CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Finland

Status in 2020

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NATIONAL WEBSITES

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1. Introduction

The Ministry of the Environment is responsible for transposing and implementing the EPBD in Finland, where building energy efficiency regulations have been in place since 1976, as part of the National Building Code. These regulations have been tightened several times since, in part due to implementing the EPBD.

EPCs were introduced at the beginning of 2008, based on the Energy Certification of Buildings Act.

In line with Directive 2010/31/EU, minimum energy performance requirements for the construction of new buildings have been revised and minimum requirements have been developed for existing buildings undergoing renovations and retrofitting. The detailed definition and regulation for NZEB has been finalised, and the revision of the Land Use and Building Act came into force on 1 January 2017. These new regulations ensure the implementation of Directive 2010/31/EU.

For boiler and AC system inspections, Finland's parliament has chosen to use alternative measures (instead of compulsory inspection) in response to Articles 14 and 15 of the EPBD.

The preparation for the implementation of Directive 2018/844/EU was ongoing in the end of 2019 and the Long Term Renovation Strategy will be submitted by due date, in March 2020.

2. Current Status of Implementation of the EPBD

2.I. Energy performance requirements: NEW BUILDINGS

Energy performance requirements are valid for new buildings under the regulations of the National Building Code of Finland.

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

Finland's National Building Code has set minimum requirements for the thermal insulation and ventilation of new buildings since 1976. These requirements have been amended and enhanced several times to improve the energy efficiency of buildings.

The requirements for the overall energy consumption of buildings are set with the new building code that came into force on 1 January 2018 for all new buildings. The aim of the regulations is to set the level for NZEB in Finland. The development of the requirements is shown in Table 1.

Year of building permit	1976	1978	1985	2003	2007	2010	2012	2018
U-values for building components (W/(m²K)								
Walls	0.4	0.29	0.28	0.25	0.24	0.17 0.40 logwall	0.17 0.40 logwall	0.17[1]
Roof	0.35	0.23	0.22	0.16	0.15	0.09	0.09	0.09
Floor	0.40	0.40	0.36	0.25	0.24	0.09/ 0.16/ 0.17[2]	0.09/ 0.16/ 0.17[3]	0.09/ 0.16/ 0.17[3]
Windows	2.1	2.1	2.1	1.4	1.4	1.0	1.0	1.0
Doors	0.7	0.7	0.7	1.4	1.4	1.0	1.0	1.0
Other base values								
n_{50}-value	6	6	6	4	4	2	q50[4]=4	q50[4]=2
Annual efficiency for heat recovery systems	0	0	0	30%	30%	45%	45%	55%
Maximum specific fan power of a mechanical exhaust air system kW/(m³/s)							1.5	0.9
Maximum specific fan power of air-conditioning system kW/(m³/s)							2	1.8
Minimum outdoor air flow of living spaces dm³/s								6
Minimum overall building outdoor air flow (dm³/s)/m²								0.35
Minimum residential apartment outdoor air flow minimum dm³/s								18

[1] Massive wood structure walls: multiply value by 1.10/1.15/1.2 (depending on building type)

[2], [3] Base floor bordering on outside air = 0.09 W/(m²K), building component against the ground = 0.16 W/(m²K), base floor bordering on crawl space = 0.17 W/(m²K).

[4] q50 is the air leakage value of the building envelope.

Table 1: Development of minimum requirements for new buildings (all building types).

The overall energy consumption is calculated using standard user profiles and primary energy factors (weighting factors) for different energy sources (Table 2). For single-family homes and apartment buildings an alternative method was introduced that is based on requirements for building components.

Weighting factor for energy source in the building code of 2018	
Fossil fuels	1.0
Electricity	1.2
District heating	0.5
District cooling	0.28
Renewable fuels	0.5

Table 2: Primary energy factors.

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

The minimum energy performance requirements have been revised for the construction of new buildings in line with the EPBD. The approach is based on the overall energy consumption, which takes the energy source (primary energy factor) into account.

The current minimum performance calculations for new buildings are based on a national calculation method that follows the main principles of CEN standards. Both CEN standards as well as other, more detailed calculation and simulation methods, can be used. However, the calculation and simulation methods must be documented for possible review.

Requirements are given as a fixed value (kWh_E/m^2 - primary energy).

The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the primary energy factor (Table 3; for weighting factors, see Table 2). The maximum values depend on the building type and, for single-family houses, on the area of the building. The new building code does not exclude any heating sources; however, the code encourages the use of RES and district heating, which have better primary energy factors than other energy sources. Other renewable energy sources (e.g., solar heating and power) are taken into account when calculating a building's primary energy needs. For single-family homes and apartment buildings it is possible to show compliance with the building code if the energy efficiency of the building components is within a given range; the set values concern building components (walls, windows, etc.) as well as system performance, and the building’s heating systems.

Type of building	Maximum value for energy consumption per year, primary energy (calculated with weight factors of energy source)	
Single-family houses	*Heated net area, A_{net} m^2*	*E-value kWhE/m^2 per year**
	A_{net}<150 m^2	200 - 0.6 A_{net}
	150 m^2 ≤ A_{net} ≤ 600 m^2	116 - 0.04 A_{net}
	A_{net}> 600 m^2	92
Row houses and max.two storey apartment buildings		105
Apartment buildings		90
Offices		100
Shops etc.		135
Hotels, motels etc.		160
Schools and day care centres		100
Sports halls		100
Hospitals		320
Other buildings	Energy consumption has to be calculated but no limit values	

**Massive wood construction: for single-family homes the maximum E-values are multiplied by 1,2 (heated net area below 150 m^2), 1.15 (for other single-family homes, row houses and small apartment buildings) and for other building types by 1.10.*

Table 3: Maximum values for primary energy consumption (E-value) in different building types.

Calculations also include thermal comfort requirements, indoor-air quality requirements and airtightness, thermal bridges and shading devices. Evaluation of airtightness is either based on a site test or on a quality control method accepted by the building industry.

Cost optimality

In the national report submitted to the European Commission in 2018, the average cost-optimal level of energy efficiency of buildings and building components for new buildings is 12% more efficient than the corresponding National Building Code regulations as set in the Ministry of the Environment Decree 1010/2017 (given in 2017). For renovations and retrofitting of existing buildings, the cost-optimal level of energy efficiency for buildings and building components is 4% more efficient than the National Building Code regulations as set in the Ministry of the Environment Decree 4/13 (given in 2013). The calculations were conducted for single-family homes, apartment buildings, office buildings and commercial buildings.

Table 4 presents the variation range between the cost-optimal level and energy regulations. The difference is calculated by weighting the result with the number of new and renovated buildings. The cost-optimal level is slightly more efficient than the demand of the regulations for both new buildings and renovated buildings. Differences are within the set 15% tolerance margin.

Reference building	Cost-optimal tolerance (E-value) kWhE/m^2	Regulations in force for reference buildings (E-value) kWhE/m^2	Difference (weighted by numbers of buildings)
New construction	76-127	90-135	-12%
Renovation and retrofitting	80-282	84-312	-4%

Table 4: Summary of cost-optimal tolerances in reference buildings, according to primary energy.

Building inspection authorities

An applicant for a building permit must ensure that the construction will fulfil the energy performance requirements. This is done through calculations whereby the results must be shown in the building permit documentation submitted to the municipal building inspection authorities responsible for inspecting the compliance of building permit applications.

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

In 2012, the Ministry of the Environment launched an intensive process to gather the necessary input for the preparation of the national plan for NZEB. Based on this process the national plan for increasing the number of NZEBs was drawn up and submitted to the European Commission in October 2012. The aim was to give technical recommendations for NZEBs in 2015.

As the Land Use and Building Act sets the base for the building code, the changes to NZEB requirements were made in autumn 2016 and the revision of the Land Use and Building Act came into force on 1 January 2017. Based on regulations given by the Ministry of the Environment, the new National Building Code is applying to new buildings since 1 January 2018.

Finland has long encouraged energy-efficient construction, and there are many examples of energy-efficient single-family homes, apartment buildings, day care centres and shopping centres (Figure 1). As the new regulations for new buildings came into force on 1 January 2018, the share of, for e.g., new single-family homes in energy efficiency classes A and B have risen to 96 % (based on energy performance certificates issued in 2018 and 2019). (Energiatodistusrekisteri.fi).

Figure 1: Luhtaa Day Care Centre in Tampere represents energy efficient modern construction.

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

The requirements for systems and/or building components for new buildings are given in the building code that is based on regulations given by the Ministry of the Environment. The building code defines requirements for heat losses, summertime temperatures, specific fan power (SFP) of ventilation and AC as well as for energy consumption metering. Details are shown in Table 1.

For residential buildings (single-family homes, row houses and apartment buildings) it is alternately possible to show compliance with the building code (energy performance of the building) using the structural energy efficiency method in which the building must adhere to set values for structural energy efficiency (U-values), maximum heat losses as well as the efficiency of the technical systems. The method limits the use of heating sources to district heating, ground source heat pumps or air-to-water heat pumps. The information must be ascertained with documentation.

2.I.v. Enforcement systems new buildings

The legislation controlling land use, spatial planning and construction in Finland is contained in the Land Use and Building Act, which came into force in 2000 and was partly changed in 2017. The Ministry of the Environment is responsible for the general steering and monitoring of construction in Finland. It issues legislation on construction and maintains the National Building Code of Finland.

The National Building Code contains regulations and guidelines that complement the legislation in the Land Use and Building Act. The building regulations must be followed, but building guidelines are not obligatory, and other solutions may be used in construction, as long as all the compulsory regulations are observed.

Each municipality is responsible for the steering and monitoring of construction in its area. The building ordinance is the municipalities' primary tool for controlling construction. This ordinance lays down regulations and instructions corresponding to local conditions.

Each municipality must have a building inspector, who provides advice on and monitors construction.

The local building inspector must approve the construction process on site at key points, such as marking the building position, structural inspection, plumbing inspection, partial handover inspection (at this point the building must have a maintenance manual), and final inspection. Other inspections vary according to municipal practices.

2.II. Energy performance requirements: EXISTING BUILDINGS

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

Minimum energy performance requirements have also been developed for existing buildings undergoing renovation and/or retrofitting that is subject to a building permit, for changing the use of a building, or repairing its technical systems.

The approach to improving energy efficiency is chosen in the planning phase of the renovation or retrofitting project, and it dictates the calculation methods as well as minimum energy requirements to be fulfilled. The three approach options are depicted in Figure 2.

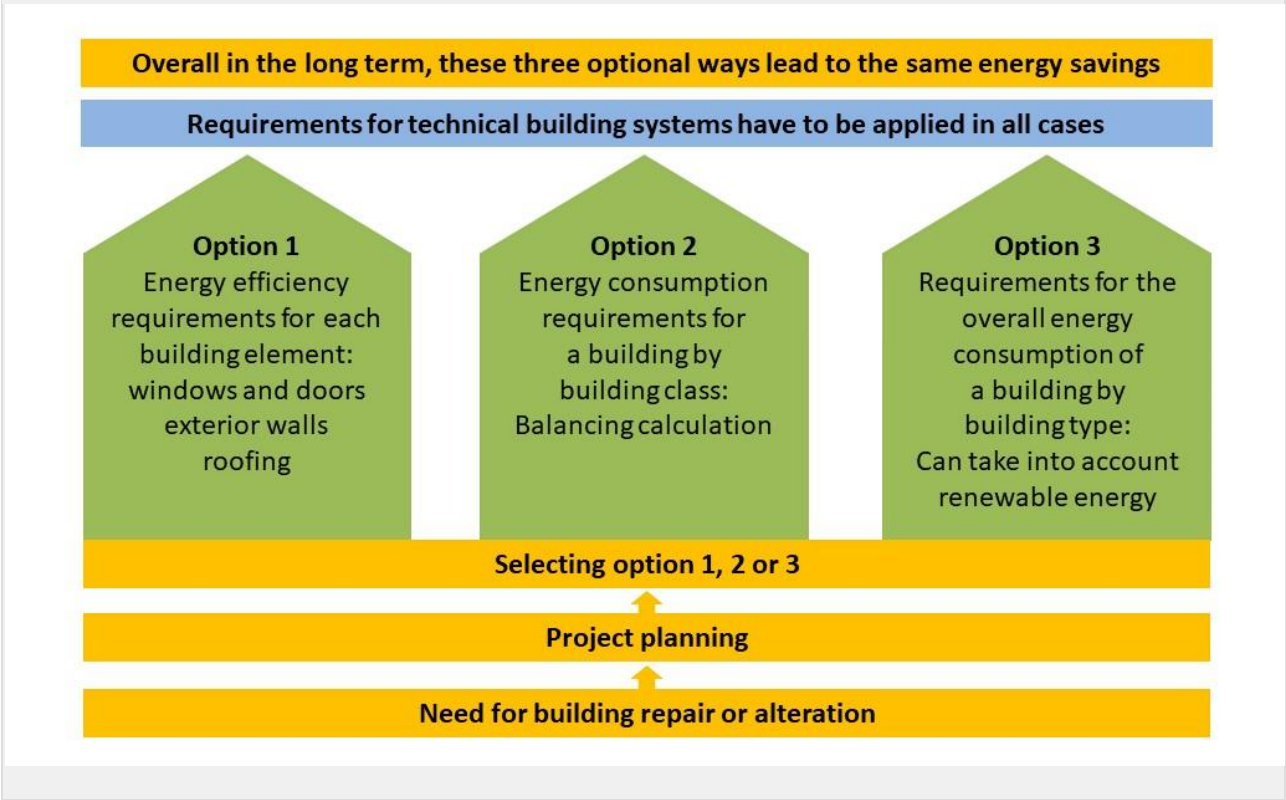

Figure 2: Three approaches to improving energy efficiency in existing buildings.

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

The Finnish National Building Code states that, when the technical systems of any type of existing buildings are renovated, modernised, or replaced, the following requirements must be met:

1. The minimum annual efficiency of heat recovery must be at least 45%.
2. The maximum specific fan power (SFP) of a mechanical supply and exhaust system is 2.0 kW/(m³/s).
3. The maximum specific fan power (SFP) of a mechanical exhaust air system is 1.0 kW/(m³/s).
4. The maximum specific fan power (SFP) of an AC system is 2.5 kW/(m³/s).
5. The efficiency of heating systems must be improved where possible when the related equipment and systems are renewed. After renewal, the ratio between efficiencies of the building's main heating system and the main heat distribution system must be at least 0.8. The ratio is the quotient of the annual efficiencies of the heating system and heat distribution system. This is to ensure that the overall heating efficiency is improved.

There are also requirements set for other technical systems, e.g., for different temperature levels of Domestic Hot Water (DHW) systems or for apartment-specific water meters.

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

The feasibility of measures to improve the energy efficiency of an existing building are assessed based on technical, operational and financial considerations. Energy efficiency improvements can be done using three alternative ways (as shown in Figure 2):

1. energy efficiency requirements for each building element;

2. energy consumption requirements for a building by building type; or

3. E-value requirements of a building by building type.

In the long term, these three options lead to the same overall energy savings. An example of the energy efficiency requirements for each building element is depicted in Table 5.

Minimum energy requirements by building element

Building element	Calculated requirement for a building built in late 1970s*	Limit
Exterior walls		
In renovation	Original U-value 0.40 W/(m^{2}K) x 0.5 = 0.20	No more than 0.17 W/(m^{2}K)
In changing use of building	Original U-value 0.40 W/(m2K) x 0.5 = 0.20	At least 0.6 W/(m^{2}K), or better
Roof		
In renovation	Original U-value 0.35 W/(m^{2}K) x 0.5 = 0.175	No more than 0.09 W/(m^{2}K)
In changing use of building	Original U-value 0.35 W/(m^{2}K) x 0.5 = 0.175	At least 0.6 W/(m^{2}K), or better
Base floor		
In renovation	No set requirement, energy efficiency to be improved if possible	
In changing use of building	No set requirement, energy efficiency to be improved if possible	
Windows and doors		
New windows and doors	U-value 1.0 W/(m^{2}K), or better	
Renovated windows and doors	No set requirement, heat retention to be improved when possible	

**Original U-values according to Building Code 1976.*

Table 5: Example of minimum energy requirements by building element, for energy efficiency improvements in a late 1970s building.

The Finnish national strategy on renovation of buildings, based on Article 4 of Directive 2012/27/EU (EED), was reviewed in line with Directive 2018/844/EU. It focuses less on developing a set of requirements and instead seeks ways to initiate energy efficiency improvements in public and private residential and commercial buildings, to be implemented during both planned and corrective maintenance. This involves innovative means related to decision making, services, and financing of renovations, which are initiated through communication measures, as well as training and improving the know-how of building professionals.

Finland has chosen to implement voluntary measures instead of relying on the 3% renovation requirement set in Article 5 of the EED. These alternative measures are calculated to achieve similar savings as the set requirement. The types of measures implemented include projects for reducing tenant electricity use, setting premiums/sanctions in contracts with building management and service companies, energy efficiency improvements as part of routine building maintenance, support and information for building users to improve energy efficiency, energy efficiency measures included in renovation projects (set in the building code, see Figure 2), as well as improving space efficiency in buildings owned and used by the government. Voluntary measures also include the voluntary energy efficiency agreement schemes for the property sector and municipalities. Energy efficiency agreements have no direct link to the EPBD, but they contain many measures that enhance the energy efficiency of buildings, e.g., energy audits and consumption monitoring.

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

The Finnish Long Term Renovation Strategy has been prepared during 2018-2020, in cooperation with many actors from the building, construction, energy and finance sectors through workshops, public hearings and public questionnaires.

The key points of the strategy to reduce the energy consumption and emissions of the building stock existing in 2020 by 90%, are energy efficiency, decommissioning and efficiency of space utilisation, as well as low carbon heating solutions.

The Finnish Long Term Renovation Strategy 2050 will be submitted to the EU on 10 March 2020.

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

To encourage energy-efficient renovation, the Finnish government has introduced various financial instruments and incentives. For public and private sector buildings, financial subsidies are available for investments in energy efficiency as well as energy auditing. For households, certain repair and renovation works, e.g., the repair and/or installation of a heat pump, etc., are tax deductible, which enables households, among other things, to hire professionals for repairs to improve energy efficiency.

The Housing Finance and Development Centre of Finland (ARA) can grant interest subsidy loans for new construction, renovation and purchase of housing, mainly for rental and social housing. Renovation and energy subsidies and subsidies for the elimination of health hazards, as well as special-needs investment subsidies for improving the housing conditions of various population groups, are granted from state funds.

At the end of 2019, the Ministry of the Environment set a new subsidy scheme for energy efficiency improvements in residential buildings, that is available in the period 2020-2022. The subsidy is available for owners of small houses, for private housing companies (row houses and blocks of flats) as well as for publicly owned residential rental buildings (built with public funding). The required improvement of energy efficiency is verified with an energy performance certificate. The subsidy applications will be handled by ARA.

There is also a subsidy for deploying charging points for electric vehicles in residential buildings. The subsidy is available for housing companies and housing rental companies, as well as parking facilities owned by housing and rental housing companies.

In recent years, joint procurement and green procurement funding has started to make headway in Finland. The largest joint green procurement project is underway; several municipalities have joined with green funding providers to purchase solar panels. There are also other types of green funding to promote the uptake of renewable technology.

2.II.vi. Information campaigns / complementary policies

Finland has information campaigns and advice programmes in place for both energy efficiency and renovation. "*Kuluttajien energianeuvonta*" (consumer energy advice programme) is aimed at homes and households and promotes energy efficiency and RES in housing as well as transport, with advisors in several regions (Figure 3). The advisory programme is nationally funded by the Energy Authority of Finland.

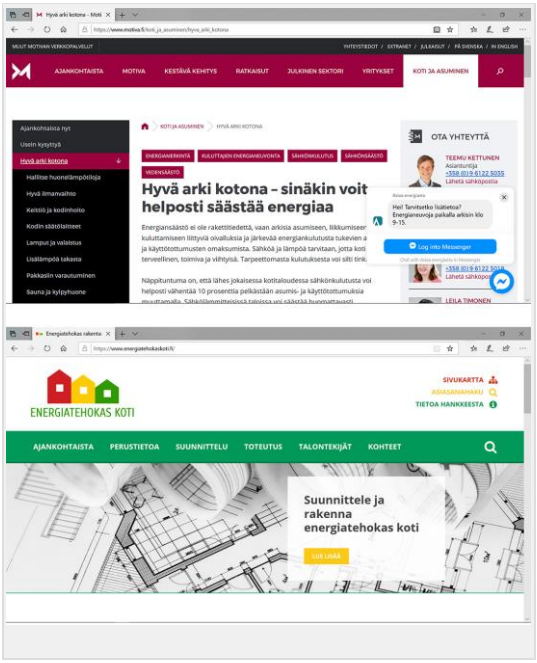

Figure 3: Information and advisory campaigns on energy efficiency in construction and housing targeting consumers.

Renovation advice is provided through www.Korjaustieto.fi; there is also a network of local advisors, with special emphasis on advice to elderly people (*Vanhustyön Keskusliitto*). The renovation advice is coordinated by the Ministry of the Environment.

In 2016, the Ministry of the Environment launched with several prominent actors in the housing sector an information campaign that targets housing companies. The aim of the campaign was to help implement simple and affordable energy efficiency measures. The campaign is featured on the website www.energiahukka.fi, where advice and information is given according to building type (Figure 4).

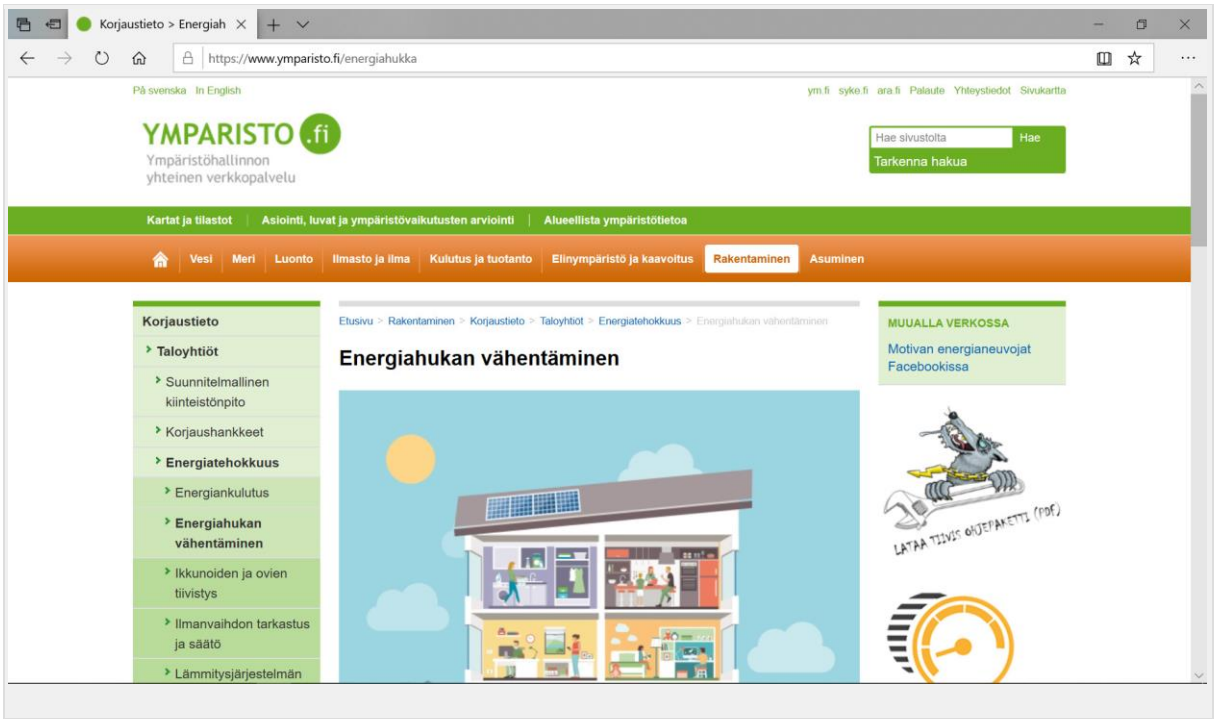

Figure 4: National campaign on energy efficiency in housing companies,"Energiahukka".

In 2019, the Ministry of the Environment, together with Motiva Oy, started a project piloting the use of artificial intelligence (AI) in advising housing companies in energy efficiency related issues. The aim is to widen the use of AI to renovation advise after the first pilot. Improving the energy efficiency of existing buildings is also very much at the centre of the voluntary energy efficiency agreements in the property sector (rental housing and commercial buildings). The third term of the energy efficiency agreement started in 2017 (2017-2025), continuing the success of the previous 2008-2016 term (Figure 5).

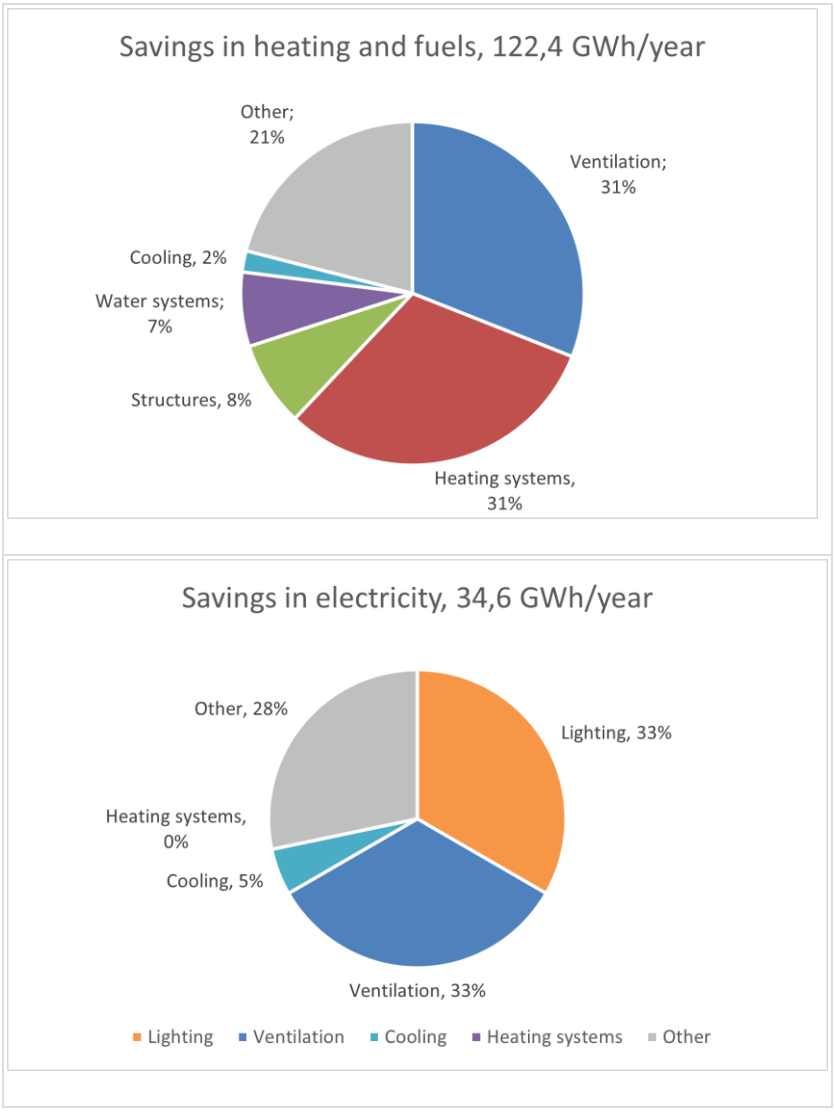

Figure 5: Yearly heating and fuel savings and electricity savings by type of measures, reported in the Property Sector Voluntary Energy Efficiency Agreement in 2018.

2.III. Energy performance certificate requirements

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

EPCs are required for all new buildings and for the sale or rental of existing buildings. Some building types, such as buildings with heated floor area smaller than 50 m^2, are excluded by default (as stated in the Land Use and Building Act and the Energy Performance of Building Act).

Legislation to implement the requirements of the EPBD was adopted at the beginning of 2013 and came into force in June 2013. All requirements apply to private and public buildings (residential, commercial and public).

EPCs are needed for all new buildings, along with the building permit application. For existing buildings, an EPC is needed when the building (or a part of a building, e.g., an apartment) is sold or rented. Energy performance certification extends to the whole building or a significant portion of the building if the building has multiple usage areas. Single apartments are not certified separately.

The transition periods for the implementation of EPC requirements are given in Table 6.

Implementation of EPC requirement *Transition periods for different types of buildings after the Building Code of 2013 took effect.*	
Type of building	**Transition period till**
Apartment buildings, single-family homes built after 1980	6/1/2013
Row houses, office and commercial buildings	7/1/2014
Institutional care, assembly and educational buildings	7/1/2015
Single-family homes built before 1980	7/1/2017

Table 6. Implementation of EPC requirements.

New building types were included on 1 June 2017; an EPC is now also required for swimming halls, indoor skating rinks, warehouses, logistics buildings and motor vehicle buildings (garages over 50 m^2).

The Ministry of the Environment is responsible for legislation and guidelines regarding EPCs, EPC templates and other instructions concerning the issuance of certificates.

The EPC is produced by a qualified expert. The ARA is the administrative authority ensuring the quality of certificates and qualified experts, and the appropriate preparation and use of the EPCs. As the responsible authority, it also makes compliance checks of issued EPCs.

Format and content of the EPC

The current EPC layout is shown in Figure 6. The EPC layout changed in 2018 as the legislation for EPCs was aligned with the renewed National Building Code, especially pertaining to new buildings. There are two EPC versions in use in Finland, one according to 2013 legislation and another following the legislation of 2018. EPCs for all new buildings are issued by the 2018 EPC layout.

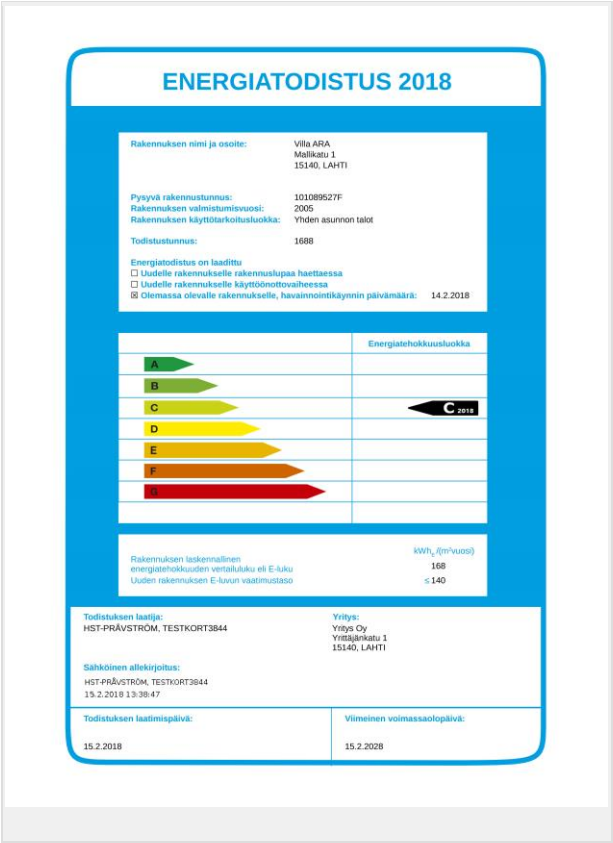

Figure 6: Current format of the EPC in Finland (new EPC introduced in 2018).

Certification requirements, as well as the format and content of the EPC, are the same for residential, non-residential and public buildings. The energy label classifies buildings on an efficiency scale, ranging from A (high energy efficiency) to G (poor energy efficiency). As an example, the efficiency scale for apartment buildings (2018) is shown in Table 7.

Energy efficiency class	Total energy consumption, E-value (kWh_E/m^2, year)
A	E-value ≤ 75
B	76 ≤ E-value ≤ 100
C	101 ≤ E-value ≤ 130
D	131 ≤ E-value ≤ 160
E	161 ≤ E-value ≤ 190
F	191 ≤ E-value ≤ 240
G	241 ≤ E-value

Table 7: Efficiency scale for apartment buildings.

Energy performance is based on overall primary energy consumption (kWh_E/m^2.year), taking the energy source (primary resource factor) into account. Primary energy factors for energy sources are fixed in the National Building Code as described previously in Table 2.

The EPC is always based on calculated energy consumption, which makes it possible to compare different buildings instead of different users. For existing buildings, information on the available measured energy

consumption must be reported alongside the calculated energy consumption if the information is available. A qualified expert must inspect the renovated building and assess the energy efficiency of the building elements and components as well as the technical systems (external walls, doors, windows, heating and DHW systems, ventilation systems, lighting and other electrical systems, e.g., electrical heating systems). An on-site inspection is required.

The qualified expert must suggest targeted cost-effective energy saving measures to be included in the EPC. Savings in kWh_E/year must be calculated in detail for each measure.

The EPC is valid for ten (10) years. However, it is recommended, though not required, that the certificate is updated following a major reconstruction of the building envelope or of the technical systems, even if the works take place before the expiry date.

EPC activity levels

Since the legislation changed in June 2013, about 62,672 EPCs have been sent to the ARA, of which 34,034 have been produced in 2015. At the end of 2019, there were altogether 138,548 EPCs in the EPC database that was launched in 2015.

Typical EPC costs

The cost of the EPC depends on the building type and size. The price of an EPC for a new single-family house is about 150 - 200 €, and for an existing single-family house, 300 - 360 €. Costs of EPCs for larger residential and for non-residential buildings are not available, but the costs vary according to building size and type as well as other factors such as location and materials available (energy consumption, etc.). The prices are according to the last survey completed in 2016. The next survey is planned to be completed within 2020.

Assessor corps

The Ministry of the Environment originally designated two accreditation bodies, "*FISE Oy*" and "*Kiinteistöalan Koulutussäätiö ry*", to approve qualified experts; at the end of 2019, only FISE Oy is working as an accreditation body. There are two levels of qualified experts, with the higher level needed for buildings requiring dynamic simulations (e.g., for new buildings with cooling facilities). To ensure the quality of the EPCs, the Ministry of the Environment, Housing Finance and Development Centre ARA, the accreditation bodies as well as training organisations work together so that the experts are able to maintain and develop their professional skills.

To apply for accreditation, the expert must have adequate training and a suitable educational background (e.g., a degree in building technology or architecture or, for the higher level, a master's degree in building technology or a related field), the lack of which can be compensated with work experience. The qualification has to be approved by a test administered by the accreditation body, and is valid for seven (7) years, after which it needs to be renewed. Qualification and accreditation for qualified experts is the same for all building types, public and private. At the end of 2019 there were altogether 1,181 registered qualified experts, of which 821 possess base level qualifications, and 360 possess higher level qualifications.

2.III.ii. Quality Assurance of EPCs

The ARA is the administrative authority ensuring the quality of EPCs and qualified experts, and the appropriate preparation and use of the certificates. The ARA controls EPCs based on the EPBD, Article 18, Appendix II, and partly checks the input of the building information data, the accuracy of the presented calculations, and the appropriateness of the suggestions given for improving energy efficiency.

Additionally, the ARA can initiate enforcement measures in case of negligence on the part of the building owner or the qualified expert. Measures are administrative, not penal, and include requests, warnings, orders, conditional fines, and suspension of the qualified expert. The conditional fines are set according to building type, and for public buildings (for municipalities) the size of the fine is also related to the size of the municipality (number of inhabitants).

The national database for EPCs was established on 1 May 2015 and has been used to control certificates ever since. All EPCs are produced and electronically signed through the database, which automatically checks the input data to ensure the quality of the EPCs produced.

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

According to legislation from 1 July 2015, the EPC must be displayed so as to be visible to the public in buildings where over 250 m^2 of total useful floor area is occupied by public authorities and visited by the public. In addition, the EPC must be displayed so as to be visible to the public in all buildings that already have an energy certificate and that have over 500 m^2 of total useful floor area visited by the public. The display regulation is controlled by the ARA.

Information on EPCs displayed in public buildings owned and occupied by public authorities, such as municipalities, is also received through the Finnish energy efficiency agreement scheme. The latest information is from 2018. The energy efficiency agreement scheme coverage in the public sector is high, as the communities involved represent close to 80% of the population of Finland and, respectively, nearly 80% of the overall volume of service buildings in the sector.

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

Real estate agents are required to ensure that the energy class of a building that is being sold or rented is posted with advertisements and other marketing materials, and that the EPC can be viewed by potential buyers or tenants during the transaction process.

The mandatory requirement to display the energy class of the building in commercial advertisements is included in the new legislation on the energy performance of buildings that came into force on 1 June 2013 and applies to different building types in accordance with the schedule set by the legislation.

As the authority responsible for the control of the mandatory advertising requirement, the ARA makes information requests, after which the building owner can set things right (with the real estate agent). If the matter persists, the actions escalate from warnings, orders and conditional fines. The Ministry of the Environment, together with the ARA and the Regional State Administrative Agencies, who control the real estate agents, are in good cooperation with the real estate sector, represented by two major organisations – the Central Federation of Finnish Real Estate Agencies (*Kiinteistöalan Keskusliitto ry*) and the Finnish Association of Real Estate Agents (*Suomen Kiinteistönvälittäjäliitto ry*) – to influence the real estate trading regulations and standards to ensure compliance with legislation. Regular meetings are arranged twice a year, Motiva also taking part in meetings.

2.IV. Smart buildings and building systems

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

Preparation of legislation pertaining to Building Automation and Controls (EPBD Article 8), is ongoing since 2019 and is expected to be concluded in the spring of 2020.

During 2017-2019, the Ministry of the Environment together with a wide group of actors coordinated by Motiva Oy concluded two projects aimed at promoting building automation in both single-family homes and apartment buildings (Figure 7). The projects collected information on building automation in residential buildings and developed buyer and user guides for homeowners / builders. Information is available in Finnish on two websites maintained by Motiva Oy: for single-family homes: www.energiatehokaskoti.fi/taloautomaatio, and for other residential buildings: www.motiva.fi/taloautomaatio.

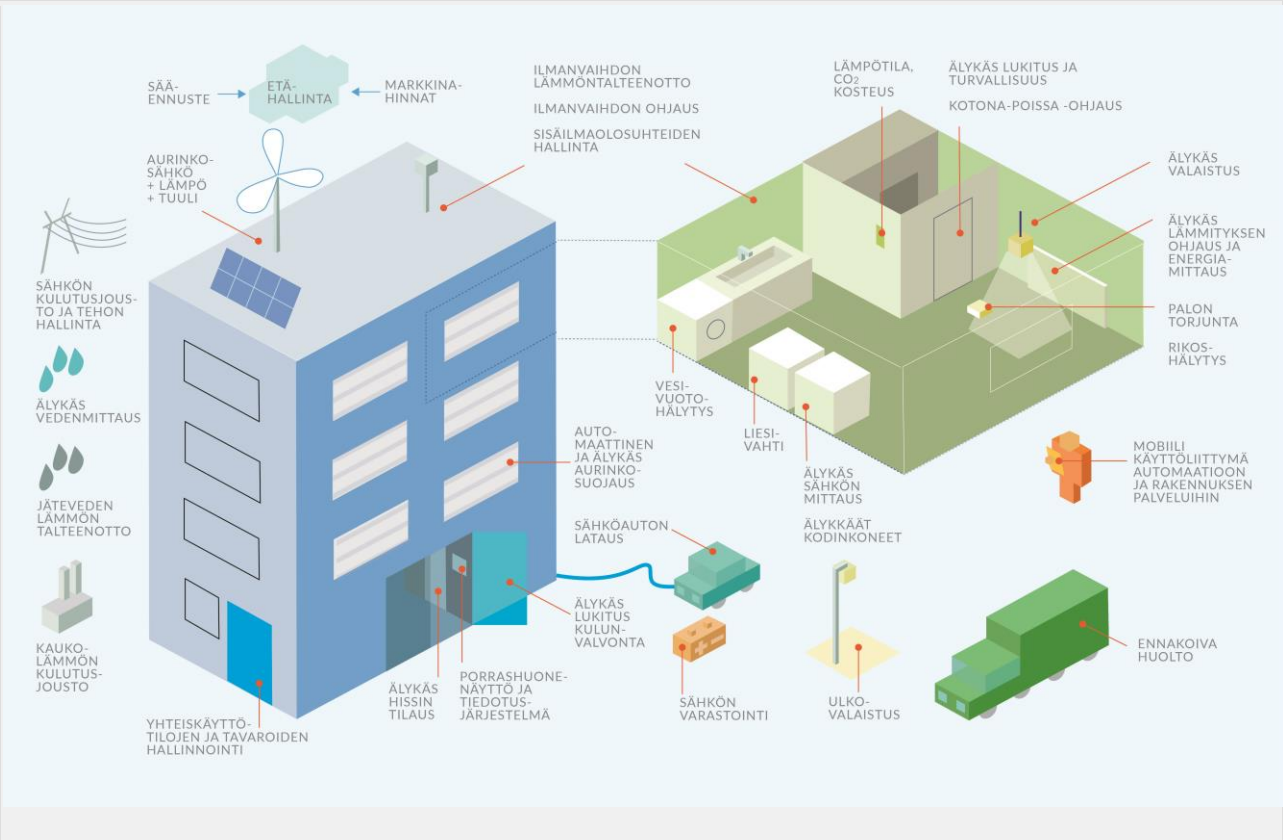

Figure 7: Information on building automation for apartment buildings.

2.IV.ii. Regulation of system performance

Preparation of legislation pertaining to Building Automation and Controls (EPBD Article 8), that was started in 2019, is ongoing, and is expected to be concluded in spring 2020.

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

Preparation of legislation pertaining to Building Automation and Controls (EPBD Article 8), that was started in 2019, is ongoing, and is expected to be concluded in spring 2020.

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

Intelligent metering (hourly-based metering) has been introduced almost everywhere in Finland following the introduction of legislation on the energy markets in 2009. This legislation sets requirements for companies operating in the production and distribution of energy to offer end-users up-to-date information on energy consumption as well as services to improve end-user energy efficiency.

By 2018, 99,8% of electricity metering points are metered hourly and read remotely (automatic meter reading). In district heating, 99% of heat sales are read remotely and 84% are metered hourly.

By law, it has been mandatory to install individual meters for cold and warm water in new buildings since 2011. It is not mandatory to use the readings as a basis for billing. The same applies to the renovation of buildings.

Intelligent metering enables the collection of useful data that can be shown in EPCs. Meters relate to the building as a whole and do not target individual HVAC systems.

Requirements (for e.g., cooling and ventilation systems, electricity or AC metering) enable active energy-savings control.

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

Finland has adopted the alternative approach for enhancing the efficiency of boiler-based heating systems (oil-, biofuel-, biomass- and gas-fired) since the implementation of the EPBD in 2007. Upon implementing the EPBD in 2013, the alternative approach has also been adopted for AC systems.

The activities in improving the energy performance of heating systems are divided by system type: measures have been planned for oil-, biofuel-, biomass- and gas-fired boilers. Activities are centred on voluntary energy efficiency agreements in the oil sector "*Höylä*", the bioenergy sector "*Kutteri*" and the gas sector. Through the agreement schemes, information and advice on selecting and using boilers as well as encouraging regular maintenance measures is passed on through leaflets, articles and guides aimed at both consumers as well as professionals working in the field (Figure 8). Savings are based on measures (numbers of actions per year) reported in the energy efficiency agreements, with examples listed in Table 8 (for *Höylä*). The Höylä agreement has been renewed for the period 2017-2025. The Kutteri agreement is set to end in 2020; decisions of the next period or other measures have not been made yet. Both agreement schemes involve stakeholders working in the sector.

To implement Directive 844/2018/EU, Finland conducted two impact assessment studies to find out which alternative is best suited for the Finnish heating market. As the conclusion of the studies was that alternative measures are best suited for Finland, development for revised alternative measures to include new heating methods was started. The work was ongoing at the end of 2019. The new measures are expected to be reported to the EC by 10 March 2020.

Figure 8: Information on 'Höylä' is distributed to consumers via the magazine 'Lämmöllä' ('with warmth').

Measures	2019	2018	2017	2016
Overhaul, EPBD-advice given	84700	86350	89540	82390
Repairs suggested	23483	25102	23483	21538
Boiler replacement	1870	2285	2367	2475
Burner replacement	4308	5771	5100	5637
Regulator replacement	5328	5588	5104	5599
Other repairs	4700	5170	4995	4890
Repairs planned	2520	2718	2430	1991

Table 8: Measures (numbers of actions per year) reported in the 'Höylä' energy efficiency agreement (EEA).

In relation to oil-fired boilers, there is a voluntary efficiency inspection method available as well as recommendations for a heating system condition survey for small family homes. The main advocate is the Heating Energy Association (*Lämmitysenergiayhdistys ry*) with comprehensive communication activities, such as the magazine "Lämmöllä" published three times a year, targeted events and websites.

In relation to bioenergy based heating, information and advice on selecting and using wood-fired boilers is available through a guidebook and a website produced by *Motiva Oy* (Figure 9). Chimney sweeps conduct metering of wood-fired boilers during yearly visits and a voluntary inspection method for biofuel boilers has been produced and was published in early 2017. New information on boiler maintenance and combining wood heating and solar energy was released in 2018 and 2019 (online videos and press releases).

Figure 9: Materials on energy efficiency for wood-fired boilers.

Gas-fired boilers are a distinct minority in Finland, amounting to only 5% of heating energy consumption of single-family homes. Information on gas heating as well as guidelines on gas heating systems is available through the Finnish Gas Association.

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

The alternative approach to enhance the energy efficiency of AC systems was implemented in 2013. This approach consists of specific advisory measures, the uptake of the voluntary energy efficiency inspection of ventilation systems, and many other measures that support the enhancement of energy efficiency of AC systems, e.g., building codes, tax reductions, voluntary energy efficiency agreements, energy audits and EPCs.

Starting from autumn 2014, the Ministry of the Environment has commissioned *Motiva Oy* to act as the coordinator to implement the various measures, initiate communication and gather necessary monitoring information. Motiva works in close cooperation with the stakeholders in the sector, such as RAKLI ry (association for professional property owners, real estate investors, corporate real estate managers and construction clients), Association of Finnish Municipalities, the Finnish Refrigeration Enterprises Association, The Finnish HVAC Association and the Finnish Building Services Industries and Trade (Talteka).

Information on the energy efficiency of cooling in both households and offices has been distributed in various ways. For households, videos on the proper use of air-to-air heat pumps, a guidebook for holiday homes, and advice on summertime cooling (including use of ventilation in cooling and proper use of fans) were produced. For offices and other commercial buildings, a guide on energy-efficient cooling was produced, with information for designing, building, and maintaining AC systems (Figure 10). Through press releases, articles, seminars and training sessions and media, altogether over 4 million contacts have been made.

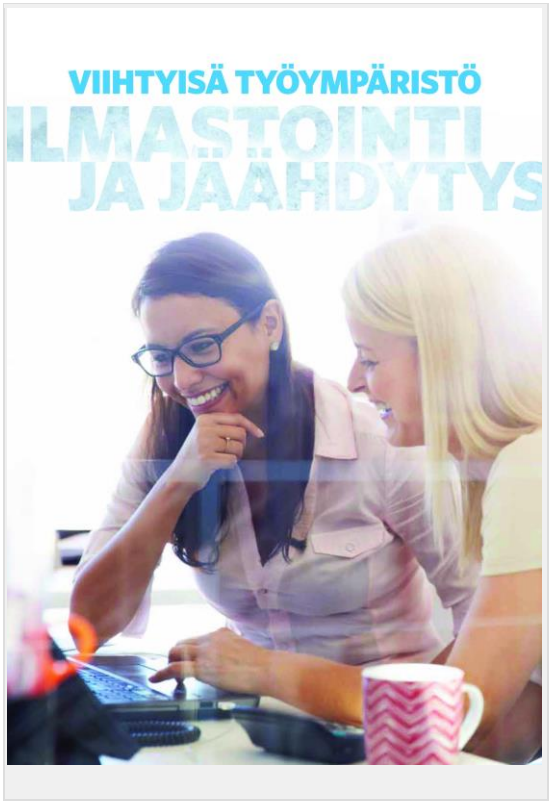

Figure 10: Energy efficiency guide on AC systems in commercial and public buildings was published in 2016.

A voluntary inspection method for ventilation and AC systems was developed and technical guides for building professionals were produced. Since 2016, over 60 inspectors have been trained as ventilation and AC inspectors, and over 40 inspections have been completed. As of 2016, the ventilation and AC inspectors are under a national certification scheme operated by the FISE Qualification of Professionals in Building, HVAC and Real Estate Sector in Finland (*FISE Oy*) and The Finnish HVAC Association (*Suomen LVI-liitto SuLVI ry*).

To implement Directive 844/2018/EU, Finland conducted two impact assessment studies to find out which alternative is best suited for the Finnish heating, cooling and ventilation market. As the studies concluded that the alternative measures are best suited for Finland, development for revised alternative measures to include the new systems was started. The new measures are expected to be reported to the EC on 10 March 2020, and they are pending national approval.

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

Not applicable in Finland as option B is used.

3. A success story in EPBD implementation

Finland has implemented the many aspects of the EPBD into Finnish legislation and building culture, in close cooperation with the significant parties (stakeholders) in the construction and building maintenance fields.

The close cooperation has continued throughout the finalisation phase of the Finnish National Building Code, as professionals and major organisations in the field have been consulted and have taken an active part in the work through various studies and several consultation forums organised by the Ministry of the Environment.

The involvement of professionals is also visible in the implementation of the EPCs. Organisations from the building ownership and building maintenance sectors are involved in developing the national transposition and disseminating EPCs. Through workshops and networking forums, the Finnish authorities are in constant communication with the professionals to ensure compliance and quality of EPCs. For example, together with *Motiva Oy*, the Ministry of the Environment and the ARA organise a networking day for EPC qualified assessors twice a year to inform the experts on EPC related developments and to discuss key issues.

The close cooperation has also been very much at the core in developing the Long Term Renovation Strategy in Finland. The strategy process has been conducted in cooperation with stakeholders from the building, construction, energy and finance sectors, through a series of workshops, public hearings and questionnaires also open to the general public.

The involvement of stakeholders helps to ensure support and acceptance of the new legislation and implementation of initiatives. This is further supported by specific information activities and active voluntary energy efficiency agreements. The Ministry of the Environment encourages both energy-efficient new constructions and renovations, by funding development projects as well as advisory programmes and campaigns. One major factor in ensuring energy efficiency in existing buildings is the continuation of the Finnish national voluntary energy efficiency agreement scheme that has achieved very good results, especially in the property sector which consists of commercial buildings and rental housing properties. The property sector reached a total annual energy savings of 0,51 TWh with annual cost savings of over 34 million € during the period 2008-2016. The savings in the new agreement period (2017-2025) are promising with annual energy savings of 90 GWh and annual cost savings of nearly 6 million € (2017-2018).

4. Conclusions, future plans

Energy use in buildings covers approximately 40% of the Finnish energy end use. This means that all possible measures must be taken to achieve the energy efficiency objectives.

Finland will finalise its Long Term Renovation Strategy in the beginning of 2020, and the work on the implementation of EPBD Articles 14 and 15 is underway, as well as the implementation of other major points in the Directive. The implementation is set to start in 2020 in close cooperation with stakeholders.

Well-tried practices, such as energy efficiency agreement schemes and existing web portals, have proved to be an excellent basis for providing information on training programmes and advisory services as well as monitoring and reporting, and will continue to be so in the future.

As the need for enhanced sustainability and energy efficiency grows within the EU, and as Finland is working to meet its goals for carbon neutrality in 2035, Finland will tap into its strengths to meet future demands: cooperation between government and the building sector, voluntary measures in implementing energy efficiency goals, and know-how in energy efficiency construction and renovation.

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)	No definition.	In relation to article 9, public buildings do not differ from other buildings. All requirements set for new buildings apply.
01.02	Definition of public buildings used by the public (according to article 13)	A public building, in relation to article 13, is a building where an authority provides public services in premises frequently visited by the public.	The definition of an authority; a legal organ with task and powers based on legal norms. These consist of both state and municipal authorities, state, and municipal institutions as well as the Evangelical Lutheran Church and the Orthodox Church. Legislated state enterprises as well as municipal enterprises are considered public institutions.
01.03	Number of residential buildings	1,300,528	Statistical Yearbook of Finland, 2019, Statistics Finland. (Number of buildings at the end of 2018)
01.04	Number of non-residential buildings	229,946	Statistical Yearbook of Finland, 2019, Statistics Finland. (Number of buildings at the end of 2018)
01.05	If possible, share of public buildings included in the number given in 01.04	32,767	Statistical Yearbook of Finland, 2019, Statistics Finland, includes only public service buildings (institutional buildings, buildings for assembly and educational buildings) (Number of buildings at the end of 2018)
01.06	If possible, share of commercial buildings included in the number given in 01.04	134,034	Statistical Yearbook of Finland, 2019, Statistics Finland, includes shop buildings, office buildings, industrial buildings, and warehouses. (Number of buildings at the end of 2018)
01.07	Number of buildings constructed per year (estimate)	36,148	Statistical Yearbook of Finland, 2019, Statistics Finland, completed buildings and dwellings. (Number of buildings at the end of 2018) Yearly average based on 2016-2018 (residential buildings are calculated by number of dwellings/apartments).
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	98% or 35,514	Statistical Yearbook of Finland, 2019, Statistics Finland, completed buildings and dwellings. (Number of buildings at the end of 2018) Yearly average based on 2016-2018 (residential buildings are calculated by number of dwellings/apartments).
01.09	If possible, share of non-residential buildings constructed per year (estimate,	2% or 499	Statistical Yearbook of Finland, 2019, Statistics Finland, completed buildings and dwellings. (Number of buildings at the end of 2018)

no	Key Indicators & Decisions – General Background	Description / value / response	Comments
	included in the number given in 01.07)		Yearly average based on 2016-2018
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	Not available. Only building volume (m^3) is recorded. Yearly average building volume of all completed buildings (residential and non-residential) is 36 Million m^3.	Statistical Yearbook of Finland, 2019, Statistics Finland, completed buildings. (Number of buildings at the end of 2018) Yearly average based on 2016-2018.

Key Indicators & Decisions – New Buildings

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the weighting factors (see Table 3).	Building code includes requirements for energy performance whereas the act includes NZEB requirements.
02.02	Requirements for energy performance of residential buildings in current building code	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the weighting factors (see Table 3). The maximum values depend on the building type and, for single-family houses, also on the area of the building. Calculations include also thermal comfort requirements, indoor-air quality requirements and airtightness, thermal bridges and shading devices.	Please note that these requirements equal NZEB requirements. See Table 3.
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the weighting factors (see Table 3).	Please note that these requirements equal NZEB requirements. See Table 3.

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments
		The maximum values depend on the building type and, for single-family houses, also on the area of the building. Calculations include also thermal comfort requirements, indoor-air quality requirements and airtightness, thermal bridges, and shading devices.	
02.04	Requirements for energy performance of non-residential public buildings in current building code	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the weighting factors (see Table 3). The maximum values depend on the building type and, for single-family houses, also on the area of the building. Calculations include also thermal comfort requirements, indoor-air quality requirements and airtightness, thermal bridges and shading devices.	
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Yes.	Ministry of the Environment Decree on the energy efficiency of new buildings 2017 (1010/2017).
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy	Please note that these requirements act as NZEB requirements. See Table 3.

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments
		consumption (E-values) calculated using the weighting factors (see Table 3).	
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	1.1.2018	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Requirements are given as a fixed value (kWh_E/m^2 - primary energy). The National Building Code of 2018 sets maximum values for overall energy consumption (E-values) calculated using the weighting factors (see Table 3).	Please note that these requirements act as NZEB requirements. See Table 3.
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	1.1.2018	
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?	Partly as part of the overall requirement.	The Building Code encourages the use of renewable energy sources and district heating, which have better weighting factors than other energy sources. Other renewable sources (e.g., solar heat and power) are taken into account when calculating a building's primary energy needs. (Weighting factors, see Table 2)
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	Minimum outdoor air flows set. See Table 1.	For new buildings, the minimum requirements for the outdoor air flows are given in the Ministry of the Environment

no	Key Indicators & Decisions – New Buildings	Description / value / response	Comments
	instance for airtightness, minimum ventilation rates		Decree on the indoor climate and ventilation of new buildings 2017 (1009/2017). Requirements are also given for room temperature planning values and air leakage values.

Key Indicators & Decisions – Existing Buildings

no	Key Indicators & Decisions – 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	
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	na	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	na	
03.05	Overall minimum requirements in case of major-renovation	There are different formulae to be applied for calculating the building's specific total energy consumption requirement (E-value, kWh/m^2), when the design and execution of the improvements in the building's energy efficiency are based on reducing energy consumption in the building's standard use (alternative 3): 1) Single-family homes, row and chain houses, small apartment buildings: E-required ≤ 0.8 x E-calculated 2) Apartment buildings: E-required ≤ 0.85 x E-calculated 3) Office buildings: E-required ≤ 0.7 x E-calculated 4) Education buildings: E-required ≤ 0.8 x E-calculated 5) Day care centre: E-required ≤ 0.8 x E-calculated	

no	Key Indicators & Decisions – Existing Buildings	Description / value / response	Comment
		6) Commercial buildings: E-required ≤ 0.7 x E-calculated 7) Commercial accommodation buildings: E-required ≤ 0.7 x E-calculated 8) Sports halls, does not apply to indoor ice rinks and swimming pools: E-required ≤ 0.8 x E-calculated 9) Hospitals: E-required ≤ 0.8 x E-calculated 10) Other buildings: sections 4 and 7 to be applied	
03.06	Minimum requirements for individual building parts in case of renovation	Energy efficiency requirements for each building element, see values in Table 5. The following requirements for the technical systems of a building apply: 1) The amount of heat recovered from the exhaust air of building ventilation shall correspond to at least 45% of the amount of heat required for ventilation heating. 2) The specific electric power of a mechanical supply and exhaust air system shall not exceed 2.0 kW/(m^3/s). 3) The specific electric power of a mechanical exhaust air system shall not exceed 1.0 kW/(m^3/s). 4) The specific electric power of a ventilation system shall not exceed 2.5 kW/(m^3/s). 5) When replacing equipment and systems, the efficiency of heating systems must be improved regarding the parts being replaced. After the replacement, the ratio between the efficiencies of the main heat production system of the building and the main heat distribution system of the premises shall be at least 0.8. The annual efficiency of the heat production system or the heat distribution system shall be at least 0.73. When the main replaced heating system of a building is a heat pump, the ratio of the Seasonal Performance Factor SPF[1] of the heat pump and the efficiency of the heat distribution system in the premises shall be at least 2.4. The specific electrical energy consumption of	

no	Key Indicators & Decisions – Existing Buildings	Description / value / response	Comment
		the accessories of a replaced heat distribution system shall be no more than 2.5 kWh/net m^2 (per heated net surface area). 6) When replacing water and/or sewage systems, the regulations on new construction shall apply. [1] Where Coefficient of Performance (COP) gives us efficiency of a heat pump at any given time, Seasonal Performance Factor (SPF) gives us the same but for annual performance of the heat pump.	
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	na	Baseline for calculation is the existing building stock of 2020. Targets are not related to the number or percentage of buildings. The existing building stock of 2020 (100%) is estimated to be only 70% by 2050.
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Residential and non-residential buildings total, heating energy consumption (gross) compared to 2020: 100% (2020), 78% (2030), 64% (2040) and 51% (2050). Residential and non-residential buildings total, heating energy consumption (delivered energy) compared to 2020: 100% (2020), 70% (2030) 51% (2040), and 38% (2050). Residential and non-residential buildings total, CO_2 emissions compared to 2020: 100% (2020), 37% (2030), 19% (2040), and 8% (2050).	According to the roadmap laid out in the Finnish LTRS, the reduction of energy consumption (gross) is 55%, compared to the heating energy consumption of buildings in 2005. The heating energy consumption (gross) will be reduced by 50 % by 2050 compared to 2020. The expected consumption of delivered heating energy will be reduced approximately by 60 % by 2050 compared to 2020. The CO_2 emissions from the heating energy consumption of the building stock will be reduced by 92% in the period 2020-2050.

Key Indicators & Decisions – Energy Performance Certificates

no	Key Indicators & Decisions – 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)	27,710	Yearly average based on EPC database (2015-2019).
04.02	Number of EPCs since start of scheme	138,548	Number of EPCs since 1.5.2015 (When the national database was established)
04.03	Number of EPCs for different building types	Single-family homes (both new buildings and existing buildings): 72,043 Row houses (both new buildings and existing buildings): 17,084 Apartment buildings (both new buildings and existing buildings): 14,107 Non-residential (both new buildings and existing buildings): 8,803	Number of EPCs by building type, categories with most EPCs. Figures at the end of 2019.
04.04	Number of assessors	1,181 qualified experts, of which 821 with base level qualifications and 360 with higher level qualifications	Registration is mandatory. Figures at the end of 2019.
04.05	Basic education requirements for assessors	The expert must have suitable training and education background (e.g., a degree in building technology or architecture or, for the higher level, a master's degree in building technology or related field). The education background can be compensated with work experience. The qualification has to be approved by a test administered by the accreditation body. Qualification and accreditation for qualified experts is the same for all building types, public and private.	
04.06	Additional training demands for assessors	No.	
04.07	Quality assurance system	The Housing Finance and Development Centre of Finland (ARA) is the administrative authority ensuring the quality of certificates and qualified experts and the appropriate	

no	Key Indicators & Decisions – Energy Performance Certificates	Description / value / response	Comment
		preparation and use of the certificates. As the responsible authority, it can also make compliance checks of issued certificates. ARA partly checks the data input of building information, the accuracy of the presented calculations, and the appropriateness of suggestions given for improving energy efficiency. Additionally, the ARA can initiate enforcement measures in case of negligence on the part of the building owner or the qualified expert. Measures are administrative, not penal, and include requests, warnings, orders, conditional fines, and in case of the qualified expert, suspension/stripping of rights to issue energy certificates. The requirements on EPC display are also controlled by the ARA.	
04.08	National database for EPCs	Yes	Database established 1.5.2015.
04.09	Link to national information on EPCs / Database	www.energiatodistusrekisteri.fi	

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	Status at the end of 2019
05.02	Are there current support systems for smart buildings?	No	Status at the end of 2019
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Yes	National Building Code
05.04	Are there current requirements for automatics (for instance in building codes)?	No	Status at the end of 2019
05.05	Chosen option A or B for heating systems (inspection or other measures)	Model B, alternative measures	Status at the end of 2019
05.06	Number of heating inspections; reports per year (if option A)	na	
05.07	Chosen option A or B for cooling systems (inspection or other measures)	Model B, alternative measures	Status at the end of 2019
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	na	
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?	No	
05.12	Link to national information on Inspection / Database	na	

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