REPORT

SpareBank 1 Østlandet
Green Portfolio Impact Assessment 2024

CLIENT

SpareBank 1 Østlandet

SUBJECT

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

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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 close to 0.7 mill. tonnes CO_2e/year:

Energy efficient residential buildings	*12,966 tonnes CO_2e/year*
Energy efficient commercial buildings	*5,714 tonnes CO_2e/year*
Electric vehicles	*2,329 tonnes CO_2e/year*
Renewable energy	*71,916 tonnes CO_2e/year*
Sustainable forestry	*591,045 tonnes CO_2e/year*
Sustainable agriculture – solar PV installations	*259 tonnes CO_2e/year*
Total	***684,229 tonnes CO_2e/year***

Note that for electric vehicles, the unscaled impact is the sum of 3,878 tonnes CO_2e/year Scope 1 emissions, and -1,549 CO_2e/year in Scope 2 emissions based on European power mix.

When scaled by the banks share of financing, the impact is estimated to 0.2 mill. tonnes CO_2e/year:

Energy efficient residential buildings	*6,941 tonnes CO_2e/year*
Energy efficient commercial buildings	*2,717 tonnes CO_2e/year*
Electric vehicles	*2,178 tonnes CO_2e/year*
Renewable energy	*27,862 tonnes CO_2e/year*
Sustainable forestry	*164,082 tonnes CO_2e/year*
Sustainable agriculture – solar PV installations	*207 tonnes CO_2e/year*
Total	***203,987 tonnes CO_2e/year***

Note that for electric vehicles, the scaled impact is the sum of 3,626 tonnes CO_2e/year Scope 1 emissions, and - 1,448 CO_2e/year in Scope 2 emissions based on European power mix.

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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 CO_2- 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 2022 (88 percent hydropower and 10 percent wind) results in emissions of 7 gCO_2e/kWh. In the figure, the production mix is included for other selected European states for comparison.

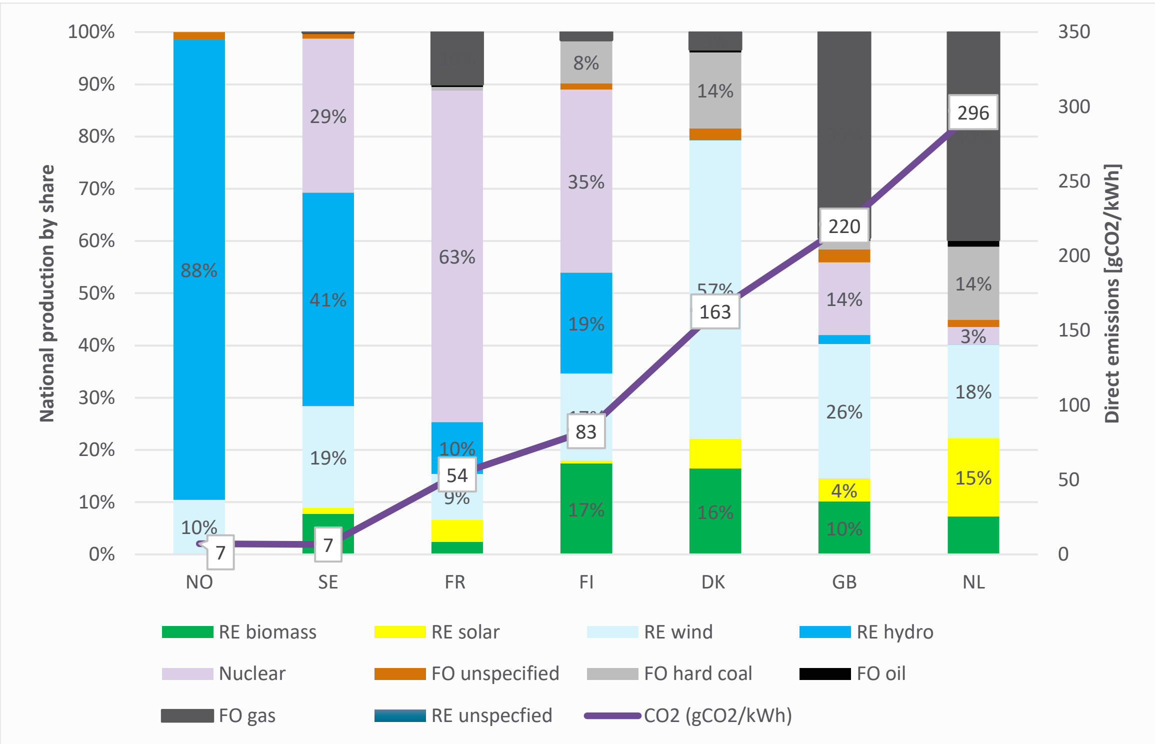

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2022, Association of Issuing Bodies[2]).

Power is traded internationally in an ever more interconnected European electricity grid. For impact calculations, the regional or European production mix is more relevant than national production. Using

[1] https://www.sparebank1.no/en/ostlandet/about-us/investor.html
[2] https://www.aib-net.org/facts/european-residual-mix, 2023

a life cycle analysis, the Norwegian Standard NS 3720:2018 "Method for greenhouse gas calculations 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 (CO_2 equivalents) for two scenarios. (Source: NS 3720:2018, Table A.1)

Scenario	Emission factor
European (EU27 + UK + Norway) consumption mix	136 gCO2e/kWh
Norwegian consumption mix	18 gCO2e/kWh

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 (February 2020)[3].

Applying the factor based on EU27 + UK + Norway energy production mix, the resulting emission factor for Norwegian residential buildings is on average 115 gCO_2e/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 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 4 but are 168 gCO_2e/kWh for passenger vehicles and 177 gCO_2e/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 a baseline.

1.2 Emission factors in green portfolio assessments vs. annual total portfolio assessments

In addition to reporting on impact of the green portfolio used as basis for emissions of green bonds, as presented in this report, the bank reports annually the greenhouse gas emissions in CO2- equivalents for the whole portfolio.

Where this green portfolio reporting considers the energy related emissions in the life cycle of the eligible objects assuming a decarbonization of the power system in line with EU policy in this life span, the emission factor used in the total portfolio reporting is reflecting the current energy mix in the power system. The latter is in line with PCAF and gives the bank annual feedback on how the total portfolio is performing.

For investors in green bonds, however, we present annual impact of the eligible objects over their lifetime using a lower emission factor, resulting in more conservative impact.

[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 line or stricter than the equivalent CBI's proxy criterion for Norwegian residential buildings.

New or existing residential buildings belonging to top 15 percent low carbon buildings in Norway:

i. New or existing 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 (12.4 percent in 2023). A two-year lag between the implementation of a new building code and the buildings built under that code must be taken into account.

ii. Existing Norwegian residential buildings with EPC-labels A or B.

iii. Refurbished Norwegian commercial and 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.)

iv. Buildings built from the 1st of January 2021 should be at least 20 percent more energy efficient than regulation at time of construction.

Over the last several decades, the changes in the building code have pushed for more energy efficient buildings. Combining the information on the calculated energy demand related to building code and information on the residential building stock, the calculated average specific energy demand on the Norwegian residential building stock is 251 kWh/m^2. Building codes TEK10 and TEK17 give an average specific energy demand for existing houses and apartments, weighted for actual stock, of 114 kWh/m^2.

Hence, the building codes TEK10 and TEK17 give a calculated specific energy demand 54 percent lower than the average residential building stock.

2.2 Impact assessment - Residential buildings

A reduction of energy demand from the average 251 kWh/m^2 of the total residential building stock to the average energy demand of buildings eligible based on building code (114 kWh/m^2), is multiplied to the emission factor and the area of eligible assets to calculate impact for buildings qualifying 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 830,000 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 (Statistics Norway[5]).

Eligibility is first checked against the building code criterion. The ones left are checked against the EPC-criterion, and last against the refurbishment criterion so no double counting of objects will occur.

The majority of the 7,589 qualifying objects are eligible through the building code criterion. Of the 516 objects qualifying according to the EPC-criterion, 9 percent are A's and the rest have energy label B. 1,140 objects qualify according to the refurbishment criteria, of which 69 percent have energy label D and were built before 1971.

Note that data is unavailable to check if the buildings built in 2021 and later are performing 20 percent better than the energy efficiency standards in the TEK17 code. Hence the number of units and area are presented separately in the tables below for information. In the impact assessment, the units are included, however, as performing no better than the TEK17 standard.

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

	No. of units of eligible buildings in portfolio						
	TEK10	TEK17	TEK17 2021+	EPC A	EPC B	EPC C <1991	EPC D <1971
Small residential buildings	1,604	510	791	13	267	98	133
Apartments	1,486	574	968	33	203	251	658
Sum	**3,090**	**1,084**	**1,759**	**46**	**470**	**349**	**791**

Table 3 Calculated area of qualifying buildings.

	Area of eligible buildings in portfolio [m²]							
	TEK10	TEK17	TEK17 2021+	EPC A	EPC B	EPC C <1991	EPC D <1971	**Sum**
Small residential buildings	244,650	79,419	120,920	2,681	49,659	17,357	23,030	**537,716**
Apartments	107,485	39,324	66,688	2,431	14,380	17,444	44,945	**292,697**
Sum	**352,135**	**118,743**	**187,608**	**5,112**	**64,039**	**34,801**	**67,975**	**830,413**

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

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

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	Avoided CO_2-emissions compared to baseline
Eligible buildings in portfolio	**113 GWh/year**	**12,966 tonnes CO_2e/year**
Eligible buildings in portfolio - scaled by bank's engagement	**60 GWh/year**	**6,941 tonnes CO_2e/year**

3 Energy efficient commercial buildings

3.1 Eligibility criteria

Unique criteria have been established for the four subcategories: office buildings, retail, hotel and restaurant buildings and industry/warehouses. The criteria identify no more than the top 15 percent most energy efficient commercial buildings countrywide based on building code.

Eligible Commercial Green Buildings for SpareBank 1 Østlandet must one of three eligibility criteria, the first being: New or existing Norwegian office and retail buildings, industrial buildings and warehouses, hotel and restaurant 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 building stock.

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.

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 to 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 stock	Average TEK10 and TEK17	Reduction
Office buildings	246 kWh/m^2	139 kWh/m^2	43 percent
Retail buildings	318 kWh/m^2	201 kWh/m^2	37 percent
Hotel and restaurant buildings	327 kWh/m^2	209 kWh/m^2	36 percent
Small industry and warehouses	285 kWh/m^2	160 kWh/m^2	44 percent

Furthermore, new or existing Norwegian office and retail buildings, industrial buildings and warehouses, hotel and restaurant buildings are eligible for green bonds if having energy label A or B.

Lastly, new, or existing Norwegian office and retail buildings, hotels and restaurants, industrial buildings and warehouses are also eligible if they have been refurbished, leading to an improved energy efficiency of 30 percent. 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 built in 1990 or earlier and have energy grade C.

3.2 Impact assessment - Commercial buildings

The eligible buildings in SpareBank 1 Østlandet’s commercial portfolio is estimated to amount to 507,000 m^2. 57 objects are found eligible according to the building code criterion. Two of the 14 buildings identified as eligible according to an EPC-criterion only, have the energy label A. An additional 33 buildings are found eligible according to a refurbishment criterion, of which 52 percent have energy label C and were built before 1991. The buildings qualifying according to two or more criteria are only counted once.

Impact is calculated by multiplying the emission factor 115 gCO_2e/kWh by the area of the eligible assets and the difference between energy usage for the more energy efficient buildings and a baseline. To calculate impact for buildings qualifying to the building code criterion, the difference is between average specific energy demand for each sub-category in the building stock and the average for qualifying buildings. 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.

Table 6 Calculated building areas for eligible commercial objects.

	Area qualifying buildings in portfolio [m^2]						
	TEK10	TEK17	EPC A	EPC B	Energy upgrade to EPC C	Energy upgrade to EPC D	Total
Office buildings	31,774	27,046	5,024	62,596	71,147	42,410	239,997
Retail/commercial buildings	81,642	6,621		9,167	28,585	7,195	133,210
Hotel and restaurant buildings	18,116		14,100	15,441	10,960	20,527	79,144
Industry and small warehouse buildings	35,675	1,816		7,433	8,010	1,600	54,534
Sum	**167,207**	**35,483**	**19,124**	**94,637**	**118,702**	**71,732**	**506,885**

Based on the calculated figures in Table 5 and Table 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	Avoided CO_2-emissions compared to baseline
Eligible buildings in portfolio	**50 GWh/year**	**5,714 tonnes CO_2e/year**
Eligible buildings in portfolio - scaled by bank's engagement	**24 GWh/year**	**2,717 tonnes CO_2e/year**

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 5,545 electric vehicles.

The eligibility criteria are framed in agreement with the Climate Bonds Initiative (CBI) criteria[6]. The eligible EVs/ zero tailpipe emission vehicles in the portfolio are also automatically aligned to the wording in the June 2021 EU Taxonomy Annex I to the Commission Delegated Regulation[7].

The bank's portfolio is assessed regarding direct emissions (Scope 1) and indirect emissions related to electric power production (Scope 2). The emission of the average vehicles compared to the total new vehicles introduced to the market (EVs excluded) constitutes the baseline used in this analysis.

4.1 Eligibility

Related to clean transportation, the SpareBank 1 Østlandet Sustainable Product Framework has a several of relevant eligibility criteria for Green Financing Instruments. This report, however, investigate the electric vehicle portfolio and the relevant criterion:

- Development, manufacture, purchase, or financing of electric, hybrid or hydrogen passenger vehicles or fleets

The portfolio in question includes solely 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 does however include 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 (28 objects in total).

4.2 General description

Personal mobility in Norway is high, among the highest in Europe, with privately owned passenger vehicles accounting for most of the passenger transportation work.

Historical figures of how far the average passenger vehicle is driven annually in Norway, show a falling slope from 2007 and 2008, when the passenger vehicles peaked and were on average driven about 14,000 km. In 2022 the average passenger vehicle in Norway travelled about 11,100 km, while light-duty vehicles travelled about 13,500 km[8]. In this analysis, the expected yearly travelled distance for the vehicles in the portfolio is estimated based on an expectation of a continuing trend of reduced yearly travelled distance, and as an average in the vehicles' lifetime.

In 2022 the average age of passenger vehicles scrapped for refund in Norway was 18 years old, and 16 years for vans[9]. The history of modern EVs is short and there is yet no evidence for the lifetime of EVs being different from other vehicles. There are uncertainties related to the expected lifetime of new

[6] https://www.climatebonds.net/standard/transport
[7] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[8] SSB 12578: Kjørelengder , etter kjøretøytype, drivstofftype, alder, staisikkvariabel og år, 2023
[9] https://www.ssb.no/en/statbank/table/05522

vehicles sold between 2011 and 2023, so the average lifetime for passenger vehicles and light-duty vehicles are set to 18 and 16 years, respectively, in this analysis independent of fuel type.

4.1 EV policy in Norway

There were almost 600,000 electric passenger vehicles on Norwegian roads by the end of 2022, which accounts for 20 percent of the total passenger vehicle stock[10]. The Norwegian Parliament have unanimously agreed that all new light-duty and passenger vehicles sold should be zero-emission from 2025[11].

A broad consensus around gradually expanding the Norwegian EV-politics has been sustained in parliament. The Norwegian EV policy, one of the world's most ambitious EV policies, was made effective by the tax exemption on VAT and the steep registration tax, in addition to a series of initial benefits like free fares on the many toll roads, ferries, free parking and free charging in cities.

In 2023, the Norwegian government adjusted the previous VAT exemption to only be applicable up to 500,000 NOK (Norwegian kroner) 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 and EVs are currently paying up to a maximum, by law, of 70 percent for toll roads, and 50 percent for parking and ferries.

4.2 Biofuel policy in Norway

Norway has an ambitious biofuel policy, with a 50 percent reduction in greenhouse gas (GHG) emissions from fossil fuel from 2018[12]. In 2018, legislation was put in place to require all petrol retailers to sell fuel containing biofuels. The goal has since been advanced, with a special emphasis on avoiding the usage of biofuels with a high risk of increasing deforestation[13]. As of 2023, the percentage of advanced biofuel of the overall quota obligation (24.5 percent) is set at 12.5 percent[14]. To incentivize 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. Subsequently, the overall use of advanced biofuel has increased year after year. In 2022, advanced biofuels accounted for 94 percent of the overall biofuel usage, thus reducing the usage of conventional biofuels[15]. As a result, the overall volume of biofuel has declined in the past years, even though the percentage of biofuels has increased. The current government platform (Hurdalsplattformen) strengthens the obligations to utilize second-generation biofuels in the fuels sold[16].

In 2020, a road tax (no: veibruksavgift) for all biofuel was introduced. The taxation of bioethanol is significantly lower compared to standard gasoline, but the road tax for biodiesel is equal to conventional diesel[17]. Previous estimates from 2018 concluded that biofuel used in Norway resulted in 72 percent lower GHG emissions in a life cycle perspective compared to regular fuels[18]. The same

[10] SSB 07849: Drivstofftype, type kjøring og kjøretøygrupper (K) 2008 - 2022
[11] https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/veg_og_vegtrafikk/faktaartikler-vei-og-ts/norge-er-elektrisk/id2677481/
[12] Produktforskriften kapittel 3: Omsetningskrav for biodrivsoff og børekrafskrierier for biodrivsoff og flytende biobrensel, Lovdata, 2019
[13] https://www.regjeringen.no/no/dokumenter/politisk-plattform/id2626036/
[14] https://lovdata.no/dokument/LTI/forskrift/2023-12-20-2305
[15] https://www.miljodirektoratet.no/aktuelt/nyheter/2022/juni-2022/avansert-biodrivstoff-oker-pa-norske-veier/
[16] https://res.cloudinary.com/arbeiderpartiet/image/upload/v1/ievv_filestore/43b0da86f86a4e4bb1a8619f13de9da9afe348b29bf24fc8a319ed9b02dd284e
[17] https://www.skatteetaten.no/satser/veibruksavgift/?year=2023#rateShowYear
[18] https://www.miljodirektoratet.no/aktuelt/nyheter/2019/mai-2019/salget-av-avansert-biodrivstoff-okte-i-fjor/

year, legislation was passed, stipulating that biofuels shall have a minimum of 50 percent lower life cycle GHG emissions than fossil fuels[19].

In 2022, 94 percent of the biofuel utilized in the Norwegian transportation sector stems from waste and residue, most of it imported from North America, and China. Biofuels accounted for 13 percent of all fuels consumed by domestic road traffic in 2022- a similar level to 2021. The share of biofuels sold in Norway containing soy or palm oil is also below 0.5 percent, aligning with the target to reduce the usage of raw materials with a high risk for deforestation[20].

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*[21] underlines the focus on tailpipe emissions because of their dominance, the need to send strong signals to vehicle purchasers and the need to promote technologies and infrastructure that have the potential to radically shift emissions trajectories and avoid fossil fuel lock-in. We do however include indirect emissions related to power production.

4.3.1 Indicators

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

- Emissions per kilometre [gCO_2e/km]
- Emissions per passenger-kilometre [gCO_2/pkm]

The passenger vehicle fleet composition and emissions from each type of passenger vehicle 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 kilometers are found by multiplying the number of passengers by the corresponding number of kilometers travelled.

Statistics Norway's method for calculating indicators for emissions per passenger kilometre utilizes a vehicle occupancy of 1.7 persons in passenger vehicles and 1.5 persons in a light-duty vehicles, and these factors have been adopted in this analysis[22].

4.3.2 Direct emissions (tailpipe) - Scope 1

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

The estimation of the baseline is performed through 3 steps:

1. Estimating the gross CO_2-emission per km from the average vehicle being substituted by the zero-emission vehicle.
2. Multiplied by the number of km the vehicle is estimated to travel.
3. Multiplied by the number of vehicles substituting fossil vehicles in the portfolio.

[19] https://lovdata.no/dokument/LTI/forskrift/2022-12-20-2356
[20] https://www.miljodirektoratet.no/aktuelt/nyheter/2023/mai-2023/mer-frityrolje-og-slakteavfall-pa-tanken-i-2022/
[21] https://www.climatebonds.net/files/files/CBI_Background%20Doc_Transport_Jan2020%20.pdf page 25
[22] https://www.ssb.no/transport-og-reiseliv/artikler-og-publikasjoner/mindre-utslipp-per-kjorte-kilometer

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

To estimate the annual emissions avoided by the eligible assets, projections are made for direct tailpipe CO_2-emissions from fossil fuels combustion in the national passenger vehicle fleet.

For the substituted fossil fuelled vehicles, emission data are retrieved from recognized test methods and not actual registrations of emissions in a Nordic climate. Test methods have lately been improved to better reflect actual emissions but are still likely to underestimate the emissions[23].

Biofuels are to some degree mixed with fossil fuels, and the reduced emissions due to these contributions are considered in the emissions from the vehicle that would have been bought as an alternative for the electric vehicle in this portfolio, in effect reducing the climate impact of zero emission vehicles. As Norway is aiming at reducing emissions from fossil fuelled vehicles through use of biofuel in the fuel sold before 2030, the marginal emission reduction possibly obtained through these political goals between 2023-2030 have been accounted for in the analysis. It is assumed that the biofuel share in the fuel mix will remain constant between 2030 and 2040.

To estimate the weighted average of emissions per fossil passenger vehicle, we use the average annual emission from new passenger vehicle models from 2011-2023[24].

To estimate the distance travelled by the average passenger vehicle we assume that EVs drive as much as an average Norwegian passenger vehicle in each of the 18 years it is in use. Statistics of annual driven distance by electric, diesel and gasoline cars younger than 10 years support this assumption[25]. For light-duty vehicles, the distance travelled is calculated similarly, using the 16-year lifetime.

Traffic volumes per passenger vehicle and light-duty vehicle has shown a historic decline. We use linear regression on publicly available dataset from the years 2005 to 2022 and extrapolate until 2040. This is a conservative approach as it is likely, at some point, to see a flattening.

Table 8 and Table 9 present the calculated emission factors for the relevant vehicle categories. The calculations are based on calculated gross tailpipe CO_2-emissions for the average vehicle produced in each of the years between 2011-2023, biofuel- and fossil fuel content in petrol/diesel pumped in each year between 2023-2040, as well as the travelled annual distance for the average vehicle.

Table 8 Passenger vehicles: Greenhouse gas emission factors (CO_2 equivalents) for substituted fossil vehicles and EVs, average direct emissions.

	Direct emissions substituted fossil passenger vehicles – average	Direct emissions EV
Emissions per passenger-km	45 gCO_2e/pkm	0 gCO_2e/pkm
Emissions per km	77 gCO_2e/km	0 gCO_2e/km
Emissions per passenger vehicle and year	639 $kgCO_2e$/vehicle/year	0 $kgCO_2e$

[23] https://www.vegvesen.no/fag/fokusomrader/miljo+og+omgivelser/klima
[24] https://ofv.no/CO2-utslippet/co2-utslippet
[25] https://www.ssb.no/statbank/table/12578/

Table 9 Light-duty vehicles: Greenhouse gas emission factors (CO_2 equivalents) for substituted fossil vehicles and EVs, average direct emissions.

	Direct emissions substituted fossil light-duty vehicles – average	Direct emissions EV
Emissions per passenger- km	133 gCO_2e/pkm	0 gCO_2e/pkm
Emissions per km	200 gCO_2e/km	0 gCO_2e/km
Emissions per light-duty vehicle and year	2,226 $kgCO_2e$/vehicle/year	0 $kgCO_2e$

4.3.3 Indirect emissions (power consumption only) - Scope 2

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

The direct emissions in power production in Europe (EU27 + UK + Norway) is expected to be dramatically reduced the coming decades. The emission trajectory 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[26].

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. In Table 10, the CO_2-emissions related to yearly power production calculated by the Association of Issuing Bodies[27] are included for all European countries except Iceland, Cyprus, Ukraine, Russia, and Moldova (EU + UK + Norway), and for Norway. The most recent numbers are for 2022, so the interval 2020-2022 is used.

Table 10 Electricity production greenhouse gas factors for European and Norwegian production mixes (CO_2 equivalents). (Source: Association of Issuing Bodies)

Scenario	Emission factor
European (EU27 + UK + Norway) production mix average 2020-2022	241 gCO_2e/kWh
Norwegian production mix average 2020-2022	6.4 gCO_2e/kWh

Using a European production mix is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[28].

The following calculations use the emission factor as an average from the baseline presented in Table 10Table 10 and the expected lifetime for each type of vehicle, following the emission trajectory of the production mixes. For passenger vehicles, with an expected lifetime of 18 years, the emission factor

[26] http://www.europarl.europa.eu/RegData/etudes/BRIE/2019/631047/IPOL_BRI(2019)631047_EN.pdf
[27] https://www.aib-net.org/facts/european-residual-mix, 2023
[28] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf

will then be an average of the emission factor in the period from 2023-2040. The same method is used to estimate the emission factor based on the Norwegian power production mix and similarly for vans.

The projected declining CO_2 emission trajectories reported for power production for EU and Norway, from 2022 and onward, will impact the indirect emissions and avoided emissions from the vehicle portfolio.

The energy consumption of EVs is very much dependent on size and outdoor temperature. There is not sufficient available data to ensure an accurate estimation of energy consumption for the average EV. In these calculations we are using the average for all currently available EV models in the Electrical Vehicle Database[29], 0.195 kWh/km, which is close to the factor presented in the Swedish "Handbok för vägtrafikens luftföroreningar"[30]. The same handbook presents an energy consumption for light-duty vehicles of 0.25 kWh/km. These factors are applied in the analysis.

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, and in Table 13 for fossil fuelled alternatives.

Table 11 Electricity consumption greenhouse gas factors (CO_2 equivalents) electric vehicles - based on EU power production mix.

	Indirect emissions electric passenger vehicle – annual average	Indirect emissions electric light-duty vehicle – annual average
Emissions per passenger-km, European power production	19.3 gCO_2e/pkm	29.5 gCO_2e/pkm
Emissions per km, European power production	32.8 gCO_2e/km	44.3 gCO_2e/km

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

	Indirect emissions electric passenger vehicle – annual average	Indirect emissions electric light-duty vehicle - annual average
Emissions per passenger-km, Norwegian power production	0.52 gCO_2e/pkm	0.8 gCO_2e/pkm
Emissions per km, Norwegian power production	0.9 gCO_2e/km	1.2 gCO_2e/km

[29] https://ev-database.org/cheatsheet/energy-consumption-electric-car
[30] Handbok för vägtrafikens luftföroreningar, chapter 6, Trafikverket, 2021

Table 13 Electricity consumption greenhouse gas factors (CO_2 equivalents) fossil fuelled alternatives.

	Indirect emissions fossil passenger vehicle*	Indirect emissions fossil light-duty vehicle*
Emissions per passenger-km, European/ Norwegian power production	0 gCO_2e/pkm	0 gCO_2e/pkm
Emissions per km, European/ Norwegian power production	0 gCO_2e/km	0 gCO_2e/km

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

4.4 Impact assessment – Electric vehicles

The 5,545 eligible vehicles in SpareBank 1 Østlandet's portfolio are estimated to drive 46.4 million km per annum. The available data from the bank includes the current number of contracts and related portfolio volume and asset values.

Table 14 Number of eligible passenger vehicles and expected yearly mileage.

	No. of vehicles	Sum distance	Sum distance
Passenger vehicles	5,335	44.1 mill. km/year	75 mill. pkm/year
Light-duty vehicles	210	2.3 mill. km/year	3.5 mill. pkm/year
Sum portfolio	**5,545**	**46.4 mill. km/year**	**78.5 mill. pkm/year**

The table below summarises, in rounded numbers, the lower CO_2-emissions compared to baseline for the eligible assets in the portfolio in an average year in the lifetime of the vehicles in the portfolio, presented as reductions in direct emissions and indirect emissions. Note that 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 by the vehicles in the portfolio in a year by the specific emission factor [CO_2e/km] in Table 8 and Table 9. Indirect emissions are calculated by multiplying distance travelled by the vehicles in the portfolio in a year by the specific emission factors [CO_2e/km] in Table 11 through Table 13.

The values in Table 15 and Table 16 reflect the bank's share of financing being 93.5 percent of the total value of the vehicle portfolio.

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

	Avoided CO_2-emissions compared to baseline – scaled by the bank's engagement
Direct emissions only (Scope 1)	3,626 tonnes CO_2e/year
Indirect emissions EVs only (Scope 2)	- 1,448 tonnes CO_2e/year
Direct and indirect	**2,178 tonnes CO_2e/year**

Table 16 The portfolio's estimated impact on GHG-emissions, indirect emissions based on the Norwegian power production mix, scaled by the bank's engagement.

	Avoided CO_2-emissions compared to baseline – scaled by the bank's engagement
Direct emissions only (Scope 1)	3,626 tonnes CO_2e/year
Indirect emissions EVs only (Scope 2)	- 39 tonnes CO_2e/year
Direct and indirect	**3,587 tonnes CO_2e/year**

The reduction in direct emissions, scaled by bank's engagement, corresponds to 1.5 million liters gasoline saved per year.

5 Renewable energy

Hydropower has played a significant role in Norway's power production since the industrial revolution. Today, hydropower remains a crucial component of the national energy mix, accounting for 89 percent of the national electricity production in 2023. The same year, onshore wind accounted for 9 percent of the national power production[31]. Solar power plants are currently being introduced to the Norwegian power sector, with the first ground mounted plant connected to the grid in 2023. The Norwegian Government has set a target to increase the electricity production from solar energy to 8 TWh in 2030, including solar PV on buildings. Per March 2024 the electricity production from PV systems in Norway is approx. 0,5 TWh.

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[32].

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

5.1 Eligibility

5.1.1 Hydropower

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

- All run-of-river power stations have no or negligible negative impact on GHG emissions.
- Due to the cold climate and high power density of Norwegian hydropower, Norwegian reservoirs are not exposed to significant cyclic revegetation of impoundment and hence the negative impacts on GHG emissions from these reservoirs are small.

Hydropower plants in the bank's portfolio qualify for green bonds if they are small-scale hydropower projects (less than 25 MW) and large-scale projects (more than 25 MW) with either:

i. life cycle emissions of less than 100 gCO_2e/kWh, or

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

Climate Bonds Initiative (CBI) have published hydropower eligibility criteria[33]. These criteria have a mitigation component and an adaptation and resilience component.

The mitigation component for existing plants requires power density > 5 W/m^2 or emission intensity < 100 gCO_2e/kWh for existing plants. (For new/under construction after 2020 the thresholds are 10 W/m^2 and 50 gCO_2e/kWh).

[31] https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet/artikler/markant-nedgang-i-stromforbruket-for-kraftintensiv-industri, 2024
[32] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[33] https://www.climatebonds.net/files/files/Hydropower-Criteria-doc-March-2021-release3.pdf

The adaptation and resilience component, addressing ESG, is in the Norwegian context covered by the rigid relevant requirements in the Norwegian regulation of hydropower.

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

5.1.2 Solar power

According to the bank's green bonds framework, all photovoltaic energy projects are eligible for green bonds. All plants in the bank's portfolio thus qualify.

Climate Bonds Initiative (CBI) published solar eligibility criteria in April 2023[34]. 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.

Portfolio alignment with DNSH requirements has not been assessed for solar power.

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 stations with capacities in the range of 0.2-10 MW. These are run-of-river plants or hydropower plants with small reservoirs and hence have higher power density of several thousand W/m^2 (ratio between capacity and impounded area). In addition, there is one solar power plant in the portfolio, which is under construction, with a planned installed capacity of 7.0 MW.

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)[35]. 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[36], 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,

[34] https://www.climatebonds.net/files/files/standards/Solar/Sector%20Criteria%20-%20Solar%20%28April%202023%29.pdf
[35] https://www.aib-net.org/
[36] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/

Østfoldforskning calculated the average GHG emission intensity of Norwegian hydropower, across all categories using LCA, to be 3.33 gCO_2e/kWh[37].

The SpareBank 1 Østlandet portfolio contains many run-of-river and small 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[36]. 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.

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[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.

5.3.3 Portfolio analysis - New or existing Norwegian renewable energy plants

The eligible plants in SpareBank 1 Østlandet's portfolio is expected to have the capacity to produce about 271 GWh per year, scaled to the bank's engagement. The available data from the bank and open sources include:

- Type of plant (run-of-river/reservoir)
- 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[38] or licensing documents[39]. Table 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 often-overestimated annual production in small hydropower, the impact is conservatively calculated for estimated production reduced by 20 percent for all energy technologies.

[37] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf, 2019
[38] https://www.nve.no/energi/energisystem/vannkraft/vannkraftdatabase/
[39] https://www.nve.no/konsesjon/konsesjonsbehandling-av-solkraftverk/

Table 17 Capacity and annual production of eligible hydropower plants and solar plants as both estimated and expected production. Productionl scaled to reflect the bank's share of engagement.

	Capacity per plant	No. of plants	Total capacity	Estimated production	Expected production
Small run-of-river	0.24-10 MW	55	191.7 MW	186.2 GWh/year	149.0 GWh/year
Small reservoir HPP	1.8-9 MW	7	23.4 MW	78.5 GWh/year	62.8 GWh/year
Solar plant	7 MW	1	7.0 MW	6.4 GWh/year	5.1 GWh/year
Sum		**63**	**222 MW**	**271 GWh/year**	**217 GWh/year**

Table 17 below summarizes the scaled renewable energy produced by the eligible assets in the portfolio in an average year, and the avoided CO_2-emissions the energy production results in.

Table 17 Annual power production and estimated positive impact on GHG-emissions.

	Expected produced power	Reduced CO_2-emissions compared to baseline
Identified eligible hydropower plants in portfolio - scaled by bank's share of financing	211.8 GWh/year	27,529 tonnes CO_2e/year
Identified eligible solar power plant in portfolio - scaled by bank's share of financing	5.1 GWh/year	333 tonnes CO_2e/year
Total	**217.1 GWh/year**	**27,862 tonnes CO_2e/year**

6 Sustainable Forestry

Forests make up about 14 million hectares (140,000 km^2), or 44 percent of the land area in Norway. 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[40].

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[41] 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

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

manage plans in place, makes it likely that criterion 2 and 3 will be fulfilled. This is because the 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 151 forest properties for which the bank has provided information about the main species of tree and forest area. The forests are assumed to be standing forests, not recently cut.

According to figures from the climate gas accounts for forests prepared by NIBIO[42], 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. The table below presents the calculated carbon storage the green loan assets represent.

Table 18 Present carbon storage in CO_2 equivalents by SpareBank 1 Østlandet's green loan portfolio.

Type of forest	Area	CO_2 Storage	Total CO_2 Storage of Forest Assets
Spruce	84,812 ha	30.2 tonnes per ha	2,557,711 tonnes
Pine	36,304 ha	30.2 tonnes per ha	1,094,830 tonnes
Total	**121,116 ha**	**30.2 tonnes per ha**	**3,652,542 tonnes**

As can be read from Table 18, the present carbon storage of the green loan portfolio of SpareBank 1 Østlandet is estimated at 3.7 million tonnes CO_2 equivalents. This amounts to 42 percent of the estimated 8.7 million tonnes of CO_2 equivalents from road traffic and the transport sector in Norway in 2022[43].

In a publication from Bioforsk [44] (now NIBIO), the average carbon sequestration capacity is estimated to be 1.33 tonnes of carbon per ha per year which corresponds to 4.88 tonnes of CO_2 per ha. In Table 19, the annual carbon sequestration capacity of the green loan portfolio has been estimated using this figure. The bank's engagement has been calculated at 28 percent.

[42] https://www.skogbruk.nibio.no/klimagassregnskapet-for-norske-skoger
[43] SSB 08940: Klimagasser, etter kilde (aktivitet), energiprodukt, komponent, statistikkvariabel og år, 2024
[44] 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.

Table 19 Estimated annual carbon sequestration by the green loan portfolio assets of SpareBank 1 Østlandet.

Type of forest	Area	Annual CO_2 sequestration	Estimated annual increase in CO_2 storage	Estimated annual increase in CO_2 storage scaled by bank's share of financing
Spruce	84,812 ha	4.88 tonnes per ha	413,882 tonnes	114,889 tonnes
Pine	36,304 ha	4.88 tonnes per ha	117,163 tonnes	49,183 tonnes
Total	**121,116 ha**	**4.88 tonnes per ha**	**591,045 tonnes**	**164,082 tonnes**

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 in the last few years. According to NVE, installation of PV system within agriculture, foresting and aquaculture industry represents eight percent of the total installations of PV systems in Norway, per March 2024[45].

There has been an increase in PV systems installation within agriculture in 2022 and 2023. This could be related to 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 was granted for these projects in 2022[46]. From August 2023 only PV systems with introduction of new technology is prioritized through the program, not conventional PV systems installation[47].

There are other 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[48] and some local support mechanisms.

Another reason for the increase in PV installations within agriculture in 2022 and 2023 could be the sudden increase in power prices from 2022.

7.1 Eligibility

According to the bank's green bond framework, loans are eligible under the sustainable agriculture criteria if they finance or refinance

i. agricultural projects/activities with a substantial positive climate impact that do not deplete existing carbon pools

ii. 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 CO_2 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 on agricultural land/buildings to either power the farm or sell to the grid" fall under the solar and wind

[45] https://www.nve.no/energi/energisystem/solkraft/oversikt-over-solkraft-i-norge/
[46] https://www.smabrukarlaget.no/media/jgxps5k3/2022-rapportering-vsp-fornybar-energi-og-teknologi-i-landbruket.pdf
[47] https://www.innovasjonnorge.no/tjeneste/fornybar-energi-i-landbruket
[48] https://www.regjeringen.no/no/aktuelt/fastsetter-forskriftsendringer-for-deling-av-egenprodusert-fornybar-strom-pa-samme-eiendom/id2975877/

criteria, respectively[49]. 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 122 eligible solar PV installations in SpareBank 1 Østlandet's portfolio are expected to have the capacity to produce about 4.4 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[50]

Table 20 describes the power plants in the portfolio. The production volume is scaled by the bank's share of financing, ranging from 29 to 100 percent.

Table 20 Total capacity and annual production of eligible solar PV installations, as well as estimated and expected production scaled by bank's engagement.

	Capacity per plant	No. of plants	Total capacity	Estimated production	Expected production
Solar PV installations	4-160 kWp	122	5,214 kWp	3,983 MWh/year	3,186 MWh/year

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. Table 21 below summarizes the scaled renewable energy produced by the eligible assets in the portfolio in an average year, and the avoided CO_2-emissions the energy production results in. As in section 5, the impact is conservatively calculated for estimated production reduced by 20 percent.

Table 21 Annual power production and estimated positive impact on GHG-emissions.

	Expected power production	Reduced CO_2 emissions compared to baseline
Identified eligible solar PV in agriculture portfolio - scaled by bank's share of financing	3,186 MWh/year	207 tonnes CO_2e/year

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