REPORT

SpareBank 1 Ringerike Hadeland
Green Portfolio Impact Assessment FY 2022

CLIENT

SpareBank 1 Ringerike Hadeland

SUBJECT

Impact assessment - energy efficient residential buildings, renewable energy and forestry

DATE: / REVISION: June 24th, 2023 / 02

DOCUMENT CODE: 10248957-01-TVF-RAP-001

Multiconsult

REPORT

PROJECT	**SpareBank 1 Ringerike Hadeland Green Portfolio Impact Assessment FY 2022**	DOCUMENT CODE	10248957-1-TVF-RAP-001
SUBJECT	Impact assessment - energy efficient residential buildings, forestry and renewable energy	ACCESSIBILITY	Open
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In summary, the assessed impact is significant for all examined asset classes in the SpareBank 1 Ringerike Hadeland portfolio qualifying according to the bank's green bond criteria.

The total impact of the assets in the portfolio is close to 70 thousand tones CO_2e/year:

Energy efficient residential buildings	*410 ton CO_2e/year*
Renewable energy	*8,450 ton CO_2e/year*
Sustainable forestry	*61,360 ton CO_2e/year*
Total	*70,220 ton CO_2e/year*

When scaled by the banks share of financing, the impact is estimated to 43 thousand tones CO_2e/year (note that scaled impact of the renewable energy asset has not been performed due to data availability):

Energy efficient residential buildings	*190 ton CO_2e/year*
Renewable energy	*8,450 ton CO_2e/year*
Sustainable forestry	*34,030 ton CO_2e/year*
Total	*42,670 ton CO_2e/year*

02	24.06.2023	Updated heading	STJ, KJRK	STJ	STJ
01	04.06.2023	Updated	STJ, KJRK	STJ	STJ
00	15.05.2023	Draft	STJ, KJRK	STJ	STJ
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY

TABLE OF CONTENTS

Contents

1 Introduction

Assignment

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

In this document we briefly describe SpareBank 1 Ringerike Hadeland's green bond qualification criteria and the result of an analysis of the bank's loan portfolio. More detailed information about the eligibility criteria is available on SpareBank 1 Ringerike Hadeland's website[1].

1.1 CO_2- emission factors related to electricity demand and production

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

As shown in figure 1, the Norwegian production mix in 2021 (91% hydropower and 8% wind) results in emissions of 4 gCO_2e/kWh. The production mix is also included in the figure for other selected European states for illustration.

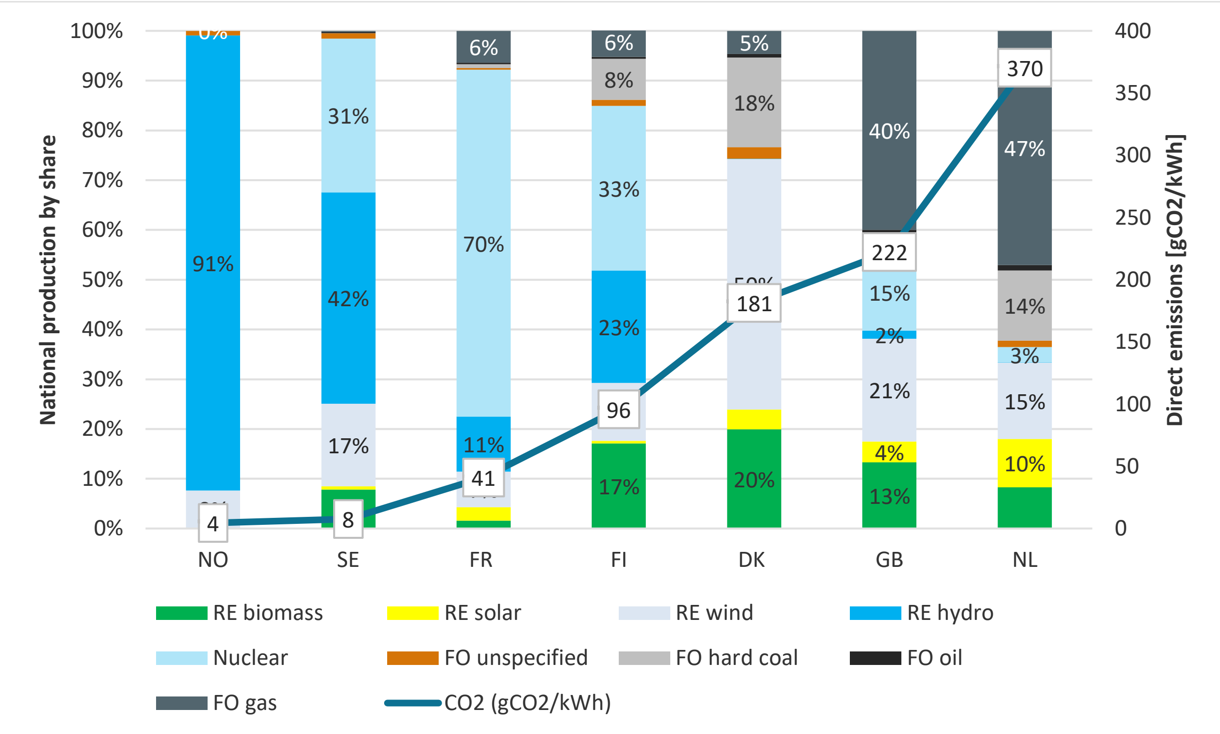

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2021, Association of Issuing Bodies[2])

[1] https://www.sparebank1.no/nb/ringerike-hadeland/om-oss/investor.html
[2] https://www.aib-net.org/facts/european-residual-mix

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 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 CO_2-factor for the next 60 years, a lifetime relevant for buildings and renewable energy assets, according to two scenarios as described in table 1.

Table 1 Electricity production greenhouse gas factors (CO_2 equivalents) for two scenarios (source: NS 3020:2018, Table A.1)

Scenario	CO_2-factor (g/kWh)
European (EU27 + UK + Norway) consumption mix	136
Norwegian consumption mix	18

The impact calculations in this report apply the European mix in table 1. This is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[3].

Applying the factor based on EU27 + UK + Norway energy production mix, the resulting CO_2-factor for Norwegian residential buildings[4] is on average 111 gCO_2e/kWh due to the influx of bioenergy and district heating in the energy mix. This factor is used in impact calculations in section 2.

[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 existing residential buildings in the SpareBank 1 Ringerike Hadeland portfolio is identified against an EPC criterion and a refurbishment criterion as formulated below. These criteria are in line or stricter than the equivalent CBI's proxy criterion for Norwegian residential buildings.

Existing residential buildings:

- Built between 2019-2021 with current standard (TEK17) and EPC A
- Built between 2012-2018 with current standard (TEK10) and A or B
- Built before 2012 with relevant standard (TEK07 or earlier) and EPC A or B or C

Refurbished buildings:

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

OR

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

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

Note that Sparebank 1 Ringerike Hadeland also have an eligibility criterion for new buildings. However, data is not available to check whether or not the buildings built in 2021 or later are performing 20% better than the energy efficiency standards in the TEK17 code, so this criterion is not included in this impact assessment.

2.2 Impact assessment - Residential buildings

A reduction of energy demand is multiplied to the emission factor and the area of eligible assets to calculate impact for buildings qualifying to the criteria. For the buildings qualifying according to the EPC-criterion, the difference in specific energy demand between achieved energy label and weighted average in the EPC database is used. For buildings qualifying on the refurbishment criterion, the difference between achieved energy label and assumed original energy label based on the year of construction.

The eligible residential buildings in SpareBank 1 Ringerike Hadeland's portfolio is estimated to amount to 38,209 square meters. The available data include reliable area for 50 % of the 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 EPC criterion. The remaining buildings are checked against the refurbishment criterion, so no double counting of objects will occur. There are 276 eligible dwellings in SpareBank 1 Ringerike Hadeland's portfolio. The major part, 244 objects, is eligible through the EPC criterion, of which 21% are A's and the rest have energy labels B and C.

Table 2 Eligible residential objects and qualifying building area

	Number of units				Area qualifying buildings in portfolio [m^2]				
	EPC A	EPC B <2018	EPC C <2012	EPC D <1989	EPC A	EPC B <2018	EPC C <2012	EPC D <1989	**Sum**
Small residential buildings	13	73	71	25	3,597	11,428	11,857	5,059	**31,941**
Apartments	39	33	15	4	2,865	2,147	963	293	**6,268**
Sum	**52**	**106**	**86**	**29**	**6,462**	**13,575**	**12,820**	**5,352**	**38,209**

Based on the calculated figures in Table 2, the energy efficiency of this part of the portfolio is estimated based on calculated energy demand dependent on energy label. 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 111 gCO_2e/kWh. A proportional relationship is expected between energy consumption and emissions.

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

Table 3 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	**4 GWh/year**	**410 tons CO2e/year**
Scaled by engagement	**2 GWh/year**	**186 tons CO2e/year**

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

3 Renewable energy

Hydropower has played a significant role in Norway's power production since the industrial revolution. Today, hydropower remains a crucial component of the national energy mix, accounting for 88% of the national electricity production in 2022[6]. The same year, onshore wind accounted for 10% of the national power production.

Power production development in Norway is strictly regulated and subject to licencing and is overseen by Norwegian Water Resources and Energy Directorate (NVE), a directorate under the Ministry of Petroleum and Energy. Licenses grant rights to build and run power production installations under explicit conditions and rules of operation. NVE puts particular emphasis on preserving the environment. The Norwegian part of the NVE homepage gives detailed information about different requirements on different kind of projects[7].

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

3.1 Eligibility

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.

In addition, the bank qualifies biomass (chip firing) projects with:

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

ii. achieved public funding support from Enova[8]

(Bioenergy projects are not included in this assessment.)

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

- All run-of-river power stations have negligible negative impact on GHG emissions.
- Due to the cold climate and high power density of Norwegian hydropower, Norwegian reservoirs are not exposed to significant cyclic revegetation of impoundment and hence the negative impacts on GHG emissions from these reservoirs are very small.

Climate Bonds Initiative (CBI) hydropower eligibility criteria[9]. 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 new/under construction the thresholds are 10 W/m^2 and 50 gCO_2e/kWh). The adaptation and resilience component, addressing ESG, is in the Norwegian context covered by the rigid relevant requirements in the Norwegian regulation of hydropower.

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

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.

3.2 Eligible assets in portfolio

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

All power produced by renewable energy power stations in SpareBank 1 Ringerike Hadeland's portfolio is from a single hydropower station with capacity of 12.5 MW. This is a run-of-river plant and hence have higher power density of several thousand W/m^2 (ratio between capacity and impounded area).

3.3 Impact assessment - Renewable energy

3.3.1 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 from the hydropower station in the SpareBank 1 Ringerike Hadeland portfolio, we refer to The Association of Issuing Bodies (AIB). AIB is responsible for developing and promoting the European Energy Certificate System – "EECS".

The Association of Issuing Bodies (AIB), referred to by NVE[10], uses an emission factor of 6 gCO_2e/kWh for all European hydropower 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. For instance, Østfoldforskning calculated the average GHG emission intensity of Norwegian hydropower, across all categories using LCA, to be 3.33 gCO_2e/kWh[11].

SpareBank 1 Ringerike Hadeland portfolio contains a run-of-river asset, 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 (see Table 1).

3.3.2 Power production estimates

Actual and planned power production has been provided by the bank and verified by Multiconsult using the NVE's hydropower database.

[10] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/
[11] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf

3.3.3 Portfolio analysis - New or existing Norwegian renewable energy plants

The eligible plant in SpareBank 1 Ringerike Hadeland's portfolio is expected to have the capacity to produce about 65 GWh per year. 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 asset has been attained from the Norwegian Water Resources and Energy Directorate's hydropower database[12] or licencing documents where the estimate is somewhat higher. Due to the often overestimated annual production in small hydropower, the impact is conservatively calculated based on the lowest estimate. The source is also credible due to the age (>70 years) of the power plant. Table 4 describes the hydropower plants identified in the mentioned database.

Table 4 Capacity and annual production of eligible hydropower plants, expected production based on power company and NVE estimates

	Capacity [MW]	# of plants	Total capacity [MW]	Expected production power company [GWh/yr]	Expected production NVE [GWh/yr]
Small run-of-river	**12.5**	**1**	**12.5**	**65**	**70.4**

Table 5 Annual power production and estimated positive impact on GHG-emissions below summarises 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 5 Annual power production and estimated positive impact on GHG-emissions

	Expected produced power	Reduced CO_2-emissions compared to baseline
Identified eligible renewable energy plants in portfolio	**65 GWh/year**	**8,450 tons gCO_2e/year**

[12] https://www.nve.no/energiforsyning/kraftproduksjon/vannkraft/vannkraftdatabase/

4 Sustainable Forestry

Forests make up about 14 million hectares (140,000 km^2), or 44% 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[13].

The standing forest in Norway is an important 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 2020, the total annual carbon sequestration (storage) by the forest amounted to 24.5[14] million tonnes CO_2 equivalents. While taking into account CO_2 emissions caused by forest- and peat land conversion, the net sequestration was estimated at 20.3 million tonnes. This represents 40% of the total Norwegian CO_2 emissions.

Both CO_2 sequestration and carbon stored in the forest biomass has 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 relatively 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.

4.1 Eligibility

SpareBank 1 Ringerike Hadeland qualify loans to finance or refinance forest activities or projects aligned with environmentally responsible forest management, including:

- Loans to reforestation, planting of new forest
- Rehabilitation of degraded lands to facilitate reforestation

All forest land must be certified in accordance with the FSC or PEFC standard (either at individual or group level)

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.

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

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 Technical Annex, FSC and PEFC certified forestry operations are likely to meet the Sustainable Forest Management requirement, hence the forestry-based assets are probably in compliance with criterion 1. Considering that the large majority of forest properties in Norway have forest 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.

With regards to fulfilling 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.

4.2 Impact Assessment

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. According to figures from the climate gas accounts for forests prepared by NIBIO[15] , 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 6 Present carbon storage in CO_2 equivalents by SpareBank 1 Ringerike Hadeland's green loan portfolio

Type of forest	Area - ha	CO_2 Storage - tonnes per ha	Total CO_2 Storage of Forest Assets - tonnes
Spruce and pine	**12,600**	**30.2**	**379,200**

As can be read from Table 6, the present carbon storage of the green loan portfolio of SpareBank 1 Ringerike Hadeland is estimated at almost 0.4 million tonnes CO_2 equivalents.

In a publication from Bioforsk [16] (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 7 below, the annual carbon sequestration capacity of the green loan portfolio has been estimated.

Table 7 Estimated annual carbon sequestration by the green loan portfolio

Type of forest	Area - ha	Annual CO_2 sequestration - tonnes per ha	Estimated annual increase in CO_2 storage - tonnes	Estimated annual increase in CO_2 storage relative to engagement - tonnes
Spruce and pine	**12,600**	**4.88**	**61,360**	**34,030**

[15] https://www.skogbruk.nibio.no/klimagassregnskapet-for-norske-skoger
[16] 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.