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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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. This table sums up the impact in rounded numbers:

Energy efficient residential buildings		*14,800 ton CO_2e/year*
Energy efficient commercial buildings		*2,400 ton CO_2e/year*
Clean transportation	*Scope 2: -1,700 ton CO_2e/year*	*Scope 1: 4,200 ton CO2e/year*
Renewable energy		*45,300 ton CO_2e/year*
Total		*66,700 ton CO_2e/year*

Note that the impact in the table above is scaled by the bank's engagement for asset classes green residential and commercial buildings and renewable energy. Clean transportation is not scaled by engagement. Un-scaled impact may be found in the report.

Contents

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.

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 [1].

1.1 CO_2- emission factors related to electricity demand and production

The eligible assets are either producing renewable energy and delivering 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% hydropower and 10% wind) results in emissions of 7 gCO_2/kWh. The production mix is also included in the figure for other selected European states for illustration.

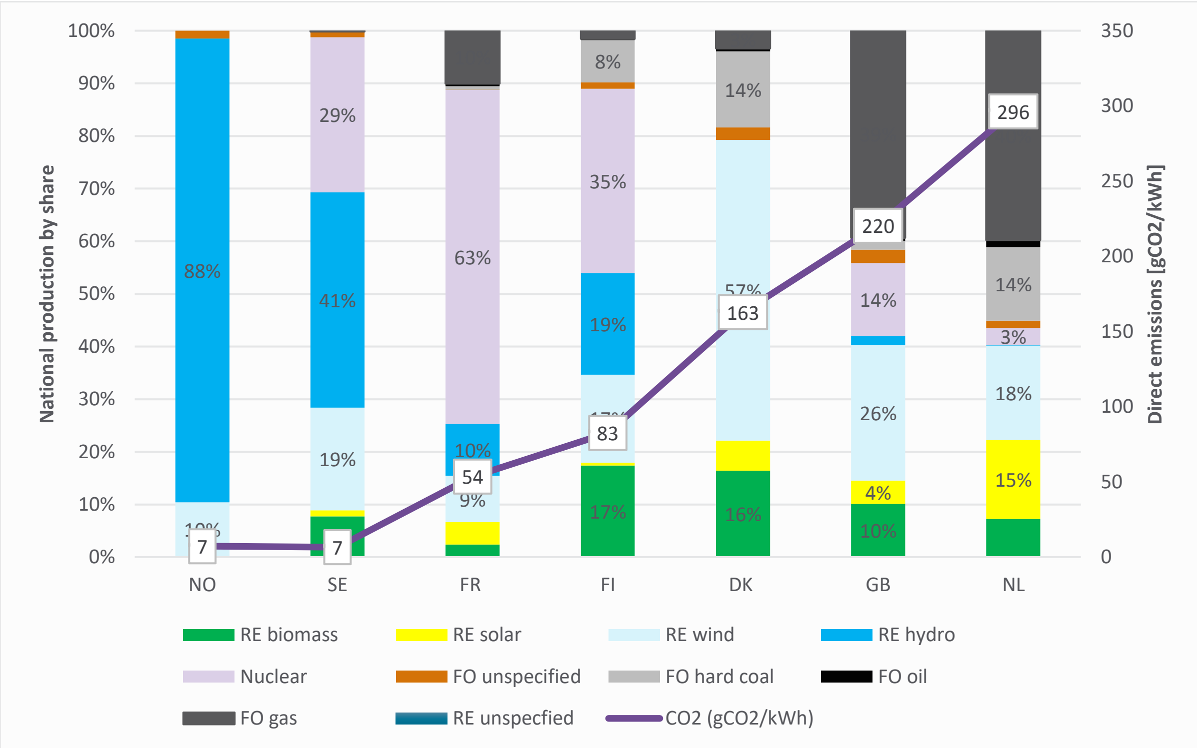

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2022, Association of Issuing Bodies[2])

Power is traded internationally in an ever more interconnected European electricity grid. For impact calculations, the regional or European production mix is more relevant than national production. Using a life-cycle analysis, the Norwegian Standard NS 3720:2018 "Method for greenhouse gas calculations for buildings" takes into account international electricity trade and that the consumption is not

[1] https://www.sparebank1.no/en/sr-bank/about-us/investor/financial-info/debt-investors.html
[2] https://www.aib-net.org/facts/european-residual-mix

necessarily equal to domestic production. The grid factor, as average in the lifetime of an asset, is based on a trajectory from the current grid factor to a close to zero emission factor in 2050 and steady until the end of the lifetime.

The mentioned standard calculates, on a life-cycle basis, the average CO_2- factor for the next 60 years, a lifetime relevant for buildings and renewable energy assets, according to two scenarios as described in table 1.

Scenario	CO_2- factor (g/kWh)
European (EU27+ UK+ Norway) electricity mix	136
Norwegian electricity mix	18

Table 1 Electricity production greenhouse gas factors (CO_2- equivalents) for two scenarios (source: NS 3020:2018, Table A.1)

The impact calculations in this report apply the European mix in table 1. This is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[3].

Applying the factor based on EU27+ UK + Norway energy production mix, the resulting CO_2- factor for Norwegian residential buildings, including the influence of bioenergy and district heating in the energy mix, is on average 111 gCO_2/kWh due to. This factor is used in impact calculations in section 2.

The average emission factor relevant for electric vehicles is calculated, not based on this Norwegian standard for greenhouse gas calculations for buildings, but based on the last average for the European production mix of the vehicles life expectancy. This is described in more detail in chapter 3.

2 Energy efficient buildings

2.1 New residential buildings NZEB-10% - 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% 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 Energy Performance Certificates System (EPC) 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[4]. 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

[3] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf
[4] https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158/

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 (1600/heated utility floor space) and that one value has been changed.

Building category	Specific energy demand- Nearly zero-energy building (NZEB)
Small residential buildings	(76[5] + 1600/m^2) kWh/m^2
Apartment buildings	67 kWh/m^2

Table 2 Specific primary energy demand (Source: guidance paper[6])

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% 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.

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

Documentation by NZEB definition referenced standard

One way to document an NZEB-10% 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

[5] Corrected value based on assumed error in the published paper. Corrected from 86 to 76 by Multiconsult. If kept NZEB would be less efficient than buildings adhering to the current building code TEK17

[6] https://www.regjeringen.no/contentassets/60e8f8ec02e246079f4af4d9578d78c2/veiledning-om-beregning-av-primarenergibehov-og-nesten-nullenergibygg.pdf

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.). Figure 7 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.

Building categories	Calculated delivered energy pr m^2 heated space (kWh/m^2 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	

Table 3 EPC labels limit values dependency on area

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 m^2, a single apartment of 65 m^2 and an apartment building of 2000 m^2. The lines indicate the calculated NZEB and NZEB-10% 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% compared to limit values in the EPC system (values dependent on dwelling area)

Limit values specific energy demand [kWh/m^2]			
Small residential buildings			
Area BRA [m^2]	NZEB-10% 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 BRA [m^2]	NZEB-10% 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 BRA [m^2]	NZEB-10% made comparable to EPC	EPC A	EPC B
500	89	86	97
2000	89	85	96
5000	89	85	95

Table 4 Qualifying EPC labels dependent on dwelling area

The thresholds 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, 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%

The EPC energy label A limit values, as described in specific energy demand in Table 4, are for all small residential buildings independent of building size below NZEB-10%. 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.

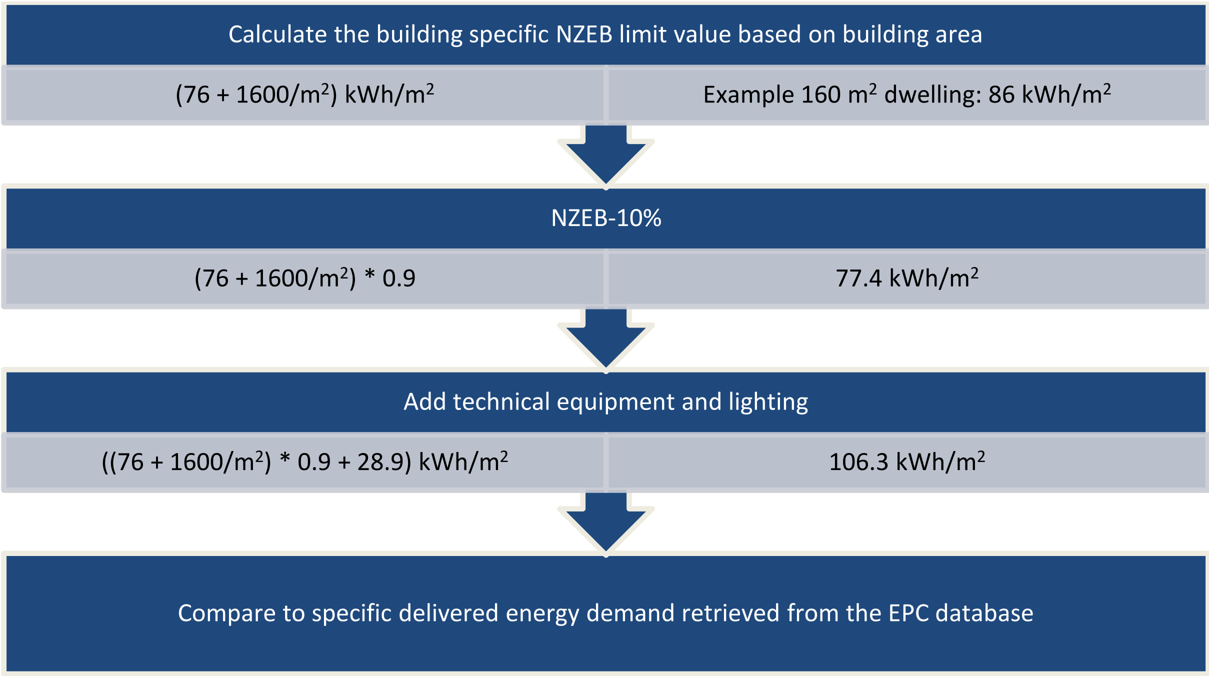

Figure 3 How to compare NZEB-10% to specific energy demand from the EPC system for small residential buildings

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% 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 (right 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% 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 up for using average values from national statistics instead of precise area data. Apartment area is available in the EPC database.

STEP 1

NZEB limit value for apartment buildings
67 kWh/m^2

NZEB-10%	
67 kWh/m^2 *0.9	60.3 kWh/m^2

Add technical equipment and lighting	
(67*0.9 + 28.9) kWh/m^2	89.2 kWh/m^2

STEP 2

Specific delivered energy demand retrieved from the EPC database
Example 65 m^2 apartment with EPC A in a 2000 m^2 building: 94.2 kWh/m^2

Remove apartment area correction factor	
Calculation dependent on EPC label (table 3)	85 kWh/m^2

Add apartment building area correction factor	
Calculation dependent on EPC label (table 3) for 2000 m^2 building	85.3 kWh/m^2

Compare specific delivered energy demand to limit value from step 1 (89.2 kWh/m^2)

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

2.2 Top 15% 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 Energy Performance Certifications.

2.2.1 Building code criterion

i. Existing Norwegian residential building that comply 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).

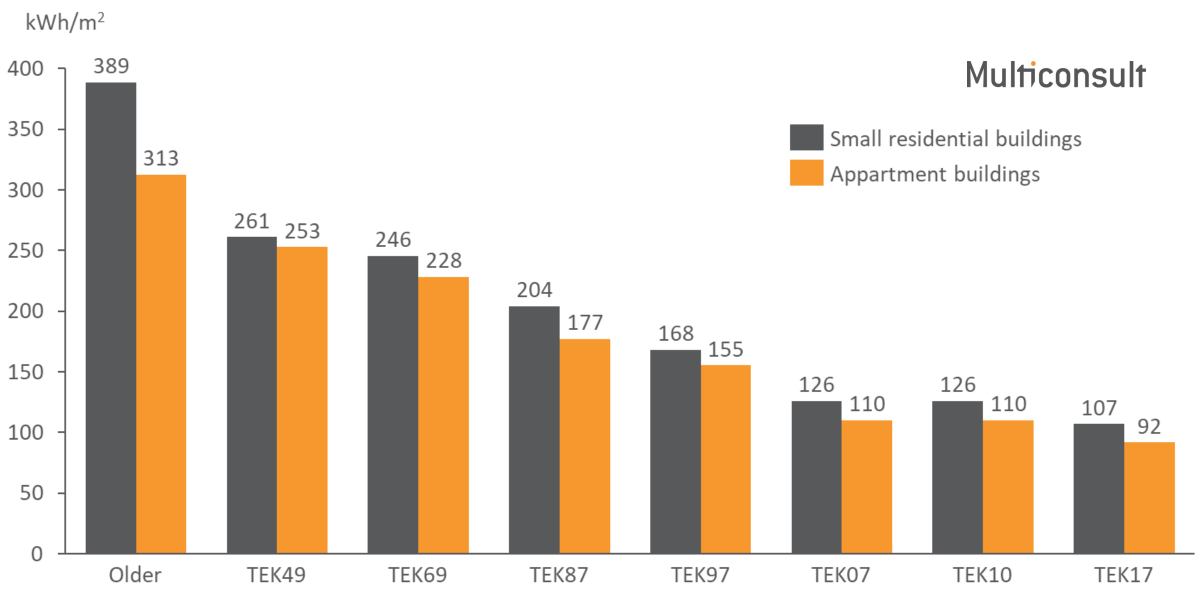

Figure 5 Development in calculated specific net energy demand based on building code and building tradition, (Multiconsult, simulated in SIMIEN)

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%, and the former shift from TEK97 to TEK10 was 25%.

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 12.4% of the total stock.

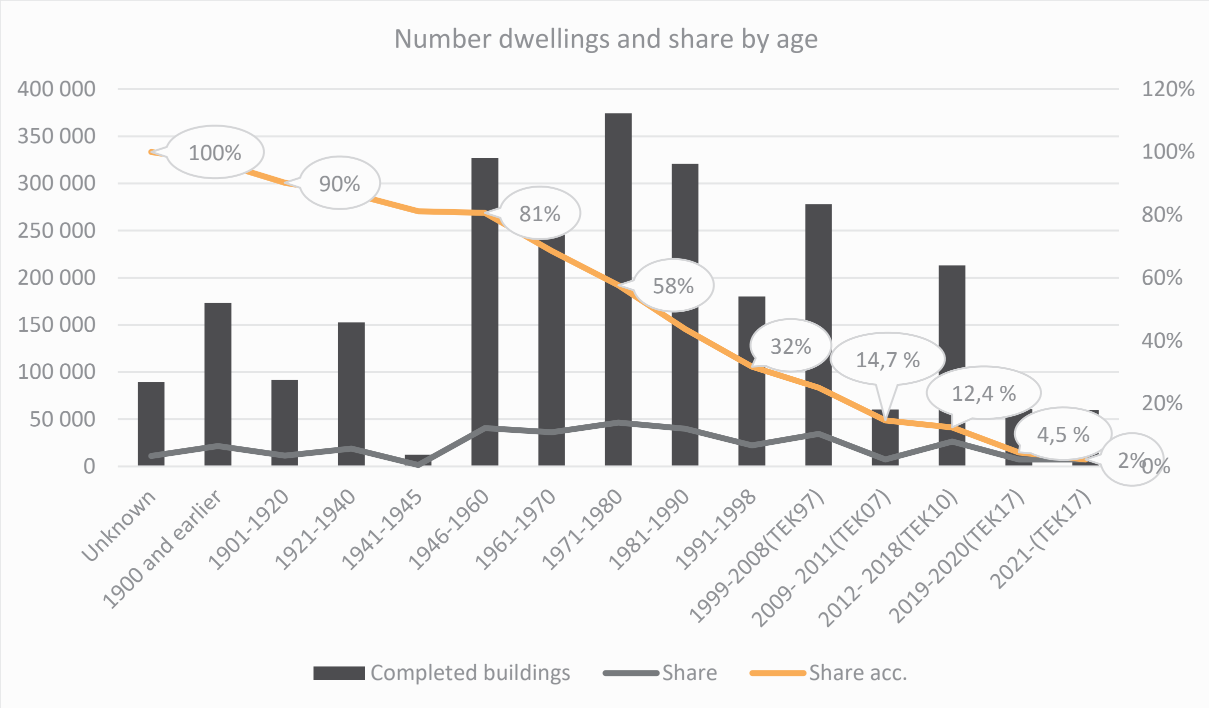

Figure 6 Age and building code distribution of dwellings (Statistics Norway and Multiconsult)

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 251 kWh/m2. Building code TEK10 and TEK17 gives an average specific energy demand for existing houses and apartments, weighted for actual stock, of 114 kWh/m^2. Hence, compared to the average residential building stock, the building code TEK07 (small residential buildings), TEK10 and TEK17 gives a calculated specific energy demand reduction of 54 %.

Given the dynamic nature of the top 15% of the building stock, the bank has tightened the eligible criteria to respect the top 15% 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. 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 to be 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%, and only a share of these labels is at the moment made available to the banks due to data quality issues.

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.). Figure 7 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.

Building categories	**Calculated delivered energy pr m^2 heated space (kWh/m^2 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	

Figure 7 EPC labels limit values dependency on area

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 8 illustrates how EPCs would be distributed based on this assumption. 8.4% of the residences would have a B or better.

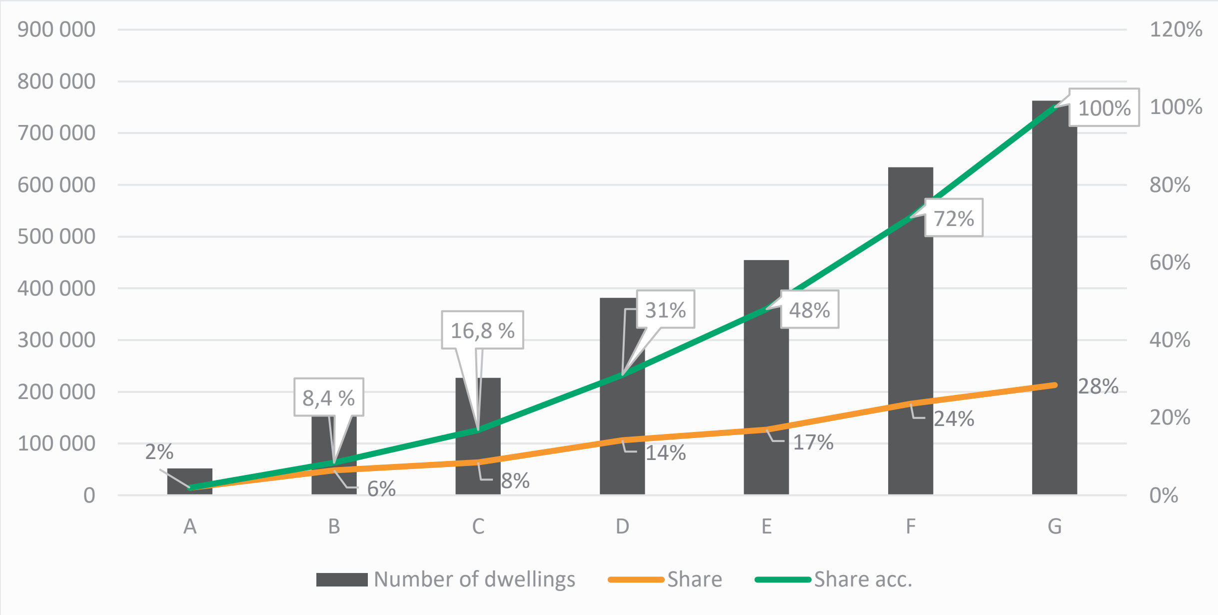

Figure 8 EPCs extrapolated to include the whole residential building stock (Source: energimerking.no Jan23 and Statistics Norway Apr23, Multiconsult)

As only half of all dwellings have a registered EPC, the available data have been extrapolated assuming the registered dwellings are representative for their age group regarding energy label. Then the EPC data indicates that 7.5 % of the current residential buildings in Norway will have a B or better. The average energy performance of a dwelling, according to the EPC system, relates to an energy label E.

The system boundary in the Norwegian EPC system differs from the one used in the building code (EPC uses delivered energy and not gross energy demand). For impact assessments the building code baseline is hence based on the EPC statistics where the average dwelling gets an E.

Given the dynamic nature of the top 15% of the building stock, the bank has decided to tighten the eligible criteria to respect the top 15% 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. 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 %'s.

Interpretation: TEK10 and newer in isolation represents 12.4%; TEK10 and newer in combination with A+B labels represents 13.8%; TEK10 and newer in combination with A+B+C labels represents 18.1%

	TEK10+TEK17	TEK07 small resi.	EPC A+B	EPC A+B+C
TEK10+TEK17	12.4 %		13,8 %	18,1 %
TEK07 small resi.		14.7 %	15,7 %	19,0 %
EPC A+B			8.4 %	
EPC A+B+C				16.8 %

Table 5 Matrix of Cumulative %'s for criteria combinations (FY22), relative to the total residential building stock in Norway

2.3 Impact assessment - Residential buildings

The eligible residential buildings in SR-Bank's portfolio are estimated to amount to more than 1.7 million square meters. The area is calculated based on the assumption that the residents in the portfolio are equivalent to the average Norwegian residential building stock (Statistics Norway[7]).

	Building category	Number of units	Area qualifying buildings in portfolio [m^2]
Both NZEB, building code and EPC criteria	Apartments	3,925	313,513
	Small residential buildings	5,405	1,006,208
Grandfathered all criteria	Apartments	611	48,184
	Small residential buildings	2,115	389,577
	Total	**12,056**	**1,757,482**

Table 6 Eligible objects and calculated building areas

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

To calculate the impact on climate gas emissions the trajectory is applied to all electricity consumption in all buildings. Electricity is the dominant energy carrier to Norwegian buildings, but the energy mix

[7] Table 06513: Dwellings, by type of building and utility floor space

includes also bio energy and district heating, resulting in a total specific factor of 111 g CO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

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.

	Avoided energy compared to baseline [GWh/yr]	Avoided CO_2-emissions compared to baseline [ton CO_2/yr]
Buildings eligible under NZEB criterion	0.1	12
Grandfathered under new buildings building code criterion	29	3,170
Buildings eligible under the building code criterion	160	17,648
Grandfathered under the building code criterion	8	842
Buildings eligible under the EPC criterion	14	1,595
Grandfathered under the EPC criterion	13	1,430
Total impact eligible buildings	**224**	**24,697**
Impact scaled by bank's engagement	**134**	**14,846**

Table 7 Performance of eligible objects compared to average residential building stock (Based on public statistics, SSB, Energimerking.no, Multiconsult)

2.4 New Commercial buildings NZEB-10% - 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% 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[8]. 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.

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

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.

Building category	Nearly zero-energy building (NZEB)	NZEB + energy demand technical equipment
Office building	76 kWh/m^2	110.5 kWh/m^2
Hotel building	159 kWh/m^2	164.8 kWh/m^2
Retail/commercial building	162 kWh/m^2	165.7 kWh/m^2
Small industrial buildings and warehouses	113 (138) kWh/m^2	136.5 kWh/m^2

Table 8 Specific primary energy demand (Source: guidance paper[9], NS3031)

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% 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.

2.4.1 Identifying the buildings with performance at NZEB-10% or better

Documentation by NZEB definition referenced standard

One way to document an NZEB-10% 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

[9] https://www.regjeringen.no/contentassets/60e8f8ec02e246079f4af4d9578d78c2/veiledning-om-beregning-av-primarenergibehov-og-nesten-nullenergibygg.pdf

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 9 the columns describe the thresholds in the EPC system for labels A, B and C. The lines indicate the calculated NZEB and NZEB-10% 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 2 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.

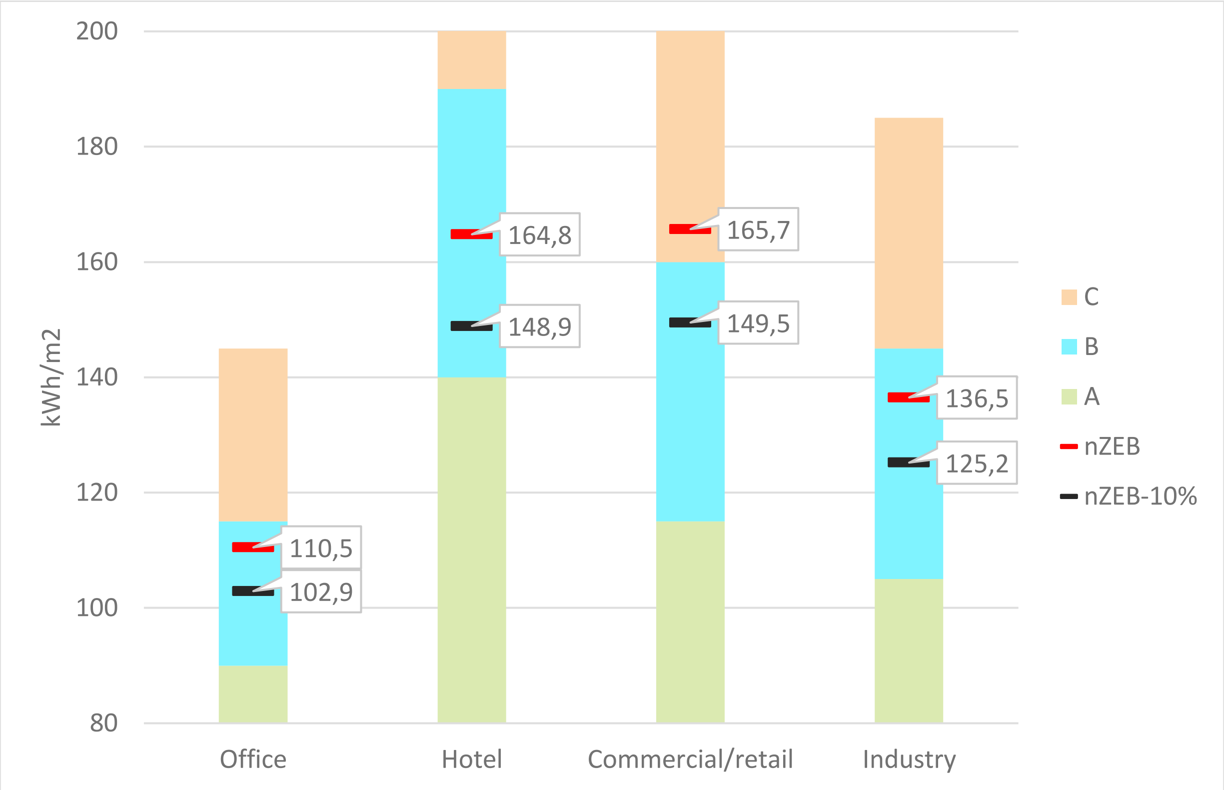

Figure 9 Energy performance with reference to the national definition of NZEB and NZEB-10% compared to limit values in the EPC system

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

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

2.5 Top 15% 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.

2.5.1 Building code criterion

Existing commercial buildings belonging to top 15% 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%. For the sub-categories' office, retail, hotel and restaurant buildings combined the buildings complying with TEK07 and later codes are currently 10% of the total. Small industry and warehouses, however, where the newbuild rate has been very high the last years, are now past 15%. Figure 10 illustrates the four sub-categories individually.

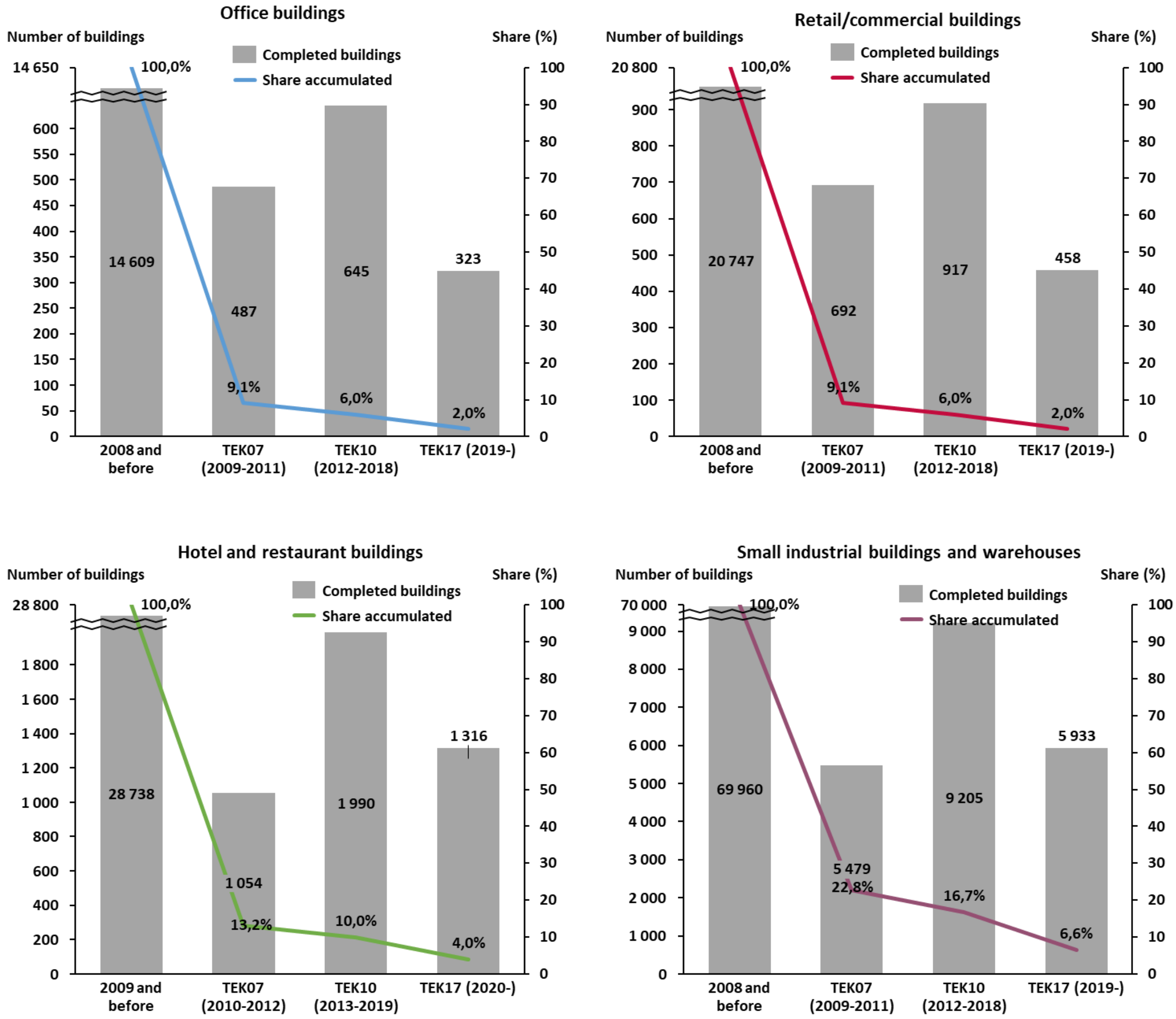

Figure 10 Age and building code distribution of commercial buildings, four major sub-categories (Statistics Norway and Multiconsult)

It is increase in 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 11 illustrates how TEK10 and younger buildings, for the four commercial buildings sub-categories combined, as of 2023 amount to 12.8% of the total Norwegian buildings of these categories.

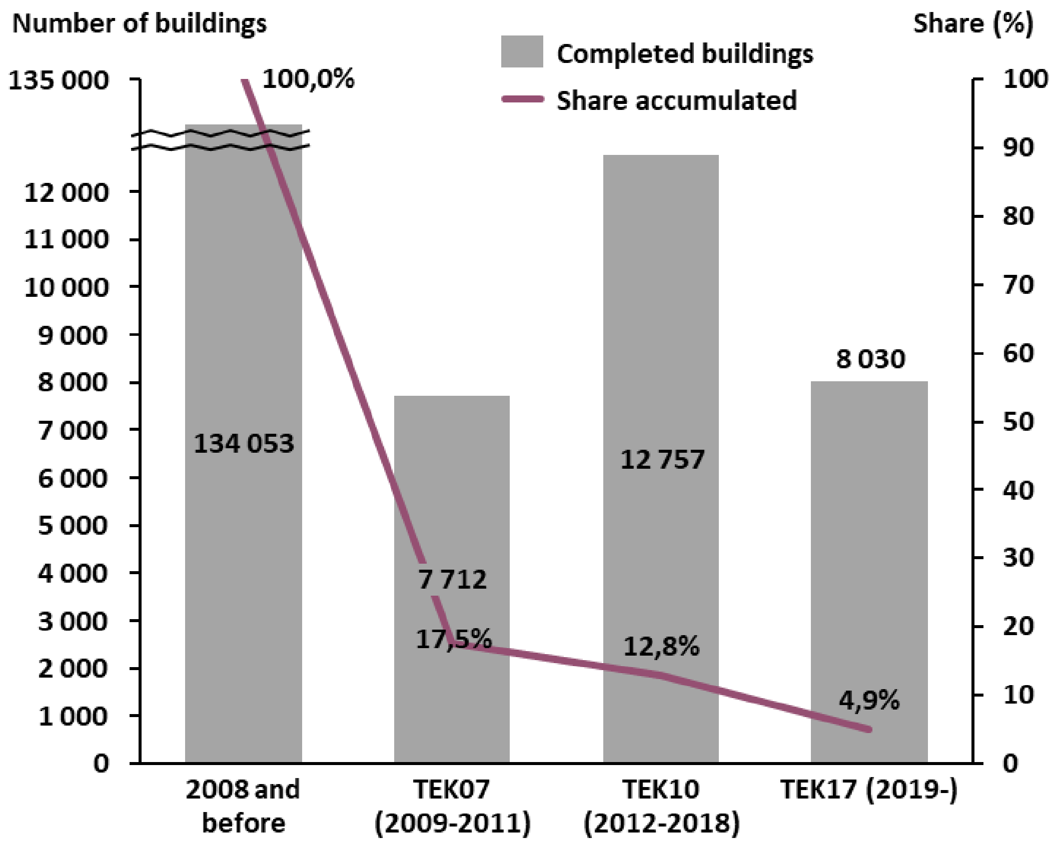

Figure 11 Age and building code distribution of commercial buildings, four major sub-categories combined (Statistics Norway and Multiconsult)

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.

Building category	Average total stock [kWh/m^2]	Average TEK10 and TEK17 [kWh/m^2]	Reduction [kWh/m^2]
Office buildings	246	139	43 %
Commercial buildings / retail	318	201	37 %
Hotel buildings	327	209	36 %
Small industry and warehouses	285	160	44 %

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

A reduction of energy demand from the average of the total commercial building stock to the average for eligible building codes is multiplied to the emission factor and area of eligible assets to calculate impact.

2.5.2 EPC criterion

New or existing commercial buildings belonging to top 15% 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%.

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

For the buildings qualifying according to this criterion, the impact calculations are based on the difference between achieved energy label and weighted average in the EPC database.

2.5.3 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 a number of 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.

2.5.4 Refurbishment criterion

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

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

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

2.6 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 201,200 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% criterion. Buildings qualifying according to two or more criteria are only counted once.

	Building category	Number of units	Area qualifying buildings in portfolio [m^2]
Both building code, EPC, and certification criteria	Office buildings	6	84,226
	Commercial buildings	5	34,238
	Hotel buildings	1	12,517
	Small industry and warehouses	7	56,657
Grandfathered under the building code criterion	Office buildings	5	7,523
	Commercial buildings	10	14,440
	Hotel buildings	1	904
	Small industry and warehouses	26	52,929
	Total	**61**	**263,434**

Table 11 Eligible objects and calculated building areas

To calculate the impact on climate gas emissions the trajectory is applied to all electricity consumption in all buildings. Electricity is the dominant energy carrier to Norwegian buildings, but the energy mix also includes bio energy and district heating, resulting in a total specific factor of 111 g CO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

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.

	Area [m^2]	Reduced energy compared to baseline [GWh/year]	Reduced CO_2-emissions compared to baseline [tons CO_2/year]
Buildings eligible under the building code criterion	67,451	8.2	898
Grandfathered under the building code criterion	75,796	6.9	763
Buildings eligible under the EPC criterion	57,979	5.5	600
Buildings eligible under the BREEAM criterion	62,208	9.4	1,036
Total impact eligible buildings	**263,434**	**30.0**	**3,297**
Impact scaled by bank's engagement	**187,026**	**21.8**	**2,402**

Table 12 Performance of eligible objects compared to average building stock

3 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 in June 2023, consisting of 5, 585 electric vehicles and four full electric vessels, is assessed in terms of direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). A baseline has been established as the emission of the average vehicle of the total new vehicle introduced to the marked, EVs excluded. Publicly available vessel specific data is used to estimate avoided direct emission for electric vessels.

3.1 Loan Portfolio Analysis SR- Bank

The Green loan portfolio of SR- Bank consists of electric vehicles and fully electric vessels 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 and vessels in the portfolio all align with the technical eligibility criteria formulated by Climate Bonds Initiative (CBI)[10] and in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[11].

3.2 General description

Personal mobility in Norway is high, among the highest in Europe, with privately owned passenger vehicles accounting for the vast majority 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 2022, the average passenger vehicle travelled about 11,100 km[12] in Norway. 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 2022 the average age of passenger vehicles scrapped for refund in Norway was 18 years old[13]. The history of modern EVs is short and there is yet no evidence for the lifetime of EVs being different from other vehicles. Due to big uncertainties related to the expected lifetime of new vehicles sold between 2011 and 2021, the average lifetime for both passenger vehicles and light duty vehicles are set to 18 years in this analysis independent of fuel type.

The Norwegian government have over time, with different administrations, had high ambitions both regarding electric vehicles and biofuel to reduce CO_2-emissions. Over 599,000 electric passenger vehicles was registered in Norwegian by the end of 2022, accounting for 20% of the total passenger vehicle stock[14]. The Norwegian Parliament have unanimously adopted a target of 100 % of sales of zero emission light duty and passenger vehicles from 2025.[15] In 2023, the Norwegian government

[10] https://www.climatebonds.net/standard/transport
[11] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[12] SSB 12578: Kjørelengder , etter kjøretøytype, drivstofftype, alder, staisikkvariabel og år, 2023
[13] https://www.ssb.no/en/statbank/table/05522
[14] https://www.ssb.no/transport-og-reiseliv/landtransport/statistikk/bilparken
[15] https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/veg_og_vegtrafikk/faktaartikler-vei-og-ts/norge-er-elektrisk/id2677481/

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% for toll roads, and 50% for parking and ferries.

Petrol retailers are obliged to sell biofuels as a defined percentage of their total sales of ordinary petroleum products. As of 2023, the percentage of advanced biofuel of the overall quota obligation (24.5%) is set at 12.5%. To incentivise the use of advanced biofuels, one litre of advanced biofuels is counted as two litres of conventional biofuel. Subsequently, the overall use of advanced biofuel has increased year after year. In 2021, advanced biofuels accounted for 75% of the overall biofuel usage, thus reducing the usage of conventional biofuels[16]. As a result, the overall volume of biofuel has declined 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[17].

In 2020, a road tax (veibruksavgift) for all biofuel was introduced. The taxation of bioethanol is significantly lower compared to standard gasoline, but the road tax for biodiesel is equal to conventional diesel[18]. Previous estimates from 2018 concluded that biofuel used in Norway resulted in 72% lower greenhouse gas (GHG) emissions in a life cycle perspective compared to regular fuels[19]. The same year, legislation was passed, stipulating that biofuels shall have a minimum of 50% lower life cycle GHG emissions than fossil fuels[20].

3.3 Climate gas emissions (Scope 1 and 2)

Categorising the emissions, we have chosen to use the CBI guidelines for the Scope 1, Scope 2 and Scope 3 emission calculations. CBI's Low Carbon Transport Background Paper to Eligibility Criteria[21] 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 indirect emissions related to power production for information.

3.3.1 Indicators

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

- Emissions per kilometre [gCO_2/km]
- Emissions per passenger kilometre [gCO_2/pkm]

The passenger vehicle fleet composition and emissions from the types of passenger 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 kilometers are calculated by multiplying the number of passengers by the corresponding number of kilometers travelled.

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16 https://www.miljodirektoratet.no/aktuelt/nyheter/2022/juni-2022/avansert-biodrivstoff-oker-pa-norske-veier/
17 https://res.cloudinary.com/arbeiderpartiet/image/upload/v1/ievv_filestore/43b0da86f86a4e4bb1a8619f13de9da9afe348b29bf24fc8a319ed9b02dd284e
18 https://www.skatteetaten.no/satser/veibruksavgift/?year=2023#rateShowYear
19 https://www.miljodirektoratet.no/aktuelt/nyheter/2019/mai-2019/salget-av-avansert-biodrivstoff-okte-i-fjor/
20 https://lovdata.no/dokument/LTI/forskrift/2022-12-20-2356
21 https://www.climatebonds.net/files/files/Low%20Carbon%20Transport%20Background%20Paper%20Feb%202017.pdf page 10

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[22].

3.3.2 Direct emissions (tailpipe)- Scope 1

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

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[23].

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, which will 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 2020-2030 have been accounted for in the analysis. It is assumed that the biofuel share in the fuel mix will remain constant between 2030 and 2038.

To estimate the weighted average of emissions per fossil passenger vehicle ($c_{\text{weighed average}}$) we use the average annual emission from new passenger vehicle models from 2011-2022[24].

To estimate the distance travelled by the average passenger vehicle we assume that 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 assumption[25].

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 2022 and extrapolate until 2040. This is a conservative approach as it is likely, at some point, to see a flattening. For buses we do not expect this declining trend.

Table 13 and Table 14 present the calculated emission factors for the relevant vehicle categories. The calculations are based on calculated gross tailpipe CO2-emissions for the average vehicle produced in each of the years between 2011-2022, biofuel- and fossil fuel content in petrol/diesel pumped in each year between 2022-2040, as well as the travelled annual distance for the average vehicle.

[22] https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/mindre-utslipp-per-kjorte-kilometer
[23] https://www.vegvesen.no/fag/fokusomrader/miljo+og+omgivelser/klima
[24] https://ofv.no/CO2-utslippet/co2-utslippet
[25] https://www.ssb.no/statbank/table/12578/

	Direct emissions substituted fossil passenger vehicles – Average	Direct emissions EV
Emissions per passenger km	46 gCO_2/pkm	0 gCO_2/pkm
Emissions per km	79 gCO_2/km	0 gCO_2/km
Emissions per passenger vehicle and year	647 $kgCO_2$/vehicle/year	0 $kgCO_2$

Table 13 ***Passenger vehicles****: Greenhouse gas emission factors (CO_2- equivalents), average direct emissions*

	Direct emissions substituted fossil light duty vehicles – Average	Direct emissions EV
Emissions per passenger km	119 gCO_2/pkm	0 gCO_2/pkm
Emissions per km	179 gCO_2/km	0 gCO_2/km
Emissions per passenger vehicle and year	2,169 $kgCO_2$/vehicle/year	0 $kgCO_2$

Table 14 ***Light Duty Vehicles****: Greenhouse gas emission factors (CO_2- equivalents), average direct emissions*

	Direct emissions substituted fossil fueled buses – Average	Direct emissions EV
Emissions per km	540 gCO_2/km	0 gCO_2/km
Emissions per bus and year	5,212 $kgCO_2$/vehicle/year	0 $kgCO_2$

Table 15 ***Buses****: Greenhouse gas emission factors (CO_2- equivalents), average direct emissions*

3.3.3 Indirect emissions (Power consumption only)- Scope 2

Norway trades power internationally through 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 in this report. Nonetheless, calculations of indirect emissions from power production setting the system boundary at national borders is included for comparison.

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[26].

[26] http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/631047/IPOL_BRI(2019)631047_EN.pdf

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 may be calculated with different system boundaries. For this section 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[27] are included for all European countries except Iceland, Cyprus, Ukraine, Russia and Moldova.

Scenario	**CO_2-factor (g/kWh)**
European (EU27 + UK + Norway) production mix average 2019-2021	245
Norwegian production mix average 2019-2021	7.8

Table 16 Electricity production greenhouse gas factors (CO_2 equivalents)

Using a European production mix is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[28]. The following calculations use the CO_2-factor as an average from the baseline presented in Table 16 and the expected lifetime for each type of vehicle, following the emission trajectory of the European production mix. For passenger vehicles, with an expected lifetime of 18 years, the CO_2-factor will then be an average of the CO_2-factor in the period from 2021-2038. The same method is used to estimate the CO_2-factor based on the Norwegian power production mix. The declining CO_2 emission trajectories reported for power production for EU and Norway, from 2021 and onward, will impact the indirect emissions and avoided emissions from the vehicle portfolio.

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[29], 0,2 kWh/100km, which is close to the factor presented in the Swedish “Handbok för vägtrafikens luftföroreningar”[30]. The same handbook presents an energy consumption for light-duty vehicles of 0.25 kWh/100km and buses 1.9 kWh/100km. These factors have been applied in the analysis. In Table 17, calculated emission factors are presented.

	Indirect emissions electric passenger vehicles - annual average	Indirect emissions electric light duty vehicles - annual average	Indirect emissions electric buses - annual average
Emissions per passenger km, indirect emissions	20 gCO_2/pkm	30 gCO_2/pkm	36 gCO_2/pkm
Emissions per km, indirect emissions	35 gCO_2/km	46 gCO_2/km	361 gCO_2/km

Table 17 Electricity consumption greenhouse gas factors (CO_2- equivalents) electric vehicles- based on EU power production mix

[27] https://www.aib-net.org/facts/european-residual-mix
[28] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf
[29] https://ev-database.org/cheatsheet/energy-consumption-electric-car
[30] Handbok för vägtrafikens luftföroreningar, chapter 6, Trafikverket, 2019

*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 vehicles are zero for scope 2.

3.4 Impact assessment: Abated emissions – Clean transportation

The 5,585 eligible vehicles in SR- Bank's portfolio are estimated to drive around 47 million kilometres in a year. The available data from the bank include current number of contracts and related portfolio volume. Passenger vehicles is the dominant category in the portfolio, accounting for 96% of the vehicles eligible for inclusion in a green bond issuance.

	Number of vehicles	Sum km/yr.
Eligible passenger vehicles in portfolio	5,194	42.6 mill.
Eligible light duty vehicles in portfolio	379	4.6 mill.
Eligible buses in portfolio	12	0.12 mill.
Sum eligible vehicles	5,585	47.3 mill.

Table 18 Number of eligible passenger vehicles and expected yearly mileage

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 by the vehicles in the portfolio in per year by the specific emission factor [CO_2/km] in Table 13 through Table 15.

Indirect emissions are calculated by multiplying the distance travelled by the number of vehicles in the portfolio in a year by the specific emission factor [CO_2/km] in Table 17.

Eligible passenger and light-duty vehicles and busses	Reduced CO_2-emissions compared to baseline
Total Direct emissions only (Scope 1)	4,245 tons CO_2/year
Total Indirect emissions EVs only (Scope 2)	-1,725 tons CO_2/year
Total Avoided emissions	2,520 tons CO_2/year

Table 19 The EV portfolio's estimated impact on direct, indirect and avoided GHG-emission in rounded numbers

The reduction in direct emissions from passenger and light-duty vehicles and buses corresponds to 1.8 million litres of gasoline saved per year.

According to publicly available sources, the four fully electric vessels in the portfolio is estimated to abate over 970,000 litres diesel per year compared to a diesel alternative.

Eligible vessels in portfolio	Reduced CO_2-emissions compared to baseline
Direct emissions only (Scope 1)	2,582 tons CO_2/year
Indirect emissions (Scope 2)	-927 tons CO_2/year
Avoided emissions	1,654 tons CO_2/year

Table 20 The electric vessels estimated impact on direct, indirect and avoided GHG-emission

Table 21 describes the mitigation of direct emissions from the passenger and light-duty vehicles, busses and fully electric ferry in the portfolio and the indirect emissions related to electricity provided to the vehicles.

Eligible vehicles in portfolio	Reduced CO_2-emissions compared to baseline
Total Direct emissions only (Scope 1)	6,827 tons CO_2/year
Total Indirect emissions EVs only (Scope 2)	-2,652 tons CO_2/year
Total Avoided emissions	4,175 tons CO_2/year

Table 21 The clean transportation portfolio's estimated impact on direct, indirect and avoided GHG-emission

The cut in direct emissions corresponds to 1.8 million litres of gasoline and 970 000 litres of diesel avoided every year.

4 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 88% of the national electricity production in 2022[31]. The same year, onshore wind accounted for 10% of the national power production.

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[32].

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

4.1 Eligibility

The eligibility criteria are formulated in line with CBI criteria[33] and the threshold is in line with the life-cycle emissions threshold of 100 gCO_2e/kWh in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[34].

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

Wind Energy: Onshore and offshore wind energy generation facilities and other emerging technologies, such as wind tunnels and cubes

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

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"[35].

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

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

[31] https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet/artikler/betydelig-nedgang-i-stromforbruket-i-2022
[32] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[33] https://www.climatebonds.net/standard/hydropower
[34] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[35] 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.

4.2 Eligible assets in portfolio

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

The largest share of power produced from renewable energy power stations in the portfolio stems from land-based wind. Hydropower stations with capacities in the range of 0.1- 25 MW account for the second largest share of renewable energy power production in the portfolio. These are to a large extent 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).

The remaining share of renewable energy power production in the portfolio is related to on-shore and offshore wind, and solar power.

4.3 Impact assessment- Renewable energy

4.3.1 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, and most of them rather small facilities in the SpareBank 1 SR-Bank portfolio, we refer to The Association of Issuing Bodies (AIB). AIB is responsible for developing and promoting the European Energy Certificate System – "EECS".

The Association of Issuing Bodies (AIB), referred to by NVE[36], uses an emission factor of 6 gCO_2/kWh for all European hydropower in their calculation.

ns 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.

In subsequent assessments we are using the AIB emission factors for all assets, even though they are higher than factors in other credible sources. E.g. has Østfoldforskning[37] calculated the life-cycle emissions of Norwegian hydropower (all categories) to 3.33 gCO_2e/kWh. For the type of 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. For wind power and solar power the life-cycle climate gas emission factor is assumed to be 20 gCO_2/kWh, and the impact 116 gCO_2/kWh (136 - 20).

[36] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/
[37] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf

4.3.2 *Power production estimates*

The renewable energy power plants in SR-Bank's portfolio are quite varied in age. And 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.

For small hydropower it is important to understand that stated power production given in the concession documents do not necessarily represent what can realistically be expected from the plant over time. For one the hydrology is uncertain, and unfortunately often overestimated in early project phases for small hydropower. However, the 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 often is more than 20% lower than the concession/pre-construction figures. There is no equivalent evidence to claim the same mismatch for large hydropower.

4.3.3 *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 763 GWh per year, scaled against the banks share of financing. 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/recorded
- Age

	Capacity [MW]	# of plants	Estimated production [GWh/yr]	Expected production [GWh/yr]
Small hydropower facilities	0.1 – 25	73	185	148
Medium hydropower facilities	>25 MW	2	46	46
Sum hydropower		75	231	194
Wind		portfolio	171	171
Offshore wind	500	2	2	2
Sum wind			173	173
Solar		portfolio	2	0.4
Total sum			406	367

Table 22 Capacity and production of eligible hydropower plants (HPP), estimated and expected production (reduced for common errors) scaled against the bank's engagement

Table 23 summarises the expected renewable energy produced by the eligible assets in the portfolio in an average year, scaled against the bank's engagement, and the subsequent abated CO_2-emissions the energy production results in.

	Expected produced power	Reduced CO_2-emissions compared to baseline
Identified eligible renewable energy plants in portfolio	367 GWh/year	45,294 tons CO_2/year
Identified eligible renewable energy plants in portfolio scaled by bank's share of financing	367 GWh/year	45,294 tons CO_2/year

Table 23 Power production and estimated positive impact on GHG-emissions