Report

Sparebanken Norge Green Portfolio Impact Assessment 2025

CLIENT

Sparebanken Norge

SUBJECT

Impact assessment – energy efficient residential buildings, commercial buildings and renewable energy

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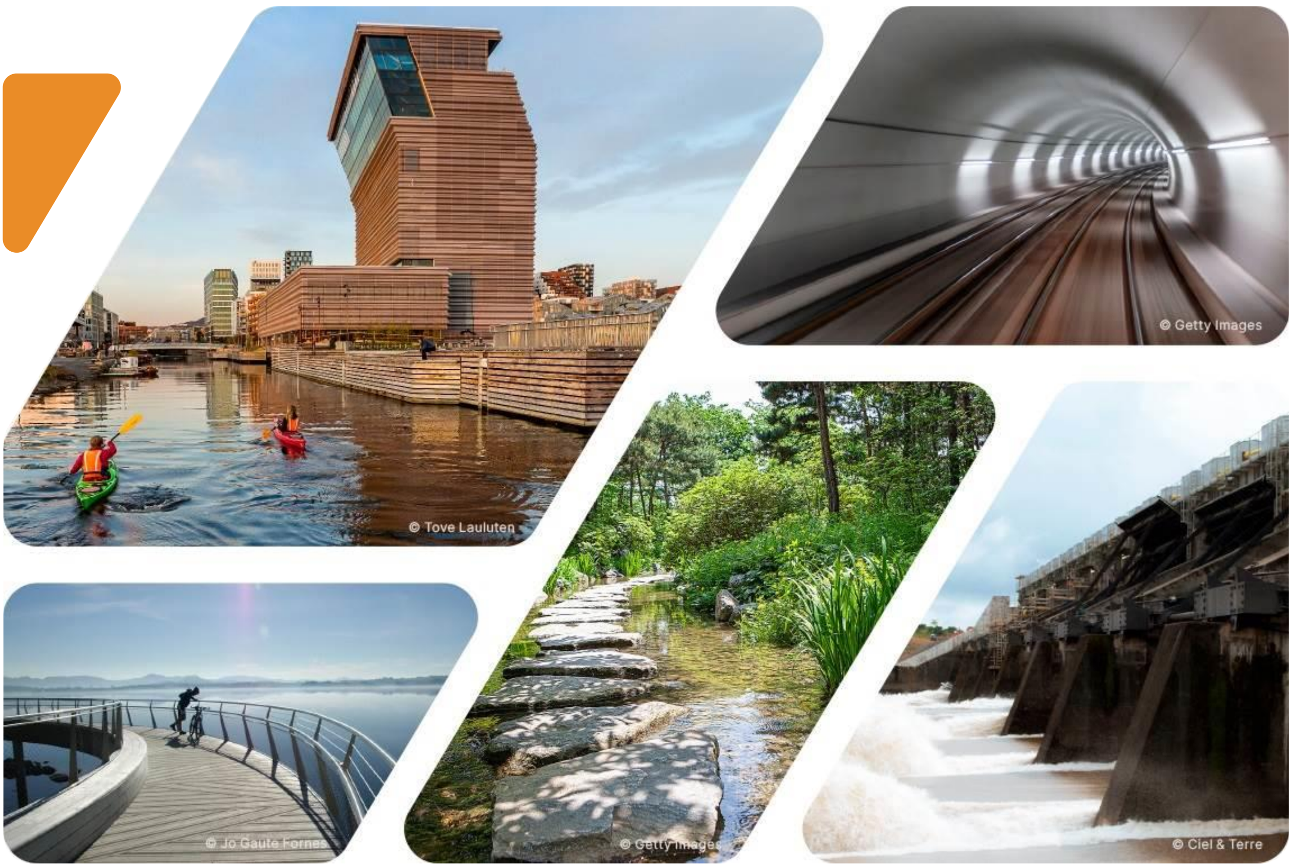

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SUMMARY

In summary, the assessed impact is significant for all examined asset classes in Sparebanken Norge's portfolio, which qualify according to the bank's green bond criteria.

The total impact of the assets in the portfolio is estimated to 188,000 tonnes *CO_2-eq*/year (rounded '000):

Energy efficient residential buildings	*45,000 tonnes CO_2-eq/year*
Energy efficient commercial buildings	*2,000 tonnes CO_2-eq/year*
Renewable energy	*141,000 tonnes CO_2-eq/year*
Total	***188,000 tonnes CO_2-eq/year***

When scaled by the bank's share of financing, the impact is estimated to 56,000 tonnes CO_2-eq/year (rounded '000):

Energy efficient residential buildings	*23,000 tonnes CO_2-eq/year*
Energy efficient commercial buildings	*1,000 tonnes CO_2-eq/year*
Renewable energy	*32,000 tonnes CO_2-eq/year*
Total	***56,000 tonnes CO_2-eq/year***

00	03.10.2025	Draft	Multiple authors	AREG	KJRK
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1 Introduction

On assignment from Sparebanken Norge, Multiconsult has assessed the impact of the bank's loan portfolio eligible for green bonds.

In this document we briefly describe Sparebanken Norge's green bond qualification criteria, the evidence for the criteria and the analysis results of the loan portfolio. More detailed documentation on methodologies and eligibility criteria is made available on Sparebanken Norge's website[1].

1.1 Electricity demand and production

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

Renewables account for approximately 99 percent of the total Norwegian electricity production, the final percentage being thermal power production from natural gas, biomass, and waste heat[2]. Figure 1-1, which is based on numbers from the Association of Issuing Bodies, shows that the Norwegian production mix in 2024 resulted in emissions of 7 gCO_2/kWh. In the figure, the production mix is included for other selected European states for comparison.

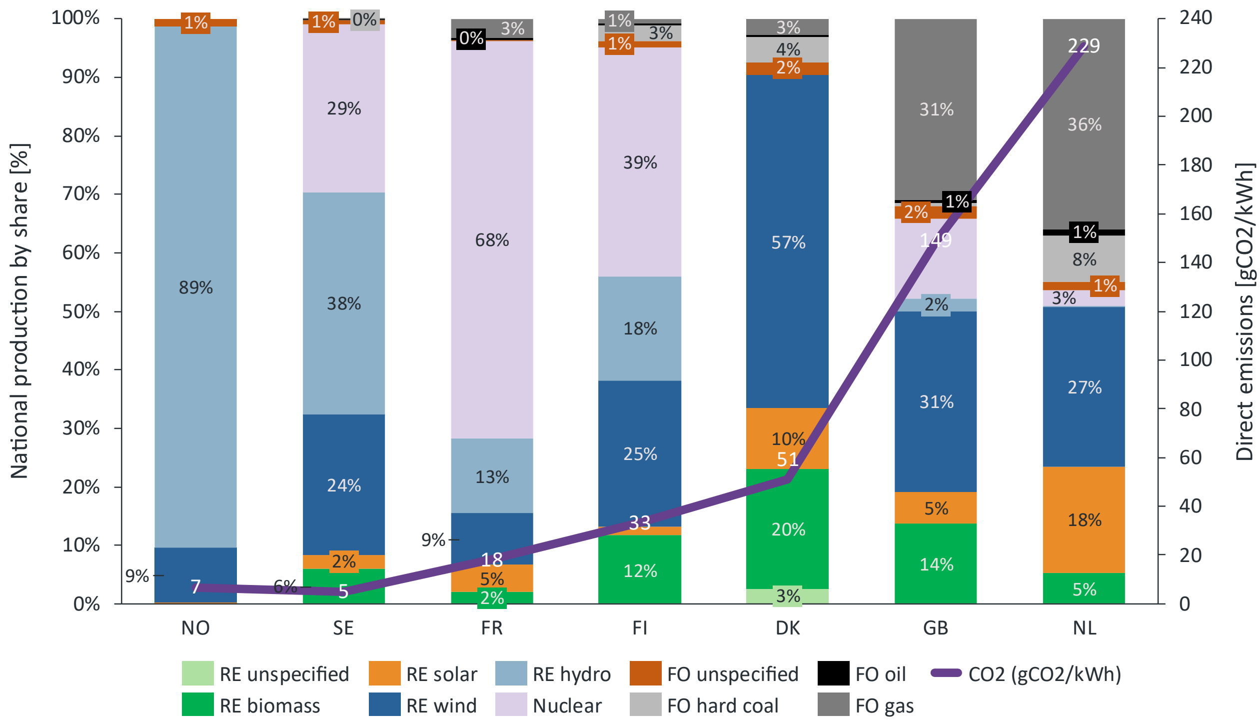

Figure 1-1 National electricity production mix in some selected countries (Source: European Residual Mixes 2024, Association of Issuing Bodies[3]).

[1] https://www.spv.no/english/investor-relations/green-bond-programme
[2] Statistic Norway Table 08307: Production, imports, exports and consumption of electric energy: https://www.ssb.no/en/statbank/table/08307
[3] https://www.aib-net.org/facts/european-residual-mix, 2025

As Figure 1-1 shows, emissions from power production vary between countries. Due to the interconnection of the power grid, the placement of the system boundary for power production heavily influences the greenhouse gas (GHG) emission factor associated with said production. To demonstrate how the choice of system boundary between Norway only or Europe as a whole, and the type of emission factor, influences the results, the impact assessments are presented here based on several emission factors.

1.2 Emission factors for energy efficient buildings

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

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

Finans Norge released a guidance document for the calculation of financed GHG emissions in 2023, including recommendations for grid factors to be used[4]. To demonstrate how emissions vary depending on grid factor, the two recommended grid factors from the Norwegian Water Resources and Energy Directorate (NVE) are included. That is, the most recent Norwegian physically delivered electricity for 2024[5] and the Norwegian residual mix for 2024[6]. The Norwegian residual mix is calculated by the Association of Issuing Bodies, which is the organization responsible for developing and promoting the European Energy Certificate System (EECS)[7].

The grid factors are summarized in Table 1-1 below and described in more detail in the following sub-sections.

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

[4] https://www.finansnorge.no/dokumenter/maler-og-veiledere/veileder-for-beregning-av-finansierte-klimagassutslipp/, 2024
[5] https://www.nve.no/energi/energisystem/energibruk/stroemdeklarasjoner/, 2025
[6] https://www.aib-net.org/facts/european-residual-mix/2024, 2025
[7] https://www.aib-net.org/, 2025

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

Scenario	Description	Emission factor electricity [gCO_2/kWh]	Emission factor incl. other heating sources [gCO_2/kWh][8]
European (EU27+ UK+ Norway) NS 3720:2018 electricity mix	Location-based electricity mix with wide system boundary including EU countries, UK and Norway, average emissions over building's 60-year lifetime	136	115
Norwegian NVE physically delivered electricity 2024	Location-based production mix with narrow system boundary of Norway only but including net export/ import only to neighbouring countries and average annual emission factors	12	13
Norwegian NVE residual mix 2024	Market-based residual mix for Norway with a European marketplace	535	443

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

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

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

Norway is part of a larger, integrated European power grid, and import and export of electricity throughout the year means not all electricity consumed in Norway is produced here. The standard also calculates the equivalent Norway only emission factor. Using the European mix instead of the Norway only mix, is then a more conservative approach.

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

1.2.2 Norwegian physically delivered electricity 2023

NVE calculates a climate declaration for physically delivered electricity for the previous year[9]. This factor represents electricity consumed in Norway, accounting for emissions from net import and export of electricity from neighbouring countries and these countries' average annual emission factors. The most recent grid factor is 13 gCO_2-eq/kWh for 2023[9].

[8] Multiconsult. Based on building code assignments for DiBK, 2015.
[9] https://www.nve.no/energi/energisystem/energibruk/stroemdeklarasjoner/, 2025

1.2.3 Norwegian residual mix 2023

Certificates of origin, direct power purchase agreements or other documentation of which power has been purchased for the buildings in the portfolio, are not available to the bank. There is also no basis for making assumptions on the share of the energy consumed by the buildings in the portfolio that has been purchased with Guarantees of Origin. An alternative market-based grid factor for Norway is then the electricity disclosure published by NVE[10] and Association of Issuing Bodies[11]. This is the electricity residual mix of the country, which shows the sources of the electricity supply that is not covered with Guarantees of Origin, considering a European marketplace for electricity. Guarantees of Origin are not very widespread in the Norwegian electricity end-user market, resulting in a high emission factor of 535 gCO_2-eq/kWh for 2023[11].

1.3 Emission factors for renewable energy production

For renewable energy, the impact calculations use the electricity emission factors from Table 1-1 as baselines. The difference between the renewable energy and the grid electricity emissions is considered the avoided emissions per produced unit of electricity. The location-based mix for Europe have been used in previous analyses, and the location-based and market-based mixes for Norway are introduced for comparison. The resulting factors are described more in subsection 4.3.1.

1.4 Upcoming changes in the Norwegian authorities' regulations on the energy efficiency of buildings

Major changes in the Energy Performance Certificate (EPC) scheme will come into force on January 1, 2026. Changes from the current scheme consist of the introduction of a new Norwegian standard for energy calculations NS 3031:2025 including updated climate data. Furthermore, the energy rating will henceforth be based on calculated weighted delivered energy. Bioenergy, district heating and district cooling are weighted by 0.45 and are more favourable than before. The new rating scale is currently unknown, so we do not know how it will compare to the current rating scale, cf section 2.1.3.

Furthermore, the Norwegian Ministry is in the process of developing new energy requirements in the building code (TEK). This will also introduce the new NS 3031:2025 and the aforementioned weighting factors for energy sources. We do not know at present whether or how much the energy requirements will be tightened. It is currently uncertain when they will be completed and come into force. Probably summer 2026 at the earliest. However, it is expected that a revised national NZEB definition will be released at the same time, which will be based on the new energy requirements that include weighting of energy sources.

[10] https://www.nve.no/energi/energisystem/energibruk/stroemdeklarasjoner/, 2025
[11] https://www.aib-net.org/facts/european-residual-mix/2024, 2025

2 Residential buildings

2.1 Eligibility criteria

According to Sparebanken Norge's Green Finance Framework, residential buildings in Norway qualify for green bonds if they meet one of the following criteria:

i. Buildings built in 2021 or later: NZEB-10 percent

Residential buildings complying with the relevant NZEB-10 percent threshold.

ii. Buildings built before 2021: EPC A label or within the top 15 percent low carbon buildings in Norway

Residential buildings with EPC labels A or B or complying with building code TEK10 and later codes.

iii. Refurbished residential buildings with an improved energy efficiency of 30 percent

Renovation of existing residential buildings resulting in a reduction of primary energy demand (PED) by at least 30 percent.

2.1.1 Buildings built in 2021 or later: NZEB-10 percent

The EU Taxonomy for sustainable activities distinguishes between new and existing buildings, with criteria dependent on whether the buildings are completed before or after 31 December 2020. The technical screening criteria for new buildings require the buildings to have an energy performance, described in terms of primary energy demand, at least 10 percent lower than the threshold set in the national definition of a nearly zero-energy building (NZEB). The energy performance is to be documented by an 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 based on the Norwegian NZEB definition. The Norwegian national definition of NZEB was published in January 2023[12] with a correction issued in January 2024[13].

All residential buildings completed after 31 December 2020 with an EPC label A qualify according to the NZEB-10 percent criterion. Residential buildings with an EPC label B may also qualify, depending on energy demand.

2.1.2 Buildings built before 2021: EPC A label or within the top 15 percent low carbon buildings in Norway

Existing Norwegian residential buildings with EPC labels A or B and Norwegian residential buildings that comply with the Norwegian building code of 2010 (TEK10) and later codes are eligible for green bonds. These buildings have significantly better energy standards and account for less than 15 percent of the residential building stock built before 2021. A two-year time lag between the implementation of a new building code and the buildings built under that code is taken into account.

[12] https://www.regjeringen.no/no/aktuelt/taksonomien-maler-for-rapportering-og-retting-av-veiledning-om-primarenergifaktorer/id3021759
[13] https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158

Figure illustrates how the criteria, in combination, make up cumulative percentages of the total residential building stock built before 2021 in Norway. Buildings with EPC A represent 1.1 percent; Buildings with EPC A and EPC B represent 7 percent; Buildings with EPC A and EPC B and buildings that comply with TEK17 represent 7.8 percent. TEK10 and newer in combination with A+B labels represent 11.9 percent; EPC A+B+C labels represent 15.2 percent of the total residential building stock built before 2021 in Norway, and so forth. The calculation precludes double-counting – each building is only counted once in the analysis.

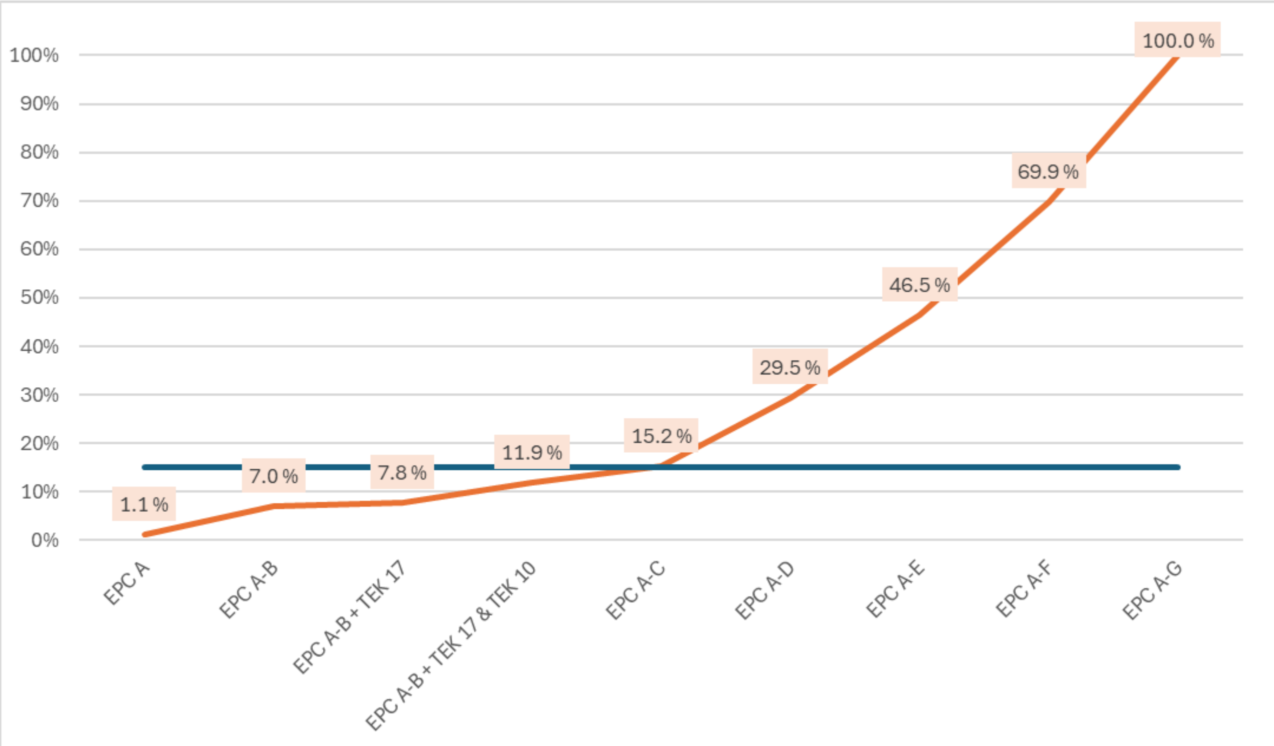

Figure 2-1 Cumulative percentages for criteria combinations, relative to the total residential building stock built before 2021 in Norway

2.1.3 The Norwegian Ministry's top 15 percent guidance publication and how this translates to the current EPC A+B & TEK10/17 methodology

On June 6, 2025, the Norwegian Ministry of Energy published thresholds for the top 15 and 30 percent most energy-efficient buildings in the Norwegian building stock within various building categories. The threshold values, however, are for most building categories much stricter than those proposed by NVE and the calculations in Norconsult's report prepared for NVE. This indicates an error in the calculations or in the publication. NVE says that the threshold values will most likely be corrected by the end of the year 2025. Knowing this, we should wait for the corrected threshold values to be published. It is hence not purposeful at this stage to compare the Norwegian Ministry's top 15 percent guidance thresholds with the current EPC A+B & TEK10/17 methodology, cf section 2.1.2 and 3.1.2.

The threshold values take into account new rules on the method for calculating energy performance in the EPC scheme that will come into force on 1 January 2026, cf section 1.4. This includes the new NS 3031:2025, updated climate data, and calculation of weighted delivered energy where bioenergy, district heating and district cooling are weighted by 0.45. This means that these threshold values can only be used against buildings that have been issued a new EPC in accordance with the new EPC scheme after 1 January 2026. For buildings that have an EPC issued before 1 January 2026, we need to convert the threshold values to align with the old EPC scheme. Therefore, the banks will need to share the EPC's date of issue in their portfolio to determine whether an EPC was issued under the old or the new regulation and apply the corresponding threshold values.

When using the corrected threshold values to come, it would be best if the banks could share not only the EPC itself (A, B, C, etc), but also the value of the calculated weighted delivered energy, so that it can be compared directly with the threshold values. If not possible for the banks to provide this, we must find new rules to apply, based on EPC and building codes, that equal the top 15 percent thresholds. In order to do this, we need to redo the calculations for TEK10 and TEK17 in accordance with the new EPC scheme. Please note that there must be a different set of rules to apply depending on whether the building has an EPC from the old or new EPC scheme.

2.1.4 Renovation of existing residential buildings

Refurbished Norwegian residential buildings are eligible if they demonstrate at least a 30 percent improvement in energy efficiency, measured in specific energy (kWh/m^2), compared to the calculated baseline based on the building code applicable in the year of construction.

Buildings qualify under this criterion if, following renovation, they achieve an energy grade of C or D, which corresponds to the required improvement threshold. Eligibility is determined by comparing the achieved energy label with the estimated building code standard (TEK) for the year of construction.

2.2 Impact assessment – residential buildings

Over the past several decades, changes in the building code have promoted more energy-efficient buildings. By combining data on calculated energy demand based on building code requirements with information on the residential building stock, the average specific energy demand is estimated at 257 kWh/m^2 for small residential buildings and 200 kWh/m^2 for apartments. These estimates are used as baselines in the impact calculations for the NZEB and top 15 percent criteria.

For buildings qualifying according to the NZEB-10 percent, the reduction is calculated based on the difference between the calculated specific energy usage of each unit and the baseline.

For buildings qualifying according to the EPC criterion, the reduction is calculated based on the difference between the energy demand for the achieved energy label and the baseline.

For buildings qualifying according to the building code criterion, the reduction is calculated based on the difference between the energy demand for the building code and the baseline.

For buildings qualifying according to the refurbishment criterion, the reduction is calculated based on the difference between the energy demand for the building code standard and the achieved EPC label after the renovations.

The eligible residential buildings in Sparebanken Norge's portfolio are estimated to amount to 3.1 million square meters. The available data includes reliable areas for most objects. For objects where this data is not available, the area per dwelling is calculated based on the average area derived from national statistics[14].

Eligibility is first checked against the NZEB-10 percent criterion for buildings built in 2021 or later. Buildings from 2020 and older are first checked against the top 15 percent criterion and then, if relevant,

[14] Statistic Norway Table 06513: Dwellings, by type of building and utility floor space: https://www.ssb.no/en/statbank/table/06513

against the refurbishment criterion. An object is only qualified based on the first criterion it fulfils, hence, no double-counting of objects will occur.

As shown in Table 2-1 the majority of the 21,981 objects are eligible through the top 15 percent criterion. 84 percent are eligible under the top 15 percent criterion, 13 percent are eligible under the NZEB-10 percent criterion, and 3 percent are eligible under the renovation criterion.

Table 2-1 Eligible residential objects in Sparebanken Norge's portfolio.

	Frequency distribution of eligible buildings in the portfolio						
	NZEB-10% EPC A	NZEB-10% grandfathered	EPC A	EPC B	TEK 17	TEK 10	Renovated
Apartments	584	911	522	370	1,303	5,425	231
Small residential buildings	216	1,295	279	2,278	1,542	6,639	386
Sum	**800**	**2,206**	**801**	**2,648**	**2,845**	**12,064**	**617**

Table 2-2 Calculated area of qualifying residential buildings (unscaled).

	Area of eligible buildings in the portfolio						
	NZEB-10% EPC A	NZEB-10% grandfathered	EPC A	EPC B	TEK 17	TEK 10	Renovated
Apartments	43,033	68,081	40,494	30,523	99,997	413,409	19,127
Small residential buildings	43,765	249,254	55,550	479,099	289,228	1,208,273	67,598
Sum	**86,798**	**317,335**	**96,044**	**509,622**	**389,225**	**1,621,682**	**86,725**

Based on the calculated figures in Table 2-1 and Table 2-2, the energy efficiency of this part of the portfolio is estimated as described earlier. All these residential buildings are not necessarily included in one single bond issuance.

To calculate the impact on climate gas emissions, the trajectory[15] is applied to all electricity consumption in all buildings. Electricity is the dominant energy carrier in Norwegian buildings, but the energy mix also includes bioenergy and district heating. Emission factors considering other heating sources in Table 1-1 are used in the calculations.

Table 2-3 below 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.

[15] Cf section 1.2.1

Table 2-3 Performance of eligible residential objects compared to the average building stock.

	Avoided energy demand compared to baseline [GWh/year]	Avoided CO_2 emissions compared to baseline [tonnes CO_2-eq/year]		
		European (EU27+ UK+ Norway) NS 3720:2018 electricity mix	Norwegian physically delivered electricity 2024	Norwegian residual mix 2024
Eligible buildings in the portfolio	390	**44,770**	4,983	172,590
Eligible buildings in portfolio - scaled by bank's engagement	199	**22,831**	2,541	88,014

3 Commercial buildings

3.1 Eligibility criteria

According to Sparebanken Norge's Green Finance Framework, commercial buildings in Norway qualify for green bonds if they meet one of the following criteria:

i. ***Buildings built in 2021 or later: NZEB-10 percent***

Commercial buildings complying with the relevant NZEB-10 percent threshold.

ii. ***Buildings built before 2021: EPC A label or within the top 15 percent low carbon buildings in Norway***

Commercial buildings with EPC labels A or B or complying with building code TEK10 and later codes.

iii. ***Refurbished commercial buildings with an improved energy efficiency of 30 percent***

Renovation of existing commercial buildings resulting in a reduction of primary energy demand (PED) by at least 30 percent.

3.1.1 Buildings built in 2021 or later: NZEB-10 percent

All commercial buildings completed after 31 December 2020 with an EPC label A qualify according to the NZEB-10 percent criterion. Commercial buildings with an EPC label B may also qualify, depending on energy demand.

3.1.2 Buildings built before 2021: EPC A label or within the top 15 percent low carbon buildings in Norway

Existing Norwegian commercial buildings with EPC labels A or B and Norwegian commercial buildings that comply with the Norwegian building code of 2010 (TEK10) and later codes are eligible for green bonds. These buildings have significantly better energy standards and account for less than 15 percent of the commercial building stock built before 2021. A time lag[16] between the implementation of a new building code and the buildings built under that code is taken into account.

Figure 3-1 illustrates how the criteria, in combination, make up cumulative percentages of the total commercial building stock built before 2021 in Norway. Buildings with EPC A represent 2.2 percent; Buildings with EPC A and EPC B represent 10.6 percent; Buildings with EPC A and EPC B and buildings that comply with TEK17 represent 11.1 percent. TEK10 and newer in combination with A+B labels represent 14.6 percent; EPC A+B+C labels represent 27.4 percent of the total commercial building stock built before 2021 in Norway, and so forth. The calculation precludes double counting – each building is only counted once in the analysis.

For information on the Norwegian Ministry's recent top 15 percent guidance publication and how this translates to the current EPC A+B & TEK10/17 methodology, see section 2.1.3.

[16] Two years for office buildings, retail buildings, industrial buildings and warehouses; three years for hotel and restaurant buildings

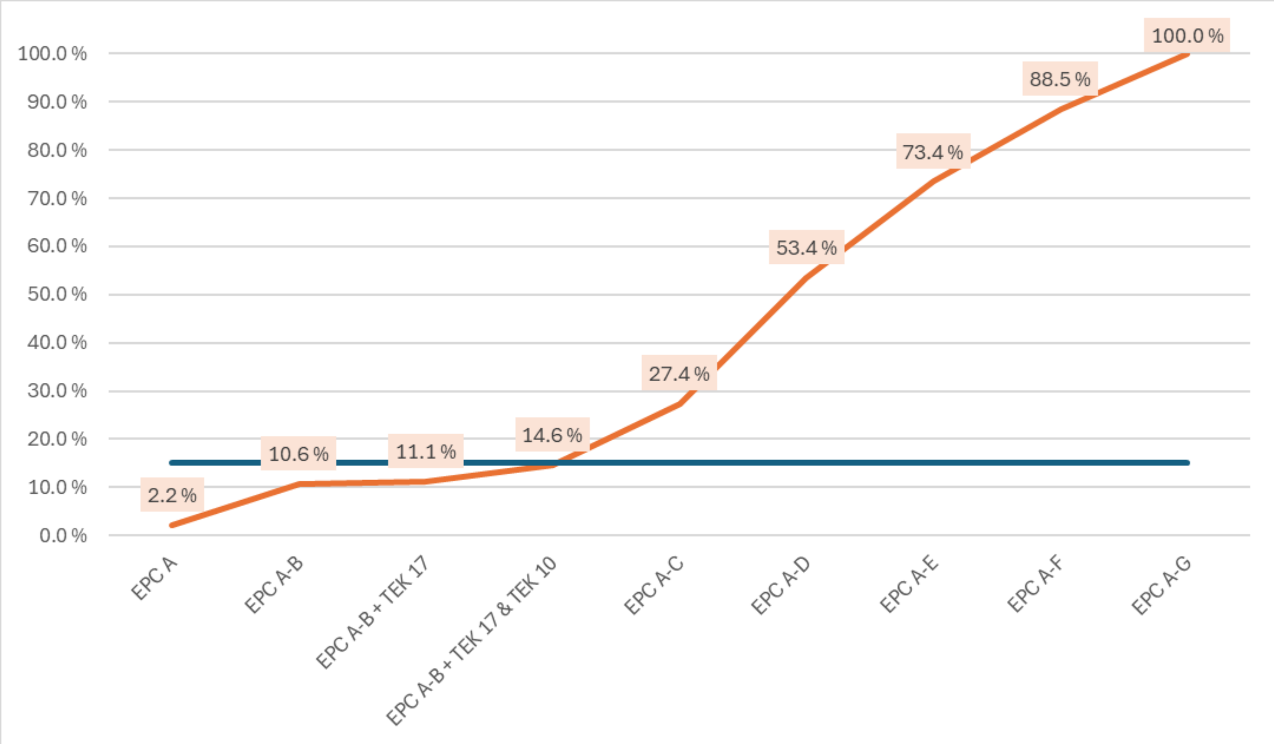

Figure 3-1 Cumulative percentages for criteria combinations, relative to the total commercial building stock built before 2021 in Norway

3.2 Impact assessment – commercial buildings

By combining data on calculated energy demand based on building code requirements with information on the commercial building stock, the average specific energy demand for each building category is estimated as presented in Table 3-1 below. These estimates are used as baselines in the impact calculations.

Table 3-1 Estimated average specific energy demand for the commercial building stock (Source: SSB, historic building codes, Multiconsult)

Building category	Average total stock (baseline) [kWh/m^2]
Retail buildings	315
Hotel and restaurant buildings	320
Industrial and small warehouse buildings	278
Office buildings	244

For buildings qualifying according to the NZEB-10 percent criterion, the reduction is calculated based on the difference between the calculated specific energy usage of each unit and the baseline.

For buildings qualifying according to the EPC criterion, the reduction is calculated based on the difference between the energy demand for the achieved energy label and the baseline.

For buildings qualifying according to the building code criterion, the reduction is calculated based on the difference between the energy demand for the building code and the baseline.

The eligible commercial buildings in Sparebanken Norge's portfolio are estimated to amount to 152,079 square meters. The available data includes reliable areas for most objects. For objects where this data is not available, the area per dwelling is calculated based on the average area derived from national statistics[17].

Eligibility is first checked against the NZEB-10 percent criterion for buildings built in 2021 or later. Buildings from 2020 and older are checked against the top 15 percent criterion. An object is only qualified based on the first criterion it fulfils, hence, no double-counting of objects will occur.

As shown in Table 3-2, the majority of the 302 objects are eligible through the top 15 percent criterion. 83 percent are eligible under the top 15 percent criterion and 17 percent are eligible under the NZEB-10 percent criterion.

Table 3-2 Eligible commercial objects in Sparebanken Norge's portfolio.

	Frequency distribution of eligible buildings in the portfolio					
	NZEB-10% EPC A	NZEB-10% grandfathered	EPC A	EPC B	TEK 17	TEK 10
Retail buildings	1	13	2	3	15	34
Hotel and restaurant buildings	-	-	-	1	-	3
Industrial and small warehouse buildings	-	21	-	2	10	39
Office buildings	3	12	6	29	19	89
Sum	**4**	**46**	**8**	**35**	**44**	**165**

Table 3-3 Calculated area of qualifying commercial buildings (unscaled).

	Area of eligible buildings in the portfolio					
	NZEB-10% EPC A	NZEB-10% grandfathered	EPC A	EPC B	TEK 17	TEK 10
Retail buildings	1,000	11,350	1,275	1,410	7,805	27,115
Hotel and restaurant buildings	-	-	-	1,700	-	5,100
Industrial and small warehouse buildings	-	11,529	-	1,098	5,490	20,917
Office buildings	1,095	4,380	2,190	10,415	6,395	31,815
Sum	**2,095**	**27,259**	**3,465**	**14,623**	**19,690**	**84,947**

Based on the calculated figures in Table 3-2 and Table 3-3, the energy efficiency of this part of the portfolio is estimated as described earlier. All these commercial buildings are not necessarily 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 in Norwegian buildings, but the energy mix also includes bioenergy and district heating. Emission factors considering other heating sources in Table 1-1 are used in the calculations.

[17] Statistic Norway Table 06513: Dwellings, by type of building and utility floor space: https://www.ssb.no/en/statbank/table/06513

Table 3-4 indicates how much more energy efficient the eligible part of the portfolio is compared to the average Norwegian commercial building stock. It also presents how much the calculated reduction in energy demand constitutes in CO_2 emissions.

Table 3-4 Avoided energy demand and emissions (CO_2-eq) of eligible objects in the portfolio compared to average commercial building stock using three emission factors. (Source: public statistics, Statistics Norway, Multiconsult)

	Avoided energy demand compared to baseline [GWh/year]	Avoided emissions compared to baseline [tons CO_2-eq/year]		
		European (EU27+ UK+ Norway) NS 3720:2018 electricity mix	Norwegian physically delivered electricity 2024	Norwegian residual mix 2024
Eligible commercial buildings in portfolio	17	**2,002**	223	7,717
Eligible buildings in portfolio - scaled by bank's engagement	9	**1,043**	116	4,021

4 Renewable energy

Hydropower has played a significant role in Norway's power production since the Industrial Revolution. Hydropower remains a crucial component of the national energy mix, producing 140 TWh annually and accounting for 89 percent of the national electricity production[18]. Onshore wind and solar power account for 10 percent (15 TWh/yr) of the national power production. The Norwegian Government has set a target to increase the electricity production from solar energy to 8 TWh by 2030.

Power production development in Norway is strictly regulated and subject to licensing and is overseen by NVE, a directorate under the Ministry of Energy. Licenses grant rights to build and run power production installations under explicit conditions and rules of operation. NVE emphasises preserving the environment. The Norwegian part of the NVE homepage gives detailed information about different requirements for different kinds of projects[35].

Data about the Norwegian assets (power plants) is available from the NVE, as all assets are subject to licensing.

4.1 Eligibility

The green loan portfolio of Sparebanken Norge assessed in this report contains Norwegian renewable energy power plants generating electricity from hydropower.

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

4.1.1 Hydropower

According to Sparebanken Norge's Green Finance Framework, hydropower plants in Norway (boreal regions) qualify for green bonds if they meet one of the following criteria:

i. life cycle emissions of less than 100 gCO_2-eq/kWh,

ii. power density greater than 5 W/m^2, or

iii. the electricity generation facility is a run-of-river plant and does not have an artificial reservoir

The eligibility criteria are formulated in line with the CBI criteria[19], and the emissions threshold is in line with the threshold of 100 gCO_2-eq/kWh in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[20].

Hydropower plants with power density over 5 W/m^2 are exempt from the most detailed investigations. For Norwegian hydropower assets, these criteria are fulfilled, and most assets overperform radically. All run-of-river power stations have no or negligible negative impact on GHG emissions. Due to the cold climate, Norwegian reservoirs are not exposed to cyclic revegetation of impoundment, and hence the

[18] Statistic Norway Table 08307: Production, imports, exports and consumption of electric energy: https://www.ssb.no/en/statbank/table/08307
[19] https://www.climatebonds.net/standard/hydropower
[20] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf

negative impacts on GHG emissions from these reservoirs are minuscule. Hydropower stations with high hydraulic head or relatively small, impounded areas have high power density.

The eligibility criteria mentioned above are central to the EU Taxonomy. Most DNSH requirements are covered by the current national regulation of hydropower, however, with exemptions.

4.2 Eligible assets in the portfolio

Sparebanken Norge's portfolio contains 135 smaller hydropower plants in operation with installed capacities ranging from 0.1 to 26.5 MW. These are run-of-river plants or small reservoir hydropower plants, which hence have a higher power density of several thousand W/m^2 (ratio between capacity and impounded area).

Multiconsult can verify that Sparebanken Norge's eligible assets have low to negligible GHG emissions related to construction and operation.

4.3 Emission factors and production estimates

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 individual impact on GHG emissions for the facilities in the portfolio, we refer to AIB[21]. AIB, as referred to by NVE[22], has used 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 hydropower assets, even though the factors are reported higher than in other credible sources in Norwegian context. For instance, Østfoldforskning[23] calculated the life-cycle emissions of Norwegian hydropower across all categories to 3.33 gCO_2-eq/kWh.

For the assets in the portfolio, with run-of-river and small hydropower assets, the AIB emission factor is regarded as conservative in an impact assessment setting. Given an average emission factor for all European hydropower of 6 gCO_2-eq/kWh, the positive impact of hydropower is 130 gCO_2-eq/kWh compared to the European electricity mix baseline of 136 gCO_2-eq/kWh from Table 1-1.

When applying the Norwegian location-based production mix and market-based residual mix emission factors from Table 1-1 as baselines, the positive impact of hydropower changes significantly. The Norwegian location-based production mix as baseline results in a positive impact of 6 gCO_2-eq/kWh for hydropower while the Norwegian market-based residual mix as baseline hoists the positive impact of hydropower to 529 gCO_2-eq/kWh.

[21] https://www.aib-net.org/, 2024
[22] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/, 2019
[23] 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

As presented in Figure 4-1, the renewable energy power plants in Sparebanken Norge's portfolio are somewhat varied in age, with start of operation ranging from 1977 to 2025 (median year 2013, standard deviation 7.5 years).

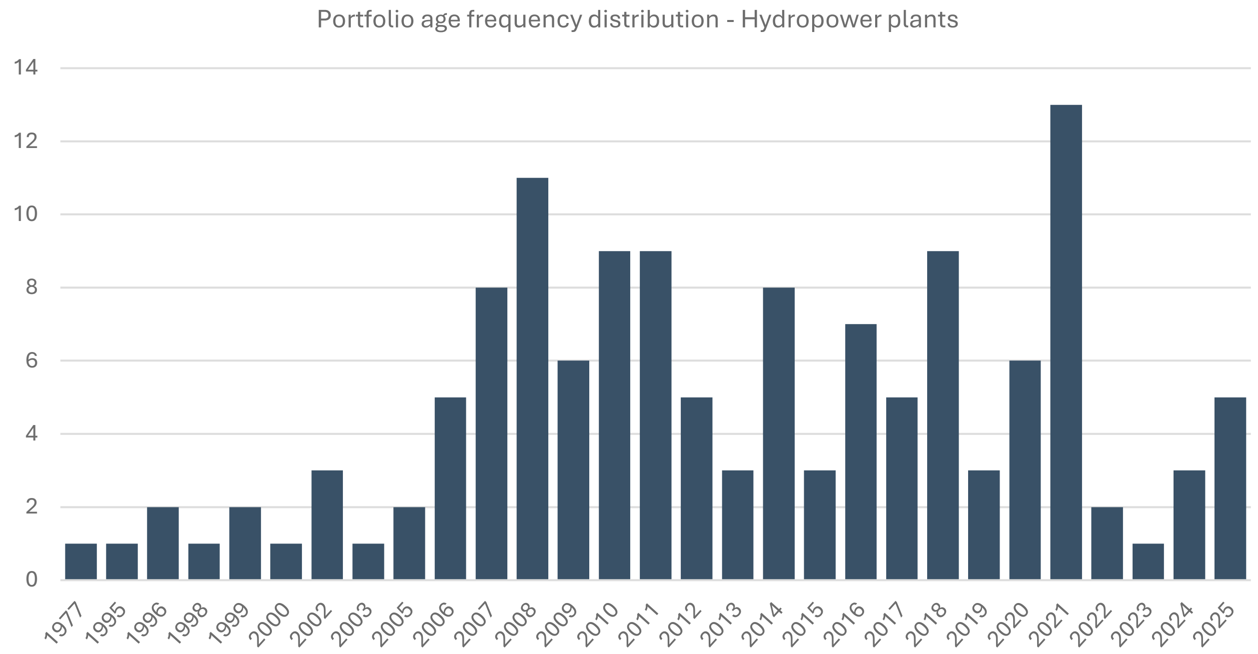

Figure 4-1 Portfolio age frequency distribution

Production and installed capacity have been attained by using NVE's hydropower database[24]. It is important to note that the indicated power production capacity in the licensing documents does not necessarily represent what can realistically be expected from the plant over time. For hydropower, the hydrology is uncertain, and unfortunately, often overestimated in early project phases. Also, production figures normally do not account for planned and unplanned production stops due to accidents, maintenance, etc. Research on small hydropower facilities has shown that actual production (expected production) is often more than 20 percent lower than the licensing/pre-construction figures (estimated production). There is no equivalent evidence to claim the same mismatch for large hydropower facilities.

[24] https://www.nve.no/energi/energisystem/vannkraft/vannkraftdatabase/

4.4 Impact assessment

The eligible hydropower plants in Sparebanken Norge's portfolio have an estimated production capacity of 1,320 GWh per year and an expected production capacity of 1,087 GWh per year. Scaled by the bank's share of financing, the estimated and expected annual production are 294 GWh and 247 GWh, respectively, cf Table 4-1 below.

Table 4-1 Capacity and annual production of identified eligible plants. Production scaled to reflect the bank's share of financing.

	No. of plants	Capacity [MW]	Estimated production [GWh/year]	Expected production [GWh/year]
Hydropower	135	474	294	247

The expected renewable energy produced by the eligible assets in the portfolio in an average year and the resulting avoided CO_2 emissions from the energy production are summarized in Table 4-2. Avoided emissions are presented based on all three emission factors from Table 1-1.

Due to the frequently overestimated annual production in small hydropower plants, the expected impact is conservatively calculated by reducing the estimated production by 20 percent, cf section 4.3.2.

Table 4-2 Expected annual power production and positive impact on GHG emissions

	Expected production [GWh/year]	Avoided emissions compared to baseline [tons CO_2-eq/year]		
		European (EU27+ UK+ Norway) NS 3720:2018 electricity mix	Norwegian physically delivered electricity 2024	Norwegian residual mix 2024
Verified eligible plants in portfolio	1,087	**141,365**	6,525	575,245
Verified eligible plants in portfolio – scaled by bank's engagement	247	**32,101**	1,482	130,625