REPORT

Sparebanken Vest – Background report on Impact Assessment on December 2022 Green Portfolio

CLIENT

Sparebanken Vest

SUBJECT

Background to impact assessment - energy efficient residential and commercial buildings and renewable energy

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REPORT

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1 Introduction

Assignment

On assignment from Sparebanken Vest, Multiconsult has assessed the basis for the impact assessment of their part of the loan portfolio eligible for green bonds as of December 31st 2022.

In this document we briefly describe Sparebanken Vest's green bond qualification criteria, the evidence for the criteria and the result of an assessment 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 2021 included only 4% from fossil fuels (oil and gas) (Fjernkontrollen[2]).

In 2021, the Norwegian power production was 99% renewable (SSB[3]). As shown in figure 1, the Norwegian production mix in 2021 (91% hydropower and 8% wind) results in emissions of 4 gCO_2/kWh. The production mix is also included in the figure for other selected European states for illustration.

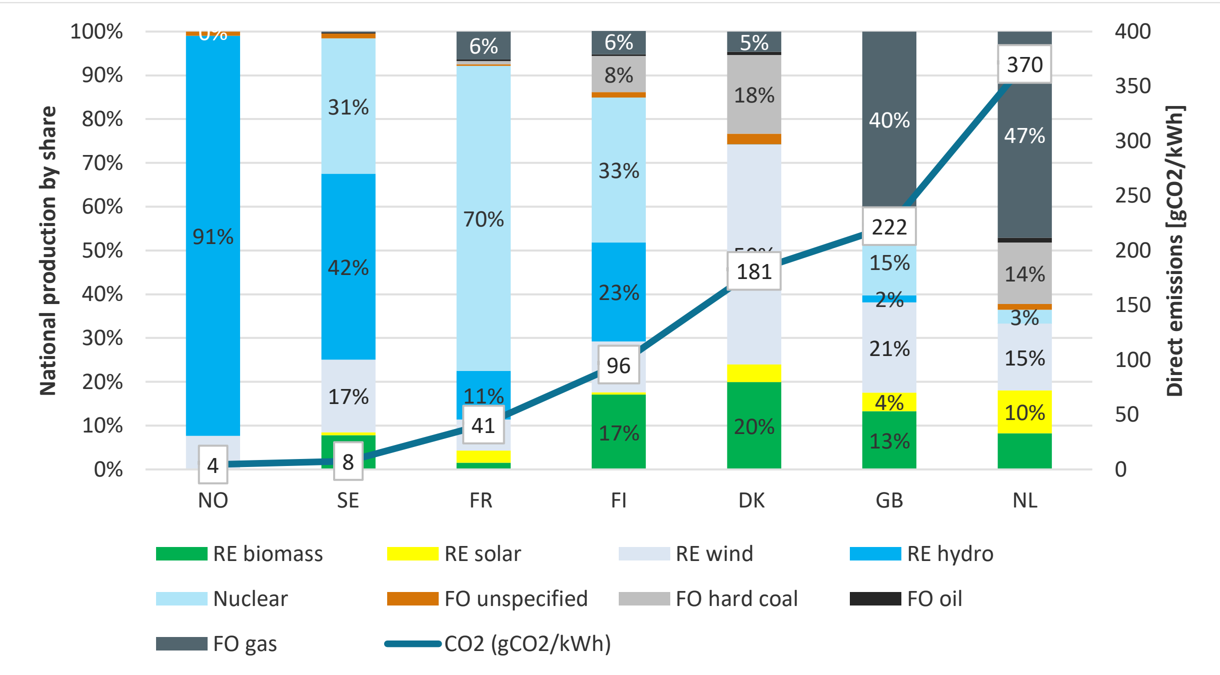

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2021, Association of Issuing Bodies[4])

[1] https://www.spv.no/om-oss/investor-relations/gronne-obligasjoner
[2] http://fjernkontrollen.no/
[3] https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet
[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 therefore 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 an 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.

2 Energy efficient buildings

2.1 Residential buildings

2.1.1 Eligibility criteria

Eligibility is identified in this impact assessment for residential buildings in the Sparebanken Vest portfolio against a building code criterion and a criterion based on the 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.

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

Over 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 251 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 117 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 TEK07 buildings in the portfolio in the green pool. Loans to TEK07 buildings 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.

Combination of criteria (Building code and EPC)

The two criteria are based on different system boundaries for calculating energy demand and the baseline based on two independent data sources. Share of the building tock that comply with the different building codes is retrieved from the national statistics, while the share of older building that have energy labels A, B and C, is found in the EPC database. Table 2 illustrates how the criteria, independently and in combination, make up cumulative percentages.

The table may be interpreted as follows: TEK10 and newer by itself represents 11.3%; TEK10 and newer in combination with A+B labels represents 12.6%; TEK10 and newer in combination with A+B+C labels represents 17.1%

	TEK10+TEK17	TEK07 small resi.	EPC A+B	EPC A+B+C
TEK10+TEK17	11.3 %		12.6 %	17.1 %
TEK07 small resi.		13.5 %	14.7 %	18.7 %
EPC A+B			7.5 %	
EPC A+B+C				15.9 %

Table 2 Matrix of Cumulative percentages for criteria combinations (FY21), relative to the total residential building stock in Norway

2.1.2 Impact assessment calculations - Residential buildings

The table below presents avoided energy dependent on eligibility criterion presented in specific energy demand. Combining this information with the object specific areas available to the bank, it is possible to describe how much better the buildings in the green portfolio perform than the average residential buildings and avoided energy consumption.

		Building code	Avoided energy demand compared to baseline
Building code-criterion	Residential buildings	TEK07-TEK17	134 kWh/m^2
		EPC	
EPC-criterion	Apartments	A	93 kWh/m^2
		B	85 kWh/m^2
		C (Grandfathered)	66 kWh/m^2
	Small residential buildings	A	121 kWh/m^2
		B	106 kWh/m^2
		C (Grandfathered)	76 kWh/m^2

Table 3 Deemed avoided specific energy demand compared to baseline

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, when based on the European production mix, of 111 gCO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions. To calculate the impact on climate gas emissions, the trajectory is applied to all electricity consumption in all buildings.

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 <u>hotel and restaurant buildings</u> 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 <u>office and retail</u> buildings that comply with the Norwegian building TEK07, TEK10, TEK17 and later building codes. Hence, finished in 2009 and later.

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

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 calculations – Building code criterion- Commercial buildings

Combining the information on the calculated specific energy demand related to building code and information on the commercial building stock, the calculated average specific energy demand on the part of the Norwegian building stock examined is presented in the table below. The table also presents the average specific energy demand for the younger and qualifying part of the building stock and the relative reduction in energy demand.

Building category	Average total stock [kWh/m^2]	Average qualifying objects [kWh/m^2]	Avoided energy compared to baseline [kWh/m^2]
Office buildings	251	151	100
Commercial buildings	323	214	109
Hotel buildings	309	208	101
Small industry and warehouses	297	174	123

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

The bank has specific data on assets including area and building category and can use this information in combination with table 4 to calculate avoided energy demand related to the green portfolio.

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. As for residential buildings, the specific emission factor of energy use in buildings are set at 111 g CO_2eq/kWh. This reflects an average European grid factor over the lifetime of these relative new buildings and a supply mix including district heating and bioenergy in addition to electricity. A proportional relationship is expected between energy consumption and emissions.

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 88% of the national power production in a normal year[7].

Investments in wind power has increased substantially over the last years and wind power is now, including turbines under construction, expected to account for about 11% 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 the Norwegian Water Resources and Energy Directorate (NVE), a directorate under the Ministry of Petroleum and Energy. A license grants the right to build and operate power production installations under explicit conditions and rules of operation. NVE puts particular emphasis on preserving the environment. Detailed information about different requirements on different kind of projects is available on the Norwegian webpage of NVE[8].

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

3.1 Eligibility

The main technical eligibility criteria for hydropower are in line with the CBI criteria[9] & the EU Taxonomy[10]. 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 the Norwegian regulation of energy plants. Hence, all Norwegian wind and hydropower assets conform to very high standards regarding environmental and social impact.

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

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 taxonomy relevant requirements regarding documentation of alignment of each asset are not addressed in this assessment.

3.2 Impact assessment – Renewable energy

3.2.1 CO_2-emissions from hydropower production

All power production facilities have a negative impact on GHG emissions. Life-cycle emission data is not available on asset level, but a few relevant studies give sufficient basis for impact assessments.

The Association of Issuing Bodies (AIB)[11] 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. Another study performed on a selection of Norwegian hydropower plants found the average GHG emission intensity in Norwegian hydropower (all categories), using LCA, to be 3.33 gCO_2e/kWh. (Norsus, 2019[12])

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.

3.2.2 Baseline and avoided emissions

There are several options for calculating a relevant baseline for renewable energy production. Some of these are:

- Marginal generating capacity in the existing dispatch hierarchy in a country/region that will most likely be displaced
- Emission factors based on the emissions of all fossil fuel power traded
- Emission factors based on the emissions of all fossil fuel power produced
- Emission factors based on the emissions of all power (fossil and non-fossil) produced

To reflect that the Norwegian power system is highly integrated in the European power system, and for consistency, the same grid factor is used for hydropower produced as electricity consumed used in the energy efficiency impact assessments. As presented in Table 1, this is 136 gCO_2/kWh on an average for an asset with a long lifetime, as is relevant for hydropower plants.

With hydropower life-cycle emissions of 6 gCO_2/kWh and a baseline of 136 gCO_2/kWh, the positive impact of the hydropower assets is deemed to be 130 gCO_2/kWh produced. Avoided emissions of the hydropower portfolio is the product of produced energy multiplied by the emission factor of 130 gCO_2/kWh. To reflect the bank's engagement, the power production can be multiplied by the factor Loan-to-Value.

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