REPORT

Norwegian Green Bond – Commercial real estate

CLIENT

SpareBank1 Næringskreditt

SUBJECT

Green commercial real estate

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TABLE OF CONTENTS

Contents

1 Introduction

Assignment

On assignment from SpareBank1 Næringskreditt, Multiconsult has applied developed criteria and a methodology to identify the most energy efficient commercial real estate in Norway, to be used with respect to a green bond issuance. In this document we describe SpareBank1 Næringskreditt's identification criterion and the evidence for the criterion. The criteria to select the buildings are based on credible standards in Norway such as the Norwegian building regulation.

Commercial real estate- included in this analysis

The analysis of the building stock includes office buildings, commercial/retail buildings (shops and stores), hotel and restaurants and small industrial buildings and warehouses. These categories are most relevant in SpareBank1 Næringskreditt's portfolio.

Data quality and sources

The building statistics have variable quality for commercial buildings in Norway. To establish a robust methodology, data on number and age of existing buildings are crucial, and for impact assessments, the relevant factors are area and age.

For the most important period, the latest years stretching further back than the criteria cut-off point, the data on number of buildings and age in the total stock have good quality for the whole stock. These data have been published for the whole period from 2000 to 2017. Some building categories are only available on an aggregated level but the necessary splits are made on the basis of data available for the years 2006 and 2018. Building years for older buildings are somewhat uncertain and assumptions on building rate and demolition rate had to be made.

Regarding building area, data is available on new buildings every year from 1983 to 2017. These data have been supplemented by data in a study on energy efficiency in existing buildings.[1]

Energy

Apart from this criterion, we also want to stress that commercial buildings in Norway are heated mostly with renewable energy. The energy consumption of Norwegian commercial buildings is predominantly electricity, with some district heating and bioenergy. The share of fossil fuel is very low and falling.

Statistics Norway made in 2011 a statistic on energy use in Norwegian commercial buildings. The demand was approximately covered by electricity (80 %), fossil oil and gas (5 %) and district heating etc. (15 %). Already in 2007, the building code was in clear disfavour of fossil energy, and the use of fossil energy in commercial buildings has declined since. In 2020, all use of fossil oil is banned from use in commercial buildings. The fuel mix in Norwegian district heating production in 2018 included

[1] Enova publication "Potensial- og barrierestudie Energieffektivisering i norske yrkesbygg», Multiconsult 2011

only 5.2 % from fossil fuels (oil and gas) (Fjernkontrollen[2]). In 2018, the Norwegian power production was 98 % renewable (NVE[3]).

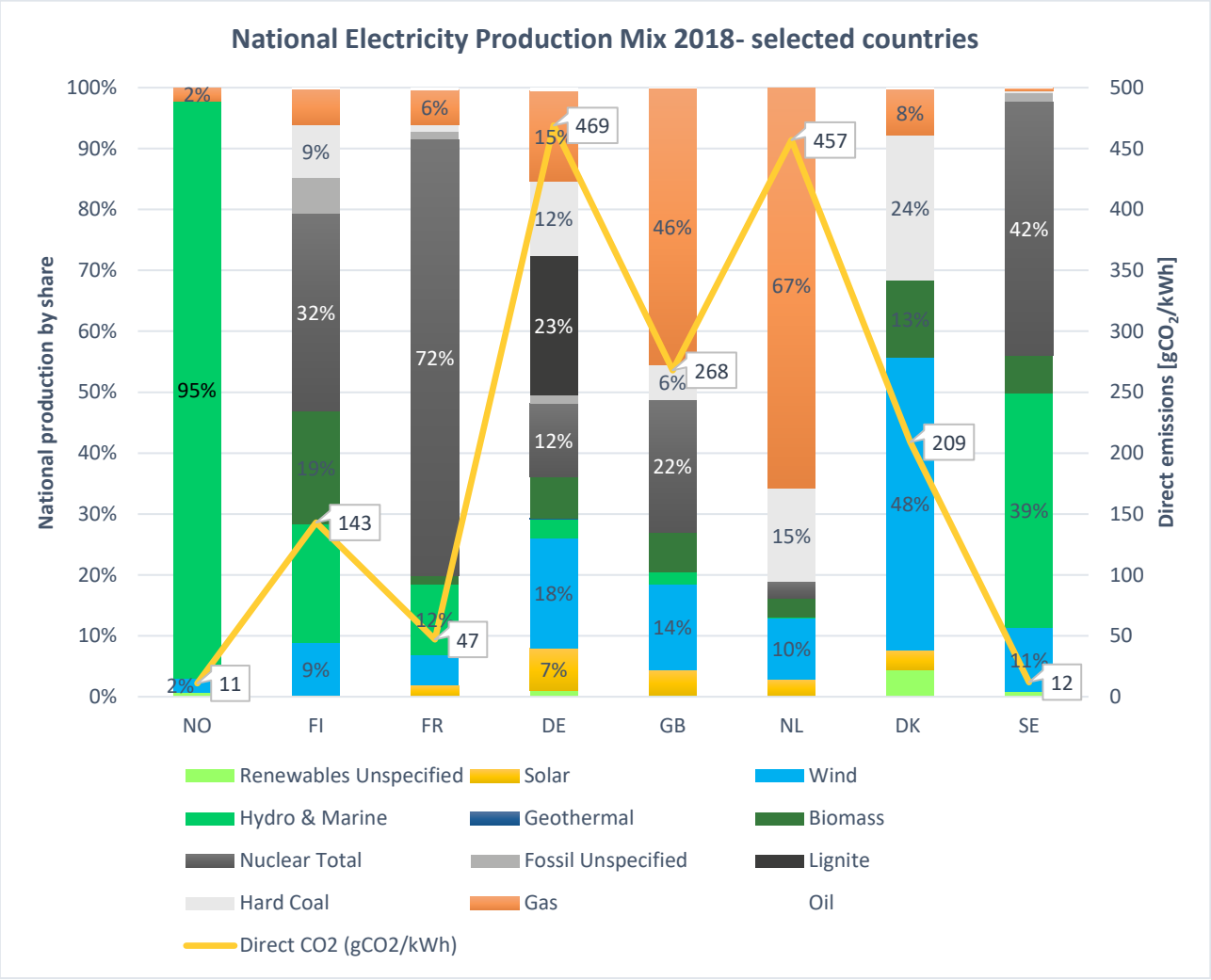


Figure 1 National electricity production mix in some relevant countries (European Residual Mixes 2018, Association of Issuing Bodies[4])

As shown in figure 1, the Norwegian production mix in 2018 gives resulting emissions of 11 gCO_2/kWh. Using a life-cycle analysis, the Norwegian Standard NS 3720:2018 “Method for greenhouse gas calculations for buildings” take into account international electricity trade and that the consumption is not necessarily equal to domestic production. The mentioned standard calculates the average CO_2- factor for the lifetime of a building to 136 g CO_2/kWh for EU28+ Norway and 18 g CO_2/kWh for Norwegian production mix only. Applying the factor based on EU28 + Norway energy production mix, the resulting CO_2- factor for Norwegian residential buildings[5] is on average 126 g CO_2/kWh.

[2] http://fjernkontrollen.no/
[3] https://www.nve.no/energy-market-and-regulation/retail-market/electricity-disclosure-2018/
[4] https://www.aib-net.org/facts/european-residual-mix
[5] Multiconsult. Based on building code assignments for DiBK

2 Loan Portfolio Analysis SpareBank1 Næringskreditt

The Green loan portfolio of SpareBank 1 Næringskreditt will consist of commercial buildings that meet the criterion as formulated below. In short, these are new commercial buildings that meet building code TEK 07 or later, OR certain refurbished commercial buildings with substantial reduction in energy demand.

2.1 Availability and quality of data to identify eligible buildings

Building stock statistics, energy efficiency requirements in historic building codes and building year of buildings in a bank's portfolio is easily available information from reliable sources.

2.2 Availability and quality of data to identify <u>other</u> eligible buildings

There are two notable limitations with respect to the EPC database. The first regards some process and data quality issues. It is currently difficult for the public to fully utilise the database and link it to the portfolio data. While the process of sorting the existing data is ongoing, ENOVA, state owned entity responsible for the EPC database and system development, is also restructuring the approach to the energy labels and a new system which may be in place in a few years. The other limitation is that the EPC database only covers a small share of the total commercial building stock. Both of these conjointly mean that the EPC database in its current form is not representative of the total Norwegian building stock and hence the use of building regulation remains the most relevant proxy for identifying green buildings in Norway.

Individual energy performance data for commercial buildings are not easily available for lenders or investors. The Energy Performance Certificates are at the present not publically available, however, matching against a portfolio is possible on the existing data set for the purpose of green bond issuance. Before the data is made publicly available the database is to be cleaned of faulty data and IT solution established for easy access. The released data will be limited to some key items as energy label. Specific energy demand or certificate history for individual assets will not be made available, at least not first time around.

When permission is granted to access and utilise the database, it will be possible to link the individual residences to the register, and give the energy certificate results for individual assets, based on some key information:

- Address- street and number, postal code
- Building identifiers GNR (Gårdsnummer) and BNR– (Bruksnummer)

The database is already available for statistical purposes and an investigation shows that, comparing the number of certificates with actual buildings in the building stock from Statistics Norway, at the best, only 36 % of all office and retail buildings, 3 % of all hotel and restaurant buildings and 4 % of all industry buildings have an energy performance certificate. This is based on raw data, even before the database has been cleaned of double entries and test entries. This influences the data quality for developing eligibility criteria and the pool of which a bank may identify objects in their portfolio.

All buildings over 1,000 m^2 are required to have a certificate. New buildings are much better represented in the statistics than older and less energy efficient buildings. In case all buildings had a certificate, the distribution in the statistics would shift towards poorer energy grades.

3 Eligibility criteria

Multiconsult has studied sections of the Norwegian commercial building stock and identified solid eligibility criteria for Green Bonds on energy efficient commercial buildings in specific subcategories. Unique criteria have been established for the four subcategories: office buildings, retail, hotel and restaurant buildings and industry/warehouses. The criteria identifies no more than the top 15 % most energy efficient commercial buildings countrywide based on building code. The methodology is based on Climate Bonds Initiative (CBI) taxonomy, where the top 15 % most energy efficient buildings are considered eligible.

Eligible Commercial Green Buildings for SpareBank1 Næringskreditt must meet the following eligibility criterion:

Hotel and restaurant buildings. New or existing Norwegian hotel buildings that comply with the Norwegian building code of 2007 (TEK07) and later codes are eligible for green bonds as all these buildings have significantly better energy standards and account for less than 15 % of the hotel and restaurant building stock. A three year lag between implementation of a new building code and the buildings built under that code must be taken into account. Hence all buildings finished in 2011 or later qualify.

Office buildings, retail buildings and industrial buildings and warehouses. New or existing Norwegian office, retail and industrial buildings/warehouses that comply with the Norwegian building code of 2007 (TEK07) and later codes are eligible for green bonds as all these buildings have significantly better energy standards and account for less than 15 % of the office, commercial and industry/warehouse building stock. A two year lag between implementation of a new building code and the buildings built under that code must be taken into account. Hence all buildings finished in 2010 or later qualify.

3.1 New or existing buildings within the relevant building categories that comply with the chosen criteria

New or existing Norwegian hotel and restaurant buildings that comply with the Norwegian building code of 2007 (TEK07) or later codes: 6.8 %

New or existing Norwegian office buildings that comply with the Norwegian building code of 2007 (TEK07) or later codes: 5.1 %

New or existing Norwegian retail/commercial buildings that comply with the Norwegian building code of 2007 (TEK07) or later codes: 5.1 %

New or existing Norwegian small industrial buildings and warehouses that comply with the Norwegian building code of 2007 (TEK07) or later codes: 13.9 %

Changes in the Norwegian building code have consistently over several decades resulted in more energy efficient buildings. As of January 1st 2018, far less than 15 % of the Norwegian commercial buildings, within the investigated subcategories, are eligible according to the SpareBank1 Næringskreditt criterion; commercial buildings in the specific subcategories built according to TEK07, TEK10 and TEK17 are eligible for Green Bonds.

Figure 2 Development in calculated specific net energy demand based on building code and building tradition, (Multiconsult, simulated in SIMIEN)

Net energy demand is calculated for model buildings used for defining the building code (TEK07/TEK10/TEK17). The result presented in figure 2 illustrates how the calculated energy demand declines with decreasing age of the buildings. From TEK10 to TEK17 the reduction is between 14 – 23 %. The former shifts from TEK07 to TEK10 was about 10 %, and from TEK97 to TEK07 about 20 %.

Figure 2 gives theoretical values for representative models of an office building, retail/commercial building, hotel building and industry/ warehouse, calculated in the computer programme SIMIEN and in accordance to Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings Method and data*, and is not based on measured energy use. In addition to the guiding assumption in Norwegian Standard NS3031:2014, experience with building tradition is included. Indoor air quality is assumed not to be dependent on building year. By that, it is assumed that older buildings (TEK69 - older) that originally had natural ventilation or mechanical exhaust with relatively small air volumes, have at one time upgraded to balanced ventilation with satisfactory air volumes - this is assumed to be a necessary upgrade the property owner had to take to meet the tenancy requirements. Many such older buildings underwent such upgrades in the 80's and 90's. For these, a minimum allowable airflow from NS 3031: 2014 Table A.6 is used. This is the same methodology as used in the EPC-system.

Building code	Specific energy demand office building	Specific energy demand commercial building	Specific energy demand industry/warehouse	Specific energy demand hotels and restaurants
TEK07	165 kWh/m^2	235 kWh/m^2	190 kWh/m^2	240 kWh/m^2
TEK 10	150 kWh/m^2	210 kWh/m^2	175 kWh/m^2	220 kWh/m^2
TEK 17	115 kWh/m^2	180 kWh/m^2	140 kWh/m^2	170 kWh/m^2

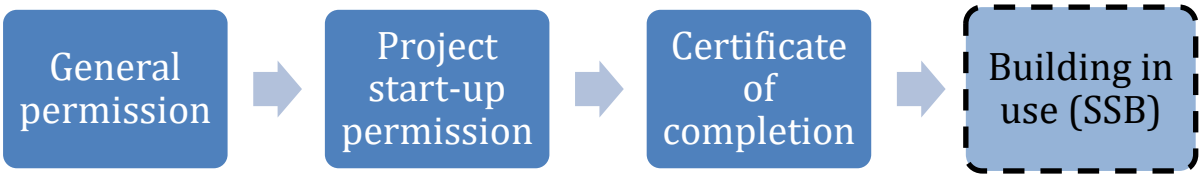
Table 1 Specific energy demand as from the building codes

Table 1 includes the specific energy demand as a maximum requirement in the respective building codes, relevant for identifying the top 15 %, by a margin, most energy efficient commercial buildings in Norway.

The building codes are having a significant effect on energy efficiency.

3.1.1 Time lag between building permit and building period

After the implementation of new a building code there is some time lag before we see new buildings completed according to this new code. First there is some transition period where two codes are overlapping. Further, the lag between the date of general permission received (no; rammetillatelse), which decides which code is to be used, and the date at which the building is completed and taken into use, varies a lot depending on such things as the complexity of the site and project, financing, the market and the building category.



The time from granted general permission to granted project start-up permission is often spent on design, sales and contracting. Based on Multiconsult's experience, six months to a year is a reasonable timespan for commercial buildings in this phase. As an illustration, the figure below, based on statistics from Statistics Norway (SSB), indicates that approximately six months to a year construction period is standard for office buildings.

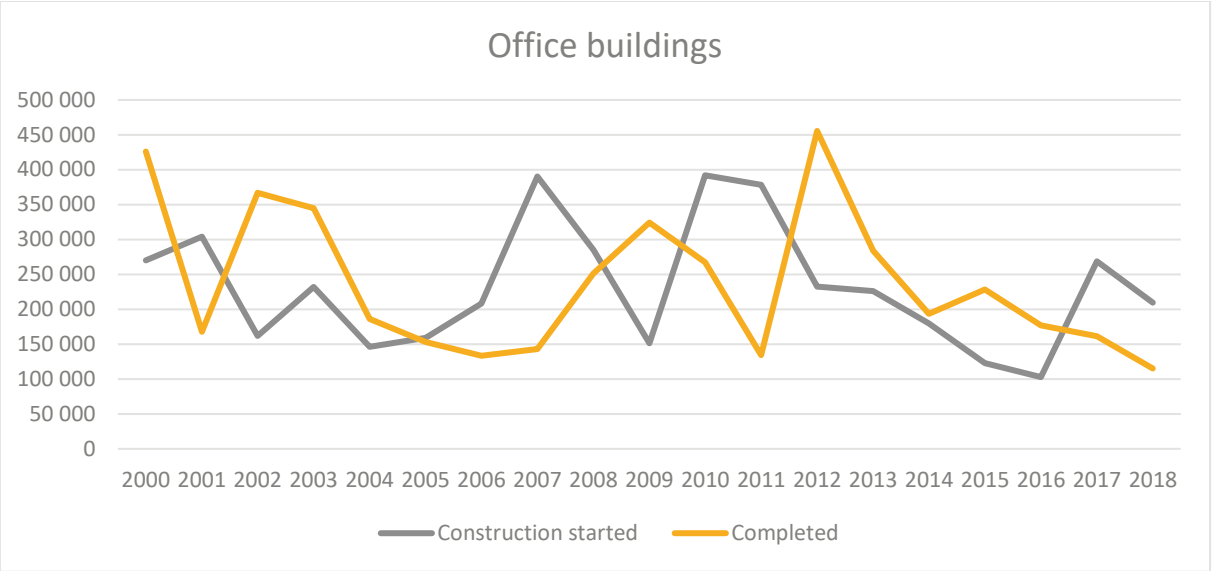


Figure 3 Project start-up and completion (Statistics Norway, bygningsarealstatistikken)

The 2007 building code was implemented February 2007. Based on the discussions on time for design and construction, we regard a time-lag of two years for offices, retail and industry/ warehouses between code implementation and buildings based on this code to be a robust and conservative assumption. Being more complex buildings, a time-lag of three years are assumed for hotel and restaurant buildings. The data available on completed construction is only available to the issuer on a yearly basis.

3.1.2 Building age statistics

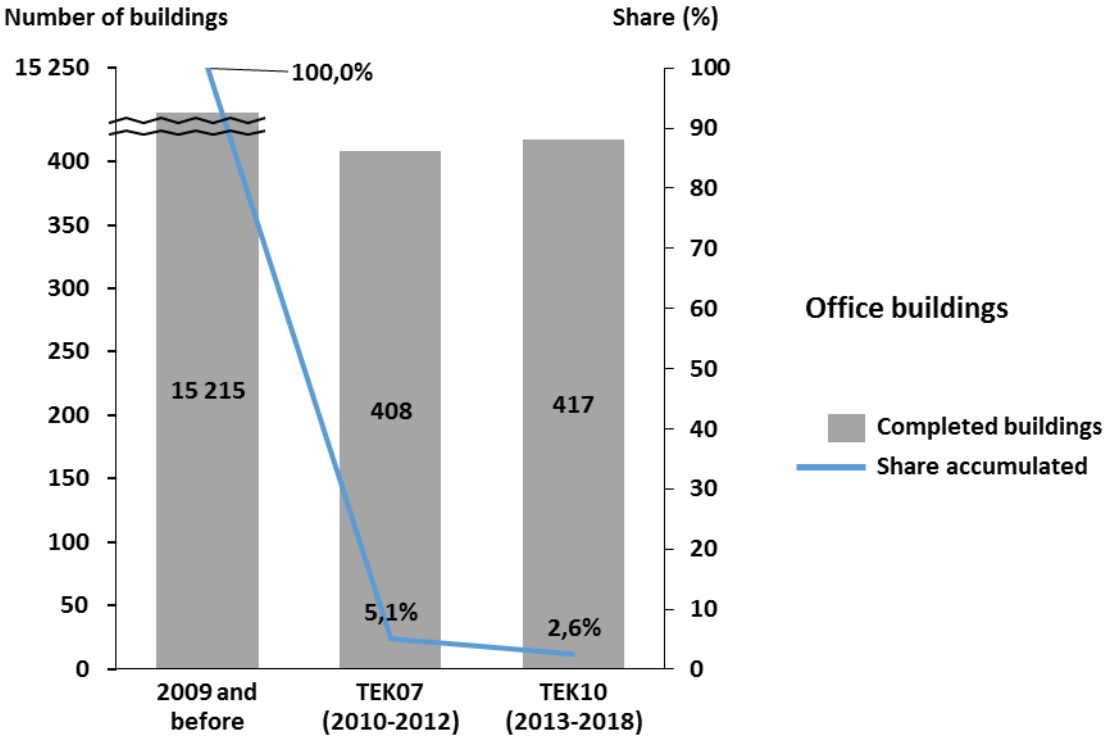


Figure 4 Age and building code distribution of office buildings (Statistics Norway and Multiconsult)

Figure 4 above shows how the Norwegian office building stock is distributed by age. The figure shows also how office buildings finished in 2010 and later (built according to TEK07) amount to 5.1 % of the total stock. The three figures below include the same information for the other three subcategories.

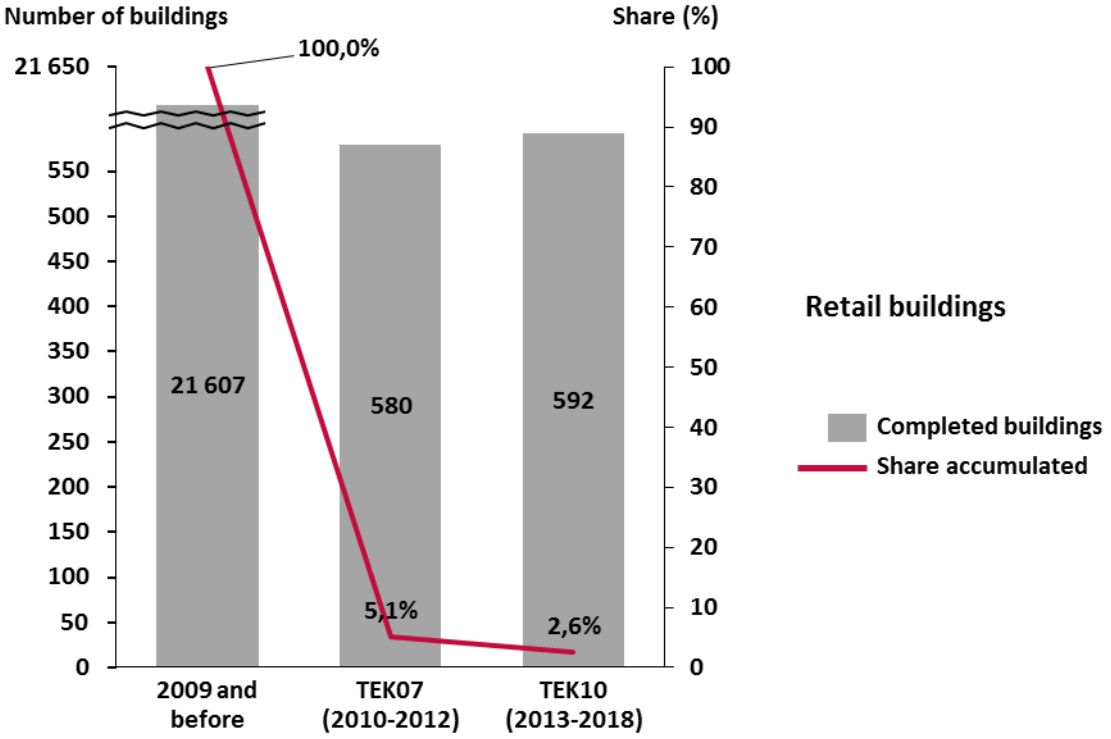


Figure 5 Age and building code distribution of commercial/retail buildings (Statistics Norway and Multiconsult)

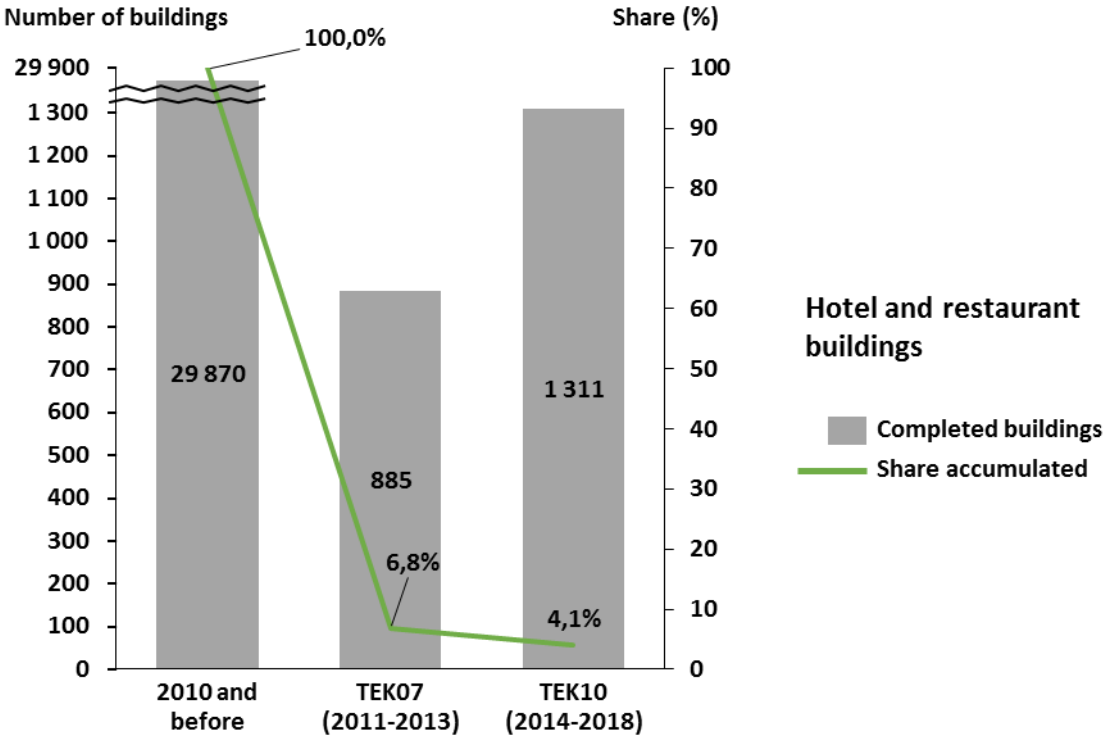


Figure 6 Age and building code distribution of hotel and restaurant buildings (Statistics Norway and Multiconsult)

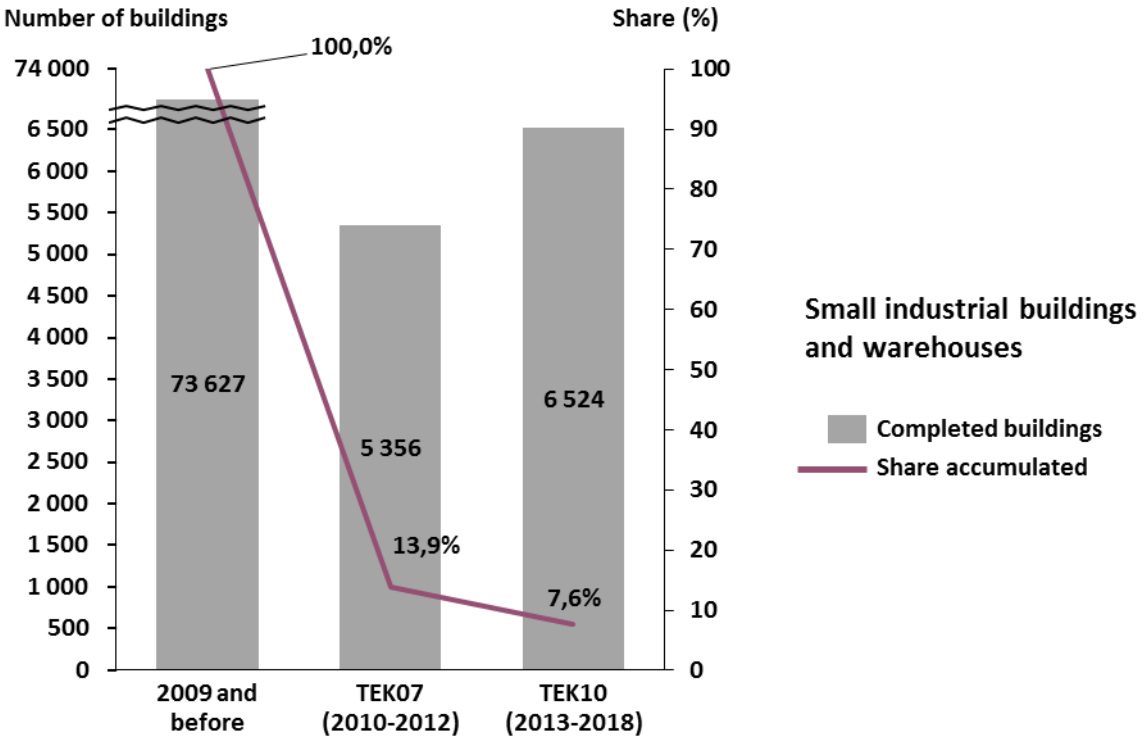


Figure 7 Age and building code distribution of small industrial buildings and warehouses (Statistics Norway and Multiconsult)

Figures 8 through 11 below show how much, based on theoretical energy demand in the same building stock, the same share of the building stock make up in share of the energy demand in the same subcategories. The same picture is relevant for CO_2- emissions.

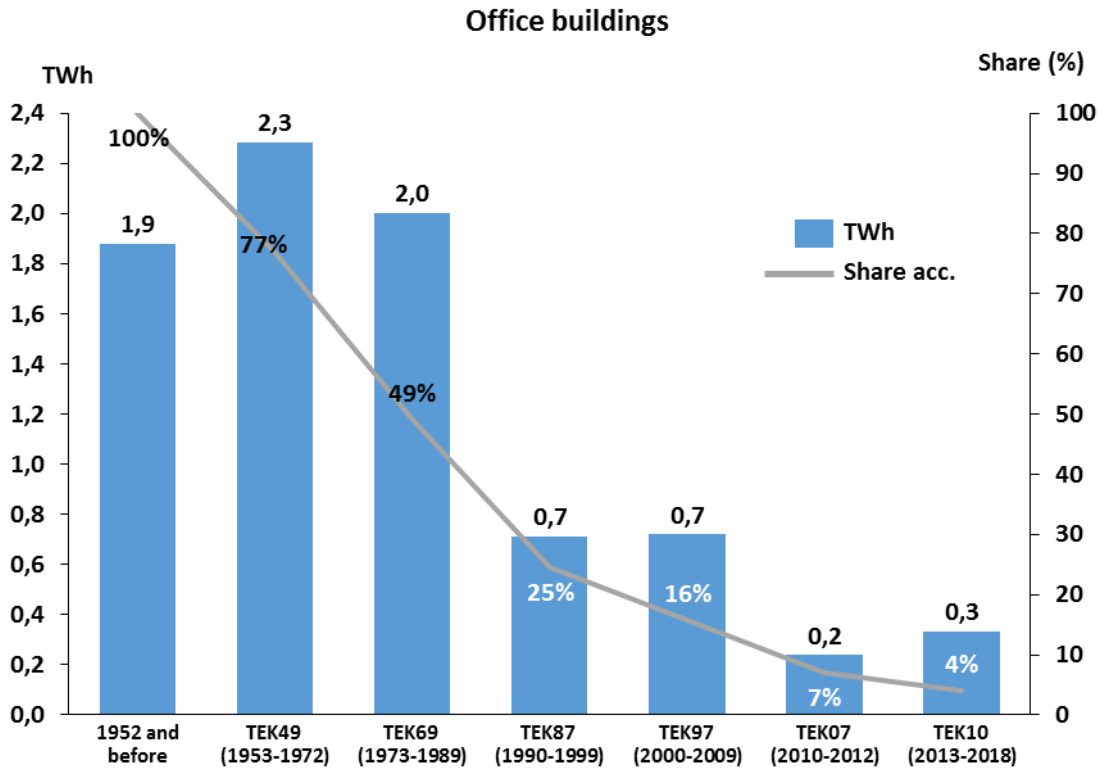


Figure 8 Share energy demand related to office buildings depending on building year

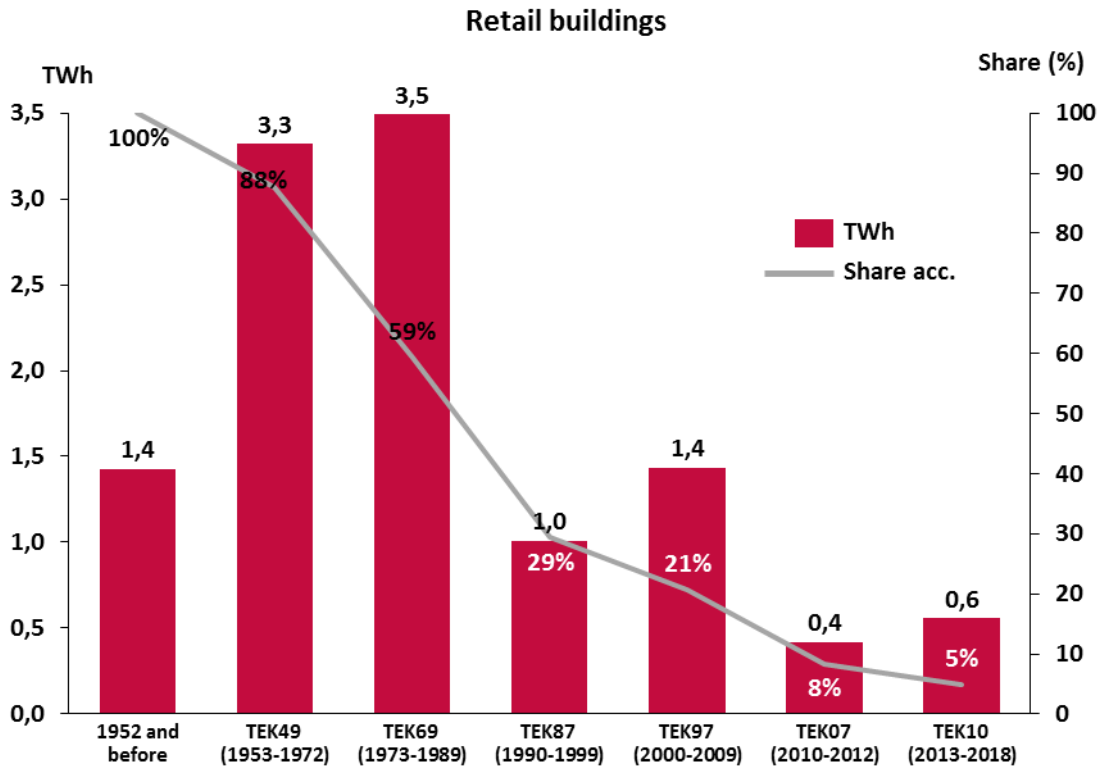


Figure 9 Share energy demand related to retail buildings depending on building year

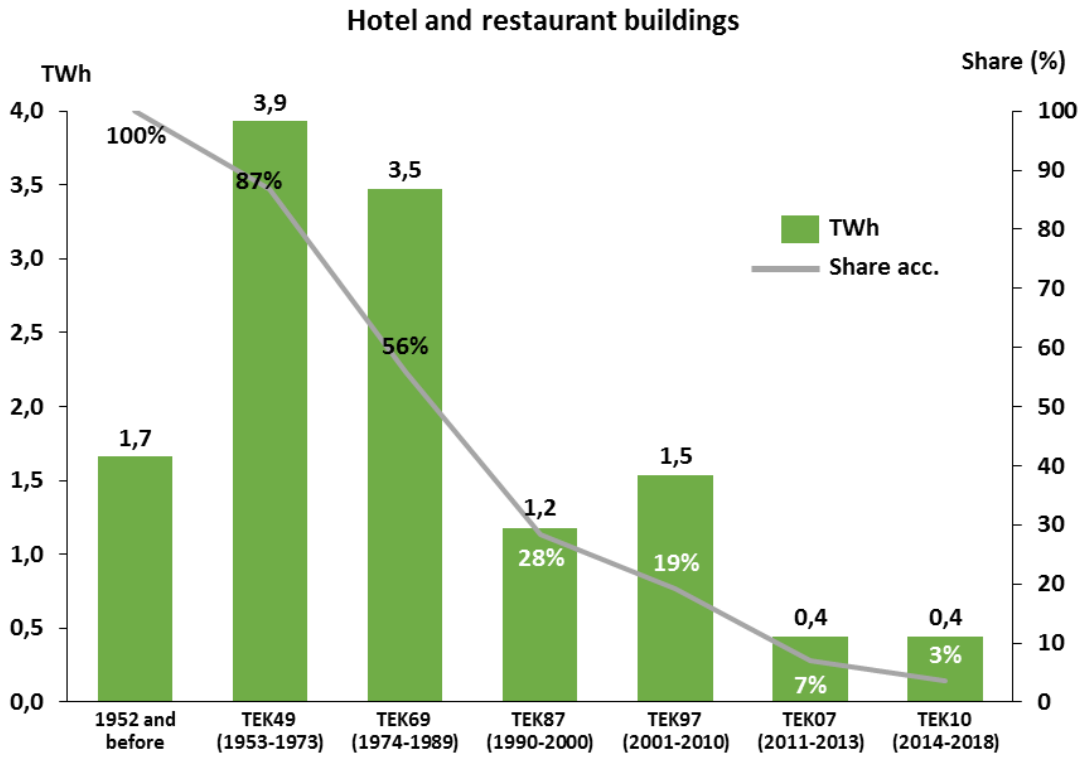


Figure 10 Share energy demand related to hotel and restaurant buildings depending on building year

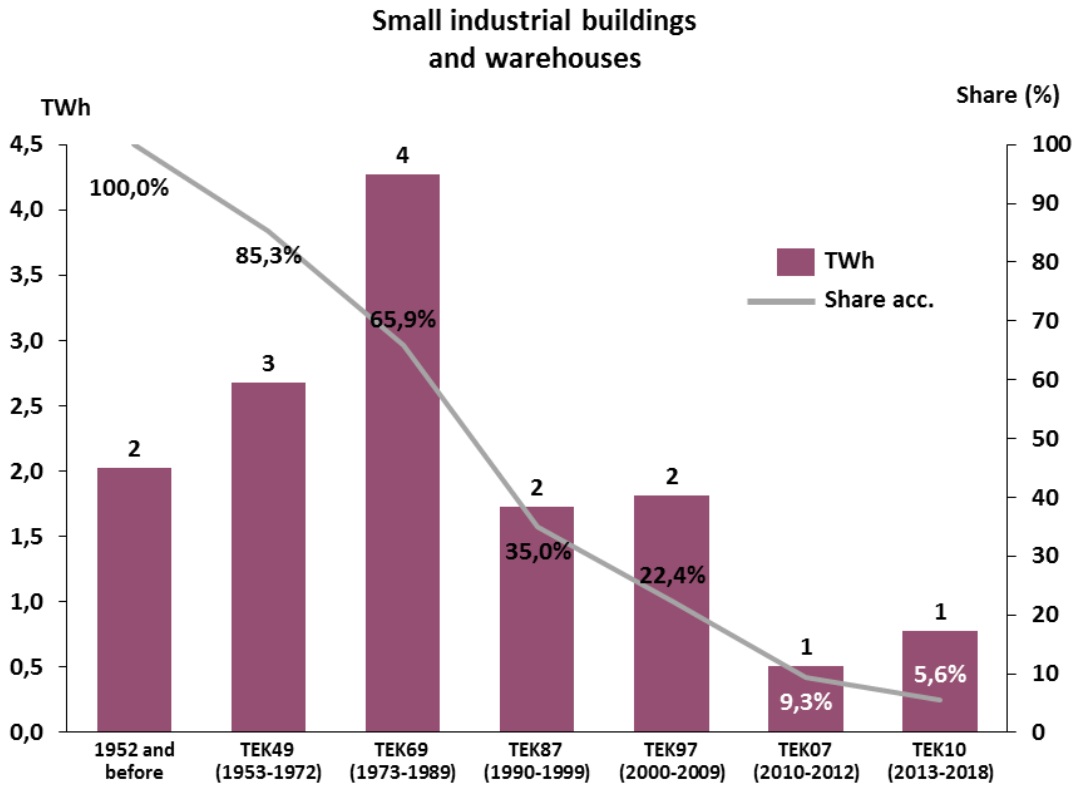


Figure 11 Share energy demand related to small industrial buildings and warehouses depending on building year

3.1.3 Eligibility under SpareBank1 Næringskreditt's building code criterion

Over the last several decades, the changes in the building code have pushed for more energy efficient commercial buildings. The building stock data indicates that, dependent on type of commercial building, between 5.1 and 13.9 % of the current buildings in Norway were constructed using the 2007 code or a younger code with even more energy efficient solutions.

Combining the information on the calculated specific energy demand related to building code in Figure 2 and information on the commercial building stock in Figures 4 through 7, the calculated average specific energy demand on the part of the Norwegian building stock examined here 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.

	Average total stock [kWh/m^2]	Average TEK07, TEK10 and TEK17 [kWh/m^2]	Reduction [kWh/m^2]
Office buildings	255	156	61 %
Commercial buildings	329	220	67 %
Hotel buildings	345	230	67 %
Small industry and warehouses	307	181	59 %

Table 2 Average specific energy demand for the building stock; whole stock, part eligible according to criteria and reduction

3.2 Refurbished Norwegian commercial buildings 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. This is aligned with the CBI taxonomy, where buildings qualify after being refurbished to a standard resulting in at least a 30 % reduction in energy demand[6]. In this case, we are looking to identify buildings that already have improved energy performance in this scale. To identify relevant buildings, the EPC database would be a suited source of data. The full release of the data are awaiting IT solution developments and necessary cleaning of the database to ensure sufficient data quality, and is not expected in the near future. As well as only including a small percentage of the total commercial building stock, the first data release will only include current certificates and will not include historic certificates for the buildings. The historic EPC-labels may, however, be made available at a later stage, so two approaches are included in this criterion;

- one solely based on the EPCs, current and historic, and
- one approach based on the current certificate compared to calculated energy demand for different building code (TEK) periods (shown in figure 2).

Table 3 below includes limit values for qualifying to the different energy grades in the EPC system[7] that make up the basis for the following calculations. It is important to note that these values are calculated with a different system boundary than the building code requirements.

[6] https://www.climatebonds.net/standard/buildings/upgrade
[7] https://www.energimerking.no/no/energimerking-bygg/om-energimerkesystemet-og-regelverket/karakterskalaen/

Building categories	Delivered energy per m^2 heated area (kWh/m^2)						
	A	**B**	**C**	**D**	**E**	**F**	**G**
Office	90	115	145	180	220	275	> F
Hotel and restaurant	140	190	240	290	340	415	> F
Commercial	115	160	210	255	300	375	> F
Industry/warehouse	105	145	185	250	315	405	> F

Table 3 Limit values in specific energy demand for energy grades in the EPC system

Table 4 below present calculated reduction in energy demand for an improvement of two steps on the energy grade scale in the Norwegian EPC system. To be able to include buildings originally only qualifying for a G, the values are calculated based on average values, and the average G building is assumed to have a specific energy demand as far off from the limit value for F as the average F is from the limit value for E ($G_{av}=F_{lim}+(F_{lim}+E_{lim})/2$).

This can be exemplified by an office building with an F (specific energy demand average of the limit value for F and limit value for E) will, with a 34 % reduction in energy demand end up with a specific energy demand average of the limit value for a C and the limit value for a D and with a D as new energy grade.

	Two-step improvement D → B	Two-step improvement E → C	Two-step improvement F → D	Two-step improvement G → E
Office buildings	37 %	35 %	34 %	34 %
Commercial buildings	41 %	33 %	31 %	33 %
Hotel buildings	38 %	32 %	30 %	30 %
Small industry and warehouses	43 %	42 %	40 %	37 %

Table 4 Improvement in specific energy demand from a two-step improvement in energy grade in EPC system calculated for average values.

3.2.1 Eligibility under building upgrade criteria

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.