FINANCE DENMARK

Insurance & Pension Denmark

Framework for Financed Emissions Accounting

Principles and methods

December 2021

Preface

In early 2019 Finance Denmark set up an advisory Forum for Sustainable Finance charged with making a series of recommendations to Finance Denmark on how the Danish financial sector can take the lead and contribute to the sustainable transition. The Forum for Sustainable Finance handed over 20 recommendations at Finance Denmark's annual meeting in December 2019.

One of the recommendations was the following: Based on best international practice, Finance Denmark should, as quickly as possible, develop a quantitative model to be used by Danish banks, mortgage lenders and investment funds to determine the carbon footprint of the activities they finance. This will create a common approach to comparable and transparent communication. A first edition focusing on major activities in sectors of particular relevance in the context of carbon emissions must be ready by 2021.

Finance Denmark established several working groups in the beginning of 2020 with participants from member institutions. Insurance & Pension was invited to join the work on the model for carbon emissions for investments. During the year Finance Denmark was in dialogue with several stakeholders and experts from Denmark and abroad. These include Statistics Denmark, The Danish Energy Agency, Danish Business Authority and Partnership for Carbon Accounting Financials (PCAF), on which the model is based on. PCAF is a Dutch initiative from 2015 which is an industry-led partnership to standardise carbon accounting for the financial sector (lending and investments) that has since spread to several countries across the globe.

A first Danish CO_2 was published in November 2020. The model is revised annually based on national and international developments. The model consists of a set of fundamental principles and specific methodology at a detailed level for 10 asset classes. The model has now been revised for the first time.

The model provides the credit institution, 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 also 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
CEO, Finance Denmark

Content

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) for activities financed by the Danish financial sector. Members can choose also to use and disclose other methods for calculating CO_2e emissions which are better suited for e.g. risk management or dialogue with individual clients.

The principles will be revised annually considering national and international developments.

1 The CO_2e emission 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 the loans and investments are calculated at the end of the year.[1]

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).[2] The Total carbon emissions expressed in tonnes CO_2e and the carbon footprint (tonnes CO_2e/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. Avoided emissions can be disclosed as a supplementary information.

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 for investments

[1] 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.

[2] For definition of scope 1-3 see Annex 1.

based on, e.g., extrapolation from similar activities without bias or penalties, taking best possible account of expected emission differences.

4 The quality and composition of data should be disclosed. 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 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

6 The CO_2e 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_2e emissions follows the Business loans asset class. If relevant, the method used to calculate CO_2e 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_2e emissions from mortgage banks to measure emissions on the investment.

8 Only on-balance sheet lending is covered. CO_2e 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_2e 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 methods for the following asset classes:

1. Listed equities
2. Corporate bonds
3. Covered bonds
4. Project finance
5. Derivatives
6. Real estate, directly owned
7. Mortgages
8. Business loans
9. Ship finance
10. Motor vehicle loans (and leasing vehicles) to private customers

Annexes

Annex 1: Carbon metrics terminology

Annex 2: Enterprise value

Annex 3: Changes from the first version – November 2020

Methods

Introduction

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

1. Listed equity
2. Corporate bonds
3. Covered bonds
4. Project finance
5. Derivatives
6. Real estate, directly owned
7. Mortgages
8. Business loans
9. Shipping finance
10. Motor vehicle loans (and leasing vehicles) to private customers

1. 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.

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. If full emission data coverage is not possible, a best estimate can be used for the uncovered part of the portfolio. The carbon mapping coverage should be disclosed in percentage terms.

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). Total financed emissions are defined as

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

(with c = investee company)

Data

Due to the potentially large universe of listed equity portfolios, the data sources will likely be a designated data vendor. No preferred data vendor is recommended. Importantly, there are differences in carbon emissions data between different data providers. 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.[1]

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

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

[1] 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.

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

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 depending on the emission data used:

1. Reported emissions
2. Physical activity-based emissions
3. Economic activity-based emissions

Option 1: Reported emissions (score 1 og 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 og 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 og 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	Calculation option		Variable
1	Reported emissions	1a	Verified emissions data is reported by the company and EVIC is known
2		1b	Emissions 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 known
3		2b	Emissions based on the production of the company and EVIC is known
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 calculation method they use and calculation methods.

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 prices).

Next steps

The next step will be to discuss and suggest possible solutions to the above-described asset class specific considerations and limitations.

2. Corporate Bonds

This asset class includes all corporate bonds without known use of proceeds and packaged products, e.g. Special Purpose Vehicles (SPVs), based on corporate bonds.

Corporate bonds with known use of proceeds are covered under project finance. Green bonds can be dealt with in this manual or the covered bonds manual.

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. If full emission data coverage is not possible, a best estimate can be used for the uncovered part of the portfolio. The carbon mapping coverage should be disclosed in percentage terms.

Moreover, it is recommended to provide an explanation of which product types were included or excluded and what the main method was for estimating missing data. Cash positions can be considered as having zero emissions. Short positions can be ignored.

Attribution

Emissions are proportionally attributed 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 EVIC or if not available the total balance.

Data

No specific source or data vendor is recommended. It is encouraged to mention the data source and the reporting period or time stamp of data.

Most data vendors link company emissions to the company's primary listed equity at ISIN-level. Hence, it is usually required to go through more steps to get the emission data for the individual issuances of corporate bonds/SPVs, than for listed equity. This can be done 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.[2]

In the absence of company-specific emission data, it is recommended to use sector average emissions as per the business loans asset class.

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.[3]

As described in the above section on coverage, it tends to be much lower for corporate debt than for listed equity. It is not uncommon with a coverage of 50-60 % or lower for corporate bonds. Hence, the data used for the carbon emission for this asset class will, most likely, be based in part of "best estimates".

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.

[2] This corresponds to the described use of enterprise value in the carbon footprint metrics.

[3] 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 bond e.g. in its book during the year. The institutions that use the flow variable should factor it into the attributed emissions.

Equations to calculate financed emissions

It is recommended to calculate both absolute and relative emissions. It is possible to use the same formula as for listed equity due to the use of enterprise value.

Total carbon emissions are calculated in accordance with the following formula

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

Carbon footprint is calculated in accordance with the following formula

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

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.

Asset class 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, links are often made to banks' emissions and not to 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 scope1 and 2 emissions. This challenge should decrease when financial institutions to a larger extend publish financed CO_2 emissions on loans and investments.

Data quality

The same 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

As the same methods and formula can be used for the calculation of the absolute and relative emissions for corporate bonds as for listed equity, the same limitations also apply as described in the section of listed equity.

At present, no distinction is made between ordinary and green bonds. Green bonds, or fixed income that serve a specific sustainability purpose often related to combatting climate change, are presently handled under this and the covered bonds methodology.

This is consistent with the overall attribution framework, as the issuers are often the same as those in the regular credit universes, and portfolios and the issuer's emissions do not change once the green bond has been taken to the market.

Green bonds issuers often report avoided emissions and some can demonstrate a positive effect on the climate, but rarely report the carbon emissions that are attached to the financed activities.

Moreover, in practice, carbon footprints of green bond portfolios are treated in various manners. This is not beneficial to the comparability and consistency of reported footprints.

Next steps

The next step will be to investigate possible solutions to the above-described challenges regarding emissions data availability, the use of market price, company identifiers and SPVs.

Possible solutions to the above-described challenge regarding the carbon accounting of green bonds will also be a focus area.

3. Covered Bonds

This asset class includes all types of covered bonds including green covered bonds and Danish mortgage bonds.[4]

[4] 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.

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

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

Portfolio coverage

Ideally, 100 % of the covered bonds should be covered. If full emission data coverage is not possible, a best estimate can be used for some or all of the uncovered part of the portfolio.

Attribution

Emissions are proportionally attributed to the providers of the company's/issuer's total capital.

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 finances by buying the bond.

Data

Data is not as easily obtainable for covered bonds, as for e.g. listed equities. Usually, there is not full look-though to the underlying assets. However, even if this is the case, it is still the recommendation to use the emission data for the issuer's/ underlying project's total financed activities (and not only the emission data for a subset of the issuer's (typically green) activities.

For guidance on emission data related to Danish mortgage bonds please see the mortgages asset class.

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:

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

(with 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:

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

(with 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:

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

(with i = cover pool)

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

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

(with i = cover pool)

Limitations

At present, no distinction is made between ordinary and green bonds. 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 this methodology.

This is consistent with the general attribution rule recommended in this framework for financed emissions accounting.

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.

4. 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.

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. The carbon footprint of equity with unknown use of proceeds at activity level can be accounted for using the method described as per the business loans asset class.

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.

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 as-

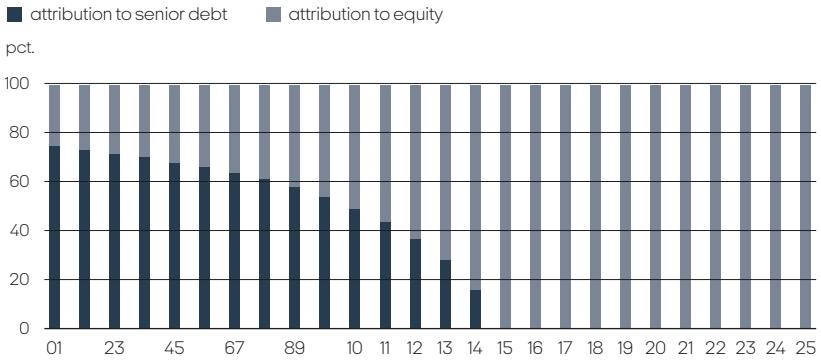
sets or total debt plus equity within the project). The total balance sheet can then be used as the attribution factor.

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.



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. As a result, higher quality GHG data can be obtained than would be available through generic input/output models, without adding an unrealistic amount of additional work to the process.

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[5] or unaudited[6] emissions are collected from the project directly or indirectly through independent third parties.
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 emissions 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.
3. **Economic activity-based emissions**, where emissions are estimated based on economic activity data collected from the project (e.g. turnover or assets). The emissions 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).[7]

Equations to calculate financed emissions

It is recommended to calculate the absolute emissions using this formula

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

(with p = project)

It is recommended to calculate the relative emissions using this formula

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

(with p = project)

For equity with unknown use of proceeds the method described in the manual on business loans can be applied.

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

[6] 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.

[7] 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 emissions data information.

Asset class specific considerations

Emissions 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.

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 ranks highest in quality but are not always known. It is recommended to rank the data quality as specified below.

TABLE 2. DATA QUALITY SCORE FOR PROJECT FINANCE
(1 = highest data quality, 5 = lowest data quality)

Data quality	Calculation option		Variable
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 projects's production.

continued next page >>

>> CONTINUED: TABLE 2. DATA QUALITY SCORE FOR PROJECT FINANCE
(1 = highest data quality, 5 = lowest data quality)

Data quality	Calculation option		Variable
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 projects's revenue.
5		3b	Outstanding amount is known. Projects 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

A limitation of the methods proposed is the lack of guidance regarding avoided and sequestered emissions (also referred to as emissions removal). It will be investigated how this can be included in a later version of the Framework looking at e.g. the Nordic Position Paper on Green Bond Impact Reporting.

Next steps

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

5. Derivatives

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

In principle, as derivates are based on underlying assets, including them in an encompassing carbon accounting framework is double counting. And if a given financial institution invests in multiple derivatives based on the same underlying asset(s), this implies double, triple or even higher multiples of counting of the emissions from the underlying asset(s).

However, the motivation behind the recommendation to include this derivatives asset class in the framework – even if it implies double counting of emissions – is to avoid a situation, where a shift from direct to indirect investments results in a decrease in accounted emissions, without any climate action having been implemented.

That is, this asset class should apply to cases where derivatives are used by the financial institution as a substitute for a direct investment. Derivatives used for strict hedging purposes or to facilitate trading for clients should not be included.

Scopes covered

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

It is only possible to make a carbon footprint for derivatives, which have look-through to the underlying or ring-fenced assets in which the financial institution is ultimately investing.

The exposure can consist of a singly asset, local or international universe, as well in listed as in private markets. As the nature of the underlying assets can vary, the scopes covered will also depend on the relevant metrics, according to the existing guidelines per asset class and data availability.

Portfolio coverage

Ideally, 100 % of the portfolio should be covered, although it will most likely be challenging to cover most of the derivatives portfolio due to the variety of underlying assets, and, hence, we promote a best effort approach. If the investor is both directly and indirectly exposed to an underlying asset(s), the derivate investment can be excluded from the financial institution's carbon accounting.

It is recommended to account for the absolute and relative emissions from the following types of derivatives based on assets in public (not private) markets:

- **Futures/Forwards:** Emissions of the underlying assts are proportionally attributed using the market value of the option.
- **Credit Default Swaps:** Emissions of the underlying assets are proportionally attributed using the market value.
- **Options:** Emissions of the underlying assets are proportionally attributed using the market value of the option.

Attribution

The attributed emissions of the underlying assets for derivatives should be aggregated and calculated. Cash holdings are considered as having zero emissions.

Emissions of the underlying assets in an indirect investment are proportionally attributed to the investor's share in the total vehicle.

Data

The first and most reliable source of the emissions of a derivative should be the asset manager or issuer, according to the existing guidelines and independently verified. Investors should engage with these asset managers and issuers to disclose the attributed emissions of these indirect investments.

If not provided, carbon emissions could be made available by other providers, like public data sources or designated data vendors. Investors could engage with data vendors to provide these emissions.

Finally, the investor could assess the indirect investment emissions by capturing the underlying portfolio (look through) and calculate the pro rata emissions with his own models and data sources. Investors should engage with asset managers and issuers to fully disclose the holdings of their investment funds. This approach is only realistic for underlying assets in public markets.

It is recommended to include thorough information on the types of derivatives that are or are not included in the carbon accounting of this asset class, especially in cases where the financial institution has numerous derivatives for trading or hedging purposes that should not be included in the financial institution's carbon accounting.

Data quality

TABEL 3. DATA QUALITY SCORE FOR DERIVATIVES
(1 = highest data quality, 5 = lowest data quality)

Data quality	Calculation option		Variable
1	Reported emissions from underlying assets	1a	Emissions from the underlying assets based on verified emissions from the issuer or data providers.
2		1b	Emissions from the underlying assets based on emissions from the issuer or data providers.
	Physical activity-based emissions from underlying assets	2a	Emissions from the underlying assets based on data for the energy consumption of the underlying assets.
3		2b	Emissions from the underlying assets calculated from data for the production or activity data of the underlying assets.

continued next page >>

>> CONTINUED: TABLE 3.DATA QUALITY SCORE FOR DERIVATIVES
(1 = highest data quality, 5 = lowest data quality)

Data Quality	Calculation Option		Variable
4	Economic activity-based emissions from the underlying assets	3a	Emissions from the underlying assets calculated from data for the revenue of the underlying assets.
5		3b	Emissions from the underlying assets are based on data for similar activities.
		3c	Emissions from the underlying assets are based on data for tCO_2e per euro revenue for similar assets.

Equations to calculate financed emissions

The approach or method for accounting the absolute and relative emissions consists overall of three steps:

Step 1: Determine the notional exposure of the derivative investment.

Step 2: Determine the financed relative emissions of the derivative investment expressed in tCO_2e/m DKK invested through analysis of its underlying reference asset(s) using the carbon footprint metric.

Step 3: Calculate the financed absolute emissions associated with the derivative investment expressed in tCO_2e.

EXAMPLE 1. Futures/forwards

eMini S&P 500 future contract

Step 1 – Determine the notional exposure to the derivative investment

$$\begin{bmatrix} Trading \\ price \end{bmatrix} \times \begin{bmatrix} Derivative \\ Multiplier \end{bmatrix} = \begin{bmatrix} Notional\ value\ of \\ the\ investment \end{bmatrix}$$

$$[DKK\ 2{,}100] \times [DKK\ 50] = \begin{bmatrix} DKK\ 105{,}000\ or\ DKK\ 0{,}105 \\ million\ invested \end{bmatrix}$$

Step 2 – Determine the financed relative emissions of the derivative investment

$$\begin{bmatrix} \frac{Total\ forecast\ GHG\ emissions\ of\ the\ underlying\ asset(s)}{Total\ invested\ value\ in\ the\ underslying\ asset(s)} \end{bmatrix} = \begin{bmatrix} Carbon\ Footprint\ of \\ the\ investment \end{bmatrix}$$

$$\begin{bmatrix} \frac{3{,}500{,}000{,}000\ metric\ tons\ CO2e}{20{,}000{,}000\ million\ invested} \end{bmatrix} = \begin{bmatrix} \frac{175\ metric\ tons\ CO2e}{DKK\ 1\ million\ invested} \end{bmatrix}$$

continued next page >>

>> CONTINUED: EXAMPLE 1. Futures/forwards

eMini S&P 500 future contract

Step 3 – Determine the financed absolute emissions of the derivative investment

$$\begin{bmatrix} Notional\ value \\ of\ exposure \end{bmatrix} \times \begin{bmatrix} Carbon\ Footprint\ of \\ the\ investment \end{bmatrix} = \begin{bmatrix} GHG\ emissions\ associated \\ with\ the\ investment \end{bmatrix}$$

$$\begin{bmatrix} DKK\ 0{,}105\ million \\ invested \end{bmatrix} \times \begin{bmatrix} 175\ metric\ tons\ CO2e \\ \hline DKK\ 1\ million\ invested \end{bmatrix} = [18{,}4\ metric\ tons\ CO2e]$$

EXAMPLE 2. Credit Default Swaps

Credit Default Swap (CDS) on BP Plc

Step 1 – Determine the notional exposure to the derivative investment

$$[Value\ of\ CDS\ Protection] = [Value\ of\ debt]$$

$$[DKK\ 1{,}000{,}000\ CDS\ protection\ for\ BP\ Plc\ debt] = [DKK\ 1{,}000{,}000\ of\ BP\ Plc\ debt\ or\ DKK\ 1\ million]$$

Step 2 – Determine the financed relative emissions of the derivative investment

$$\begin{bmatrix} Total\ GHG\ emissions \\ of\ the\ underlying\ asset(s) \\ \hline Total\ invested\ value\ in\ the \\ underlying\ asse(s) \end{bmatrix} = \begin{bmatrix} Carbon\ Footprint\ of \\ the\ investment \end{bmatrix}$$

$$\begin{bmatrix} DKK\ 136{,}000{,}000\ metric\ tons\ CO2e \\ \hline DKK\ 78{,}000\ million\ invested \end{bmatrix} = \begin{bmatrix} 1{,}744\ metric\ tons\ CO2e \\ \hline DKK\ 1\ million\ invested \end{bmatrix}$$

Step 3 – Determine the financed absolute emissions of the derivative investment

$$[Value\ of\ debt] \times \begin{bmatrix} Carbon\ Footprint\ of \\ the\ investment \end{bmatrix} = \begin{bmatrix} GHG\ emissions\ associated \\ with\ the\ investment \end{bmatrix}$$

$$\begin{bmatrix} DKK\ 1\ million \\ invested \end{bmatrix} \times \begin{bmatrix} 1{,}744\ metric\ tons\ CO2e \\ \hline DKK\ 1\ million\ invested \end{bmatrix} = [1{,}744\ metric\ tons\ CO2e\ ]$$

EXAMPLE 3. Options

Put option on Starbucks

Step 1 – Determine the notional exposure to the derivative investment

$$\begin{bmatrix} Exercise \\ price \end{bmatrix} \times \begin{bmatrix} Number \\ of\ shares \end{bmatrix} \times [Delta] = \begin{bmatrix} Notional\ value \\ of\ exposure \end{bmatrix}$$

$$[DKK\ 50] \times [100] \times [-0{,}5] = \begin{bmatrix} DKK\ 2{,}500\ or\ DKK\ 0{,}0025 \\ million\ of\ exposure \end{bmatrix}$$

continued next page >>

>> CONTINUED: EXAMPLE 3. Options

Put option on Starbucks

Step 2 – Determine the financed relative emissions of the derivative investment

$$\left[\begin{array}{c} Total\ GHG\ emissions \\ \overline{of\ the\ underlying\ asset(s)} \\ Total\ invested\ value\ in\ the \\ underlying\ asset(s) \end{array}\right] = \left[\begin{array}{c} Carbon\ Footprint\ of \\ the\ investment \end{array}\right]$$

$$\left[\frac{DKK\ 1{,}500{,}000\ metric\ tons\ CO2e}{DKK\ 85{,}600\ million\ invested}\right] = \left[\frac{(-17{,}5)\ metric\ tons\ CO2e}{DKK\ 1\ million\ invested}\right]$$

Step 3 – Determine the financed absolute emissions of the derivative investment

$$\left[\begin{array}{c} Notional\ value \\ of\ exposure \end{array}\right] \times \left[\begin{array}{c} Carbon\ Footprint\ of \\ the\ investment \end{array}\right] = \left[\begin{array}{c} GHG\ emissions\ associated \\ with\ the\ investment \end{array}\right]$$

$$\left[\begin{array}{c} DKK\ 0{,}0025 \\ million\ of\ exposure \end{array}\right] \times \left[\frac{(-17{,}5)\ metric\ tons\ CO2e}{DKK\ 1\ million\ invested}\right] = \left[(-0{,}04)\ metric\ tons\ CO2e\right]$$

Asset class specific considerations

Measuring carbon emissions on derivatives is a new area. In principle, as derivates are based on underlying assets, including them in a carbon accounting framework is double counting. However, derivatives are included as an asset class to avoid a situation, where a shift from direct to indirect investments results in a decrease in accounted emissions, without any climate action having been implemented.

Limitations

Other types of derivatives – it is not clear how to do carbon footprinting for those based on assets in the private market or without look-through.

This approach only realistically works for underlying assets in public markets. More exotic types of underlying assets where methodology has not yet been defined are a challenge.

Next steps

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

6. 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 emission 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 Mortgages 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

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

(with b = building)

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

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

(with b = building)

Asset class specific considerations

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

Data quality

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

Data quality	Calculation option		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 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 based on floor area	2a	Estimated building energy comsumption per floor area based on official building energy labelse (1) or other relevant energy label and the floor area are avilable. Emissions are calculated using estimated building energy consumption and average emission factors specific to the respective energy source.
4		2b	Estimated builidng energy consumption per floor area based on building type and location-specific statistical data (2) and the floor area are vailable. Emissions are calculated using estimated building energy consumption and average emission factors specific to the respective energy source.
5	Estimated building emission s based on number of buildings	3a	Estimated building energy consumption per building based on building type and location-specific statistical data and the number of building are available. Emissions are calculated using estimated building energy consumption and average emission factors specific to the respective energy source.

(1) E.g. official Danish building energy label or other relevant energy labeling of the property. See also "Mortgages"
(2) C.f 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.

7. Mortgages

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:

1. Owner occupied dwellings
2. Private rental housing and cooperative housing
3. Subsidized housing
4. Properties for social purposes
5. Multipurpose commercial premises, e.g. offices and trade
6. Agriculture
7. 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 report 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[8] loan-to-value (LTV). 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.

[8] '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 prevents 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.

It is assumed 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

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

If Current LTV is larger than 100, then

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

Calculation of financed emissions

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

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

where B_i are the assets in portfolio i, b_i is building b in 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

Data on actual energy consumption or actual emissions for Danish properties is limited. However, Denmark has a well-developed system for producing energy performance certificates (EPCs/"Energimærker") for properties. Therefore, a large share of emissions will be based on average expected energy consumption, reflected by the EPCs, of a property 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.

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

Data quality	Calculation option		Variable
1	Actual building emissions	1a	The building's actual energy consumption converted to CO_2e emissions calculated using supplier-specific emission factors specific to the respective energt source. Alternatively actual emissions can be used.
2		1b	The building's actual energy consumption converted to CO_2e emissions calculated using average emission factors

continued next page >>

>> CONTINUED: TABLE 5. DATA QUALITY FOR MORTGAGE LENDING
[1 = highest data quality; 5 = lowest data quality]

Data quality	Calculation option		Variable
3	Calculated building emissions	2a	The building's average calculated energy consumption based on official building energy labels that is valid or has been invalid in maximum five years and the floor area and converted to CO_2e emisisons calculated using average 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_2e emissions calculated using average emission factors.
5	Ejendommens gennemsnitlige udledning	3a	The building's avergae calculated energy consumption based on property type and converted to CO_2e emisi-sons calculated using average emission factors.

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_2e emissions are calculated, the lender can inform about the data quality for the portfolio, e.g. a cover pool.

Calculating emissions

Energy consumption can be converted to CO_2e emissions using emission factors. The Danish Energy Agency publish emission factors,[9] which are recommended to be used. Thus, the annual emissions of a building can be expressed by the following

$$Building\ emissions\ = \frac{Energy\ consumption}{Energy\ factor} \times\ Supply\ efficiency\ \times Emission\ factor$$

where energy factor equals 0.85 when primary heating source is district heating, 1.9 for electricity and 1 for other primary heating sources. The energy factor is used to determine a property's net energy consumption. The supply efficiency is system specific and if the property is heated with district heating or directly with electricity the supply efficiency is set to 1. If supply efficiency is not available, it is set to 1.

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

Method 1a and 1b

It is recommended that if data with actual energy consumption or emissions is available it is used to calculate financed emissions.

Method 2a

The EPC scores for properties in Denmark are retrieved from the Danish Energy Agency. Data are retrieved for all properties in Denmark with a valid EPC score. The EPC score is valid for ten years.

The EPC score describes the energy consumption of a property, which is illustrated in table 6 and table 7 below:

TABEL 6. EPC SCORES FOR RESIDENTIAL PURPOSES

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

TABEL 7. EPC SCORES FOR MULTIPURPOSE COMMERCIAL PREMISES AND PUBLIC PROPERTIES

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

To calculate the energy consumption of a property, the method uses the average of the minimum and maximum consumption for a given EPC score.[10] The calculations are based on a property's net energy consumption.

[10] Note the EPC score 'G' only has a lower boundary, and therefore no trivial average exists. The consumption for EPC score 'G' is therefore defined as the lower boundary plus the average consumption for EPC score 'F'

EXAMPLE 1.

CO_2 emissions for a detached house, heated floor area is 100 m², EPC score 'A2015' 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) for district heating yields

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

Method 2b

The method estimates an EPC score for a property based on a distribution of EPC scores made from properties with valid EPC scores. The distributions are calculated based on property type, area, year of construction and primary heat source. The categories can be found in Appendix A.

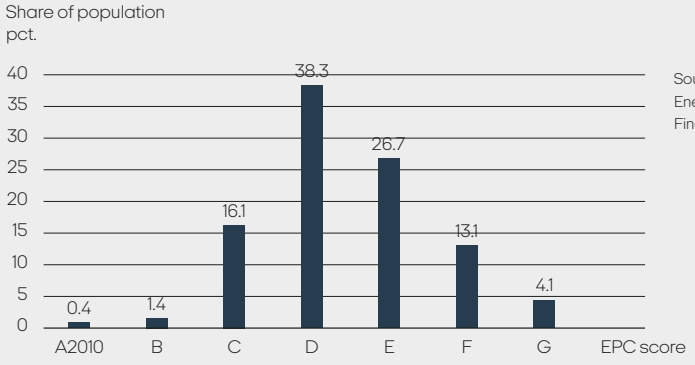
A property with no EPC score or an EPC score which has been non-valid for more than five years is assigned with a distribution of EPC scores. Using the same principle as in other methods, the method uses the average of the minimum and maximum consumption for a given EPC score.

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 heating source is natural gas.

The distribution of EPC scores for properties 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

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>> CONTINUED: EXAMPLE 2.

Using table 6 yields,

$$
\begin{aligned}
&Calculated\ energy\ consumption\ per\ m^2 \\
&= 0\,\% \times 0.5 \times (0 + 27) \\
&+ 0\,\% \times 0.5 \times \left(27 + 30 + \frac{1000}{100}\right) \\
&+ 0.4\,\% \times 0.5 \times \left(30 + \frac{1000}{100} + 52.5 + \frac{1650}{100}\right) \\
&+ 1.4\,\% \times 0.5 \times \left(52.5 + \frac{1650}{100} + 70 + \frac{2200}{100}\right) \\
&+ 16.1\,\% \times 0.5 \times \left(70 + \frac{2200}{100} + 110 + \frac{3200}{100}\right) \\
&+ 38.3\,\% \times 0.5 \times \left(110 + \frac{3200}{100} + 150 + \frac{4200}{100}\right) \\
&+ 26.7\,\% \times 0.5 \times \left(150 + \frac{4200}{100} + 190 + \frac{5200}{100}\right) \\
&+ 13.1\,\% \times 0.5 \times \left(190 + \frac{5200}{100} + 240 + \frac{6500}{100}\right) \\
&+ 4.1\,\% \times \left(240 + \frac{6500}{100} + 0.5 \times \left(190 + \frac{5200}{100} + 240 + \frac{6500}{100}\right)\right) \\
&= 201.36\ kWh/m^2/year,
\end{aligned}
$$

and hence

$$Calculated\ energy\ consumption\ = 201.36 \times 100 = 20136\ kWh/year$$

Using the emission factor for natural gas (0.204) yields

$$CO_2 - emissions\ = 20136\ kWh/year\ \times 0.204\ kg\ CO_2/kWh\ = 4108\ kg\ CO_2\ /year$$

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 is measured.

The absolute emissions are calculated in tCO_2e 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 Occupied Dwellings

For owner occupied dwellings the method for calculating CO_2 emissions follows the recommendations in the Data quality section using table 6.

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_2emission for holiday houses it is recommended to use average numbers produced by the Danish Energy Agency and Danish Building Research Institute.[11] 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 af 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 CO_2 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 always equals 100 when calculating financed emissions.

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, 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_2e emissions follows the business loans asset class.

[11] www.sbi.dk/Assets/Elforbrug-i-sommerhuse/sbi-2006-06-pdf.pdf table 11 and table 16

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.

Manufacturing etc.

For properties with manufacturing etc. purposes the method for calculating CO_2e emissions follows the business loans asset class. If relevant, the method used to calculate CO_2e 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.

Properties with Mixed Purposes

In some cases, a property may have several purposes, e.g. both residential and commercial. Depended 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. 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. These loans are covered in all cases by this manual, and the emission for the financed activity will therefore reflect the mortgage, i.e. of the emission of the property, independently of how the borrower ultimately uses the proceeds of his loan for.

Denmark has a well-developed system for producing EPCs for properties. However, the EPCs reflect the expected energy consumption of a property and not actual energy consumption, which might under- or overestimate consumption for some properties.

Most privately owned properties do not have a valid EPC, and the EPC is estimated using the method described above. Looking at an individual property the estimated energy consumption may be too low or high, however, on a portfolio level, the approach is reasonable.

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

Methods using EPCs are based on a property's net energy consumption. The model only includes the part of a property'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.

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 property is based on a distribution of EPC scores made from properties with valid EPC scores. The distributions are calculated based on property type, area, year of construction and primary heat source.

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

Property type	Area	Year of construction	Primary heat source
Detached houses	Urban municipalities	< 1890	Biofuel
Terraced, linked or semi-detached houses	Intermediate municipalities	1891-1930	Electricity
Multi-dwelling houses	Rural and outlying municipalities	1931-1950	District-Heat
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	

Property type

The property type is determined by the code for use of buildings[12] provided by The Central Register of Buildings and Dwellings (BBR) in Denmark.

Use of EPC score	Property type	Code for use
Residential	Detached houses	[120 ; 122], [185;190]
Residential	Terraced, linked or semi-detached houses	[130 ; 132]
Residential	Multi-dwelling houses	[140 ; 160]
Residential	Farmhouses	110
Multipurpose commercial premises and public properties	Multipurpose commercial premises	[320 ; 390] , [410 ; 490],
Multipurpose commercial premises and public properties	Properties for social purposes	[520 ; 539]

Area

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

Urban municipalities by code	Intermediate municipalities by code	Rural or outlying municipalities by code
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 municipalities by code	Intermediate municipalities by code	Rural or outlying municipalities by code
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 >>

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

>> continued

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

Urban municipalities by code	Intermediate municipalities by code	Rural or outlying municipalities by code
		787
		791
		810
		813
		820
		825
		840
		846
		849
		860

Primary heat source

The primary heat source is determined by the codes provided by BBR in Denmark and the EPC data provided by the Danish Energy Agency.

Primary heat source	'Varme-installations-kode' [13]	'Opvarm-nings-kode' [14]	Heatsupply
District-Heat	1		District-Heat
Electricity	5.7	1	Electricity
Natural Gas		7	CityGas, FuelGasOil, FuelOil, NaturalGas
Oil		3	
Coal	6	4	Coal, Coke
Biofuel	3	6	Biogas, Briquettes, Corn, Wood, Wood-Chips, Wood-Pellets, Straw, StrawPellets, RapeOil

[13] teknik.bbr.dk/kodelister/0/1/0/Varmeinstallation
[14] teknik.bbr.dk/kodelister/0/1/0/Opvarmningsmiddel

8. 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.

Equation 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:

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

For absolute emissions this is

$$\sum_{c} \frac{Outstanding\ amount_{t}}{EVIC\ or\ Total\ balance_{c}} \times\ Company\ emissions_{c}$$

(with c = company)

For relative emissions this is

$$\sum_{c} \frac{\frac{Outstanding\ amount_{t}}{EVIC\ or\ Total\ balance_{c}} \times\ Company\ emissions_{c}}{All\ business\ loans}$$

(with 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 non-listed 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.

$$\sum_{c} Sector\ absolute\ emissions \times \frac{Revenue\ company_{c}}{Revenue\ sector} \times \frac{Oustanding\ amount_{c}}{EVIC\ or\ Total\ balance_{c}}$$

(with 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 emissions 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:

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

(with 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:

a) Company specific data on its scope 1 and 2 emissions
b) Physical output and/revenue company data and emission factors
c) Total sectoral balance sheet and emission factor

Data

There are several possible sources, including:

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

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:

1. Reported emissions
2. Physical activity-based emissions
3. Economic activity-based emissions

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 tons of steel produced). The emission data should be expressed per physical activity e.g. ton CO_2e/ton of steel)

Economic activity-based emissions (score 4 and 5)

Emissions are based on data for the economic activity of the company 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, ton CO_2e/revenue or ton CO_2e/assets).

TABLE 8. DATA QUALITY FOR BUSINESS LOANS
(1 = highest data quality; 5 = lowest data quality)

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

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. The tool is expected to be available during 2022.

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 firms 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 emissions 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 EU Commission has in the Spring of 2021 put forward a proposal for directive on sustainability reporting (CSRD). The directive is being negotiated at EU level.

9. 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)[17] 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[18] 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]

[17] IMO 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] 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.

Equations to calculate financed emissions

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

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

(with c = vessel)

The relative emissions (footprint)

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

(with c = vessel)

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_2e/t heavy fuel oil)

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

(with 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:

1. The amount of fuel consumption for each type of fuel in metric tonnes
2. 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 9. DATA QUALITY FOR SHIP FINANCE
(1 = highest data quality; 5 = lowest data quality)

Data quality	Calculation option		Variable
1	Reported emissions	1a	Primary data on actual ship fuel consumption and fuel type emission factors are vailable.
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 traveled is estimated. Fuel type emission factors are available. 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.

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

This asset class refers to on-balance sheets loans and leasing contract 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 emissions 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 e/l diesel) weighted with the attribution factor.

Calculation of emissions from motor vehicle loans to private customers

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

(with v = vehicle , f = fuel type)

Calculation of emissions from leased cars to private customers

$$\sum_v Efficiency_v \times Distance\ travel_v\ X\ Emission\ factor_f$$

(with 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 in 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 of no data are available from WLTP or NEDC. The latter will often be available for new cars.

The knowledge about CO_2 emissions from electric cars and Plug-in hybrid cars is increasing fast. It is recommended that emissions are calculated based on averages broken down by fuel types:

1. Petrol
2. Diesel
3. Electricity
4. PHEV (Plug-In Hybrid Vehicle)

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.

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

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.

TABLE 10. DATA QUALITY FOR MOTOR VEHICLE LOANS AND LEASING VEHICLES FOR PRIVATE CUSTOMERS

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

Data quality	Calculation option		Variable
1	Actual vehicle-specific emissions	1a	Actual vehicle fuel 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	Estimated efficiency (km/l), estimated distance traveled and estimated type of vehicle.

Limitations

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 type of vehicle's emissions and efficiency. Older cars, however, will not have WTLP or NEDC emissions 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 for financed emission.

Emissions for 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

Work is ongoing to obtain data on average kilometers for vehicles to be used in the formula for calculating vehicle emissions as well as average emissions for cars depending on their fuel type.

In a later version, Finance Denmark will 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 to private customers – Appendix 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 Ton CO_2.

With data from 2019 the emission factor will be:

$$Emission\ factor_{El} = \frac{4.158\ 1000T\ CO2}{106.293\ TJ} = 39{,}12\ TCO_2/TJ$$

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

$$Emission\ factor_{El} = \frac{4.158\ 1000T\ CO2}{106.293\ x\ 0{,}000278\ TWh} = 140{,}71\frac{1000TCO_2}{TWh} = 140{,}71\ x\frac{10^9}{10^{12}} = 0{,}1407\frac{gCO_2}{Wh}$$

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

Annexes

ANNEX 1

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 judge 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.

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.

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 which the investor participates in 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.

Corporate bonds: This asset class includes all corporate bonds without known use of proceeds and packaged products, e.g. SPV's 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.[1] 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.

Carbon footprint: Carbon footprint 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.

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 emissions 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 emissions sources when prioritizing data collection efforts.

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 of the company's debt was paid off.

[1] 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.

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 sheets loans and leasing contract 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 participating all 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.

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.

Emissions 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 two metrics for financed emissions:

1) Total carbon emissions in tonnes CO_2e
2) The carbon footprint in tonnes CO_2e per million DKK financed (investment or loan)

The total carbon emissions in tonnes CO_2 equivalents (CO_2e) 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 CO_2 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 .[2]

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

[2] The relevant excerpt from the final TCFD report is The Common Carbon Footprinting and Exposure Metrics, which can be accessed via www.tcfdhub.org/Downloads/pdfs/E09%20-%20Carbon%20footprinting%20-%20metrics.pdf

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.

Initially, it is relevant to mention that 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 sensitive to fluctuations in the market, and, thus, leads 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[3] 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 minorities' interest".

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.

[3] The regulation can be accessed via ec.europa.eu/finance/docs/level-2-measures/benchmarks-delegated-act-2020-4757_en.pdf

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.[4]

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

For non-listed companies it will be relevant to the 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)

[4] In the EU draft RTS under the Sustainability Disclosure Regulation this definition of enterprise value without the inclusion of cash is recommended.

ANNEX 3

Changes from the first version - November 2020

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[5] 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 equities

The section on identification codes is deleted since it was unnecessary.

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

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