REPORT

Identifying residences better than NZEB-10%

CLIENT

Eika Boligkreditt AS

SUBJECT

Method for identifying new green Norwegian residential buildings according to the EU Taxonomy's criteria NZEB minus 10%

DATE: / REVISION: June 27, 2024 / 00

DOCUMENT CODE: 10260652-01-TVF-RAP-001

Multiconsult

Multiconsult

REPORT

PROJECT	**Identifying residences better than NZEB-10%**	DOCUMENT CODE	10260652-01-TVF-RAP-001
SUBJECT	Method for identifying new green Norwegian residential buildings according to the EU Taxonomy's criteria NZEB minus 10%	ACCESSIBILITY	Open
CLIENT	**Eika Boligkreditt AS**	PROJECT MANAGER	Ibrahim Temel
CONTACT	**Henrik Bråten**	PREPARED BY	Trond Ivar Bøhn
		RESPONSIBLE UNIT	10105080 Renewable Energy Advisory Services

00	27.04.2024	Draft	Trond Ivar Bøhn	Kjerstid R. Kvisberg	Ibrahim Temel
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY

Table of Contents

1 Introduction

On assignment from Eika 1 Boligkreditt AS, Multiconsult has developed a step-by-step method to identify new green Norwegian residential buildings according to the EU Taxonomy criterion "NZEB minus 10%", using the national definition of nearly zero energy buildings (NZEB) from January 2023 and the national Energy Performance Certificates System (EPC). The report begins with some background information on these national definitions and schemes.

2 Energy Performance Certificates (EPC) for Norwegian residential buildings

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 *("energikarakter")* and a heating rating *("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.

The heating rating ranges from colour green (best) to red (weakest). This rating provides information on whether the energy requirement for space heating and tap water heating can be covered by energy sources other than electricity and fossil energy. The heating rating does not indicate how much energy the building or residence uses, only the source from which this energy can be used based on the specified heating equipment.

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

Table 1: The EPC's energy rating thresholds for residential building categories and dependency on the residence heated utility area. (Source: enova.no/energimerking)

Building category	**Calculated specific net delivered energy pr 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
Sqm. 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
Sqm. 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 m². Regardless, the thresholds for apartments in Table 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 1 are also valid for an apartment building, but there may be changes in the future.

The properties already registered in the EPC database are considered representative of all residential buildings built under the same building code. However, they are not representative of the total stock, as newer residential buildings are highly overrepresented in the database. The EPC coverage ratio relative to the total residential building stock is about 50%, and only a share of these EPCs is currently made available to banks due to data quality issues.

3 The national definition of nearly zero energy buildings (NZEB) 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% lower than the threshold set in the national definition of a nearly zero-energy building (NZEB). The energy performance is to be documented by an Energy Performance Certificate (EPC)[1].

The Norwegian national definition of NZEB was published in January 2023[2] with a correction issued in January 2024[3]. 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 2 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),

[1] EU Taxonomy, Annex 1 chapter 7.1 Construction of new buildings

[2] https://www.regjeringen.no/no/aktuelt/rettleiing-om-utrekning-av-primarenergibehov-i-bygningar-og-energirammer-for-nesten-nullenergibygningar/id2961158/, 2023

[3] https://www.regjeringen.no/contentassets/296636deecef419590fe6b5668fe196f/23-12-korrigert-veiledning-om-beregning-av-primarenergibehov-og-nesten-nullenergibygg.pdf, 2024

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 2: Thresholds for NZEB specific primary energy demand. (Source: guidance paper[3])

Building category	Specific primary energy demand for nearly zero-energy building (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% 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.

4 Identifying the buildings with performance at NZEB-10% or better

4.1.1 Documentation by NZEB definition referenced standard

One way to document an NZEB-10% 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.

4.1.2 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 Chapter 3, 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 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% thresholds calculated by adding the fixed values for lighting and technical equipment.

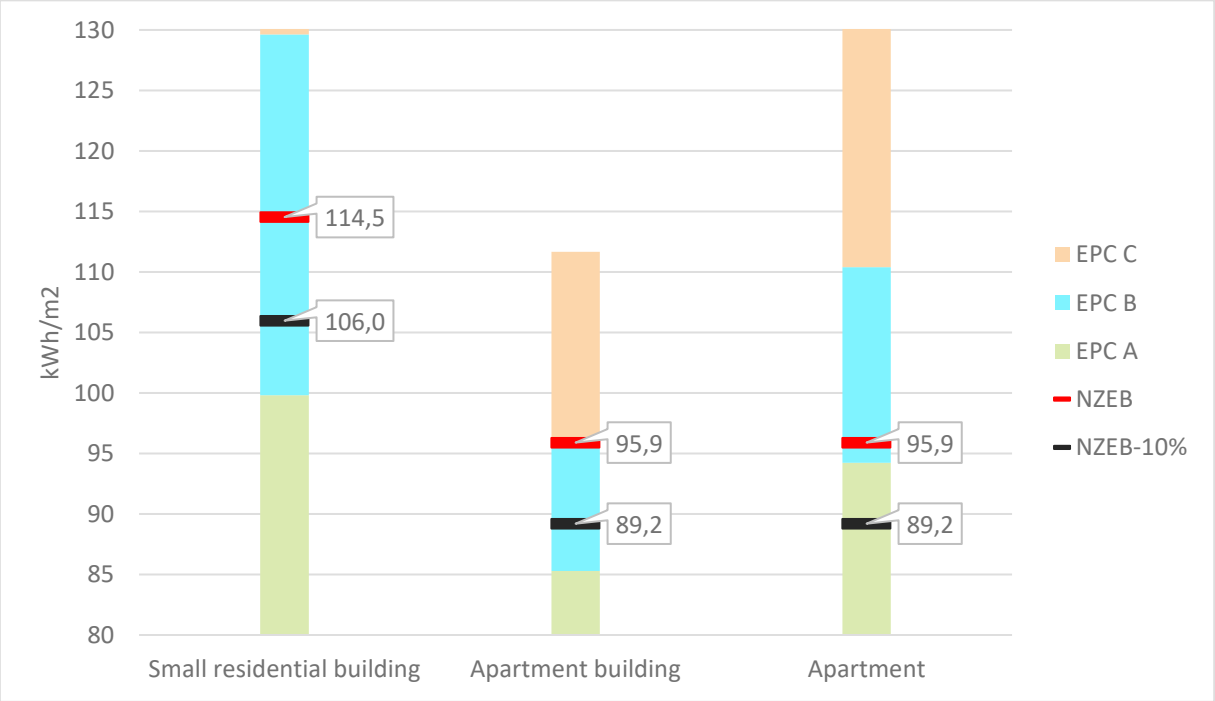


Figure 1: Energy performance with reference to the national definition of NZEB and NZEB-10% compared to limit values in the EPC system (values dependent on the heated utility area of building/residence).

The thresholds in Figure 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 3 provides a more granular picture, including a wider range of residence and building sizes.

Table 3: Qualifying EPC's dependent on the heated utility area of building/residence.

Limit values, specific net delivered energy [kWh/m^2]			
Small residential buildings			
Area unit [m^2]	NZEB-10 % 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 % 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 for the time being no (very few) EPCs at building level)			
Area unit [m^2]	NZEB-10 % 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 Chapter 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 1Table 2 illustrates EPC thresholds using an average apartment size of 65 m², derived from 2021 building data from Statistics Norway, showing that even EPC A is not always sufficient for qualifying as NZEB-10%.

In the future, new apartment buildings will have an EPC established for the building as a whole, simplifying the conversion between the EPC system and the NZEB definition. This will also make the identification of NZEB-10% apartment buildings more accurate, likely resulting in more qualifying objects, as shown in Table 3.

4.1.3 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%.

The EPC energy rating A limit values, as described in specific net delivered energy in Table 3, are below NZEB-10% 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 2.

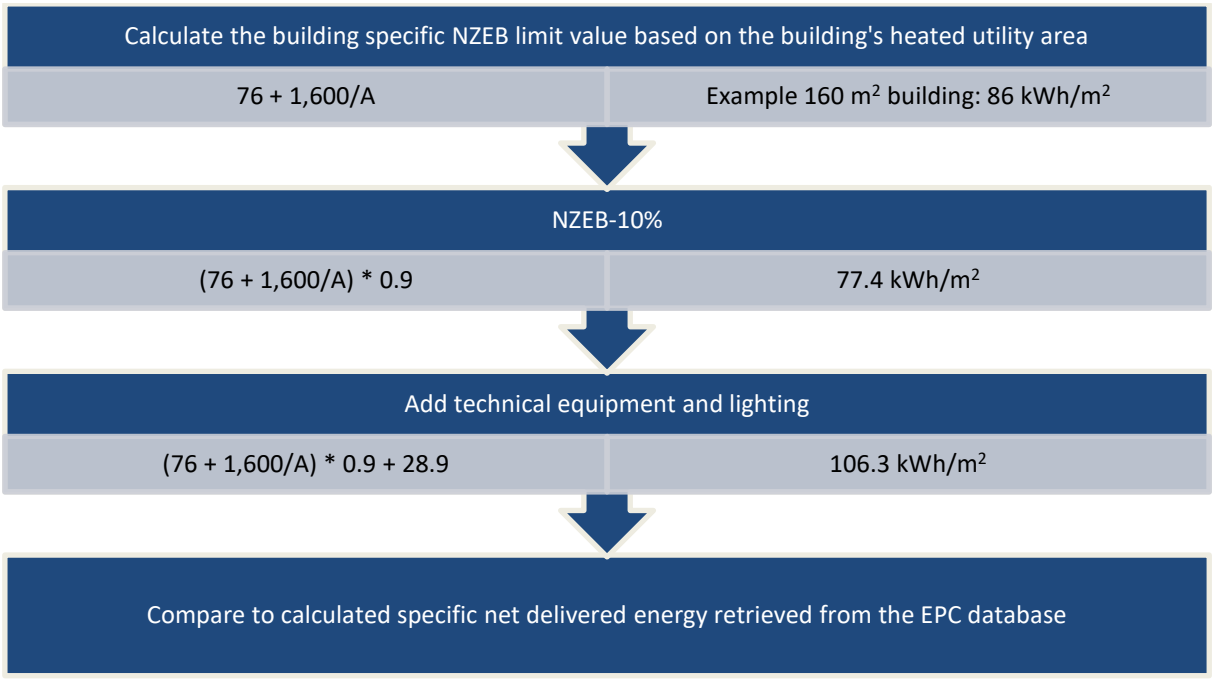


Figure 2: How to compare NZEB-10% to calculated specific net delivered energy from the EPC system for small residential buildings.

4.1.4 Eligibility apartment buildings

Apartment 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 for the new-build criterion NZEB-10%.

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 3). 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 3.

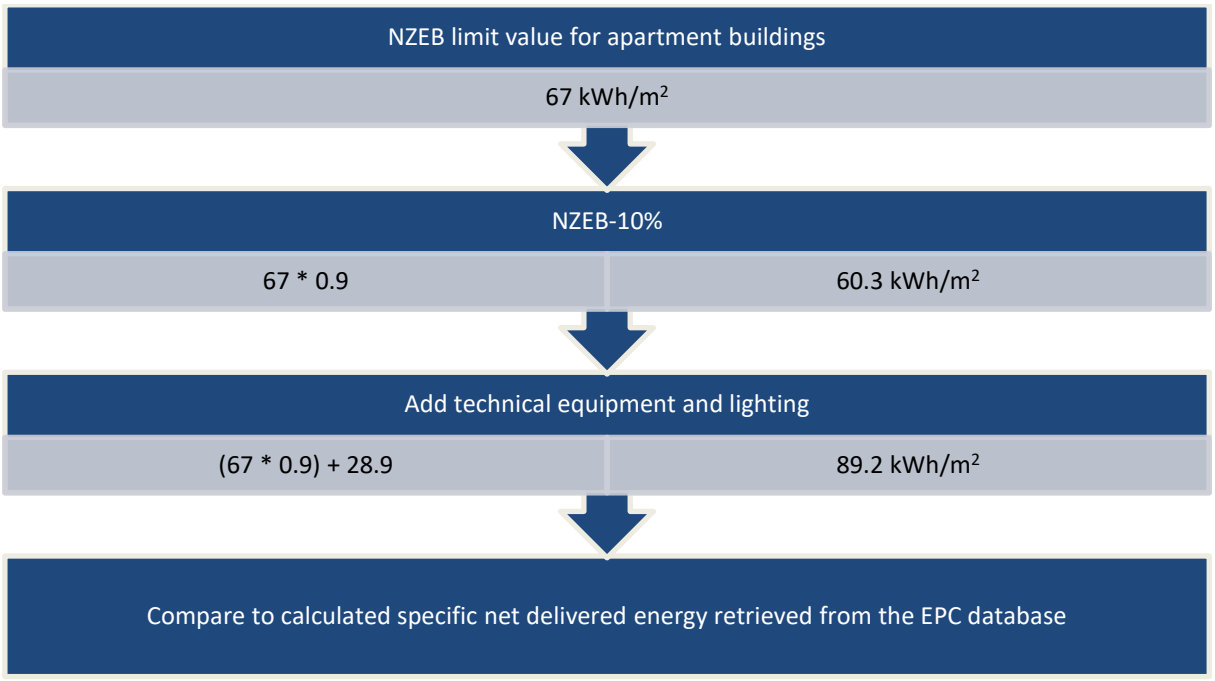


Figure 3: How to compare NZEB-10% to calculated specific net delivered energy from the EPC system for apartment buildings.

4.1.5 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%.

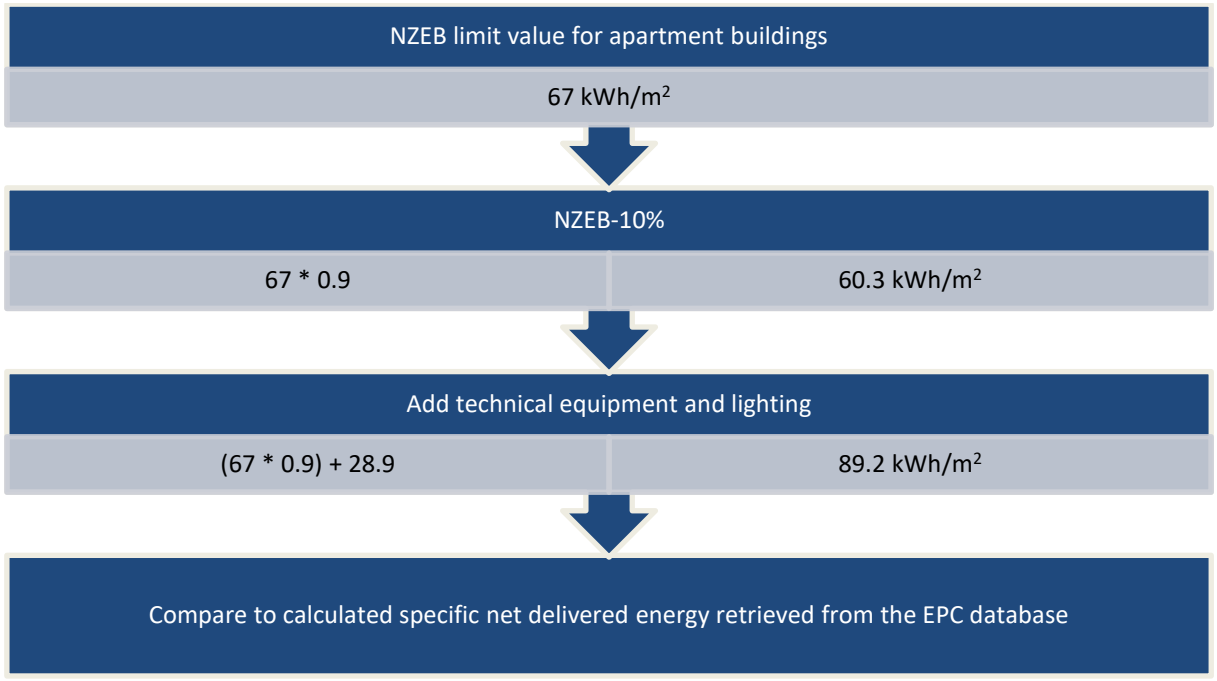
With EPCs only available at the apartment level and not the building level (prior to March 2024), an EPC A alone is not sufficient to identify NZEB-10% performance for an apartment without additional assumptions.

As illustrated in Figure 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 1). The practical approach utilizing detailed EPC data on the individual apartment, can then be described by Step 1 in Figure 4. (Step 1 is the same as for eligible apartment buildings in Figure 3). Step 1 is independent of apartment and apartment building size and translates the NZEB-10% threshold to a limit value comparable to the calculated specific net delivered energy in the EPC system.

As an alternative, taking into account 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 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 m² just qualifying for an EPC A, placed in a 2,000 m² building. The implications of an area correction factor diminish for large buildings, as illustrated in Table 3, hence opening up the possibility of using average values from national statistics instead of precise area data. Apartment area is available in the EPC database.

STEP 1



STEP 2

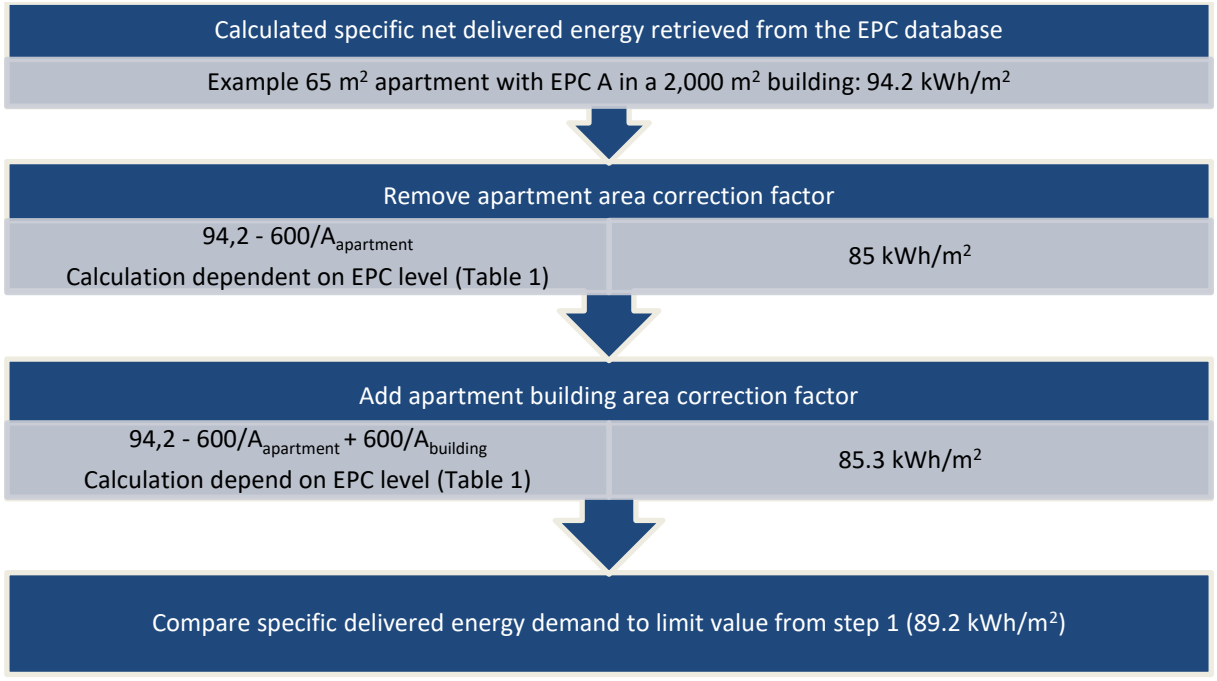


Figure 4: How to compare NZEB-10% to specific energy demand from the EPC system for individual apartments.

5 Upcoming changes

The Norwegian EPC system is not yet using primary energy, but this is expected to be included in an upcoming change in the EPC system. According to Multiconsult's knowledge, NVE, on behalf of the Ministry of Energy (Energidepartementet), has prepared a proposal for a new calculation method for EPC, which will replace the current §10 of the EPC regulation[4]. The proposal implies that the energy rating A-G should be based on the calculated specific net delivered energy weighted with primary energy factors for different energy carriers, and that the current heating rating will be omitted. The primary energy factors (or weighting factors) are expected to also consider other qualities of energy carriers based on renewable energy, such as district heating and bioenergy, so that buildings using such energy carriers will have a better energy rating than in the current EPC scheme. However, the weighting factors are not yet decided.

Furthermore, the energy calculations must be made in accordance with the forthcoming new Norwegian Standard NS 3031, which is an improved version of the current NS 3031:2014. The new calculation method also means that the current energy rating scale will be replaced, but it is not known how the new division into limit values for A-G will be. It is also not known whether there will be joint or separate thresholds for apartments and apartment buildings. It is expected that the Ministry of Energy will send a proposal for a new §10 for consultation during the autumn of 2024, but there are major uncertainties regarding the timeline.

As a result of the above-mentioned process involving the determination of new weighting factors/primary energy factors, it is expected that these will be used not only for the EPC system but also in relation to new energy criteria in the building code (TEK) as well as for NZEB with assessments against the Taxonomy's criteria. In that case, it means that the definition of NZEB and primary energy factors introduced by the Norwegian authorities in January 2023 will be withdrawn and replaced with a new definition.

According to Multiconsult's knowledge, NVE has also, on behalf of the Ministry of Energy, prepared proposals for methodology and limit values to determine which buildings are to be considered among the top 15% best, to be applied against criteria in the Taxonomy's Annex 1 Chapter 7.7. However, the Ministry of Energy has not yet adopted or published this, so changes may occur.

As described, there are imminent major changes that will affect how to determine which new and existing buildings qualify for the EU Taxonomy for sustainable activities. The methodology and thresholds described in this document must be expected to be revised when the Norwegian authorities introduce changes in the EPC regulations and probably also a new definition of NZEB and primary energy factors. When this will happen is not known, as such processes take a long time in experience, but Multiconsult assumes 2025 at the earliest.

[4] https://lovdata.no/dokument/SF/forskrift/2009-12-18-1665