REPORT

SpareBank 1 Østfold Akershus Green Portfolio Impact Assessment 2024

CLIENT

SpareBank 1 Østfold Akershus

SUBJECT

Impact assessment - energy efficient residential and commercial buildings

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Report

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In summary, the assessed impact is significant for both examined asset classes in the SpareBank 1 Østfold Akershus portfolio qualifying according to the bank's green bond criteria.

The total impact of the assets in the portfolio is close to 2,400 tons CO_2-eq/year:

Energy efficient residential buildings	*1,150 tons CO_2e/year*
Energy efficient commercial buildings	*1,237 tons CO_2e/year*
Total	*2,387 tons CO_2e/year*

When scaled by the bank's share of financing, the impact is estimated to approximately 950 tons CO_2-eq/year:

Energy efficient residential buildings	*561 tons CO_2e/year*
Energy efficient commercial buildings	*387 tons CO_2e/year*
Total	*948 tons CO_2e/year*

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1 Introduction

Assignment

On assignment from SpareBank 1 Østfold Akershus, Multiconsult has assessed the impact of the part of the bank's loan portfolio eligible for green bonds according to SpareBank 1 Østfold Akershus' Green Bonds Framework.

In this document, we briefly describe SpareBank 1 Østfold Akershus' green bond qualification criteria and the result of an analysis of the bank's loan portfolio. More detailed documentation on baseline, methodologies and eligibility criteria is made available on SpareBank 1 Østfold Akershus' 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.

In 2023, renewables accounted for 98 percent of the total (154 TWh) Norwegian electricity production, the final two percent 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 2023 resulted in emissions of 0 gCO_2/kWh. In the figure, the production mix is included for other selected European states for comparison.

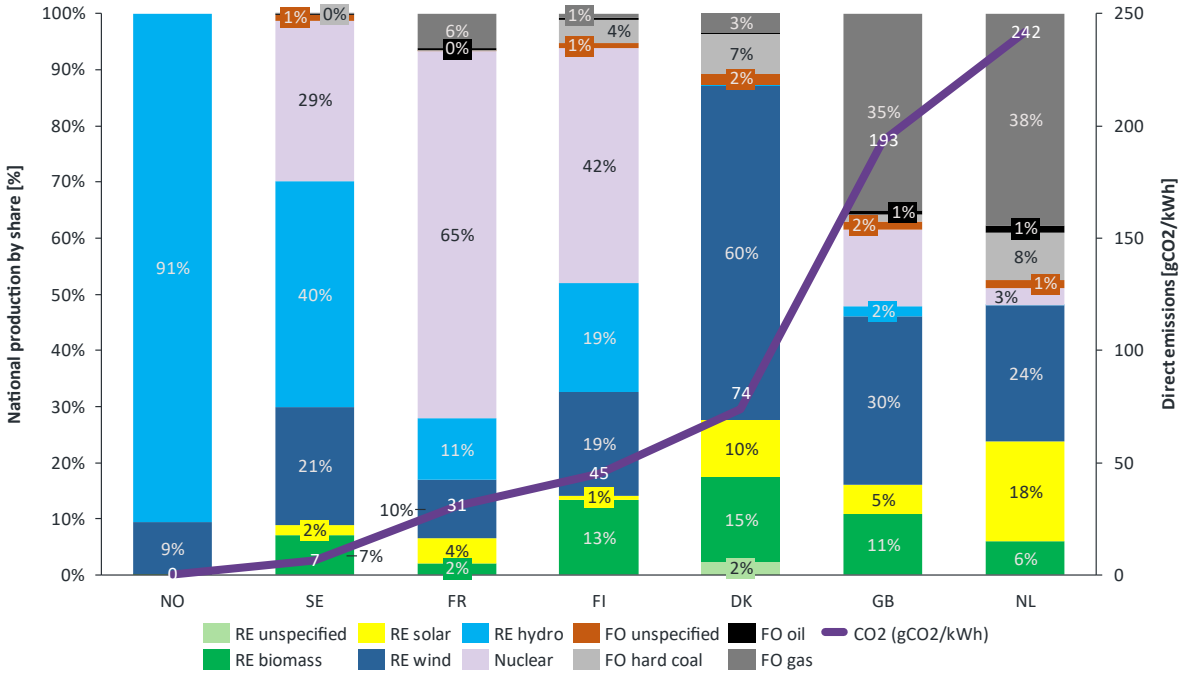

Figure 1-1 National electricity production mix in some selected countries (Source: European Residual Mixes 2023, Association of Issuing Bodies[3]).

[1] https://www.sparebank1.no/nb/ostfold-akershus/om-oss/samfunnsansvar/retningslinjer-og-rammeverk.html
[2] Statistics Norway Table 08307: Production, imports, exports and consumption of electric energy (GWh) 1950 - 2023, 2024
[3] https://www.aib-net.org/facts/european-residual-mix, 2024

As Figure 1-1 shows, emissions from power production varies 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 type of emission factor influence the results, the impact assessments are here presented based on several emission factors.

1.2 Emission factors for energy efficient buildings

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

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

Finans Norge released a guidance document for 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 2023[5] and the Norwegian residual mix for 2023[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 other energy sources for heating purposes is applied to all electricity emission factors resulting in the “Emission factor considering other heating sources”, found in the rightmost column in Table 1-1.

[4] https://www.finansnorge.no/dokumenter/maler-og-veiledere/veileder-for-beregning-av-finansierte-klimagassutslipp/, 2024
[5] https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/, 2024
[6] https://www.aib-net.org/facts/european-residual-mix/2023, 2024
[7] https://www.aib-net.org/, 2024

Table 1-1 Electricity production GHG factors (CO_2-eq) without and with influx of other heating sources for buildings in three scenarios. (Source: NS 3720:2018, Table A. 1, NVE5, AIB6)

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 2023	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.	15	15
Norwegian NVE residual mix 2023	Market-based residual mix for Norway with a European marketplace.	599	495

1.2.1 European (EU27+ UK+ Norway) electricity mix over the lifetime of the buildings

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 CO_2- 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 in 2050. This value is comparable to the equivalent determined in Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (January 2020).

1.2.2 Norwegian physically delivered electricity 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 15 gCO_2-eq/kWh for 2023[9]. This is also a location-based grid factor.

[8] Multiconsult. Based on building code assignments for DiBK, 2015.
[9] https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/, 2024

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 is not available to the bank. There is also no basis for making assumptions on the share of the energy consumed by the buildings in the portfolio that has been purchased with Guarantees of Origin. An alternative market-based grid factor for Norway is then the electricity disclosure published by NVE[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 599 gCO_2-eq/kWh for 2023[11].

[10] https://www.nve.no/energy-supply/electricity-disclosure/?ref=mainmenu, 2024
[11] https://www.aib-net.org/facts/european-residual-mix/2023, 2024

2 Energy efficient residential buildings

2.1 Eligibility criteria

For this impact assessment for existing residential buildings in the SpareBank 1 Østfold Akershus portfolio, eligibility is identified against an EPC criterion and a refurbishment criterion as formulated below. These criteria are in line or stricter than the equivalent CBI's proxy criterion for Norwegian residential buildings.

Existing residential buildings built before 1st January 2022:

- Built after 2018
    - Current standard (TEK17) and EPC A
- Built in or before 2018
    - Relevant standard (TEK10 or earlier) and EPC A or B

Refurbished buildings:

- ENOVA supported projects and solutions.
- Renovations leading to minimum 30 percent energy efficiency improvements, measured in specific energy (kWh/m^2) compared to the calculated label based on the building code in the year of construction.

OR

- Renovation leading to at least a two-step improvement in the EPC-label relative to the calculated label based on the building code in the year of construction. A lower threshold is set at an achieved EPC D.

Due to data availability on refurbished buildings in the portfolio, this impact assessment considers buildings as eligible only if they have specific delivered energy demand (kWh/m^2), estimated based on EPC-label, minimum 30 percent lower than the calculated energy demand based on the building code in the year of construction. A lower threshold is set at an achieved EPC D. Buildings older than 1999 can qualify with EPC C and older than 1989 with EPC D.

Note that Sparebank 1 Østfold Akershus also have an eligibility criterion for new buildings. However, data is not available to check whether the buildings built in 2022 or later are performing 20 percent better than the energy efficiency standards in the TEK17 code. Thus, this criterion is not included in this impact assessment.

2.2 Impact assessment

The eligible residential buildings in SpareBank 1 Østfold Akershus' portfolio are estimated to amount to 75,000 square meters. The available data from the bank include reliable area and energy grade A-G for a large share of the objects. For objects where area is not available, the area per dwelling is calculated based on the average area derived from national statistics[12]. The energy grades in the portfolio are a combination of registered energy labels from Enova and estimates from third parties such as Eiendomsverdi. No assumptions have been made to replace the missing energy ratings.

[12] Statistics Norway Table 06513: Dwellings, by type of building and utility floor space, 2024

Eligibility is first checked against the EPC criterion. The remaining buildings are checked against the refurbishment criterion, so no double counting of objects will occur.

As Table 2-1 shows, in total 577 residential buildings in the portfolio are eligible for green bonds. Most of the buildings, 338 objects, are eligible through the EPC criterion. Of these, 23 percent have energy label A and the rest have energy label B.

Table 2-1 Eligible residential objects and calculated building areas.

	No. of units				Area qualifying buildings in portfolio [m^2]				
	EPC A	EPC B	EPC C <1999	EPC D <1989	EPC A	EPC B	EPC C <1999	EPC D <1989	Sum
Apartments	15	170	30	59	3 038	29 405	6 878	12 430	51 751
Small residential buildings	64	89	55	95	5 185	7 118	3 936	6 949	23 188
Total	**79**	**259**	**85**	**154**	**8 223**	**36 523**	**10 814**	**19 379**	**74 939**

Based on the calculated figures in Table 2-1, the energy efficiency of the residential portfolio is estimated. Not all residential buildings are necessarily included in one single bond issuance.

For each eligible object, impact is calculated by finding the reduction in energy demand compared to a baseline of an average building from the entire building stock, due to the eligible building being more energy efficient. The calculated average specific energy demand of the residential Norwegian building stock, separated on apartments and small residential buildings, are 202 kWh/m^2 and 257 kWh/m^2, respectively. As only half of all Norwegian dwellings have a registered EPC, the average specific energy demand of the Norwegian residential building stock as described above is used as baseline for the buildings qualifying according to the EPC criterion.

For the impact calculations for the EPC criterion, the specific energy demand for eligible buildings is estimated from the achieved energy label, based on the energy grade scale[13]. This demand is compared against the baseline as described above. The reduction in energy demand is multiplied with the area of the eligible asset and the emission factors from Table 1-1, and summed up for all the units.

For buildings qualifying on the refurbishment criterion, the difference between achieved energy label and assumed original energy label based on the year of construction is similarly multiplied with dwelling area and emission factors and summed up.

Table 2-2 shows 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 avoided CO_2-emissions. A proportional relationship is expected between energy consumption and emissions. The avoided emissions are calculated using the three emission factors described in section 1.2: European NS 3720:2018 electricity mix, and NVE's grid factors for Norway only, representing physically delivered electricity and the residual mix for 2023. The impact is presented both in total and scaled by the bank's engagement, as represented by the loan-to-value ratio.

[13] https://www.enova.no/energimerking/om-energimerkeordningen/om-energiattesten/karakterskalaen/, 2024

Table 2-2 Performance of eligible objects compared to baseline of average residential building stock – in total and scaled by bank's engagement. (Sources: public statistics, Statistics Norway, enova.no/energimerking, Multiconsult)

	Avoided energy compared to baseline [GWh/year]	Avoided CO_2-emissions compared to baseline [tons CO_2-eq/year]		
		European lifetime mix	Norwegian physically delivered el. 2023	Norwegian residual mix 2023
Total impact eligible buildings in portfolio	10.0	1,150	155	4,956
Scaled impact eligible buildings in portfolio	4.9	561	76	2,417

3 Energy efficient commercial buildings

3.1 Eligibility criteria

Eligibility in this impact assessment for existing commercial buildings in the SpareBank 1 Østfold Akershus' portfolio is identified against an EPC criterion and a refurbishment criterion as formulated below.

Existing buildings built before 1st of January 2022:

- EPC A

OR

- Buildings that meet both of the following criteria:
    - Buildings that receive or are expected to receive one or more of the following certification standards:
        - A BREEAM or BREEAM-NOR "Excellent" (or better)
        - Nordic Swan Ecolabel
        - FutureBuilt with FutureBuilt ZERO criteria for "lavutslippsbygg og områder"

    AND

    - that have received, or are expected to receive one or more of the following energy efficiency thresholds
        - Built after 2018 → EPC = A
        - Built before 2018 → EPC = A or B
        - Receive a "Paris Proof" from Grønn Byggallianse

Refurbished buildings:

- ENOVA supported projects and solutions
- Professional technical consultations, energy audits and management services related to the improvement of energy performance of buildings.
- Renovations leading to minimum 30 percent energy efficiency improvements, measured in specific energy (kWh/m^2) compared to the calculated label based on the building code in the year of construction.

OR

- Renovation leading to at least a two-step improvement in the EPC-label relative to the calculated label based on the building code in the year of construction. A lower threshold is set at an achieved EPC D.

Note that data is not made available on certification (BREEAM etc.) for commercial buildings in the portfolio. Therefore, only the EPC A criterion is considered for existing buildings.

Due to data availability on refurbished buildings in the portfolio, this impact assessment considers buildings as eligible if they have specific delivered energy demand (kWh/m^2) measured in EPC-label minimum 30 percent lower than the calculated energy demand based on the building code in the year

of construction. A lower threshold is set at an achieved EPC D. Buildings older than 2009 can qualify with an EPC B, older than 1999 with EPC C and older than 1989 with EPC D.

Note that Sparebank 1 Østfold Akershus also have an eligibility criterion for new buildings. However, data is not available to check whether the buildings built in 2022 or later are performing 20 percent better than the energy efficiency standards in the TEK17 code, so this criterion is not included in this impact assessment.

3.2 Impact assessment - Commercial buildings

The eligible commercial buildings in SpareBank 1 Østfold Akershus' portfolio are estimated to amount to almost 160,000 square meters. The available data include reliable area 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]. The portfolio has information on energy ratings A-G for many objects, either registered energy labels from Enova or estimates from third parties such as Eiendomsverdi. No assumptions have been made to replace the missing energy ratings.

Eligibility is first checked against the EPC criterion. The remaining buildings are checked against the refurbishment criterion, so no double counting of objects will occur. 29 office buildings are eligible for green bonds, and the area eligible under each criterion is show in Table 3-1. Four of the buildings have energy label A, while the rest qualify on the refurbishment criterion.

Table 3-1 Eligible commercial buildings and calculated building areas.

	Area qualifying buildings in portfolio [m^2]				
	EPC A	EPC B <2009	EPC C <1999	EPC D <1989	Total
Office buildings	12,284	0	27,136	119,515	158,935

Similarly to impact calculations for residential buildings, impact for the energy efficient parts of the portfolio is estimated based on calculated energy demand dependent on energy label. This difference is then multiplied to the emission factors from Table 1-1 and area of eligible assets to calculate impact.

Table 3-2 indicates how much more energy efficient the eligible part of the portfolio is, compared to the average commercial Norwegian building stock. It also presents how much the calculated reduction in energy demand constitutes in avoided CO_2 emissions. The avoided emissions are calculated using the three emission factors described in 1.2: European NS 3720:2018 electricity mix, and NVE's grid factors for Norway only, representing physically delivered electricity and the residual mix for 2023. A proportional relationship is expected between energy consumption and emissions.

[14] Statistics Norway Table 06513: Dwellings, by type of building and utility floor space, 2024

Table 3-2 Avoided energy demand and emissions (CO_2-eq) of eligible objects in the commercial portfolio compared to average 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 lifetime mix	Norwegian physically delivered el. 2023	Norwegian residual mix 2023
Total impact eligible buildings in portfolio	10.8	1,237	167	5,327
Scaled impact eligible buildings in portfolio	3.4	387	52	1,668