REPORT

SR-Bank Green Portfolio Impact Assessment

CLIENT

SpareBank 1 SR-Bank ASA

SUBJECT

Impact assessment- energy efficient residential and commercial buildings, electric vehicles, and renewable energy

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Multiconsult

Report

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In summary, impact assessed for all examined asset classes in the SR-Bank portfolio qualifying according to SR-Bank's Green Bond Framework is dominated by renewable energy but with significant contributions from all asset classes. The following table sums up the impact calculated based on European location-based mixes in rounded numbers:

Energy efficient residential buildings	*17,800 ton CO_2-eq/year*
Energy efficient commercial buildings	*1,400 ton CO_2-eq/year*
Clean transportation	*3,200 ton CO_2-eq/year*
Renewable energy	*237,800 ton CO_2-eq/year*
Total	***260,200 ton CO_2-eq/year***

Note that the impact in the table above is scaled by the bank's engagement for all asset classes. Not scaled impact may be found in the report.

Also note that for electric vehicles, the scaled impact above is the sum of 5,000 tons CO_2-eq/year Scope 1 emissions, and -1,800 CO_2-eq/year in Scope 2 emissions based on European power mix.

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1 Introduction

On assignment from SR-Bank, Multiconsult has assessed the impact of the part of SR-Bank's loan portfolio eligible for green bonds according to SR-Bank's Green Bonds Framework[1].

In this document we describe SR-Bank's green bond qualification criteria, the evidence for the criteria and the result of an analysis of the loan portfolio of SR-Bank. More detailed documentation on baseline, methodologies and eligibility criteria is made available on SR-Bank's website[2].

1.1 Electricity demand and production

The eligible assets are either producing renewable energy and delivering it into the existing power system or using electricity from the same system. The energy consumption of Norwegian buildings is also predominantly electricity, with some district heating and bioenergy. The share of fossil fuel is very low and declining.

As shown in Figure 1, the Norwegian production mix in 2022 (88 percent hydropower and 10 percent wind) results in emissions of 7 gCO_2/kWh. The production mixes for other selected European states are also included in the figure for illustration.

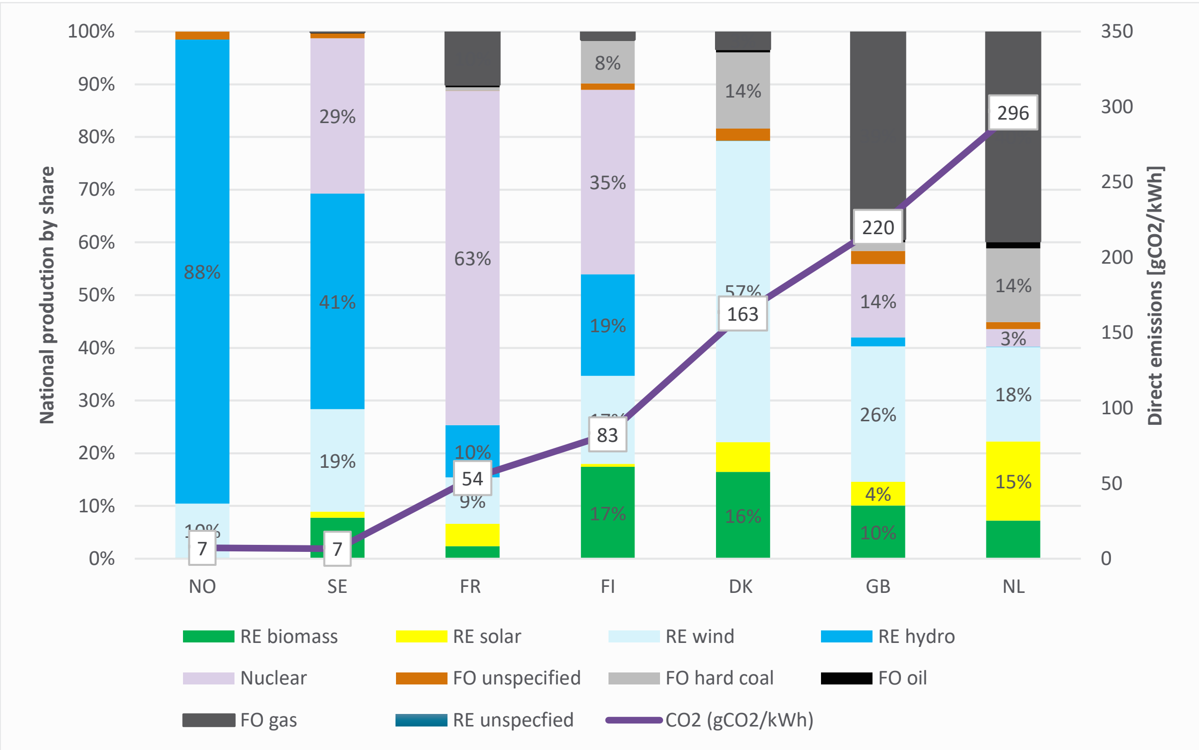

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2022, Association of Issuing Bodies[3])

Due to the interconnection of the power grid, the placement of the system boundary for power production heavily influences the emission factor. To demonstrate how emissions vary depending on

[1] https://www.sparebank1.no/content/dam/SB1/bank/sr-bank/om-oss/Investor/Rapporter/2023/Q2/SR-Green_Bond_Framework_2023.pdf
[2] https://www.sparebank1.no/en/sr-bank/about-us/investor/financial-info/debt-investors.html
[3] https://www.aib-net.org/facts/european-residual-mix

grid factor, the impact assessments for buildings, renewable energy and electric vehicles are each presented based on several emission factors.

1.2 Emission factors for energy efficient buildings

The CO_2-emissions resulting from in use energy demand in residential buildings depends to a large degree on the age of the building. This again is due to two factors: the differences in energy efficiency requirements in the building code, and development in the predominant solutions and energy sources for heating in new buildings. Examples of the latter are direct electric heating, several types of heat pumps, bioenergy, and district heating. The share of fossil fuel is very low and declining.

Since the Norwegian buildings are predominantly heated by electricity, the placement of the system boundary for power production heavily influences the emission factor. Since the financed qualifying objects in the portfolio are rather new, and expected to have a 60-year life, the impact is considered best illustrated by the yearly average CO_2-emissions in their lifetime. The main grid factors used in this green portfolio impact assessment reflects an average in the buildings lifetime, assuming a decarbonisation in the European energy system.

Finans Norge recently released a guidance document for calculation of financed greenhouse gas emissions, including recommendations for grid factors[4]. To demonstrate how emissions vary depending on grid factor, the two recommended grid factors from The Norwegian Water Resources and Energy Directorate (NVE) are included. That is the most recent, Norwegian physically delivered electricity for 2022[5] and the Norwegian residual mix, as calculated by the Association of Issuing Bodies for 2022[6]. The grid factors are summarized in Table 1 and described more in detail in the following sub-sections.

Table 1 Electricity production greenhouse gas factors (CO_2-eq) with and without influx of other heating sources for buildings in three scenarios. (Source: NS 3720:2018, Table A.1, NVE[5], AIB[6])

Scenario	Description	Emission factor electricity [gCO_2/kWh]	Emission factor incl. other heating sources [gCO_2/kWh] [7]
European (EU27+ UK+ Norway) NS 3720:2018 electricity mix	Location-based electricity mix with wide system boundary including EU countries, UK and Norway, average emissions over building's 60-year lifetime	136	115[8]
Norwegian NVE physically delivered electricity 2022	Location-based production mix with narrow system boundary of Norway only but including net export/ import only to neighbouring countries and average annual emission factors	19	19
Norwegian NVE residual mix 2022	Market-based residual mix for Norway with a European marketplace	502	416

[4] https://www.finansnorge.no/dokumenter/maler-og-veiledere/veileder-for-beregning-av-finansierte-klimagassutslipp/, 2024
[5] https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/, 2024
[6] https://www.aib-net.org/facts/european-residual-mix, 2023
[7] Multiconsult. Based on building code assignments for DiBK, 2015.
[8] This is higher than the 111 gCO_2/kWh used in 2023 impact assessments, due to correction of the allocation of heating sources between small residential buildings and apartments. 124 gCO_2/kWh has also been used in previous impact assessments. The current factor is lower due to a decreased share of fossil fuels in heating following the ban from 2020 (https://lovdata.no/dokument/SF/forskrift/2018-06-28-1060).

To calculate the impact on climate gas emissions, the grid factors are applied to all electricity consumption in all residential buildings. Electricity is, as mentioned, the dominant energy carrier to Norwegian residential buildings, but the energy mix also includes other energy carriers such as bio energy and district heating. The influx of other energy sources for heating purposes is applied to all electricity emission factors resulting in the "Emission factor considering other heating sources", found in the rightmost column in Table 1.

1.2.1 European (EU27+ UK+ Norway) and Norwegian electricity mix over building's lifetime

Using a life-cycle analysis (LCA), the Norwegian Standard NS 3720:2018 "Method for greenhouse gas calculations for buildings" considers international trade of electricity and the fact that consumption and grid factor does not necessarily mirror domestic production. The grid factor, as average in the lifetime of an asset, is based on a linear trajectory from the current grid factor to a close to zero emission factor in 2050 and steady until the end of the lifetime. These factors are location-based.

The mentioned standard calculates, on a life-cycle basis, the average CO_2- factor for the next 60 years, according to European (EU27+ UK+ Norway) system boundary, as described in Table 1.

Calculations in previous impact assessments have been based on the European (EU27+ UK+ Norway) NS 3720:2018 factor in Table 1. Norway is part of a larger, integrated European power grid, and import and export of electricity throughout the year means not all electricity consumed in Norway is produced here. The standard also calculates the equivalent Norway only emission factor. Using the European mix instead of the Norway only mix, is then a more conservative approach.

The European electricity factor is 136 gCO_2-eq/kWh, which constitutes the GHG emission intensity baseline for energy use in buildings with a life span of 50-60 years and assuming that the CO_2-factor of the European power production mix is close to zero in 2050. This value is comparable to the equivalent determined in Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (January 2020).

1.2.2 Norwegian physically delivered electricity 2022

NVE calculates a climate declaration for physically delivered electricity for the previous year. This factor represents electricity consumed in Norway, accounting for emissions from net import and export of electricity from neighbouring countries and these countries' average annual emission factors. The most recent factor published is for 2022, this grid factor is 19 gCO_2-eq/kWh. This is also a location-based grid factor.

1.2.3 Norwegian residual mix 2022

Certificates of origin, direct power purchase agreements or other documentation of which power has been purchased for the buildings in the portfolio is not available to the bank. There is also no basis for making assumptions on the share of the energy consumed by the buildings in the portfolio that has been purchased with Guarantees of Origin. An alternative market-based grid factor for Norway is then the electricity disclosure published by NVE[9] and Association of Issuing Bodies[10]. This is the electricity residual mix of the country, which shows the sources of the electricity supply that is not covered with Guarantees of Origin, considering a European marketplace for electricity. Guarantees of Origin are not very widespread in the Norwegian electricity end-user market, resulting in a high emission factor of 502 gCO_2-eq/kWh for 2022.

[9] https://www.nve.no/energy-supply/electricity-disclosure/?ref=mainmenu, 2024

[10] As calculated by AIB. Lower than Norwegian residual mix due to larger share of electricity usage covered by Guarantees of Origin.

1.3 Emission factors for zero-emission vehicles

The GHG emission intensity baseline for power consumption may be calculated with different system boundaries. For electric vehicles, a three-year average emission factor for power in Europe is applied. Yearly power production and related CO_2-emissions presented by the Association of Issuing Bodies[11] are included for all European countries excluding Iceland, Cyprus, Ukraine, Russia and Moldova.

Similarly to the European NS 3720:2018 electricity mixes for buildings, an average emission factor relevant for electric vehicles is also calculated based on a trajectory from the current grid factor to a close to zero emission factor in 2050. But while a life-cycle based factor is used for buildings, a factor based on European (EU27+UK+Norway) electricity production mixes for recent years is applied to represent the location-based production mix with wide system boundaries.

Taking into account the emission trajectory and lifetime of the vehicles this gives the electricity factors 159 gCO_2-eq/kWh for passenger vehicles and 168 gCO_2-eq/kWh for light-duty vehicles. In addition, the Norwegian NVE physically delivered electricity and residual mixes for 2022 presented in the previous subsection are applied. Relevant indirect emission factors per distance [gCO_2/km] are calculated based on these and used in the EV analysis. See more detail in subsection 4.3.3.

1.4 Emission factors for renewable energy production

For renewable energy, the impact calculations compare the emissions from hydropower and wind power to the emissions of the grid electricity. The difference between the two is considered the avoided emissions per produced unit of electricity. The electricity emission factors from Table 1 are used as baseline for the calculations. The location-based mix for Europe have been used in previous analyses, and the location-based and market-based mixes for Norway are introduced for comparison. The resulting factors are described more in subsection 5.3.1.

[11] https://www.aib-net.org/facts/european-residual-mix, 2023

2 Energy efficient residual buildings

2.1 New residential buildings NZEB-10 percent - criteria for buildings finished since December 31st 2020

The EU Taxonomy for sustainable activities distinguishes between new and existing buildings, with criteria dependent on whether the building is completed before or after 31 December 2020. The technical screening criteria for new buildings requires the building to have an energy performance, described in primary energy demand, at least 10 percent lower than the threshold set in the national definition of a nearly zero-energy building (NZEB). The energy performance is to be documented by an Energy Performance Certificate (EPC).

Multiconsult has assessed the performance of new buildings and how the most energy efficient buildings may be identified in the bank's loan portfolio on the back of the national definition of nearly zero energy buildings (NZEB) of January 2023. As the building code and the national EPC system are key to understand the NZEB definition and to efficiently identify buildings complying to a new build criterion for green buildings, some background information on these and how the Norwegian residential building stock perform today is included below.

The Norwegian national definition of NZEB was published in January 2023[12] with a correction issued in January 2024[13]. The NZEB definition has clear references to the building code TEK17, and in practical terms, the definition is no stricter than TEK17. The difference lies in a) a shift of system boundary to delivered energy and by introducing primary energy factors, and b) an exclusion of energy demand related to lighting and technical equipment.

The definition introduces primary energy factors, set to 1 for all energy carriers. Table 2 shows the NZEB thresholds for residential buildings where specific primary energy demand as presented in the published guidance paper. It is to be noted that the threshold for small residential buildings is influenced by the heated utility floor space of the building by a factor (1,600/heated utility floor space).

Table 2 Specific primary energy demand (Source: guidance paper[13])

Building category	Specific energy demand- Nearly zero-energy building (NZEB) [kWh/m^2]
Small residential buildings	(76 + 1,600/m^2)
Apartment buildings	67

For residential buildings, the specific energy demand threshold is related to, but not directly comparable to, the requirements in the building code (Figure 5) as energy demand for lighting and technical equipment is excluded in the NZEB definition. This demand is, however, fixed values in both the building code calculations and in the EPC energy label calculations, hence, can be added or subtracted in conversions between the two systems.

Since parts of the energy demand are excluded from the NZEB definition, a 10 percent improvement is smaller in absolute terms than it would be if all consumption were to be included in the definition. As demand related to lighting and technical equipment is fixed, the improvement can only come from efficiency measures related to the remaining demand.

[12] https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158/, 2023

[13] https://www.regjeringen.no/contentassets/296636deecef419590fe6b5668fe196f/23-12-korrigert-veiledning-om-beregning-av-primarenergibehov-og-nesten-nullenergibygg.pdf, 2024

2.1.1 Identifying the buildings with performance at NZEB-10 percent or better

Documentation by NZEB definition referenced standard

One way to document an NZEB-10 percent energy performance, is to present results from calculation in accordance with Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings - Method and data*. These calculations are required for all new buildings and a central part of the required documentation to get a building permit and certification of completion. This is however documentation that is not easily available in public registers, hence for banks. It is also not easily accessible information for non-experts unless clear descriptions of results relevant for the NZEB definition is presented.

Documentation by EPC data

Another, and more practical and available option for identifying qualifying objects in a bank's portfolio, is to retrieve sufficient data from the EPC database combined with data on dwelling size. Where reliable area data is not available to the bank, the national average in the building statistics may be used. This is also more in-line with documentation requirement in EU taxonomy Annex 1. The Norwegian EPC system is not yet using primary energy, but this might be included in an upcoming change in the EPC system. Since the information accompanying the NZEB definition set national primary energy factors to 1 (one) flat for all energy carriers, it is a fair assumption that specific net delivered energy in the EPC system is equal to specific primary energy demand in the NZEB definition.

The energy label (A to G) in the EPC system is based on calculated net delivered energy, including the efficiencies of the building's energy system (power, heat pump, district energy, solar energy etc.). Table 3 describes how the limit values are dependent on the area of the dwelling. The building codes are defined by calculated net energy demand, not including the building's energy system and requirements independent of dwelling area. Both systems include all standard consumption, also lighting and technical equipment.

Table 3 EPC labels limit values for residential building categories and dependency on building area. (Source: enova.no/energimerking)

Building categories	**Calculated delivered energy pr m² heated space (kWh/m² BRA)**						
	A	**B**	**C**	**D**	**E**	**F**	**G**
	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	No limit
Detached or semi-detached residential dwelling	95	120	145	175	205	250	>F
Sqm. adjustment	+800/A	+1600/A	+2500/A	+4100/A	+5800/A	+8000/A	
Appartments	85	95	110	135	160	200	>F
Sqm. adjustment	+600/A	+1000/A	+1500/A	+2200/A	+3000/A	+4000/A	

The EPC database administrator (Enova) has recently opened for sharing more detailed information from the database with banks, including calculated specific net delivered energy. This enables translation between the specific energy demand in the NZEB definition and the specific net delivered energy available in the energy performance certificate, adding the fixed values for lighting and technical equipment.

In Figure 2 the columns describe the thresholds in the EPC system for labels A, B and C where area correction is applied for a small residential building with heated area of 166 m², a single apartment of 65 m² and an apartment building of 2,000 m². The lines indicate the calculated NZEB and NZEB-10 percent thresholds calculated by adding the fixed values for lighting and technical equipment. Table 4 gives a more granular picture including more dwelling and building sizes.

Figure 2 Energy performance with reference to the national definition of NZEB and NZEB-10 percent compared to limit values in the EPC system (values dependent on dwelling area).

Table 4 Qualifying EPC labels dependent on dwelling area.

Limit values specific energy demand [kWh/m²]			
Small residential buildings			
Area unit [m²]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
50	126	111	152
100	112	103	136
150	107	100	131
200	105	99	128
250	103	98	126
300	102	98	125
Apartments (EPC available, but no NZEB definition established at apartment level)			
Area unit [m²]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
50	89	97	115
75	89	93	108
100	89	91	105
125	89	90	103
150	89	89	102
175	89	88	101
Apartment buildings (NZEB definition in place, but no (very few) EPCs at building level)			
Area unit [m²]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
500	89	86	97
2,000	89	85	96
5,000	89	85	95

The thresholds in Figure 3 are calculated based on standard values for lighting and technical equipment in the Norwegian standards and average building areas found in building statistics for 2021. Due to the area correction factor, the threshold can be calculated individually for all objects in the portfolio based on actual area. For apartments, the NZEB-lines in the figure are constant but the EPC thresholds dependent on apartment size. For small residential buildings, both NZEB and EPC energy label thresholds are dependent on the size of the dwelling.

For small residential buildings, the dwelling size specific NZEB threshold is found by inserting the buildings heated utility floor space area in the area correction factor. Adding the fixed values for lighting and technical equipment, the value is comparable to the specific net delivered energy given in the EPC-system.

A complicating factor for apartments in a bank's portfolio when using the EPC data to identify qualifying objects, is the fact that the NZEB definition, as is the case for the building code calculations, considers the whole building as one unit and not the sum of individual apartments. In the current EPC system, each apartment is labelled individually. The EPC limit values reflect individual apartments sharing walls with heated area, as other apartments, and consequently are lower than what is the case for buildings. There is an area correction factor in the EPC label calculations but not in the building code and NZEB calculations for apartment buildings. Using the individual apartment area correction factor in the EPC system results in an NZEB threshold, converted to EPC terms, much stricter than for all other building categories. In an upcoming change in the EPC system, the whole apartment building is anticipated to be labelled as a unit. This will simplify the conversion between the EPC system and the NZEB definition, however, energy certificates based on the current system will be around for many years as the period of validity is 10 years. There are, however, also today exemptions. The EPC regulation opens for establishing certificates for apartments based on calculations for the apartment building as one unit, and this is when all apartments are smaller than 50 m^2. The area correction is then based on the building's total area and not the sum of apartments only. Assuming this approach may also be used for all apartment buildings, as the "apartment column" in Figure 2 illustrate EPC thresholds using an average apartment building size derived from 2021 building data from Statistics Norway.

2.1.2 Eligibility small residential buildings

- Small residential buildings completed since 31 December 2020 with energy label A, or energy label B with specific delivered energy demand below the defined threshold, qualify on the new-build criterion NZEB-10 percent

The EPC energy label A limit values, as described in specific energy demand in Figure 3 and Table 4, are for all small residential buildings independent of building size below NZEB-10 percent. Hence, an energy label A is sufficient to identify green buildings of this category. As illustrated by the above analysis, only qualifying small residential EPC A buildings is a conservative approach, as some EPC B buildings also would qualify. The more granular specific delivered energy demand is made available from the EPC system and can supplement the straightforward qualifying label A buildings in the green pool with some buildings with energy label B.

The practical approach utilizing detailed data on the building can be illustrated as in Figure 3.

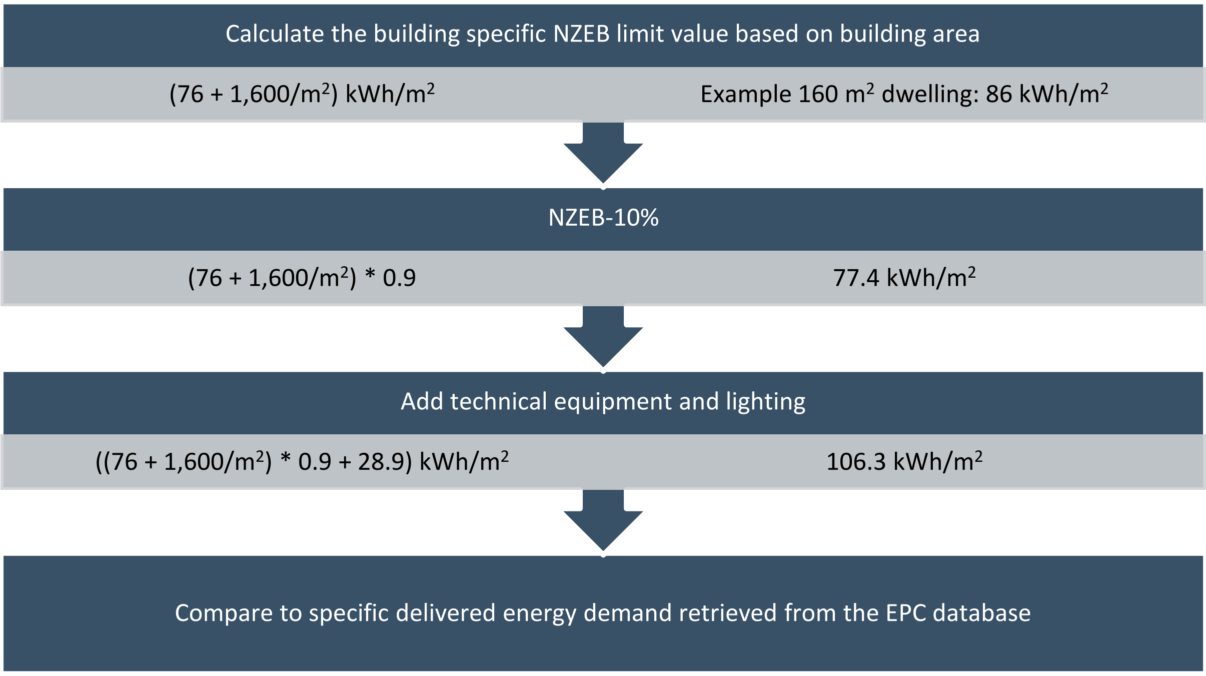

Figure 3 How to compare NZEB-10 percent to specific energy demand from the EPC system for small residential buildings.

2.1.3 Eligibility apartments and apartment buildings

With energy label only available on apartment level, and not building level, an EPC A energy label is alone not sufficient to identify a NZEB-10 percent performance of an apartment without additional assumptions. An apartment building may even in the current EPC system be analysed and provided a certificate and an energy label as one unit, and the last rows in Table 4 illustrates that for such a case the energy label A would be sufficient to identify and qualify apartment buildings, and the apartments within. In the same manner, the specific delivered energy demand retrieved for each apartment, in addition to area of apartment and building, can be combined to qualify even some apartments with energy label B.

As illustrated in Figure 2, there are two potential approaches to understanding and comparing the NZEB definition and the EPC data. One is ignoring the difference that lies in the NZEB-definition relating to the whole building while the EPC system relates to individual apartments (“apartment” column in Figure 2). The practical approach utilizing detailed EPC data on the individual apartment can then be described by Step 1 in Figure 4 and compare this value to the specific delivered energy retrieved from the EPC database. Step 1 is independent of apartment and apartment building size and translates the NZEB-10 percent threshold to a limit value comparable to the specific delivered energy in the EPC system.

As an alternative, taking into account that apartment buildings also in the EPC system may be considered as one unit, and expand this approach beyond apartment buildings with only small apartments, Step 2 in Figure 4 can be applied in addition to Step 1. This requires information on EPC energy label, apartment area and apartment building area, here illustrated by an apartment of 65 m^2 just qualifying for an EPC A placed in a 2,000 m^2 building. The implications of an area correction factor diminish for large buildings, as illustrated in Table 4, hence opening for using average values from national statistics instead of precise area data. Apartment area is available in the EPC database.

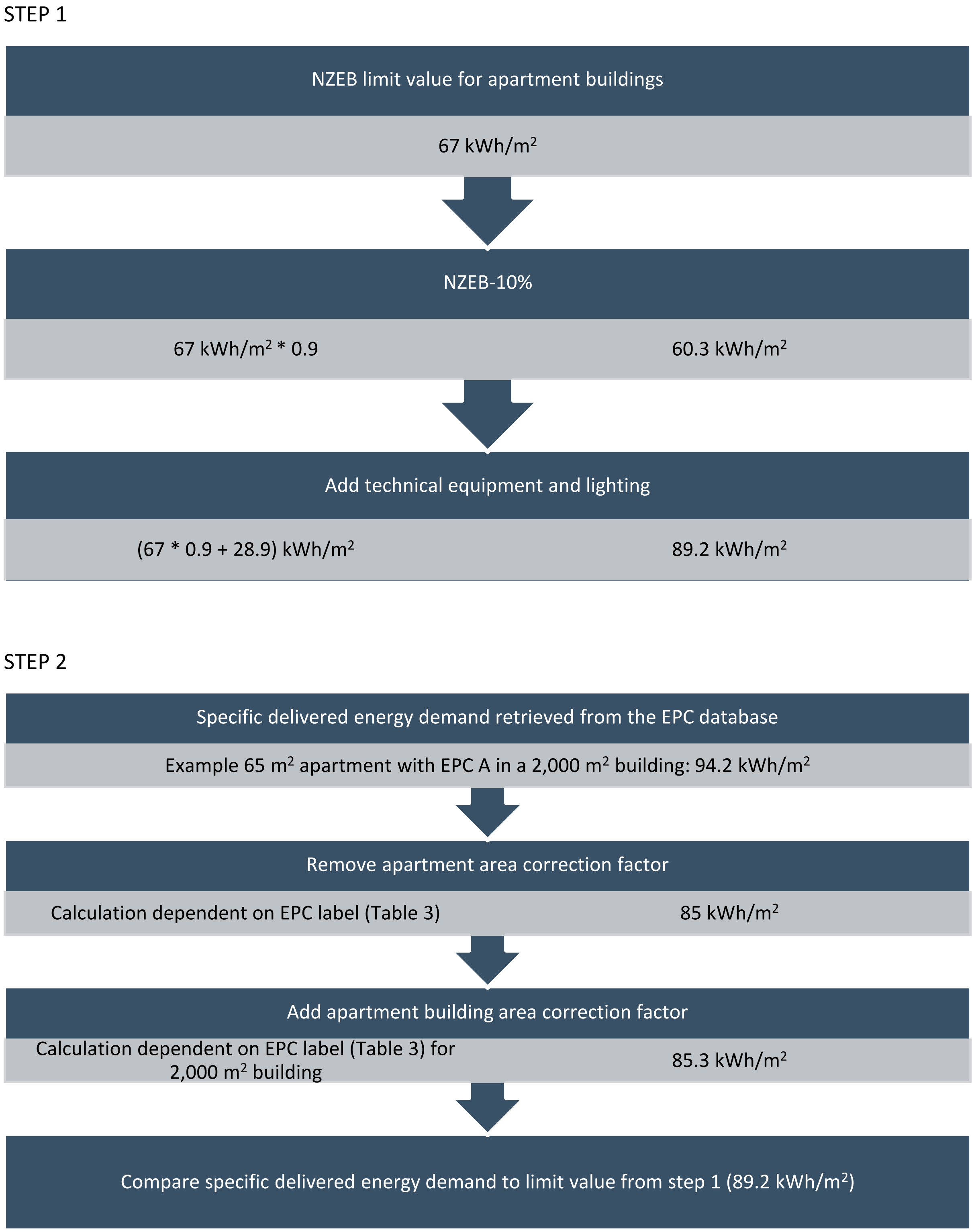

Figure 4 How to compare NZEB-10 percent to specific energy demand from the EPC system for apartments.

Previously eligible TEK17 buildings originated between 01/01/2021 and 31/01/2023 have been grandfathered as of 31/01/2023 following the publication of the official Norwegian NZEB definitions.

2.2 Top 15 percent residential buildings - criteria for buildings finished before January 1st 2021

The SR-Bank eligibility criteria for existing residential buildings are based on building code and on EPCs.

2.2.1 Building code criterion

i. Existing Norwegian residential building that complies with the Norwegian building codes of 2010 (TEK10) or 2017 (TEK17). Hence, built in 2012 and later.

Changes in the Norwegian building code (TEK) have consistently, over several decades, resulted in increasingly energy efficient buildings. The building codes are defined by calculated net energy demand, not including the efficiency of the building's energy system. Figure 5 illustrates how the calculated net energy demand declines with decreasing age of the buildings. Net energy demand in the figure is calculated using standard building models identical to the models used for defining the building codes (TEK10/TEK17).

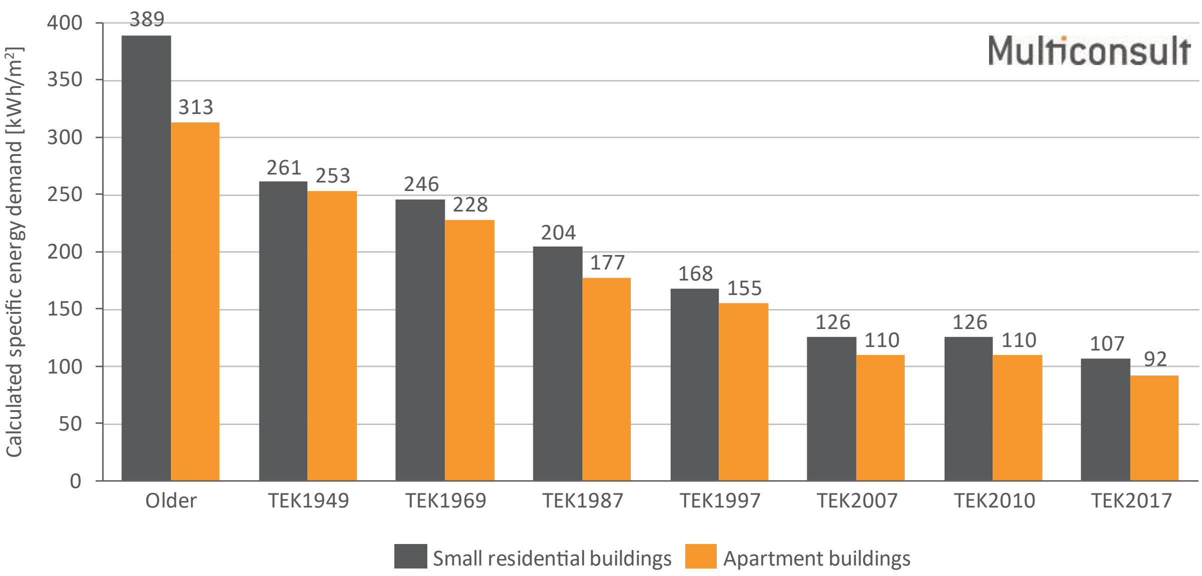

Figure 5 Development in calculated specific net energy demand based on building code and building tradition. (Source: Multiconsult, simulated in SIMIEN)

It should be noted that for residential buildings, there was no change between TEK07 and TEK10 with respect to energy efficiency requirements. From TEK10 to TEK17 the reduction is about 15 percent, and the former shift from TEK97 to TEK10 was 25 percent.

The figure shows theoretical values for representative building category models, calculated in the simulation software SIMIEN and in accordance with Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings - Method and data*, and not based on measured/actual energy use. In addition to the guidelines and assumptions from the standard, building tradition has also been considered. For older buildings, the calculated theoretical values tend to be higher than the actual measured use, mostly because the ventilation air flow volume is assumed to be the same, independent of age, while there is no heat recovery in the older buildings. Indoor air quality is assumed to be independent of building year. This is consistent with the methodology used in the EPC-system.

The building codes are having a significant effect on the energy efficiency of buildings. An investigation of the energy performance of buildings registered in the EPC database built after 1997 show for example a clear improvement in the calculated energy level for buildings completed after 2008/2009 when the building code of 2007 (TEK07) came into force. In the period between 1998 and 2009, when there was no change in the building code, there is no observable improvement, however a small reduction in energy use might have taken place due to an increased market share for heat pumps in new buildings, and to a certain degree, improved windows.

Figure 6 shows how the Norwegian residential building stock is distributed by age. The figure shows how buildings finished in 2012 or later (built according to TEK10 or TEK17) make up 13.3 percent of the total stock.

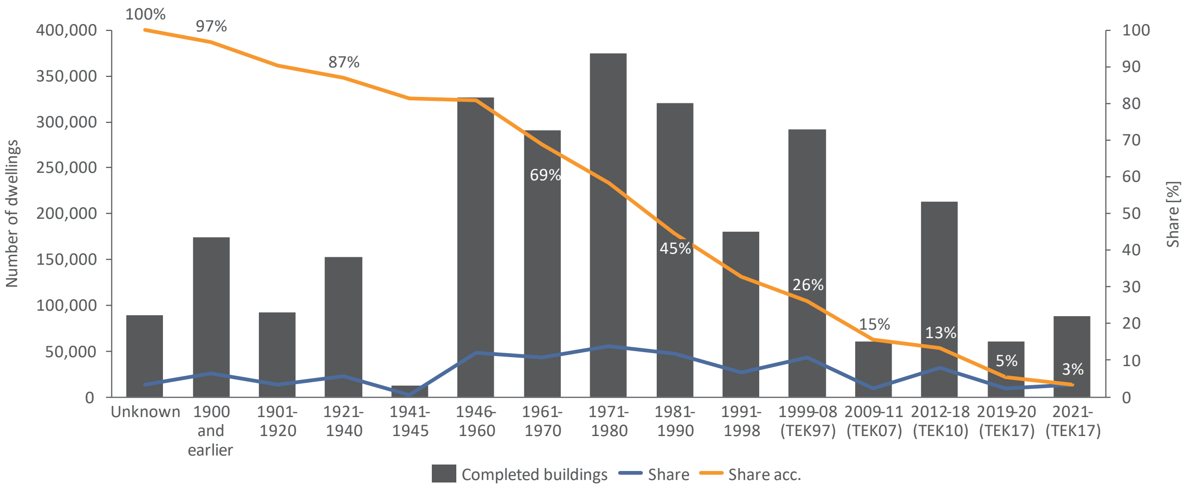

Figure 6 Age and building code distribution of dwellings. (Source: Statistics Norway, Multiconsult)

Given the dynamic nature of the top 15 percent of the building stock, the bank has tightened the eligible criteria to respect the top 15 percent threshold. Hence, the bank is no longer including TEK07 small residential buildings in the portfolio in the green pool that were originated post 31/12/2021. Any loans originated before this date are grandfathered.

2.2.2 *EPC criterion*

i. Existing Norwegian residential buildings built using older building codes than TEK10 with EPC-labels A and B.

The EPC System became operative in 2010 and made mandatory for all new residences completed after the 1st of July 2010 and for all residences sold or rented out. The properties already registered in the EPC database are considered representative for all the residential buildings built under the same building code. However, they are not representative for the total stock, as younger residential buildings are highly overrepresented in the database. The EPC labels coverage ratio relative to the total residential building stock is about 50 percent, and only a share of these labels is currently made available to the banks due to data quality issues.

Assuming registered EPCs are representative for the building stock completed in the time period a certain building code is applied, it is possible to indicate what the label distribution would be if all residential buildings were given a certificate. Figure 7 illustrates how EPCs would be distributed based on this assumption. 9.3 percent of the residences would have a B or better.

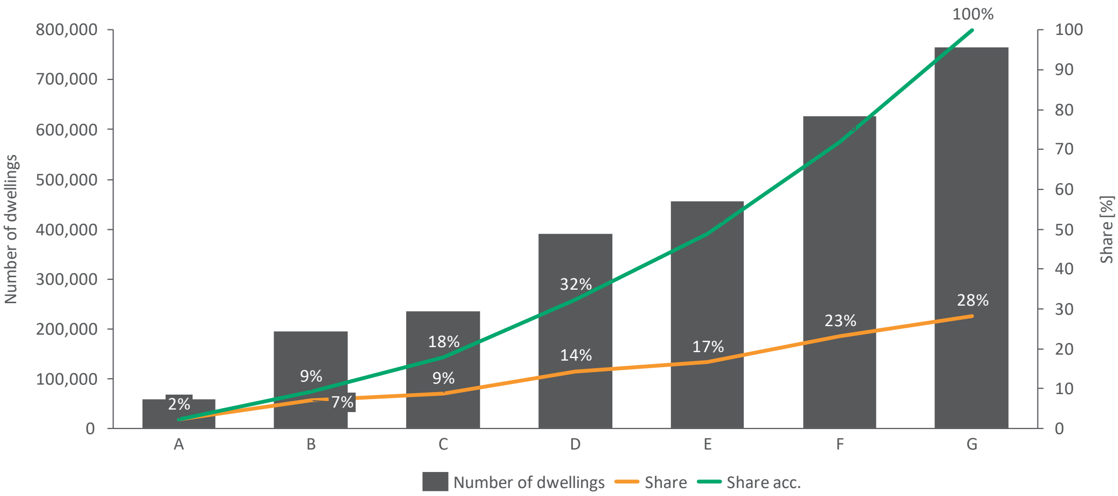

Figure 7 EPCs extrapolated to include the whole residential building stock (Source: energimerking.no, Statistics Norway, Multiconsult)

Given the dynamic nature of the top 15 percent of the building stock, the bank has decided to tighten the eligible criteria to respect the top 15 percent threshold. Hence, the bank is no longer including EPC C label buildings in the portfolio in the green pool that were originated post 31/12/2020. Any loans originated before this date are grandfathered.

2.2.3 Combination of criteria

The two criteria are based on different statistics. It is, however, interesting to view them in combination. Table 5 illustrates how the criteria, independently and in combination, make up cumulative percent.

Interpretation: TEK10 and newer in isolation represents 13.3 percent; TEK10 and newer in combination with A+B labels represents 14.8 percent; TEK10 and newer in combination with A+B+C labels represents 19.2 percent of the total Norwegian residential building stock.

Table 5 Matrix of Cumulative percentages for criteria combinations (FY23), relative to the total residential building stock in Norway.

	TEK10+TEK17	EPC A+B	EPC A+B+C
TEK10+TEK17	13.3 percent	14.8 percent	19.2 percent
EPC A+B		9.3 percent	
EPC A+B+C			16.8 percent

2.3 Impact assessment - Residential buildings

The eligible residential buildings in SR-Bank's portfolio are estimated to amount to more than 2.6 million square meters. For most units, the bank has supplied reliable area and energy grade, either from an EPC or estimated based on building information by a third party. Where area is missing, it has been calculated based on the assumption that the dwellings in the portfolio are equivalent to the average Norwegian residential building stock[14].

[14] Statistics Norway Table 06513: Dwellings, by type of building and utility floor space

Table 6 Number of eligible objects and calculated building areas.

Criteria	Building category	No. of units	Area of eligible buildings in portfolio [m^2]
NZEB, building code and EPC criteria	Apartments	5,025	391,950
	Small residential buildings	10,249	1,915,522
Grandfathered under NZEB, building code and EPC criteria	Apartments	427	34,153
	Small residential buildings	1,409	264,246
Total		**17,110**	**2,605,871**

Based on the calculated figures in Table 6, the energy efficiency of this part of the portfolio is estimated. All the residential buildings are not included in one single bond issuance.

Eligibility is first checked against the NZEB-10 percent criterion. The ones left are checked against the EPC A criterion, then the building code criterion, and lastly against the EPC B criterion so no double counting of objects will occur.

For buildings qualifying under the NZEB-10 percent criteria, impact is calculated by taking the difference between the calculated specific energy usage of each unit and the limit for a corresponding NZEB unit of the same area and building type. The reduction in energy demand is multiplied with the area of the eligible asset and the emission factors from Table 1 and summed up for all the units. A proportional relationship is expected between energy consumption and emissions in impact calculations.

Over the last several decades, the changes in the building code have pushed for more energy efficient buildings. Combining the information on the calculated energy demand related to building code and information on the residential building stock, the calculated average specific energy demand on the Norwegian residential building stock is 249 kWh/m^2. Separated on apartments and small residential buildings, the averages are 202 kWh/m^2 and 257 kWh/m^2, respectively. Building code TEK10 and TEK17 gives an average specific energy demand for existing buildings, weighted for actual stock, of 102 kWh/m^2 for apartments and 119 kWh/m^2 for houses. Hence, compared to the average apartment stock, the building codes TEK10 and TEK17 gives a calculated specific energy demand reduction of 50 percent. For small residential houses, the same number is 54 percent. Impact is estimated similarly for new buildings grandfathered with TEK17 and small residential buildings grandfathered with TEK07.

As only half of all dwellings have a registered EPC, we choose to use the average specific energy demand of the Norwegian residential building stock, calculated based on building code and information on the residential building stock, as baseline for the buildings qualifying according to the EPC criterion also. The calculated specific energy demand reduction is found between the energy demand for the achieved energy label and the average energy demand for the apartment and small residential building stock separately. Impact is calculated by this method for existing buildings eligible based on EPC A, B and C.

Table 7 indicates how much more energy efficient the eligible part of the portfolio is compared to the average residential Norwegian building stock. It also presents how much the calculated reduction in energy demand constitutes in CO_2-emissions. The avoided energy usage and emissions of the eligible buildings are also shown as scaled by the bank's share of financing by the loan-to-value ratio. The CO_2-emissions are calculated using the three emission factors described in section 1.2: European NS 3720:2018 electricity mix used in previous analyses, and NVE's grid factors for only Norway, representing physically delivered electricity and the residual mix for 2022.

Table 7 Avoided energy demand and emissions (CO_2-eq) of eligible objects in the portfolio compared to average residential building stock using three emission factors. (Source: public statistics, Statistics Norway, Energimerking.no, Multiconsult)

	Avoided energy demand compared to baseline [GWh/year]	**Avoided emissions compared to baseline [tons CO_2-eq/year]**		
		European lifetime mix	Norwegian physically delivered el. 2022	European residual mix 2022
Buildings eligible under NZEB criterion	5	544	88	1,969
Grandfathered under NZEB criterion	8	952	154	3,445
Buildings eligible under the building code criterion	161	18,463	2,995	66,851
Grandfathered under building code criterion	9	1,068	173	3,869
Buildings eligible under the EPC criterion	110	12,615	2,046	45,675
Grandfathered under EPC criterion	25	2,858	464	10,349
Total impact eligible buildings	**318**	**36,500**	**5,920**	**132,158**
Impact scaled by bank's engagement	**155**	**17,799**	**2,887**	**64,446**

3 Energy efficient commercial buildings

3.1 New commercial buildings NZEB-10 percent - criteria for buildings finished since December 31st 2020

As for residential buildings, Multiconsult has assessed the performance of new commercial buildings and how the most energy efficient buildings may be identified in the bank's loan portfolio on the back of the national definition of nearly zero energy buildings (NZEB) of January 2023.

The EU Taxonomy for sustainable activities distinguishes between new and existing buildings, with criteria dependent on whether the building is completed before or after 31 December 2020. The technical screening criteria for new buildings requires the building to have an energy performance, described in primary energy demand, at least 10 percent lower than the threshold set in the national definition of a nearly zero-energy building (NZEB). The energy performance is to be documented by an Energy Performance Certificate (EPC).

The Norwegian national definition of NZEB was published in January 2023[15]. The NZEB definition has clear references to the building code TEK17, and in practical terms, the definition is no stricter than TEK17. The difference lies in a) a shift of system boundary to delivered energy and by introducing primary energy factors, and b) an exclusion of energy demand related to technical equipment.

The definition introduces primary energy factors, set to 1 for all energy carriers. Table 8 shows the NZEB thresholds for the type of commercial buildings most relevant in private banks' portfolios with specific primary energy demand as presented in the published guidance paper. The most-right column indicates specific energy demand when made comparable to building code and EPC system.

Table 8 Specific primary energy demand for commercial building categories. (Source: guidance paper[16], NS3031)

Building category	Nearly zero-energy building (NZEB) [kWh/m²] [17]	NZEB + energy demand technical equipment [kWh/m²]
Office building	76	110.5
Hotel building	159	164.8
Retail/commercial building	162	165.7
Small industrial buildings and warehouses	113 (138)	136.5

The specific energy demand threshold is related to, but not directly comparable to, the requirements in the building code (Figure 5) as energy demand for technical equipment is excluded in the NZEB definition. This demand is, however, fixed values in both the building code calculations and in the EPC energy label calculations, hence, can be added or subtracted in conversions between the two systems.

Since parts of the energy demand are excluded from the NZEB definition, a 10 percent improvement is smaller in absolute terms than it would be if all consumption were to be included in the definition. As demand related to technical equipment is fixed, the improvement can only come from efficiency measures related to the remaining demand.

[15] https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158/
[16] https://www.regjeringen.no/contentassets/60e8f8ec02e246079f4af4d9578d78c2/veiledning-om-beregning-av-primarenergibehov-og-nesten-nullenergibygg.pdf
[17] The figures in brackets apply to areas where heat recovery of ventilation air entails a risk of spreading contamination or infection.

3.1.1 Identifying the buildings with performance at NZEB-10 percent or better

Documentation by NZEB definition referenced standard

One way to document an NZEB-10 percent energy performance, is to present results from calculation in accordance with Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings - Method and data*. These calculations are required for all new buildings and a central part of the required documentation to get a building permit and a certification of completion. This is however documentation that is not easily available in public registers, hence for banks. It is also not easily accessible information for non-experts unless clear descriptions of results relevant for the NZEB definition is presented.

Documentation by EPC data

Another, and more practical and available option for identifying qualifying objects in a bank's portfolio, is to retrieve sufficient data from the EPC database. This is also more in-line with documentation requirement in EU taxonomy Annex 1. The Norwegian EPC system is not yet using primary energy, but this might be included in an upcoming change in the EPC system. Since the information accompanying the NZEB definition set national primary energy factors to 1 (one) flat for all energy carriers, it is a fair assumption that specific net delivered energy in the EPC system is equal to specific primary energy demand in the NZEB definition.

The EPC database administrator (Enova) has recently opened for sharing more detailed information from the database with banks, including calculated specific net delivered energy. This enables translation between the specific energy demand in the NZEB definition and the specific net delivered energy available in the energy performance certificate, adding the fixed values for technical equipment.

In Figure 8, the columns describe the thresholds in the EPC system for labels A, B and C. The lines indicate the calculated NZEB and NZEB-10 percent thresholds calculated by adding the fixed values for technical equipment.

The NZEB- definition is relatively straight forward to compare against the energy grades in the EPC system even for commercial buildings. For some buildings, however, there are a couple of issues not addressed in the national NZEB-definition that potentially could differ between the two. These are not considered to be material for the assessments on a portfolio level, and minor even on an object level. The technicalities regarding how to include locally produced electricity is not stated whether it include all local power demand or only the demand included in the NZEB-definition. The thresholds in Figure 8 assumes the methodology to be in line with the EPC system and let all building related on-site consumption to reduce the calculated net delivered energy demand. Furthermore, the EPC system gives district cooling the same efficiency factor on delivered energy as conventional locally produced cooling. This is done not to discredit a solution just as efficient due to the system boundary. The NZEB-definition does not mention district cooling and the calculation technicalities. Since the bank do not have data on cooling solutions available, and district cooling only covering a miniscule part of the cooling demand in Norway, the premise in the EPC system is assumed valid also for commercial buildings with district cooling.

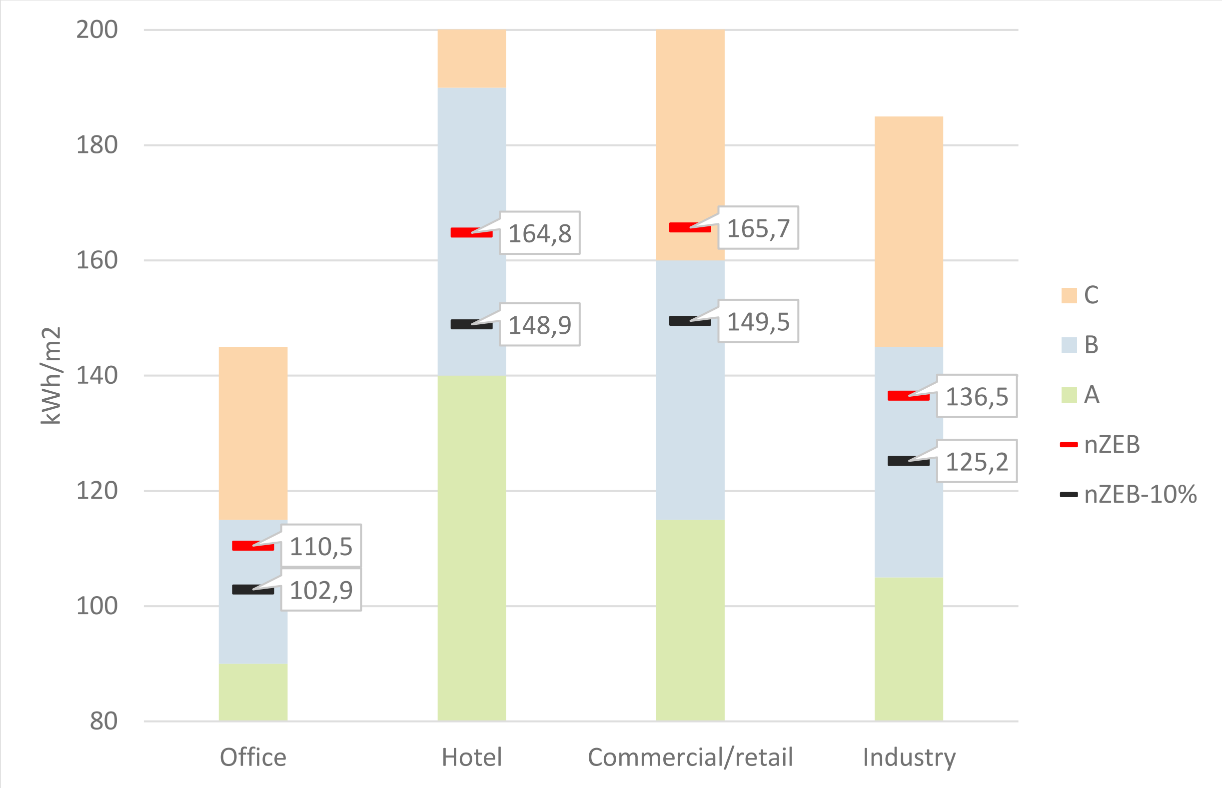

Figure 8 Energy performance with reference to the national definition of NZEB and NZEB-10 percent compared to limit values in the EPC system.

Table 9 Maximum specific energy demand derived from the EPC-system to qualify to new build criterion, NZEB-10 percent.

Building category	NZEB-10 percent threshold [kWh/m^2]
Office buildings	103
Commercial buildings / retail	150
Hotel buildings	149
Small industry and warehouses	125

Previously eligible TEK17 buildings originated between 01/01/2021 and 31/01/2023 have been grandfathered as of 31/01/2023 following the publication of the official Norwegian NZEB definitions. Any loans originated before this date are grandfathered.

3.2 Top 15 percent commercial buildings- criteria for buildings finished before January 1st 2021

The SR-Bank eligibility criteria for commercial buildings are divided in four, one based on building code, one based on EPC label, one based on certifications such as BREEAM, and at last an upgrade criterion.

3.2.1 Building code criterion

Existing commercial buildings belonging to top 15 percent low carbon buildings in Norway:

i. New or existing Norwegian hotel and restaurant buildings that comply with the Norwegian building code TEK10, TEK17 and later building codes. Hence, built after 2013.

ii. New or existing Norwegian office, retail and industrial buildings and warehouses that comply with the Norwegian building TEK10, TEK17 and later building codes. Hence, built after 2012.

Since the criteria was established, the building stock has grown, and the new buildings are entering the top 15 percent. For the sub-categories' office and retail combined the buildings complying with TEK07 and later codes are currently 10 percent of the total. For hotel and restaurant buildings, TEK07 and later codes are 14 percent of the total. Small industry and warehouses, however, where the newbuild rate has been very high the last years, are now past 20 percent. Figure 9 illustrates the four sub-categories individually.

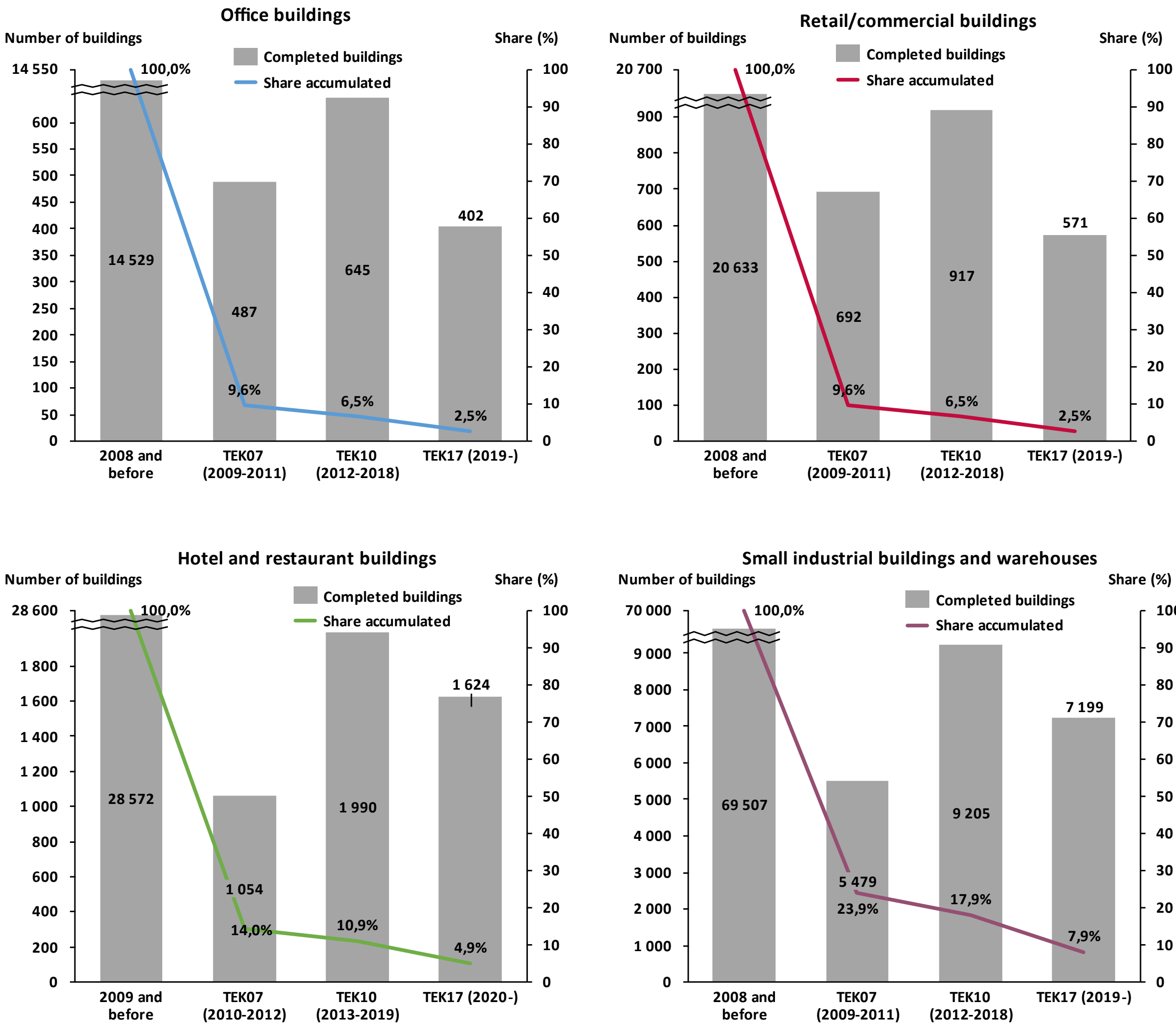

Figure 9 Age and building code distribution of commercial buildings, four major sub-categories. (Source: Statistics Norway and Multiconsult)

It is the increase in small industry and warehouses that adds volume to the building stock. There are some uncertainties regarding the type of buildings included in the small industry and warehouses category in the statistics. At one point, more sub-categories were added to this category, of which several are not subject to energy efficiency requirements, e.g. garages. These accounted for several thousand objects and Statistics Norway indicate the approximate volume of these subcategories, however not with building year. In this analysis, a conservative approach has been adopted by assuming these buildings have building years distributed like the total category stock. As buildings of this kind are small and with shorter lifetime, the real breaking point for this category is earlier than TEK10.

The total picture indicates the need to move the criterion for this sub-category from TEK07 to TEK10. Figure 10 illustrates how TEK10 and younger buildings, for the four commercial buildings sub-categories combined, as of 2023 amount to 13.8 percent of the total Norwegian buildings of these categories.

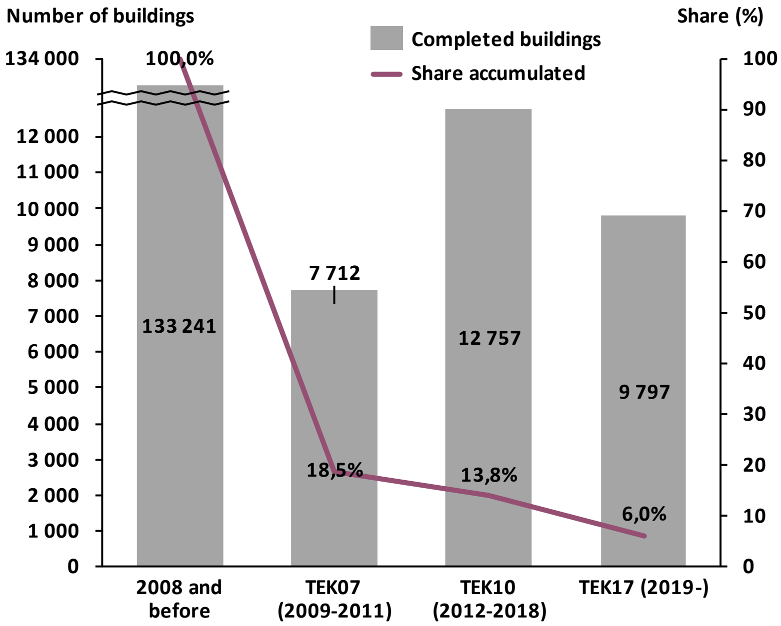

Figure 10 Age and building code distribution of commercial buildings, four major sub-categories combined. (Source: Statistics Norway and Multiconsult)

The bank is no longer including TEK07 label buildings in the portfolio in the green pool that were originated post 31/01/2023. Loans originated before this date are grandfathered.

Combining the information on the calculated specific energy demand related to building code and information on the commercial building stock, the calculated average specific energy demand on the part of the Norwegian building stock examined is presented in the table below. The table also presents the average specific energy demand for the younger and qualifying part of the building stock and the relative reduction in energy demand.

Table 10 Average specific energy demand for the building stock; whole stock, part eligible according to criteria and reduction. (Source: Statistics Norway, historic building codes, Multiconsult)

Building category	Average total stock [kWh/m²]	Average TEK10 and TEK17 [kWh/m²]	Reduction [%]
Office buildings	245	138	44
Commercial buildings / retail	316	199	37
Hotel buildings	322	202	37
Small industry and warehouses	281	158	44

3.2.2 EPC criterion

New or existing commercial buildings belonging to top 15 percent low carbon buildings in Norway:

i. New or existing Norwegian office, retail, hotel and restaurant buildings, and industrial buildings and warehouses with EPC labels reflecting the top 15 percent.

Buildings built before 2021 with EPC label A or B qualify for this criterion.

3.2.3 Certification criteria: BREEAM, LEED and Nordic Swan Ecolabel

New, existing, or refurbished commercial buildings which received at least one or more of the following classifications:

i. LEED “Gold“

ii. BREEAM or BREEAM-NOR “Very Good”, or equivalent or higher level of certification

iii. Nordic Swan Ecolabel

BREEAM-NOR is the most often used certification scheme for commercial buildings in Norway, and the bank has identified several buildings in the portfolio that qualify.

Documentation on energy demand or the design of specific buildings is not easily available, but the impact may be calculated based on minimum requirements in the certification system dependent on certification and system criteria.

3.2.4 Refurbishment criterion

i. Refurbished Commercial buildings in Norway with an improved energy efficiency of 30 percent

Refurbished buildings with an improved energy efficiency of at least 30 percent or more compared to before refurbishment are eligible.

This criterion has so far not been used to identify eligible buildings in the portfolio.

3.3 Impact assessment - Commercial buildings

The available data include building year, reliable area per object, building category and certificate information. In SR-Bank’s portfolio, 62,200 square meters of office buildings qualify due to BREEAM certificate Excellent (2) or Outstanding (1). Another 121,900 square meters qualify due to the building code and EPC criteria, as indicated in the table below. No commercial buildings qualify according to the NZEB-10 percent criterion. Buildings qualifying according to two or more criteria are only counted once.

Table 11 Eligible objects and calculated building areas.

Criteria	Building category	No. of units	Area qualifying buildings in portfolio [m^2]
Both building code, EPC, and certification criteria	Office buildings	6	94,668
	Commercial buildings	8	10,634
	Hotel buildings	1	12,517
	Small industry and warehouses	13	63,727
Grandfathered all criteria	Small industry and warehouses	1	2,725
	Total	**29**	**184,271**

Similarly to impact calculations for residential buildings, impact for the buildings qualifying on building code is calculated by first calculation the reduction in energy demand from the average of the total commercial building stock to the average for eligible building codes. This difference is then multiplied to the emission factors from Table 1 and area of eligible assets to calculate impact. A proportional relationship is expected between energy consumption and emissions.

No buildings have yet been qualifying based on NZEB-10 percent. The building code method is used for buildings grandfathered under the NZEB-10 percent criterion.

For the buildings qualifying according to the EPC criterion, the impact calculations are based on the difference between achieved energy label and the average of the total stock within each category.

Impact based on BREEAM certification has been calculated based on minimum requirements in the certification system compared to the same baseline from building code calculations.

Table 12 indicates how much more energy efficient the eligible part of the portfolio is compared to the average residential Norwegian building stock. It also presents how much the calculated reduction in energy demand constitutes in CO_2-emissions. The avoided energy usage and emissions of the eligible buildings are also shown as scaled by the bank's share of financing by the loan-to-value ratio.

The CO_2-emissions are calculated using the three emission factors described in section 1.2: European NS 3720:2018 electricity mix used in previous analyses, and NVE's grid factors for only Norway, representing physically delivered electricity and the residual mix for 2022.

Table 12 Area, estimated avoided energy demand and emissions (CO_2-eq) of eligible objects in the portfolio compared to average commercial building stock using three emission factors. (Source: public statistics, Statistics Norway, energimerking.no, Multiconsult)

	Area [m2]	**Avoided energy demand compared to baseline [GWh/year]**	**Avoided emissions compared to baseline [tons CO_2-eq/year]**		
			European lifetime mix	Norwegian physically delivered el. 2022	Norwegian residual mix 2022
Grandfathered under NZEB-10 percent criterion	2,725	0.4	44	7	160
Buildings eligible under building code criterion	103,811	11.7	1,342	218	4,860
Buildings eligible under EPC criterion	15,527	2	233	38	844
Buildings eligible under BREEAM criterion	62,208	9.4	1,077	175	3,898
Total impact eligible buildings	**184,271**	**23.5**	**2,696**	**438**	**9,762**
Impact scaled by bank's engagement	**96,025**	**12,3**	**1,411**	**229**	**5,108**

4 Clean transportation- Electric vehicles and vessels

The impact of electric vehicles in Norway on climate gas emissions is assessed in the following. The bank's portfolio of May 2024, consisting of 6,936 electric vehicles, is assessed in terms of direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). A baseline is established as the emission of the average new vehicles introduced to the market, EV's excluded.

4.1 Eligibility

The green loan portfolio of SR-Bank contains electric vehicles that meet the eligibility criteria as formulated below:

Eligibility criteria:
Fully electric, hydrogen or otherwise zero emissions vehicles for the transportation of passengers or freight

The identified eligible vehicles in the portfolio also align with the technical eligibility criteria formulated by Climate Bonds Initiative (CBI)[18] and in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[19].

4.2 General description

Personal mobility in Norway is high, among the highest in Europe, with privately owned passenger vehicles accounting for most of the passenger transportation work.

Historical figures of how far the average passenger vehicle is driven annually in Norway, show a falling slope from 2007 and 2008, when the passenger vehicles peaked and were on average driven about 14,000 km. In 2023, the average passenger vehicle travelled about 11,300 km in Norway, while light-duty vehicles travelled about 13,300 km[20]. In this analysis, the expected yearly travelled distance for the vehicles in the portfolio is estimated based on an expectation of a continuing trend of reduced yearly travelled distance, and as an average in the vehicles' lifetime.

In 2023 the average age of passenger vehicles scrapped for refund in Norway was 18 years old and 16 years for vans[21]. The history of modern EVs is short and there is yet no evidence for the lifetime of EVs being different from other vehicles. There are uncertainties related to the expected lifetime of new vehicles sold between 2011 and 2023, so the average lifetime for passenger vehicles and light-duty vehicles are set to 18 and 16 years in this analysis, respectively, independent of fuel type.

4.2.1 EV policy in Norway

The Norwegian government have over time, with different administrations, had high ambitions both regarding electric vehicles and biofuel to reduce CO_2-emissions. 690,000 electric passenger vehicles were registered in Norwegian by the end of 2023, up from 600,000 by 2023 and now accounting for 24 percent of the total passenger vehicle stock[22]. The Norwegian Parliament have unanimously agreed that all new light-duty and passenger vehicles sold should be zero-emission from 2025[23].

[18] https://www.climatebonds.net/standard/transport
[19] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[20] Statistics Norway 12578: Kjørelengder, etter kjøretøytype, drivstofftype, alder, statistikkvariabel og år, 2024
[21] Statistics Norway 05522: Vehicles scrapped for refund, by contents and year, 2024
[22] Statistics Norway 07849: Registered vehicles, by type of transport and type of fuel (M) 2008 - 2023, 2024
[23] https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/veg_og_vegtrafikk/faktaartikler-vei-og-ts/norge-er-elektrisk/id2677481/, 2023

In 2023, the Norwegian government adjusted the previous VAT exemption to only be applicable up to 500,000 NOK of the purchase price. Additionally, EV vehicles now need to pay a registration fee, to the same degree as fossil fuel vehicles. Many of the other benefits have been cut and EVs are currently paying up to a maximum, by law, of 70 percent for toll roads, and 50 percent for parking and ferries.

4.2.2 Biofuel policy in Norway

Norway has an ambitious biofuel policy, with a goal of 50 percent reduction in greenhouse gas (GHG) emissions from fossil fuel from 2018[24]. In 2018, legislation was put in place to require all petrol retailers to sell fuel containing biofuels. The goal has since been advanced, with a special emphasis on avoiding the usage of biofuels with a high risk of increasing deforestation[25].

As of 2023, the percentage of advanced biofuel of the overall quota obligation (24.5 percent) is set at 12.5 percent[26]. To incentivize the use of advanced biofuels, one litre of advanced biofuels is counted as two litres of conventional biofuel, for every litre that exceeds the 12.5 percent advanced biofuel requirement. Subsequently, the overall use of advanced biofuel has increased year after year. In 2022, advanced biofuels accounted for 94 percent of the overall biofuel usage, thus reducing the usage of conventional biofuels[27]. As a result, the overall volume of biofuel has declined in the past years, even though the percentage of biofuels has increased. The current government platform ("Hurdalsplattformen") strengthens the obligations to utilize second-generation biofuels in the fuels sold[28].

In 2020, a road tax (no: veibruksavgift) for all biofuel was introduced. The taxation of bioethanol is significantly lower compared to standard gasoline, while the road tax for biodiesel is similar to conventional diesel[29]. Previous estimates from 2018 concluded that biofuel used in Norway resulted in 72 percent lower GHG emissions in a life cycle perspective compared to regular fuels[30]. The same year, legislation was passed, stipulating that biofuels shall have a minimum of 50 percent lower life cycle GHG emissions than fossil fuels[31].

4.3 Climate gas emissions (Scope 1 and 2)

Categorising the emissions, we have used the CBI guidelines for the Scope 1, Scope 2 and Scope 3 emission calculations. CBI's *Low Carbon Transport Background Paper*[32] underlines the focus on tailpipe emissions because of their dominance, the need to send strong signals to vehicle purchasers and the need to promote technologies and infrastructure that have the potential to radically shift emissions trajectories and avoid fossil fuel lock-in. We do however include information on indirect emissions related to power production.

4.3.1 Indicators

In this analysis, we are using two relevant climate gas emission indicators for vehicles:

- Emissions per kilometre [gCO_2/km]

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[24] Produktforskriften kapittel 3: Omsetningskrav for biodrivsoff og bærekrafskrierier for biodrivsoff og flytende biobrensel, Lovdata, 2019
[25] https://www.regjeringen.no/no/dokumenter/politisk-plattform/id2626036/, 2019
[26] https://lovdata.no/dokument/LTI/forskrift/2023-12-20-2305, 2023
[27] https://www.miljodirektoratet.no/aktuelt/nyheter/2022/juni-2022/avansert-biodrivstoff-oker-pa-norske-veier/, 2023
[28] https://www.regjeringen.no/no/dokumenter/hurdalsplattformen/id2877252/, 2023
[29] https://www.skatteetaten.no/satser/veibruksavgift/?year=2024#rateShowYear, 2024
[30] https://www.miljodirektoratet.no/aktuelt/nyheter/2019/mai-2019/salget-av-avansert-biodrivstoff-okte-i-fjor/, 2023
[31] https://lovdata.no/dokument/LTI/forskrift/2022-12-20-2356, 2023
[32] https://www.climatebonds.net/files/files/Low%20Carbon%20Transport%20Background%20Paper%20Feb%202017.pdf page 10

- Emissions per passenger-kilometre [gCO_2/pkm]

The passenger vehicle fleet composition and emissions from each type of vehicles are used to calculate the emissions per kilometre.

A passenger-kilometre, abbreviated as pkm, is the unit of measurement representing the transport of one passenger over one kilometre. Passenger-kilometres are calculated by multiplying the number of passengers by the corresponding number of kilometres travelled.

Statistics Norway's method for calculating indicators for emissions per passenger kilometre utilises a vehicle occupancy of 1.7 persons in passenger vehicles and 1.5 persons in a light-duty vehicle, and these factors have been adopted in this analysis[33].

4.3.2 *Direct emissions (tailpipe)- Scope 1*

Under scope 1 we calculate the "Direct tailpipe CO_2 emissions from fossil fuels combustion" avoided.

The estimation of the baseline is performed through three steps:

1. Estimating the gross CO_2-emission per km from the average vehicle that is being substituted by the zero-emission vehicle.
2. Multiplied by the number of km the vehicle is estimated to travel.
3. Multiplied by the number of vehicles substituting fossil vehicles in the portfolio.

All EVs and fuel cell vehicles are considered eligible with zero tailpipe emissions. Therefore, for scope 1 calculations, the emissions from these vehicles are set to zero, and the baseline will amount to the total avoided emissions.

To estimate the annual emissions avoided by the eligible assets, projections are made for direct tailpipe CO_2 emissions from fossil fuels combustion in the national passenger vehicle fleet.

For the substituted fossil fuelled vehicles, emission data are retrieved from recognised test methods and not actual registrations of emissions in a Nordic climate. Test methods have lately been improved to better reflect actual emissions but are still likely to underestimate the emissions[34].

Biofuels are to a varying degree mixed with fossil fuels. The abated emissions due to these contributions are reflected in the emissions from the vehicle, that would otherwise have bought as an alternative to the electric vehicle in this portfolio, in effect reduce the climate impact of zero emission vehicles. As Norway is aiming at substantially lowering emissions from fossil fuelled vehicles through use of biofuel in the fuel sold before 2030, the marginal emission reduction possibly obtained through these political goals between 2023 and 2030 have been accounted for in the analysis. It is assumed that the biofuel share in the fuel mix will remain constant between 2030 and 2040.

To estimate the weighted average of emissions per fossil passenger vehicle, we use the average annual emission from new passenger vehicle models from 2011-2023[35].

To estimate the distance travelled by the average passenger vehicle we assume that the EVs drive as much as an average Norwegian passenger vehicle in each of the 18 years it is in use. Statistics of annual driven distance by electric, diesel and gasoline cars younger than 10 years support this

[33] https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/mindre-utslipp-per-kjorte-kilometer
[34] https://www.vegvesen.no/fag/fokusomrader/miljo+og+omgivelser/klima
[35] https://ofv.no/CO2-utslippet/co2-utslippet

assumption[36]. For light-duty vehicles, the distance travelled is calculated similarly, using the 16-year lifetime.

Traffic volumes per passenger vehicle and light duty vehicle has shown a historic decline. We use linear regression on publicly available dataset from the years 2005 to 2023 and extrapolate until 2040. This is a conservative approach as it is likely, at some point, to see a flattening.

Table 13 and Table 14 present the calculated emission factors for the relevant vehicle categories. The calculations are based on calculated gross tailpipe CO_2-emissions for the average vehicle produced in each of the years between 2011-2023, biofuel- and fossil fuel content in petrol/diesel pumped in each year between 2023-2040, as well as the travelled annual distance for the average vehicle.

*Table 13 **Passenger vehicles**: Greenhouse gas emission factors (CO_2 equivalents) for substituted fossil vehicles and EVs, average direct emissions.*

	Direct emissions per passenger-km [gCO_2/pkm]	Direct emissions per km [gCO_2/km]	Direct emissions per vehicle per year [$kgCO_2/vehicle/year$]
Substituted fossil passenger vehicles – average	45	77	640
Electric passenger vehicles	0	0	0

*Table 14 **Light-duty vehicles**: Greenhouse gas emission factors (CO_2 equivalents) for substituted fossil vehicles and EVs, average direct emissions.*

	Direct emissions per passenger-km [gCO_2/pkm]	Direct emissions per km [gCO_2/km]	Direct emissions per vehicle per year [$kgCO_2/vehicle/year$]
Substituted fossil light-duty vehicles – average	133	200	2,333
Electric light-duty vehicles	0	0	0

4.3.3 Indirect emissions (Power consumption only) - Scope 2

Power is traded internationally in an interconnected European electricity grid. For impact calculations of all power consumption, and even electrification of transportation, the regional or European production mix is more relevant than the national power production mix and is the basis for the main analysis. We have, however, also included calculations of indirect emissions from power production setting the system boundary at national borders.

The direct emissions in power production in Europe (EU27 + UK + Norway) is expected to be dramatically reduced the coming decades. The emission trajectory takes into consideration the 1.5 °C scenario and a substantial reduction of emissions from the power sector towards zero emissions in 2040. This aligns with the EU's ambitious goal of decarbonizing the power sector[37].

[36] Statistics Norway 12578: Road traffic volumes, by main type of vehicle, type of fuel and age of vehicle 2005 - 2023, 2024
[37] http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/631047/IPOL_BRI(2019)631047_EN.pdf, 2019

Passenger vehicles in Norway have a life expectancy of 18 years. The production mix is based on the assumed emissions in 2028, which is the weighted average of the lifetime for the vehicles in the portfolio.

The GHG emission intensity baseline for power consumption depends on system boundaries. The table below illustrates the CO_2-factor for the European production mix as an average of the three last years with available data. The factor is calculated by Association of Issuing Bodies[38], and includes the EU countries, UK, and Norway. The value will vary from year to year.

To demonstrate how emissions vary depending on grid factor and for clarity if comparing avoided emissions from other segments, two more grid factors introduced in section 1.2 are included: Norwegian physically delivered electricity 2022 and the Norwegian residual mix for 2022. The mentioned grid factors are included in Table 15 below.

Table 15 Electricity greenhouse gas factors (CO_2- equivalents). (Sources: Association of Issuing Bodies[39], NVE[40], Multiconsult).

Scenario	Description	Emission factor [gCO_2/kWh]
European (EU27+UK+Norway) production mix average 2020- 2022	Location-based production mix with wide system boundary of EU countries, UK, and Norway	241
Norwegian physically delivered electricity 2022	Location-based production mix with narrow system boundary including net export/ import only to neighbouring countries and average annual emission factors	19
Norwegian residual mix 2022	Market-based residual mix with a European marketplace, represents electricity not covered by Guarantees of Origin	502

For the average production mix, the following calculations use the emission factor as an average from the 2022-baseline in Table 15 over the expected lifetime for each type of vehicle, following the assumed trajectory of the European production mix toward zero. For instance, for passenger vehicles with an expected lifetime of 18 years, the emission factor will then be an average over the period 2023-2040. The projected trajectories for declining CO_2 emissions related to power production for European (EU27 incl. UK and Norway), from 2023 and forward, will impact the indirect emissions and avoided emissions from the vehicle portfolio. The same method is not used to estimate the CO_2- factor based on the Norwegian-only mixes.

The energy consumption of EVs is very much dependent on size and outdoor temperature. There is not sufficient available data to ensure an accurate estimation of energy consumption for the average EV. In these calculations we are using the average for all currently available EV models in the Electrical Vehicle Database[41], 0.195 kWh/km, which is close to the factor presented in the Swedish "Handbok för vägtrafikens luftföroreningar"[42]. The same handbook presents an energy consumption for light-

[38] https://www.aib-net.org/facts/european-residual-mix
[39] https://www.aib-net.org/facts/european-residual-mix, 2023
[40] https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/, 2024
[41] https://ev-database.org/cheatsheet/energy-consumption-electric-car, 2024
[42] "Handbok för vägtrafikens luftföroreningar", ch. 6, Trafikverket, 2021

duty vehicles of 0.25 kWh/km. These factors (0.195 kWh/km and 0.25 kWh/km) have been used in the analysis.

In Table 16, indirect emission factors are presented in both emissions per kilometre and per passenger-kilometre, used to calculate indirect emissions for the portfolio based on European (incl. UK and Norway) production mix. Similar factors have been computed based on the Norwegian factors and used in corresponding calculations of impact.

*Table 16 Annual average GHG emission factors (CO_2- equivalents) per distance for all electric vehicles - based on **EU + UK + NO** average power production mix 2020-2022.*

	Indirect emissions per passenger-km [gCO_2/pkm]	Indirect emissions per km [gCO_2/km]
Electric passenger vehicles	18.2	31
Electric light-duty vehicles	28	42

Note that there are indirect emissions related to fossil fuel as well but that are scope 3 emissions and not included in this analysis. Scope 3 emissions differ between fossil and electric vehicles mostly due to the batteries where there is rapid technology development. Indirect emissions related to fossil fuelled passenger and light-duty vehicles are zero for scope 2.

4.4 Impact assessment: Avoided emissions – Clean transportation

The 6,936 eligible vehicles in SR-Bank's portfolio are estimated to drive around 59.3 million kilometres per year. The available data from the bank include current number of contracts, car brand and model name and related portfolio volume. Based on information supplied from the bank, Multiconsult has identified 6,369 passenger vehicles and 567 light-duty vehicles. Passenger vehicles is the dominant category in the portfolio, accounting for 92 percent of the vehicles eligible for inclusion in a green bond issuance.

Table 17 Number of eligible vehicles and expected yearly mileage.

	No. of vehicles	Sum distance [km/year]
Eligible passenger vehicles in portfolio	6,936	52.7 mill.
Eligible light duty vehicles in portfolio	567	6.6 mill.
Sum eligible vehicles	**6,936**	**59.3 mill.**

The table below summarises, in rounded numbers, the reduced CO_2-emissions compared to baseline for the eligible assets in the portfolio in an average year in the lifetime of the vehicles in the portfolio, presented as reductions in direct emissions and indirect emissions. Note that indirect emissions are only calculated for EVs, and not fossil fuelled vehicles.

Direct emissions are calculated by multiplying the distance travelled [km] by the vehicles in the portfolio in per year by the specific emission factors [gCO_2/km] in Table 13 and Table 14. Indirect emissions are calculated by multiplying the distance travelled by the number of vehicles in the portfolio in a year by the specific emission factors [gCO_2/km] in Table 16.

In Table 18 below, the direct, indirect and sum of avoided emissions are presented for the portfolio are shown based on all indirect emission grid factors mentioned in Table 15, i.e. European power production mix 2020-2022, Norwegian electricity mix considering export/import and Norwegian residual mix for 2022. The table enables comparison with the bank's impact reporting on other green bond asset classes and financed emissions across all assets – green and others.

Table 18 The portfolio's estimated impact on Scope 1 and Scope 2 GHG-emissions (CO_2-eq). Sum of avoided emissions is presented in total and scaled by the bank's engagement.

	Avoided emissions compared to baseline [tons CO_2-eq/year]		
	European production mix 2020-2022	Norwegian physically delivered el. 2022	Norwegian residual mix 2022
Direct emissions only (Scope 1)	5,401	5,401	5,401
Indirect emissions EVs only (Scope 2)	-1,913	-227	-5,994
Sum avoided direct and indirect emissions	**3,487**	**5,174**	**-593**
Sum avoided direct and indirect emissions - scaled	**3,222**	**4,781**	**-548**

Note that the high residual mix for Norway lead to net negative avoided emissions.

The reduction in direct emissions from passenger and light-duty vehicles corresponds to 2.2 million litres of gasoline saved per year.

5 Renewable energy

Hydropower is the dominant power production solution in Norway since the beginning of the industrialisation. Today, hydropower remains a crucial component of the national energy mix, accounting for 89 percent of the national electricity production in 2023. The same year, onshore wind accounted for 9 percent of the national power production[43]. Solar power plants are currently being introduced to the Norwegian power sector, with the first ground mounted plant connected to the grid in 2023.

Power production development in Norway is strictly regulated and subject to licencing and is overseen by Norwegian Water Resources and Energy Directorate (NVE), a directorate under the Ministry of Petroleum and Energy. Licenses grant rights to build and run power production installations under explicit conditions and rules of operation. NVE puts particular emphasis on preserving the environment. The Norwegian part of the NVE homepage gives detailed information about different requirements for different kind of projects[44].

Data about the Norwegian assets are available from Norwegian Water Resources and Energy Directorate (NVE) as all assets are subject to licencing.

5.1 Eligibility

SR-bank's eligibility criteria are formulated in line with CBI criteria[45]. The hydropower threshold is in line with the life-cycle emissions threshold of 100 gCO_2-eq/kWh in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[46].

Eligibility criteria:
Solar Energy: Photovoltaics (PV), concentrated solar power (CSP) and solar thermal facilities

Wind Energy: Onshore and offshore wind energy generation facilities

Hydropower in Norway, that meet one of the following criteria:
- the facility is a run-of-river plant and does not have an artificial reservoir
- the power density of the electricity generation facility is above 5 W/m^2
- the lifecycle emissions from the generation are lower than 100 gCO_2e/kWh

5.1.1 Hydropower

Hydropower plants with power density > 5 W/m^2 are exempt from the most detailed investigations. More on the power density, general background for the criteria and portfolio eligibility, please refer to Multiconsult report "SR-Bank Green Hydropower portfolio"[47].

For Norwegian hydropower assets, the eligibility criteria are easily fulfilled and most assets overperform radically.

- All run-of-river power stations have no or negligible negative impact on GHG emissions

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[43] https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet/artikler/markant-nedgang-i-stromforbruket-for-kraftintensiv-industri, 2024
[44] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[45] https://www.climatebonds.net/standard/hydropower
[46] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[47] https://www.sparebank1.no/en/sr-bank/about-us/investor/financial-info/debt-investors.html

- Due to the cold climate and high power density of Norwegian hydropower, Norwegian reservoirs are not exposed to significant cyclic revegetation of impoundment and hence the negative impacts on GHG emissions from these reservoirs are very small.
- Hydropower stations with high hydraulic head and/or relatively small, impounded area have high power density

The adaptation and resilience component in Climate Bonds Initiative (CBI) hydropower eligibility criteria and the EU Taxonomy's "Do no significant harm", addressing environmental and social issues, is in the Norwegian context to a large degree covered by the rigid relevant requirements in the Norwegian regulation of energy plants. Hence, all Norwegian wind and hydropower assets conform to very high standards regarding environmental and social impact. Portfolio alignment with DNSH requirements has not been assessed in detail.

5.1.2 Wind power

According to the bank's green bond framework, all onshore and offshore wind generation facilities are eligible for green bonds. All wind power plants in the bank's portfolio thus qualify.

CBI has published wind eligibility criteria[48]. According to these, onshore electricity generation facilities are automatically eligible.

Norwegian wind power assets also conform to very high standards regarding environmental and social impact. Portfolio alignment with DNSH requirements has not been assessed in detail.

5.2 Eligible assets in portfolio

SR-Bank's portfolio contains 166 plants of varied age and size, from less than 1 MW to several hundred MW. Approx. 60 percent of the portfolio is Norwegian hydropower and 40 percent wind power in Norway, Sweden, Finland, and Denmark.

Multiconsult has investigated a sample of SR-Bank's portfolio and can verify that the assets, both planned and in operation have low to negligible GHG-emissions related to construction and operation.

Hydropower stations with capacities in the range of 0.1-25 MW account for almost 20 percent of renewable energy power production in the portfolio. These are run-of-river plants with no or very small reservoirs and hence very high-power density of thousands W/m^2 (ratio between capacity and impounded area).

5.3 Impact assessment- Renewable energy

5.3.1 CO_2-emissions from renewable energy power production

All power production facilities have a negative impact on GHG emissions. Instead of calculating the impact on GHG emissions for all facilities in the SpareBank 1 SR-Bank portfolio, we refer to The Association of Issuing Bodies (AIB)[49]. AIB is responsible for developing and promoting the European Energy Certificate System – "EECS".

AIB, as referred to by NVE[50], uses an emission factor of 6 gCO_2/kWh for all European hydropower in their calculations of the European residual mix. The value is based on a life-cycle analysis where all upstream and downstream effects in the whole value chain for power production are included.

[48] https://www.climatebonds.net/standard/wind, 2024
[49] https://www.aib-net.org/, 2024
[50] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/, 2019

In subsequent assessments we are using the AIB emission factors for hydropower assets, even though the factors are reported higher than in other credible sources in Norwegian context. For instance, Østfoldforskning[51] calculated the life-cycle emissions of Norwegian hydropower across all categories to 3.33 gCO_2-eq/kWh.

For the assets in the portfolio, with many run-of-river and small hydropower assets, the AIB emission factor is regarded as conservative in an impact assessment setting. The positive impact of the hydropower assets is 130 gCO_2/kWh compared to the baseline of 136 gCO_2/kWh from Table 1.

Similarly, the equivalent LCA based emission factor for wind power used by AIB is 20 gCO_2/kWh[50]. Using the AIB factor, the positive impact of the wind power assets is then 116 gCO_2-eq/kWh, compared to the baseline of 136 gCO_2-eq/kWh from Table 1.

Given the Norwegian electricity mix for physically delivered electricity of 19 gCO_2/kWh from Table 1, the positive impact for hydropower will be 13 gCO_2/kWh compared to the baseline, while there will be no positive impact for wind power. For the Norwegian residual mix of 502 gCO_2/kWh from Table 1, the positive impact will be 496 gCO_2/kWh and 482 gCO_2/kWh compared to baseline for hydropower and wind power, respectively.

5.3.2 Power production estimates

The renewable energy power plants in SR-Bank's portfolio are quite varied in age. A large portion of younger plants add uncertainty to future power production. Actual or planned power production has been attained by the bank and supplemented by information from NVE[52,53] and Energimyndigheten[54].

It is important to note that indicated power production capacity in the licensing documents do not necessarily represent what can realistically be expected from the plant over time. For hydropower, the hydrology is uncertain, and unfortunately often overestimated in early project phases. Also, production figures normally do not account for planned and unplanned production stops, due to accidents, maintenance etc. Research on small hydropower has shown that actual production may be more than 20 percent lower than the licensing/pre-construction figures. There is no equivalent evidence to claim the same mismatch for large hydropower or wind power.

5.3.3 Impact new or existing Norwegian renewable energy plants

The eligible plants in SR-Bank's portfolio are estimated to have the capacity to produce about 2,000 GWh per year, adjusted based on research mentioned in the previous section and scaled against the banks share of financing. The bank's share of financing ranges from 2 to 100 percent. The available data from the bank and in open sources include:

- Type of plant (wind/solar/hydropower, run-of-river/reservoir)
- Installed capacity
- Production estimated and/or recorded
- Age

The planned power production for the assets has been attained from the bank, the Norwegian Water Resources and Energy Directorate's and Energimyndigheten's energy production databases or

[51] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf
[52] https://www.nve.no/energiforsyning/kraftproduksjon/vannkraft/vannkraftdatabase/, 2024
[53] https://www.nve.no/energi/energisystem/vindkraft/data-for-utbygde-vindkraftverk-i-norge/, 2024
[54] Vindbrukskollen, https://vbk.lansstyrelsen.se/, 2024

licencing documents. Due to the often-overestimated annual production in small hydropower, the impact for the 118 hydropower plants smaller than 10 MW is conservatively calculated by reducing the estimated production by 20 percent.

Table 19 shows the capacity, number of plants, estimated and expected production for the assets in SR-Bank's portfolio. Expected production has here been scaled by the bank's share of financing of each plant.

Table 19 Capacity and annual production of the eligible renewable plants and the expected production (estimated production reduced for common errors) in total and scaled against the bank's engagement.

	Capacity [MW]	No. of plants	Expected production [GWh/year]	Expected production – scaled [GWh/year]
Small hydropower	0.3-23.7 MW	123	1,209	499
Medium hydropower	26.5-80 MW	11	2,098	206
Large hydropower	> 100 MW	3	2,585	72
Sum hydropower	0.3-140 MW	137	5,892	777
Sum onshore wind	1-150 MW	29	3,747	1,179
Sum hydro and wind		**166**	**9,639**	**1,956**

Table 20 summarises the expected renewable energy produced by the eligible assets in the portfolio in an average year and the subsequent abated CO_2-emissions the energy production results in, in total and scaled against the bank's engagement in financing of the plants.

Table 20 Power production and estimated positive impact on GHG-emissions (CO_2-eq), in total and scaled by bank's share of financing of the plants.

	Expected production [GWh/year]	Avoided emissions compared to baseline [tons CO_2-eq/year]		
		European lifetime mix	Norwegian physically delivered el. 2022	Norwegian residual mix 2022
Identified eligible RE plants in portfolio	**9,639**	**1,200,605**	**76,599**	**4,728,446**
Identified eligible RE in portfolio - scaled	**1,956**	**237,798**	**10,101**	**953,770**