REPORT

Sparebanken Vest Green Portfolio Impact Assessment 2023

CLIENT

Sparebanken Vest

SUBJECT

Energy efficient residential and commercial buildings, renewable energy

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RAPPORT

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In summary, impact assessed for all examined asset classes in the Sparebanken Vest portfolio qualifying according to the bank's green bond criteria, is dominated by hydropower assets but with significant contributions from energy efficient residential and commercial buildings. This table sums up the impact:

TOTAL ESTIMATED IMPACT FOR QUALIFYING OBJECTS IN PORTFOLIO:

Energy efficient residential buildings	*27,271 ton CO_2e/year*
Energy efficient commercial buildings	*2,102 ton CO_2e/year*
Renewable energy	*62,751 ton CO_2e/year*
Total	*92,124 ton CO_2e/year*

IMPACT FOR QUALIFYING OBJECTS IN PORTFOLIO SCALED BY THE BANK'S SHARE OF FINANCING:

Energy efficient residential buildings	*15,063 ton CO_2e/year*
Energy efficient commercial buildings	*1,138 ton CO_2e/year*
Renewable energy	*30,120 ton CO_2e/year*
Total	*46,321 ton CO_2e/year*

(Note: Scaled impact reflecting the bank's share of financing of renewable energy assets assumes, on a portfolio level, unchanged share of financing from previous years.)

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INNHOLDSFORTEGNELSE

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1 Introduction

On assignment from Sparebanken Vest, Multiconsult has assessed the impact of the part of Sparebanken Vest's Q1 2023 loan portfolio eligible for green bonds according to Sparebanken Vest's Green Bonds Framework.

In this document we describe Sparebanken Vest's green bond qualification criteria, the evidence for the criteria and the result of an analysis of the loan portfolio of Sparebanken Vest. More detailed documentation on baseline, methodologies and eligibility criteria is made available on Sparebanken Vest'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.

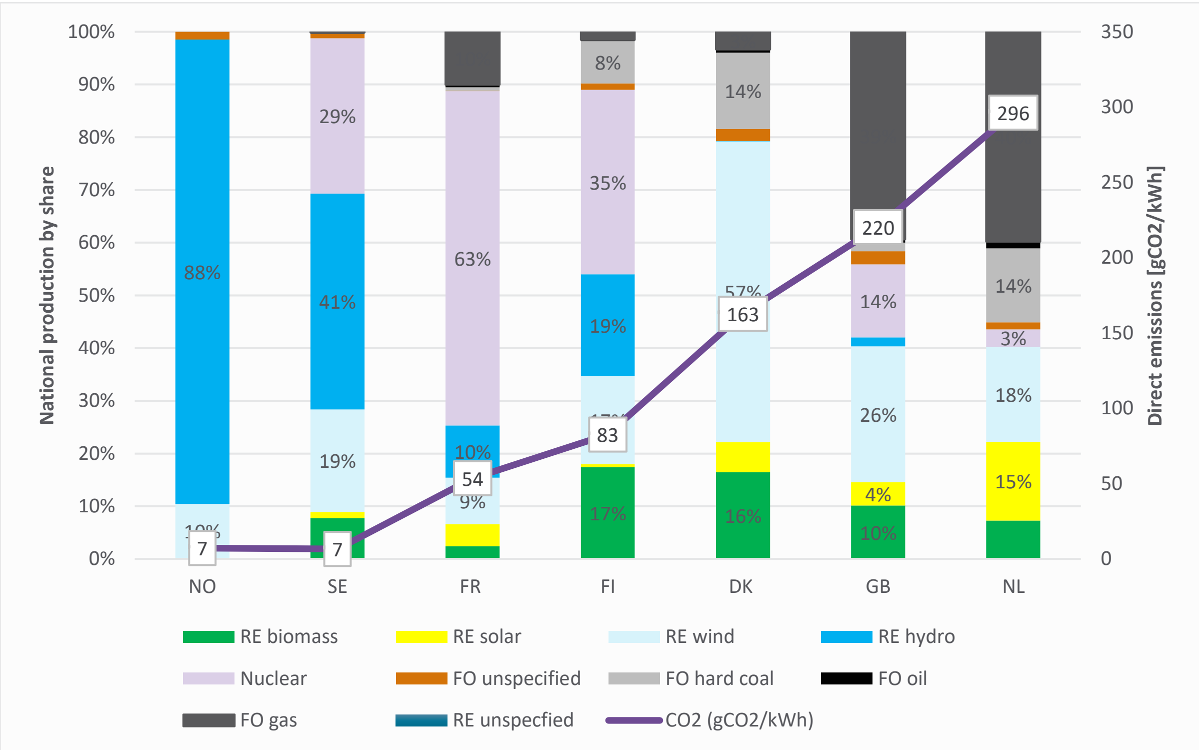

Figure 1 National electricity production mix in selected countries (European Residual Mixes 2022, Association of Issuing Bodies[2])

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

[1] https://www.spv.no/-/media/Investor-relations/IR-dokumenter/Green-Bond-Programme/2023/Green_Bond_Framework_2023.pdf
[2] https://www.aib-net.org/facts/european-residual-mix

for buildings" takes into account international electricity trade and that the consumption is not 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 110 gCO_2/kWh. This factor is used in impact calculations in section 2 and 3.

2 Energy efficient residential buildings

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

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, the report include some background information on these and how the Norwegian residential building stock perform today.

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[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 primary energy factors, and b) an exclusion of energy demand related to lighting and technical equipment.

[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/

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 to the NZEB definition are 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.). Figure 7 describes how the limit values are dependent on the area of the dwelling. The building codes

[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

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 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	

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 m², a single apartment of 65 m² and an apartment building of 2000 m². 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.

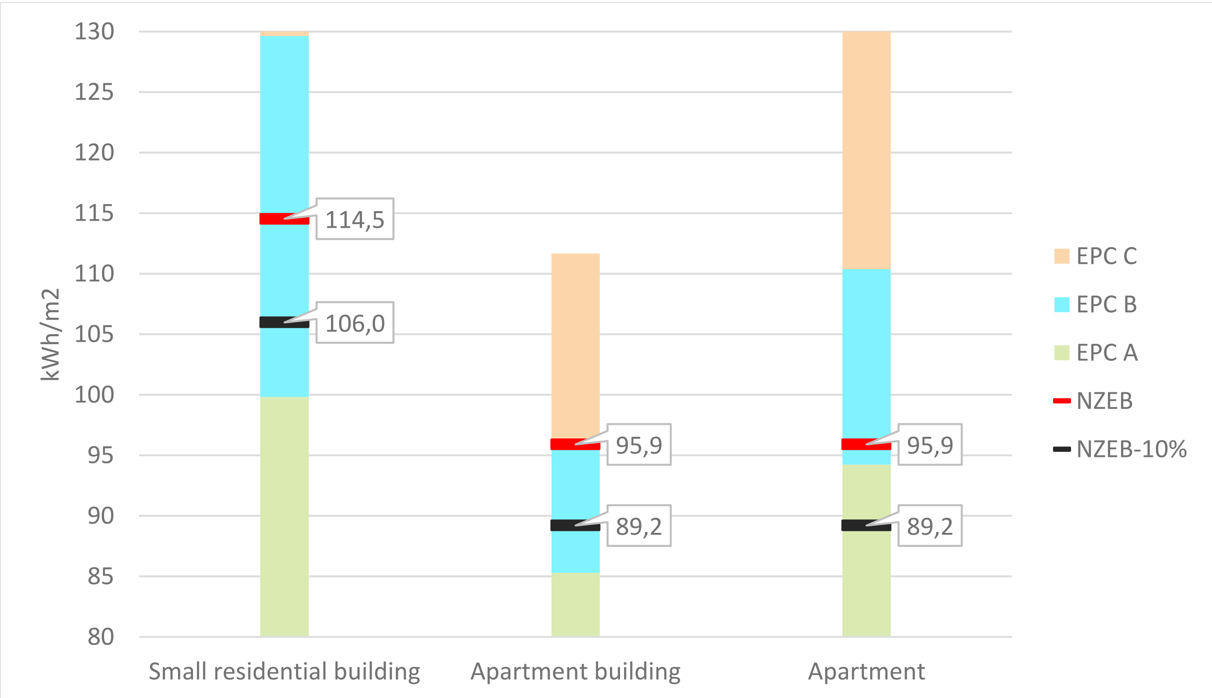

Figure 2 Energy performance with reference to the national definition of NZEB and NZEB-10% compared to limit values in the EPC system (values dependent on dwelling area)

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			
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			
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 the 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 follows:

Calculate the building specific NZEB limit value based on building area	
$(76 + 1600/m^2)$ kWh/m^2	Example 160 m^2 dwelling: 86 kWh/m^2

↓

NZEB-10%	
$(76 + 1600/m^2) * 0.9$	77.4 kWh/m^2

↓

Add technical equipment and lighting	
$((76 + 1600/m^2) * 0.9 + 28.9)$ kWh/m^2	106.3 kWh/m^2

↓

Compare to specific delivered energy demand retrieved from the EPC database

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.

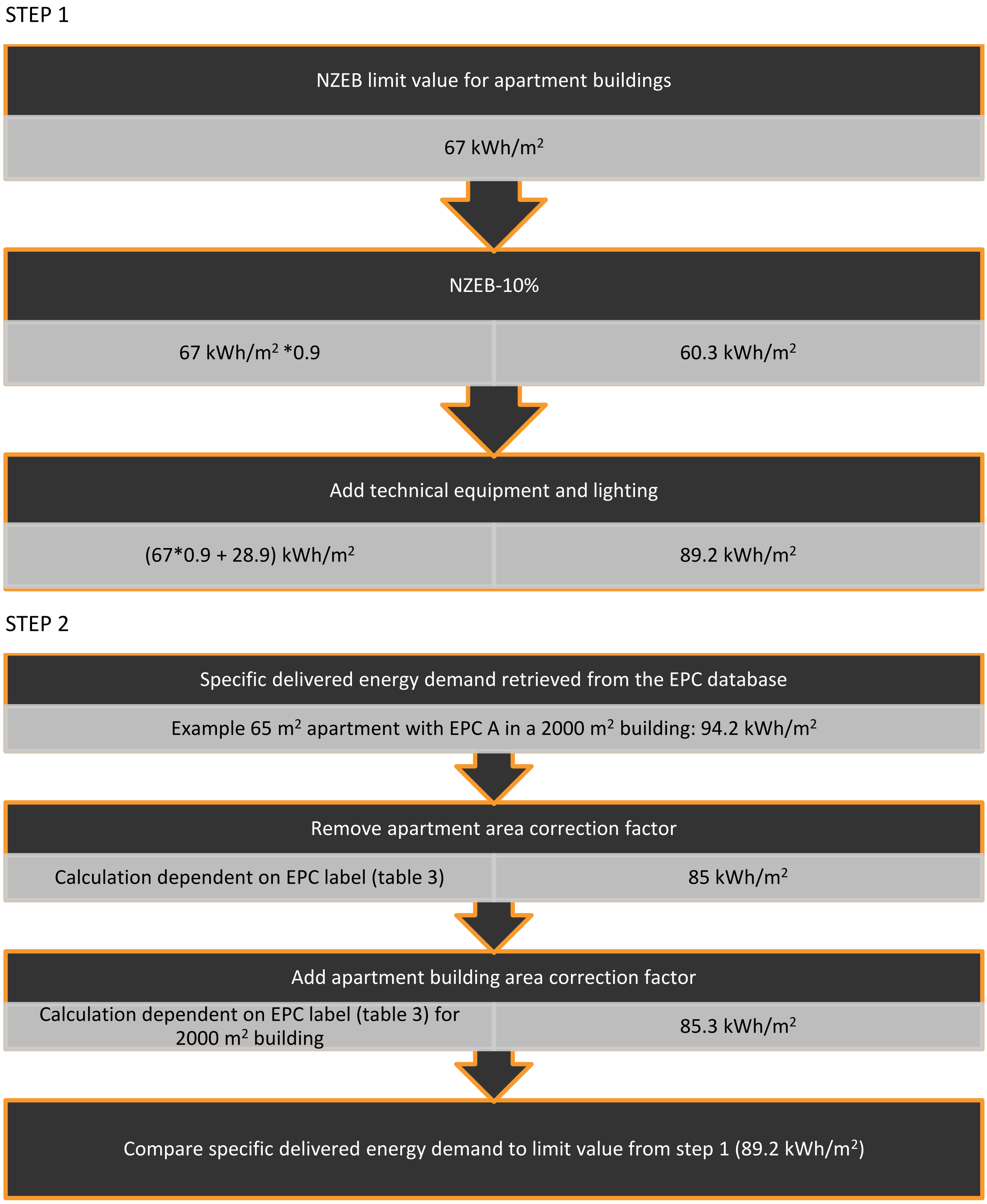

Figure 4 How to compare NZEB-10% to specific energy demand from the EPC system for apartments

Before the new NZEB-10% criteria were defined for Norwegian buildings, new residential buildings qualified due to the building code criterion as they were built according to TEK17. Due to the new criteria, the bank is no longer including TEK17 buildings in the green pool originated in the portfolio post 31/01/2023. Loans originated before this date are grandfathered.

2.2 Top 15% Residential buildings - criteria for buildings finished before January 1st 2021

The Sparebanken Vest eligibility criteria for existing residential buildings are based on building code and on Energy Performance Certifications.

2.2.1 Building code criterion

i. Buildings complying with TEK10 & TEK17 building codes (built ≥2012)

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).

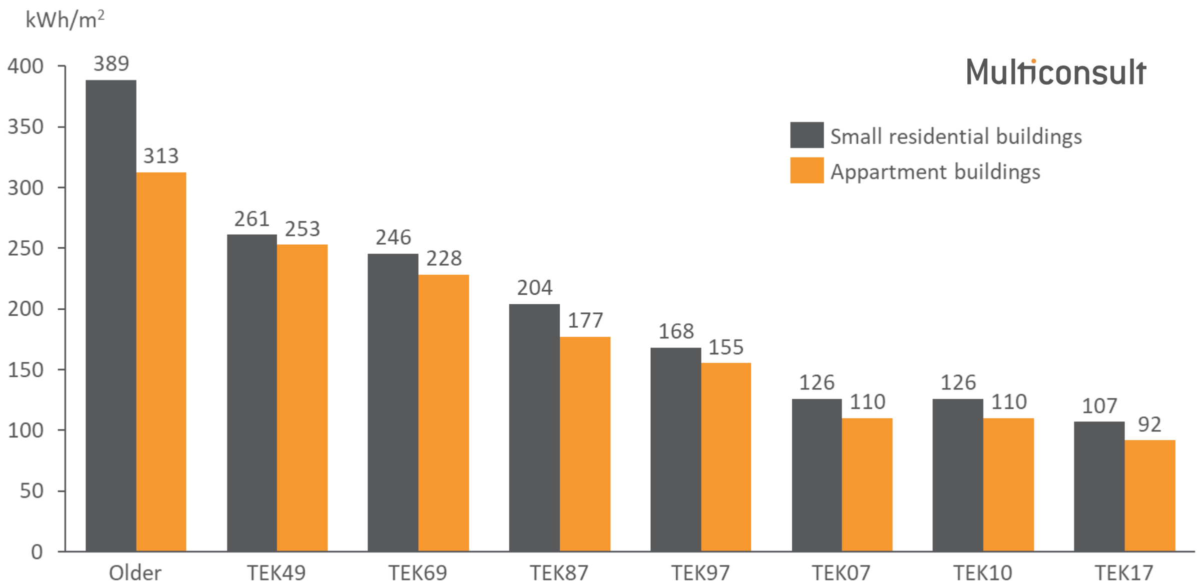

Figure 5 Development in calculated specific net energy demand based on building code and building tradition, (Multiconsult, simulated in SIMIEN)

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.

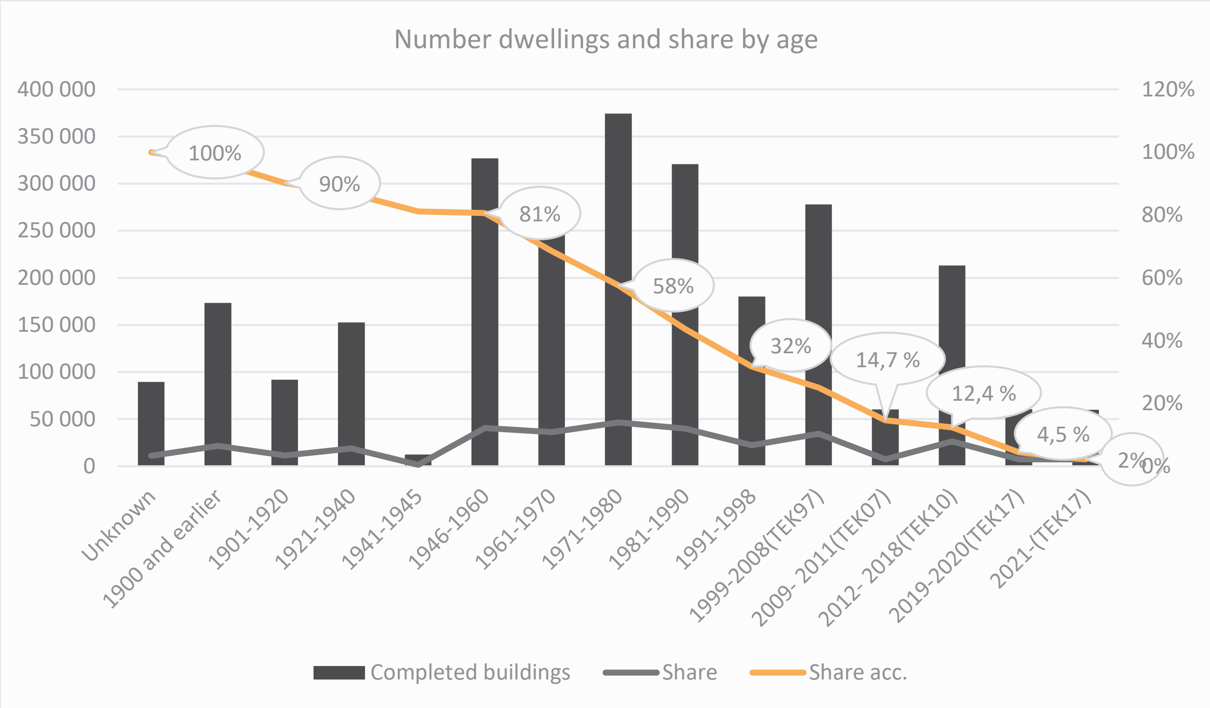

Figure 6 Age and building code distribution of dwellings (Statistics Norway and Multiconsult)

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/m^2. Building code TEK10 and TEK17 give 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 decided to tighten 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 (reflecting the top 15%)

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 dwellings would have a B or better.

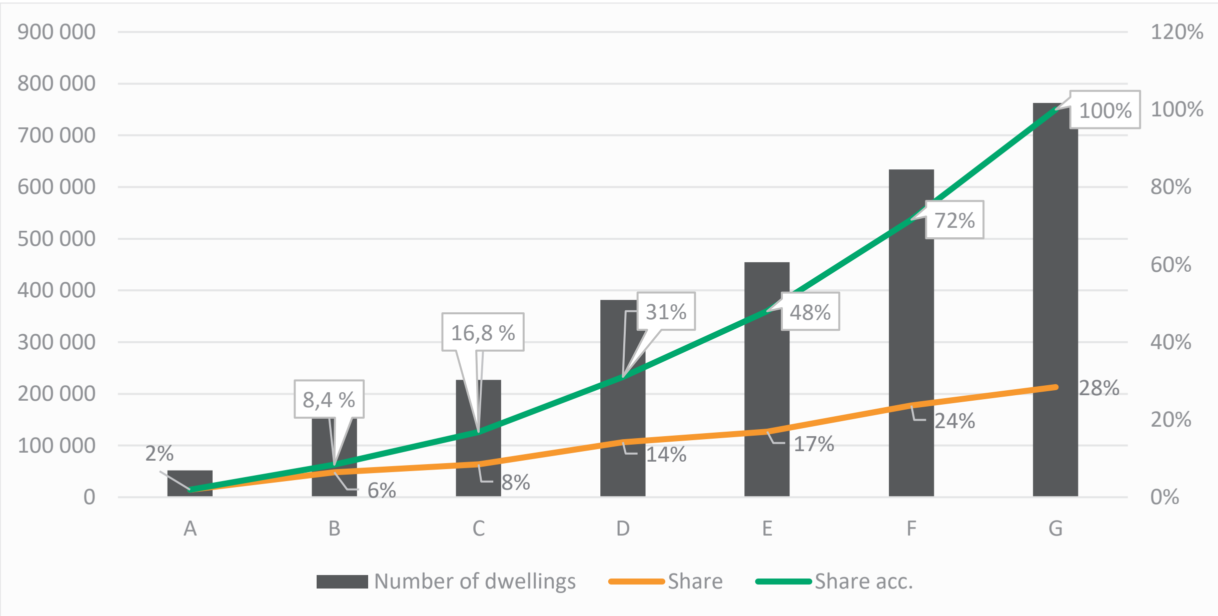

Figure 8 EPCs extrapolated to include the whole residential building stock (Source: energimerking.no Jan23 and Statistics Norway Apr23, Multiconsult)

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 8.4 % 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 (FY21), relative to the total residential building stock in Norway

2.3 Impact assessment - Residential buildings

The 14 700 eligible residential buildings in Sparebanken Vest's portfolio are estimated to amount to almost 2 million square meters. Area is available from the bank for most objects in the portfolio. For objects where it is missing, 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]
NZEB-10% criterion	Apartments	105	7,150
	Small residential buildings	65	13,034
Both building code and EPC criteria	Apartments	4,857	359,106
	Small residential buildings	6,102	1,114,616
Grandfathered all criteria	Apartments	1,346	96,319
	Small residential buildings	2,202	385,348
	Total	**14,677**	**1,975,573**

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 includes also bio energy and district heating, resulting in a total specific factor of 110 gCO_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.

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

	Area [m²]	Avoided energy compared to baseline [GWh/yr]	Avoided CO_2-emissions compared to baseline [ton CO_2/yr]
Buildings eligible under the NZEB criterion	20,184	0.3	38
Grandfathered under the NZEB criterion	211,643	29	3,186
Buildings eligible under the building code criterion	1,270,315	173	19,122
Grandfathered under the building code criterion	54,819	7	825
Buildings eligible under the EPC criterion	203,407	21	2,350
Grandfathered under the EPC criterion	215,205	16	1,751
Total impact eligible buildings	**1,975,573**	**247**	**27,271**
Impact scaled by bank's engagement		**136**	**15,063**

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

3 Energy efficient commercial buildings

3.1 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.

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 indicate specific energy demand when made comparable to building code and EPC system.

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

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.

3.1.1 *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 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 to the NZEB definition are 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.

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

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 are not stated whether it include all local power demand or only the demand included in the NZEB-definition. The thresholds in Figure 9 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.

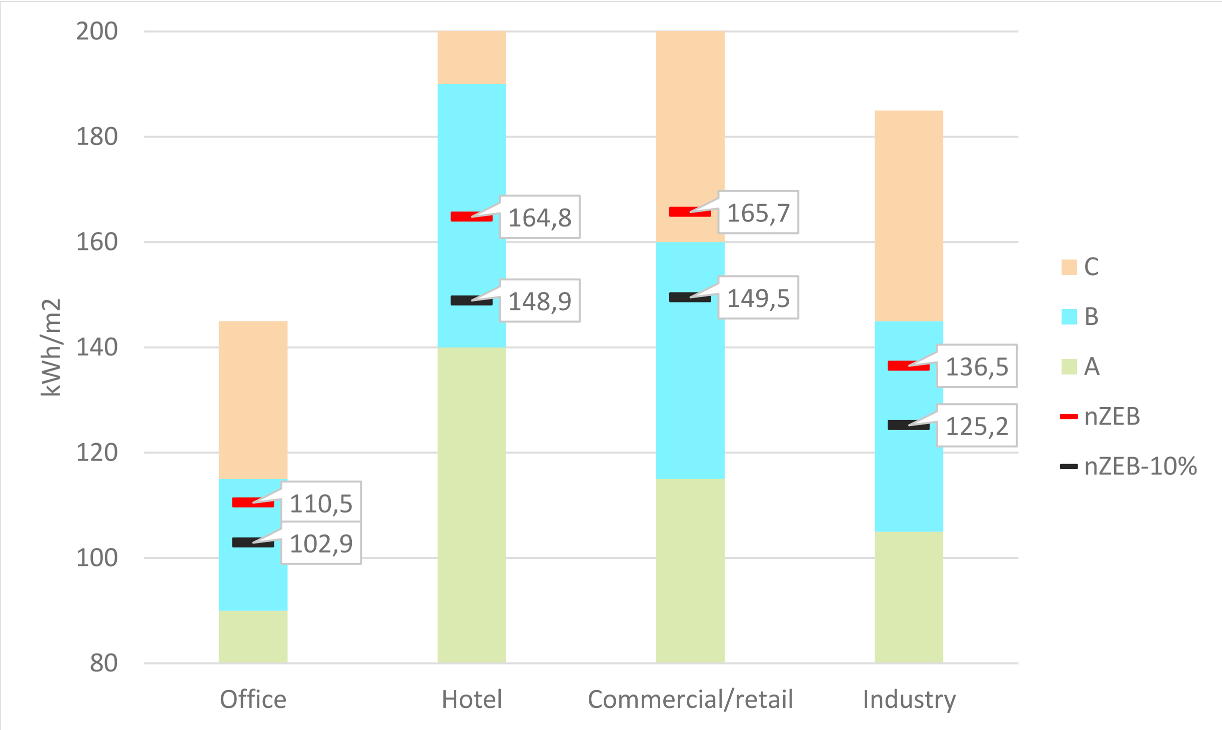

Figure 9 Energy performance with reference to the national definition of NZEB and NZEB-10% compared to limit values in the EPC system- Commercial buildings

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

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

Before the new NZEB-10% criteria were defined for Norwegian buildings, new commercial buildings qualified due to the building code criterion as they were built according to TEK17. Due to the new criteria, the bank is no longer including TEK17 buildings in the green pool originated in the portfolio post 31/01/2023. Loans originated before this date are grandfathered.

3.2 Top 15% Commercial buildings- criteria for buildings finished before January 1st 2021

The Sparebanken Vest 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% low carbon buildings in Norway:

i. Hotel and restaurant buildings complying with the Norwegian building code TEK10 and later building codes. Hence, built after 2013.

ii. Office, retail and industrial buildings and warehouses complying with the Norwegian building TEK10 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 in the last years, are now past 15%. This indicates the need to move the criterion for this sub-category. Figure 10 illustrates how TEK10 and younger buildings, for the four commercial buildings sub-categories, as of 2023 amount to 12.8% of the total Norwegian buildings of these categories.

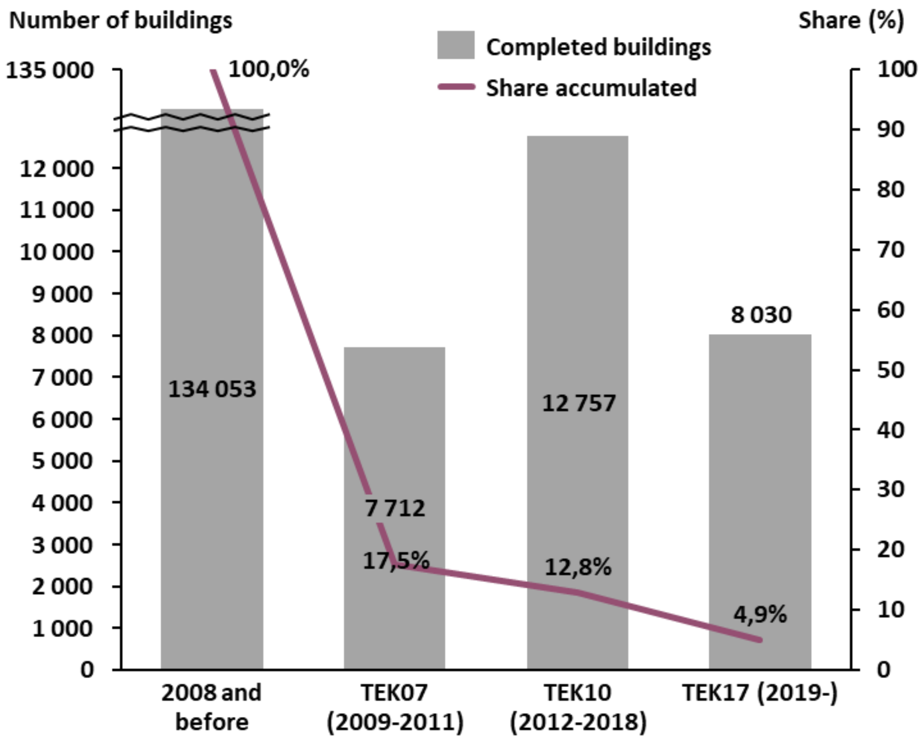

Figure 10 Age and building code distribution of commercial buildings, four major sub-categories (Statistics Norway and Multiconsult)

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.

3.2.2 EPC criterion

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.

3.2.3 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.

3.3 Impact assessment - Commercial buildings

The 388 eligible buildings in Sparebanken Vest’s portfolio are estimated to amount to 175,625 square meters. The bank has specific data on assets including area and building category. Table 11 indicates the number of objects and the area of each building category making basis for the following impact assessments.

Table 11 include information on the number of qualifying objects and the building area for commercial buildings in the bank’s portfolio.

	Building category	Number of units	Area qualifying buildings in portfolio [m^2]
NZEB-10% criterion	Office buildings	1	365
	Commercial buildings	0	0
	Hotel buildings	0	0
	Small industry and warehouses	0	0
Both building code and EPC criteria	Office buildings	145	51,715
	Commercial buildings	51	37,030
	Hotel buildings	2	3,400
	Small industry and warehouses	51	17,555
Grandfathered under all criteria	Office buildings	63	22,155
	Commercial buildings	39	29,455
	Hotel buildings	1	1,700
	Small industry and warehouses	35	12,250
	Total	**388**	**175,625**

Table 11 Eligible objects and calculated building areas

As for residential buildings, the specific emission factor of energy used in buildings is set at 110 gCO_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]	Avoided energy compared to baseline [GWh/year]	Avoided CO_2-emissions compared to baseline [tons CO_2/year]
Buildings eligible under the NZEB criterion	365	0.0	1
Grandfathered under the NZEB criterion	33,300	4.6	507
Buildings eligible under the building code criterion	100,150	10.9	1,199
Grandfathered under the building code criterion	32,260	2.7	299
Buildings eligible under the EPC criterion	9,550	0.9	96
Total impact eligible buildings	**175,625**	**19.1**	**2,102**
Impact scaled by bank's engagement		**10.3**	**1,138**

Table 12 Performance of eligible objects compared to average building stock

4 Renewable energy

Hydropower has played a significant role in Norway's power production since the industrial revolution. Today, hydropower remains a crucial component of the national energy mix, accounting for 88% of the national electricity production in 2022[10]. The same year, onshore wind accounted for 10% of the national power production.

Power production development in Norway is strictly regulated and subject to licensing 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 on different kind of projects[11].

Data about the assets is available from NVE as all assets are subject to licensing.

4.1 Eligibility

New or existing hydropower in the bank's portfolio qualify if they meet one of the following criteria:

- the electricity generation facility is a run of river plant and does not have an artificial reservoir
- the power density of the electricity generation facility is above $5W/m^2$
- the lifecycle emissions from the generation of the electricity from hydropower are lower than 100g CO_2e/Kw

The main eligibility criteria are in line with the CBI criteria and the EU Taxonomy. For Norwegian hydropower these criteria are easily fulfilled and most assets overperform radically.

- All run-of-river power stations have negligible negative impact on GHG emissions.
- 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.

Climate Bonds Initiative (CBI) hydropower eligibility criteria[12] was updated in 2021. These criteria have a mitigation component and an adaptation and resilience component. The mitigation component for existing plants in operation before 2020 requires power density > 5 W/m^2 or emission intensity < 100 gCO_2e/kWh. However, for plants set in operation later, CBI has stricter criteria with the thresholds 10 W/m^2 and 50 gCO_2e/kWh. The adaptation and resilience component, addressing ESG, is in the Norwegian context covered by the rigid relevant requirements in the Norwegian regulation of hydropower.

The eligibility criteria mentioned above are central also in the EU taxonomy. Most *do no significant harm* (DNSH) requirements are covered by current national regulation of hydropower, however, with exemptions. Portfolio alignment with DNSH requirements has not been assessed.

[10] https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet/artikler/betydelig-nedgang-i-stromforbruket-i-2022
[11] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[12] https://www.climatebonds.net/files/files/Hydropower-Criteria-doc-March-2021-release3.pdf

4.2 Eligible assets in portfolio

Sparebanken Vest's eligible assets have low to negligible GHG emission related to operation of the renewable power plants, something Multiconsult can verify.

Multiconsult has investigated all 66 hydropower plants where Sparebanken Vest's is directly financing specific hydropower plants. Of these, 65 are run-of-river plants with capacity below 10 MW, and one medium sized 25 MW plant. The bank also finances pure play companies where specific power plants are not identified. A random sample of these portfolios indicate the same picture where most assets are run-of-river. A few have reservoirs, however they are existing lakes with some regulation capacity and area of impoundment are small.

Based on the map service NVE Atlas[13], artificial reservoirs and plant specific impounded area may be identified, and power density calculated (ratio between capacity and impounded area). Due to data availability, lifecycle emissions of the plants are not calculated.

The investigation is made with rough, but very conservative area estimations, and findings indicate eligibility by a significant margin. For run-of-river plants a dummy value of 100 m^2 impounded area is used. Where the intake is in a lake with no indicated impounded area in the data source, an impounded area is set at 1,000 m^2.

100% of the plants have power density >5000 W/m^2

97% of the plants have power density >1000 W/ m^2

86% of the plants have power density >500 W/ m^2

All 66 hydropower plants in the portfolio identified in the NVE Hydropower Database[14] are eligible according to the banks criteria. This investigation also confirms that the plants are eligible according to CBI's strictest power density criterion (power density >10 W/ m^2).

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 Sparebanken Vest 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[15], 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.

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[16] 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

[13] https://atlas.nve.no/Html5Viewer/index.html?viewer=nveatlas#
[14] https://www.nve.no/energi/energisystem/vannkraft/vannkraftdatabase/
[15] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/
[16] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf

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.

4.3.2 Power production estimates

The renewable energy power plants in Sparebanken Vest'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 Sparebanken Vest's criterion – New or existing Norwegian renewable energy plants

The eligible plants in Sparebanken Vest's portfolio are estimated to have the capacity to produce about 483 GWh per year. The available data from the bank and in open sources include:

- Type of plant (run-of-river/reservoir)
- Installed capacity
- Production estimated/recorded
- Age

	Capacity [MW]	# of plants	Total capacity [MW]	Expected production [GWh/yr]
Small hydropower facilities	0.1 - 25	66 (of which 65 <10MW)	162	483

Table 13 Capacity and production of eligible hydropower plants and expected production

Table 14 summarises the expected renewable energy produced by the eligible assets in the portfolio in an average year, and the resulting avoided CO_2-emissions the energy production results in. The scaled impact assumes the share of financing to be unchanged on a portfolio level from the previous years.

	Expected produced power	Reduced CO_2-emissions compared to baseline
Identified eligible hydropower plants in portfolio	483 GWh/year	62,751 tons CO_2/year
Impact scaled by share of financing	232 GWh/year	30,120 tons CO_2/year

Table 14 Power production and estimated positive impact on GHG-emissions

Sparebanken Vest Green Portfolio Impact Reporting
Q1 2023

Portfolio date: End of March 2023

Eligible Project Category		**Signed Amount**	**Share of Total Financing**	**Eligibility for Green Bonds**	**Annual Site Energy Savings**	**Annual Site Renewable Energy Production**	**Annual CO2 Emission Avoidance**
a/		**b/**	**c/**	**d/**	**e/**	**e/**	**e/**
Residential Green Buildings		**NOK**	**%**	**%**	**MWh**	**MWh**	**tCO2**
Green residential buildings in Norway	Sparebanken Vest Boligkreditt (Covered bonds)	22 411 611 585	59	100	106 726		11 789
	Sparebanken Vest (Senior bonds)	6 531 714 673					
Grandfathered green residential buildings pre NZEB-definition	Sparebanken Vest Boligkreditt (Covered bonds)	3 355 393 472	71	100	18 511		2 045
	Sparebanken Vest (Senior bonds)	1 897 773 952					
Grandfathered green residential buildings TEK07	Sparebanken Vest Boligkreditt (Covered bonds)	557 593 991	53	100	3 586		396
	Sparebanken Vest (Senior bonds)	62 805 381					
Grandfathered green residential buildings EPC C	Sparebanken Vest Boligkreditt (Covered bonds)	2 822 735 648	53	100	7 538		833
	Sparebanken Vest (Senior bonds)	395 770 761					
Green commercial buildings in Norway							
Green commercial buildings in Norway	Sparebanken Vest (Senior bonds)	4 948 638 559			6 144		676
Grandfathered commercial buildings pre NZEB-definition	Sparebanken Vest (Senior bonds)	687 986 929	55	100	2 862		315
Grandfathered commercial buildings TEK07	Sparebanken Vest (Senior bonds)	647 520 366			1 342		148
Renewable energy							
	Sparebanken Vest (Senior bonds)	1 802 941 352	48	100		231 696	30 120
Total		**46 122 486 670**			**146 709**	**231 696**	**46 322**

Portfolio based green bond report according to the Harmonized Framework for Impact Reporting

a/ Eligible category
b/ Signed amount represents the amount legally committed by the issuer for the portfolio or portfolio components eligible for Green Bond financing
c/ This is the share of the total portfolio cost that is financed by the issuer
d/ This is the share of the total portfolio costs that is Green Bond eligible
e/ Impact indicators
-Site energy savings calculated using the difference between the top 12% of buildings and the national building stock bechmarks
-Annual CO2 emission avoidance