CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Estonia
Status in 2020

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NATIONAL WEBSITES
https://vana.mkm.ee/en/objectives-activities/construction-and-housing-sector;
https://kredex.ee/en/energy-performance-existing-buildings
https://www.ttja.ee/en/business-client/buildings-construction/energy-efficiency

1. Introduction

In Estonia, the implementation of the EPBD is the overall responsibility of the Ministry of Economic Affairs and Communications. Improving the energy efficiency of buildings has been one of the priorities of the governmental energy and housing policy in Estonia. The amendments of the Building Code[1], which transposed the main elements of Directive 2002/91/EC, came into force in October 2006. However, the regulations transposing all the EPBD requirements were finalised in January 2009[2], and the main regulations[3], in compliance with Directive 2010/31/EU, came into force in January 2013. The Ministry of Economic Affairs and Communications adopted updated and stricter energy performance requirements in 2018, which were enforced from the beginning of 2019.

Before the EPBD requirements, there were no specific legal obligations, e.g., thermal transmittance values, or requirements for technical building systems.

In 2015, a new renovation grant scheme[4] started for apartment buildings. During the 2015 – 2018 period, a total of 102 million € was used to renovate existing apartment buildings in Estonia. With updated conditions (regionality aspect: in the two bigger cities Tallinn and Tartu, the grant limit was 30%; in cities where the average real estate value was bigger than 500 €/m^2 (mainly in county centers), the grant limit was 40%; while in other regions in Estonia, the grant limit was 50%), the grant scheme[5] was extended to the 2019 – 2020 period with another 46 million € used for renovation. Due to the Covid pandemic, extra funds[6] were provided so that in 2020 a total of ca. 56 million € were granted. In 2020, the factory reconstruction grant[7] for apartment buildings was opened (ca. 15 million € and 20 buildings).

Information about the conditions and process for application to the different grants and other services related to energy efficiency measures in apartment buildings are available on the KredEx homepage (https://kredex.ee/en/teenused/ku-ja-kov/laen-kaendus-ja-toetus).

This report presents an overview of the status of implementing and improving the EPBD in Estonia. It addresses certification, minimum requirements, and inspection systems as well as quality control mechanisms, training of qualified experts, information campaigns, etc.

2. Current Status of Implementation of the EPBD

2.1. Energy performance requirements: NEW BUILDINGS

The minimum energy performance requirements are expressed as a primary energy performance indicator calculated for the building according to its standardised use and are applied to the building as a whole. Data for standardised use include assumptions for occupants, small power equipment and lighting usage profiles, operation times as well as indoor climate requirements. The energy performance calculation takes into account the energy needs for space heating, domestic hot water, cooling, lighting, ventilation, and electrical appliances. The minimum energy performance value characterises the primary energy use of the building; in other words, the delivered energy is multiplied by the primary energy factors (Table 1) of the energy carriers from which the exported energy multiplied by the same factors are deducted (Figure 1).

Renewable energy (wood, biofuel)	0.65
District heating	0.9
Efficient district heating	0.65
Electricity	2.0
District cooling	0.4
Efficient district cooling	0.2
Fossil fuels (oil, natural gas, coal, peat, solid fossil fuel)	1.0

Table 1: Primary energy factors.

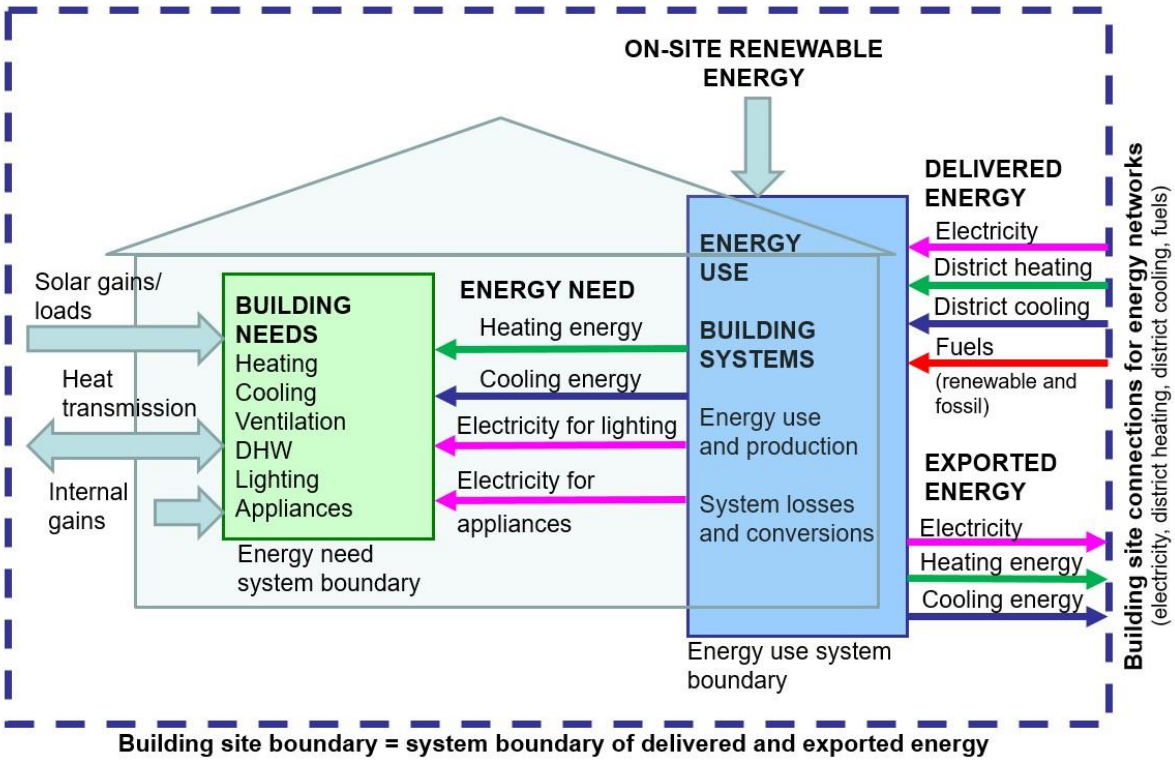

Figure 1. System boundary of minimum energy performance requirements.

Compliance with the minimum energy performance requirements must be documented through an energy calculation of the building, using the prescribed methodology. The calculated energy performance value must not exceed the maximum energy performance value set by legislation. Energy calculations for non-residential buildings must be executed by use of a dynamic energy simulation. For residential buildings, the monthly methodology is also accepted. All the input data, including requirements for the calculation tool, is specified in the 'Methodology for calculating the energy performance of buildings'[8].

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

The minimum energy performance requirements are expressed as a primary energy performance indicator (EPI). The maximum primary energy values are listed in Table 2. Buildings that will be erected after 31 December 2019 and waiting for a construction permit must meet the NZEB (class A) requirements. Small residential buildings (detached houses, row houses) with a heated floor area < 220 m^2 are exempted from this requirement and must meet low-energy building (class B) requirements without considering local renewable energy production. Estonia has not set minimum requirements for U-values.

The building has to meet the minimum energy performance requirements as a whole. For detached and terraced houses, compliance with the minimum energy performance requirements can also be demonstrated by a simplified calculation. From 2008 to 2018, this alternative method was based on the specific heat loss tabulated values through the building envelope. This method required only envelope heat transfer coefficients (U-values) to be subjected to heat loss calculations for conduction and infiltration losses and could be used if a mechanical supply and exhaust ventilation system with specified heat recovery and specific fan power were used. Depending on the heat source, specific heat loss values are set, so that they comply with minimum energy performance requirements. With this method, no further energy calculation was required. For example, the maximum specific heat loss value to be fulfilled in the case of a ground source heat pump serving as the heat source was 1.0 W/(m^2.K), and in the case of a gas boiler, it was 0.6 W/(m^2.K). It is important to note that these values are not U-values, but specific conduction (average U-value of building envelope including thermal bridges) and infiltration heat loss values calculated per heated floor area.

From 2019, this alternative method was further developed and implemented as an Excel calculator. Heating energy need is still calculated from the specific heat loss but corrected with solar heat gains. Building envelope and technical systems (ventilation, heating, solar collector and photovoltaic) input data can be specified by the user, and the calculator also uses certain simple rules, e.g. window to wall ratio multiplied by the solar heat gain coefficient, for overheating risk estimation.

Building type		EPI value requirement, kWh/(m^2 year)		
	NZEB (class A) EPBD scope*	**NZEB (class A)**	**Low energy building (class B)**	**Renovation of existing building (class C)**
Small residential buildings (detached house, row house): a) net heated area <120 m^2 b) net heated area 120-220 m^2 and row house c) net heated area >220 m^2	 89.4 73.4 59.5	 145 120 100	 165 140 120	 185 160 140
Multi-apartment buildings	45.9	105	125	150
Military barracks	85.9	170	200	250
Office buildings, libraries and research buildings	62.11	100	130	160
Accommodation building, hotel	138	145	170	220
Commercial buildings	118	130	150	210
Public buildings	135	135	160	220
Commerce buildings and terminals	154	160	190	230
Educational buildings	82.6	100	120	160
Pre-school institutions for children	90.0	100	120	165
Healthcare buildings	83.7	100	130	170
Warehouse	54.0	65	80	100
Industrial building	68.7	110	140	170
Buildings with high energy consumption	Na	820	850	950

** EE EPI values in other columns include appliances in non-residential buildings, and lighting and appliances in residential buildings that are not included in EPBD energy uses. As being tabulated fixed values, EPI values for EPBD scope can be reported.*

Table 2. Primary energy requirements for buildings (bold values denote minimum requirements for new built structures).

Requirements are also set for summer thermal comfort in buildings. For residential buildings, this requirement is defined as the hourly mean indoor temperature in excess of the maximum limit of 150 degree-hours (ºCh) over +27°C during the summertime period (from 1 June to 31 August). For non-residential buildings, this requirement is defined as the hourly mean indoor temperature in excess of the maximum limit of 100 degree-hours (ºCh) over +25°C (+27°C for warehouses, industrial buildings) during the summertime period (from 1 June to 31 August, educational buildings 1 May to 15 June and 15 August to 30 September). For compliance assessment, detailed procedures are described in the regulation 'Calculation Methodology for Building Energy Performance Calculations'[9]. Temperature calculations are needed for typical living rooms and bedrooms that are most likely to encounter overheating. Temperature calculations for non-residential buildings are needed for typical room types. The verification is to be conducted considering rooms as single zones, and by using dynamic simulation software.

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

The energy performance requirements for new buildings and major renovations of existing buildings are regulated by four regulations:

- The 'Minimum Energy Performance Requirements'[10] regulation. This regulation applies for new buildings and buildings undergoing major renovations, and includes the main requirements, e.g., maximum allowable primary energy consumption, general recommendations and requirements for building envelope elements and technical building systems. General recommendations include a thermal comfort-based U-value recommendation, some requirements for technical building

systems, e.g, for mechanical ventilation and some individual metering requirements. In addition to these, there are no specific component-based requirements for new buildings and for buildings undergoing major renovations. Numeric energy performance requirements are set only for the building's primary energy consumption. Besides that, the regulation gives the definition and primary energy performance value for low-energy buildings and NZEB. This regulation also includes primary energy factors of different energy carriers.

- The 'Calculation Methodology for Building Energy Performance Calculations' regulation[8]. This regulation includes all the necessary information about the calculation of the energy performance, e.g., efficiencies of heating and ventilation systems, infiltration airflows, and standardised patterns of use of the ten (10) different building types and other energy calculation input data, as well as detailed calculation formulas and guidelines for energy calculations. Basically, this regulation provides guidance on how to run dynamic energy simulations that result in energy needs as well as calculation rules and methods from energy needs to energy usage for delivered, exported and primary energy.

- The 'Requirements for Technical Building Systems that considerably affect Building energy efficiency' regulation[11]. This regulation applies to buildings where smaller, rather than major, renovations will be performed. It specifies system performance requirements for building service systems that will be installed or replaced (heating, domestic hot water, ventilation, cooling, automation systems, local heat and electricity production systems).

- The 'Requirements for evaluating energy efficiency of technical systems that considerably affect building energy efficiency and data requirements to be presented to Building Register' regulation[12] describes and enforces actions to assess energy efficiency through inspections of systems with rated heating or cooling capacity over 70 kW installed, to be installed, replaced, or renovated in existing buildings.

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

The current energy performance legislation includes the definition of low-energy buildings and NZEB buildings. A low-energy building is a building that is characterised by sound engineering solutions, considering the current best practices without the on-site renewable electricity production, and which meets the set primary energy performance requirements (Table 2). An NZEB is a building that is characterised by sound engineering solutions, considering the current best practices, but including on-site energy production by RES (the share of energy by RES is not fixed) and which also meets the set primary energy performance requirements (Table 2). Requirements for the low-energy building and the NZEB are fully based on the primary energy indicator. There are no component-based requirements.

All public buildings that apply for a building permit after 31 December 2018 must be NZEB. All buildings (except for small residential buildings, see Table 2) that apply for a building permit after 31 December 2019 must be NZEB.

2.I.iv. Requirements for building components for new buildings

Estonia has set requirements for building envelopes to be sufficiently airtight and insulated. In the determination of the suitable insulation for the building, different factors must be taken into consideration. Key factors are minimum energy performance requirements, need for maintenance, thermal comfort and

the avoidance of condensation and mold growth on thermal bridges, inner surfaces, and structural elements.

In order to maintain a comfortable thermal environment in the building, the overall thermal transmittance of its envelope in general may not exceed 0.65 W/(m^2K). If the doors or windows have a thermal transmittance value higher than 0.65 W/(m^2K), thermal comfort must be ensured with a heating system solution.

The average leakage rate of the building envelope may not exceed the value used in the energy calculation performed to prove the building's compliance with the minimum requirements for energy performance.

2.I.v. Enforcement systems new buildings

Since August 2019, the first EPC energy efficiency calculations need to be performed before applying for a building permit. The EPC will be calculated based on the preliminary design stage of the building, and will indicate the future energy need of the building which can not be higher than the minimum requirements. Before applying for a use permit, control calculations are made based on the real building materials and appliances installed in the building. If necessary, a new EPC is provided. This is part of the permit process managed and controlled by local municipalities.

The Estonian Consumer Protection and Technical Regulatory Authority (CPTRA) control of EPCs is based on random selection. CPTRA also provides building permits for national defence and security agency buildings and EPCs are checked on these cases also.

2.II. Energy performance requirements: EXISTING BUILDINGS

Primary energy requirements apply to renovations that fall under the definition of 'major renovations'. Major renovations are defined as any renovations involving more than 25% of the construction cost of a similar new building.

For renovations not falling under the definition of major, no minimum requirements for building envelope elements apply. Only the requirements set for technical building systems (i.e., when a system is replaced or a new system is installed), and the performance requirements for these systems (for heating, domestic hot water, cooling, ventilation, automation systems, local heat and electricity production systems) must be followed (see chapter 2.IV.ii).

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

The minimum energy performance requirements are expressed as a primary energy performance indicator calculated for the building according to its standardised use and applied to the building as a whole. The maximum primary energy values are listed in Table 2, see column 'Renovation of existing building (class C)'.

Estonia has not set minimum requirements for U-values. The building has to meet the minimum energy performance requirements as a whole.

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

There are no requirements on individual building parts.

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

Estonia has not set a separate definition for NZEB for existing buildings. At the moment, there are no national plans for renovating the existing building stock towards NZEB standards. Renovation of residential buildings is mainly guided through renovation grants that require major renovation or achievement of new building energy efficiency levels.

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

The main goal of this long-term renovation strategy is the full renovation, by 2050, of buildings erected before 2000. The depth of this full renovation is reflected in the minimum required energy performance of a building after a major renovation, which, according to the Estonian energy performance regulations, is currently class C. The strategy has the following central principles:

- Cost-effective application of energy efficiency requirements: Energy and resource efficiency; in addition to the energy performance of buildings, taking into account the environmental impact of the construction materials and processes.
- Regional balance: Ensuring renovation as well as balanced, functional living quarters and second-tier centres.
- Quality of living and working environment: Ensuring a healthy interior climate, improving accessibility and functionality as well as abiding by the basic principles for high-quality space in the solutions for buildings and public spaces during the renovation.
- Technological development: The development of renovation solutions and technologies to improve the sustainability of the renovated buildings and reduce renovation costs.
- Climate change mitigation and adaptation: Climate change mitigation, reduction of the carbon intensity of buildings, buildings that contribute towards climate neutrality.
- The strategy that ensures energy savings, the healthy interior climate in buildings and a high-quality spatial environment is estimated to improve the living and working conditions of 80% of Estonian citizens.

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

Financial grants are available for renovation of apartment buildings and detached houses. Grant schemes are managed by Fund KredEx.
Existing apartment buildings that were built before energy efficiency regulations came into force (in 2009) and which have not been renovated, usually have an EPC class of E or F (Figure 2).

A 30% or 40% grant can be applied to EPC Class D, and a 30%, 40% or 50% grant can be applied to EPC Class C major renovations achieved after the completion of renovation works. Different grant shares are based on property values and regional location: higher grants for rural areas where property values are lower (up to 50%) and lower grants in the two largest cities of Tallinn and Tartu where property values are high (30%).

In addition to the EPC class, requirements are also in place for the thermal transmittance in the building envelope, the heating system, and the ventilation system. Fulfilling the thermal transmittance requirements for external walls usually means the creation of an insulation layer that is 150-200 mm thick. Fulfilling the thermal transmittance requirements for the roof usually means 300-400 mm of insulation

layer. New windows must be triple-glazed windows. The heating system has only two requirements: the system must be balanced, and radiators must be equipped with thermostats in order to allow room-based indoor temperature control.

Special attention was paid to the requirements regarding the ventilation system. Requirements are set for the airflow rates and sound level. Fulfilling those requirements means installation of mechanical ventilation system. Higher grant share (EPC class C) requires a mechanical supply and exhaust ventilation with heat recovery.

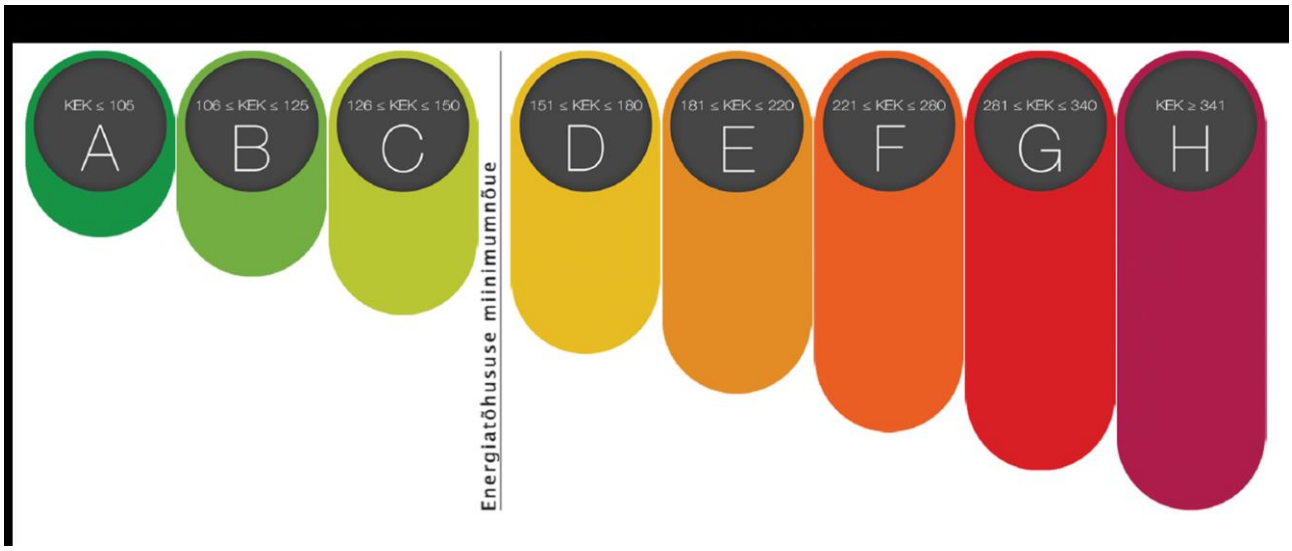

Figure 2. EPC classes for apartment buildings.

For detached houses, a 30% grant can be applied when single energy efficiency renovation works are performed. In that case, achievement of the prescribed EPC class is not required. The 50% grant can be applied when major renovation works are performed. In that case, achievement of an EPC class C is required.

2.II.vi. Information campaigns / complementary policies

Public awareness for energy efficiency and energy certification systems is at quite a good level in the case of renting or buying buildings. People generally ask for the EPC, and the building law states that, in the case where a buyer or tenant enquires about the EPC, the seller has to provide it.

CPTRA is monitoring how the EPC information is published in real estate advertisements and is working closely with the real estate portals in providing input (such as articles) for their newsletters. Some examples:

- https://blog.kinnisvara24.delfi.ee/miks-on-energiamargis-oluline/
- https://www.city24.ee/et/kinnisvarauudised/15497/labi-hoonefondi-rekonstrueerimise-kliimaneutraalseks-eestiks--miks-on-energiamargis-oluline

Fund KredEx and the Ministry of Economic Affairs and Communications, together with the Tartu Regional Energy Agency, organise a national energy week once a year. Fund KredEx has also carried out several other information campaigns, mostly targeted at apartment buildings, as their share is roughly 70% of the total residential building stock. These campaigns have been organised on an annual basis to inform apartment building tenants about energy saving measures and the potential magnitude of the savings, in order to give expert advice and to inform them about support provided by the state (subsidy programmes).

Several methods have been used in these campaigns. Information has been distributed through TV, radio, print media, internet, street advertisements, training courses for persons responsible for building maintenance, etc. As a result of these campaigns, energy saving activities have taken off and renovation grants have become very popular among apartment associations and detached house owners.

To further raise awareness and knowledge, the CPTRA together with the Ministry of Economic Affairs and Communications organise seminars for local municipalities and housing associations at least once a year in different cities. Energy efficiency is always a major part of these seminars.

2.III. Energy performance certificate requirements

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

Estonia has one central public building register, named 'Register of Construction Works'[13], through which experts issue EPCs. All the EPCs issued, including related data, calculations and other information available, are compiled into this database, which is publicly available to all citizens.

2.III.ii. Quality Assurance of EPCs

CPTRA makes random checks on EPCs and deals with complaints. Since 2016, the value of checks has been rising; in the year 2020, more than 600 EPCs were checked.

The most common error made on calculated EPCs (for building permits) is a difference in source data through the project (for example U-values, window areas, thermal bridges, etc). To be more specific, calculated EPC is based on the preliminary design stage of the building. However, some data might be different throughout the project (e.g. U-values in construction part vs. HVAC part). Such mistakes must be corrected for the building permit to be issued by the local municipality.

Errors made on EPCs based on energy consumption calculations are mostly minor (for example, weighting factor) and are expected to be eliminated once the move towards a more dynamic EPC, where the energy class will be displayed live and visible on a 3D-Twins platform, is completed. In these situations, the utility consumption values will be automatically fed into the platform. Also, the weighting factors of different energy carriers will be assigned automatically. When completed, individually creating an EPC will only require checking the automatic values and verifying the automatic data input, to the best of one's judgement.

So far, no penalty has been imposed. A penalty can be as high as 64,000 € for a company, or 6,400 € for individual experts, if the shortcomings are not corrected.

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

Current legislation requires an EPC for every public building used by the government that has a floor area larger than 250 m^2. The EPC must be placed in a location visible to visitors.

In 2015, the CPTRA focused on central government buildings, so that by the end of 2015, 90% of the relevant buildings had an EPC. Exceptions are in place for certain building types, e.g., historical buildings, etc.

In the 2016-2021 period, the CPTRA focus was on local municipality buildings. By the end of January 2022, 90% of local municipality buildings for which an EPC is mandatory have an EPC. A full report[14] on the local municipality building stock was published in April 2022.

According to the report, 98% of the buildings that are required by law to have an EPC, meet this requirement. A 2% of the missing EPCs can be justified with local municipalities' plans to renovate those buildings within the coming years after which these buildings will be certified and given higher energy class (*vs. if they would get the EPC today*).

Of the existing buildings owned by the local municipalities, class C and class D buildings have the largest share, respectively 23% and 22% (Figure 3).

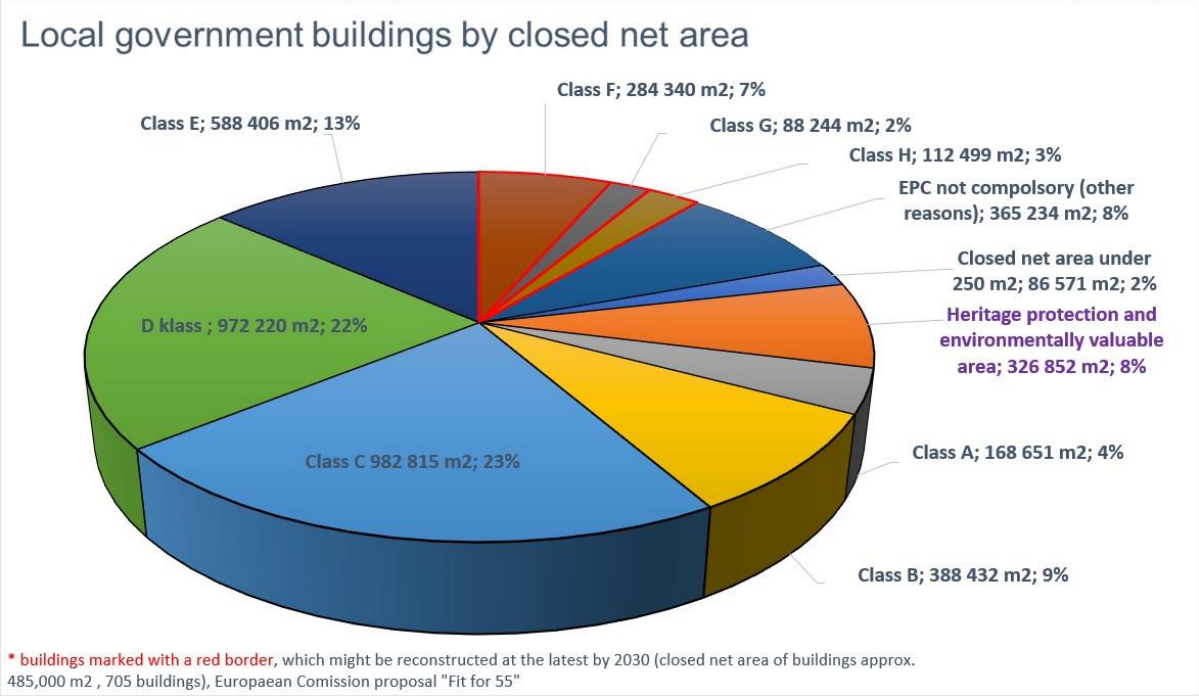

Figure 3: Energy profile of local government buildings'

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

Current regulations require an EPC for renting and/or selling buildings since January 2013. The National Building Code also requires advertisements to include at least the building energy class and the primary energy consumption per heated area. The compliance rate for advertisements has risen from 3% in 2013 to 10% by the end of 2014.

In the 2015-2016 period, the CPTRA worked intensely to increase the information provided on EPCs in the real estate sector. With information provided directly to different stakeholders (real estate agents and companies, real estate sales portals) and seminars, the compliance rate for advertisements has risen from 3% in 2013 to 58% by end of 2016. After 2016, there was a slow but steady increase, reaching 65-70% by the end of 2020, aiming to achieve the next big additional step when the EPC data is made available in the form of a dynamic 3D-Twin platform.

2.IV. Smart buildings and building systems

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

Estonia currently has no initiatives on smart buildings in place.

2.IV.ii. Regulation of system performance

The 'Requirements for Technical Building Systems that considerably affect Building energy efficiency'[11] regulation specifies system performance requirements for building service systems that will be installed or replaced in an existing building. Performance requirements are set for installing or replacing the heating and the hot water system's heat source, AC, air-handling units, automation systems and local renewable energy systems.

For the heating and hot water systems, if two or more heat sources are installed, the efficiency of the heat sources is determined as the energy use weighted average of the systems. Furthermore, if the heating system is a one-pipe system with radiator by-pass, there is no requirement to install self-regulating equipment to keep the set temperature in a room or building part.

For the AC, the performance requirement is that the AC to be installed must have a Seasonal Energy Efficiency Ratio[15] of at least 5.6.

For the air-handling units, the requirement is that the performance efficiency of the heat recovery must be at least 70%. If the ventilation system requires the use of a liquid-coupled heat exchanger, then the efficiency of the heat recovery must be at least 50%. Specific fan power of the air-handling unit may not exceed 2.2 kW/(m^3/s).

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

According to the 'Requirements for Technical Building Systems that considerably affect Building energy efficiency' regulation[11], the automation system to be installed shall enable the monitoring of the operation of all technical systems located in the building and control it in accordance with the operating hours of the building.

Furthermore, the automation system to be installed in an office or educational and research building shall enable the control of general lighting in a manner which takes into account the use of premises and daylight.

Also, the Building Code[16] specifies that for a non-residential building's actual or designed heating or cooling system whose rated capacity exceeds 290 kW, an automation system must:

1. make it possible to constantly control and monitor the building's energy consumption and to collect and analyse the building's energy performance consumption data;
2. make it possible to analyse the building's energy performance in a comparative manner so as to ascertain any reductions in the energy performance of the building's utility systems, in order to notify the building's owner or the operator of the building's utility systems of possibilities for improving the energy performance;
3. provide for data transmission between a utility system with a significant impact on the building's energy performance, which is connected to the building's automation system, and other equipment located in the building;

4. provide for interoperability between technical solutions, equipment and utility systems which belong to different manufacturers to achieve a significant impact on the building's energy performance.

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

In new buildings or existing buildings undergoing major renovations with more than one owner, metering equipment must be installed in the heating system to determine the use of the heating energy in the different parts of the building. Intelligent metering does not factor in the energy efficiency calculations or requirements.

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

Estonia has adopted the alternative approach (model B) instead of mandatory inspections for heating and AC systems.

The role of on-site heat generation in water-based heating systems is significantly lower than the heat supply from district heating. At the same time, the data of on-site heat generation devices that are being used, or even data of companies that are selling and installing the devices, was incomplete and unreliable, as it has not been recorded systematically. With these restrictions in place, it was obvious that at the time of the inspection scheme's scheduled implementation, the requirement would be difficult to enforce. Therefore, for boilers, Estonia adopted option B of Article 14 of the EPBD.

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

The use of AC systems is not widespread in buildings, due to the prevailing cold climate in Estonia. In cases where an AC system is installed, it usually concerns small devices (heat pumps) with a rated output lower than 12 kW. Larger systems are usually installed in new buildings that must fulfil the minimum energy performance requirements according to the current regulations. The Building Code[16] establishes the following:

In existing buildings with heating or cooling systems whose rated capacity exceeds 70 kilowatts, an inspection of the building's utility system is performed in order to assess the energy performance. This capacity limit may or may not include a ventilation system. During the inspection, the effectiveness and capacity of the heating source or the cooling unit and the ventilation unit is assessed based on the building's heating or cooling need. The assessor electronically enters the specifications of the assessment in the register of construction works.

When filing the application for a use and occupancy permit, or a use and occupancy notice, the assessment of the energy performance of a heating or cooling system whose rated capacity exceeds 70 kilowatts is annexed to such an application or notice.

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

Since August 2020, the 'Requirements for evaluating energy efficiency of building technical systems that considerably affect building energy efficiency and data requirements to be presented to Building Register' regulation[12] describes and enforces actions to assess energy efficiency through inspections of systems with a rated heating or cooling capacity of over 70 kW. This also includes systems to be installed, replaced or renovated in existing buildings.

No impact study/data/statistics are available yet.

3. A success story in EPBD implementation

The execution of the renovation work grant schemes in Estonia has shown that extensive integrated renovation is possible in situations in which buildings are managed by apartment associations, where apartment owners have to agree on the extent and budget of the renovation works. New innovative solutions can be implemented and it seems that apartment owners are willing to invest in order to renovate their apartment and building. Financial support keeps the cost of renovation work to an acceptable level. The grant scheme also allows requirements to be set out for the measures involved in any renovation work, thus promoting extensive integrated renovation works.

4. Conclusions, future plans

The EPBD, Directive 2010/31/EU, has been fully transposed into national legislation in Estonia. Updated requirements and new regulations came into force in January 2013. Estonia will continue conducting information campaigns and seminars to improve the level of knowledge of building owners, designers and architects as well as specialists working in the municipalities. The Directive 2018/844 was considered when the latest revision of the regulation 'Minimum Energy Performance Requirements'[8] regulation was completed. The directive forced some changes in the legislation, e.g., specifying certain definitions, implementing requirements for electric vehicle recharging and inspecting heating and cooling systems. Furthermore, due to the directive, new cost-optimality calculations for energy efficiency classes were performed. This helped to re-define the cost optimal levels of the energy efficiency requirements for new builds and major renovations.

The Ministry of Economic Affairs and Communications adopted updated, stricter energy performance requirements in 2018, which were enforced from the beginning of 2019.

At the beginning of 2021, Estonia is in the development phase to make energy performance certificates (EPCs) for existing buildings available as an automated service. This means that the online national building register will be enhanced so that, based on actual energy consumption values (to be reported in the building register), the user/owner/certificate issuer can see the latest (last year) energy performance rating. Authorised certificate issuers can issue the certificate upon the client's request based on these values. The service is expected to go live in second part of 2021.

In the future, the same service (calculating EPCs based on data available in the online building register platform) is envisioned for new buildings as well.

Endnotes

1. The Building Code, passed 15.05.2002, not in force, riigiteataja.ee/akt/12742131
2. Regulation No 258 of the Government of the Republic 'Energy efficiency minimum requirements', passed 20.12.2007, not in force, riigiteataja.ee/akt/12903585
3. Regulation No 68 of the Government of the Republic 'Energy efficiency minimum requirements', passed 30.08.2012, not in force, riigiteataja.ee/akt/105092012004. Regulation No 63 of the Minister of Economic Affairs and Communications 'Methodology for calculating the energy performance of buildings', passed 08.10.2012, not in force, https://www.riigiteataja.ee/akt/118102012001

4. Regulation No 23 of the Minister of Economy and Infrastructure 'Conditions for granting support for the reconstruction of apartment buildings', passed 20.03.2015, not in force, riigiteataja.ee/akt/113042017004

5. Regulation no 24 of the Minister of Business and Infrastructure 'Conditions and procedures for granting support for the reconstruction of apartment buildings', passed 04.04.2019, not in force, https://www.riigiteataja.ee/akt/128082020002

6. Regulation No 28 of the Minister of Economy and Infrastructure 'Conditions and procedures for granting support for the reconstruction of apartment buildings due to the special situation of COVID-19', passed 27.05.2020, not in force, https://www.riigiteataja.ee/akt/129092020008

7. Regulation No 51 of the Minister of Economy and Infrastructure 'Conditions and procedures for granting factory reconstruction for apartment buildings', passed 24.08.2020, not in force, https://www.riigiteataja.ee/akt/128082020003

8. Regulation No 63 of the Minister of Economic Affairs and Communications 'Methodology for calculating energy performance of buildings', https://www.riigiteataja.ee/akt/118102012001 (passed 08.10.2012, not in force)

9. Regulation No 58 of the Minister of Economy and Infrastructure 'Methodology for calculating energy performance of buildings', https://www.riigiteataja.ee/akt/107072020012?leiaKehtiv (passed 05.06.2015, in force), riigiteataja.ee/akt/109062015021 (not in force)

10. Regulation No 63 of the Minister of Business and Information Technology 'Minimum requirements for building energy performance' https://www.riigiteataja.ee/akt/107072020011 (passed 11.12.2018, in force)

11. Regulation No 40 of the Minister of Economy and Infrastructure 'Requirements for technical building systems that considerably affect building energy efficiency', passed 03.07.2020, in force, https://www.riigiteataja.ee/akt/109072020014

12. Regulation No 47 of the Minister of Economy and Infrastructure 'Evaluating energy efficiency of building technical systems that considerably affect building energy efficiency and data requirements to be presented to Building Register', passed 06.08.2020, https://www.riigiteataja.ee/akt/111082020001

13. The Building Register, www.ehr.ee

14. https://ttja.ee/media/1952/download

15. SEER – Seasonal Energy Efficiency Ratio (net energy need for cooling / electricity used for cooling)

16. The Building Code (passed 11.02.2015, not in force), https://www.riigiteataja.ee/en/eli/516122020001/consoli

Annexes -Key Indicators & Decisions

Key Indicators & Decisions – General Background

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	Construction permit applied and building constructed for a local authority or government agency or any other public-law agency; used or possessed building must meet NZEB requirements as of 1 February 2019.	
01.02	Definition of public buildings used by the public (according to article 13)	The energy performance certificate must be displayed in a prominent place clearly visible to the public in the following cases: 1. When the net floor area of a building that is frequently visited by the public exceeds 500 m^2; 2. When the net floor area of a building that belongs to a local authority or government agency or any other public-law agency exceeds 250 m^2 and is often visited by the public.	
01.03	Number of residential buildings	255,170	
01.04	Number of non-residential buildings	410,926	
01.05	If possible, share of public buildings included in the number given in 01.04	1.1% (4,711 buildings)	Entertainment, educational, health and other public buildings
01.06	If possible, share of commercial buildings included in the number given in 01.04	2.2% (9,118 buildings)	Office and Retail & Service
01.07	Number of buildings constructed per year (estimate)	~5,000	Construction permits (2020)
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	~50%	Construction permits (2020)
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	~50%	Construction permits (2020)
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	~2.05	Construction permits (2020)

Key Indicators & Decisions – New Buildings

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other	Primary energy requirements only, see Table 2	
02.02	Requirements for energy performance of residential buildings in current building code	Primary energy requirements, see Table 2	
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Primary energy requirements, see Table 2	
02.04	Requirements for energy performance of non-residential public buildings in current building code	Primary energy requirements, see Table 2	
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Yes, see Table 2	
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Yes, see Table 2	
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	Since 1 January 2020 (with the exception for small residential buildings)	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	See Table 2	
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	Since 1 January 2020	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	No	
02.11	Is renewable energy a part of the overall or an additional requirement?	Overall requirement	
02.12	If renewable energy is an additional requirement to NZEB, please indicate level	N/A	
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Building type dependent. Covered in regulations with default/minimum values	

Key Implementation Decision – Existing Buildings

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
03.01	Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?	Yes	
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Yes, the same as for new buildings	
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	Same as new buildings	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	Same as new buildings	
03.05	Overall minimum requirements in case of major-renovation	See column 'Renovation of existing building (class C)' in Table 2	
03.06	Minimum requirements for individual building parts in case of renovation	N/A	
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	3% of public buildings	
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Buildings built before 2000 (totalling 54 million m2) – percentage to be renovated to class C: 22% by 2030, 64% by 2040, 100% by 2050.	For class C, see Table 2

Key Implementation Decision - Energy Performance Certificates

no	Key Implementation Decision – Energy Performance Certificates	Description / value / response	Comment
04.01	Number of energy performance certificates per year (for instance average or values for of 3-5 years)	~3,200	Calculated EPCs and EPCs based on measured energy consumption
04.02	Number of EPCs since start of scheme	~23,700	
04.03	Number of EPCs for different building types	60% of EPCs for single houses, 20% of EPCs for apartment buildings, and 20% of EPCs for other building types	
04.04	Number of assessors	93	
04.05	Basic education requirements for assessors	technical higher education and completed in-service training and professional work experience	
04.06	Additional training demands for assessors	technical higher education and completed in-service training and professional work experience	
04.07	Quality assurance system	Estonian Qualifications Framework (EQF)	
04.08	National database for EPCs	Building register	
04.09	Link to national information on EPCs / Database	www.ehr.ee	

Key Indicators & Decisions – Smart Buildings and Building Systems

no	Key Implementation Decision – 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)?	Yes, see Section 2.IV.ii	
05.04	Are there current requirements for automatics (for instance in building codes)?	Yes, see Section 2.IV.ii	
05.05	Chosen option A or B for heating systems (inspection or other measures)	B	
05.06	Number of heating inspections; reports per year (if option A)	unknown	
05.07	Chosen option A or B for cooling systems (inspection or other measures)	B	
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	unknown	
05.09	Is there a national database for heating inspections?	No	
05.10	Is there a national database for cooling / air-conditioning inspections?	No	
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	N/A	
05.12	Link to national information on Inspection / Database	N/A	

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