quality score 2.

Physical activity-based emissions (score 2 and 3)

Emissions are estimated by physical activity-based data from the lender or investor (e.g., megawatt-hours of natural gas consumed, or tonnes of steel produced). The emission data should be expressed per physical activity e.g., tonnes CO_2/tonnes of steel).

Economic activity-based emissions (score 4 and 5)

Emissions are based on data for the economic activity (e.g., revenue, or total balance). It is recommended to use statistical data for regional or sector specific average emissions per economic activity (e.g., tonnes CO_2/revenue or tonnes CO_2/assets).

TABLE 9. DATA QUALITY SCORE FOR BUSINESS LOANS
(1 = highest data quality; 5 = lowest data quality)

Data quality	Option		Variable
1	Reported emissions	1a	Verified emissions of the company are available and EVIC or balance sheet are available
2		1b	Unverified emissions of the company are available and EVIC or balance sheet are available
	Physical activity-based emissions	2a	Emissions are calculated using primary physical activity data for the company's energy consumption. EVIC or balance sheet information are available
3		2b	Emissions are calculated using the company's production. EVIC or balance sheet information are available

>> continued next page

>> CONTINUED: TABLE 9. DATA QUALITY SCORE FOR BUSINESS LOANS
(1 = highest data quality; 5 = lowest data quality)

Data quality	Option		Variable
4	Economical activity-based emissions	3a	Emissions are calculated using the company's revenue. EVIC or balance sheet information are available.
5		3b	Emissions factors for the sector per unit of asset are known (e.g. tCO_2e per. euro of asset in a sector
		3c	Emissions factors for the sector per unit of revenue are known (e.g. tCO_2e per. euro of revenue earned in a sector

Company specific data

Many listed companies provide data already, which is often also available from third-party providers of ESG data. For companies in specific branches, other existing sources could be exploited.

EU's Emission Trading System (EU ETS) covers the large carbon emitting Danish companies.

The Danish agricultural sector has a project (at their research centre SEGES) that should enable the provision of individual data on emissions at farm level.

Furthermore, the Danish Business Authority is publishing the so-called "Climate Compass", where companies can calculate their own scope 1 and 2 (and 3) emissions based on input about e.g., energy consumption, purchase of electricity and heating divided on sources of energy.

Sector data

Finance Denmark provides data from Statistic Denmark, Green National Accounts covering scope 1 and 2 emissions broken down by sectors and subsectors in the Danish economy, both in absolute terms and relative to the sector turnover. Statistics Denmark also provides data for total lending as well as total assets for the relevant sectors and subsectors.

Asset class specific considerations

CO_2 emission data are at present only scarcely available for the small and medium-sized enterprises that constitute a significant part of the Danish companies. Each bank focuses its efforts to gather better emission data from those commercial customers contributing the most to the financed emissions of the bank. In the Danish economy, such customers are likely to be in the following sectors: Agriculture, transportation, manufacturing, and energy production. However, some banks may experience that enterprises in other sectors are more relevant.

Some initiatives are underway that will enlarge provision of company-specific data at national and EU level[16] However, improving methodologies and increased precision in the data can make it difficult to compare estimates from one year to the next as such changes both reflect improved methods and genuine changes in the financed emissions.

Limitations

Average values do not reflect how individual companies are improving and reducing their emissions. This emphasizes the need to increase the coverage rate of calculated emissions based on company-specific data over time.

The data is the latest available data when calculating the emissions. This will in many cases imply a mismatch between the financial and emission data due to a lack in emission data publications.

Next steps

Focus will be on increasing the share of corporate lending where financed emissions are calculated from data collected at company-level.

[16] The Corporate Sustainability Reporting Directive (CSRD) was adopted in 2022, and the adoption of final reporting standards will follow. Large companies will begin this reporting in 2025 for the fiscal year 2024.

8. Shipping Finance

This asset class refers to the financial institutions' on-balance sheet exposure - including loans, syndicated loans, club deals, and guarantees – secured by mortgages on a vessel or finance leases secured by title over vessels. The scope includes vessels that fall under the scope of the International Maritime Organization (IMO) (i.e., vessels that are engaged in international trade and are 5,000 gross tonnage (GT) or above).

Scopes covered

Scope 1 and 2.

Portfolio coverage

The coverage of the portfolio should be communicated by the financial institution. Emissions could cover all ship finance secured by a mortgage in vessels above 5,000 Gross Tonnage (GT) and trading internationally. Small vessels (below 5,000 GT) are not included in the scope of international regulation (both IMO and EU regulation) which requires ship owners to collect and report fuel consumption data. Hence, data for these vessel types and vessels that only trade domestically is likely less available than in the case of larger vessels, and emissions will often have to be estimated using other methods. If the institution does not have data for vessels, one should apply the methodology of the business loans asset class. Furthermore, if the institution is not part of the Poseidon Principles,[17] or exposures to ships are not deemed to be significant, the business loans asset class should also be used.

Attribution of emission

The lender accounts for a share of the emissions of the financed vessel determined by the ratio between the outstanding exposure and the value of the vessel at the time of the origination of the loan (the attribution factor).[19]

Equations to calculate financed emissions

The total financed emissions are calculated by multiplying the attribution factor with the emissions from the vessels.

$$\sum_{c} \frac{Outstanding\ amount_t}{Value\ of\ the\ vessel\ at\ origination_c} \times\ Vessel\ emissions_c$$

(c = vessel)

The relative emissions (footprint):

$$\sum_{c} \frac{\frac{Outstanding\ amount_t}{Value\ of\ the\ vessel\ at\ origination} \times\ Vessel\ emissions_c}{All\ loans\ to\ vessels}$$

(c = vessel)

[17] IIMO DCS and EU Monitoring Reporting and Verification – both regulations implementing data collection and reporting schemes for shipowners requiring shipowners to collect fuel oil consumption data enabling calculation of CO_2 emissions.

[18] See www.poseidonprinciples.org

[19] If the attribution factor is significantly above 100 per cent due to loans being given at company level rather than to individual vessels, the business loans manual could be used.

Where the vessels' emissions can be calculated by multiplying the annual fuel consumption of the vessel (t) with the fuel emission factor (e.g., tCO_2/t heavy fuel oil):

$$\sum_{v} Fuel\ consumption_v \times Fuel\ emission\ factor_f$$

(v = vessel, f = fuel type)

Data

The IMO Data Collection System regulation (DCS) specifies the data to be collected and reported for each calendar year for ships which are 5,000 GT and above engaged on international trade. It includes:

- The amount of fuel consumption for each type of fuel in metric tonnes
- Distance travelled in nautical mile

Since the data reported is not published on individual ships, financial institutions must obtain the same data directly from the shipowners. However, an international data exchange platform is being developed for the use of the Poseidon Principles Signatories. The financial institution can receive data on the value of the vessel at loan origination from the shipowners or brokers.

Data quality

TABLE 10. DATA SCORE FOR SHIP FINANCE
(1 = highest data quality; 5 = lowest data quality)

Data quality	Options		Variables
1	Reported emissions	1a	Primary data on actual ship fuel consumption and fuel type emission factors are available
2		1b	Primary data on actual ship distance traveled and fuel type emission factors are available. Fuel consumption is estimated
	Physical activity-based emissions	2a	Distance travelled is estimated. Fuel type emission factors are vaiolable. Fuel consumption is estimated

Calculation of financed emissions meets data quality 1.

Limitations

Ship finance to smaller vessels and some specific ship types not included in the scope of the Poseidon Principles are not covered.

Next steps

One of the next steps will be to look more into improving access to data for all financial institutions providing ship finance and seeking alignment between measurement of emissions from large and small vessels.

9. Motor Vehicle Loans (and leasing vehicles to private customers)

This asset class refers to on-balance sheet loans and leasing contracts used to finance one or several motor vehicles for private consumers.

Scopes covered

Scope 1 and 2. Scope 3 can be included as a supplement if possible and relevant.

Portfolio coverage

Carbon emissions related to new car loans and newly leased cars are calculated if readily available. The institution should calculate emissions on car loans and on newly leased cars separately. This follows from the fact that according to the GHG Protocol, emissions related to leased cars are placed under category 13 (downstream leasing) while the rest of the financed emissions in this manual are characterized as emissions under category 15 (loans and investments).

The quality of the data will gradually improve since data on use of fuel from all new cars are available from the Worldwide Harmonized Vehicle Test Procedure (WLTP) and data on distance traveled should improve. Lack of data will especially be a problem for older cars. For some of these cars, older emission tests as New European Driving Cycle (NEDC) are available, and they can be converted to WLTP using a conversion factor. If NEDC is not available for the car, average emissions for private cars from the Danish Center for Environment and Energy (DCE) can be used.

Attribution

The attribution factor for consumer motor vehicle loans is based on the institutions' data on lending and the value of the car including taxes at loan origination. In case of lack of data, the emissions will be fully attributed to the institution providing the car loan. The leasing company will have an attribution factor of 100 % of the value of the car.

The emission can be calculated by multiplying the efficiency (e.g., diesel/km) with the vehicle distance traveled (km) and the vehicle fuels emissions factor (e.g., kg CO_2/l diesel) weighted with the attribution factor.

Calculation of emissions from motor vehicle loans to private customers

$$\sum_{v} Efficiency_v \times Distance\ travel_v \times Emission\ factor_f \times \frac{Loan\ at\ origination_v}{Value\ of\ the\ car\ at\ loan\ origination_v}$$

(v = vehicle, f = fuel type)

Calculation of emissions from leased cars to private customers

$$\sum_{v} Efficiency_v \times Distance\ travel_v \times Emission\ factor_f$$

(v = vehicle, f = fuel type)

Data

The financed emissions for loans/leasing are calculated using available data about the car and data from the authorities.

The emission factors for the different fuel types are based on the yearly publication from the Danish Energy Agency[20] See Annex A for the emission factors for electricity.

The Danish Center for Environment and Energy (DCE) provides data for average distance traveled in kilometers and average use of fuel which can be used if no data are available from WLTP or NEDC. The latter will often be available for new cars.

[20] ens.dk/sites/ens.dk/files/CO2/energistyrelsens_standardfaktorer_for_2021-25-01-2022.pdf

It is recommended that emissions are calculated based on averages broken down by fuel types:

- Petrol
- Diesel
- Electricity
- PHEV (Plug-In Hybrid Vehicle)

Data quality

Data quality will be improved as more information about the individual cars increases. Three different levels of data quality are available:

- Actual vehicle-specific emissions (Score 1)
- Estimated vehicle-specific emissions (Score 2+3)
- Estimated vehicle-unspecific emissions (Score 4+5)

Actual vehicle-specific emissions (Score 1)

Emissions are calculated based on vehicle-specific fuel consumption from WLTP and the actual vehicle distance traveled scaled with the relevant emission factor. If the actual vehicle fuel consumption is known, this will be used.

Estimated vehicle-specific emissions (Score 2)

Emissions are estimated based on vehicle-specific fuel consumption from WLTP and the estimated distance traveled. This is scaled by the relevant emission factor.

Estimated vehicle-unspecific emissions (Score 4)

Emissions are based on estimated fuel consumption and distance traveled from DCE scaled by the relevant emission factor.

There are not specific requirements for the calculation of the average distance traveled. Information from the DCE gives the financial institutions the possibility to get more precise data by using the following categories for the cars: type of fuel, Euro emissions standard (euronorm) and size of motor. This will however not affect the data score.

Limitations

TABEL 11. DATA QUALITY SCORE FOR MOTOR VEHICLE LOANS AND LEASING VEHICLES FOR PRIVATE CUSTOMERS

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

Data quality	Options		Variables
1	Actual vehicle-specific emisisons	1a	Actual vehicle consumption
		1b	WLTP (km/l), actual distance traveled and known type of fuel
2	Estimated vehicle-specific emissions	2a	WLTP (km/l), estimated distance traveled and known type of fuel
4	Estimated vehicle-unspecific emissions	3a	Estimeret efficiency (km/l), estimated distance traveled and estimated type of vehicle

WLTP methods test all new cars by a standard lab test of car use, where the primary target is to get test data allowing one to compare different types of vehicle's emissions and efficiency. Older cars, however, will not have WTLP or NEDC emission tests and cannot be calculated at this level of data quality.

The financial institutions' loan portfolio typically has both new and old cars. This is particularly relevant in Denmark, where high taxes on purchase of new cars imply that cars tend to be used longer than in other countries. Financial institutions are encouraged to describe how total lending and emissions are divided into the different options for estimates of financed emissions.

Emissions of hybrid vehicles varies considerable depending on the actual mix of petrol/diesel and electricity used for travelling. It is difficult to get reliable data on actual consumption leading often to the use of test data in combination with assumptions on mix of fuel type.

Asset class specific considerations

The Danish Council on Climate Change has tested car types in a life span including scope 3, which can be used as a supplement to scope 1 and 2.

Next steps

In a later version, Finance Denmark plans to focus on emissions from commercial vehicles. Also scope 3 emissions for especially electric and hybrid cars is an area for future analysis.

Motor Vehicle Loans (and leasing vehicles to private customers) - annex A

Emission factors for electricity as fuel

The yearly energy statistics from the Danish Energy Agency[21] shows the annual production of electricity in Denmark in Terra Joule (TJ) and the yearly emission from production of electricity in 1000 Tonnes CO_2.

With data from 2020 the emission factor will be:

$$Emission\ factor_{El} = \frac{3.784\ 1000T\ CO2}{103.441\ TJ} = 36{,}58\ TCO_2/TJ$$

The emission factor can be calculated as gCO_2 emission per Watt-hour (Wh) by converting electricity production from Joule to Watt-hour:

$$Emission\ factor_{El} = \frac{3.784\ 1000T\ CO2}{103.441\ x\ 0{,}000278\ TWh} = 131{,}59\frac{1000TCO_2}{TWh} = 131{,}59\ x\frac{10^9}{10^{12}} = 0{,}13$$

[21] ens.dk/service/statistik-data-noegletal-og-kort/maanedlig-og-aarlig-energistatistik

10. Reporting of avoided CO_2 emissions and CO_2 emission removals

The financial sector can finance several initiatives that either contribute to reducing or even removing greenhouse gas emissions from the atmosphere. In the first case, CO_2 emissions are avoided/saved, and they can be calculated separately, but cannot be subtracted.

1. Reduction of CO_2 emissions: Emission reduction contributes to limiting the increase in the CO_2 content of the atmosphere. Production processes – not least energy production – based on more energy-efficient processes contribute to reducing emissions, but reduction of CO_2 emissions can also consist of avoiding emissions e.g., by replacing fossil energy production with renewable energy or by physically collecting and storing carbon, e.g., when installing CCS (Carbon Capture and Storage) in industrial facilities or in conventional energy production. The purchase of certified CO_2 credits can also help to reduce CO_2 emissions.

2. Removal of CO_2 emissions: In contrast to reduction, only the removal of CO_2 from the atmosphere can lead to a sustained reduction of the atmosphere's absolute CO_2 content. CO_2 removal can be achieved e.g., by increasing:

- New forest planting
- Commercial forestry with growing forest and increased CO_2 removal over time and/or
- Conversion of atmospheric CO_2 to solid form for long-term storage. Including the effects that, e.g., wooden products for the building and construction industry have when storing CO_2, as well as the effect of replacing high CO_2-emitting construction materials, or by combining biofuel (bioenergy) with CCS.

Generally, CO_2 removal will be beneficial due to the physical removal of already existing CO_2 from the atmosphere. A prerequisite, however, is that CO_2 removal does not simultaneously cause a receding focus from also driving the green transition with the aim of reducing CO_2 emissions across economic activity. This is reflected in several international initiatives for financial companies, e.g., Net-Zero Asset Owner Alliance, where a hierarchy of mitigation actions is recommended, with CO_2 reductions as the primary in the hierarchy. This is due to the necessity of a green transition to be able to limit the global temperature increase in line with the Paris Agreement, in order not to risk that a focus on CO_2 removal fails to address the high starting point and thus maintain or increase an unsustainable starting point for net-zero emissions.

In that light, an effective reduction of CO_2 emissions can have the same positive effect on the atmosphere as actual CO_2 removal. In the long term, it is expected that physical removal of CO_2 will also play a significant role in stabilizing the CO_2 concentration in the atmosphere and reducing the concentration, even after net-zero emissions have been achieved. Overall, it is therefore essential that financial companies report on the contribution of their investments and lending to avoiding CO_2 emissions and removing CO_2 from the atmosphere, where these contributions are not covered by the "ordinary" reporting on developments in scope 1-, 2- and 3 emissions.

Presentation

Investor or lender presents avoided emissions and CO_2 absorption on separate lines, just as CO_2 credits are also presented on a separate line. Investor or lender must clearly explain to which project(s) the avoided CO_2 emission or CO_2 absorption is linked, including if the CO_2 reductions have been achieved through CO_2 credits. Regarding CO2 reductions that are reported as avoided emissions, the investor or lender must explain specifically why the CO_2 reduction in question is not included in the reporting of scope 1, 2 or 3 emissions, but must be reported as avoided emissions.

Limitations

Investment and lending activities that support reduction or removal of CO_2 from the atmosphere can be included in financial companies' reported CO_2 emissions to the extent that the reduction or removal in question is not already included in the calculation of financed emissions (scope 1, 2 or 3).

Examples of investments in, or lending to existing companies, etc., which are already included in the calculation of financed (scope 1, 2 or 3) emissions are:

- Investments that have already been made in, or loans that have already been granted to companies that transform their business/production processes in a more energy-efficient direction, thereby reducing the CO_2 emissions of the production. In this case, the company's transformation initiatives will lead to a reduction in scope 1 and/or scope 2 emissions. For investors and lenders, it will lead to reduced financed emissions.
- Investments that have already been made in, or loans that have already been granted to companies that invest in CCS technology for their own production facilities, thereby reducing the CO_2 emissions of the production. Likewise, the company's CCS activities will lead to a reduction in scope 1 and/or 2 emissions, and for investors and lenders, it will lead to reduced financed emissions.

- Restructuring of investment or lending portfolios from companies with high CO_2 emissions per produced unit to companies with lower CO_2 emissions per produced unit. For investors and lenders, this will lead to reduced financed emissions.
- Renewal or restructuring of loans granted to companies. In this case, the company's CO_2 emissions are already included in the lender's calculation of financed emissions.
- Investment already made in, or loans granted to companies investing in forestry – either by planting of existing non-planted areas or by purchasing existing forests. In this case, the company's forestry activities (provided that the activities lead to a net increase in wood mass) will eventually lead to CO_2 absorption, which is disclosed according to international standards. The CO_2 absorption will be included in the investor's or borrower's total calculation of financed emissions.

Examples of investment or lending activities, **which are not already included** in the calculation of financed emissions, are:

- Financing of new energy production that replaces existing energy production, the financing being made through a project outside a company where investments have already been made, and provided that the financing is not taken from other similar projects. In a case like this, the investor's or lender's calculation of financed emissions will not reflect the beneficial effect of the investment in terms of reduced CO2 emissions.
- Direct investment in forests, i.e., where the investment is not made through a company that is already included in the investor's or lender's calculation of financed emissions.
- Investments in CCS technology granted through a project which is not linked to a company that is already included in the investor's or lender's calculation of financed emissions.

Concretely, this limitation implies, e.g., that:

- When investing in or lending to a company that introduces detergents that work at low water temperatures, avoided CO_2 emissions resulting from consumers washing at lower temperatures cannot be disclosed as avoided CO_2 emissions. This type of reduced emissions should be included in the company's scope 3 calculations, and in this way, the reduced carbon footprint of the company's products is also included in the investor's or lender's calculation of financed emissions.
- When investing in or lending to a company that switches its car fleet from ICE vehicles to electric vehicles, the reduction of CO_2 emissions cannot be calculated as avoided CO_2 emissions. In this case, the CO_2 reduction is included in the company's calculation of scope 1 emissions, and thus in the investor's or lender's calculation of financed emissions.

- When investing in or lending to an energy company that replaces fossil power/heat production with renewable energy, the CO_2 reduction cannot be calculated as avoided CO_2 emissions. Also in this case, the CO_2 reduction is included in the company's calculation of scope 1 emissions, and thus in the investor's or lender's calculation of financed emissions.
- When financing a limited project whose purpose is to establish a new power/heat production based on renewable energy to replace existing fossil power/heat production, where the project is established outside the organizational framework of an existing energy producer, the reduced CO_2 emissions can be calculated as avoided CO_2 emissions. In this case, the phasing out of a fossil production will not be included in an existing energy producer's calculation of CO_2 emissions, and, thus, the CO_2 reduction will not be included in the investor's or lender's calculation of financed emissions.

It follows that the assets classes that could mainly involve reporting on avoided emissions or the removal of CO_2 are project finance and certain business loans as well as investments in unlisted equity. In addition, CO_2 reduction resulting from CO_2 credits can be reported.

Calculations

When purchasing CO_2 credits, the CO_2 reduction for which the credits have been purchased, as well as the nature of the credits purchased, are disclosed. If different types of credits have been purchased, information is given separately for each credit.

Avoided emissions and captured CO_2 are calculated based on the characteristics of the individual project or activity and on a best effort basis.

For project investments, an estimate of avoided emissions or captured CO_2 must be calculated based on the nature of the project and the process(es) that the project makes redundant. The investor's or lender's share of avoided or captured CO_2 is calculated based on the following formula:

$$Removed\ emissions = \sum_{c} \frac{Investment\ value_c}{Company/Project\ EVIC_c} \times the\ project's\ removed\ CO_2\text{-}emissions_c$$

$$Avoided\ emissiones = \sum_{c} \frac{Investment\ value_c}{Company/Project\ EVIC_c} \times the\ project's\ avoided\ CO_2\text{-}emissions_c$$

c denotes the various projects for which avoided or captured CO_2 is calculated.

Alternatively, avoided emissions can be calculated according to the investor's share in the individual projects, e.g., if information on project debt cannot easily be obtained. It must be clearly stated if such an alternative method is used.

There are tools that can help calculate the amount of CO_2 captured by forest investments, e.g., Home | FRESCO. Investors and lenders are recommended to use the calculation method that best suits the individual investment. It should be clearly explained which method is used.

Annexes

ANNEX 1

Carbon metrics terminology

This annex includes a glossary, a presentation of the carbon accounting metrics recommended in the Principles and Framework for financed emissions accounting, and an overview of key actors' carbon metrics terminology.

1. Glossary

Absolute emissions: Total emissions attributed to a financial institution's lending and investing activity. Expressed in tonnes CO_2e.

Asset class: A set of financial instruments which have similar financial characteristics.

Attribution share or attribution factor: The share of total greenhouse gas emissions of the borrower or investee allocated to the loan or investments.

Avoided emissions: Emission reductions that the financed project produces versus what would have been emitted in the absence of the project (the baseline emissions). In this context, avoided emissions are only from renewable energy and energy efficiency projects.

Business loan: This asset class covers commercial loans. Business lending activities can cover both domestic and cross-border lending from Denmark and from the institutions' subsidiaries and branches abroad. Off-balance credit products are not necessarily covered nor small and highly volatile exposures (credit facilities linked to current accounts). Revolving credit facilities could also be excluded as public lending. Business loans for ring-fenced activities can be left out of this method, if the financial institution judges that it will have a more sustainability target, which will be considered purposeful to place it in the project finance category. Furthermore, loans secured by mortgages are covered in the manual on mortgages.

Carbon footprint: Carbon foodprint is the formula recommended to calculate the financed relative emissions by dividing absolute emissions by the size of the relevant portfolio and expressed in tCO_2/monetary unit. The FSB's Task-force on Climate-related Disclosure (TCFD) and the draft RTS under the EU Sustainability Disclosure regulation both recommend using the formula to calculate relative emissions, though TCFD inserts market cap and not enterprise value in the formula as in the draft RTS and as recommended in the Framework for financed emissions accounting.

CO_2-equivalent (CO_2e): The amount of CO_2 that would cause the same integrated radiative forcing (a measure for the strength of climate change drivers) over a given time horizon as an emitted amount of another GHG or mixture of GHGs. Conversion factors vary based on the underlying assumptions and as the science advances.

Corporate bonds: This asset class includes all corporate bonds without known use of proceeds and packaged products, e.g., SPVs based on corporate bonds. Corporate bonds with known use of proceeds are covered under project finance.

Covered bonds: This asset class includes all types of covered bonds including green covered bonds and Danish mortgage bonds.[22] Covered bonds with known use of proceeds at the level of economic activity can, however, be accounted for using the method described under the project finance asset class.

Derivatives: This asset class includes options, futures/forwards and credit default swaps based on listed constituents (traded in a market) and with full look-through (to the underlying constituents), as well as packaged products based on this type of derivatives (including synthetic ETFs).

Double counting: Occurs when GHG emissions (generated, avoided, or removed) are counted more than once in a GHG inventory or toward attaining mitigation pledges or financial pledges for the purpose of mitigating climate change. Double counting occurs e.g., when scope 3 emissions are calculated at portfolio level if emissions from investment assets in the same supply chain are included. When financing is made available for 1) oil and gas companies, 2) truck manufacturers, and 3) road freight transport, emissions due to the combustion of diesel during truck driving will be scope 1 for the transport company and scope 3 (downstream) for the two other companies. Thus, the same emissions are counted three times in the portfolio.

Emission scopes: The GHG Protocol Corporate Standard classifies an organization's GHG emissions into three scopes. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting organization, including both upstream and downstream emissions.

Enterprise Value Including Cash (EVIC): The sum of the market capitalization of ordinary shares at fiscal year-end, the market capitalization of preferred shares at fiscal year-end, and the book values of total debt and minorities' interests. No deductions of cash or cash equivalents are made.

Environmentally extended input-output (EEIO) data: EEIO data refers to EEIO emission factors that can be used to estimate scope 1, 2 and upstream scope 3 GHG emissions for a given industry or product category. EEIO data is particularly useful in screening emission sources when prioritizing data collection efforts.

[22] A Danish mortgage bond is a covered bond, funding mortgage loans granted against a mortgage on real property, and issued by a Danish mortgage bank.

Equity: Bank's or investor's ownership in a company or project. There are various types of equity, but equity typically refers to shareholder equity, which represents the amount of money that would be returned to a company's shareholders if all the assets were liquidated, and all the company's debt was paid off.

Greenhouse gas (GHG) emissions: The seven gases mandated under the Kyoto Protocol and to be included in national inventories under the United Nations Framework Convention on Climate Change (UNFCCC) - carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

Greenhouse Gas (GHG) Protocol: Comprehensive global standardized frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions. The GHG Protocol supplies the world's most widely used greenhouse gas accounting standards. The Corporate Accounting and Reporting Standard provides the accounting platform for virtually every corporate GHG reporting program in the world.

Investment: The term investment (unless explicitly stated otherwise) is used in the broad sense: "Putting money into activities or organizations' with the expectation of making a profit." Most forms of investment involve some form of risk taking, such as investment in equities, debt, property, projects, and even fixed interest securities which are subject to inflation risk, among other risks.

Listed corporate finance: Finance provided to companies traded on a market such as listed equity and corporate bonds.

Listed equity: This asset class only includes listed equity. Private equity with known use of proceeds can use the same method as project finance. Private equity with unknown use of proceeds can use the same method as business loans.

Mortgage: This asset class covers mortgage loans, which are loans secured by mortgages on real property. This includes all mortgage loans granted by Danish mortgage banks and loans granted against a mortgage on real properties from commercial retail banks.

Motor vehicle loan: This asset class refers to on-balance sheet loans and leasing contracts used to finance one or several motor vehicles for private consumers.

Non-listed corporate finance: Finance provided to companies not traded on a market such as business loans or commercial real estate.

Paris Agreement: The Paris Agreement, adopted within the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, commits all participating countries to limit global temperature rise to well-below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C, adapt to changes already occurring and regularly increase efforts over time.

Project finance: This asset class includes project finance and equity with known use of proceeds. More specifically, it includes on-balance sheet loan or equity with known use of proceeds at the level of economic activity, such as, the construction of a gas-fired power plant, a wind or solar project, or energy efficiency projects. For the calculation of emissions, only the financed (ring-fenced) activities are included. Emissions and financials related to existing activities outside the financed project but within the financed organization are not considered.

Real estate directly owned: The asset class comprises directly owned real estate/property whether legally owned by the investor (i.e., the investor owns the property's title deed) or held by the investor via a subsidiary, SPV or otherwise. Real estate investments in which the investor participates via e.g., real estate funds or public (or private) real estate investment companies are not included in the asset class. Real estate under construction is also exempt from the asset class.

Scenario analysis: A process of analyzing future events by considering alternative possible outcomes.

Science-based reduction targets (SBTs): Targets adopted by companies to reduce greenhouse gas (GHG) emissions are considered "science-based" if they are in line with what the latest climate science says is necessary to meet the goals of the Paris Agreement—to limit global warming to well-below 2°C above preindustrial levels and pursue efforts to limit warming to 1.5°C.

Scope 3, category 15 (investments) emissions: This category includes scope 3 emissions associated with the reporting company's loans and investments in the reporting year, not already included in scope 1 or scope 2.

Emission removals (i.e., sequestered emissions): Refers to atmospheric carbon dioxide (CO_2) emissions that are captured and stored in solid or liquid form, thereby removing their harmful global warming effect.

Total balance sheet value: A balance sheet is a financial statement that reports a company's assets, liabilities, and shareholders' equity. The balance sheet value refers to the value of total debt plus equity.

Total carbon emissions: Total carbon emissions is the formula recommended to calculate the financed absolute emissions. The formula attributes the company's emissions to the investor/lender based on the ratio between the current value of investment/lending in the company divided by the company's enterprise value. The FSB's Task-force on Climate-related Disclosure (TCFD) and the draft RTS under the EU Sustainability Disclosure regulation both recommend using the formula to calculate absolute emissions, though TCFD inserts market cap and not enterprise value in the formula as in the draft RTS and as recommended in the Framework for financed emissions accounting.

2. Metrics

Finance Denmark recommends members to publish at least two metrics for financed emissions:

1. Total carbon emissions in tonnes CO_2
2. The carbon footprint in tonnes CO_2 per million DKK financed (investment or loan)

The total carbon emissions in tonnes CO2 equivalents (CO2e) are measured using the Green House Gas Protocol (GHG) covering seven gases. This absolute emission metric is a good metric to understand the climate impact on loans and investments and set a baseline for climate action.

The carbon footprint in tonnes CO2 equivalents per million DKK financed (investment or loan) - this relative emission metric is a good metric to compare how different portfolios stack up against each other.

Please notice that the relative metric named carbon footprint is the same as in the TCFD's final recommendations.[23]

In the PCAF Global Standard, the same metric is called *carbon intensity*.

[23] The relevant excerpt from the final TCFD report is The Common Carbon Footprinting and Exposure Metrics, which can be accessed via https://www.virksomhedsguiden.dk/content/ydelser/klimakompasset/a193cadc-ab0d-4161-a8cc-272f046acd38/

ANNEX 2

Enterprise value

Value of the company in the carbon metrics

Enterprise value is often used in the calculation of carbon footprints. However, there are several definitions of the term being used by different actors, and often the definition of Enterprise value being used is not provided.

Enterprise value is typically used instead of the market capitalization (market cap) in the calculation of carbon footprints. Enterprise value is preferred over market cap, as the latter makes the carbon footprint more sensitive to fluctuations in the market, and, thus, leads easily to changes in the carbon footprint without any climate action having been implemented. Moreover, using market cap, all emissions are attributed to equity investors. If the equity is not listed or if the primary goal is to avoid market fluctuations, then using total balance sheet value is an option.

EVIC

The recommended definition of enterprise value is the one included in the EU delegated regulation from July 2020 supplementing the Benchmark Regulation as regards minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks[24] called Enterprise Value Including Cash (EVIC).

EVIC is "the sum of the market capitalization of ordinary shares at fiscal year-end, the market capitalization of preferred shares at fiscal year-end, and the book value of total debt and minority interests".

EVIC = equity (market cap. of ordinary shares + market cap. of preferred shares) + (book value of) total debt + minority interests.

Considerations

The recommended definition of enterprise value (EVIC) includes more components than other definitions of enterprise value and mixes components based on market capitalization at fiscal year-end with components based on book value.

[24] The regulation can be accessed via this link: eur-lex.europa.eu/legal-content/DA/ALL/?uri=CELEX:32020R1818

This makes sense from a carbon accounting attribution perspective, as several of the EVIC components are only readily available in book value – and not in market value.

EVIC allows for the inclusion of the debt in the distribution of a given company's GHG-emissions (rather than only attributing all of a given company's GHG-emissions to the equity-owners).

Other definitions of enterprise value

Many emission data providers do, however, not use the above-mentioned EU definition of EVIC. Instead, they use the definition of enterprise value (EV) as:

the company's market cap *plus* its total debt *minus* the cash or cash equivalents:

EV = market cap + total debt – cash or cash equivalents.

For unlisted companies, it will be relevant to use the sum of the total company equity and debt (i.e.; the total balance sheet).

Recommended alternatives to EVIC

If the above-recommended definition of EVIC from the EU Climate Benchmark Regulation cannot be applied, or where EVIC is not available due to data issues, it is recommended to use:

1. Total balance sheet value expressed as the sum of total company equity and debt
2. Enterprise value (EV)

ANNEX 3

OECD member countries contra non-OECD member countriesmember countries

Several international organizations (e.g., IEA, IIGCC and NGFS) recommend the distinction between developed and less developed countries (in the following called OECD and non-OECD countries) when estimating carbon footprint and setting targets for the reduction of CO2 emissions (Net-Zero Targets). The reason is that data coverage and CO2 data quality are significantly worse in non-OECD countries than in OECD countries. Furthermore, there is a risk of making the transition both more difficult and more expensive for non-OECD countries if they are measured according to the same criteria as OECD countries. The balance between growth and sustainability, respectively, is particularly difficult for non-OECD countries. This should be taken into consideration when setting climate targets.

The lack of data coverage and quality is both a problem in itself and if, in the absence of data, an extrapolation is made across sectors and countries that are not comparable. Many of the data requirements and standards that have been developed recently, among other things because of sustainable finance legislation, have been designed with developed countries in mind and are often less suited to the economic and financial structures of developing countries. The cost of collecting and verifying data are in many cases heavy for issuers to bear in non-OECD countries, which will lead to a higher Cost of Capital and/or make it difficult for them to secure the necessary funding. The primary goal of this Framework for Financed Emissions Accounting is to contribute to a sustainable restructuring of the economy. To make this goal a reality, it is important to support an allocation of capital towards the issuers where capital really can make a difference in the transition. Many of these issuers are probably located in non-OECD countries. Therefore, it is important to avoid misalignment between the framework's goal and recommendations.

This problem is particularly prevalent for the asset class corporate bonds and less so for equities. Another possibility is to make this distinction (between OECD and non-OECD countries) only for certain asset classes. Separate reporting for non-OECD countries is not recommended – but it is, however, recommended to consider these countries when calculating the carbon footprint for a portfolio and when setting climate targets.

Access to data is constantly improving. It is therefore necessary to continuously reassess the distinction between OECD and Non-OECD countries and whether this can be passed out as data coverage and quality improve globally.

ANNEX 4

Changes from the first version – Nov. 2020

Changes to the second version (December 2021)

Data quality

For each asset class a data hierarchy has been added that makes it possible to assign the data a quality score between 1 and 5. The score shows the quality of the data behind the estimation of the financed emissions. Score 1 is the highest score and 5 is the lowest. The data hierarchy follows PCAF Global Standard from November 2020.

Mortgages

The following changes have been made:

Attribution

It is recommended only to estimate LTV scaled emissions. Financed emissions may in separate statements be calculated using alternative methods, e.g., by attributing 100 % of a building's annual emissions to the financial institution. Consequently, the section is adjusted to ensure consistency.

Data quality

As for the other asset classes, a table is added on data quality. Furthermore, it is noticed that the quality can be measured at the level of the capital centre.

It is not recommended to use the calculated energy consumption from the EPC, since it can be misleading due to outdated energy factors.

Calculation of emissions

The section is adjusted to ensure consistency between the table on data quality and the description of the methods to calculate emissions.

The formula to calculation of the emission of the property is adjusted to take the supply efficiency into account if possible.

Asset class specific considerations

It is added that if better data is available for individual holiday houses, it is recommended that this data is used.

Motor Vehicle Loans (and leasing vehicles) to private customers

The following changes have been made:

Portfolio coverage

It is specified that the institution should calculate emissions on car loans and on newly leased cars separately. This follows from the fact that according to the GHG Protocol, emissions related to leased cars are placed under category 13 (downstream leasing) while the rest of the financed emissions in this manual are characterized as emissions under category 15 (loans and investments).

Attribution

The attribution factor for consumer motor vehicle loans is based on the institutions data on lending and the value of the car including taxes at loan origination. In case of lack of data, the emissions will be fully attributed to the institution providing the car loan. A leasing company will have an attribution factor of 100 % of the value of the car.

Data

It is added that the emission factors for the different fuel types are based on the yearly publication from the Danish Energy Agency.[25] The emission factors for electricity can be found in Annex A to the manual for motor vehicles.

The Danish Center for Environment and Energy (DCE) provides average figures for distance traveled and average consumption of fuel when more detailed information from WLTP or NEDC is not available.

Listed equity

The section on identification codes has been deleted since it was unnecessary.

[25] ens.dk/sites/ens.dk/files/CO2/standardfaktorer_for_2020.pdf

Changes to the third version (December 2022)

Corporate bonds

Principles for corporate bonds have been added to the section on listed equity, as the two asset classes are largely handled in the same way.

Data coverage

Recommended principles for evaluation in case of missing data have been added.

Annex 3 added: OECD member countries contra non-OECD member countries

A separate annex on considerations regarding data from non-OECD member countries have been added.

Project finance divided into Private equity and Project finance

Private equity has been given its own asset class. The background is, in addition to the quite large difference between the asset classes, that the investor is often close to (larger) project investments and thus can have easier access to the necessary data than with private equity investments.

Derivatives

The section on derivatives as an asset class has been removed. The reason is that there is still no international consensus on how derivatives should be handled in calculations of financed greenhouse gas emissions. An international standard in the area is therefore awaited.

Mortgages

An option has been added to use an emission factor for pipeline gas, if the Danish Energy Agency publishes such a factor, which takes into account the content of biogas in the pipeline gas.

To increase the ease of use, formulas have been added to illustrate the calculations at the individual data quality levels.

Principles for the use of energy labels (ECP) have been added when a property has several valid ECPs and where there are several buildings on a property.

An option has been added to correct calculated energy consumption based on ECPs when the energy factor has changed since the ECP was drawn up. This contributes to a more accurate calculation of emissions.

The method 2b has been further explained so that G-rated buildings are calculated with a fixed value, which is assessed to be representative of G-rated buildings.

For mortgages granted to subsidized housing, it is recommended that LTV is weighted, as is the case with other residential properties. This is done to avoid double counting.

For loans granted to support manufacturing purposes, a distinction is introduced between whether the loan is granted to private or business customers, as mortgage banks also have private customers with e.g., own workshops. For these customers, it is not fair to use the method used for the business loans asset class, as the customers do not disclose reports on their own emissions. Furthermore, these emissions cannot be calculated on the basis of data from Statistics Denmark as they do not have an industry code.

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