CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Norway

Status in 2020

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1. Introduction

Since 2010 Norway has fully implemented Directive 2002/91/EC. Energy performance requirements for new buildings were revised in 2010 and most recently in 2015, reaching their full effect as of 1 January 2017. By the end of 2020, approximately 1.2 million EPCs have been issued, with a majority issued to houses and apartments, and 30,000 issued to non-residential buildings.

Norway has decided to include Directive 2010/31/EU in the EEA Agreement[1], with necessary adaptations. Directive 2018/844 is not included in the EEA Agreement.

In 2016, state-owned energy administrator Enova took over as operator of the EPC scheme. An evaluation of the scheme is ongoing and may lead to changes that will coincide with implementing Directive 2010/31/EU. The Norwegian Water Resources and Energy Administration remains responsible for the control and use of sanctions related to EPCs and inspections.

This report presents an overview of the implementation's current status, as well as further plans for the improvement of schemes available under the EPBD in Norway. These schemes include minimum requirements, certification (EPCs) and inspection systems including the status of quality control mechanisms, qualified experts in the market, information campaigns, incentives and subsidies.

2. Current Status of Implementation of the EPBD

2.I. Energy performance requirements: NEW BUILDINGS

2.I.i. Progress and current status of new buildings (regulation overall performance)

In 2012, a broad agreement in the Norwegian Parliament stated that all new buildings should be at 'Passive House' level in 2015, and at NZEB level by 2020.

The two Norwegian standards for passive houses and low-energy buildings are already in place: the NS 3700 for residential buildings and the NS 3701 for non-residential buildings[2]. The definition of 'Passive House' level from the political agreement was to be implemented in building regulations in 2015. In November 2015, the new requirements were published and have been effective since January 2017. The requirements of 2015 do not fully meet the Norwegian passive house standards but are set at a more cost-optimal level.

The requirements for 2020 and the national definition of NZEB are in preparation so as to comply with Directive 2010/31/EU.

2.I.ii. Format of national transposition and implementation of existing regulations

The Norwegian building regulation, mandatory since 2017, includes two options to fulfil the requirements. For non-residential buildings, only the first option is allowed.

- The first option contains specific energy limits for different building types. The requirements are set in kWh/m^2 useful energy demand per year within the building envelope, which considers heat recovery from ventilation systems but not system losses and energy export. If this option is chosen, a set of absolute minimum requirements must also be fulfilled.

- The second option (only for residential buildings) addresses different components of the building envelope as well as requirements for technical installations and solutions. The requirements will be considered fulfilled if it is proved that nine specific energy measures are applied. In addition to requirements concerning insulation and envelope airtightness, there are specific requirements for the heat recovery of ventilation air in the ventilation apparatus (yearly mean heat recovery rate) and the specific fan power (SFP) factor. These requirements are shown in Table 1.

In order to ensure flexibility in heating systems and to facilitate systems based on renewable energy, all buildings larger than 1,000 m^2 shall have flexible heating systems, normally waterborne, and must be able to utilise low-temperature heating distribution systems. Single-family houses need to have a chimney flue unless flexible heat distribution is installed or the house fulfils the requirements of the Norwegian passive house standard (NS 3700:2013). Installation of fossil fuels-based heating systems is not allowed. As Norwegian electricity production is almost exclusively based on renewable energy and fossil fuels are to be phased out from buildings, primary energy factors are not used in the regulations. To stimulate local renewable production when electricity is produced on site (more than 20 kWh/m^2 per year), the specific energy limit can be exceeded by 10 kWh/m^2 per year.

The Norwegian energy requirements are set for 13 different building categories. Indicatively, Table 1 shows the progress over time of certain aspects necessary to fulfil the Norwegian minimum energy requirements for commercial buildings, single-family houses and apartment buildings.

Requirement	1997	2007	2010 (after Directive 2002/91/EC)	2015 Specific requirements (after Net energy demand) only applicable for residential buildings
Net energy demand (kWh/m^2 per year)	-	Single-family house: 125 + 1,600/m^2 heated floor area	Single- family house: 120 + 1,600/m^2 heated floor area	Single-family house: 100 + 1,600/m^2 heated floor area
		Apartment: 120	Apartment: 115	Apartment: 95
		Commercial building: 165	Commercial building: 150	Commercial building: 115
Maximum area of glass plus doors	20% of heated floor area	20% of heated floor area	20% of heated floor area	25% of heated floor area
Max U-value: exterior wall W/(m^{2}K)	0.22	0.18	0.18	0.18
Max U-value: roof W/(m^{2}K)	0.15	0.13	0.13	0.13
Max U-value: exposed floors W/(m^{2}K)	0.15	0.15	0.15	0.1
Max U-value: glass/doors W/(m^{2}K)	1.6	1.2	1.2	0.8
Thermal bridges (max linear U-value) W/(m.K)	-	Single-family house: 0.03	Single-family house: 0.03	Single-family house: 0.05
		Other buildings: 0.06	Other buildings: 0.06	Apartment buildings: 0.07
Minimum efficiency of heat recovery in ventilation air	60%	70%	Single-family house: 70%	80%
			Commercial building: 80%	
Maximum airtightness	Single-family house: 4.0	Single-family house: 2.5	Single-family house: 2.5	0.6

Requirement	1997	2007	2010 (after Directive 2002/91/EC)	2015 Specific requirements (after Net energy demand) only applicable for residential buildings
(Max air changes/hour at 50 Pa pressure difference)	Other buildings (with more than two floors): 1.5	Other buildings (with more than two floors): 1.5	Other buildings (with more than two floors): 1.5	
Max Specific Fan Power factor kW/(m^3/s)	-	Single-family houses: 2.5	Single-family houses: 2.5	Single-family houses: 1.5
		Non-residential building: 2.0	Non-residential building: 2.0	
Max screening factor for glass/window (gt)	-	-	0.15 (all buildings)	

Table 1. Minimum energy requirements for buildings in Norway.

Table 2 shows the absolute minimum requirements that must be fulfilled if using the option of net energy demand limit.

U-value exterior wall W/(m^{2}K)	U-value roof W/(m^{2}K)	U-value exposed floors W/(m^{2}K)	U-value glass/doors W/(m^{2}K)	Airtightness (air changes/hour at 50 Pa pressure difference)
≤ 0.22	≤ 0.18	≤ 0.18	≤ 1.2	≤ 1.5

Table 2. Minimum requirements under the "specific energy limits" option.

Since 1 January 2013, all new buildings are required to be controlled by an independent expert to a certain extent. For larger residential buildings and for non-residential buildings, the control will be more extensive than for single-family houses. Air leakage testing is mandatory for all building types and must be documented according to the current standard.

As the requirements regulate the net energy demand, no primary energy factors are available.

The Norwegian standard for the calculation of the energy performance of buildings is NS 3031, which is derived from EN 15603. The regulation of 2015 is based on the 2014 version of NS 3031.

2.I.iii. Action plan for progression to NZEB for new buildings

The 2012 agreement on climate issues in the Norwegian Parliament stated that the building requirements in 2020 will correspond to NZEB level. This was reiterated by the government in 2015, when the new

requirements were presented. However, the concept of NZEB in a Norwegian context has not yet been defined. A national NZEB definition is underway as part of the implementation of Directive 2010/31/EU.

Up until now, the national support scheme for buildings has been more ambitious than the energy performance requirements, and regional programmes have worked well to increase the amount of very energy efficient buildings. The Norwegian support scheme for new buildings meeting the criteria of the 'Passive House' standards has therefore been replaced by a new programme for even more ambitious projects. Support is given in particular to innovative solutions to improve technical building systems and heating systems.

Figure 1 shows one of the first residential houses in Norway with energy performance at what was expected to be NZEB, which is a good example of what can be achieved.

Heating	12.9 kWh/m^2 year
Hot water	29.8 kWh/m^2 year
Ventilation fans	4.4 kWh/m^2 year
Cooling	0.0 kWh/m^2 year
Technical equipment	17.5 kWh/m^2 year
Pumps	0.8 kWh/m^2 year
Lighting	11.4 kWh/m^2 year
Others	0.8 kWh/m^2 year
Total	76.8 kWh/m^2 year

Figure 1. Norway´s first NZEB, a single-family house, was completed in 2012 and has since been in operation. The table shows the specified calculated energy need.

After the first full calendar year in use, the actual energy used for the operation of the house (excluding outdoor pool and other consumption not related to the building operation) was about 6,500 kWh, and electricity produced from the solar panels was 7,126 kWh.

2.1.iv. Requirements for building components for new buildings

All building components are included in the calculation of energy performance, which is regulated in the building code (see 2.1.i. Minimum requirements):

- Exterior wall U-value ≤ 0,22 W/m^{2}K
- Roof U-value ≤ 0,18 W/m^{2}K
- Exposed floors U-value ≤ 0,18 W/m^{2}K
- Window/door U-value ≤ 1,2 W/m^{2}K
- Minimum airtightness (Max air changes/hour at 50 Pa pressure difference) 1.5

Pipes, ducts and equipment used for the building´s heating system must be insulated. The thickness of the thermal insulation must be cost-optimal and calculated according to a European standard, e.g., the EN 12828:2012+A1:2014 or the DS 452:2013.

2.I.v. Enforcement systems new buildings

The building code requires all actors involved in the planning, construction and control phases to be certified according to the complexity of the project. A company is certified when it can document internal systems and competence according to what is required. As part of the construction process, the builder is obliged to document the building according to the national requirements.

The authority to control new buildings lies with the municipality. All builders have to send checklists and some other documents to the municipalities before construction starts and afterwards. The municipalities will give permission to start the construction and place the building into use if the checklists and documents fulfil the criteria. In addition, the municipalities can control documents that are not sent to the municipality, as well as the building site or the finished building. This control is a random sampling and only a few percent of the buildings are controlled.

2.II. Energy performance requirements: EXISTING BUILDINGS

2.II.i. Progress and current status of existing buildings (regulation overall performance)

In general, the measures applicable to the renovation of existing buildings are the same as the requirements for new buildings if the measures are covered by the building regulations. The local authorities can give exemptions from the requirements under certain conditions. This applies to necessary remodelling, renovation and change of use, and in cases when, for example, the requirements will be unreasonable compared to the energy savings the measures will provide. For extensions, additions, underpinning and change of use, the requirements only apply to the new part of the building.

Heating	5.9 kWh/m^2 year
Hot water	1.4 kWh/m^2 year
Ventilation	2.3 kWh/m^2 year
Cooling	1.3 kWh/m^2 year
Lighting	7.7 kWh/m^2 year
Others	0.8 kWh/m^2 year
Total	19.4 kWh/m^2 year

Figure 2. 'Powerhouse Kjørbo' with the specified calculated energy need during operation.

The renovated office building 'Powerhouse Kjørbo' demonstrates the benefits of transforming a typical 1980s office building into a plus-energy building, as it will now generate more energy during its lifetime since renovation than the total energy used for materials production, construction and operation, and demolition. The project was completed in 2014 and was awarded the BREEAM-NOR 'Outstanding' classification, the highest classification in BREEAM-NOR (http://ngbc.no/breeam-nor/). The project also

fulfils all requirements in the Norwegian passive house standard for non-residential buildings, NS 3701. The building produces energy using tilted solar panels on its flat roofs.

2.II.ii. Regulation on individual parts, distinct from whole building performance

For residential buildings, one option is to meet the requirements at the component level, whereas for non-residential buildings the requirements apply to the building as a whole. The local authorities can give exemptions from the requirements under certain conditions. This applies to necessary remodelling, renovation and change of use, and in cases when, for example, the requirements will be unreasonable compared to the energy savings the measures will provide. Still, constructors will have to build as energy efficiently as economically and technically feasible.

2.II.iii. Initiatives/plans to improve the existing building stock

As for new buildings, the concept of NZEB in a Norwegian context has not yet been defined. The requirements in force from 2017 are considered as a step towards NZEB requirements, which are scheduled for 2021. There are also financial and technical support schemes available through a government-financed agency as described below.

Plans for renovating the existing building stock towards NZEB are not applicable in Norway. However, through Enova (www.enova.no), grants are given to renovation projects, capacity building, etc. Many research projects are also working towards cost-efficient renovation methods. In 2017, the Parliament approved a proposal to prohibit the use of fossil oil for heating in all buildings from January 2020.

Directive 2012/27/EU (EED) has not yet been implemented in Norway, and thus national renovation plans are not applicable. However, Norway decided to include this directive in the EEA Agreement with necessary adaptations.

2.II.iv. Long Term Renovation Strategies, status

Long-Term Renovation Strategies is a requirement of the revised EPBD (2018) which is not part of the EEA agreement. But as this is required in Directive 2012/27/EU (EED), work on such a strategy is under preparation. See section 2.II.iii.

2.II.v. Financial instruments and incentives for existing buildings

For small residential buildings, incentives are established to motivate owners to upgrade their buildings when renovating, so as to approach the standard for new buildings. Subsidies are offered to develop a thorough plan for the upgrade and to cover some of the investment. The support scheme is connected to the EPC and is also coordinated with preferential loans. There are subsidies for single technologies as well, such as heat pumps, bio-solutions for heat, solar energy, etc.

For multi-family residential buildings and non-residential buildings, there is financial support for mapping building portfolios as a basis for larger energy upgrading projects covering all parts of a portfolio. While upgrading projects, owners are able to access subsidies when using best available technologies with high energy standards. For buildings owned by municipalities, there are preferential loans available as well. The use of energy performance contracting for buildings owned by municipalities has increased in recent years, to take advantage of the described incentives. This has initiated large energy projects with a 25-35%[3] reduction of energy consumption in existing buildings.

2.II.vi. Information campaigns / complementary policies

Information campaigns generally work in synergy with financial incentives when directed towards the building owners, motivating them to make use of the incentives. There have also been information campaigns targeting the supplier side of the market which inform about new building codes, the ban on fossil fuel heating and the importance of advising the homeowner on energy upgrades when renovating.

A national information centre on energy in buildings answers approximately 60,000 questions annually via telephone, webchat, social media and e-mail. The centre also contributes to certain web-based discussion forums, offering expert advice to homeowners regarding the renovation of private homes, certification, subsidies, technical building issues, etc.

The Norwegian EPC database has been further developed to facilitate an easy mapping of EPCs for banks. This is paving the road for preferential green loans from banks to finance construction of energy efficient buildings or the upgrading of old buildings to a high level of energy efficiency.

Figure 3. Lavenergiprogrammet (Programme for low energy buildings 2007-2017) comprised information campaigns targeting building professionals, craftsmen, etc. This example is of moisture in the construction.

2.III. Energy Performance Certificate requirements

2.III.i. Progress and current status on EPCs at sale or rental of buildings

The legislation regarding energy performance certification has been in place since 1 January 2010 under the Energy Act, but following a political discussion, the regulation was revised as of 1 July 2010.

The EPC for both residential and non-residential buildings is valid for ten (10) years, or until major changes are implemented in the building. EPCs are issued by Enova after online building data registration. The registered data is stored in the database at Enova's premises.

The owner of a building or apartment is responsible for the registration and presentation of an EPC at the point of sale or rent. The EPC shall be part of the marketing material to inform interested parties about the energy performance. The majority of the registered EPCs concern residential buildings. Each apartment needs to have an EPC, whereas for non-residential buildings the EPC is normally issued for the building as a whole. Of the 1.2 million EPCs issued as of January 2021, 97% concern dwellings. Table 3 shows the building stock and the corresponding number of EPCs in 2019. The data is extracted from Statistics Norway and Enova's register of EPCs, and estimates are based on these statistics.

Building type	Existing stock in 2019	Newly built in 2019	Sold in 2019	Rented in 2019	Total with EPC	EPCs issued in 2019
House or apartment	2.6 mil.	33,000	250,000	N/A	900,000 (estimation)	120,000
Holiday house	0.43 mil.	6,000 (estimation)	15,000	N/A		
Non-residential buildings in total	2.6 mil.	80,000 (estimation)	N/A	N/A		
Non-residential with EPC-obligation	0.25 mil.	5,000 (estimation)	4,000 (estimation)	N/A	20,000	1,500

Table 3. Total building stock and number of EPCs.

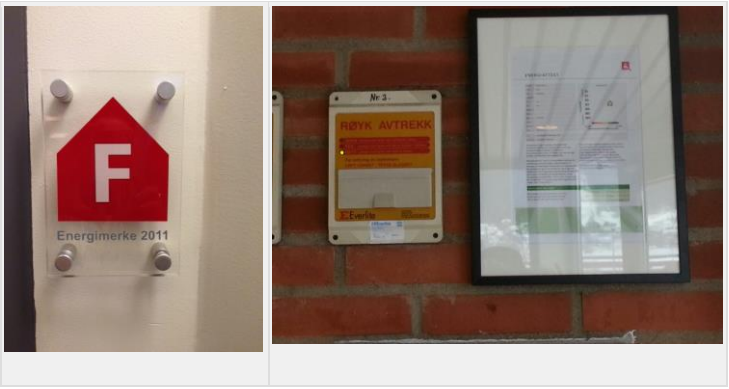

Figure 4. Two examples of EPCs or energy labels on the entry wall of non-residential buildings.

Experience shows that most of the EPCs for residential buildings relate to permanent houses; only a small proportion concern holiday houses. Likewise, registration is well advanced at the point of sale and less advanced at the point of rent. The number of new EPCs in 2019 seems to account for a considerable share of new houses as well as houses sold. Out of approximately 3 million dwellings, 20% are estimated to have an EPC as of 2019. This number is growing annually.

In the non-residential sector, approximately 8% of the buildings with a certifying obligation already have an EPC. Experience shows that most of the certificates concern buildings above 1,000 m^2, in which the obligation to display the EPC applies. The market for selling and renting non-residential buildings is not as uniform as the market for the residential sector, and in practice energy certification is much less developed.

2.III.ii. Quality Assurance of EPCs

Quality assurance of EPCs takes place at three different levels:

- During registration, the energy certification system performs data validity checks, and there are strong restrictions on what data is eligible. Normally, the data has to be within a certain range, thus excluding typing errors and misunderstandings. Also, there are restrictions to avoid false values. Most important is that the grade A energy level cannot be achieved unless a building leakage test has been performed according to standard procedures and the date of the test has been registered.
  For the simple registration of houses or apartments, there are even stronger restrictions as to what types of data are allowed to be registered. Only experts who have the required professional knowledge and competence are allowed to assign and input data.

- The most important quality assurance is the control performed by the buyer who reads the EPC and demands that the data be correct. The EPC is designed to enable the reader to understand the main input data used. Sellers are in general well aware of the obligation to give correct information to the market.

- Independent control. The first controls by NVE (2011-2012) concentrated on the existence of the EPC and, if relevant, whether the EPC was presented to potential buyers, or in the case of large non-residential buildings, to the users of the building. During the control carried out in 2014, the sample in question was also controlled regarding the input values of the calculation of the energy label.

The first sanctions were issued in 2015 over the lack of a valid EPC or inspection report. Of a sample of 81 non-residential buildings, 61 building owners were addressed with sanctions warnings. In this first round, the owners were given ample time to conform to the requirements. Compulsory fines were handed down to eight (8) companies covering 13 buildings. All the cases were finalised in December 2015 with fines for five (5) companies covering seven (7) buildings.

During 2016 and 2017, a total of 96 non-residential buildings were controlled. Seventy-seven (77) of these checks aimed to verify the existence of an EPC. Thirty-seven (37) of these concerned new buildings. The remaining 19 buildings were subject to EPC control and on-site inspection, on account that they had top-tier classification (A or B). The EPCs of ten (10) buildings showed minor discrepancies, which was pointed out. In 32 cases, serious (or multiple) discrepancies were shown for which a sanctions warning had to be issued. This control round has also served as a basis for the identification of possible improvements during Enova's evaluation of the present scheme.

In 2018, NVE controlled 69 non-residential buildings above 1,000 m^2 that were listed for sale or rent. Thirty-nine (39) of them had no EPC. They were issued with a sanctions warning. Deviations existed in more than 50% of the non-residential buildings used by commercial businesses; thus, there is a clear indication of negligence amongst building owners.

Due to a reorganisation of the control group and some backlogs from 2018, the focus of 2019 was on regrouping and planning for 2020. However, six buildings (above 1,000 m^2, for lease) were controlled. One of them had a compliant EPC, four had no EPC and one had a non-compliant EPC that was issued without following the dynamic calculation method.

In 2020, NVE controlled the existence and compliance of large (by number of students) middle schools of municipal ownership. Middle schools were chosen as subjects because they are frequented by the public and are often above 1,000 m^2 in size. The main goal of the control was to raise awareness about the EPC in

the public sector. Out of 20 controlled buildings, nine (9) buildings had fully compliant EPCs, five buildings had non-compliant EPCs and six (6) buildings had no EPC. One sanctions warning has been issued.

2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public

The directive's requirements for public buildings in Norway relate to all non-residential buildings. Thus, the regulation does not distinguish between public and private buildings above 1,000 m^2.

Since these buildings have an ongoing obligation to obtain and display the EPC, the task of informing the building owner about the EPC obligation has been simpler than for sold or rented non-residential buildings. The understanding among developers of new building projects seems to be well established – in particular among owners who want to construct high quality buildings. A typical example is office buildings with headquarters for well-known companies. The knowledge and practical experience is less developed among owners of existing buildings.

It has been observed that a number of municipalities are lagging behind in certification due to budget constraints.

2.III.iv. Implementation of mandatory advertising requirement – status

Since Norway has only implemented Directive 2002/91/EC and not Directive 2010/31/EU, building owners are not required to include energy labels in all advertisements, for instance, in newspapers.

The regulation does, however, require building owners to use the EPC or a summary of it when marketing a building for sale or rent. The label and certificate must thus be included in the total amount of documents being presented to the potential buyer or tenant.

2.IV. Smart buildings and building systems

2.IV.i. Status and plans on smart buildings

All buildings have now had smart metering of electricity installed. This also allows for the extension of smart technologies for various applications.

In planning for a revised EPC scheme, it is also being investigated as to whether the maximum electrical capacity should be part of an extended energy performance calculation.

2.IV.ii. Regulation of system performance

The energy limits which are set for different building categories cover the source of heating and the efficiency of heat recovery from ventilation. Also, pipes, ducts and equipment used for the building´s heating system must be insulated. The thickness of the thermal insulation must be cost-optimal and calculated according to a European standard, e.g., the EN 12828:2012+A1:2014 or the DS 452:2013.

2.IV.iii. Building Automation and Controls (BACs)

See 2.IV.i.

2.IV.iv. Status and encouragement of intelligent metering

Since 2019, all customers of electricity have an advanced consumption meter. This allows for automatic reading and facilitates further installation of various intelligent systems for management and control.

There are requirements to have meters for heat energy used for space heating and domestic hot water in new non-residential buildings and apartment blocks. The purpose of these measurements is to encourage energy management.

2.IV.v. Progress and current status on heating systems (Inspection / Equivalence)

The Norwegian regulation requires inspections of both heating and AC systems.

Since 2010, owners of fossil fuel-based heating systems are obliged to have the boiler inspected every four (4) years. For systems older than 15 years, an inspection of the whole heating system is required.

This obligation remains, but the ban on heating with systems for mineral oil (as of January 2020) makes this inspection, broadly speaking, irrelevant. The sale of heating oil and kerosene has steadily declined since 2003.

2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)

Since 2010, it has also been mandatory to have AC systems inspected. Most AC systems in Norway are for ventilation purposes only, possibly with cooling integrated into the system. The regulation thus requires that systems with a nominal capacity above 12 kW, or systems that serve a heated area above 500 m^2 in total, must be inspected every four (4) years.

There are no trustworthy statistics available on the number of systems covered by this regulation, but an estimate would be 100,000 systems. As of December 2019, 5,600 systems for cooling and 25,500 ventilation systems have been inspected. Although a great number of systems have yet to be inspected, this scheme is already well introduced within the market. For the system owner it is common practice to order an inspection as part of the regular maintenance, and in turn use the report as basis for further action. The industry organisations for maintenance and installation have undertaken an important role in providing information on the scheme, and this has proven to be vital for the results.

2.IV.vii. Enforcement and impact assessment of inspections

Procedures for control and sanctions on inspections are the same as those for energy certification. Control on inspection takes place simultaneously with control on energy performance certification.

3. A success story in EPBD implementation

Preparing the market for stricter energy performance requirements

On 1 January 2016, new and stricter energy performance requirements came into force in Norway and they became mandatory in January 2017. This implementation required a change in the way buildings are constructed. Better planning and more cooperation between different technical professions have led to an increase in the production of compact, airtight and well-insulated buildings, with well-adapted technical installations.

The work of preparing the market for the new regulations started in 2010. Several concepts of energy efficient buildings had been tested. Based on this, the German concept of '*Passivhaus*' was selected and adapted to Norwegian circumstances. A strategy was developed to share building knowledge among planners and contractors and to insert the concept into the Norwegian market for new buildings.

Evaluations (see endnote 4) show that the programme has led to innovation and increased knowledge about building energy efficient buildings. An important key to success was the cooperation between several governmental organisations, research institutions, property developers and trade organisations in the building sector.

The evaluation showed that the most ambitious part of the building market was changed as a result of the process, but questions remained as to whether or not the rest of the market would follow. Almost two years later, new performance requirements were set closely to the standards established in the programme. This secures the spread of knowledge and techniques for building energy efficient buildings in a new way, which will soon be seen as the normal way.

4. Conclusions, future plans

Although Norway has only implemented Directive 2002/91/EC, Directive 2010/31/EU is also being actively pursued. The Norwegian government has reached an agreement to continue its implementation with the necessary adaptations. The most recent Directive 2018/844 will also be considered for implementation.

The requirements for new buildings have been revised recently and they are up for a new revision in 2021. The new requirements will be in line with a national definition of NZEB.

The energy certification and inspection schemes are currently under evaluation, with potential revisions to ensure the best effect in the market. Conditions for coordinating schemes more efficiently are in place; the responsibility for the energy certification and inspection schemes has been transferred from NVE to Enova, and a considerable number of programmes for dissemination of information, technology dissemination and efficiency support measures are now organised by the same organisation.

Whereas the EPC has to a large extent up to today been an isolated issue, there will now be options for the EPC to be part of the evaluation of applications and recommendations for good building owner practice.

NVE remains responsible for control and use of sanctions. This activity is scaled up to become an intrinsic part of the schemes to further underscore the obligations of building owners.

Endnotes

1. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A21994A0103%2801%29 *NS 3700: 2013 Kriterier for passivhus og lavenergibygninger – Boligbygninger, NS 3701: 2012 Kriterier for passivhus og lavenergibygninger – Yrkesbygninger* (standards.no).

2. Experiences from approximately 50 EPC-projects in Norwegian municipalities in 2010. See also report "EPC in the Nordic countries"

3. See the evaluation report *'Evaluering av Enovas passivhusprogram*' for a presentation and evaluation of the programme (In Norwegian).

Annexes - Key Indicators & Decisions

Key Indicators & Decisions – General Background

no	Key Indicators & Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	N/A	Not yet decided
01.02	Definition of public buildings used by the public (according to article 13)	N/A	Not applicable. The display of EPCs is mandatory for all non-residential buildings. Reference to Directive 2002/91/EC.
01.03	Number of residential buildings	1,573,000 - of which 1,177,000 are single-family houses	End of 2016, Statistics Norway (https://www.ssb.no/bygg-bolig-og-eiendom/statistikker/bygningsmasse)
01.04	Number of non-residential buildings	2,664,000	End of 2020, Statistics Norway
01.05	If possible, share of public buildings included in the number given in 01.04	N/A	No definition available
01.06	If possible, share of commercial buildings included in the number given in 01.04	N/A	No definition available
01.07	Number of buildings constructed per year (estimate)	40,000	Statistics Norway (https://www.ssb.no/bygg-bolig-og-eiendom/statistikker/byggeareal/kvartal). Estimate 2017-2020.
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	90%	Estimate by NVE
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	10%	Estimate by NVE
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	9.2 million m^2 (2020)	Statistics Norway (https://www.ssb.no/bygg-bolig-og-eiendom/statistikker/byggeareal/aar)

Key Indicators & Decisions – New Buildings

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments	Description
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other	Several components constitute the energy part of building codes.		
02.02	Requirements for energy performance of residential buildings in current building code	There are two methods for fulfilling the requirements: specific energy limits set in kWh/m^2 per year net energy need, or specific component requirements, in total 9 measures. Regardless of the method chosen, a set of absolute minimum requirements must also be fulfilled. In addition, all buildings larger than 1,000 m² shall have flexible heating systems, normally waterborne, and must be prepared for low-temperature heating distribution. Single-family houses need to have a chimney flue unless flexible heat distribution is installed. Installation of fossil fuel-based heating systems is not allowed.	Net energy demand (kWh/m^2 per year): Single-family house/row house etc: 100 + 1,600/m^2 heated floor area, Apartment buildings: 95 Component requirements: Max U-value: exterior wall 0.18 W/(m^{2}K) Max U-value: roof 0.13 W/(m^{2}K) Max U-value: exposed floors 0.10 W/(m^{2}K) Max U-value: windows/doors 0.80 W/(m^{2}K) Thermal bridges (max linear U-value) W/(m^{2}K): (0.05 for houses and 0.007 for apartment buildings) Minimum efficiency of heat recovery in ventilation air: 80% Minimum airtightness (Max air changes/hour at 50 Pa pressure difference) 0.6 Max SFP factor 1.5 kW/(m^3/s)	Absolute minimum requirements: Max U-value: exterior wall 0.22 W/(m^{2}K) Max U-value: roof 0.18 W/(m^{2}K) Max U-value: exposed floors 0.18 W/(m^{2}K) Max U-value: windows/doors 1.20 W/(m^{2}K) Minimum airtightness (Max air changes/hour at 50 Pa pressure difference) 1.5
02.03	Requirements for energy performance of non-residential	For non-residential buildings one can only choose the specific energy limit option.	Net energy demand (kWh/m^2 heated floor area per year)	The same minimum requirements as

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments	Description
	commercial buildings in current building code	There are 11 categories with specific energy limits for each. In addition, all buildings larger than 1,000 m² shall have flexible heating systems, normally waterborne, and must be prepared for low-temperature heating distribution. Single-family houses need to have a chimney flue, unless flexible heat distribution is installed. Installation of heating systems prepared for fossil fuels is not allowed.	Kindergarten 135 Office Building 115 Schools 110 Universities 125 Hospitals 225 (265) Nursing homes 195 (230) Hotels 170 Sports facilities 145 Commercial building 180 Cultural buildings 130 Light industries/workshops 140 (160)	above have to be fulfilled. Requirements within parenthesis applies where heat recovery of ventilation air increases the risk of spreading contaminated air or infections. If electricity is produced on the property (more than 20 kWh/m² per year), the specific energy limit can be exceeded by 10 kWh/m² per year (for all categories)
02.04	Requirements for energy performance of non-residential public buildings in current building code	Not applicable		
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Not yet decided		
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Not yet decided		
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	Not yet decided	Planned for 2020	

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments	Description
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Not yet decided		
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	Not yet decided	Planned for 2021	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	Not yet decided		
02.11	Is renewable energy a part of the overall or an additional requirement?	Not yet decided		
02.12	If renewable energy is an additional requirement to NZEB, please indicate level			
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Not yet decided		

Key Indicators & Decisions – Existing Buildings

no	Key Indicators & Decisions – Existing Buildings	Description / value / response	Comment	Description
03.01	Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?	Not yet decided		
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Not yet decided	Expectedly Yes	
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	Not yet decided		
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	Not yet decided		
03.05	Overall minimum requirements in case of major-renovation	Same as for new buildings	See above. In general, when measures are applied to existing buildings the same requirements are used as for new buildings. This includes extensions, additions, underpinning, change of use, etc.	The local authorities can give exemptions from the requirements under certain conditions. This applies to necessary remodelling, renovation and change of use, and in cases when for example the requirements will be unreasonable compared to the energy savings the measures will provide.
03.06	Minimum requirements for individual building parts in case of renovation	The absolute minimum requirements for new buildings will apply.		Max U-value: exterior wall 0.22 W/(m^{2}K) Max U-value: roof 0.18 W/(m^{2}K) Max U-value: exposed floors 0.18 W/(m^{2}K) Max U-value: windows/doors 1.20 W/(m^{2}K)

no	Key Indicators & Decisions – Existing Buildings	Description / value / response	Comment	Description
				Minimum airtightness (Max air changes/hour at 50 Pa pressure difference) 1.5
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	Not applicable		
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Not applicable		

Key Indicators & Decisions – Energy Performance Certificates

no	Key Indicators & Decisions – Energy Performance Certificates	Description / value / response	Comment	Description
04.01	Number of energy performance certificates per year (for instance average or values for of 3-5 years)	125,000 (house/apartment/holiday house) 1,600 (non-residential)		
04.02	Number of EPCs since start of scheme	1,200,000 (house/apartment/holiday house) 30,000 (non-residential)	As of end 2020	
04.03	Number of EPCs for different building types	N/A		
04.04	Number of assessors	1,500	Estimate by NVE	Experts are needed only for certification of new buildings and non-residential buildings.
04.05	Basic education requirements for assessors	Bachelor's degree in buildings technique and energy, plus experience with the calculation of energy performance	Length of experience (2-6 years) depends on building complexity	
04.06	Additional training demands for assessors	No other requirements		
04.07	Quality assurance system	• Built-in features in Energy Certification System (ECS) • Buyer and user's interest in correct information and control of registered data • Independent control of certification and inspections	The ECS has restrictions on what a layperson is allowed to register. Only experts are given full	The first sanctions were used in 2015 based on the lack of valid EPC or inspection report. Later, several rounds of control have

no	Key Indicators & Decisions – Energy Performance Certificates	Description / value / response	Comment	Description
			freedom and responsibility.	been performed. In 2018, the control comprised 69 buildings, and in 2019, six buildings.
04.08	National database for EPCs	Part of the Energy Certification System	Hosted by Enova	Yes
04.09	Link to national information on EPCs / Database	https://www.energimerking.no/no/energimerking-bygg/energimerkestatistikk/		

Key Indicators & Decisions – Smart Buildings and Building Systems

no	Key Indicators & Decisions – Smart Buildings and Building Systems	Description / value / response	Comment
05.01	Is there a national definition of smart buildings?	No	
05.02	Are there current support systems for smart buildings?	No	
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Part of the energy performance calculation	
05.04	Are there current requirements for automatics (for instance in building codes)?	No	
05.05	Chosen option A or B for heating systems (inspection or other measures)	Option A	
05.06	Number of heating inspections; reports per year (if option A)	600	Altogether approximately 1,000
05.07	Chosen option A or B for cooling systems (inspection or other measures)	Option A	
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	22,000	As of December 2019: 5,800 systems for cooling and 25,500 ventilation systems have had an inspection
05.09	Is there a national database for heating inspections?	Yes, same database as for EPC	Inspection reports are stored as a PDF, which means that data is not available for thorough analysis.
05.10	Is there a national database for cooling /	Yes, same database as for EPC	Inspection reports are stored as a PDF, which

no	Key Indicators & Decisions – Smart Buildings and Building Systems	Description / value / response	Comment
	air-conditioning inspections?		means that data is not available for thorough analysis.
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	Yes	Note: data is only available as PDF documents.
05.12	Link to national information on Inspection / Database	https://www.energimerking.no/no/energimerking-bygg/energivurdering-av-teknisk-anlegg/	

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