



Impact reporting methodology 2023

Impact reporting methodology

Introduction

In addition to outlining the allocation of green bond proceeds to green loans, the objective of KommuneKredit's Green Bond Impact Report is to demonstrate the expected environmental impact of green loans financed through the issuance of green bonds in alignment with our Green Bond Framework.

Expected environmental impact

Our [Green Bond Impact Report](#) illustrates the expected environmental impacts from projects to which green bond proceeds have been allocated. The impacts are based on our customers' ex-ante estimates of expected annual outcome for an average year in the project's life-cycle. As a result, the Green Bond Impact Report does not guarantee that the

expected/reported impact will materialise in practise. The figures should therefore be applied with caution. The indicators are selected based on an analysis of relevance to our green bond investors.

The expected environmental impact of financed projects is quantified where possible, focusing on the first two environmental objectives of the EU Taxonomy, 'Climate change mitigation' and 'Climate change adaptation'¹. The green loan categories 'Clean Transportation', 'Green Buildings', and 'Energy' lie well within the climate mitigation objective, and expected environmental impacts are thus reported in reduced/avoided CO₂e emissions. Projects in the green loan categories 'Sustainable Water and Wastewater Management' and 'Pollution

Prevention and Control' focus on both climate mitigation and adaptation but are better described under the upcoming objective of the EU Taxonomy, 'Sustainable use and protection'. The effects of these categories mostly relate to environmental considerations. Still, some climate mitigation effects are readily reported. Lastly, our category 'Climate Adaptation', belongs to the 'Climate change adaptation' objective.

The environmental impact that we

Get in touch

We welcome any comments, suggestions, or questions you may have regarding our impact report. Please send an email to bk@kommunekredit.dk.



Key reporting principles

We follow the impact reporting principles of the Nordic Public Sector Issuers Position Paper on Green Bond Impact Reporting, 2024.

- We calculate CO₂e emissions using scope 1 and scope 2 as defined by the Greenhouse Gas Protocol.
- We apply a conservative approach to the selection and calculation of emission baselines.
- We report on the impact share that is attributable to KommuneKredit's financing.
- We apply a portfolio approach.
- We provide an impact assessment with the reservations that not all related data can be obtained and that the reported impact is reliant on our customers' ex ante estimate of physical activity data.

¹ Note that KommuneKredit's Green Bond Framework 2022 aligns with the International Capital Markets Association's (ICMA) [Green Bond Principles](#) (GBP) 2021. Nevertheless, to accommodate and reflect emerging regulation, our green loan eligibility criteria were, as a starting point, based on the EU Taxonomy's Technical Screening Criteria (TSC) of the Climate Change Mitigation Objective. KommuneKredit engaged an independent technical consultant to help conduct a general level assessment of the loan categories and criteria against the TSC and Do No Significant Harm criteria ('DNSH'). Moreover, CICERO Shades of Green, now a part of S&P Global, provided a voluntary assessment of the EU Taxonomy alignment vis-à-vis the TSC of the Climate Mitigation Objective as part of the second party opinion of the Framework.

report on is therefore divided into three sub-categories.

- The climate adaptation impact (qualitative)
- The environmental impact (qualitative/quantitative)
- The greenhouse gas emissions (GHG) reduced/avoided (quantitative).

Our impact reporting is dependent on data as reported to us by our customers. With regard to the first two categories, the expected environmental impact is a direct disclosure of the data that we have received from our customers. The third category regarding reduced/avoided GHG is calculated by KommuneKredit using the reported physical activity data from our customers (for example, number of MWh)². The CO₂e emissions reduced/avoided calculated by KommuneKredit could therefore differ from

other applied methodologies. Due to the conservativeness of KommuneKredit's approach, the figures that we report will be on the lower side. Data provided by the customer on each individual loan is available [here](#).

Impact per invested DKK

Figures are presented on the impact per invested DKK. These figures present the estimated environmental impact of projects to which green bond proceeds have been allocated. It is a readily comparable parameter but should be used with some reservation.

The practice of reporting environmental impact varies between issuers of green bonds. The share of eligible projects in a Green Bond Framework that focus on the CO₂e effect and climate adaptation, or general environmental considerations, will vary. Moreover, how far along the recipients of the green bond proceeds

are in the green transition will affect the applied baselines for CO₂e emission calculations. Impact per invested DKK is therefore presented at an aggregate level and for each category eligible in the Green Bond Framework.

Calculating CO₂e emissions

The environmental impact of projects under our Green Bond Framework (2022) is calculated based on physical activity data compared to an alternative scenario where the project has not taken place or displaces some other more CO₂e-intensive practice. To calculate the climate impact from projects financed by KommuneKredit through our Green Bond Framework (2022), baseline emission factors and project emission factors therefore need to be established.

Calculating CO₂e emissions

Two types of emission factors need to be established to calculate CO₂e emissions:

- Baseline emission factors (emission factor for the alternative scenario).
- Project emissions factors (emission factor for the expected emissions from the project in question).

The reported CO₂e impact per primary physical activity data is exclusively linked to the baselines as presented in the following. At KommuneKredit we therefore update our emission factors for CO₂e emissions calculations annually. The emission factors for CO₂e emission calculations are established based on the following screening criteria, in prioritised order:

Factors recommended by [the Nordic Position Paper on Green Bonds Impact Reporting](#)

² However, with the following exceptions: CO₂e data is directly delivered by the customer concerning loans in the Pollution Prevention and Control category, infrastructure investments in the Clean Transportation category and where the production of biogas is the primary focus for projects in the Sustainable Water and Wastewater Management category.

1. Utilise readily available national average emission factor for the primary physical activity data analysed
2. Calculate national average emission factor for the primary physical activity data analysed
3. Utilise readily available international average emission factor for the primary physical activity data analysed
4. If unavailable or data is too uncertain, no CO₂e emission reduced/avoided is reported.

The baseline emission factors and the project emission factors that we apply in our impact calculations are summarised in the table to the right and described in more detail in the following sections.

Baseline and project emission factors summarised

Baseline emission factors	Emission factor	Unit of measurement
Diesel-fuelled passenger car	138	gCO ₂ e/km
Electricity consumption	191	kgCO ₂ e/MWh
Heat consumption excluding district heating and heat pumps	91	kgCO ₂ e/MWh
Heat consumption including district heating and heat pumps	74	kgCO ₂ e/MWh

Project emission factors	Emission factor	Unit of measurement
Transportation with 0 direct tailpipe emissions	0	gCO ₂ e/km
Geothermal heat pumps	41	kgCO ₂ e/MWh
Ground water heat pumps	79	kgCO ₂ e/MWh
Variable electricity generation, e.g., wind and solar power projects	0	kgCO ₂ e/MWh
Biomass as a heat source	6	kgCO ₂ e/MWh
District heating projects	72	kgCO ₂ e/MWh

Baseline emission factors

Electricity

A common baseline for electricity is used throughout the green categories in our Green Bond Framework. The Nordic Public Sector Issuers have in their [Nordic Position Paper on Green Bonds Impact Reporting](#) calculated a baseline emission factor for electricity using the International Financial Institution's (IFI) Harmonized Framework methodology. The emissions baseline is a consequential assessment and are an average of two margins, a grid Operating Margin (OM) and a Build Margin (BM) from potential new generation capacity that is affected by the project. The default combination of OM and BM (1/3 OM and 2/3 BM) for all electricity-related projects is used to reflect an open Nordic electricity system interconnected to neighbouring northern European systems. The OM and BM from the European mainland mix, including the UK and Norway and excluding

Cyprus, establishes the base for the baseline emission factor. The resulting default baseline emission factor for electricity is kg CO₂e/MWh.

District heating

A significant share of projects financed by the issuance of Green Bonds at KommuneKredit target district heating investments. Projects categorised as 'Energy' are loans for investments in, and ongoing maintenance of, distribution infrastructure and clean energy generation to ensure that customers receive district heating. Projects in the Green Building category will also rely on district heating data.

For simplicity's sake, and as most recipients of the district heating projects that we finance are at the household level, household alternative heat generation is utilised for the calculation of baselines. Two baselines are established for district heating, one where

the data points omit the share of heat consumption that is coupled to district heating and household heat pumps and one that includes them. It is assumed that general district heating projects do not substitute other district heating projects or household heat pumps or biogas, but that heat-related emissions from a specific building in the Green Building category includes all heat sources. Both baselines are calculated using the following data sources:

- Total heat output of alternative heat sources³ from the Danish Energy Agency's 'Klimastatus- og fremskrivning 2022'⁴ datasets forming the basis for the report, available [here](#).
- Heat efficiency values from the Danish Energy Agency's 'Technology Data', available [here](#).
- Nationally determined CO₂e emission baselines where available for the heat source in question as presented by

the Danish Business Authority⁵. Where unavailable, international baselines are utilised. Specifically, the average electricity CO₂e emission factor recommended by the Nordic Public Sector Issuers and the US Environmental Protection Agency (EPA) Center for Corporate Climate Leadership's Emission Factors for Greenhouse Gas Inventories concerning biomass⁶, available [here](#).

Clean Transportation

A single baseline has been established for Clean Transportation, as the expected CO₂e emissions resulting from investments within this green loan category, with the exception of electrified passenger cars, are reported directly by the green loan recipient. When calculating the impact of investments in electrified passenger cars, we utilise an average CO₂e emission factor for the average Danish diesel-fuelled passenger car, which is 138 g CO₂e per km. This emission factor is directly

³ Alternative heat sources include fuel oil, natural gas, biogas, biomass, other renewable sources, direct electricity heating and, lastly, district heating and heat pumps, which are included where relevant.

⁴ Updated version only available in Danish.

⁵ The Danish Business Authority's [Klimakompasset](#).

⁶ Biogenic CO₂e emissions are not included as they are considered 'outside of scopes' by the GHG Protocol Corporate Accounting and Reporting Standard.

Project emission factors

Projects that are financed with the proceeds from our green bonds do not necessarily imply a positive climate impact or carbon neutrality. Within the green loan categories that our Green Bond Framework 2022 encompasses, there are investments that are important to the sustainable transition of society, although not for reducing CO₂e emissions, for example, cloudburst protection and coastal protection.

The project emission factors relevant to each green loan category in our Green Bond Framework are described below, with the exception of the green loan category 'Climate Adaptation', which is not relevant for the calculation of carbon emissions.

Clean Transportation

As noted earlier, we calculate the CO₂e emission reductions for electrified pas-

senger cars utilising an emission factor provided by the Danish Energy Agency. Note, however, that our green loan portfolio 2022 does not contain investments for electric cars.

Green Buildings

For the construction or acquisition of buildings, the baseline for avoided CO₂e emissions is based on the average energy framework⁷ requirements in Danish Building regulation.

The Danish Building regulation states that all new new buildings (non-residential purposes) the total energy supply demand of the building for heating, ventilation, cooling, domestic hot water and lighting per sq. metre heated floor area may not exceed 41.0 kWh/sq. metre per year plus 1,000 kWh per year divided by the heated floor area. Disclosed energy savings from green buildings as a net value are compared to this national building requirement.

For building renovations, a baseline for CO₂e emissions will consider both electricity savings and heat consumption at the household level. For electricity, the baseline of 191 kgCO₂e/MWh will be applied. For heat consumption, the baseline of 74 kgCO₂e/MWh will be applied.

Sustainable Water and Wastewater Management

Two types of investments that imply CO₂e reduction/avoidance is financed within the Sustainable Water and Wastewater Management category; Ground water heat pumps and the production of biogas. Intrinsic heat in ground water can be utilised to produce energy in the water supply system. At a wastewater treatment plant, the treatment of sludge can produce biogas. The two options differ in how their baseline is acquired.

Ground water heat pumps displace either individual heat production in households as a part of the district heating network

or internal energy needs in the water supply system. As such, the baseline for ground water heat pumps is either the kgCO₂e/MWh emitted by the average Danish household that is not connected to the district heating network, see tabel p. 4, or the common baseline for electricity. If the purpose of the ground water heat pump is to produce district heating, the general baseline is 84 kgCO₂e/MWh. If the financed ground water heat pump projects produce energy for internal energy needs, the emission factor is calculated using the average heat efficiency of approximately four divided by the emission factor for electricity (315 kgCO₂e/MWh divided by 4), which in 2022 equals 79 kgCO₂e/MWh.

CO₂e reduction ensured by biogas is reported by the recipient of the green loan. It is noted that a large share of the projects categorised within the category Sustainable Water and Wastewater Management strive to optimise facilities that

⁷ Energy Framework is a factor that determines the total energy need (heating, ventilation, cooling and domestic hot water).

collect, treat, supply, and purify water or wastewater and in doing so reduce energy consumption, CO₂e emissions, improve health measures or further ensure the general water supply in Denmark. Data concerning energy consumption at the individual plant and average energy used for the supply are not readily available. The resulting reduced/avoided CO₂e emissions for energy efficiency in water or wastewater projects are therefore not reported.

Energy

The distribution, pipelines, storage of energy and associated infrastructure are considered integral to the continued provision of district heating. The average CO₂e emission of 72 kgCO₂e/MWh from Danish district heating is applied, directly reported in Klimakompasset's underlying emission factors. A heat distribution loss of 10% is assumed.

Project emission factors for direct invest-

ments in the production of heat are dependent on the source of heat production. Electricity generation from wind and solar are considered CO₂e neutral. Biomass produces very little CO₂e emissions within scopes, as biomass primarily emits biogenic emissions. The project emission baseline is sourced from [EPA](#). Geothermal heat pumps have an average heat efficiency of 7.6⁸, resulting in an average emission of 41.45 kgCO₂e/MWh, using the general baseline for electricity emissions.

Pollution Prevention and Control

CO₂e reduction ensured by projects categorised as pollution prevention and control is reported by the recipient of the green loan.

Collected Data and Climate Impact Calculation

The table on next pages summarises the data collected for KommuneKredit's green bond impact reporting as well as the climate impact calculation applied in the reporting.

⁸ [Technology Data](#)

Collected data and climate impact calculation

Category	Collected data	Climate impact calculation
Clean transportation	<ul style="list-style-type: none"> Number of km of new train lines, etc. created. Passenger-kilometres in new means of transportation. Estimated reduction in car use and car kilometres. Project's effect on increased resilience to climate change. Number of charging points installed or upgraded. 	<p><i>Diesel-fuelled kilometres displaced</i> (Passenger-kilometres in new means of transportation) * (Baseline emission factor for Diesel fuelled passenger car)</p>
Green buildings	<ul style="list-style-type: none"> Heated surface area in square metres. Annual energy avoided in MWh compared to the relevant building code (for new buildings). Annual energy reduced in MWh compared to the pre-investment situation (for refurbishments). Annual energy production on-site, in MWh. Estimated annual heating consumption avoided, measured in kWh/m²/year. 	<p><i>Construction of buildings or acquisition</i> ((Energy Framework BR18 (kWh/m²/year)) – (Estimated annual heating consumption avoided, measured in kWh/m²/year)) * (Heated surface area in square metres) * (Heat consumption including district heating and heat pumps (kgCO₂e/MWh))</p> <p><i>Major renovation/Energy Efficiency</i> (Annual energy reduced in MWh compared to the pre-investment situation (for refurbishments)) * ((Heat consumption including district heating and heat pumps (kgCO₂e/MWh)) or (Baseline emission factor for Electricity consumption (kgCO₂e/MWh))</p> <p><i>Energy production on-site</i> (Annual energy production on-site, in MWh) * ((Baseline emission factor for Electricity consumption (kgCO₂e/MWh))</p>

Category	Collected data	Climate impact calculation
Sustainable Water and Wastewater Management	<ul style="list-style-type: none"> Number of person equivalents (PE) of water or wastewater the plant processes, identifying any increase that can be attributed to the investment. Energy needs per processed m³, measured in kWh/m³. Annual water savings, in m³. Annual volume of wastewater treated or avoided, in m³. Resulting increase in capacity of facilities, m³/year. Reductions in emissions of methane, nitrogen, and phosphorus. Qualitative description of weather-related or climate-related problems that will be mitigated by the investment. Square meters adapted to weather-related or climate-related problems. Estimated annual increase in electricity/district heat distribution/production, measured in MWh/year. Estimated amount of biogas produced in a year, in MWh/year. Estimated CO₂e emission avoided/reduced due to biogas production, in tCO₂e/year. 	<p><i>Increase in district heat production</i> ((Baseline emission factor for Heat consumption excluding district heating and heat pumps (kgCO₂e/MWh)) - (Project emission factor for Groundwater heat pump (kgCO₂e/MWh))) * (Estimated annual increase in electricity/district heat distribution/production, measured in MWh/year)</p> <p><i>Increase in renewable energy for internal electricity needs</i> ((Baseline emission factor for Electricity consumption (kgCO₂e/MWh)) - (Project emission factor for Groundwater heat pump (kgCO₂e/MWh))) * (Estimated annual increase in electricity/district heat distribution/production, measured in MWh/year)</p> <p>CO₂e emission reduced/avoided due to the production of biogas is reported by the loan recipient</p>
Energy	<ul style="list-style-type: none"> Estimated annual increase in district heat distribution, in MWh/year. Estimated annual increase in renewable energy share of district heating, in MWh. Estimated annual energy reduced/avoided in MWh. 	<p><i>Increase in distributed district heating</i> ((Baseline emission factor for Heat consumption excluding district heating and heat pumps (kgCO₂e/MWh)) - (Project emission factor for District heating projects (kgCO₂e/MWh))) * ((Estimated annual increase in district heat distribution, in MWh/year) * 90% (Heat loss))</p> <p><i>Increase in renewable energy share of district heating</i> ((Baseline emission factor for Heat consumption excluding district heating and heat pumps (kgCO₂e/MWh)) - ((Project emission factor for Geothermal heat pumps (kgCO₂e/MWh)) or (Project emission factor for Biomass as a heat source (kgCO₂e/MWh)) or (Project emission factor for Variable electricity generation, e.g., wind and solar power projects (kgCO₂e/MWh)))) * (Estimated annual increase in renewable energy share of district heating, in MWh)</p> <p><i>Annual energy reduced/avoided</i> ((Baseline emission factor for Electricity consumption (kgCO₂e/MWh)) * (Estimated annual energy reduced/avoided in MWh))</p>

Category	Collected data	Climate impact calculation
Pollution prevention and control	<ul style="list-style-type: none"> ▪ Waste that is prevented, minimised, reused or recycled before and after the project in pct. of total waste and/or in absolute amount in tonnes p.a. ▪ Annual absolute (gross) amount of waste that is separated and/or collected and treated (including composted) or disposed of (in tonnes p.a. and in pct. of total waste). ▪ Annual energy generation, in MW. ▪ CO₂e emission reductions resulting from the financed project ▪ Qualitative description of environmental effects. 	CO ₂ e reduction ensured by projects categorised as pollution prevention and control is reported by the recipient of the financing.
Climate adaption	<ul style="list-style-type: none"> ▪ Physical climate risk addressed and expected adaptation-related outcome (quantified if possible). ▪ Qualitative description of weather-related or climate-related problems that will be mitigated by the investment. ▪ Square meters adapted to weather-related or climate-related problems. 	Not relevant.

KommuneKredit

Kultorget 16
DK-1175 Copenhagen K
Denmark

Phone +45 3311 1512
kk@kommunekredit.dk
www.kommunekredit.com
CVR no. 22 12 86 12

