REPORT

SpareBank 1 Østlandet Green Portfolio Impact Assessment 2025

CLIENT

SpareBank 1 Østlandet

SUBJECT

Impact assessment - energy efficient residential and commercial buildings, electric vehicles, renewable energy, forestry, and agriculture solar PV installations

Date / Revision: 23 May 2025 / 00

Document code: 10266097-01-TVF-RAP-001

Multiconsult

Report

PROJECT	SpareBank 1 Østlandet Green Portfolio Impact Assessment 2025	DOCUMENT CODE	10266097-01-TVF-RAP-001
SUBJECT	Impact assessment - energy efficient residential and commercial buildings, electric vehicles, renewable energy, forestry, and agriculture solar PV installations	ACCESSIBILITY	Open
CLIENT	SpareBank 1 Østlandet	PROJECT MANAGER	Ibrahim Temel
CONTACT	Cathrine Mordal	PREPARED BY	Ibrahim Temel, Kjersti Rustad Kvisberg, Are Grongstad, Mette Kristine Kanestrøm, Ina Teresa Winther, Rune Moe
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

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

The total impact of the assets in the portfolio is estimated to 0.72 mill. tonnes *CO2-eq*/year:

Energy efficient residential buildings	*10,554 tonnes CO2-eq/year*
Energy efficient commercial buildings	*6,684 tonnes CO2-eq/year*
Electric vehicles	*4,174 tonnes CO2-eq/year*
Renewable energy	*112,608 tonnes CO2-eq/year*
Sustainable forestry	*581,500 tonnes CO2-eq/year*
Sustainable agriculture – solar PV installations	*140 tonnes CO2-eq/year*
Total	***715,660 tonnes CO2-eq/year***

Note that for electric vehicles, the unscaled impact is the sum of 5,820 tonnes CO2-eq/year Scope 1 emissions, and -1,646 CO2-eq/year in Scope 2 emissions based on European power mix.

When scaled by the banks share of financing, the impact is estimated to 0.23 mill. tonnes *CO2-eq*/year:

Energy efficient residential buildings	*5,236 tonnes CO2-eq/year*
Energy efficient commercial buildings	*3,591 tonnes CO2-eq/year*
Electric vehicles	*3,907 tonnes CO2-eq/year*
Renewable energy	*40,133 tonnes CO2-eq/year*
Sustainable forestry	*180,448 tonnes CO2-eq/year*
Sustainable agriculture – solar PV installations	*96 tonnes CO2-eq/year*
Total	***233,411 tonnes CO2-eq/year***

Note that for electric vehicles, the scaled impact is the sum of 5,448 tonnes CO2-eq/year Scope 1 emissions, and -1,541 CO2-eq/year in Scope 2 emissions based on European power mix.

00	23.05.2025	Draft	Multiple authors	Are Grongstad	Ibrahim Temel
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY

TABLE OF CONTENTS

1 Introduction

On assignment from SpareBank 1 Østlandet, Multiconsult has assessed the impact of the part of the bank's loan portfolio eligible for green bonds.

In this document we briefly describe SpareBank 1 Østlandet's green bond qualification criteria, the evidence for the 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 Østlandet's website[1].

1.1 CO2-emission factors related to electricity demand and production

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

As shown in Figure 1, the Norwegian production mix in 2023 (91 percent hydropower and 9 percent wind) results in emissions of 0 gCO2-eq/kWh, as calculated by Association of Issuing Bodies (AIB)[2]. In the figure, the production mix is included for other selected European states for comparison.

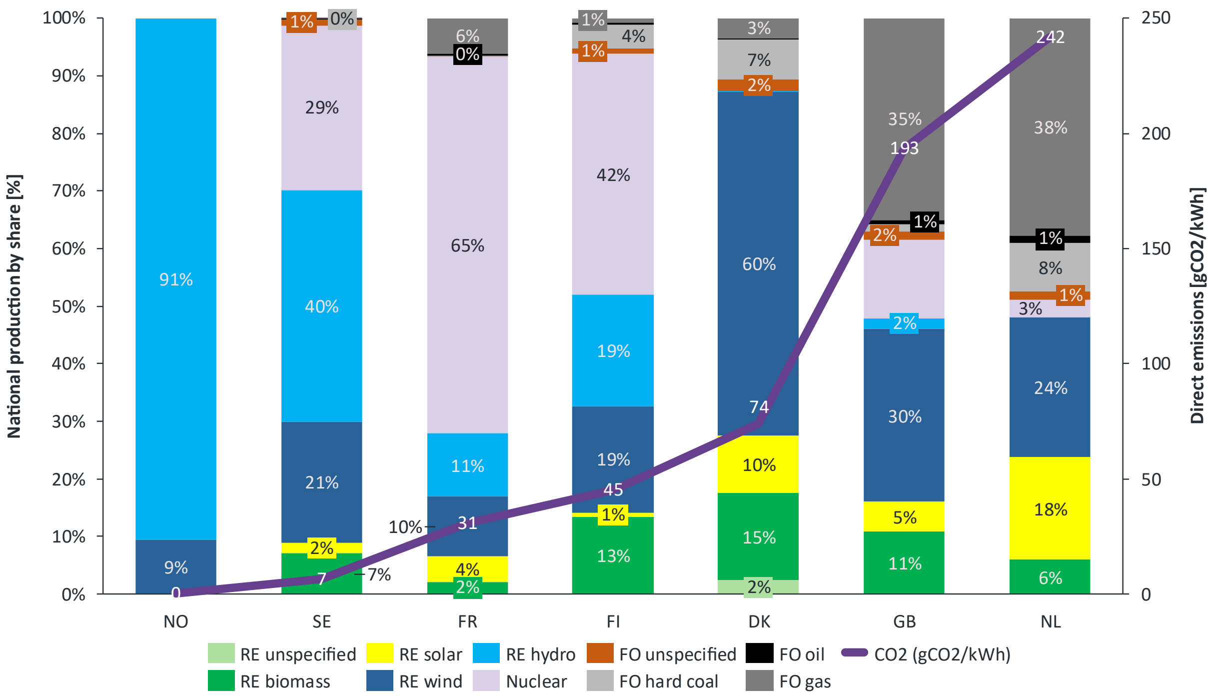

Figure 1 National electricity production mix in some selected countries[2].

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.sparebank1.no/en/ostlandet/about-us/investor/debt-investors/green-bond-framework.html
[2] https://www.aib-net.org/

for buildings" considers 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 emission factor for the next 60 years, a lifetime relevant for buildings and renewable energy assets, according to two scenarios as described in Table 1.

Table 1 Electricity production greenhouse gas factors (CO2-equivalents) for two scenarios. Source: (SN/K 356 Klimagassberegninger for bygg, 2018), Table A.1

Scenario	Emission factor [gCO2-eq/kWh]
European (EU27 plus UK and Norway) consumption mix	136
Norwegian consumption mix	18

The building 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[3].

Applying the factor based on EU27 plus UK and Norway energy production mix, the resulting emission factor for Norwegian residential buildings is on average 136 gCO2-eq/kWh due to the influx of bioenergy and district heating in the energy mix[4]. This factor is used in impact calculations in sections 2 and 3. The equivalent for Norwegian power production is 18 gCO2-eq/kWh.

The average emission factors relevant for electric vehicles are also calculated based on a trajectory from the current grid factor to a close to zero emission factor in 2050. The relevant indirect emission factors for EV's used in the analysis are presented in more detail in section 0 but are 150 gCO2-eq/kWh for passenger vehicles and 159 gCO2-eq/kWh for light-duty vehicles.

For the calculations of impact for renewable energy production in sections 5 and 7, the emission factors from Table 1 are used as baselines.

[3] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf
[4] Multiconsult. Based on building code assignments for DiBK

2 Energy efficient residential buildings

2.1 Eligibility criteria

Eligibility in this impact assessment for residential buildings in the SpareBank 1 Østlandet portfolio is identified against a building code criterion and an EPC criterion as formulated below. These criteria are in accordance with the EU Taxonomy Climate Delegated Act.

The dataset provided by SpareBank 1 Østlandet contains the following data for each object: Building category, area, year of construction, EPC energy label and the bank's share of financing (loan-to-value). There dataset contains no data on energy demand.

2.1.1 Buildings built from the 1st of January 2021: NZEB-10%

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 requires 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 Energy Performance Certificate (EPC).

Multiconsult has assessed the performance of new buildings and how the most energy efficient buildings may be identified in the bank's loan portfolio based the Norwegian NZEB definition. The Norwegian national definition of NZEB was published in January 2023[5] with a correction issued in January 2024[6].

All residential buildings completed after 31 December 2020 with EPC label A qualify according to the NZEB-10 percent criterion. Residential buildings with EPC label B may also qualify depending on energy demand. However, with no energy demand available in the dataset from the bank, only buildings completed after 31 December 2020 with EPC label A are eligible under the NZEB-10 percent criterion.

2.1.2 Buildings built before the 1st of January 2021: EPC A label or within the top 15% 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 as all 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 lag between the implementation of a new building code and the buildings built under that code must be taken into account.

Figure 2 illustrates how the criteria, in combination, make up cumulative percentages of the total residential building stock built before the 1st of January 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 the 1st of January 2021 in Norway. The calculation precludes double counting – each building is only counted once in the analysis.

---

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

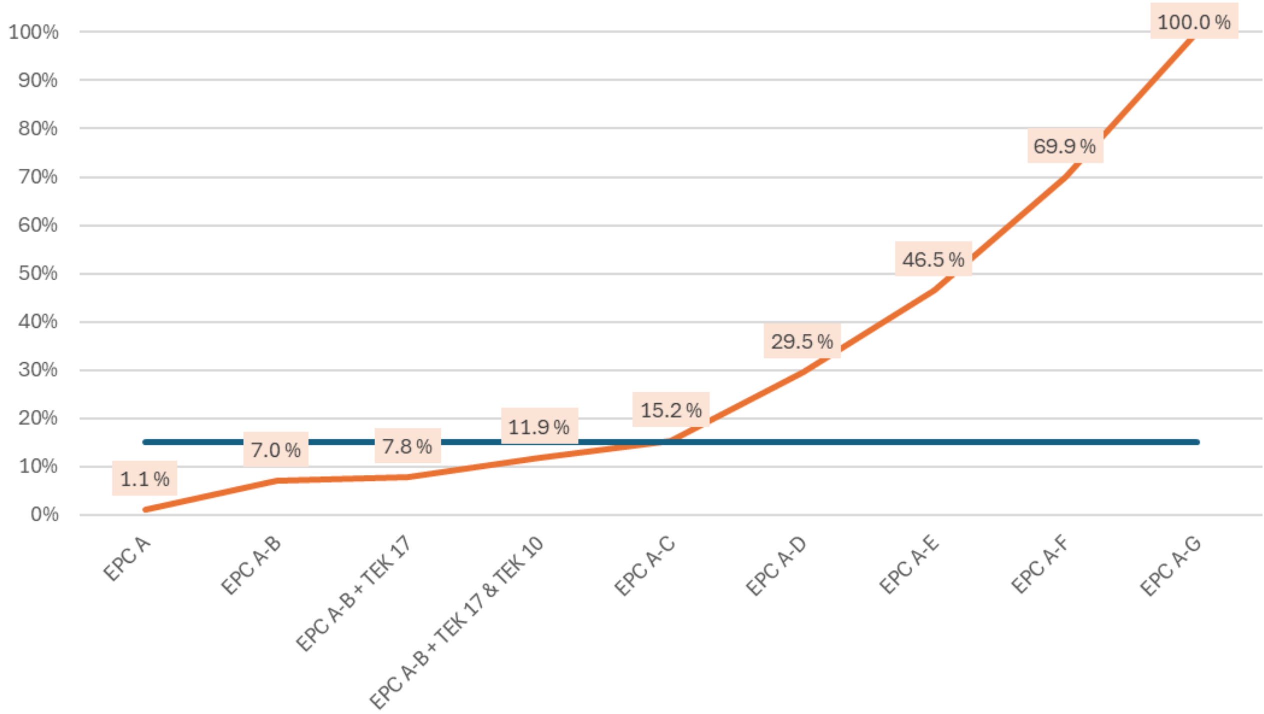

Figure 2 Cumulative percentages for criteria combinations, relative to the total residential building stock built before 1st of January 2021 in Norway

2.1.3 Renovation of existing buildings

Refurbished Norwegian residential buildings with at least a 30 percent improvement in energy efficiency measured in specific energy, kWh/m^2, compared to the calculated label based on building code in the year of construction.

Residential buildings qualify for this criterion if they are:

- built in 1971 or earlier and have energy grade D or better,
- or built in 1991 or earlier and have energy grade C

2.2 Impact assessment – Residential buildings

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 253 kWh/m^2. Building codes TEK10 and TEK17 give an average specific energy demand for existing houses and apartments, weighted for actual stock, of 112 kWh/m^2.

A reduction of energy demand from the average 253 kWh/m^2 of the total residential building stock to the average energy demand of buildings eligible based on building code (112 kWh/m^2), is multiplied by the emission factor and the area of eligible assets to calculate impact for buildings qualifying according to the building code criterion.

For the buildings qualifying according to the EPC-criterion only, the difference between energy demand for achieved energy label and weighted average in the EPC database is used.

For the buildings qualifying according to the refurbishment criterion only, the calculations are based on the difference between energy demand for achieved energy label and the energy label based on building year.

The eligible residential buildings in SpareBank 1 Østlandet's portfolio is estimated to amount to 732,500 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 average area derived from national statistics[7].

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. Finally, buildings from 1989 or older are checked against the refurbishment criterion. An object is only qualified based on the first criterion it fulfils, so no double counting of objects will occur.

The majority of the 6,420 eligible objects are eligible through the top 15 percent criterion. Of the 5,378 buildings eligible under the top 15 percent criterion, 83 percent are eligible based on building code. Of the objects identified based on energy grade, 36 percent have EPC A, and 64 percent EPC B. 340 buildings with EPC A are eligible under the NZEB-10 percent criterion. 702 objects qualify according to the refurbishment criteria, of which 63 percent have energy label D and were built before 1971.

Table 2 Eligible residential objects in the SpareBank 1 Østlandet portfolio.

	No. of units of eligible buildings in portfolio						
	NZEB-10% EPC A	TEK17	TEK10	EPC A	EPC B	EPC C 1988 or older	EPC D 1970 or older
Small residential buildings	107	1,760	547	96	375	124	153
Apartments	233	1,573	573	235	219	134	291
Sum	**340**	**3,333**	**1,120**	**331**	**594**	**258**	**444**

Table 3 Calculated area of qualifying buildings.

	Area of eligible buildings in portfolio						
	NZEB-10% EPC A	TEK17	TEK10	EPC A	EPC B	EPC C 1988 or older	EPC D 1970 or older
Small residential buildings	17,726	263,500	83,365	17,354	71,126	21,191	25,508
Apartments	16,044	114,087	38,766	17,284	16,118	9,689	20,766
Sum	**33,770**	**377,587**	**122,131**	**34,638**	**87,244**	**30,880**	**46,274**

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

Based on the calculated figures in Table 2 and 3, the energy efficiency of this part of the portfolio is estimated based on calculated energy demand dependent on building code. All these residential 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 to Norwegian buildings, but the energy mix also includes bioenergy and district heating, resulting in a total specific emission factor of 115 gCO_2e/kWh. A proportional relationship is expected between energy consumption and emissions.

Table 4 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.

Table 4 Performance of eligible residential objects compared to average building stock.

	Avoided energy demand compared to baseline [GWh/year]	Avoided CO2-emissions compared to baseline [tonnes CO2-eq/year]
Eligible buildings in portfolio	92	10,554
Eligible buildings in portfolio - scaled by bank's engagement	46	5,236

3 Energy efficient commercial buildings

3.1 Eligibility criteria

Eligibility in this impact assessment for commercial buildings in the SpareBank 1 Østlandet portfolio is identified against a building code criterion and an EPC criterion as formulated below. These criteria are in accordance with the EU Taxonomy Climate Delegated Act.

The dataset provided by SpareBank 1 Østlandet contains the following data for each object: Building category, area, year of construction, EPC energy label and the bank's share of financing (loan-to-value). There dataset contains no data on energy demand.

3.1.1 Buildings built from the 1st of January 2021: NZEB-10%

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 requires 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 Energy Performance Certificate (EPC).

Multiconsult has assessed the performance of new buildings and how the most energy efficient buildings may be identified in the bank's loan portfolio based the Norwegian NZEB definition. The Norwegian national definition of NZEB was published in January 2023 with a correction issued in January 2024.

All commercial buildings completed after 31 December 2020 with EPC label A qualify according to the NZEB-10 percent criterion. Residential buildings with EPC label B may also qualify depending on energy demand. However, with no energy demand available in the dataset from the bank, only buildings completed after 31 December 2020 with EPC label A are eligible under the NZEB-10 percent criterion.

3.1.2 Buildings built before the 1st of January 2021: EPC A label or within the top 15% 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 as all these buildings have significantly better energy standards and account for less than 15 percent of the commercial building stock built before 2021.

For hotel and restaurant buildings, a three-year lag between implementation of a new building code and the buildings built under it is considered. Hence all buildings finished in 2013 or later qualify.

For office buildings, retail buildings, industrial buildings and warehouses a two-year lag between implementation of a new building code and the buildings built under that code must be considered. Hence all buildings finished in 2012 or later qualify.

Figure 3 illustrates how the criteria, in combination, make up cumulative percentages of the total commercial building stock built before the 1st of January 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 the 1st of January 2021 in Norway. The calculation precludes double counting – each building is only counted once in the analysis.

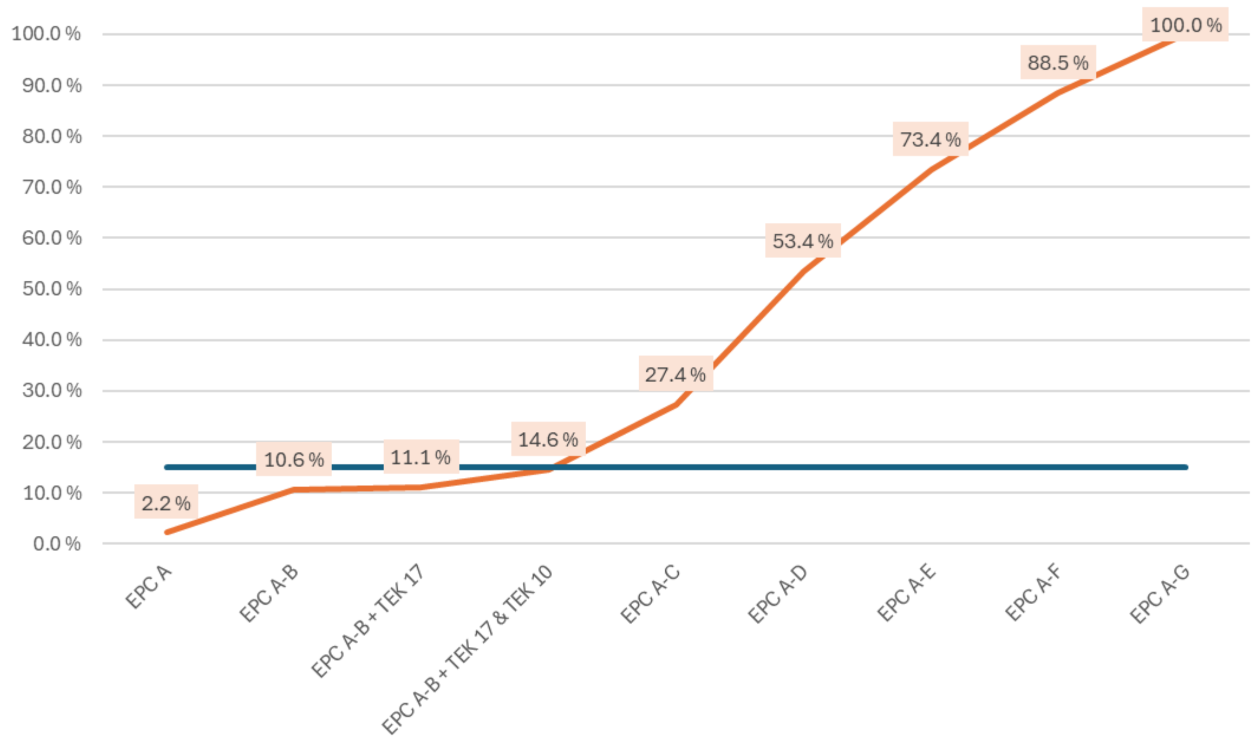

Figure 3 Cumulative percentages for criteria combinations, relative to the total commercial building stock built before 1st of January 2021 in Norway

3.1.3 Renovation of existing buildings

Refurbished Norwegian commercial buildings with at least a 30 percent improvement in energy efficiency measured in specific energy, kWh/m^2, compared to the calculated label based on building code in the year of construction.

Office and retail buildings, industrial buildings and warehouses qualify for this criterion if they are:

- built in 1971 or earlier and have energy grade D or better,
- or built in 1991 or earlier and have energy grade C

Hotels and restaurants qualify according to this criterion if they are:

- built in 1970 or earlier and have energy grade D or better,
- or built in 1990 or earlier and have energy grade C.

3.2 Impact assessment – Commercial buildings

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.

Reduction in energy demand from the average of the commercial building stock to the average for eligible building codes is multiplied by the emission factor and area of eligible assets to calculate impact.

Table 5 Average specific energy demand for the building stock; whole stock, part eligible according to criteria and reduction.

	Average total actual stock	Average TEK10 and TEK17	Reduction
Office buildings	249 kWh/m^2	133 kWh/m^2	41 percent
Retail buildings	321 kWh/m^2	195 kWh/m^2	39 percent
Hotel and restaurant buildings	330 kWh/m^2	195 kWh/m^2	41 percent
Small industry and warehouses	293 kWh/m^2	158 kWh/m^2	46 percent

Impact is calculated by multiplying the emission factor 115 gCO2e/kWh by the area of the eligible assets and the difference between energy usage for the more energy efficient buildings and a baseline.

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

For the buildings qualifying according to the refurbishment criterion only, the calculations are based on the difference between energy demand for achieved energy label and the energy label based on building year.

The eligible buildings in SpareBank 1 Østlandet's commercial portfolio is estimated to amount to 600,000 m^2. Six objects are found eligible according to NZEB-10 percent, all with EPC A. 68 buildings are eligible under top 15 percent for buildings from 2020 and older, of which five buildings have EPC A and eleven have EPC B. The majority, 52 buildings, are found eligible based on building codes TEK10 and TEK17. An additional 36 buildings are found eligible according to a refurbishment criterion, of which 53 percent have energy label C and were built in 1989 or earlier. The buildings qualifying according to two or more criteria are only counted once.

Table 6 Calculated building areas for eligible commercial objects.

	Area qualifying buildings in portfolio [m^2]						
	NZEB-10% EPC A	TEK17	TEK10	EPC A	EPC B	EPC C 1988 or older *1989 for hotels and restaurants	EPC D 1970 or older *1971 for hotels and restaurants
Office buildings	13,692	15,476	20,130	53,032	51,544	37,120	33,607
Retail/commercial buildings	3,000	7,389	64,890	-	4,919	36,425	15,827
Hotel and restaurant buildings	-	-	17,739	14,100	15,441	10,960	20,527
Industry and small warehouse buildings	92,352	1,816	42,683	-	12,755	13,347	1,600
Sum	**109,044**	**24,681**	**145,442**	**67,132**	**84,659**	**97,852**	**71,561**

Based on the calculated figures in Table 5 and 6, the energy efficiency of this part of the portfolio is estimated. All the commercial buildings in the portfolio are not included in one single bond issuance.

The table below 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 7 Performance of commercial eligible objects compared to average building stock.

	Avoided energy demand compared to baseline [GWh/year]	Avoided CO2-emissions compared to baseline [tonnes CO2-eq/year]
Eligible buildings in portfolio	58	6,684
Eligible buildings in portfolio - scaled by bank's engagement	31	3,591

4 Electric vehicles

Multiconsult has assessed the direct and indirect impact of electric vehicles. The bank has provided the necessary data on number of electric vehicles in their portfolio and portfolio volume including type of engine, fuel, and vehicle category - all vehicles registered in Norway. SpareBank 1 Østlandet's vehicle portfolio contains 7,068 electric vehicles. For more information related to the eligibility criteria we refer to SpareBank 1's website[8].

The identified eligible vehicles in the portfolio also align with the technical eligibility criteria formulated by Climate Bonds Initiative (CBI)[9] and in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[10].

The bank's portfolio is assessed regarding direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). A baseline is established as the emission of the average new vehicles introduced to the market, EVs excluded.

4.1 Eligibility

Related to clean transportation, the SpareBank 1 Østlandet Green Bond Framework (2024) has several eligibility criteria for eligible loans. This section investigates the electric vehicle portfolio and the relevant criterion:

- Loans, credits and investments to finance or refinance production, establishment, acquisition, expansion, upgrades, maintenance and operation of low carbon vehicles, where low carbon vehicles are defined as: Fully Electric, Hydrogen or otherwise zero-emission passenger and freight vehicles

The portfolio in question includes solely fully electric vehicles financed by the bank.

This analysis is limited to passenger vehicles, including taxis, and light-duty vehicles below 3.5 tonnes. The SpareBank 1 Østlandet portfolio includes a limited volume of other electric vehicle types, among them heavy-duty vehicles like tractors, buses, and trucks above 3.5 tonnes, motorbikes, and camper vans (182 objects in total). These vehicle types are not assessed here.

4.2 EV Policies and Regulations

This chapter summarizes trends in personal mobility, EV and biofuel policy in Norway relevant for the subsequent Scope 1 and Scope 2 assessments.

4.2.1 Personal Mobility and the Car Fleet in Norway and Sweden

Personal mobility in Norway is high, among the highest in Europe, with privately owned passenger vehicles making up the largest share of the passenger transportation work. Historical data indicates that the average distance driven annually by passenger vehicles in Norway has been declining since 2007[11]. During this peak year, passenger vehicles in Norway were driven an average of 14,000 km annually.

[8] See https://www.sparebank1.no/en/ostlandet/about-us/investor/debt-investors/green-bond-framework.html
[9] https://www.climatebonds.net/standard/transport
[10] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf

In 2023, the average Norwegian passenger vehicle travelled about 11,300 km. For light-duty vehicles, the average travelled distance was 13,300 km[11]. The expected yearly travelled distance for the vehicles in the portfolio is in this analysis estimated based on an expectation of a continuing trend of reduced yearly travelled distance, and as an average over the vehicles' lifetime.

The average age of passenger vehicles scrapped for refund in Norway in 2023 was 18 years and for vans 16 years in 2023[12]. The history of modern EVs is short and there is yet no evidence for the lifetime of EVs being different from other vehicles. Due to uncertainties related to the expected lifetime of new vehicles sold between 2013 and 2024, the average lifetime for passenger vehicles and light-duty vehicles in this analysis are set to 18 and 16 years, respectively.

4.2.2 Electric Vehicle Policy in Norway

The Norwegian government has over time, with different administrations, had high ambitions both regarding electric vehicles and biofuel to reduce CO2 emissions. There were 789,000 electric passenger vehicles on Norwegian roads by the end of 2024, which accounts for 27 percent of the total passenger vehicle stock[13]. The Norwegian Government's targets are that all new light-duty and passenger vehicles sold should be zero-emission from 2025, and that new heavy-duty vehicle sales should be zero-emission or biogas by 2030[14].

The Norwegian EV policy, one of the world's most ambitious EV policies, was effectively put into motion by a series of green incentives, including tax exemption on VAT and registration tax, free fares on the many toll roads and ferries, and free parking and charging in cities.

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

4.2.3 Biofuel Policy in Norway

Norway has an ambitious biofuel policy. From 2018, legislation required all petrol retailers to sell fuel containing biofuels to road traffic. The policy has since evolved. The current government platform has an emphasis on avoiding the usage of biofuels with a high risk of increasing deforestation and strengthens the obligations to utilize second-generation biofuels in the fuels sold[15].

In 2024, the overall quota obligation of biofuels to road traffic was 19 percent, whereof the advanced biofuel requirement was set at 12.5 percent. To incentivise the use of advanced biofuels, one litre of advanced biofuels is counted as two litres of conventional biofuel, for every litre that exceeds the 12.5 percent advanced biofuel requirement[16].Subsequently, the overall use of advanced biofuel has increased. Biofuels made up 15 percent of fuels consumed by domestic road traffic in 2023, up from 12 percent in 2022. Due to the increased use of EVs, the total volume of fuels sold in Norway has decreased

[11] Statistics Norway 12578: Kjørelengder, etter kjøretøytype, drivstofftype, alder, statistikkvariabel og år, 2024
[12] Statistics Norway 05522: Vehicles scrapped for refund, by contents and year, 2024
[13] Statistics Norway 07849: Registered vehicles, by type of transport and type of fuel (M) 2008 - 2023, 2024
[14] https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/veg_og_vegtrafikk/faktaartikler-vei-og-ts/norge-er-elektrisk/id2677481, 2024
[15] https://www.regjeringen.no/no/dokumenter/hurdalsplattformen/id2877252, 2023
[16] https://lovdata.no/dokument/SF/forskrift/2004-06-01-922/KAPITTEL_5#KAPITTEL_5, 2024

in recent years. The overall volume of biofuel has therefore been relatively stable, since the percentage of biofuels has increased[17].

Road taxes (no; veibruksavgift) for all biofuels were introduced in 2020. The taxation of bioethanol is around 50 percent lower than that on standard gasoline. The road tax for biodiesel is similar to that for conventional diesel, with biodiesel taxes being 10 percent higher in 2024[18]. Legislation passed in 2016 mandates that biofuels and liquid biofuels must have a minimum of 50 percent lower life cycle greenhouse gas (GHG) emissions than fossil fuels[16].

In 2023, more than 80 percent of the advanced biofuels in the Norwegian transportation sector derived from used frying oil and animal fat, mostly imported from USA and China. There were no reports of biofuels sold in Norway containing soy or palm oil in 2023, aligning with the goal to reduce the use of raw materials with a high risk for deforestation[17].

4.3 Climate gas emissions (Scope 1 and 2)

Categorizing the emissions, we have chosen to use the CBI guidelines for the emission calculations. CBI's *Land Transport Background Paper* underlines the focus on tailpipe emissions because of their dominance, the need to send strong signals to vehicle purchasers, and the need to promote technologies and infrastructure that have the potential to radically shift emissions trajectories and avoid fossil fuel lock-in[19]. We do however include information on indirect emissions related to power production.

4.3.1 Indicators

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

- Emissions per kilometre [gCO2/km]
- Emissions per passenger-kilometre [gCO2/pkm] or tonne-kilometre [gCO2/tkm]

The vehicle fleet composition and emissions from the different types of vehicles is used to calculate the emissions per kilometre.

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

A vehicle occupancy of 1.7 persons in passenger vehicles and 1.5 persons in a light-duty vehicle have been adopted in this analysis[20].

4.3.2 Direct emissions (tailpipe) - Scope 1

Baseline of Fossil Fuel Combustion Vehicles and Avoided Emissions from EVs

Under scope 1 emissions, we calculate the "Direct tailpipe CO2 emissions from fossil fuels combustion" avoided[19].

The estimation of the baseline is performed through three steps:

---

[17] https://www.miljodirektoratet.no/aktuelt/fagmeldinger/2024/juli-2024/nye-omsetningskrav-ga-mer-biodrivstoff-i-2023
[18] https://www.skatteetaten.no/satser/veibruksavgift/?year=2024#rateShowYear
[19] C. Moore, J. Leigh-Bell and H. Jackson, "Land Transport Criteria Version 2," Climate Bonds intitiative, London, 2020.
[20] https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/mindre-utslipp-per-kjorte-kilometer

1. Estimating the gross CO2 emissions per km (c) from the average vehicle that is being substituted by the zero-emission vehicle.
2. Multiplied by the number of km (d) the vehicle is estimated to travel.
3. Multiplied by the number (n) of vehicles substituting fossil vehicles in the portfolio.

This can be described in the following equation:

$$E_{baseline} = c_{weighted\ average} \cdot d_y \cdot n_{total} = E_{avoided} \quad (1)$$

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

To estimate the annual emissions avoided by the eligible assets, projections are made for direct tailpipe CO2 emissions from fossil fuel combustion in the national vehicle fleets.

For the substituted fossil-fuelled vehicles, emission data are retrieved from recognized test methods and not actual registrations of emissions in a Nordic climate.

Biofuels are already to some degree mixed with fossil fuels in Norway. The reduced emissions due to these contributions are considered in the emission calculations from fossil fuel vehicles. As fossil fuel vehicle emissions are the baseline for EV emission calculation, the biofuels are in effect reducing the impact of the EVs.

Norway aims to reduce emissions from fossil fuelled vehicles by using biofuel in the fuel sold before 2030. The marginal emission reduction possibly obtained through these political goals between 2024-2030 have been accounted for in the analysis. It is assumed that the biofuel share in the fuel mix will remain constant between 2030 and the end of the vehicles' lifetime, assumed to be in 2041 and 2039 for passenger vehicles and light-duty vehicles registered in 2024, respectively.

To estimate the weighted average of emissions per fossil vehicle ($c_{weighted\ average}$) we use the average annual emission from new vehicle models from 2011-2024[21].

To estimate the distance travelled by the average vehicle we assume that EVs drive the average of the total vehicle portfolio for each vehicle type in each country each of the years it is used in its lifetime. Statistics of annual driven distance by electric, diesel and gasoline cars younger than 10 years builds up under this assumption[22].

Traffic volumes per passenger vehicle and light-duty vehicle have shown a historic decline. We use linear regression on the publicly available datasets and extrapolate until 2041 and 2039, respectively. This is a conservative approach as it is likely, at some point, to see flattening.

Emission Factors - Scope 1

Table 8 and Table 9 present the calculated emission factors and CO2 emissions in a year for the relevant vehicle categories. The numbers are based on calculated gross tailpipe CO2 emissions for the average vehicle produced in each of the years between 2011-2024, biofuel- and fossil fuel content in

[21] https://ofv.no/CO2-utslippet/co2-utslippet
[22] https://www.ssb.no/en/statbank/table/08307

petrol/diesel pumped in each year between 2024-2041, as well as the travelled annual distance for the average vehicle.

Table 8 Passenger vehicles: Greenhouse gas emission factors (CO2-eq) for substituted fossil vehicles and EVs, average direct emissions.

	Direct emissions substituted fossil passenger vehicles – average	Direct emissions EVs
Emissions per passenger-km	57 gCO_2e/pkm	0 gCO2/pkm
Emissions per km	97 gCO_2e/km	0 gCO2/km
Emissions per vehicle per year	773 $kgCO_2e$/vehicle/year	0 kgCO2/vehicle/year

Table 9 Light-duty vehicles: Greenhouse gas emission factors (CO2-eq) for substituted fossil vehicles and EVs, average direct emissions.

	Direct emissions substituted fossil light-duty vehicles – average	Direct emissions EVs
Emissions per passenger-km	133 gCO2e/pkm	0 gCO2/pkm
Emissions per km	199 gCO2e/km	0 gCO2/km
Emissions per vehicle per year	2,139 kgCO2e/vehicle/year	0 kgCO2/vehicle/year

4.3.3 Indirect emissions (power consumption only) - Scope 2

Under scope 2 emissions, we calculate the "Indirect emissions from electricity consumption"[19].

Norway trades power internationally through an interconnected European electricity grid. For impact calculations of all power consumption, and even electrification of transportation, the regional or European production mix is more relevant than the national power production mix and is the basis for the main analysis in this report. Nonetheless, calculations of indirect emissions from power production setting the system boundary at national borders are included for comparison.

The direct emissions in power production in Europe (EU27 plus UK and Norway)[23] is expected to be dramatically reduced the coming decades. The emission trajectory used in this analysis takes into consideration the 1.5°C scenario and a substantial reduction of emissions from the power sector towards zero emissions in 2050. This aligns with the EU's ambitious goal of decarbonizing the power sector[24].

The GHG emission intensity baseline for power consumption may be calculated with different system boundaries. For this section, a three-year average emission factor for power in Europe and Norway is applied.

Table 10 Electricity production greenhouse gas factors for European and Norwegian production mixes (CO2-eq).

Scenario	Emission factor [gCO2-eq/kWh]
European (EU27 + UK + Norway) production mix average 2021-2023	231.4
Norwegian production mix average 2021-2023	3.9

[23] EU27, UK and Norway include all European countries except Iceland, Cyprus, Ukraine, Russia, and Moldova, plus United Kingdom and Norway.
[24] G. Amanatidis, "Briefing - European policies on climate and energy towards 2020, 20230 and 2050," European Parliament Policy Department for Economic, Scientific and Quality of Life Policies Directorate-General for Internal Policies, Brussels, 2019

In Table 10, the CO2 emissions related to yearly power production calculated by the Association of Issuing Bodies are included for European countries (EU27 plus UK and Norway) and for Norway[25]. The most recent numbers are for 2023, so the interval 2021-2023 is used. These values will vary from year to year.

The following calculations use the emission factor as an average from a baseline in 2023, seeand the expected lifetime for each type of vehicle, following the expected declining trajectory. The projected trajectories for declining CO2 emissions related to power production for European (EU27 plus UK and Norway) and Norwegian power production, from 2024 and forward, will impact the indirect emissions and avoided emissions from the vehicle portfolio.

The energy consumption of EVs is very much dependent on size and outdoor temperature. There is not sufficient available data to ensure an accurate estimation of energy consumption for the average EV. In these calculations, the average for all currently available EV models in the EV Database, 0.189 kWh/km, is applied[26]. For the energy consumption of light-duty vehicles, 0.26 kWh/km is applied[27].

In Table 11 and Table 12, indirect emission factors are presented both for a European power production mix and a Norwegian power production mix for EVs. Fossil fuelled alternatives do not involve electricity consumption or indirect emissions.

Note that there are indirect emissions related to fossil fuel as well, scope 3 emissions, and not included in this analysis. Scope 3 emissions differ between fossil and electric vehicles mostly due to the batteries where there is rapid technology development.

Table 11 Electricity consumption greenhouse gas factors (CO2-eq) electric vehicles - based on European (EU27 plus UK and Norway) power production mix 2021-2023.

	Indirect emissions electric passenger vehicle – annual average	Indirect emissions electric light-duty vehicle – annual average
Emissions per passenger-km, European power production	16.7 gCO2-eq/pkm	27.5 gCO2-eq/pkm
Emissions per km, European power production	28.3 gCO2-eq/km	41.2 gCO2-eq/km

Table 12 Electricity consumption greenhouse gas factors (CO2-eq) electric vehicles - based on Norwegian power production mix 2021-2023.

	Indirect emissions electric passenger vehicle – annual average	Indirect emissions electric light-duty vehicle - annual average
Emissions per passenger-km, Norwegian power production	0.3 gCO2-eq/pkm	0.5 gCO2-eq/pkm
Emissions per km, Norwegian power production	0.5 gCO2-eq/km	0.7 gCO2-eq/km

[25] Association of Issuing Bodies, “European Residual Mixes 2023”
[26] https://ev-database.org/cheatsheet/energy-consumption-electric-car
[27] https://bransch.trafikverket.se/contentassets/5d86ee446e8a4628bd5aacc27cb213eb/emissionsfaktorer-vagtrafik-2022-2030-2045_v2.xlsx.

4.4 Impact assessment – Electric vehicles

The 7,068 eligible vehicles in SpareBank 1 Østlandet's portfolio are estimated to drive 56.8 million km per annum. The available data from the bank includes the current number of contracts and related portfolio volume and asset values.

Table 13 Number of eligible passenger vehicles and expected yearly mileage.

	No. of vehicles	Sum distance	Sum distance
Passenger vehicles	6,807	54.0 mill. km/year	91.8 mill. pkm/year
Light-duty vehicles	261	2.8 mill. km/year	4.2 mill. pkm/year
Sum portfolio	**7,068**	**56.8 mill. km/year**	**90.0 mill. pkm/year**

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

Direct emissions in the following tables are calculated by multiplying distance travelled [km] by the vehicles in the portfolio in a year, by the specific emission factors [gCO2/km]. Indirect emissions are calculated by multiplying distance travelled [km] by the vehicles in the portfolio in a year by the specific emission factors [gCO2/km].

The values in Table 14 and Table 15 reflect the bank's share of financing being 93.5 percent of the total value of the vehicle portfolio.

Table 14 The portfolio's estimated impact on GHG-emissions, indirect emissions based on the European power production mix, scaled by the bank's engagement.

	Avoided CO2-emissions compared to baseline – scaled by the bank's engagement [tonnes CO2-eq/year]
Direct emissions only (Scope 1)	5,448
Indirect emissions EVs only (Scope 2)	- 1,541
Direct and indirect	**3,907**

Table 15 The portfolio's estimated impact on GHG-emissions, indirect emissions based on the Norwegian power production mix, scaled by the bank's engagement.

	Avoided CO2-emissions compared to baseline – scaled by the bank's engagement [tonnes CO2-eq/year]
Direct emissions only (Scope 1)	5,448
Indirect emissions EVs only (Scope 2)	- 26
Direct and indirect	**5,422**

The reduction in direct emissions, scaled by bank's engagement, corresponds to 2.3 million litres gasoline saved per year.

5 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 138 TWh annually and accounting for 88 percent of the national electricity production[28]. Onshore wind and solar power account for 10 percent (16 TWh/yr) and 0.4 percent (0.6 TWh/yr) of the national power production, respectively. 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 the 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 emphasizes preserving the environment. The Norwegian part of the NVE homepage gives detailed information about different requirements on different kind of projects[29].

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

5.1 Eligibility

The SpareBank 1 Østlandet's Green Bond Framework pertains to the acquisition, development, operation and maintenance of renewable energy power plants generating electricity from solar power, wind power, geothermal power, hydropower and transmission systems. The green loan portfolio of SpareBank 1 Østlandet assessed in this report contains renewable energy power plants generating electricity from hydropower, wind power and solar power.

The EU Taxonomy's "Do no significant harm" (DNSH) criteria for hydropower, wind power and solar power 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 rigid relevant requirements in the Norwegian regulation of energy plants. All Norwegian hydropower, wind power and solar power assets conform to very high standards regarding environmental and social impact. Portfolio alignment with DNSH requirements has not been assessed in detail.

5.1.1 Hydropower

According to the bank's green bonds framework, hydropower plants qualify for green bonds if they are small-scale hydropower projects (less than 25 MW) or large-scale projects (more than 25 MW) with either:

i. life cycle emissions of less than 100 gCO_2e/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

[28] https://www.nve.no/energi/energisystem/kraftproduksjon/
[29] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/

The eligibility criteria are formulated in line with the Climate Bonds Initiative (CBI) criteria[30], and the emissions threshold is in line with the threshold of 100 gCO_2e/kWh in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[31].

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

The eligibility criteria mentioned above are central in the EU taxonomy. Most *do no significant harm* (DNSH) requirements are covered by current national regulation of hydropower, however, with exemptions.

5.1.2 Wind power

According to the bank's green bonds framework, wind power plants qualify for green bonds if they are onshore or offshore wind energy generation facilities or other emerging technologies, such as wind tunnels and cubes.

According to the CBI wind eligibility criteria[32], onshore wind energy generation facilities are automatically eligible. All onshore Norwegian wind power plants in the portfolio thus fulfil this criterion.

5.1.3 Solar power

According to the bank's green bonds framework, all photovoltaics (PV), concentrated solar power (CSP) and solar thermal facilities qualify for green bonds.

Climate Bonds Initiative (CBI) published solar eligibility criteria in April 2023[33]. According to these, onshore solar electricity generation facilities are eligible with a minimum of 85% of electricity generated from solar energy resources. Norwegian solar plants in construction easily fulfill this criterion.

5.2 Eligible assets in portfolio

Sparebank 1 Østlandet's eligible assets have low to negligible GHG emission related to construction and operation of the renewable power plants, something Multiconsult can verify.

The power produced by renewable energy power stations in SpareBank 1 Østlandet's portfolio is mainly from hydropower plants (101 identified plants) with installed capacities in the range of 0.2-10 MW. These are run-of-river plants or small reservoir hydropower plants which hence have higher power density of several thousand W/m^2 (ratio between capacity and impounded area). Moreover, there are four (Norwegian) wind power plants in the portfolio with installed capacities in the range of 2.4-163 MW. In addition, there is one solar power plant in the portfolio with an installed capacity of 7 MWp.

[30] https://www.climatebonds.net/standard/hydropower
[31] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[32] https://www.climatebonds.net/standard/wind
[33] https://www.climatebonds.net/files/files/standards/Solar/Sector%20Criteria%20-%20Solar%20%28April%202023%29.pdf

5.3 Impact assessment – Renewable energy

5.3.1 CO_2-emissions from renewable energy power production

All power production facilities have a negative impact on GHG emissions. Instead of calculating the impact on GHG emissions across the SpareBank 1 Østlandet portfolio, with most of the facilities being in small scale, we refer to The Association of Issuing Bodies (AIB)[34]. AIB is responsible for developing and promoting the European Energy Certificate System (EECS).

The average emission factor for all European hydropower is 6 gCO_2e/kWh, used by the Association of Issuing Bodies (AIB), as referred to by NVE[35], in their calculations of the European residual mix. The value is based on a life cycle analysis (LCA) 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 the factors are reported higher than in other credible sources in a Norwegian context. For instance, Østfoldforskning calculated the average GHG emission intensity of Norwegian hydropower, across all categories using LCA, to be 3.33 gCO_2e/kWh[36].

The SpareBank 1 Østlandet portfolio contains many run-of-river and small reservoir hydropower assets, and the AIB emission factor is therefore regarded as conservative in an impact assessment setting. The positive impact of the hydropower assets is 130 gCO_2e/kWh, compared to the baseline of 136 gCO_2e/kWh from Table 1.

Similarly, the equivalent LCA based emission factor for solar power used by AIB is 71 gCO_2/kWh[35]. Østfoldforskning found in a comparative study that photovoltaic power has average emissions of 50.9 gCO_2/kWh, making the AIB factor more conservative. Using the AIB factor, the positive impact of the solar power assets is then 65 gCO_2e/kWh, compared to the baseline of 136 gCO_2e/kWh from Table 1.

The equivalent emission factor for wind power is by AIB set at 20 gCO_2/kWh. The positive impact of the wind power assets in SpareBank 1 Nord-Norge's portfolio is then 116 gCO_2/kWh compared to the baseline of 136 gCO_2/kWh.

5.3.2 Power production estimates

Actual and planned power production has been provided by the bank and verified by Multiconsult using the NVE's hydropower database[37] , wind power database[38] and licensing cases[39].

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

[34] https://www.aib-net.org/
[35] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/
[36] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf, 2019
[37] https://www.nve.no/energi/energisystem/vannkraft/vannkraftdatabase/
[38] https://www.nve.no/energi/energisystem/vindkraft/data-for-utbygde-vindkraftverk-i-norge/, 2024
[39] https://www.nve.no/konsesjon/konsesjonsbehandling-av-solkraftverk/

5.3.3 Portfolio analysis – Norwegian renewable energy plants

The eligible Norwegian plants in SpareBank 1 Østlandet's portfolio are expected to have the capacity to produce about 318 GWh per year, scaled by the bank's engagement (share of financing). The available data from the bank and open sources include:

- Installed capacity
- Estimated or recorded production
- Age

To cross-check the data, the planned power production for the assets has been attained from the Norwegian Water Resources and Energy Directorate's hydropower database [37], wind power database[40] or licensing documents[39]. Table 16 describes the power plants identified in the mentioned database. The production volume is scaled by the bank's share of financing, ranging from 25 to 100 percent.

Due to the frequently overestimated annual production in solar and small hydropower plants, the expected impact is conservatively calculated by reducing estimated production by 20 percent (80% efficiency).

Table 16 Capacity and annual production of identified eligible hydropower plants, wind plants and solar plants. Production scaled to reflect the bank's share of engagement.

	No. of plants	Capacity (MW/MWp)	Estimated production (GWh/year)	Expected production (GWh/year)
Identified eligible hydropower plants in portfolio	101	281.0	310.8	250.8
Identified eligible wind power plants in portfolio	4	75.9	62.0	62.0
Identified eligible solar power plants in portfolio	1	7.0	6.4	5.1
Sum	**106**	**363.9**	**379.2**	**318.0**

[40] https://www.nve.no/energi/energisystem/vindkraft/data-for-utbygde-vindkraftverk-i-norge/, 2024

Table 17 and Table 18 summarize the unscaled and scaled renewable energy production by the eligible assets in the portfolio in an average year, and the expected avoided CO_2-emissions the energy production results in.

Table 17 Expected annual power production and positive impact on GHG-emissions.

	Expected production (GWh/year)	Expected reduced CO_2-emissions compared to baseline (tonnes CO_2e/year)
Identified eligible hydropower plants in portfolio	642.3	83,505
Identified eligible wind power plants in portfolio	248.0	28,770
Identified eligible solar power plants in portfolio	5.1	333
Total	**895.5**	**112,608**

Table 18 Expected annual power production and positive impact on GHG-emissions. Scaled to reflect the bank's share of engagement.

	Expected production (GWh/year)	Expected reduced CO_2-emissions compared to baseline (tonnes CO_2e/year)
Identified eligible hydropower plants in portfolio	250.8	32,608
Identified eligible wind power plants in portfolio	62.0	7,193
Identified eligible solar power plants in portfolio	5.1	333
Total	**318.0**	**40,133**

6 Sustainable Forestry

Forests make up about 14 million hectares (140,000 km^2), or 44 percent of the land area in Norway[41]. Of this, approximately 8.6 million hectares are productive forest area, and the most important and economically important tree species are spruce, pine and birch[41].

The standing forest in Norway is a key factor in the Norwegian climate gas accounting that is reported on an annual basis to the United Nations as required by the UN Framework Convention on Climatic Change and the Kyoto Protocol. In 2021, the total annual carbon sequestration (storage) by the Norwegian forests amounted to 20.1[42] million tonnes CO_2 equivalents. While considering CO_2 emissions caused by forest- and peat land conversion, the net sequestration was estimated at 15.5 million tonnes. This represents 32 percent of the total Norwegian CO_2 emissions.

Both CO_2 sequestration and carbon stored in the forest biomass have been steadily increasing since the 1920s, because of active forest management since 1945 and especially in the period 1955 – 1992. Trees planted in this period have been, and still partly are, in healthy growth, while logging has remained stable with some increases in quantity over the last years. In the future, the CO_2 sequestration is expected to drop towards 2050 and then stabilize, for again to increase towards 2100. That is due to the combined effect of logging and replanting and the fact that climate change and increased temperatures will lead to an increased growth rate for the forest.

Norwegian obligations through international agreements related to sustainable forestry have been included in Norwegian regulation, including criteria for sustainable forestry negotiated in the European forest cooperation. The purpose of the Norwegian Forestry Act is to promote sustainable management of forest resources and to ensure biodiversity, consideration for the landscape, outdoor life, and cultural values. The Forestry Act applies to all forests. The Biodiversity Act in Norway contains provisions on the protection of forests and special provisions on priority species and selected habitat types to ensure important environmental values, including in forests.

6.1 Eligibility

According to the bank's green bond framework, loans to finance management of forest land certified in accordance with the Forest Stewardship Council (FSC) standards and/or the Programme for the Endorsement of Forest Certified (PEFC) are eligible.

Close to all commercially managed forests in Norway are certified according to ISO 14001, where compliance with the Norwegian PEFC Forest Standard (Living Forest Standard) is one of the main qualification criteria. This makes it highly likely that all forests in the bank's forest-based portfolio are PEFC certified. Nothing has come to the Consultant's attention whilst assessing the forestry portfolio that would suggest otherwise.

It is reasonable to assume that the bank's forestry-based assets will fall into the category Existing Forest Management in the EU Taxonomy. According to the statement in the Technical Annex, FSC and PEFC certified forestry operations are likely to meet the Sustainable Forest Management requirement, the bank's forestry-based assets are probably in compliance with criterion 1. Considering also that most forest properties in Norway, and consequently also the bank's forestry-based assets, have forest manage plans in place, makes it likely that criterion 2 and 3 will be fulfilled. This is because the

[41] https://www.skogbruk.nibio.no/skogen-i-norge, 2021
[42] https://miljostatus.miljodirektoratet.no/tema/klima/norske-utslipp-av-klimagasser/utslipp-og-opptak-fra-skog-og-arealbruk/

information provided in the forestry management plans normally will allow for establishment of a verified GHG balance baseline and a demonstration of consistency and steady progress with respect to carbon storage.

Regarding fulfillment of the requirements of the Forestry Criteria of the Climate Bonds Initiative, it is equally likely that the forest-based loan assets fulfil the requirements of PEFC certification. Uncertainty remains regarding compliance with the climate adaptation and resilience checklist of the Climate Bonds Initiative's Forestry Criteria, which requires a mandatory climate change risks assessment and a plan to mitigate any identified risk.

6.2 Impact Assessment – Forestry

An actively and well managed forested area may bring benefits in the form of carbon sequestration, recreational space, and wildlife preservation. The focus in this high-level evaluation of the forest green loan assets is the mitigation of climate change impacts that these assets potentially represent.

The Sparebank 1 Østlandet portfolio contains 149 properties in total, of which 142 are classified as forest holdings. For these 142 forest properties, the bank has provided information about the main species of tree and forest area. The forests are assumed to be standing timber, not recently harvested.

According to figures from the climate gas accounts for forests prepared by NIBIO[43], lowland forests in Norway amounted to a total area of 14 988 000 hectares (ha) and a carbon stock of 452 million tonnes of CO_2. This equals 30.2 tonnes of CO_2 storage per hectare of forest.

Table 19 Expected annual power production and positive impact on GHG-emissions

	Expected production (GWh/year)	Expected reduced CO_2-emissions compared to baseline (tonnes CO_2e/year)
Identified eligible hydropower plants in portfolio	642.3	83,505
Identified eligible wind power plants in portfolio	248.0	28,770
Identified eligible solar power plants in portfolio	5.1	333
Total	**895.5**	**112,608**

Table 20 presents the calculated carbon storage the green loan assets represent.

Table 20 Present carbon storage in CO_2 equivalents by SpareBank 1 Østlandet's green loan portfolio.

Main species of tree	Area (ha)	CO_2 Storage (tonnes per ha)	Total CO_2 Storage of Forest Assets (tonnes)
Spruce (*Picea abies*)	82 856	30.2	2 498 729
Pine (*Pinus sylvestris*)	36 304	30.2	1 094 830
Total	**119 160**	**30.2**	**3 593 560**

[43] https://www.skogbruk.nibio.no/klimagassregnskapet-for-norske-skoger

As can be read from Table 20, the present carbon storage of the green loan portfolio of SpareBank 1 Østlandet is estimated at 3.6 million tonnes CO_2 equivalents. This amounts to 41 percent of the estimated 8.7 million tonnes of CO_2 equivalents from road traffic sector in Norway in 2022[44].

In a publication from Bioforsk[45] (now NIBIO), the average carbon sequestration capacity is estimated to be 1.3 tonnes of carbon per ha per year which corresponds to 4.9 tonnes of CO_2 per ha. In Table 21, the annual carbon sequestration capacity of the green loan portfolio has been estimated using this figure. The bank's engagement has been calculated at 30 percent.

Table 21 Estimated annual carbon sequestration by the green loan portfolio assets of SpareBank 1 Østlandet.

Main species of tree	Area (ha)	Annual CO_2 sequestration (tonnes per ha)	Estimated annual increase in CO_2 storage (tonnes)	Estimated annual increase in CO_2 storage scaled by bank's share of financing (tonnes)
Spruce (*Picea abies)*	82 856	4.9	404 338	125 472
Pine (*Pinus sylvestris)*	36 304	4.9	177 163	54 976
Total	**119 160**	**4.9**	**581 500**	**180 448**

[44] SSB 08940: Klimagasser, etter kilde (aktivitet), energiprodukt, komponent, statistikkvariabel og år, 2024
[45] A. Grønlund,. K. Bjørkelo, G. Hylen and S. Tomter (2010). CO_2-opptak i jord og vegetasjon i Norge. Lagring, opptak og utslipp av CO_2 og andre klimagasser.

7 Sustainable Agriculture – Solar PV installations

Historical update and status for PV systems installations on agriculture buildings

Installation of solar power systems, also called photovoltaics (PV) systems, on agriculture buildings have increased the last few years. A recent calculation carried out by Multiconsult for the organization Norges Vel shows that agricultural buildings have large roof areas that can be well-suited for solar power production and the theoretical power potential for solar power productions, could be between 5 and 7 TWh. The greatest potential is around the Oslofjord, in Innlandet, and Trøndelag.[46] According to NVE, installation of PV system within agriculture, foresting and aquaculture industry represents seven percent of the total installations of PV systems in Norway, per April 2025[47].

After a large increase in PV systems installation nationally within agriculture, foresting and aquaculture industry in 2022 and 2023, there was an 82 % reduction in PV systems installations in 2024 (4 MW) compared with 2023 (23 MW). The high increase in 2022/2023 could be related to high energy prices and a support scheme through Innovation Norway's renewable energy and technology program for agriculture (no; "Verdiskapningsprogrammet for fornybar energi og teknologi i landbruket"). In 2022 the total of 220 solar energy projects received investment support from this support scheme. 200 of the projects were pure PV systems resulting in 9 GWh new yearly electricity production (which corresponds to approx. 10-11 MW installed capacity). Support of the order of 25 million Norwegian krone was granted for these projects in 2022[48]. From August 2023 only PV systems with introduction of new technology are prioritized through the program, not conventional PV systems installation[49]. The decrease in installation of PV systems in 2024 within agriculture could be a result of lacking attractive support scheme, together with lower energy prices and high interest rates.

There are available support schemes for solar PV installations on farms, among them a support scheme that enables sharing self-produced renewable energy within a property without paying grid tariffs and public taxes for the electricity self-consumed[50] and some local support mechanisms.

7.1 Eligibility

According to the bank's green bond framework, loans are eligible under the sustainable agriculture criteria if they finance or refinance agricultural projects/activities with a substantial positive climate impact that do not deplete existing carbon pools

- agricultural projects/activities with a farm sustainability plan with a substantial positive climate impact has been established based on yearly record of its climate performance (Landbrukets Klimakalkulator) advisory

PV systems on agriculture buildings have a substantial positive climate impact. The PV systems produce renewable energy and hence reduce CO_2 emissions over their lifetime (ref CO2 calculation compared to European power mix below). In addition, the PV systems are installed on existing infrastructure such as buildings and will therefore also contribute to sustainable land management.

The CBI Agriculture criteria cover farm-level production of crops (including agroforestry) and livestock. The agricultural criteria however align with other sector criteria, where "Solar panels or wind turbines

[46] https://www.multiconsult.no/aktuelt/nyheter/2025/mars/stort-potensial-for-solenergi-fra-landbruksbygg
[47] https://www.nve.no/energi/energisystem/solkraft/oversikt-over-solkraft-i-norge
[48] https://www.smabrukarlaget.no/media/jgxps5k3/2022-rapportering-vsp-fornybar-energi-og-teknologi-i-landbruket.pdf
[49] https://www.innovasjonnorge.no/tjeneste/fornybar-energi-i-landbruket
[50] https://www.regjeringen.no/no/aktuelt/fastsetter-forskriftsendringer-for-deling-av-egenprodusert-fornybar-strom-pa-samme-eiendom/id2975877

on agricultural land/buildings to either power the farm or sell to the grid" fall under the solar and wind criteria, respectively[51]. Agricultural loans for solar PV installations are therefore here considered eligible related to the same solar criteria as described in section 5 Renewable energy.

7.2 Impact assessment – Solar PV installations

The 56 eligible solar PV installations in SpareBank 1 Østlandet's portfolio are expected to have the capacity to produce about 1.5 GWh per year, scaled to the bank's engagement. The available data from the bank include:

- Installed capacity
- Estimated or recorded production
- Loan balance
- Installation price[52]

Table 22 outlines the capacity and production of power plants in the portfolio.

Table 22 Total capacity and annual production of eligible solar PV installations

	No. of plants	Capacity (kWp)	Estimated production (MWh/year)	Expected production (MWh/year)
Identified eligible solar PV installations	56	2,941	2,693	2,154

Impact for the agriculture solar installations in the SpareBank 1 Østlandet portfolio has been calculated with the same method and emission factors as in section 5.3 ("*Impact assessment – Renewable energy*"). Table 23 below summarizes the unscaled and scaled renewable energy produced by the eligible assets in the portfolio in an average year, and the expected avoided CO_2-emissions the energy production results in. As in section 5, the expected impact is conservatively calculated by reducing estimated production by 20 percent.

Table 23 Annual power production and estimated positive impact on GHG-emissions

	Expected production (MWh/year)	Expected reduced CO_2-emissions compared to baseline (tonnes CO_2e/year)
Identified eligible solar PV installations	2,154	140
Identified eligible solar PV installations - scaled by bank's share of financing	1,482	96

[51] https://www.climatebonds.net/standard/agriculture, 2021
[52] Where balance and/or value is missing, bank's engagement is assumed to be 1.