

Documentation of the calculation for DLR's financed GHG footprint

Description of data, model
calculations and assumptions

Content

| | |
|--|----------|
| Documentation of the calculation for DLR's financed GHG footprint | 3 |
| Version overview | 3 |
| Introduction | 4 |
| Data sources | 5 |
| Model assumptions | 5 |
| | |
| Appendix | 7 |

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Version overview

| Version | udførende | Opdatering | Dato |
|---------|-------------------------------------|---|------------|
| 1.0 | Jakob Hauge/Jakob Kongsgaard Olsson | Calculation rules for the 1 st version of calculation of the GHG footprint | 18.01.2021 |
| 1.1 | JHA/KAV | Model update for holiday homes and buildings without a heating source | 20.01.2023 |
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Introduction

DLR publishes quarterly CO₂e emissions for funded activities. The financed emissions are expressed in tons of CO₂e and the CO₂ footprint (tons of CO₂e/DKKm financed). CO₂e is made up of several greenhouse gases covered by the Kyoto Protocol, measured in CO₂ equivalents.

DLR's statements generally follow the principles for measuring and accounting financed emissions as described in Finance Denmark's CO₂ model for the financial sector, [Finance Denmark's CO₂ model](#).

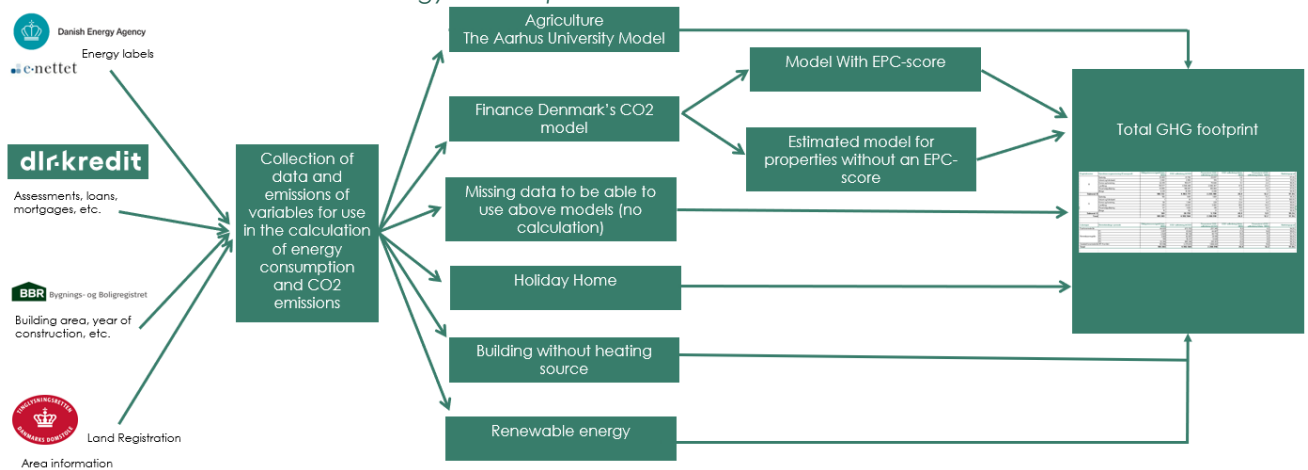
This method does not take the actual emissions into account, but calculates the emissions based on the Energy label and heating source. DLR wishes that data of the actual emissions can be used as soon as possible.

For agricultural lending DLR has chosen to calculate CO₂e emissions on the basis of a method developed by Troels Kristensen from Aarhus University:

https://pure.au.dk/portal/files/196779902/Klimaeffekt_ved_oml_gning_til_ko_jordbrug_04092020.pdf.

The method is based on calculated 'norms' based on the number and species of animals, as well as hectares of cultivated farmland. Data for these calculations is obtained from DLR's own databases. In the long term, the ambition is for DLR to use data that more closely reflects the actual emissions of financed agricultural properties.

Overview of how we calculate energy consumption and CO₂ emissions:



Data sources

DLR has used the following sources of data in the calculation of CO₂e:

1. DLR's loan portfolio and mortgage assessments
2. The Central Register of Buildings and Dwellings (BBR):
 - Total area of the building
 - Primary heat source
 - Year of construction
 - Address
3. Energy label reports from the Danish Energy Agency
 - Energy label from the reports
 - Heated area
 - Valid energy reports and energy reports that are a maximum of 5 years old are included
4. Agricultural information
 - Hectare information is subtracted from Tinglysning.dk

Model assumptions

Two different models have been used to calculate the carbon footprint.

Calculation of the carbon footprint of farms over 10 hectares.

Agriculture is defined as farming with more than 10 hectares. For residential farms under 10 hectares, CO₂ is calculated using the model for buildings described below.

The CO₂ calculation for all farms over 10 hectares is based on Aarhus University's model for calculating the climate effect of agriculture, cf. Table 5.2 in the model for Climate effect of conversion to organic agriculture - [Klimaeffekt ved omlægning til øko jordbrug 04092020](#).

In the model, no distinction has been made between organic and conventional farming, which will be adjusted in the upcoming model.

DLR's assessments of hectares is based on DLR's own database on individual farms.

Model for calculating the carbon footprint of buildings.

The CO₂ calculation is based on Finance Denmark's (FIDA's) CO₂ model for mortgage lending (paragraph 7), see [Finance Denmark's CO₂ model](#).

For the calculation of CO₂ emissions, the building's area, and primary heat source from the BBR register have been used. The primary heat source is subsequently grouped into the categories established by FIDA for the primary heat source in order to be able to prepare an estimated energy consumption of buildings without an energy label, cf. Table 1.

Emission factor: Emission factors from the Danish Energy Agency's inventory of calorific values and CO₂ emissions have been used, with the exception of biofuels, which are assumed to have the same emission factor as district heating, as we do not have documentation biofuel is CO₂ neutral: [Brændværdier og CO₂ emissionsfaktorer \(HB2019 - Historisk\) | Håndbog for energikonsulenter \(hbemo.dk\)](#)

For the calculations, energy labels are also used on the buildings, as the Danish Energy Agency discloses.

Calculations on emissions are divided into two parts:

Buildings with an energy label

The calculations for buildings with an energy label have been conducted using FIDA's model for the CO₂ calculation based on estimated energy consumption, where the building's energy label has been used to calculate the CO₂ emissions.

Buildings without an energy label

The calculations for buildings without an energy label have been made using FIDA's CO₂ model, where a distribution of all energy labels in Denmark has been made on the four variables listed in Table 1. Then the emissions are calculated for all energy labels and the distribution is multiplied through.

Holiday homes

According to FIDA's calculation model a standardized factor is used for calculating CO₂ emissions.

Buildings without a heating source

The CO₂ emissions are set to 0 for buildings without a heating source.

Renewable energy

The CO₂ emissions are set to 0 for renewable energy.

Other assumptions

Loans with a mortgage on the following properties are omitted from the models:

- Properties on the Faroe Islands and Greenland do not have energy labels
- Properties with 0 or missing data in total area in the BBR register
- Properties with a lack of primary heat source in the BBR register
- BBR data where errors/omissions can be detected

For industry and crafts, emissions are calculated on those buildings that can be categorized as office buildings. Others have not been calculated, as CO₂ emissions must be collected for each company.

Appendix

Table 1:4 parameters used to allocate energy labels on each categorization

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

Link to Finance Denmark's model for calculating CO₂ emissions:

[Finance Denmark's CO₂ model](#)

Link to Aarhus University's calculation of the climate effect of conversion to organic agriculture:

https://pure.au.dk/portal/files/196779902/Klimaeffekt_ved_oml_gning_til_ko_jordbrug_04092020.pdf

Link to the Danish Energy Agency's inventory of calorific values:

[Brændværdier og CO₂ emissionsfaktorer \(HB2019 - Historisk\) | Håndbog for energikonsulenter \(hbemo.dk\)](#)