REPORT

Sparebanken Vest Green Portfolio Impact Assessment 2021

CLIENT

Sparebanken Vest

SUBJECT

Impact assessment- energy efficient residential and commercial buildings and renewable energy-2021

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REPORT

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In summary, impact assessed for all examined asset classes in the Sparebanken Vest portfolio qualifying according to the bank's green bond criteria, as of December 31st 2021, is dominated by hydropower assets but with significant contributions from energy efficient residential and commercial buildings. This table sums up the impact:

Total estimated impact for qualifying objects in portfolio:

Energy efficient residential buildings	*26,762 ton CO_2e/year*
Energy efficient commercial buildings	*1,381 ton CO_2e/year*
Renewable energy	*917,172 ton CO_2e/year*
Total	*945,315 ton CO_2e/year*

Impact for qualifying objects in portfolio scaled by the bank's share of financing:

Energy efficient residential buildings	*14,121 ton CO_2e/year*
Energy efficient commercial buildings	*753 ton CO_2e/year*
Renewable energy	*131,269 ton CO_2e/year*
Total	*146,143 ton CO_2e/year*

03	24.02.2022	Volume by value adjustment	STJ, NP	NP, STJ	STJ
02	17.02.2022	31.12.2021 portfolio	STJ, NP	NP, STJ	STJ
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1 Introduction

Assignment

On assignment from Sparebanken Vest, Multiconsult has assessed the impact of the part of Sparebanken Vest's loan portfolio eligible for green bonds as of December 31st 2021.

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

1.1 CO_2- emission factors related to energy demand

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. Since January 2020, all use of fossil oil is banned from use in buildings. The fuel mix in Norwegian district heating production in 2020 included only 3% from fossil fuels (oil and gas) (Fjernkontrollen[2]).

In 2020, the Norwegian power production was 98% renewable (SSB[3]). As shown in Figure 1, the Norwegian production mix in 2020 (92% hydropower and 6% wind) resulted in emission of 8 gCO_2/kWh. In the figure, the production mix is included for other selected European states for illustration.

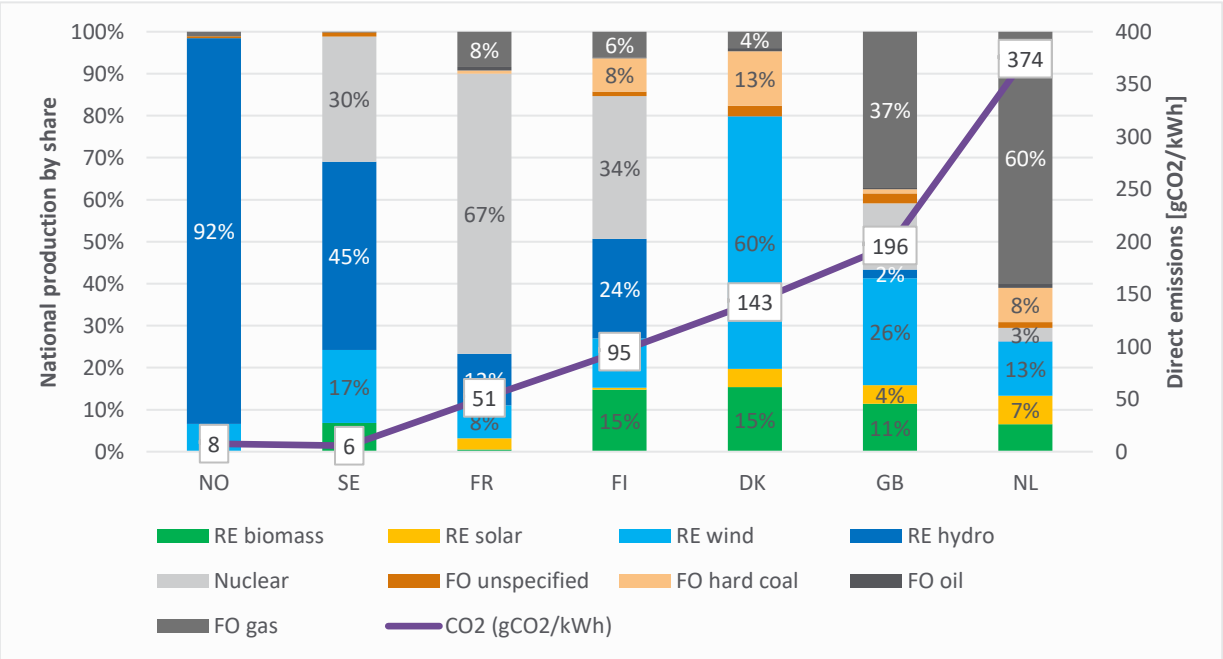

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2020, Association of Issuing Bodies[4])

[1] https://www.spv.no/om-oss/investor-relations/gronne-obligasjoner
[2] http://fjernkontrollen.no/
[3] https://www.ssb.no/statbank/table/12824
[4] 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" takes into account 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.

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.

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

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

The impact calculations in this report apply the European mix in table 1. Using a European mix instead of a national production mix is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[5].

Applying the factor based on EU27+UK + Norway energy production mix, the resulting CO_2- factor for Norwegian residential buildings[6] is on average 111 gCO_2/kWh due to the influx of bioenergy and district heating in the energy mix. In this analysis, the emission factors for the energy mix differs from previous years due to real decarbonization of district heating production and very reduced fossil fuel use. This factor is used in impact calculations on pages 7 through 10.

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

2 Energy efficient buildings

2.1 Residential buildings

2.1.1 Eligibility criteria

Eligibility is in this impact assessment for residential buildings in the Sparebanken Vest portfolio identified against a building code criterion as formulated below and a criterion based on the national Energy Performance Certificate (EPC) system.

Building code criterion

This criterion is in line with the equivalent Climate Bonds Initiative (CBI)'s proxy criteria for Norwegian residential buildings.

i. New or existing Norwegian apartments that comply with the Norwegian building codes of 2010 (TEK10) or 2017 (TEK17). Hence, finished in 2012 and later.

ii. New or existing Norwegian other residential dwellings that comply with the Norwegian building codes of 2007 (TEK07), 2010 (TEK10) or 2017 (TEK17). Hence, finished in 2009 and later.

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 for the Norwegian residential building stock is 252 kWh/m^2. Building code TEK07 (small residential buildings), TEK10 and TEK17 gives an average specific energy demand for existing houses and apartments, weighted for actual stock, of 118 kWh/m^2. Hence, compared to the average residential building stock, the building code TEK07 (small residential buildings), TEK10 and TEK17 gives a calculated specific energy demand reduction of 53%.

As of 30/06/2021, the bank is no longer including new buildings in the portfolio in the green pool. Loans from before this date are grandfathered.

Energy Performance Certificate (EPC) criterion

Existing Norwegian residential buildings with EPC-labels A and B.

Previously EPC C labels were included, and the relevant loans have been grandfathered as of 31/12/2020.

Refurbished Residential buildings in Norway with an improved energy efficiency of 30%

One of two criteria below must be met:

i. Refurbished Norwegian residential buildings with at least two steps of improvement in energy label compared to the calculated label based on building code in the year of construction.

ii. Refurbished Norwegian residential buildings with at least a 30% 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.

This criterion has so far not been used to identify eligible buildings in the portfolio.

2.1.2 Impact assessment - Residential buildings

The eligible residential buildings in Sparebanken Vest's portfolio are estimated to amount to 1,907,665 square meters. The available data include reliable area for most objects. For object where this data is not available, the area per dwelling is calculated based on average area derived from national statistics (Statistics Norway[7]).

Table 2 include information on the number of qualifying objects and their living area for residential buildings in both the bank's Private market portfolio (PM) and Business market portfolio (BM).

		Number of units	Area qualifying buildings in portfolio [m^2]
Criterion 1 and 2	Apartments	4,906	360,436
	Small residential buildings	6,333	1,131,757
Grandfathered Criterion 1 and 2	Apartments	495	37,626
	Small residential buildings	2,197	377,846
	Total	13,931	1,907,665

Table 2 Eligible residential objects and calculated building areas in PM and BM portfolios

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 bio energy and district heating, resulting in a total specific emission factor of 111 gCO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

Table 3 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.

	Avoided energy compared to baseline	Avoided CO_2-emissions compared to baseline
Buildings eligible under the building code criterion	184 GWh/year	20,338 tons CO_2/year
Grandfathered under the building code criterion	34 GWh/year	3,743 tons CO_2/year
Buildings eligible under the EPC criterion	12 GWh/year	1,331 tons CO_2/year
Grandfathered under the EPC criterion	12 GWh/year	1,315 tons CO_2/year
Total impact eligible buildings	**242 GWh/year**	**26,726 tons CO_2/year**
Impact scaled by bank's engagement	**128 GWh/year**	**14,121 tons CO_2/year**

Table 3 Performance of eligible residential objects compared to average residential building stock

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

2.2 Commercial buildings

2.2.1 Eligibility criteria

The eligibility criteria for commercial buildings are divided in three, one based on building code, one based on certifications as BREEAM, and at last an upgrade criterion.

Building code criterion

New or existing commercial buildings belonging to top 15% low carbon buildings in Norway:

i. New or existing Norwegian hotel and restaurant buildings that comply with the Norwegian building code TEK07, TEK10, TEK17 and later building codes. Hence, finished in 2010 and later.

ii. New or existing Norwegian office and retail that comply with the Norwegian building TEK07, TEK10, TEK17 and later building codes. Hence, finished in 2009 and later.

iii. New or existing Norwegian industrial buildings and warehouses that comply with the Norwegian building TEK10, TEK17 and later building codes. Hence, finished in 2012 and later.

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.

Building category	Average total stock [kWh/m^2]	Average qualifying objects [kWh/m^2]	Reduction [%]
Office buildings	251	151	40 %
Commercial buildings	323	214	34 %
Hotel buildings	309	208	33 %
Small industry and warehouses	297	169	43 %

Table 4 Average specific energy demand for the building stock; whole stock, part eligible according to criteria and reduction

A reduction of energy demand from the average of the total commercial building stock to the average for eligible building codes is multiplied to the emission factor and area of eligible assets to calculate impact.

Certification criteria: BREEAM, LEED and Nordic Swan Ecolabel

New, existing or refurbished commercial buildings which received at least one or more of the following classifications:

i. LEED “Gold“, BREEAM or BREEAM-NOR “Excellent”, or equivalent or higher level of certification
ii. Nordic Swan Ecolabel

This criterion has so far not been used to identify eligible buildings in the portfolio.

Refurbishment criterion

Refurbished Commercial buildings in Norway with an improved energy efficiency of 30%.

i. Refurbished Norwegian commercial buildings with at least two steps of improvement in energy label compared to the calculated label based on building code in the year of construction
ii. Refurbished Norwegian commercial buildings with at least a 30% improvement in calculated energy efficiency, kWh/m^2 delivered energy to the building, compared to the calculated energy efficiency based on building code in the year of construction.

This criterion has so far not been used to identify eligible buildings in the portfolio.

2.2.2 Impact assessment - Commercial buildings

The 264 eligible buildings in Sparebanken Vest's portfolio are estimated to amount to 113,272 square meters. The bank has specific data on assets including area and building category. Table 5 indicates the number of objects and the area of each building category making basis for the following impact assessments.

Table 5 include information on the number of qualifying objects and the building area for commercial buildings in both the bank's Private market portfolio (PM) and Business market portfolio (BM).

	Number of units	Area qualifying buildings in portfolio [m^2]
Office/commercial buildings	190	67,950
Small industry and warehouses	70	38,522
Hotel buildings	4	6,800
Sum	264	113,272

Table 5 Eligible objects and calculated building areas

As for residential buildings, the specific emission factor of energy used in buildings are set at 111 g CO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

Table 6 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.

	Avoided energy compared to baseline	Avoided CO_2-emissions compared to baseline
Commercial buildings in portfolio	12.4 GWh/year	1,381 tons CO_2/year
Commercial buildings scaled by engagement	6.8 GWh/year	753 tons CO_2/year

Table 6 Performance of eligible objects compared to average building stock

3 Renewable energy

Hydropower is the clearly dominant power production solution in Norway and has been for 100 years since the beginning of the industrialisation. With the current mix of production capacity in the system, hydropower is expected to account for about 89% of the national power production in a normal year[8].

Investments in wind power has increased substantially over the last years and wind power is now expected to account for about 9% of the national power production in a normal year.

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 operate 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[9].

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

3.1 Eligibility

The main eligibility criteria for hydropower are in line with the CBI criteria[10] & the EU Taxonomy[11]. 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, reservoirs are not exposed to significant cyclic revegetation of impoundment and hence the negative impacts on GHG emissions from these reservoirs are very small.
- Hydropower stations with high hydraulic head and/or relatively small impounded area have high power density

Eligibility criteria:
All renewable energy plants with emission intensity below 100 gCO_2e/kWh are eligible for green bonds.

Climate Bonds Initiative (CBI) have published hydropower eligibility criteria. These criteria have a mitigation component and an adaptation and resilience component. The mitigation component requires power density > 5 W/m^2 or emission intensity < 100 gCO_2/kWh.

The adaptation and resilience component in CBI hydropower eligibility criteria and the EU Taxonomy's "Do no significant harm", addressing ESG, is in the Norwegian context covered by the requirements in

[8] https://www.nve.no/energiforsyning/kraftproduksjon/?ref=mainmenu
[9] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[10] https://www.climatebonds.net/standard/hydropower
[11] https://ec.europa.eu/info/law/sustainable-finance-taxonomy-regulation-eu-2020-852/amending-and-supplementary-acts/implementing-and-delegated-acts_en

the Norwegian regulation of energy plants. Hence, all Norwegian wind and hydropower assets conform to very high standards regarding environmental and social impact.

The eligibility criteria mentioned above are central also in the taxonomy. Most *do no significant harm* (DNSH) requirements in the taxonomy are covered by current national regulation of hydropower, however, with exemptions. The requirements regarding documentation of eligibility of each asset are not addressed in this assessment.

3.2 Impact assessment- Renewable energy

3.2.1 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 for all, and most of them rather small facilities in the Sparebanken Vest 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)[12] uses an emission factor of 6 gCO_2e/kWh for all European hydropower in calculations of the European residual mix. The value is based on a life-cycle analysis where all upstream and downstream effects in the whole value chain for power production are included.

In subsequent assessments we are using the AIB emission factors for all assets, even though they are higher than factors in other credible sources. E.g. has the average GHG emission intensity in Norwegian hydropower (all categories) been calculated, using LCA, to 3.33 gCO_2e/kWh. (Norsus, 2019[13])

For the type of assets in the portfolio, with many run-of-river and small hydropower assets, and all large and medium sized HPPs being minimum 30 years old, the AIB emission factor is regarded as conservative in an impact assessment setting. The positive impact of the hydropower assets is 130 gCO_2/kWh compared to the baseline of 136 gCO_2/kWh presented in Table 1.

3.2.2 Power production estimates

The renewable energy power plants in Sparebanken Vest's portfolio are quite varied in age. And a large portion of younger plants add uncertainty to the future power production. A sample of the Planned power production for the assets has been attained from the Norwegian Water Resources and Energy Directorate's hydropower database[14].

For small hydropower it is important to understand that stated power production given in the concession documents do not necessarily represent what can realistically be expected from the plant over time. For one the hydrology is uncertain, and unfortunately often overestimated in early project phases for small hydropower. There is, however, also the fact that the 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 % lower than the concession/pre-construction figures. There is no equivalent evidence to claim the same mismatch for large hydropower.

[12] AIB is responsible for developing and promoting the European Energy Certificate System - "EECS"
[13] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf
[14] https://www.nve.no/energiforsyning/kraftproduksjon/vannkraft/vannkraftdatabase/

3.2.3 Portfolio analysis – New or existing Norwegian renewable energy plants

The available data from the bank and in open sources include:

- Type of plant
- Installed capacity
- Production in normal year
- Age
- Location/name of plant
- The banks engagement as share of financing, and for some assets not fully owned by client, the clients stake in the asset

	Capacity [MW]	# of plants	Total capacity [MW]	Expected production [GWh/yr]
Small HPP	0.1 - 25	93	307	658
Medium sized HPP	25- 100	6	349	200
Large HPP	> 100	3	835	152
Sum		102	1,491	1,010

Table 7 Capacity and production of hydropower plants in the portfolio

The expected production of renewable energy in the table above is representative of the bank's relative engagement in the plants and not the total production of the plants at approximately 7,000 GWh/yr.

Other important features of the portfolio are that 86 of the 102 plants are run-of-river plants, and that all other plants with impoundments are old, 30 years or older.

Table 8 summarises the expected renewable energy produced by the eligible assets in the portfolio in an average year, and the resulting avoided CO_2-emissions the energy production results in.

	Produced power compared to baseline	Reduced CO_2-emissions compared to baseline
Eligible hydropower plants in portfolio	**1,010 GWh/year**	**131,269 tons CO_2/year**

Table 8 Power production and estimated positive impact on GHG-emissions

Sparebanken Vest Green Portfolio Impact Reporting
December 31st 2021

Portfolio date: December 31st 2021

Eligible Project Category		**Signed Amount**	**Share of Total Financing**	**Eligibility for Green Bonds**	**Annual Site Energy Savings**	**Annual Site Renewable Energy Production**	**Annual CO2 Emission Avoidance**
a/		**b/**	**c/**	**d/**	**e/**	**e/**	**e/**
Residential Green Buildings		**NOK**	**%**	**%**	**MWh**	**MWh**	**tCO2**
Green residential buildings in Norway	Sparebanken Vest Boligkreditt (Covered bonds) Sparebanken Vest (Senior bonds)	20 653 000 000 5 742 000 000	55	100	105 677		11 691
Grandfathered green residential buildings TEK07	Sparebanken Vest Boligkreditt (Covered bonds) Sparebanken Vest (Senior bonds)	2 685 000 000 442 000 000	48	100	16 217		1 794
Grandfathered green residential buildings EPC C	Sparebanken Vest Boligkreditt (Covered bonds) Sparebanken Vest (Senior bonds)	2 254 000 000 408 000 000	54	100	5 748		636
Green commercial buildings in Norway	Sparebanken Vest (Senior bonds)	2 801 000 000	47	100	6 785		753
Renewable energy	Sparebanken Vest (Senior bonds)	2 064 000 000	48	100		1 009 765	131 269
Total		**37 049 000 000**			**134 428**	**1 009 765**	**146 143**

Portfolio based green bond report according to the Harmonized Framework for Impact Reporting

a/	Eligible category
b/	Signed amount represents the amount legally committed by the issuer for the portfolio or portfolio components eligible for Green Bond financing
c/	This is the share of the total portfolio cost that is financed by the issuer
d/	This is the share of the total portfolio costs that is Green Bond eligible
e/	Impact indicators -Site energy savings calculated using the difference between the top 12% of buildings and the national building stock bechmarks -Annual CO2 emission avoidance