REPORT

Building portfolio - carbon and energy footprint

CLIENT

Eika Boligkreditt AS

SUBJECT

Norwegian energy efficient buildings

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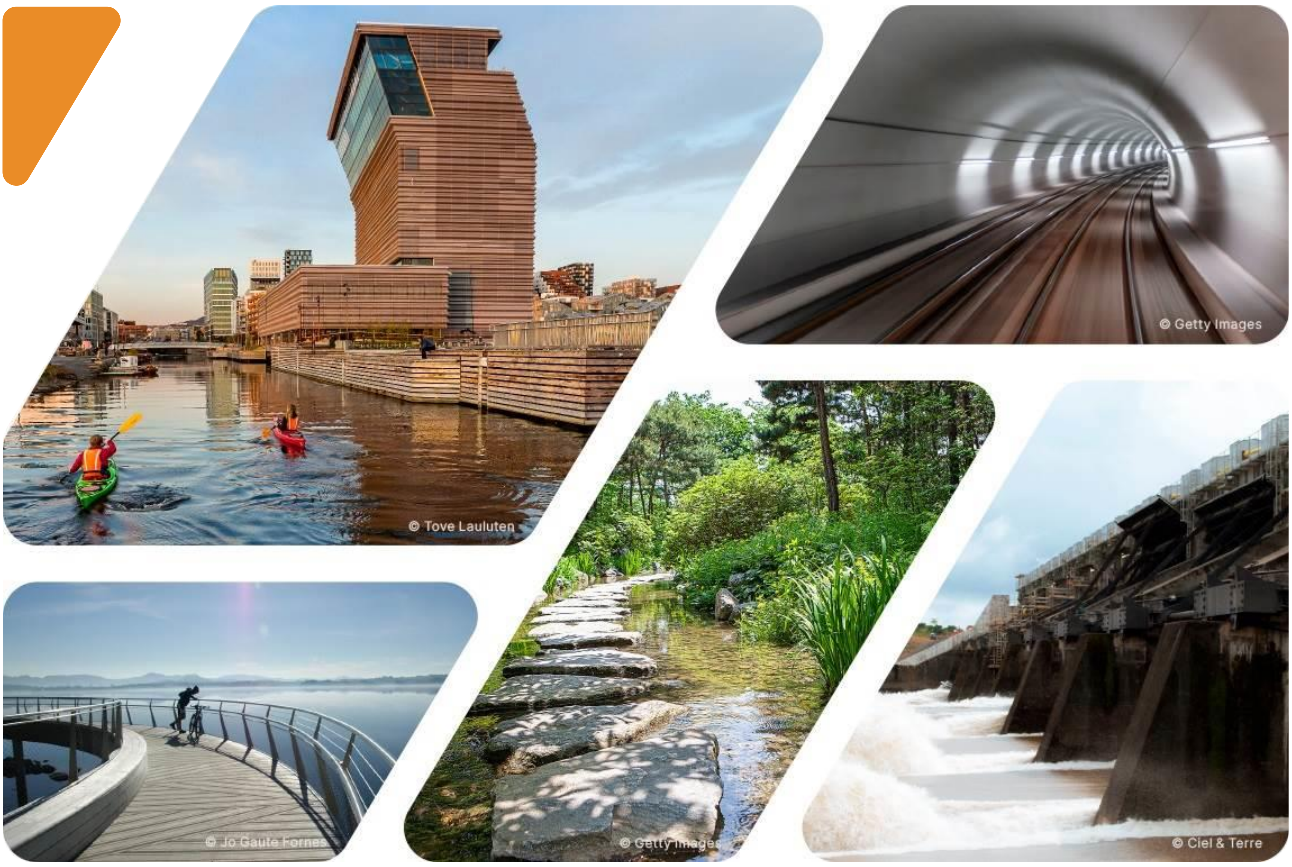

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CLIENT	Eika Boligkreditt AS	PROJECT MANAGER	Ibrahim Temel
CONTACT	Anders Mathiesen, Henrik Bråten	PREPARED BY	Ibrahim Temel, Kjersti Rustad Kvisberg
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

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1 Introduction

On assignment from Eika Boligkreditt, Multiconsult has studied both the full Eika residential loan portfolio and the share of the portfolio eligible under the bank's Green Bond Framework.

For the total portfolio, the energy efficiency and CO2 emissions related to in-use energy demand has been assessed. In this report, the methodology is presented and substantiated based on both energy requirements in the national building code and Energy Performance Certificates (EPC). Results for the full portfolio can be found in section 5.

In this document we briefly describe Eika Boligkreditt's green bond qualification criteria and the result of an analysis of the bank's loan portfolio. More detailed information about the eligibility criteria is available on the bank's website. The Eika Boligkreditt Green Bond Framework[1] identify eligibility criteria for residential buildings. This report describes the evidence for the criteria and the result of an impact assessment of the loan portfolio of Eika. The criteria to select the buildings are based on credible standards in Norway such as the Norwegian nearly zero-energy building (NZEB) guidelines, building regulations and EPCs. The eligibility criteria are described in section 6 and green portfolio results in section 7.

2 The Norwegian building stock

The Norwegian building stock consists of about 2.7 million dwellings in apartment buildings and small residential buildings. Figure 2-1 illustrates the building stock according to the latest available statistics.

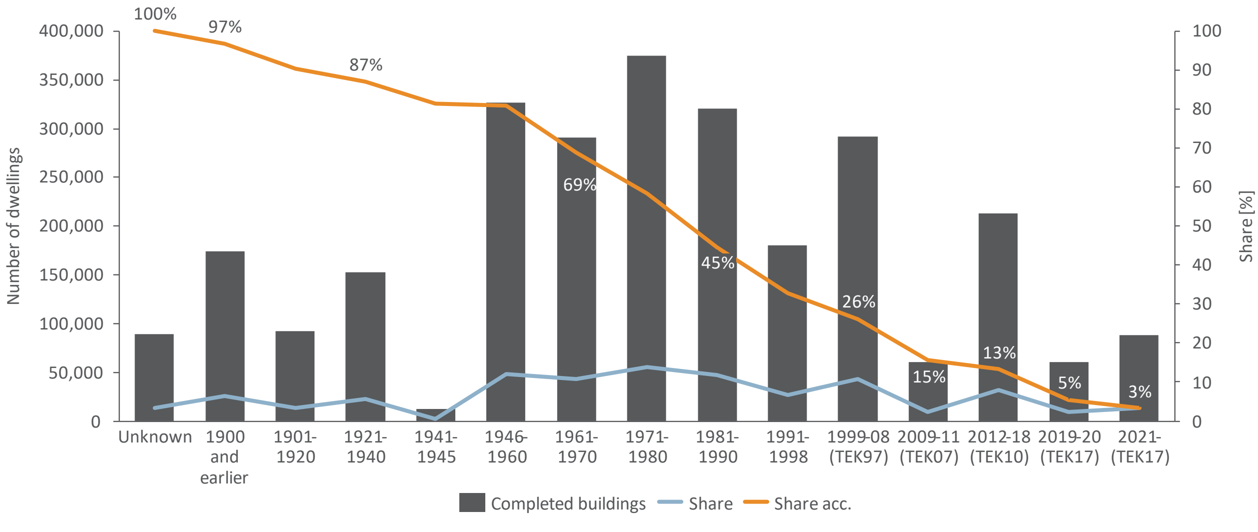

Figure 2-1 Age and building code distribution of dwellings.

Of the total stock, small residential buildings constitute about 70 percent, and apartments the remaining 30 percent. However, the share of apartments has been increasing over the last couple of decades.

[1] Available from: https://www.eikbol.no/Investor-relations/green-bonds?sc_lang=en

3 Grid factors for energy efficiency analysis and impact assessment

The CO2 emissions resulting from in-use energy demand in residential buildings depends to a large degree on the age of the building. This is due to two factors: the differences in energy efficiency requirements in the building codes over time, and development in the heating technologies and energy sources for heating in new buildings. Examples of the latter are direct electric heating, various types of heat pumps, bioenergy, and district heating.

Multiconsult takes these two factors into consideration when calculating the emission factors to be used in both total portfolio energy efficiency analyses (section 5) and green portfolio impact assessments (section 6 and section 7). This section first presents some general statistics on energy usage in Norwegian buildings and the Norwegian electricity production, before presenting the grid factors used in following sections.

3.1 Energy consumption in Norwegian buildings

The energy consumption of Norwegian buildings is predominantly electricity, with some district heating and bioenergy. The share of fossil fuel is very low and declining.

In 2013, Statistics Norway assessed energy use in Norwegian households. They found demand was covered by electricity (79 percent), fossil oil and gas (four percent) and bioenergy etc. (16 percent). Already in 2007, the building code was in clear disfavour of fossil energy, and the use of fossil energy in buildings has declined since. From 2020, fossil oil is banned from use in buildings.

The fuel mix in Norwegian district heating production included only four percent from fossil fuels (oil and gas) in 2023 [1]. Renewables accounted for 98 percent of the total (154 TWh) Norwegian electricity production, the final two percent being thermal power production from natural gas, biomass, and waste heat [2].

Figure 3-1 shows that the Norwegian production mix in 2023 resulted in emissions of 0 gCO2/kWh, as calculated by the Association of Issuing Bodies (AIB) [3]. In the figure, the production mix is included for other selected European states for comparison. These values vary from year to year.

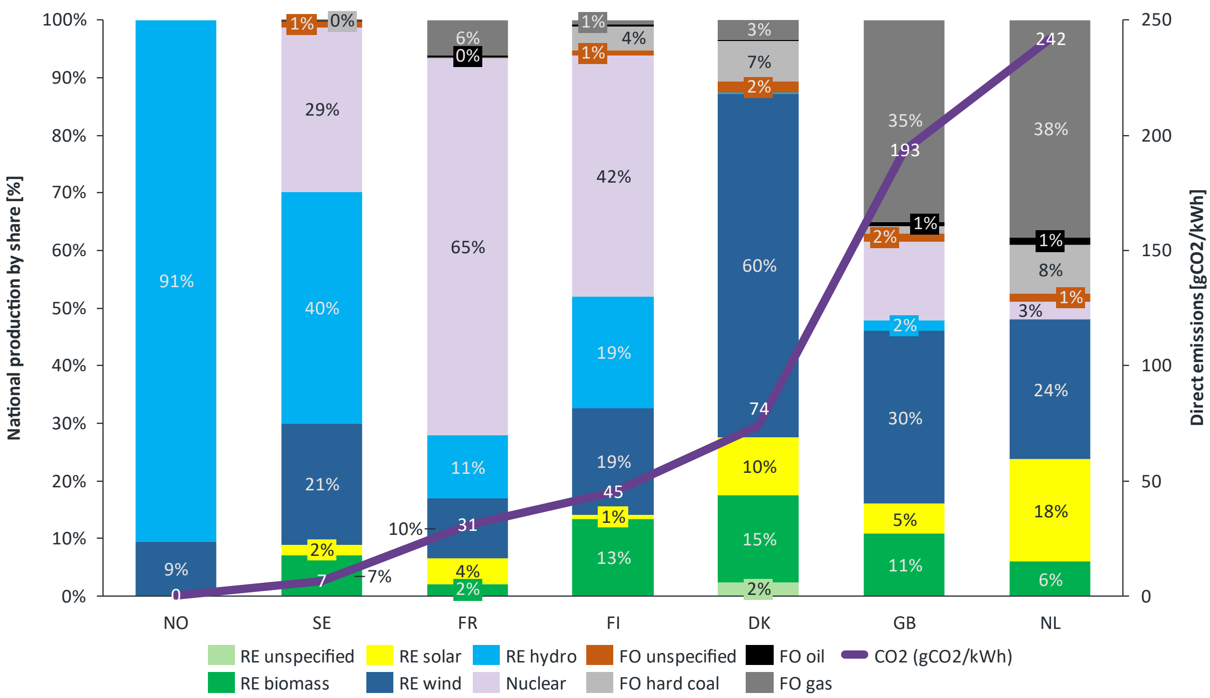

Figure 3-1 National electricity production mix in selected European countries. Source: [3]

As Figure 3-1 shows, emissions from power production varies between countries. Due to the interconnection of the power grid, the placement of the system boundary for power production heavily influences the greenhouse gas (GHG) emission factor associated with said production. To demonstrate how the type of emission factor and choice of system boundary between Norway only or Europe as a whole influence the results, the portfolio assessments are here presented based on several emission factors.

3.2 Emission factors for total loan portfolio

This section describes the emission factors used in the energy efficiency analysis of the total Eika portfolio.

Since the Norwegian buildings are predominantly heated by electricity, the mentioned placement of the system boundary for power production influences the emission factors that are applied in calculating emissions from building energy usage. To demonstrate how emissions vary depending on grid factor, emissions for the total loan portfolio analysis in section 5 are presented based on four different factors shown as scenario 1) – 4) in Table 3-1.

The factors 1) to 3) are location-based and 4) is market-based. For all scenarios, emission factors per building code and building category are computed using the influx of other energy sources for heating[2] and used in the emission calculations.

Table 3-1 Four emission factors used in computations of portfolio emissions, with description of system boundaries, import/export and whether market- or location-based. Sources: [3] [4] [5]

Scenario	Description	Emission factor [gCO2-eq/kWh]
1) European 2021-23 production mix	Location-based production mix with wide system boundary including EU countries, UK, and Norway	231
2) Norwegian 2021-23 production mix	Location-based production mix with narrow system boundary not including export and import	4
3) Norwegian physically delivered electricity 2023	Location-based production mix with narrow system boundary of Norway only but including net export/ import only to neighbouring countries and average annual emission factors	15
4) Norwegian residual mix 2023	Market-based residual mix for Norway with a European marketplace	599

3.2.1 Scenarios 1 and 2 – European and Norwegian production mixes

Norway is part of a larger, integrated European power grid, and import and export of electricity throughout the year means not all electricity consumed in Norway is produced here. To account for this, emissions are presented based on both Norwegian and European power mixes. The Norwegian and European production mixes are both non-supplier specific, location-based grid factors.

[2] Calculated by Multiconsult, based on building code assignments for the Norwegian Building Authority (DiBK).

The emissions from production mixes may fluctuate from year to year, depending on external factors such as changes in global energy supply. Taking a rounded average reduces the impact of these fluctuations on the yearly emissions from residential buildings presented in this report, making it easier to identify impact of changes in the portfolio composition.

The two first factors are then the rounded averages of national production mixes for the three years 2021 to 2023, which indicate factors of 231 and 4 gCO2-eq/kWh for European and Norwegian energy mixes, respectively [3]. This differs from the lifecycle average emission factor used in the green portfolio impact assessment, where the emissions throughout the building lifetime is more relevant (see section 3.3).

3.2.2 Scenario 3 – Norwegian physically delivered electricity

As an alternative to production mixes, The Norwegian Water Resources and Energy Directorate (NVE) calculates a climate declaration for physically delivered electricity for the previous year. This factor represents electricity consumed in Norway, accounting for emissions from net import and export of electricity from neighbouring countries and these countries' average annual emission factors. For 2023, this grid factor is 15 gCO2-eq/kWh [4]. This is also a location-based grid factor.

3.2.3 Scenario 4 – Norwegian residual mix

Certificates of origin, direct power purchase agreements or other documentation of which power has been purchased for the buildings in the portfolio is not available to the bank. There is also no basis for making assumptions on the share of the energy consumed by the buildings in the portfolio that has been purchased with Guarantees of Origin.

An alternative market-based grid factor for Norway is then the electricity disclosure calculated by Association of Issuing Bodies and referred to by NVE. This is the electricity residual mix of the country, which represents the sources of the electricity supply that is not covered with Guarantees of Origin, considering a European marketplace for electricity. Guarantees of Origin are not very widespread in the Norwegian electricity end-user market, resulting in a high emission factor of 599 gCO2-eq/kWh for 2023 [3] [5].

3.3 Emission factors for green portfolio impact assessment

This section outlines the emission factors used in the assessment of the green bond eligible part of Eika's portfolio.

The CO2 emissions from in use energy demand in residential buildings largely depend on the age of the building. This is due to two main factors: variations in energy efficiency requirements in the building codes over time and development in the heating technologies and energy sources in new buildings. Examples of the latter are direct electric heating, various types of heat pumps, bioenergy, and district heating. Norwegian buildings are predominantly heated by electricity. The share of fossil fuel is very low and declining.

Since the financed qualifying objects in the portfolio are relatively new, and expected to have a 60-year lifespan, their impact is best illustrated by the average yearly CO2 emissions over their lifetime. The grid factors used in this green portfolio impact assessment reflect a projected lifetime average, assuming a decarbonisation in the European energy system. This approach differs from the grid factors used in the total portfolio energy efficiency analysis that are based on current emission factors from Norwegian and European electricity production (see section 3.2).

Using a life-cycle analysis, the Norwegian Standard NS 3720:2018 *Method for greenhouse gas calculations for buildings* [6] considers international trade of electricity and the fact that consumption and grid factor does not necessarily mirror domestic production. The grid factor, as average in the lifetime of an asset, is based on a linear trajectory from the current grid factor to a close to zero emission factor in 2050 and steady until the end of the lifetime.

The standard provides a life-cycle-based calculation of the average emission factor for the next 60 years under two scenarios, as outlined in Table 3-2. This report incorporates calculations based on both factors.

Table 3-2 Electricity production greenhouse gas factors (CO2-eq) for buildings in two scenarios. Source: [6, Table A.1]

Scenario	Emission factor electricity [gCO_2-eq/kWh]	Emission factor incl. other heating sources [gCO2-eq/kWh][3]
European (EU27+ UK+ Norway) electricity mix over lifetime	136	115
Norwegian electricity mix over lifetime	19	18

To calculate the impact on climate gas emissions, the grid factors are applied to all electricity consumption in the Norwegian residential building stock. Electricity is, as mentioned, the dominant energy carrier to Norwegian residential buildings, but the energy mix also includes other energy carriers such as bio energy and district heating. The influx of other energy sources for heating purposes is applied to all electricity emission factors resulting in the “Emission factor incl. other heating sources”, found in the rightmost column in Table 3-2. The same factors are used for commercial buildings.

For clarity if comparing avoided emissions from the green portfolio with total portfolio calculations, the two Finans Norge recommended grid factors are included (scenario 3 and scenario 4 in section 3.2). Considering the same influx of alternative heating sources, the resulting emission factor for the Norwegian physically delivered electricity 2023 is 16 gCO2/kWh (scenario 3) and for the Norwegian residual mix 2023 it is 495 gCO2/kWh (scenario 4).

[3] Calculated by Multiconsult, based on building code assignments for the Norwegian Building Authority (DiBK).

4 Energy efficiency in the building stock

The actual energy performance of individual buildings is not publicly available, and the bank cannot request energy data from their clients and expect sufficient data of reliable quality. Two options for describing buildings' energy performance are presented in the following sections. The two are historic energy requirements in the national building code and the EPC system.

4.1 National building code

Changes in the Norwegian building code have consistently, over several decades, resulted in more energy efficient buildings. The building codes are defined by calculated net energy demand, not including the efficiency of the building's energy system. The calculated specific energy demand [kWh/m^2] dependent on building code, presented in Figure 4-1, illustrates how the energy demand declines with decreasing age of the buildings.

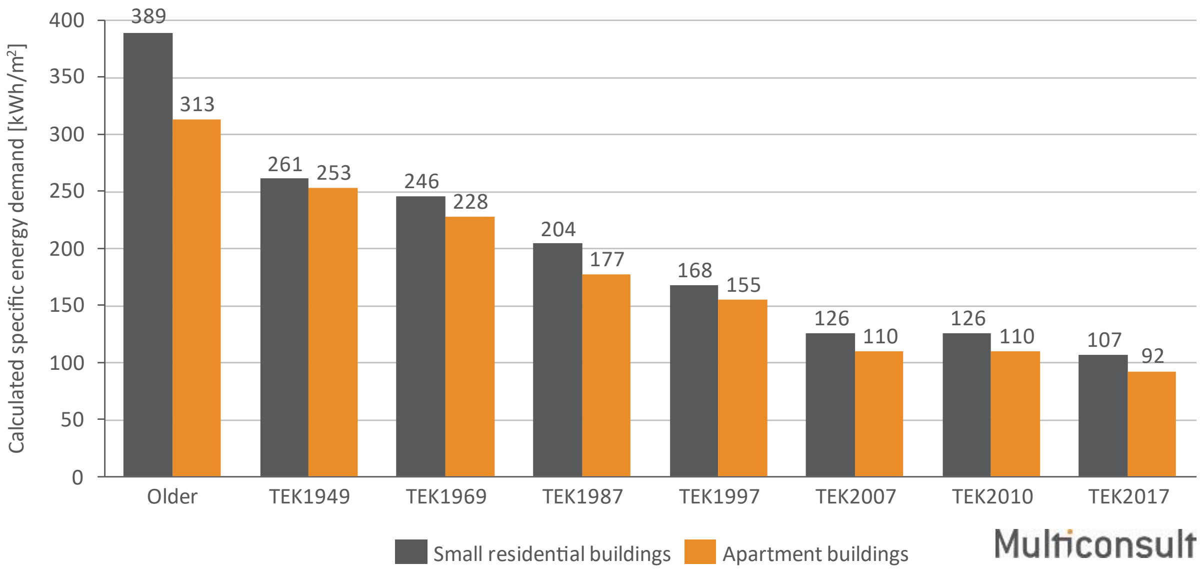

Figure 4-1 Development in calculated specific net energy demand based on building code and building tradition.

From TEK07 to TEK17 the reduction was about 15 percent and the former shift from TEK97 to TEK07 was no less than 25 percent. Note that, for residential buildings, there was no change between TEK07 and TEK10 with respect to energy efficiency requirements.

The figure above gives theoretical values for representative models of an apartment and a small residential building, calculated in the computer programme SIMIEN and in accordance with Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings. Method and data* and not based on measured energy use. In addition to the guiding assumption in Norwegian Standard NS 3031:2014, experience with building tradition is included. Net energy demand is calculated for model buildings used for defining the building code. For older buildings, the calculated values tend to be higher than the actual measured demand, mostly because the calculated ventilation air flow volume in older buildings is assumed to be as high as in newer buildings, but without heat recovery. Indoor air quality is hence assumed not to be dependent on building year. This is the same methodology as used in the EPC system.

The building codes have a significant effect on energy efficiency. An investigation of the energy performance of buildings registered in the EPC database younger than 1997, shows a clear improvement in the calculated energy level for buildings finished after 2008/2009 when the building code of 2007 came into force. The same observation on improvement is evident when the building code of 1997 came into force. In the period between 1997 and 2007, a period when there was no change in the building code, it is difficult to see any clear changes. However, a small reduction of energy use might have taken place in the latest years coming up to 2007. This might be due to an increased use of heat pumps in new buildings, and to a certain degree, better windows.

4.1.1 Time lag between building permit and building period

After the implementation of a new building code, there is some time lag before we see new buildings completed according to this new code. 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 factors such as the complexity of the site and project, financing, and the housing market.

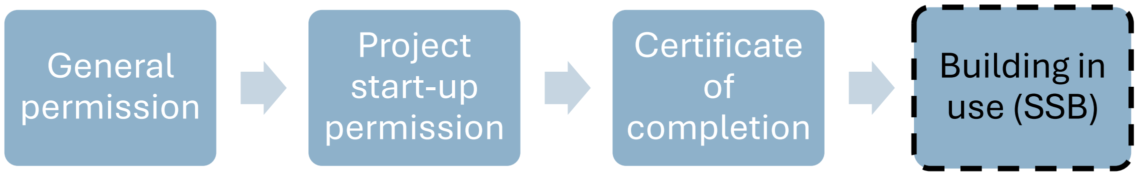

Figure 4-2 Illustration of process from building permit to building in use

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 residential buildings in this phase. Building statistics indicate that approximately six months to a year construction period is standard for residential buildings [7].

Based on expert input, we assume a two-year lag between code implementation and building completion as a robust and conservative estimate. While some deviations may occur, the methodology relies on building year data, available to the bank annually.

Since TEK07 and TEK10 had identical energy requirements, buildings completed in 2012 are assumed to follow TEK10, though some from 2011 may also comply. Likewise, some 2012 projects may still be based on TEK07. Buildings completed in 2009–2011 are assumed to follow TEK07, though some 2008 buildings may also comply, while 2009 may include delayed projects still using TEK97.

4.1.2 The suitability of building codes to demonstrate energy performance in large portfolios

The registered efficiency improvements substantiate that Norwegian buildings comply with the building code in force.

The bank may obtain sufficient information about the financed objects to estimate the energy performance of the buildings its loan portfolio. For objects with available information on building year and building category, the energy performance may be calculated based on specific energy demand illustrated in Figure 4-1. Living area can be used when available, or an average for each building category may be utilized for large portfolios.

For buildings without recorded building year, the category "Older" in Figure 4-1 (buildings from 1950 and earlier) may be applied in a conservative approach.

4.2 Energy Performance Certificates (EPC)

The Norwegian EPC System became operative in 2010 and was made mandatory for all new residences completed after the 1st of July 2010, as well as for all residences sold or rented out.

The EPC consists of an energy rating (no; "energikarakter") and a heating rating (no; "oppvarmingskarakter"). The energy rating ranges from A (best) to G (weakest). The rating provides an overall assessment of the building's energy needs, specifically the number of kilowatt-hours the building or residence is calculated to require per square meter for standardized (normal) use in a standardized climate. The energy rating is based on a calculation of net delivered energy according to the Norwegian Standard NS 3031:2014 *Calculation of energy performance of buildings - Method and data*, including the efficiencies of the building's energy system (power, heat pump, district energy, solar energy etc.). Thus, the energy rating is independent of actual measured energy use. As from 2023, all registrations must be linked to a listing in Norway's official property register (no; matrikkelen). The heating rating ranges from colour green (best) to red (weakest). The heating label is seldom used and not considered relevant in the context of this work.

The Norwegian EPC system does not yet use primary energy, but this is expected to be included in an upcoming change. When using the EPC to assess the energy performance of a building or residence in conjunction with the EU Taxonomy, currently only the energy rating is used, not the heating rating.

Table 4-1 describes how the energy rating thresholds for A – G depend on the heated utility area of the residence [8]. Note that the calculation of net delivered energy include all standard consumption, also lighting and technical equipment.

Table 4-1 The EPC's energy rating thresholds for residential building categories and dependency on the residence heated utility area. Source: [8]

Building category	Calculated specific net delivered energy per m^2 heated utility area [kWh/m^2]						
	A	B	C	D	E	F	G
	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	Lower than or equal to	No limit
Small residential buildings	95	120	145	175	205	250	> F
Sq. m adjustment	+800/A	+1,600/A	+2,500/A	+4,100/A	+5,800/A	+8,000/A	
Apartments	85	95	110	135	160	200	> F
Sq. m adjustment	+600/A	+1,000/A	+1,500/A	+2,200/A	+3,000/A	+4,000/A	

Until recently, the Norwegian EPC regulations stated that apartments must have individual EPCs. This meant that apartments in an apartment building would receive different EPC energy ratings depending on their location in the building in relation to surfaces exposed to the outdoors, etc. The EPC regulation allowed establishing EPCs for apartments based on calculations for the apartment building as one unit only when all apartments were smaller than 50 m^2. Regardless, the thresholds for apartments in Table 4-1 were still applicable.

However, the EPC regulation was changed on March 1, 2024. It is now possible to create an EPC valid for an entire apartment building, provided it is prepared by a company that meets the competence requirements. This aligns with the method used to evaluate energy requirements in the building code (TEK17) and will therefore be the preferred way to establish EPCs for new apartment buildings from now on. When an apartment owner wants to sell their apartment and needs an EPC, they can choose whether to use an EPC established for the apartment building as a whole or prepare an individual EPC for the apartment. For now, the threshold for apartments in Table 4-1 are also valid for an apartment building, but there may be changes in the future.

4.2.1 Registered EPCs in the Norwegian residential stock

The EPC database is available for statistical purposes. Comparing the number of certificates with actual buildings in the building stock from Statistics Norway, coverage of individual dwellings is about 50 percent. This is based on raw data, before the database has been cleaned of double entries and test entries. Low coverage influences the basis for establishing a base line and eligibility criteria and reduces the pool volume of which a bank may identify objects in their portfolio.

Figure 4-3 shows how the stock of residences in Norway registered in the EPC database is distributed by building code, and their certificate label.

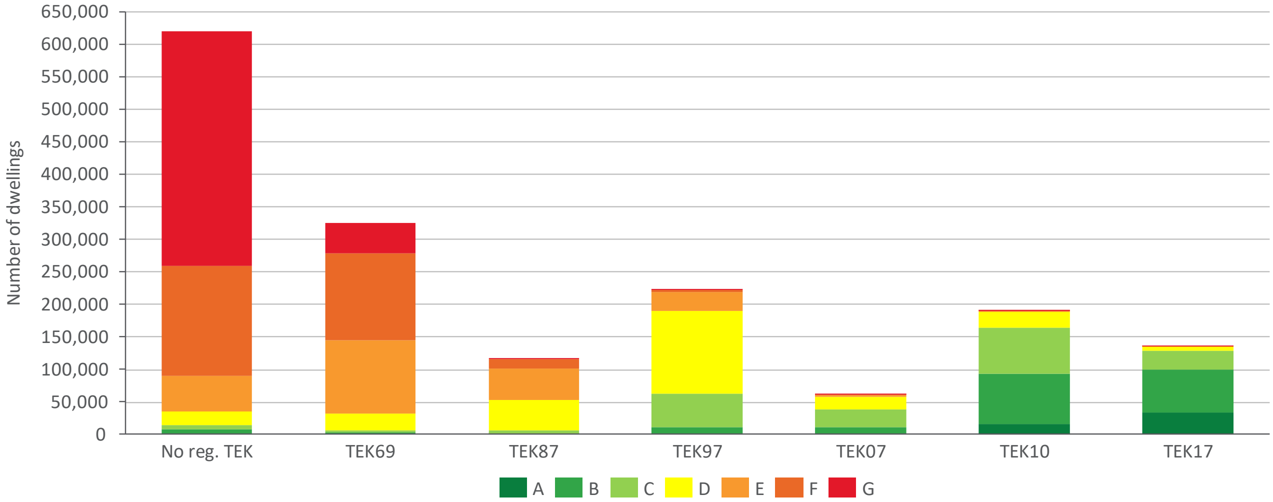

Figure 4-3 Registered EPCs of Norwegian residences distributed per building code and energy label. Source: [9] [10]

The registered properties in the EPC database are considered representative for the buildings built under the same building code, however not representative for the total stock, as younger buildings are overrepresented in the database. Figure 4-4 shows the energy grades in the already granted certificates to Norwegian residential buildings.

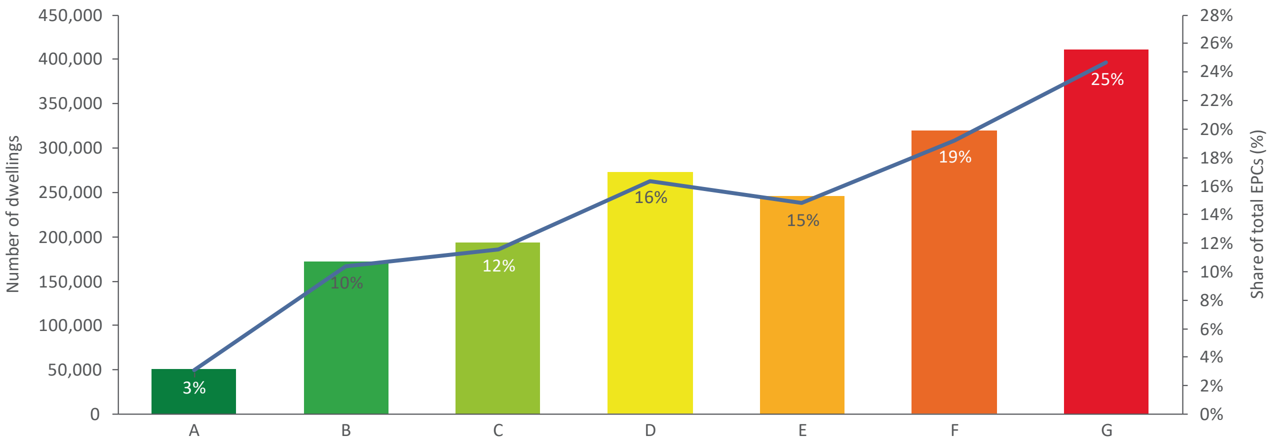

Figure 4-4 Norwegian building stock Energy Performance Certificates by grade. Residential buildings only, representative only of buildings with EPCs. Source: [9] [10]

Extracting only buildings built before 2009 (TEK07 or older building codes), eight percent of the total stock is expected to get a C or better and similarly two percent have a B or better. These are buildings that have initially been built, or through refurbishment, attained higher energy efficiency standards than the original building year (and respective building code) would imply.

The EPC coverage is, as mentioned, not equally distributed over the building stock. Figure 4-5 shows the age of the buildings with EPCs and the total number of buildings in the building stock, and how much of the building stock is represented in the EPC database. This illustrates how younger buildings are overrepresented in the EPC database. Note that EPC data is regularly updated and the data behind the figure includes new registrations in 2024. Building stock data is, however, only updated on a yearly basis and the figure only includes buildings finished before the end of 2023. [11]

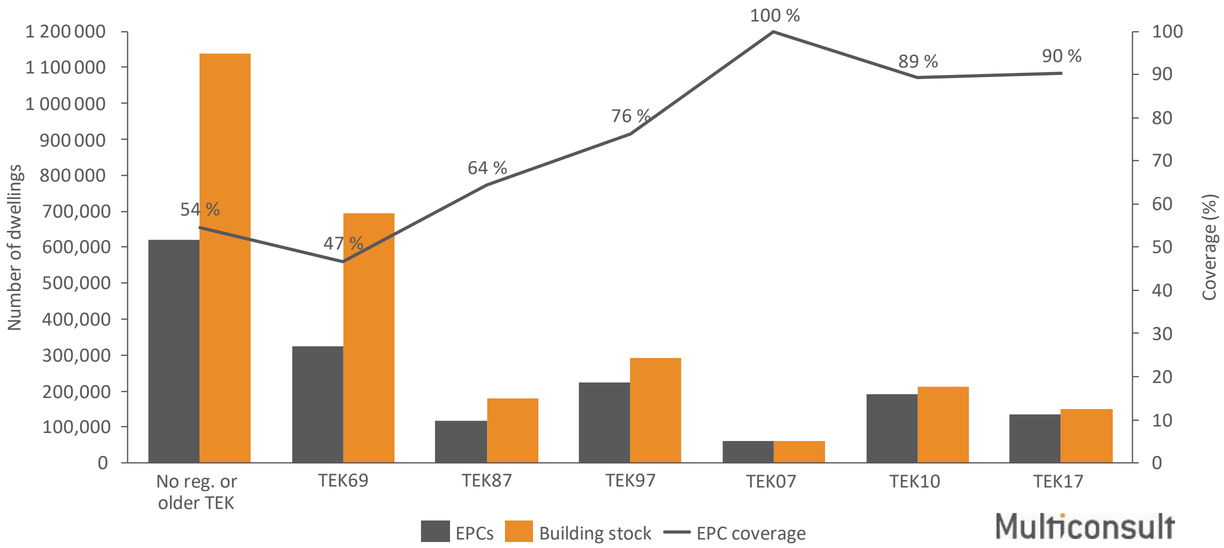

Figure 4-5 Age distribution in EPCs vs. actual residential building stock and EPC coverage by building year. Source: [11] [9] [10]

Assuming registered EPCs for each period are representative for the building stock, we can indicate what the label distribution would be if all residential buildings were given a certificate. Figure 4-6 illustrates how EPCs would be distributed based on this assumption.

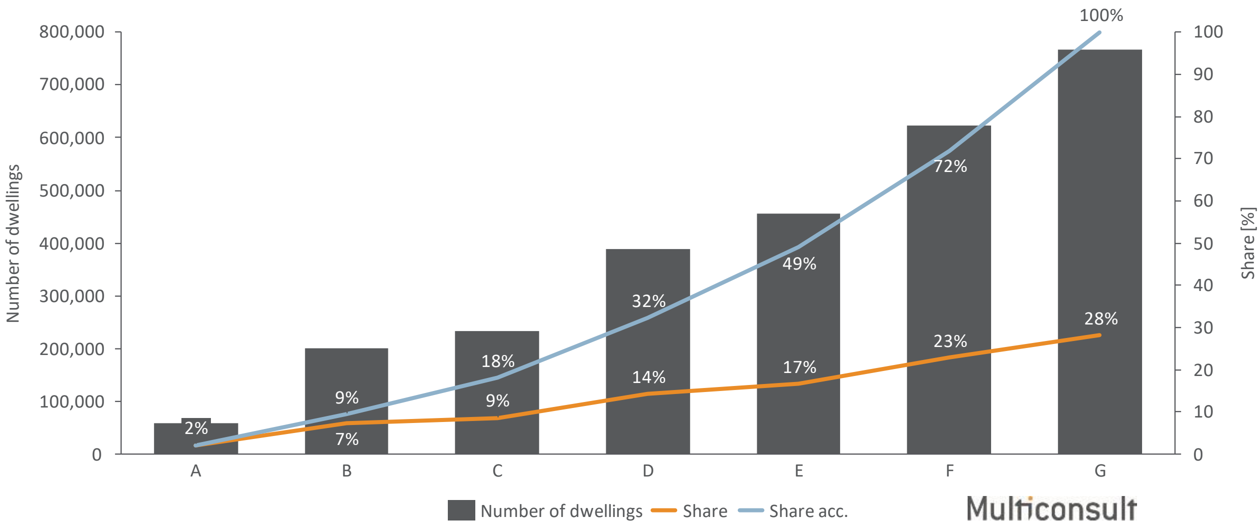

Figure 4-6 EPCs extrapolated to include the whole residential building stock. Source: [11] [9] [10]

4.2.2 The suitability of the EPC system to demonstrate energy performance in large portfolios

EPCs can consider building specific data and illustrate a buildings energy efficiency performance. The bank may obtain relevant information about the financed objects in the EPC database. Eika has linked the individual residences to the EPC database and included the energy certificate results for individual assets, based on some key information. The bank has also obtained calculated energy labels from Eiendomsverdi's database. The data this analysis is based on, includes both energy labels and specific energy demand [kWh/m^2], either from an EPC or Eiendomsverdi estimates.

To calculate the energy demand in buildings, average values derived from Figure 4-1, or specific energy demand supplied with the portfolio, may be utilized in combination with living area. Living area is to a large degree available information to the bank, but an alternative is to apply an average for each building category.

Coming changes in the EPC system will not mean all old certificates are invalid. Hence, for the green portfolio assessment in sections 6 and 7, both building code and EPC criteria will prevail until certificates based on the old system have expired. For identifying the most energy efficient buildings, the changes in the system are not expected to be problematic.

4.3 Building code and EPC as basis for energy efficiency analysis

Combining EPCs and building code in a dynamic portfolio might give fluctuating results as the two solutions use different system boundaries.

As mentioned, the energy label in the EPC system is based on calculated delivered energy and the building codes are defined by net calculated energy, not including the building's energy system. The difference between the two values will vary depending on energy supply solution, building category, applied energy efficiency measures and local climate. According to Finans Norge, delivered energy is the most relevant measure when calculating portfolio footprint, but the difference between delivered energy and net energy usually is below five percent, and the sizes can therefore be interchanged. [12]

Our calculations indicate that the difference might be greater than the five percent indicated by Finans Norge. However, depending on the heating source, the difference can be in favour of both delivered energy and net energy. This means that the average for all residential buildings probably will have little difference between net and delivered energy.

This difference in system boundaries also means that for buildings with both identified building code and EPC, the calculated energy demand might vary depending on which method is used.

The building code approach is based on consistently updated statistics on building stock and standardized calculations of energy performance dependent on building code and age of the buildings, combined with portfolio specific area per dwelling. This is found to be a robust and consistent approach to monitor a complete portfolio over time and illustrate the energy use related carbon footprint of the buildings in use. Using the building code is also considered a more conservative approach related to portfolio footprint calculations compared to using the EPC system, giving a larger footprint. Both methods are base for calculations of green portfolio footprint for buildings eligible under criterion 2 Eika's Green Bond Framework.

Using specific energy demand or median energy usage per energy grade to estimate energy usage do correspond to higher data quality scores than building codes according to PCAF's standard for mortgages, as referenced by Finans Norge's guidance document for calculation of financed greenhouse gas emissions [12]. In Eika's residential portfolio, 98 percent of buildings have an energy label, including estimates from Eiendomsverdi.

The building code and EPC approaches are therefore combined in the following analysis of the complete Eika residential loan portfolio. Specific energy per object is used where available. Where only energy labels are available, energy demand have been calculated based on middle values of energy usage per energy grade. Labels A and G do not have a middle value. For EPC A, 95 percent of the upper limit of the grade is used and for EPC G, 115 percent of the upper limit of EPC F, in accordance with Finans Norge. The estimated energy demand is then multiplied directly with the emission factors presented in section 3.2. For the rest of the buildings, the calculations are based on building code and emission factors take into consideration building age and sources of heating.

The EPC approach was introduced and applied for about half of objects for the portfolio of December 2023. Previous analyses have applied only the building code approach. In any later updates, consistency and transparency will be pursued when describing the portfolio's energy and climate performance, even with transition in methodology or enhanced data quality.

5 Total loan portfolio - Energy efficiency analysis

5.1 Portfolio information

The analysis is based on the portfolio as of December 31st, 2024. The Private Market (PM) portfolio include individual dwellings, while the Business Market (BM) portfolio include apartment buildings and loans to cooperative housing (no; borettslag). The analysed portfolio of Eika PM residential loan portfolio has of 36,566 unique small residential buildings and 13,172 apartments, while the BM portfolio has 169 unique apartment buildings and other residential buildings.

From the loan portfolio, holiday homes and buildings registered in the portfolio as second mortgages (no; tilleggssikkerhet) have been excluded from the analysis. These dwellings are excluded due to two reasons; as there are no energy requirements in the building code (holiday homes), and to avoid double counting as same assets may be included in other portfolios (second mortgages).

The data supplied by the bank includes object area, building year, energy rating and calculated delivered energy [kWh/m^2] for most objects. The energy ratings consist of EPC labels from Enova and estimated energy labels from Eiendomsverdi's database. For dwellings without living area information, the category average in the national statistics is assumed. For objects without specific energy, assumptions are made per building type and energy label based on Table 4-1.

Figure 5-1 shows how the remaining assets in the PM and BM portfolio are distributed by age, indicated by building code, and taking into consideration the time lag from implementation of a code to most finished buildings adhering to the new code. For objects without building year information, the building is conservatively assumed to fall into the "Older" category.

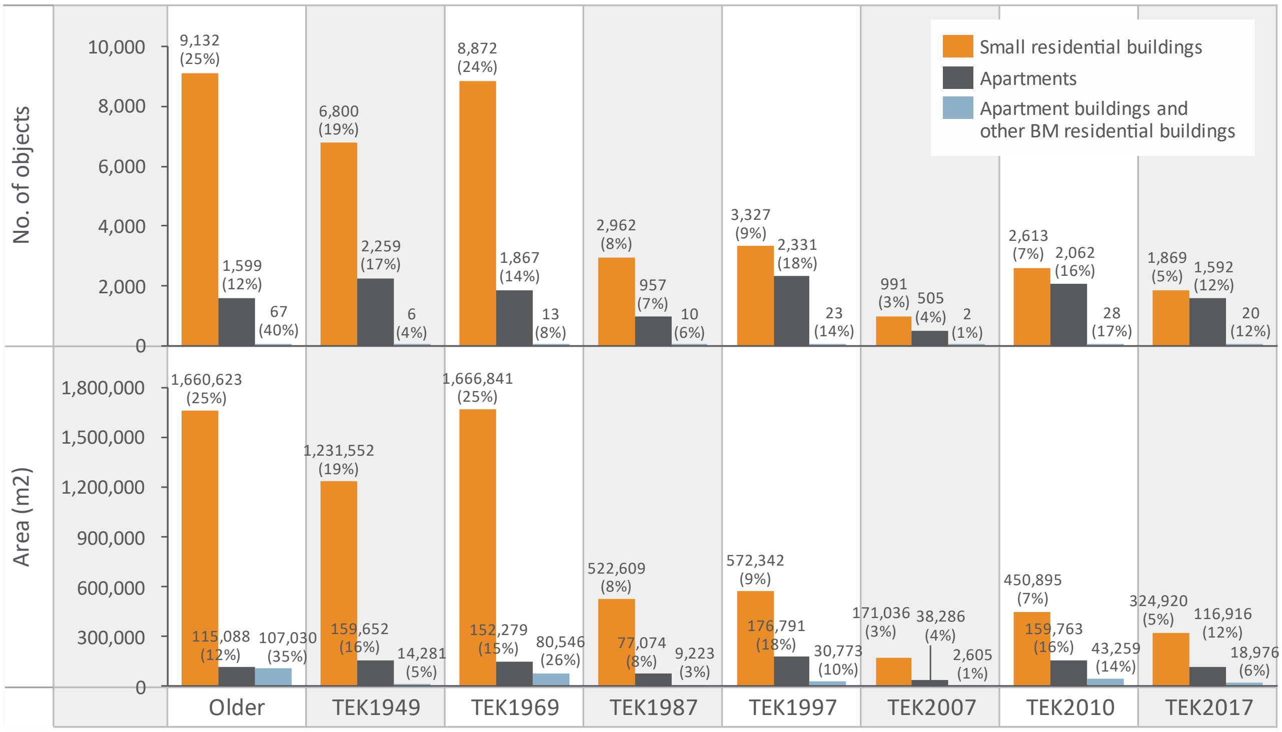

Figure 5-1 Eika PM and BM loan portfolio as of December 31st, 2024. Percentage represents share of building type total. Assumptions apply.

5.2 Calculated energy demand

Combining the age distribution of the living area in the portfolio with calculated energy demand in the building stock dependent on energy label or building code, we can illustrate the energy demand in the whole portfolio. Over the years, the energy footprint of this dynamic portfolio will develop, and the bank will be able to monitor the energy efficiency of their portfolio.

Better data availability has increased the percentage of EPC-based calculations from about half of the portfolio in 2024 to 98 percent in 2025. Calculated energy demand for these objects utilizes specific energy usage [kWh/m^2] from the portfolio or per energy label from Table 4-1. Energy demand for the remaining objects is based on building code and calculated specific net energy demand from Figure 4-1.

Figure 5-2 illustrates energy demand in the buildings of the current portfolio as shown in Figure 5-1. The energy demand in the buildings is scaled down to reflect the bank's engagement. The scaling simply reflects the loan's share of the object value at loan origin.

Buildings in the current portfolio, as of December 31st, 2024, represents yearly energy demand of 1,650 GWh. Adjusted to only reflect the bank's engagement relative share of property value at origin, the portfolio represents yearly energy demand of 805 GWh.

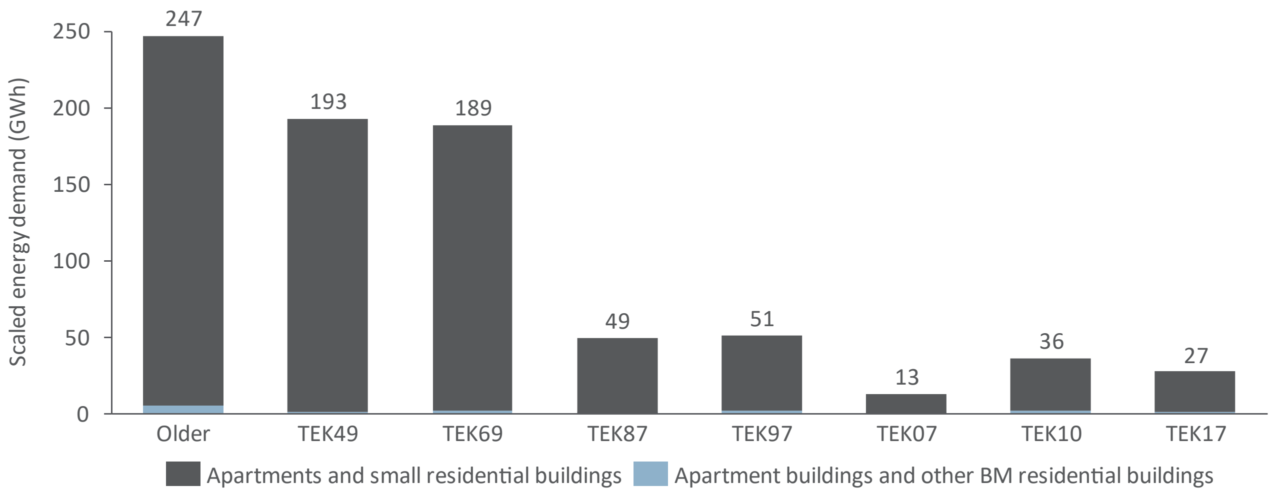

Figure 5-2 Portfolio in-use energy demand scaled by bank's engagements share of property value distributed by age of buildings. Assumptions apply.

5.3 Calculated CO2 emissions related to operational energy demand

Four emission factor scenarios are used to calculate the energy related CO2 emissions from Eika's total portfolio (see section 3.2). Emissions for the PM and BM portfolio have been calculated based on energy ratings provided by Eika or based on building code.

For the EPC based calculations, emission factors from Table 3-1 are applied directly to the energy demand to calculate emissions. For the building code-based emissions, building code specific CO2 emissions per square meter in the Norwegian residential building stock are used. Figure 5-3 and Figure 5-4 illustrate these factors based on a European power production mix (scenario 1) or a Norwegian power production mix (scenario 2), respectively. Emissions for a Norwegian physically delivered grid factor (scenario 3) and Norwegian residual mix (scenario 4) have been calculated similarly, only changing input grid factors.

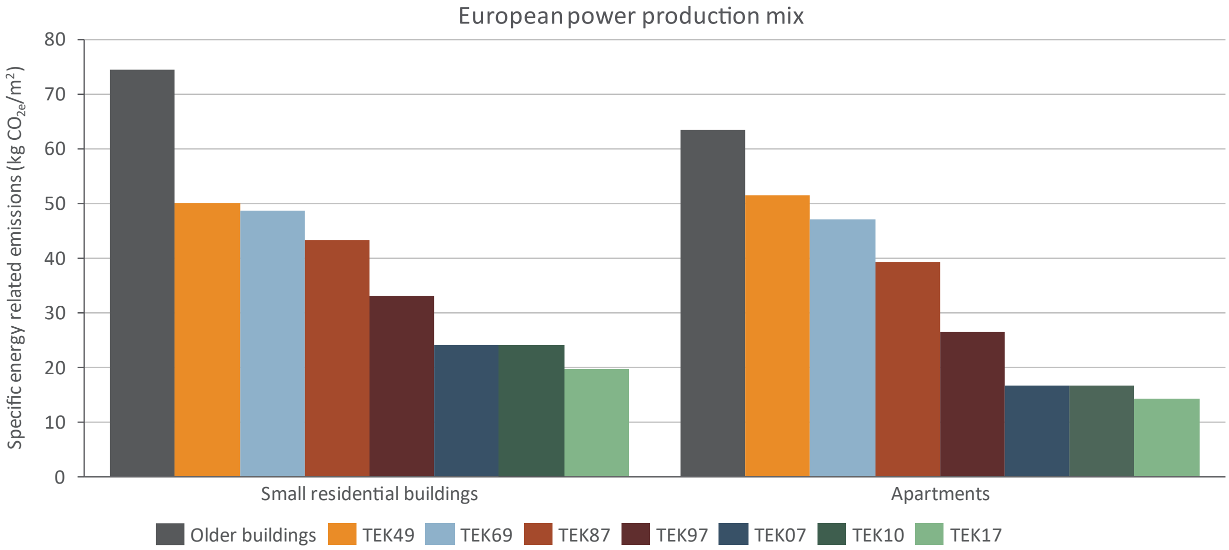

Figure 5-3 Total Norwegian residential building stock specific emissions [kgCO2-eq/m²] dependent on building category and age of buildings, scenario 1) European power production mix.

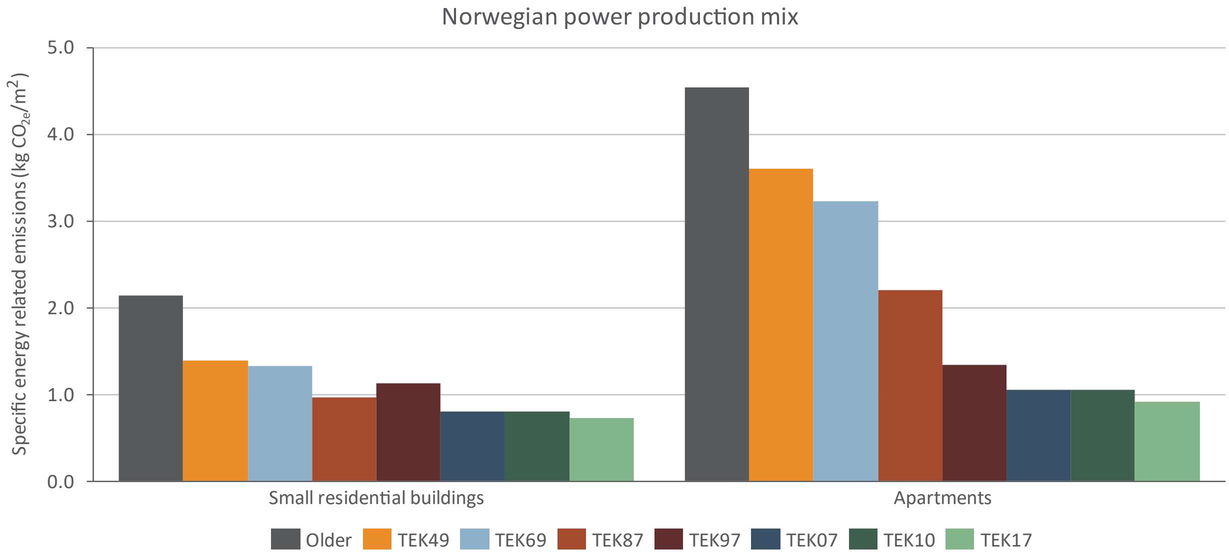

Figure 5-4 Total Norwegian residential building stock specific emissions [kgCO2-eq/m²] dependent on building category and age of buildings, scenario 2) Norwegian power production mix.

The energy usage per object and emission factors from section 3.2 gives a basis to estimate the CO2 emissions of the total Eika residential buildings portfolio. Figure 5-5 to Figure 5-8 illustrate the CO2 emissions related to in-use energy demand in the buildings in the current portfolio scaled down to reflect the bank's engagement. The figures show emissions calculated based on the four grid factors European power production mix (scenario 1), Norwegian power production mix (scenario 2), Norwegian physically delivered electricity (scenario 3) and Norwegian residual mix (scenario 4), respectively.

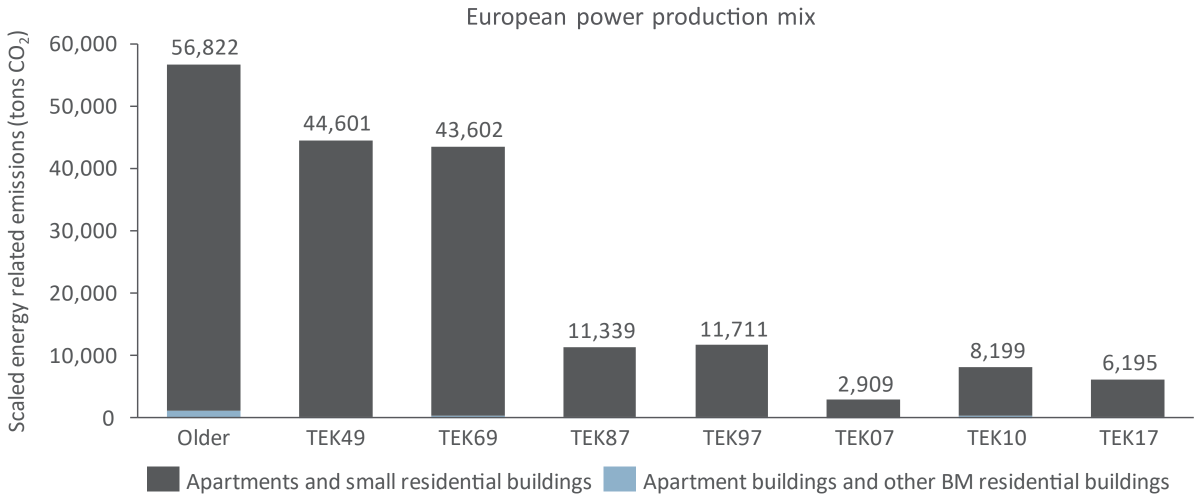

Figure 5-5 Portfolio CO2 emissions related to yearly in-use energy demand, scaled by engagements share of property value. Scenario 1) European power production mix as basis for calculation.

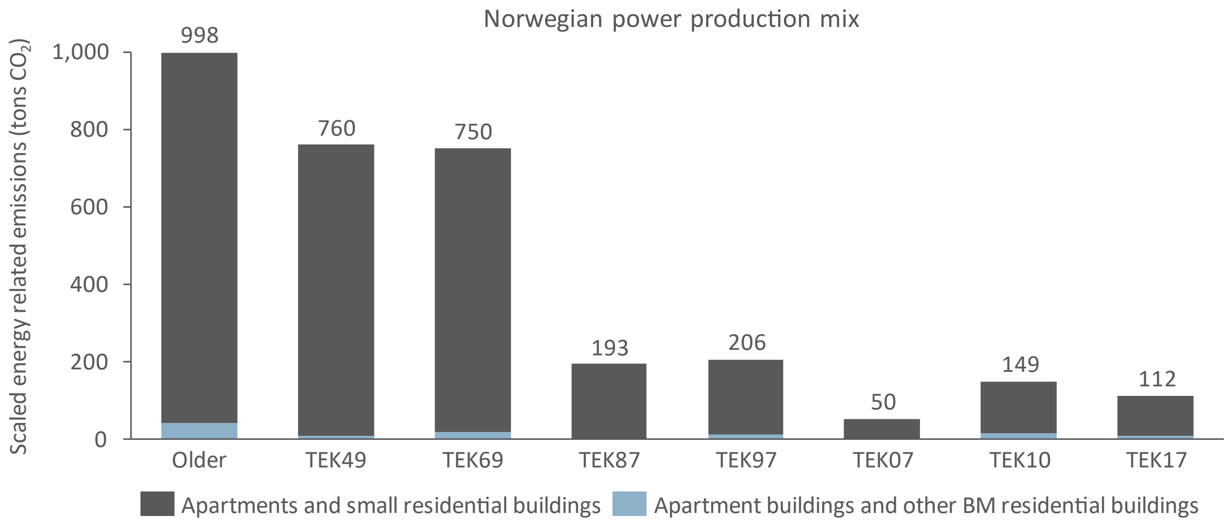

Figure 5-6 Portfolio CO2 emissions related to yearly in-use energy demand, scaled by engagements share of property value. Scenario 2) Norwegian power production mix as basis for calculation.

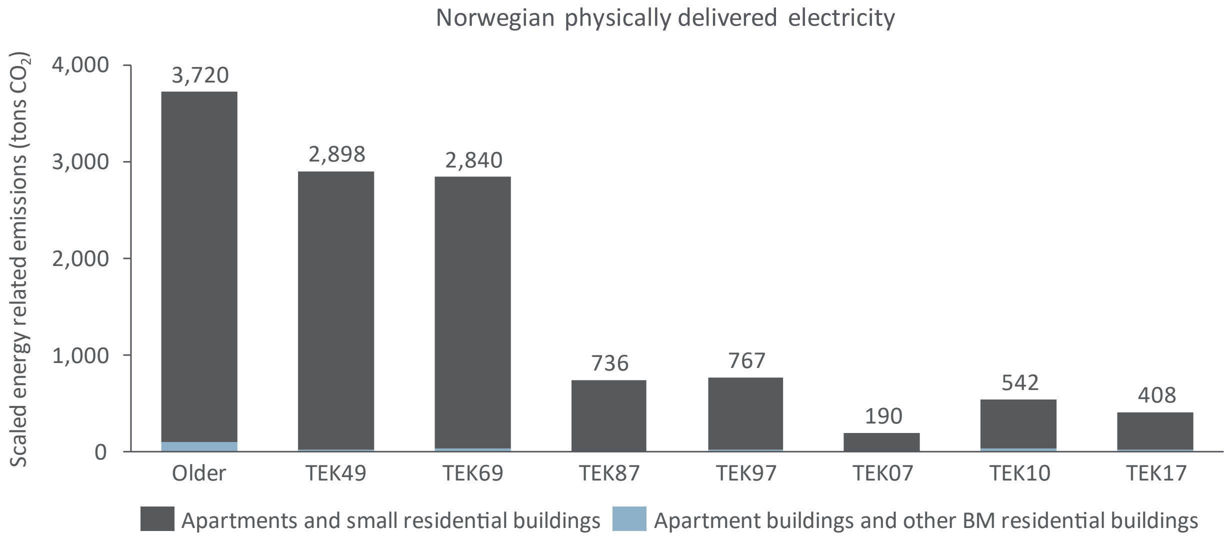

Figure 5-7 Portfolio CO2 emissions related to yearly in-use energy demand, scaled by engagements share of property value. Scenario 3) Norwegian physically delivered el. used in calculation.

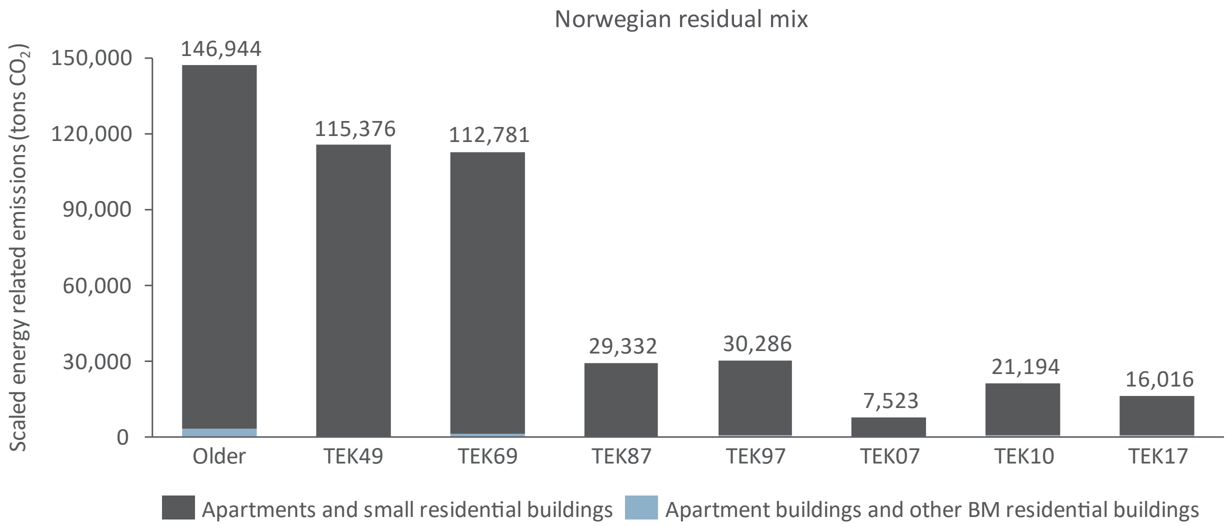

Figure 5-8 Portfolio CO2 emissions related to yearly in-use energy demand, scaled by engagements share of property value. Scenario 4) Norwegian residual mix as basis for calculation.

Summing emissions for all objects, Table 5-1 shows the estimated yearly emissions for all four scenarios. The numbers are adjusted to only reflect the bank's engagement relative share of property value at loan origin, for the portfolio as of December 31st, 2024. The table also includes emissions relative to the dwelling area in the portfolio, the portfolio emission intensity. Both emissions and area are scaled by the bank's share of engagement in the calculation.

Table 5-1 PM + BM Portfolio sum of energy related emissions and emission intensity based on the four emission factors presented in section 3.2 (scenario 1-4) [CO2-eq].

Scenario	Electricity emission factor [gCO2-eq/kWh]	Scaled portfolio emissions per year [tonnes CO2-eq]	Portfolio emission intensity [kgCO2-eq/m^2]
1) European 2021/22/23 production mix	231	185,400	48.9
2) Norwegian 2021/22/23 production mix	4	3,200	0.8
3) Norwegian physically delivered electricity 2023	15	12,100	3.2
4) Norwegian residual mix 2023	599	479,500	126

6 Green bonds eligibility criteria - Residential buildings

Eika Boligkreditt published an updated Green Bond Framework in 2024. According to this framework, buildings in the Eika portfolio must meet one or more of the following eligibility criteria:

1. Residential buildings in Norway:
    a. Buildings built in 2021 or later: NZEB-10 percent
    b. Buildings built before 2021: EPC A label or within the top 15 percent low carbon buildings in Norway
2. Refurbished residential buildings in Norway: Leading to a reduction of primary energy demand (PED) of at least 30 percent or comply with the applicable requirements for major renovations

The following sections explain Multiconsult's approach for identifying building emissions according to criterion 1a and 1b. The methodology to calculate the energy savings and corresponding avoided emissions for these buildings, compared to the average energy usage of residential buildings in Norway, is also described. Criterion 2 has not been applied in this assessment.

6.1 Criterion 1a for new residential buildings: NZEB-10 percent

6.1.1 The national definition of nearly zero-energy buildings of January 2023

The EU Taxonomy for sustainable activities distinguishes between new and existing buildings, with criteria dependent on whether the building is completed before or after 31 December 2020. The technical screening criteria for new buildings requires the building to have an energy performance, described in primary energy demand, at least 10 percent lower than the threshold set in the national definition of a NZEB. The energy performance is to be documented by an EPC [13]. For information about the Norwegian EPC system, see section 4.2.

The Norwegian national definition of NZEB was published in January 2023 [14] with a correction issued in January 2024 [15]. The NZEB definition has clear references to the building code TEK17, and in practical terms, the definition is no stricter than TEK17. The difference lies in:

a. a shift of system boundary to primary energy demand based on calculated net delivered energy and the introduction primary energy factors, and
b. an exclusion of energy demand related to lighting and technical equipment. The definition states that for calculations of primary energy demand in relation to the Energy Performance of Building Directive and the EU Taxonomy, a factor of 1.0 must be used for all energy carriers.

Table 6-1 shows the NZEB thresholds for residential buildings with specific primary energy demand as presented in the published guidance paper. It is to be noted that the threshold for small residential buildings is influenced by the heated utility area of the building by a factor (1600/heated utility area), and that the threshold for apartments buildings is for the building as a whole and not for individual apartments (as previously in the EPC System).

Table 6-1 Thresholds for NZEB specific primary energy demand. Source: [15]

Building category	Specific primary energy demand for NZEB [kWh/m^2]
Small residential buildings	(76 + 1,600/A)
Apartment buildings	67

The thresholds in the table indicate the building's primary energy demand and are based on calculated net delivered energy according to the Norwegian Standard NS 3031:2014, multiplied with a primary energy factor of 1.0 for all energy carriers. In practical terms, this means that calculated primary energy demand equals calculated net delivered energy.

For residential buildings, the specific primary energy demand thresholds are related to, but not directly comparable to, the EPC calculations since energy demand for lighting and technical equipment is excluded in the NZEB definition. However, this demand is fixed values in the EPC calculations for residential buildings and can be added or subtracted in conversions between the two systems.

Since parts of the primary energy demand are excluded from the NZEB definition, a 10 percent improvement is smaller in absolute terms than it would be if all consumption were included in the definition. As energy demand related to lighting and technical equipment for residential buildings is fixed, the improvement can only come from efficiency measures related to the remaining energy demand.

6.1.2 Identifying the buildings with performance at NZEB-10 percent or better

Documentation by NZEB definition referenced standard

One way to document an NZEB-10 percent energy performance, is to present results from calculations in accordance with Norwegian Standard NS 3031:2014. These calculations are required for all new buildings and a central part of the required documentation to obtain a building permit and certification of completion. However, this documentation is not easily available in public registers, and thus for banks. It is also not easily accessible for non-experts unless clear descriptions of results relevant to the NZEB definition are presented.

Documentation by EPC data

Another, more practical and accessible option for identifying qualifying objects in a bank's portfolio is to retrieve sufficient data from the EPC database combined with data on the residences' heated utility area. Where reliable area data is not available to the bank, the national average from building statistics may be used. This approach is also more in line with the documentation requirements in EU Taxonomy Annex 1.

Since the information accompanying the NZEB definition sets national primary energy factors to 1 (one) flat for all energy carriers, as described in section 6.1.1, the specific net delivered energy in the EPC system is equal to the specific primary energy demand in the NZEB definition. There is also a difference between the two systems regarding the calculation of energy for climate cooling, but because climate cooling is very rare in Norwegian residences, this can be neglected in this context.

The EPC database administrator, Enova, has recently opened for sharing more detailed information from the database with banks, including calculated specific delivered energy. This enables translation between the specific primary energy demand in the NZEB definition and the specific delivered energy available in the EPC, adding the fixed values for lighting and technical equipment.

In Figure 6-1 the columns describe the thresholds in the EPC system for labels A, B and C, where area correction is applied for a small residential building with heated area of 166 m^2, a single apartment of 65 m^2, and an apartment building of 2,000 m^2, which are average building areas found in building statistics for 2021. The lines indicate the NZEB and NZEB-10 percent thresholds calculated by adding the fixed values for lighting and technical equipment.

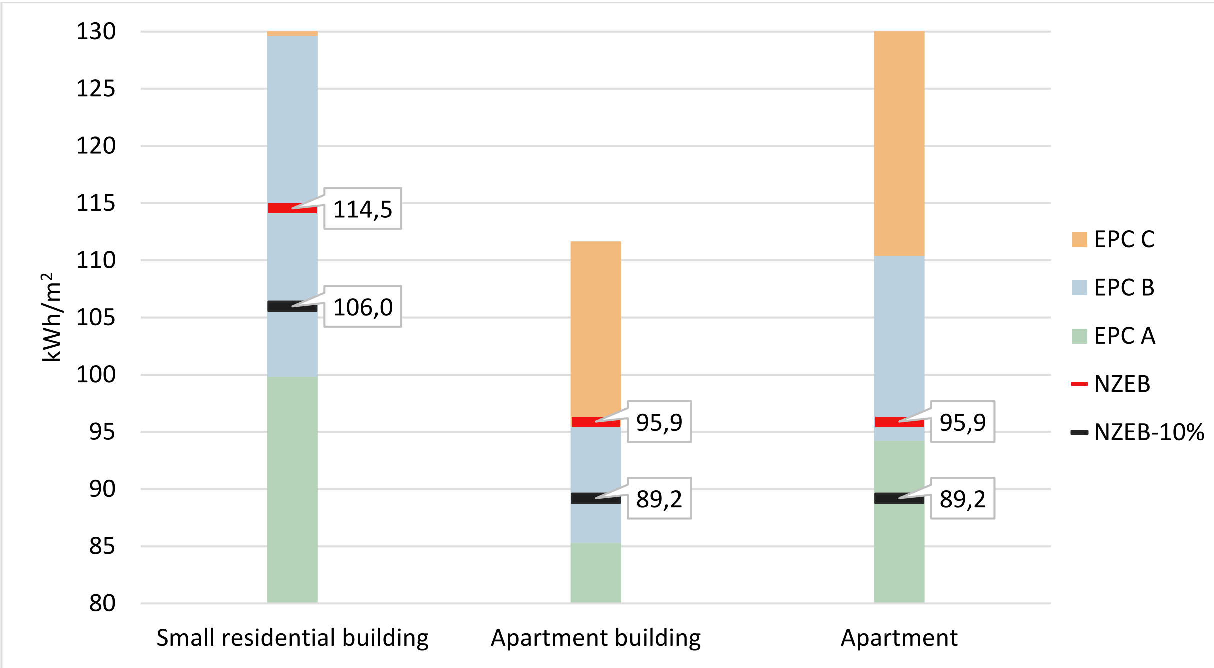

Figure 6-1 Energy performance with reference to the national definition of NZEB and NZEB-10 percent compared to limit values in the EPC system (values dependent on the heated utility area of building/residence).

The thresholds in Figure 6-1 are calculated based on standard values for lighting and technical equipment in the Norwegian Standard NS 3031:2014 and average building areas found in building statistics for 2021. Due to the area correction factor, the threshold can be calculated individually for all objects in the portfolio based on actual area. For apartments, the NZEB lines in the figure are constant, while the EPC thresholds depend on apartment size. For small residential buildings, both NZEB and EPC thresholds are dependent on the size of the residence. Table 6-2 provides a more granular picture, including a wider range of residence and building sizes.

Table 6-2 Qualifying EPC's dependent on the heated utility area of building/residence.

Limit values specific energy demand [kWh/m^2]			
Small residential buildings			
Area unit [m^2]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
50	126	111	152
100	112	103	136
150	107	100	131
200	105	99	128
250	103	98	126
300	102	98	125
Apartments (EPC available, but no NZEB definition established at apartment level)			
Area unit [m^2]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
50	89	97	115
75	89	93	108
100	89	91	105
125	89	90	103
150	89	89	102

175	89	88	101
Apartment buildings (NZEB definition in place, but no (very few) EPCs at building level)			
Area unit [m^2]	NZEB-10 percent made comparable to EPC	EPC A	EPC B
500	89	86	97
2,000	89	85	96
5,000	89	85	95

For small residential buildings, the area specific NZEB threshold is found by inserting the buildings heated utility floor space area in the area correction factor. By adding the fixed values for lighting and technical equipment, the value becomes comparable to the calculated specific net delivered energy given in the EPC system.

A complicating factor for apartments in a bank's portfolio when using the EPC data to identify qualifying objects is that the NZEB definition considers the whole building as one unit, not individual apartments or the sum of individual apartments. As described in section 4.2, the EPC regulation has recently changed, allowing an EPC to be valid for an entire apartment building. However, all existing EPCs in the portfolio prior to March 2024 were made according to the previous regulations, where apartments had to have individual EPCs. These EPCs will be around for many years, as the period of validity is 10 years. The EPC limit values reflect individual apartments sharing walls with other heated areas, resulting in lower values compared to whole buildings.

There is an area correction factor in the EPC calculations but not in the NZEB calculations for apartment buildings. Using the individual apartment area correction factor in the EPC system results in an NZEB threshold, converted to EPC terms, much stricter than for other building categories. The "apartment column" in Figure 6-1 and Table 6-2 illustrates EPC thresholds using an average apartment size of 65 m^2, derived from 2021 building data from Statistics Norway, showing that even EPC A is not always sufficient for qualifying as NZEB-10 percent.

In the future, new apartment buildings will have an EPC established for the whole building, simplifying the conversion between the EPC system and the NZEB definition. This will also make the identification of NZEB-10 percent apartment buildings more accurate, likely resulting in more qualifying objects, as shown in Table 6-2.

Eligibility small residential buildings

Small residential buildings completed since December 31, 2020, with an EPC A, or an EPC B with calculated specific net delivered energy below the defined threshold, qualify the new-build criterion NZEB-10 percent.

The EPC energy rating A limit values, as described in specific net delivered energy in Table 6-2, are below NZEB-10 percent for all small residential buildings, regardless of building size. Hence, an EPC A is sufficient to identify green buildings of this category. As illustrated by the above analysis, qualifying only small residential buildings with an EPC A is a conservative approach, as some buildings with an EPC B would also qualify. The more granular calculated specific net delivered energy available from the EPC system can supplement the straightforward qualifying of EPC A buildings in the green pool with some buildings having an EPC B.

The practical approach utilizing detailed data on the building can be illustrated as shown in Figure 6-2.

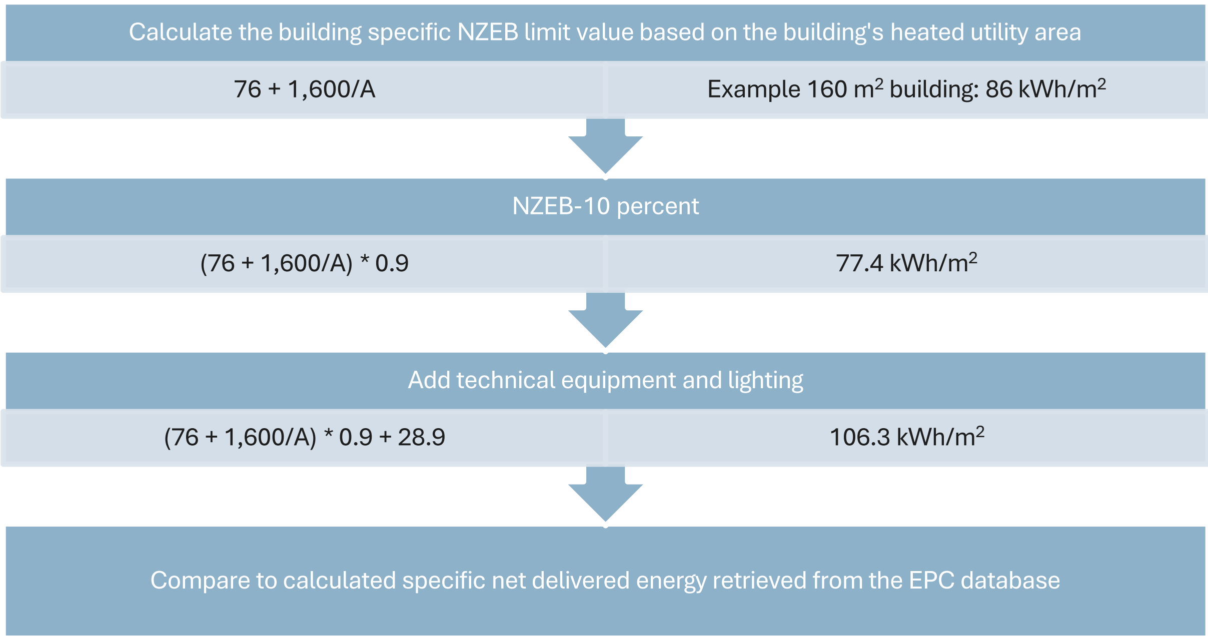

Figure 6-2 How to compare NZEB-10 percent to calculated specific net delivered energy from the EPC system for small residential buildings.

Eligibility apartment buildings

Apartment buildings completed since December 31, 2020, with an EPC A, or an EPC B and calculated specific net delivered energy below the defined threshold, qualify for the new-build criterion NZEB-10 percent.

With an EPC for an apartment building as a whole (option available after March 2024), an EPC A is sufficient to identify and qualify apartment buildings (as illustrated in the last rows of Table 6-2). Some EPC B buildings would also qualify, using the calculated specific net delivered energy available from the EPC system.

The practical approach utilizing detailed data on the building can be illustrated as follows, in Figure 6-3.

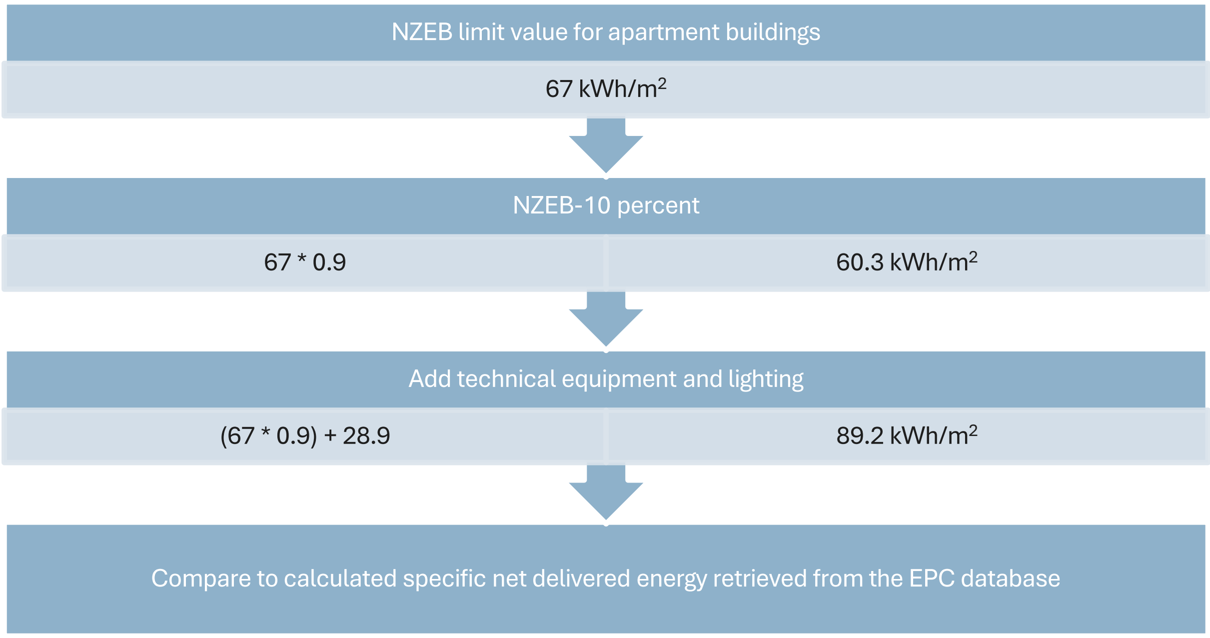

Figure 6-3 How to compare NZEB-10 percent to calculated specific net delivered energy from the EPC system for apartment buildings.

Eligibility apartments

Apartments completed since December 31, 2020, with calculated specific net delivered energy below the defined threshold, qualify under the new-build criterion NZEB-10 percent.

As illustrated in Figure 6-4, there are two potential approaches to understanding and comparing the NZEB definition and the EPC data for individual apartments. One approach is to ignore the difference in the NZEB definition, which relates to the whole building, while the EPC relates to individual apartments ("apartment" column in Figure 6-1). The practical approach utilizing detailed EPC data on the individual apartment, can then be described by Step 1 in Figure 6-4. (Step 1 is the same as for eligible apartment buildings in Figure 6-3). Step 1 is independent of apartment and apartment building size and translates the NZEB-10 percent threshold to a limit value comparable to the calculated specific net delivered energy in the EPC system.

As an alternative, considering that calculated specific net delivered energy for an average apartment is equal to or higher than that for an apartment building as a whole, Step 2 in Figure 6-4 can be applied in addition to Step 1. This requires information on the EPC energy rating, apartment area, and apartment building area. Here in Step 2, it is illustrated by an apartment of 65 m^2 just qualifying for an EPC A, placed in a 2,000 m^2 building. The implications of an area correction factor diminish for large buildings, as illustrated in Table 6-2, hence opening the possibility of using average values from national statistics instead of precise area data. Apartment area is available in the EPC database.

STEP 1

NZEB limit value for apartment buildings	
67 kWh/m^2	

NZEB-10 percent	
67 * 0.9	60.3 kWh/m^2

Add technical equipment and lighting	
(67 * 0.9) + 28.9	89.2 kWh/m^2

Compare to calculated specific net delivered energy retrieved from the EPC database

STEP 2

Calculated specific net delivered energy retrieved from the EPC database	
Example 65 m^2 apartment with EPC A in a 2,000 m^2 building: 94.2 kWh/m^2	

Remove apartment area correction factor	
94,2 - 600/$A_{apartment}$ Calculation dependent on EPC level (Table 4-1)	85 kWh/m^2

Add apartment building area correction factor	
94,2 - 600/$A_{apartment}$ + 600/$A_{building}$ Calculation depend on EPC level (Table 4-1)	85.3 kWh/m^2

Compare specific delivered energy demand to limit value from step 1 (89.2 kWh/m^2)

Figure 6-4 How to compare NZEB-10 percent to specific energy demand from the EPC system for individual apartments.

The calculation in step 2 shows that the correction factor 600/$A_{building}$ must be higher than 4.2 for an apartment with EPC A to not qualify as a green building. This value (4.2) represents the difference between the NZEB-10 percent threshold and the EPC A threshold (89.2 - 85). For the correction factor to exceed 4.2, the apartment building's area must be less than 142.86 m^2, which is not a realistic size for an apartment building in Norway.

Based on this assessment, we can conclude that all apartments with an EPC A rating are sufficient to identify green buildings in this category.

6.2 Criterion 1b for residential buildings: Top 15 percent

According to the Eika framework, residential buildings built before 2021 with EPC A label or within the top 15 percent low carbon buildings in Norway are eligible. The top 15 percent most energy efficient buildings in the Norwegian building stock, and thus the eligible parts of the Eika portfolio, can be identified based on building codes and EPCs.

6.2.1 Building codes

As mentioned in section 4.1, changes in the Norwegian building code have consistently, over several decades, resulted in more energy efficient buildings. This means newer buildings have a lower energy usage than older buildings. Net energy demand has been calculated for model buildings equivalent to those used in the building code definitions. The results presented in Table 6-3, also seen previously in Figure 4-1, illustrates how the calculated energy demand declines with decreasing age of the buildings. From TEK07 to TEK17 the reduction is about 15 percent and the former shift from TEK97 to TEK07 was no less than 25 percent.

Table 6-3 Specific energy demand calculated for model buildings representing apartments and small residential buildings. Source: Multiconsult

Building code	Specific energy demand (model homes) [kWh/m^2]	
	Apartments	Small residential buildings
TEK07/10	110	126
TEK17	92	107

Figure 6-5 shows how the Norwegian residential building stock is distributed by age [16]. The figure shows how buildings finished in 2012 and later (and built according to TEK10 and TEK17) amount to 13.3 percent of the total stock.

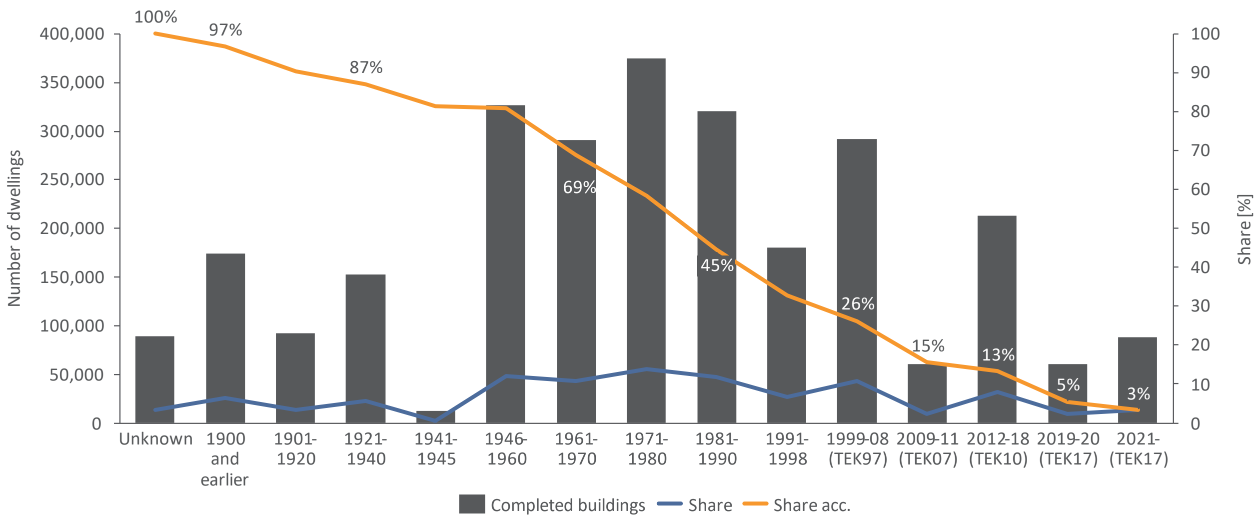

Figure 6-5 Age and building code distribution of dwellings. Source: [16], Multiconsult

Based on theoretical energy demand in the building stock, the same 13.3 percent of the stock makes up only five percent of the energy demand in residential buildings and 4.7 percent of the related CO2 emissions, as indicated in Figure 6-6 and Figure 6-7, respectively. The difference between energy demand and CO2 emissions are due to the less CO2-intensive heating solutions in newer buildings. It must be noted that these calculations are based on the European power production mix that reflects an average in the buildings lifetime, assuming a decarbonisation in the European energy system as presented in section 3.3.

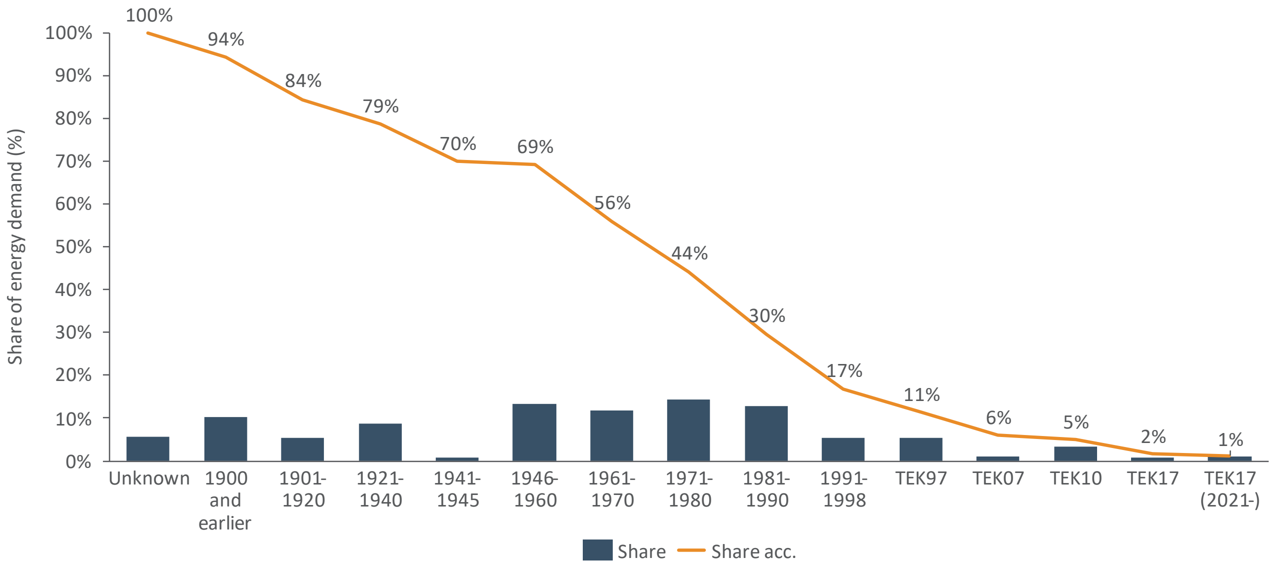

Figure 6-6 The building stock's relative share of energy demand dependent on building year and code. Source: [16], Multiconsult

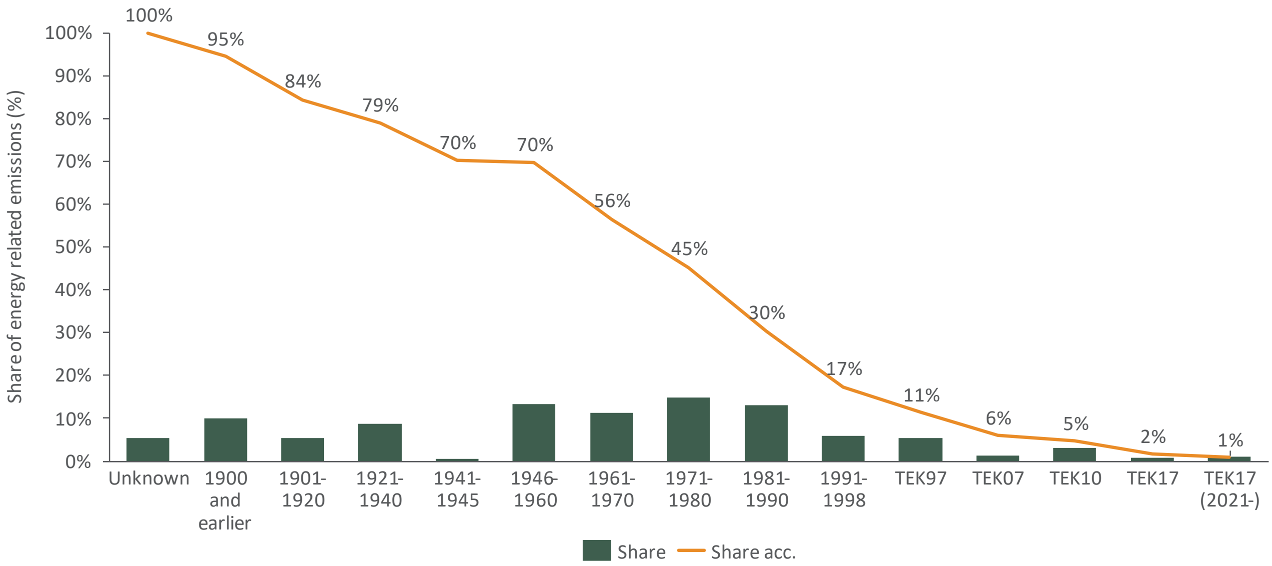

Figure 6-7 The building stock's relative share of CO2 emissions related to energy demand dependent on building year and code. Calculation based on European power production mix in asset lifetime (see section 3.3). Source: [16], [6], Multiconsult

Eligibility based on building codes

The above building stock data indicates that 13.3 percent of the current residential buildings in Norway were constructed using the code of 2010 (TEK10) and later codes.

Combining the information on the calculated energy demand related to building code in Figure 4-1 and information on the residential building stock in Figure 6-5, the calculated average specific energy demand of the residential Norwegian buildings, weighted for actual stock, is 202 kWh/m^2 for apartments and 257 kWh/m^2 for small residential buildings. The corresponding energy demand for eligible buildings (TEK10 and TEK17) is 102 kWh/m^2 for apartments and 119 kWh/m^2 for small residential buildings.

Hence, compared to the average residential building stock, building codes TEK10 and TEK17 give a calculated specific energy demand reduction of 50 percent for apartments and 54 percent for small residential buildings. This difference is later used in calculations of avoided energy usage and emissions.

New or existing Norwegian residential buildings that comply with the Norwegian building code of 2010 (TEK10) and later codes are thus eligible for green bonds as all these buildings have significantly better energy standards and account for less than 15 percent of the residential building stock. A two-year lag between implementation of a new building code and the buildings built under that code must be considered.

6.2.2 Energy Performance Certificates

Residential buildings with EPC A are automatically eligible based on the framework. For information about the Norwegian EPC system, see section 4.2. The energy label in the EPC system is based on calculated delivered energy, including the efficiencies of the building's energy system, while the building codes are defined by net calculated energy, not including the building's energy system. The criteria are hence based on two different system boundaries and must be regarded as two separate criteria describing and classifying the buildings level energy efficiency differently.

The grade C was defined in 2010 so that a building under the building codes of TEK07 in most cases should get an EPC C. Residences built after the building code of 2007 will hence mostly get a C or better.

The EPC coverage is not equally distributed over the building stock. There is currently a coverage ratio of EPC labels relative to the total building stock of about 50 percent, where younger buildings are overrepresented in the EPC database, as previously illustrated in Figure 4-5.

Assuming registered EPCs are representative for the building stock completed in the time period a certain building code is applied; it is possible to indicate what the label distribution would be if all residential buildings were given a certificate. Figure 6-8 illustrates how EPCs would be distributed based on this assumption. 9.3 percent of the residences would have a B or better.

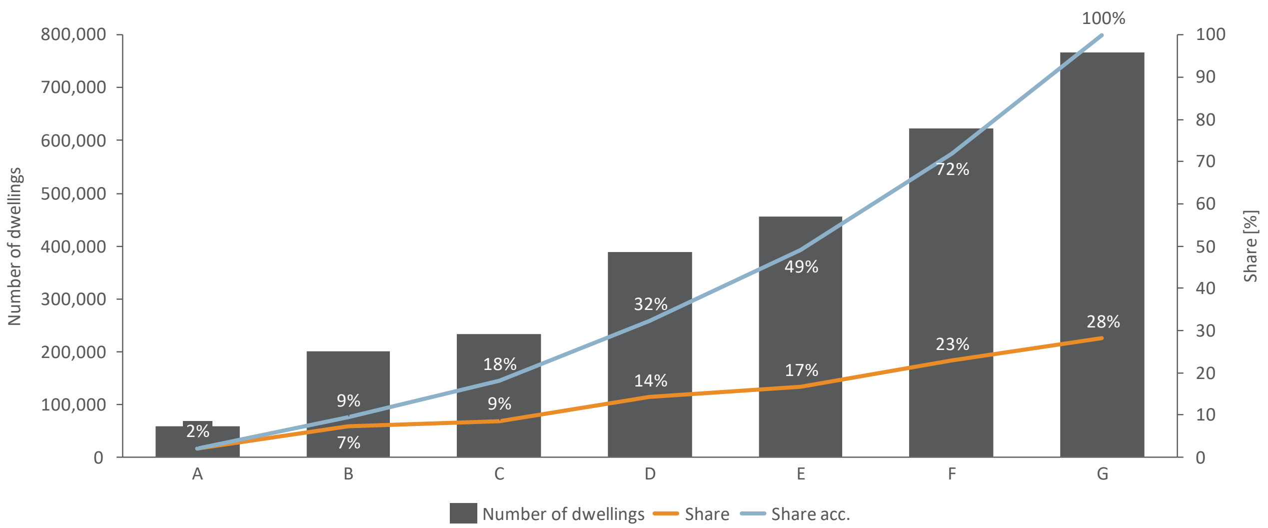

Figure 6-8 EPCs extrapolated to include the whole residential building stock. Source: [11] [9] [10]

Eligibility based on EPCs

An EPC is mandatory for new buildings and existing residential buildings that are sold or rented. The EPC data indicates that 18 percent of the current residential buildings in Norway will have a C or better, and 9.3 percent will have an A or B.

6.2.3 Combination of building codes and EPCs

The two described criteria are based on different statistics. It is, however, interesting to view them in combination. Table 6-4 illustrates how the criteria, independently and in combination, make up cumulative percentages of the total residential building stock in Norway.

Interpretation: TEK10 and newer in isolation represents 13.3 percent; TEK10 and newer in combination with A+B labels represents 14.8 percent; TEK10 and newer in combination with A+B+C labels represents 19.2 percent of the total Norwegian residential building stock.

Table 6-4 Matrix of Cumulative percentages for criteria combinations (FY23), relative to the total residential building stock in Norway.

	TEK10+TEK17	EPC A+B	EPC A+B+C
TEK10+TEK17	13.3 percent	14.8 percent	19.2 percent
EPC A+B		9.3 percent	
EPC A+B+C			16.8 percent

Based on this, residential buildings with EPC A, built under TEK10 and TEK17 or with EPC B are considered eligible under criterion 1b.

7 Green portfolio analysis – Eligible assets for green bond issuance

The green loan portfolio of Eika consists of residential buildings that meet the criteria as formulated in section 6.

7.1 Eligible buildings

Multiconsult has investigated Eika's PM and BM portfolios. Eika implemented a new Green Bond Framework in 2024. The reviewed buildings have been classified as eligible for green bonds according to Eika's eligibility criteria related to NZEB-10 percent and Top 15 percent, as measured by building code and EPC label for residential buildings. Criterion 3 on refurbishment has not been applied. Grandfathering of objects eligible under the previous green framework has not been assessed. In addition to the previously mentioned criteria, Eika has chosen to exclude assets with significant physical climate risk from the green portfolio. The bank has conducted the identification of these at-risk assets. Holiday homes have also been excluded from the analysis, due to data availability and to avoid double counting of assets.

The 8,304 eligible unique dwellings and apartment buildings in Eika's portfolio are estimated to amount to 1.2 million m^2. Living area per object is available in intervals for most objects. The average value for the intervals is used in the calculation. Where object specific living area data is missing, the area is calculated based on national statistics [16].

Objects in the portfolio built in 2021 or later are matched against the NZEB-10 percent criterion. Objects built before this year, are first qualified based on EPC A, then on building codes TEK10 and TEK17. Finally, objects are qualified based on EPC B. There is no double-counting of objects that qualify under more than one criterion.

In total, 15 percent of the objects in both the PM portfolio and the BM portfolio are eligible under criterion 1 or 2, also taking into account physical climate risk. The eligible objects and related area are presented in more detail in Table 7-1 and Table 7-2.

Table 7-1 Number of eligible individual dwellings in PM portfolio and estimated total building areas.

Criterion	Type of PM building	Number of objects	Area total [m^2]
Criterion 1, NZEB-10 percent	Small residential buildings	470	93,576
	Apartments	412	28,948
Criterion 2, Top 15 percent	Small residential buildings	4,541	804,323
	Apartments	2,847	220,165
Total criterion 1 and 2		8,270	1,147,012

Table 7-2 Number of eligible buildings in BM portfolio and estimated total building areas.

Criterion	Type of BM building	Number of objects	Area total [m^2]
Criterion 2, Top 15 percent	Apartment buildings	32	46,282
	Other residential buildings	2	1,269

7.2 Impact assessment

Based on the calculated figures in Table 7-1 and Table 7-2, the energy efficiency of the residential portfolio is estimated. Not all residential buildings are necessarily included in one single bond issuance.

For each eligible object, impact is calculated by finding the reduction in energy demand and related emissions compared to the baseline of an average building from the entire building stock, due to the eligible building being more energy efficient. The reduction in energy demand is then multiplied with the area of the eligible asset and the emission factors from Table 3-2, and summed up for all the units. A proportional relationship is expected between energy consumption and emissions in impact calculations.

For buildings qualifying under the NZEB-10 percent criteria, the reduction is calculated by taking the difference between the calculated specific energy usage of each unit and the NZEB threshold for a corresponding NZEB unit of the same area and building type.

The baseline for the top 15 percent of existing buildings is the calculated average specific energy demand of the residential Norwegian building stock, which, separated on apartments and small residential buildings, is 202 kWh/m^2 and 257 kWh/m^2, respectively. As only half of all Norwegian dwellings have a registered EPC, these average specific energy demands of the Norwegian residential building stock are used as baseline for the buildings qualifying according to the EPC criterion.

For the existing buildings eligible based on building code, avoided energy demand is estimated as the difference between the calculated average specific energy demand for all buildings, as described above, and the TEK10/TEK17 averages described in section 6.2.1.

For the impact calculations for the EPC eligible buildings, the specific energy demand is estimated from the achieved energy label based on the energy grade scale (see section 4.2). This demand is compared against the baseline as described above.

Table 7-3 below indicates how much more energy efficient the eligible parts of the portfolio is compared to the average residential Norwegian building stock, that is, compared to the criterion specific baselines. It also presents how much the calculated reduction in energy demand constitutes in CO2 emissions. The avoided energy usage and emissions of the eligible buildings are scaled down to reflect Eika's engagement relative to the objects' market value at loan origin. The CO2 emissions are calculated using the four emission factors described in section 3.3: European and Norwegian NS 3720:2018 electricity mix, and two grid factors for only Norway, representing physically delivered electricity and the residual mix for 2023.

Table 7-3 Avoided energy usage and CO2 emissions from eligible objects compared to average building stock using Norwegian and European electricity mixes as average over the building's lifetimes, scaled by bank's engagement. Norwegian physically delivered electricity and Norwegian residual mix for 2023 included for comparison.

	Avoided energy [GWh/ year]	Avoided CO2 emissions [tonnes CO2-eq/year]			
		European life cycle mix	Norwegian life cycle mix	Norwegian phys. del. el. 2023	Norwegian residual mix 2023
Eligible buildings in the PM portfolio (criterion 1)	1.6	184	29	25	791
Eligible buildings in the PM portfolio (criterion 2)	69.1	7,934	1,240	1,069	34,181
Eligible buildings in the BM portfolio (criterion 2)	1.9	213	33	29	919
Total PM+BM	**72.6**	**8,331**	**1,302**	**1,123**	**35,891**

8 References

[1] Norsk Fjernvarme, "Fjernvarme - Energikilder 2023," 2024. [Online]. Available: https://www.fjernkontrollen.no/.

[2] Statistics Norway, "Elektrisitet - Statistikkbanken kildetabell 14091," 24 01 2025. [Online]. Available: https://www.ssb.no/energi-og-industri/energi/statistikk/elektrisitet.

[3] Association of Issuing Bodies, "European Residual Mixes 2023," Association of Issuing Bodies, Brussels, 2024.

[4] Norwegian Water Resources and Energy Directorate, "Hvor kommer strømmen fra?," 17 10 2024. [Online]. Available: https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/. [Accessed 28 01 2025].

[5] Norwegian Water Resources and Energy Directorate, "Electricity disclosure," 10 06 2024. [Online]. Available: https://www.nve.no/energy-supply/electricity-disclosure/. [Accessed 30 06 2024].

[6] SN/K 356 Klimagassberegninger for bygg, "NS 3720:2018 Metode for klimagassberegninger for bygninger," Standard Norge, Oslo, 2018.

[7] Statistics Norway, "Building Statistics," 20 01 2025. [Online]. Available: https://www.ssb.no/en/bygg-bolig-og-eiendom/bygg-og-anlegg/statistikk/byggeareal. [Accessed 28 01 2025].

[8] Enova SF, "Karakterskalaen," Enova SF, 10 06 2015. [Online]. Available: https://www.enova.no/energimerking/om-energimerkeordningen/om-energiattesten/karakterskalaen/. [Accessed 27 01 2025].

[9] Enova SF, *EPC database - energimerking.no,* Oslo: Enova SF, 2023.

[10] Enova SF, "Energimerkesystemet - Offentlige data (API)," Enova SF, 2025. [Online]. Available: https://test.data.enova.no/api-details#api=ems-offentlige-data&operation=Fil_EnergimerkerFileByYear. [Accessed 25 01 2025].

[11] Statistics Norway, "06266: Dwellings, by type of building and year of construction (M) 2006 - 2024," 12 03 2024. [Online]. Available: https://www.ssb.no/en/statbank/table/06266/. [Accessed 19 04 2024].

[12] Finance Norway, "Gudelines for calculating financed emissions," Finance Norway, Oslo, 2023.

[13] European Commission, *EU Taxonomy, Annex 1, chapter 7.1 Construction of new buildings,* Brussels, 2021.

[14] Kommunal- og distriktsdepartementet, "Rettleiing om utrekning av primærenergibehov i bygningar og energirammer for nesten nullenergibygningar," 31 01 2023. [Online]. Available: https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158.

[15] Kommunal- og distriktsdepartementet, "Veiledning om beregning av primærenergibehov i bygninger og energirammer for nesten nullenergibygninger," 12 01 2024. [Online]. Available: https://www.regjeringen.no/no/aktuelt/taksonomien-maler-for-rapportering-og-retting-av-veiledning-om-primarenergifaktorer/id3021759/.

[16] Statistics Norway, "06513: Dwellings, by type of building and utility floor space (M) 2007 - 2024," 12 03 2024. [Online]. Available: https://www.ssb.no/en/statbank/table/06513.