REPORT

Sparebanken Sør Green Buildings Portfolio- Impact Assessment Report

CLIENT

Sparebanken Sør

SUBJECT

Norwegian Energy Efficient Buildings- Green residential buildings- Impact assessment

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CLIENT	**Sparebanken Sør**	PROJECT MANAGER	Stig Jarstein
CONTACT	Magne Kvaslerud, Jørgen Brøvig	PREPARED BY	Stig Jarstein, Magnus Sletmoe Dale
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

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TABLE OF CONTENTS

Contents

1 Introduction

Assignment

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

In this document we briefly describe Sparebanken Sør's green bond qualification criteria, the evidence for the criteria and the result of an analysis of the loan portfolio of Sparebanken Sør.

2 Eligibility criteria

The methodology to select the qualifying assets is based on Climate Bonds Initiative (CBI) taxonomy, where no more than the top 15 % most energy efficient buildings are considered eligible. Sparebanken Sør's baseline and criterion are in line with the CBI baseline methodology for energy efficient residential buildings for Norwegian conditions published in spring 2018.

2.1 Building code criterion

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.

New or existing Norwegian residential buildings that comply with the mentioned Norwegian building codes are eligible for green bonds as all these buildings have significantly better energy standards and account for less than 15 % of the residential building stock. A two year lag between implementation of a new building code and the buildings built under that code has been accounted for. As of 2019, 11 % of Norwegian residential buildings are eligible according to the Sparebanken Sør criterion.

Changes in the Norwegian building code have consistently over several decades resulted in more energy efficient buildings.

Figure 1 illustrates how the calculated net energy demand declines with decreasing age of the buildings. Note that, for residential buildings, there was no change between TEK07 and TEK10 with respect to energy efficiency requirements.

Combining the information on the calculated energy demand related to building code in Figure 1 and information on the residential building stock in

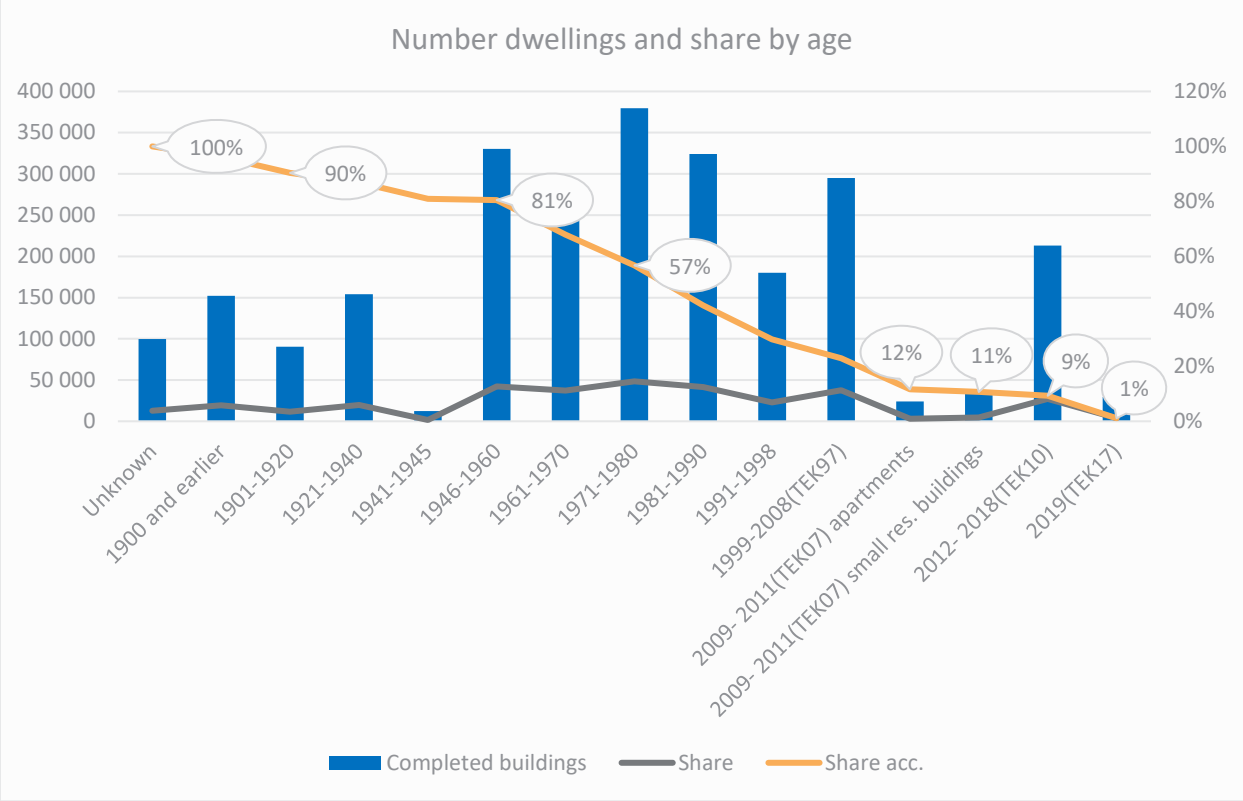

Figure 2, the calculated average specific energy demand on the Norwegian residential building stock is 253 kWh/m^2. Building codes TEK07, TEK10 and TEK17 give an average specific energy demand for existing dwellings, weighted for actual stock, of 120 kWh/m^2.

Hence, compared to the average residential building stock, the buildings qualifying under this criterion give a calculated specific energy demand reduction of 52 %.

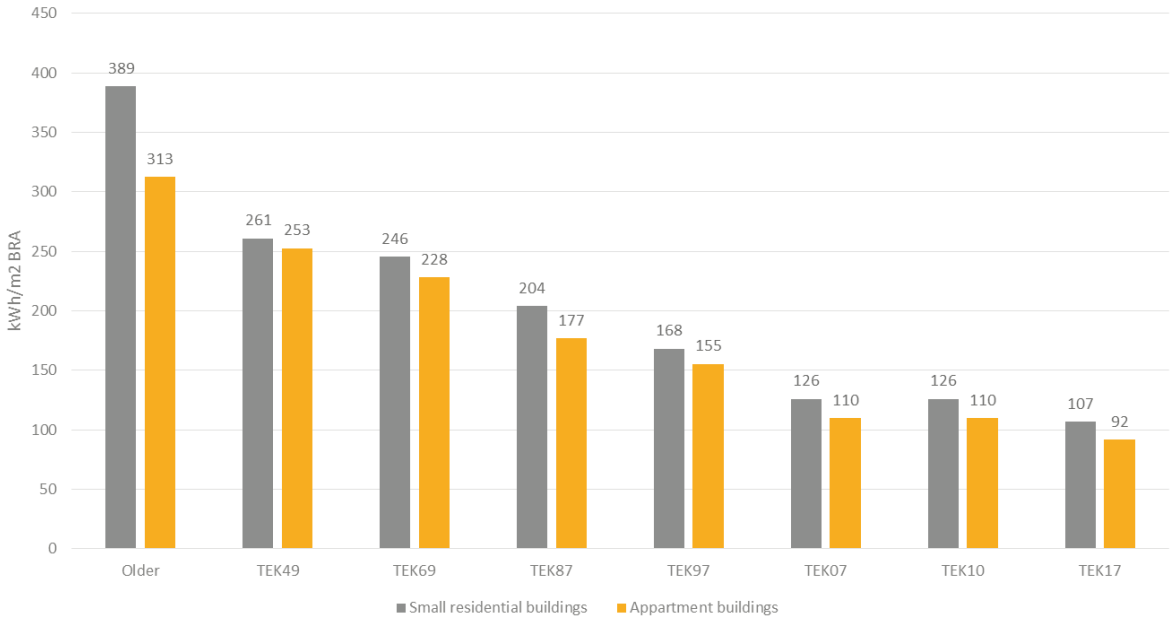

Figure 1 Development in calculated specific net energy demand based on building code and building tradition, (Multiconsult, simulated in SIMIEN)

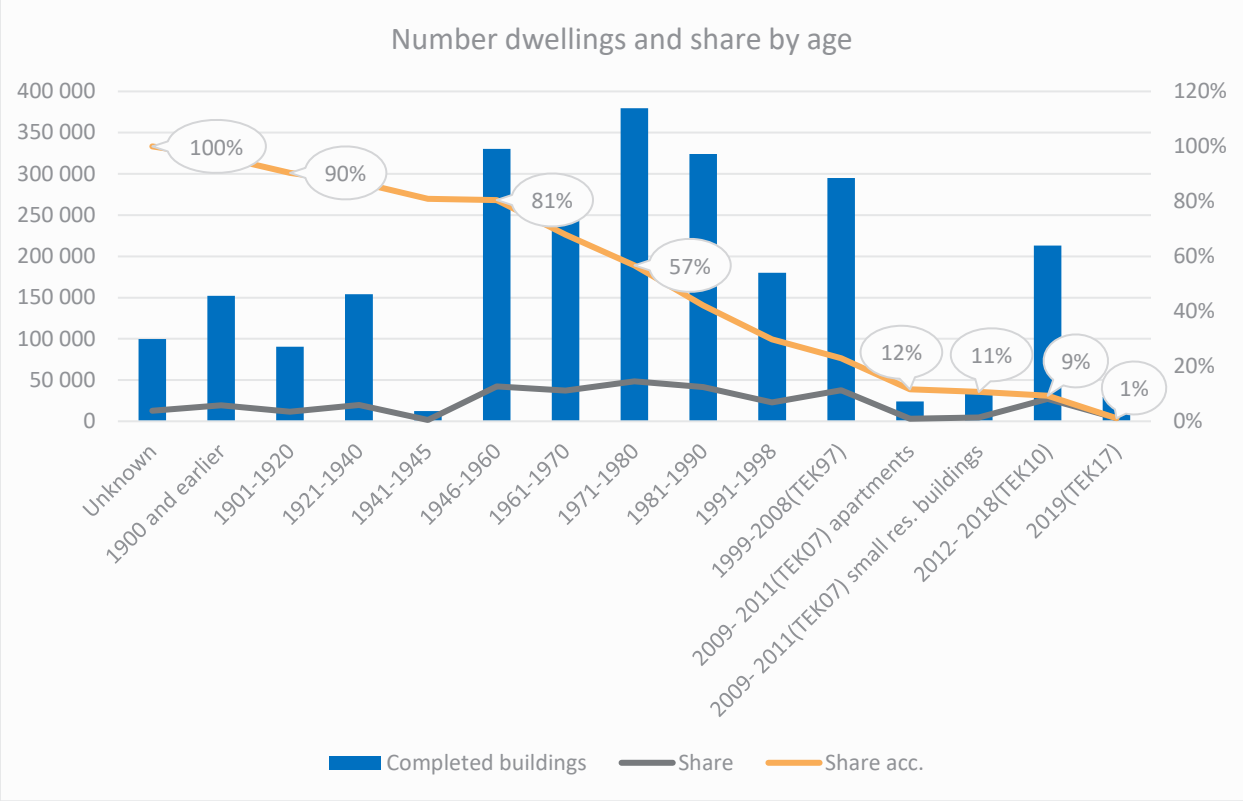

Figure 2 Age and building code distribution of dwellings (Statistics Norway[1] and Multiconsult)

Figure 2 above shows how the Norwegian residential building stock is distributed by age. The figure shows how buildings qualifying according to Sparebanken Sør criteria amount to 11 % of the total stock.

[1] Boligstatistikken, Tabell: 06266: Boliger, etter bygningstype og byggeår (K). Adjusted to match the development of building code.

2.2 EPC criterion

Existing Norwegian residential buildings built using older building codes than TEK10 for apartments and TEK07 for other residential dwellings with EPC-labels A, B and C.

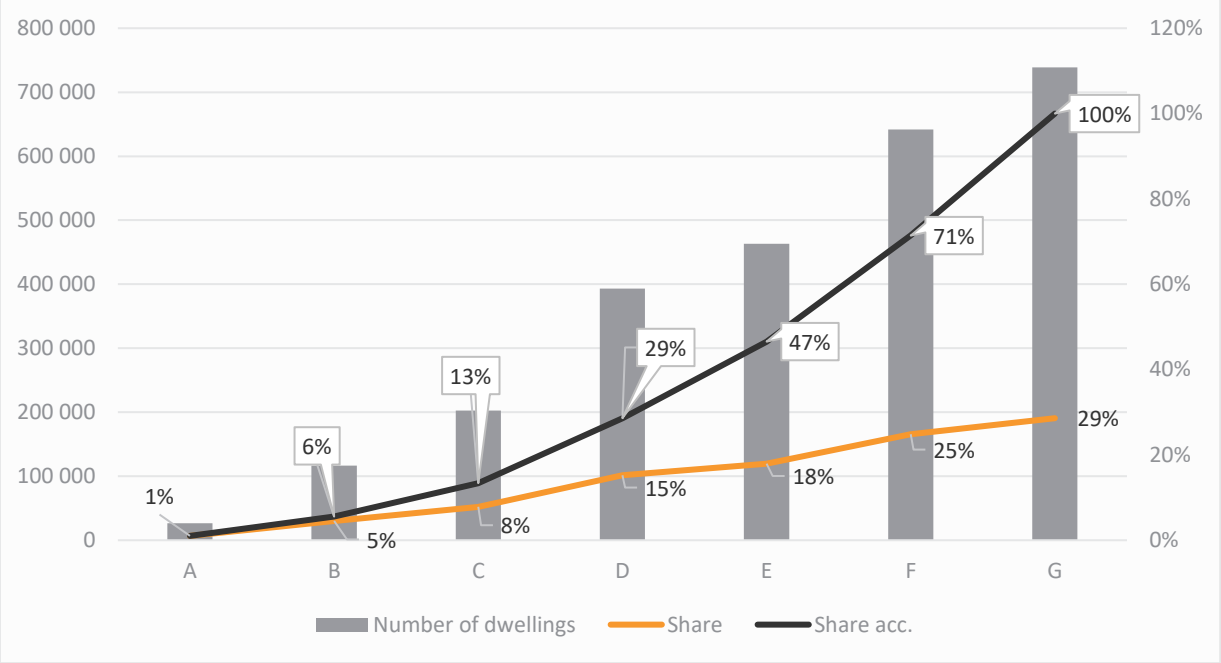

Figure 3 EPCs extrapolated to include the whole residential building stock (Source: energimerking.no and Statistics Norway, Multiconsult, September 2020)

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 13 % of the current residential buildings in Norway will have a C or better. The average energy performance of a dwelling, according to the EPC system, 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 hence based on the EPC statistics where the average dwelling gets an E. For buildings qualifying according to this criterion, the improved energy efficiency is calculated by factors presented in the table below. All energy labels cover a span and in these calculations the average values are assumed for all dwellings, except for dwellings with energy label A, where the limit value is expected as a conservative approach.

	Apartments	Small residential buildings
Difference between average efficiency to energy label A	93 kWh/m^2	121 kWh/m^2
Difference between average efficiency to energy label B	85 kWh/m^2	106 kWh/m^2
Difference between average efficiency to energy label C	66 kWh/m^2	76 kWh/m^2

Table 1 Difference in energy efficiency between qualifying dwellings and the national average

2.3 Refurbishment criterion

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

Refurbished buildings with an improved energy efficiency of at least 30 % or more are eligible for Green Bonds.

As the tables below illustrate, when under this criterion only qualifying buildings with energy label D, the calculated improved efficiency depends on age of the building and building category.

Building year:	after 2018	2012-2018	2009-2018	1999-2008	1989-1998	1971-19887	1951-1970	before 1951
Building code:	TEK17	TEK10	TEK07	TEK97	TEK87	TEK69	TEK49	OLDER
Calculated delivered energy [kWh/m^2,year]:	106,9	126	126	168,2	204,2	245,6	261	388,5
Improvement (average)								
A	6 %	21 %	21 %	41 %	51 %	59 %	62 %	74 %
B		9 %	9 %	32 %	44 %	53 %	56 %	70 %
C				14 %	29 %	41 %	44 %	63 %
D					12 %	26 %	31 %	54 %
E						10 %	15 %	43 %
F								30 %

Table 2 Eligible small residential buildings

Building year:	after 2018	2012-2018	2009-2018	1999-2008	1989-1998	1971-19887	1951-1970	before 1951
Building code:	TEK17	TEK10	TEK07	TEK97	TEK87	TEK69	TEK49	OLDER
Calculated delivered energy [kWh/m^2,year]:	91,7	110,1	110,1	155,4	177,2	228,3	252,7	312,7
Improvement (average)								
A		14 %	14 %	39 %	47 %	59 %	63 %	70 %
B				34 %	42 %	55 %	60 %	67 %
C				22 %	31 %	47 %	52 %	61 %
D					15 %	34 %	40 %	52 %
E						18 %	26 %	40 %
F								25 %

Table 3 Eligible apartments

3 Portfolio analysis and impact assessment

The grid factor on electricity consumption, as average in the buildings' lifetime, 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 expected life of a building from 2010 is 60 years.) According to Norwegian Standard NS 3720:2018 "Method for greenhouse gas calculations for buildings", greenhouse gas factor for electricity used in buildings is to be calculated on a life-cycle basis according to two scenarios:

Scenario	**CO_2- factor (g/kWh)**
European (EU28+ Norway) consumption mix	136
Norwegian consumption mix	18

Table 4 Electricity production greenhouse gas factors (CO_2- equivalents) for two scenarios (source: NS 3020:2018, Table A.1)

The following calculations apply the European mix in table 4. This is in line with Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (February 2020)[2]. 136 gCO_2/kWh constitute the GHG emission intensity baseline for energy use in buildings with a life span of 50-60 years and assuming that the CO_2-factor of the European production mix is close to zero in 2050.

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 includes also bio energy and district heating, resulting in a total specific factor of 124 g CO_2eq/kWh. A proportional relationship is expected between energy consumption and emissions.

3.1 Eligible assets in the portfolio

The eligible buildings in Sparebanken Sør's portfolio is estimated to amount to 0.9 million square meters. The available data include to a large degree reliable area per object. Where area data is missing, it is calculated on the basis of average area derived from national statistics (Statistics Norway[3]).

Criterion	Type of dwelling	Number of objects	Area total [m^2]
Criterion 1 (Building code)	Apartments	1 791	147 873
	Small residential buildings	3 116	601 213
Criterion 2 (EPC)	Apartments	464	37 291
	Small residential buildings	499	91 630
Criterion 3 (30 % impr.)	Apartments	81	4 877
	Small residential buildings	101	20 171
Sum		**6 052**	**903 055**

Table 5 Eligible objects and calculated building areas

[2] https://www.kbn.com/globalassets/dokumenter/npsi_position_paper_2020_final_ii.pdf
[3] Table 06513: Dwellings, by type of building and utility floor space

Energy and emission impact is for criterion 1 based on the calculated figures in figure 1, portfolio data and building statistics. A reduction of energy demand from the average 253 kWh/m^2 of the total residential building stock to 122 kWh/m^2 (TEK07/TEK10) or 102 kWh/m^2 (TEK17) dependent on building code is multiplied to the emission factor and area of eligible assets to calculate impact.

The calculated average specific energy demand for eligible assets under criterion 1 is 120 kWh/m^2. This is 52 % lower than the calculated average of the total residential building stock.

Energy and emission impact is for criterion 2 and 3 is calculated based on tables 2 and 3, portfolio data and EPC statistics.

The table below indicates how much more energy efficient the eligible part of the portfolio is compared to the average residential Norwegian building stock. It also present 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
Buildings eligible under the building code criterion	749 086 m^2	100 GWh/year	12 362 tons CO_2/year
Buildings eligible under the EPC criterion	128 921 m^2	9 GWh/year	1 164 tons CO_2/year
Buildings eligible under the upgrade criterion	25 048 m^2	2 GWh/year	237 tons CO_2/year
Eligible buildings in portfolio- total	**903 055 m^2**	**111 GWh/year**	**13 763 tons CO_2/year**

Table 6 Performance of eligible objects compared to average residential building stock

3.2 Impact reporting sheet

Sparebanken Sør Green Covered Bond Impact Reporting 2020

Portfolio date: June 2020

Eligible Project Category	Signed Amount	Share of Total Portfolio Financing	Eligibility for Green Bonds	Annual Site Energy Savings	Annual CO2 Emission Avoidance
a/	**b/**	**c/**	**d/**	**e/**	**e/**
Residential Green Buildings	**NOK**	**%**	**%**	**MWh**	**tCO2**
New residential buildings in Norway	10 403 000 000	100	100	110 962	13 763
Residential buildings in Norway built before 2009	-				
Refurbished residential buildings in Norway with an improved energy efficiency of 30%	-				
Total	**10 403 000 000**			**110 962**	**13763**

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