REPORT

Sparebanken Møre Green Portfolio Impact Assessment 2023

CLIENT

Sparebanken Møre

SUBJECT

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

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REPORT

PROJECT	**Sparebanken Møre Green Portfolio Impact Assessment 2023**	DOCUMENT CODE	10253284-01-TVF-RAP-01
SUBJECT	Impact assessment- energy efficient residential and commercial buildings, electric vehicles and renewable energy	ACCESSIBILITY	Open
CLIENT	**Sparebanken Møre**	PROJECT MANAGER	Stig Jarstein
CONTACT	Signe Lade Sølvik	PREPARED BY	Stig Jarstein, Kjersti Rustad Kvisberg
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

In summary, impact assessed for all examined asset classes in the Sparebanken Møre portfolio qualifying according to green bond criteria is dominated renewable energy but with significant contributions from all asset classes. This table sums up the impact in rounded numbers:

Energy efficient residential buildings	*7,600 ton CO_2e/year*
Energy efficient commercial buildings	*1,700 ton CO_2e/year*
Renewable energy	*48,300 ton CO_2e/year*
Total	*57,600 ton CO_2e/year*

Note that the impact in the table above is not scaled by the bank's engagement. The scaled values for the green residential buildings portfolio are presented later in the report.

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1 Introduction

Assignment

On assignment from Sparebanken Møre, Multiconsult has assessed the impact of the part of the bank's loan portfolio eligible for green bonds according to Sparebanken Møre's Green Bonds Framework.

In this document we briefly describe Sparebanken Møre's green bond qualification criteria, the evidence for the criteria and the result of an analysis of the loan portfolio of Sparebanken Møre. More detailed documentation on baseline, methodologies and eligibility criteria is made available on the bank'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 2022 (88% hydropower and 10% wind) results in emissions of 7 gCO_2/kWh. The production mix is also included in the figure for other selected European states for illustration.

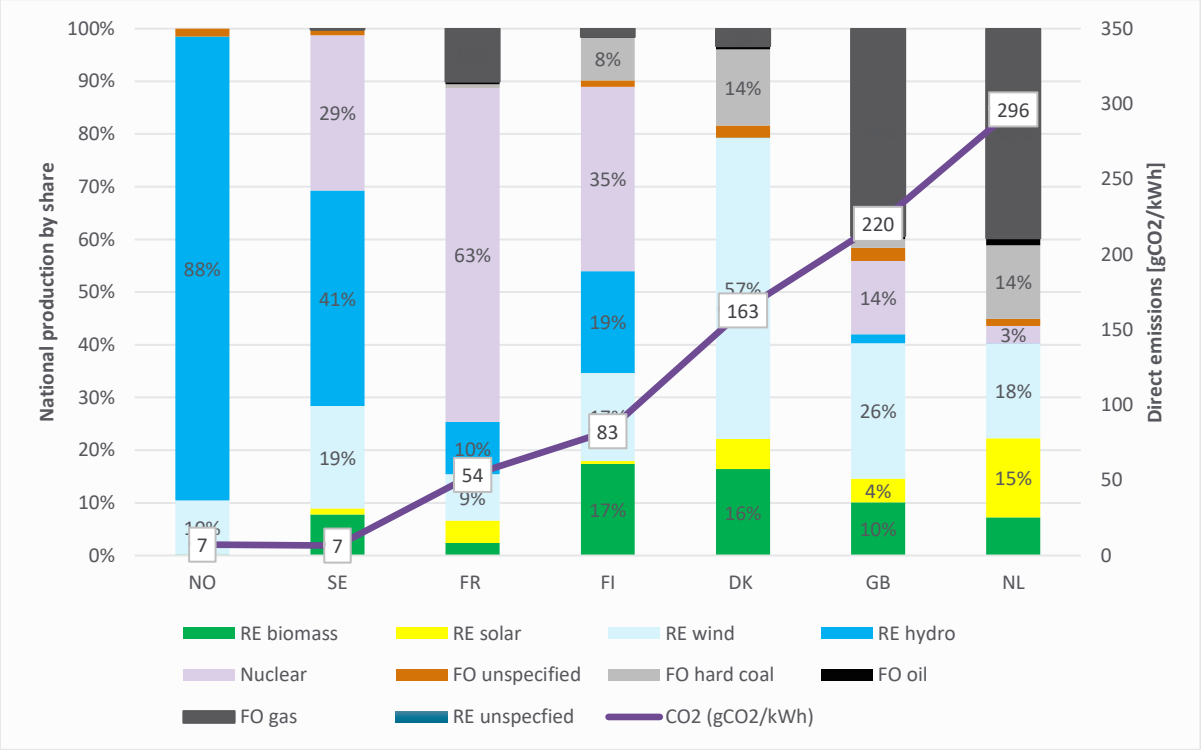

Figure 1 National electricity production mix in some selected countries (European Residual Mixes 2022, Association of Issuing Bodies [2])

[1] https://www.sbm.no/samfunnsansvar/green-bond-framework/
[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" 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 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.

Scenario	**CO_2 factor (g/kWh)**
European (EU27 + UK + Norway) electricity mix	136
Norwegian electricity 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. 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, including the influence of bioenergy and district heating in the energy mix, is on average 110 gCO_2/kWh. This factor is used in impact calculations in section 2.

[3] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf

2 Energy efficient buildings

2.1 Residential buildings

2.1.1 Eligibility criteria

In this impact assessment eligible Green Residential Buildings for Sparebanken Møre must meet one of the following eligibility criteria:

Building code criterion

New or existing Norwegian residential dwellings that comply with the Norwegian building code of 2010 (TEK10) or later codes. Hence, built in 2012 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 on the Norwegian residential building stock is 251 kWh/m^2. Building code TEK10 and TEK17 gives an average specific energy demand for existing houses and apartments, weighted for actual stock, of 114 kWh/m^2.

Hence, compared to the average residential building stock, the building code TEK10 and TEK17 gives a calculated specific energy demand reduction of 54 %

EPC criterion

Existing Norwegian residential buildings built using older building codes than TEK10 with EPC-labels A and B.

As only half of all dwellings have a registered EPC, the available data have been extrapolated, assuming the registered dwellings are representative for their age group regarding energy label. Then the EPC data indicates that 8.4 % of the current residential buildings in Norway will have a B or better. According to the EPC system, the average energy performance of a dwelling relates to an energy label E. The system boundary in the Norwegian EPC system differs from the one used in the building code (EPC uses delivered energy and not gross energy demand). For impact assessments, the building code baseline is based on the EPC statistics, where the average dwelling gets an E.

Combination of criteria

The two criteria are based on different statistics. It is, however, interesting to view them in combination. Table 2 illustrates how the criteria, independently and in combination, make up cumulative %'s.

Interpretation: TEK10 and newer in isolation represents 12.4%; TEK10 and newer in combination with A+B labels represents 13.8%; TEK10 and newer in combination with A+B+C labels represents 18.1%.

	TEK10+TEK17	EPC A+B	EPC A+B+C
TEK10+TEK17	12.4 %	13,8 %	18,1 %
EPC A+B		8.4 %	
EPC A+B+C			16.8 %

Table 2 Matrix of Cumulative %'s for criteria combinations (FY22), relative to the total residential building stock in Norway (Based on public statistics, SSB, Energimerking.no, Multiconsult)

2.1.2 Impact assessment - Residential buildings

The eligible residential buildings in the portfolio are estimated to amount to 517,000 square meters, as shown in Table 3.

	Number of units	Area qualifying buildings in portfolio [m^2]					
		TEK10	TEK17	TEK17 2021+	EPC A	EPC B	**Total**
Apartments	1,334	121,926	38,833	16,725	630	8,897	**187,011**
Small residential houses	2,171	195,999	52,056	51,266	744	29,940	**330,005**
Total	**3,505**	**317,925**	**90,889**	**67,991**	**1,374**	**38,837**	**517,016**

Table 3 Eligible objects and calculated building areas

Approximately 1,000 of the residential units have loans in both Sparebanken Møre and Møre Boligkreditt. Of the total loan balance in the portfolio, approximately 70% is associated with Møre Boligkreditt, while the remaining 30% is held by Sparebanken Møre. To allocate and present the impact assessment proportionally to these two financial institutions, the area of each building has been allocated based on Møre Boligkreditt and Sparebanken Møre's respective shares of the loan balance for each individual building.

The energy efficiency of the eligible portion of the portfolio is estimated according to the calculated energy demand, which is dependent on the building code or energy label assigned to each building. 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 110 gCO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

Table 4 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 [GWh/year]	Avoided CO_2-emissions compared to baseline [tons CO_2/year]
Møre Boligkreditt	Buildings eligible under the building code criterion	47	5,242
	Buildings eligible under the EPC criterion	3	320
Sparebanken Møre	Buildings eligible under the building code criterion	18	1,936
	Buildings eligible under the EPC criterion	1	131
Total	**Eligible buildings in portfolio**	**69**	**7,628**
Møre Boligkreditt	Impact scaled by bank's engagement	27	3,026
Sparebanken Møre	Impact scaled by bank's engagement	12	1,326
Total	**Impact scaled by bank's engagement**	**39**	**4 353**

Table 4 Performance of eligible objects compared to average residential building stock (Based on public statistics, SSB, Energimerking.no, Multiconsult)

2.2 Commercial buildings

2.2.1 Eligibility criteria

The Sparebanken Møre eligibility criteria for commercial buildings considered in this impact assessment is the building code criterion described below. Criteria based on certification schemes as BREEAM-NOR and an upgrade criterion is not considered.

Building code criterion

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

Norwegian commercial buildings that comply with the Norwegian building code of 2010 (TEK10) and later codes are eligible for green bonds as these buildings have significantly better energy standards and account for less than 15% of the commercial building stock.

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

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

2.2.2 Impact assessment - Commercial buildings

The Norwegian building stock examined is presented in Table 5 below with calculated average specific energy demand. For each building sub-category, statistical information on the age profile of the building stock is combined with calculated specific energy demand dependent on building code. 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.

	Average total stock [kWh/m^2]	Average TEK10 and TEK17 [kWh/m^2]	Reduction [kWh/m^2]
Office buildings	251	147	42 %
Commercial buildings	323	206	36 %
Hotel buildings	309	184	41 %
Small industry and warehouses	297	169	43 %

Table 5 Average specific energy demand for the building stock; whole stock, part eligible according to criteria and reduction (Source: SSB, historic building codes, Multiconsult)

The eligible buildings in Sparebanken Møre's commercial portfolio are estimated to amount to ~144,000 square meters, as shown in Table 6.

The difference between the average specific energy demand for each sub-category in the building stock and the average for qualifying buildings is multiplied by the emission factor and area of eligible assets to calculate the impact for buildings qualifying under the building code criterion.

	Area qualifying buildings in portfolio [m^2]		
	TEK10	TEK17	Total
Office buildings	50 986	3 565	54 551
Retail/commercial buildings	41 800	7 590	49 389
Hotel and restaurant buildings	18 736	0	18 736
Industry and small warehouse buildings	19 321	1 618	20 939
Sum	130 843	12 772	143 615

Table 6 Eligible objects and calculated building areas

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 factor of 110 g CO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

Table 7 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.

	Area	Reduced energy compared to baseline	Reduced CO_2 emissions compared to baseline
Eligible commercial buildings in portfolio	143,615 m^2	16 GWh/year	1,734 tons CO_2/year

Table 7 Performance of eligible objects compared to average building stock- <u>not scaled</u> by the bank's share of financing

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. Hydropower accounted for 88% of the national power production in 2022. Onshore wind power has been developed at speed in Norway, and production in 2022 accounted for 10% of the national power production.

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. 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 for different kinds of projects[4].

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

3.1 Eligibility

Sparebanken Møre's Green Product Framework includes equipment, development, manufacturing, construction, operation, distribution, and maintenance of renewable energy generation. The Green loan portfolio of Sparebanken Møre assessed in this report consists of hydropower plants that meet the criteria as formulated as:

- Power plants with emission intensity below 100 gCO_2e/kWh are eligible for green bonds.
- Projects are limited to small-scale run-of-river with maximum production capacity of less than 25 MW.

The eligibility criteria are formulated in line with CBI criteria[5], and the threshold is in line with the emissions threshold of 100 gCO_2e/kWh in the EU Taxonomy Annex I to the Commission Delegated Regulation[6].

Hydropower plants with power density > 5 W/m^2 are exempt from the most detailed investigations.

For Norwegian hydropower assets, these criteria are easily fulfilled and most assets overperform radically.

- All run-of-river power stations have no or negligible negative impact on greenhouse gas emissions
- Due to the cold climate, Norwegian reservoirs are not exposed to cyclic revegetation of impoundment, and hence the negative impacts on greenhouse gas emissions from these reservoirs are very small
- Hydropower stations with high hydraulic head and/or relatively small impounded areas have high power density

The adaptation and resilience component in Climate Bonds Initiative (CBI) hydropower eligibility criteria and the EU Taxonomy's "Do no significant harm", addressing environmental and social issues, is in the Norwegian context to a large degree covered by the rigid relevant requirements in the

[4] https://www.nve.no/konsesjonssaker/konsesjonsbehandling-av-vannkraft/
[5] https://www.climatebonds.net/standard/hydropower
[6] https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf

Norwegian regulation of energy plants. Hence, all Norwegian wind and hydropower assets conform to very high standards regarding environmental and social impact. Portfolio alignment with DNSH requirements has not been assessed in detail.

3.2 Eligible assets in the portfolio

Multiconsult has investigated a sample of Sparebanken Møre's portfolio and can confirm that the assets have low to negligible greenhouse gas emissions related to construction and operation.

All hydropower stations in the portfolio have installed capacities in the range of 0.4 – 8.5 MW and are all run-of-river plants with no or very small reservoirs and hence have a power density of several thousand W/m^2 (ratio between capacity and impounded area). Multiconsult has conducted a brief general assessment of eligibility based on available reports on the performance of national hydropower. The assets have not been examined in detail using designated tools (e.g., G-RES) nor assessed against all elements of "do no significant harm" mentioned in the EU taxonomy.

All assets are investigated using available maps, such as NVE Atlas, and concession information, and are found to have power densities in the thousands, well within the threshold of 5 W/m^2 (and the CBI threshold of 10 W/m^2 for assets put in operation in 2020 or later).

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 greenhouse gas emissions. Instead of calculating the impact on greenhouse gas emissions for all, and most of them rather small facilities in Sparebanken Møre's 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[7], uses an emission factor of 6 gCO_2/kWh for all European hydropower in their 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., Norsus/Østfoldforskning[8] has calculated the life-cycle emissions of Norwegian hydropower (all categories) to 3.33 gCO_2e/kWh. For the type of assets in the portfolio, with many run-of-river and small hydropower assets, 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.

3.3.2 Power production estimates

The renewable energy power plants in Sparebanken Møre's portfolio are quite varied in age. A large portion of younger plants add uncertainty to the future power production. The bank has presented annual production and these numbers are compared to the planned power production for the assets attained from the Norwegian Water Resources and Energy Directorate's hydropower database[9].

[7] https://www.nve.no/norwegian-energy-regulatory-authority/retail-market/electricity-disclosure-2018/
[8] https://norsus.no/wp-content/uploads/AR-01.19-The-inventory-and-life-cycle-data-for-Norwegian-hydroelectricity.pdf
[9] https://www.nve.no/energiforsyning/kraftproduksjon/vannkraft/vannkraftdatabase/

For small hydropower, it is important to understand that the stated power production given in the concession documents does 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. In this case the bank's figures are higher than the figures presented in the hydropower database. As the bank's data may be more influenced by actual production data, we find it adequately conservative to use the data from the NVE hydropower database.

3.3.3 Sparebanken Møre's criterion – New or existing Norwegian renewable energy plants

The eligible plants in Sparebanken Møre's portfolio have a capacity stated in concession documents to produce about 371 GWh per year. The energy production estimations indicate, supported with public available date for the named plants, that alle powerplant capacities in the portfolio are below 10 MW. The available data from the bank include:

- Company
- Type of plant (all being run-of-river)
- Yearly production capacity

A substantial part of the hydropower portfolio is related to a syndicated loan. Information about how the hydropower plants included in the syndicated loan is split between the lenders is available and used in the calculations. This split was not available for the 2022 reporting and is the reason for the lower impact figures related to renewable energy this year. The bank's share of financing is not accounted for.

	Capacity	# of plants	Expected production
Small hydropower	< 10 MW	25	371 GWh/year

Table 8 Capacity and production of eligible hydropower plants

Table 9 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	Reduced CO_2 emissions compared to baseline
Eligible hydropower plants in portfolio	**371 GWh/year**	**48,295 tons CO_2/year**

Table 9 Power production and estimated positive impact on greenhouse gas emissions- not scaled by the bank's share of financing