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Finland: Impact, compliance and control of legislation

Finland has adopted appropriate measures to implement the directive into national legislation. The new legislation and decrees came into force on 1 January 2008 [1]. The EPDB has led to -30% tightening of the national regulations concerning the new buildings. The accelerated regulation development is still needed for the renovations.

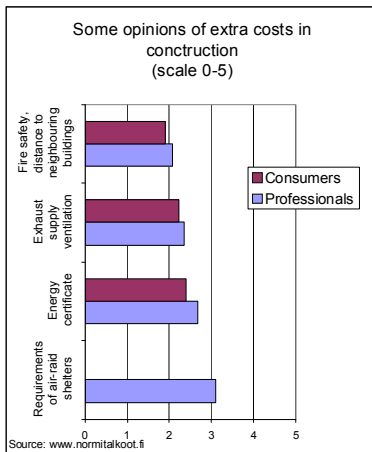
1 > Impact of the EPBD on the national requirements

Finland has set minimum requirements in the National Building Code for thermal insulation and ventilation of new buildings since 1976. The requirements have been changed several times in order to improve energy efficiency in buildings.

The changes have been made in 2003, when the level of the requirements was tightened by 25-30%, and in 2007, when the requirements were changed because of the implementation of the EPBD. The latest tightened (-30%) requirements were given on December 2008 and will come into force in the beginning of 2010.

The regulatory framework has traditionally controlled the thermal losses of buildings. The Minister of Housing has announced that in 2012 Finland will introduce a regulation based on overall energy consumption, where the energy sources will be taken into account (primary resource factor).

Regulations themselves compose no barrier for the energy efficiency. The expected impact of the EPBD can be modest in the short run because the current heating energy requirements are already quite strict and are applied mainly to new buildings. The accelerated regulation development is mainly needed for the overall energy calculation, for the renovations and for cutting down the increasing electricity use of appliances. The last topic is challenging because it is partly out of the administrative sector of the Ministry of the Environment.



The ranking of some extra cost in the Finnish construction

Source: www.normitalkoot.fi

Reference values for maximum heat loss	Year					
	1976	1978	1985	2003	2007	2010
Wall, U-value (W/m ² ,K)	0.40	0.29	0.28	0.25	0.24	0.17
Roof, U-value (W/m ² ,K)	0.35	0.23	0.22	0.16	0.15	0.09
Floor, U-value (W/m ² ,K)	0.40	0.40	0.36	0.25	0.24	0.16
Window, U-value (W/m ² ,K)	2.1	2.1	2.1	1.4	1.4	1.0
Door, U-value (W/m ² ,K)	0.7	0.7	0.7	1.4	1.4	1.0
Air-tightness, n50 (1/h)	6	6	6	4	4	2
The yearly exhaust air heat recovery efficiency	0 %	0 %	0 %	30 %	30 %	50 %
Thermal transmittance (W/K)¹	2017	1905	1879	1367	1353	917
Change 1976 =100	0 %	-6 %	-7 %	-32 %	-33 %	-55 %
The EPDB-effect					-1 %	-33 %

¹A typical 3-floor apartment house design in Finland

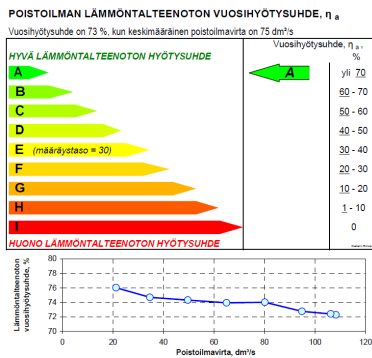
The indoor climate and ventilation of buildings has been a fundamental part of the Finnish regulatory framework. The guidelines of minimum ventilation rate by various building types and spaces have been used more than two decades in Finland. The EPDB did not change the current practice, but some emphasizing in the summer comfort can be seen.

In renovations, the National Building Code is applied in accordance with the Land Use and Building Act, Section 13: "The regulations in the Building Code concern the construction of new buildings. Unless otherwise specifically prescribed by the regulations, they are applicable to renovation and alteration work only in so far as the type and extent of the measure and a possible change in use of the building or part thereof require". The legislation allows the local building supervision authorities to decide whether the building regulations will be applied to the renovation or not. The current practice is that the energy regulations are rarely applied, but there is a market driven voluntary practice to increase the energy efficiency to some extent in the refurbishment of the building envelope.

The rising construction costs were studied recently in the context of the Finnish regulatory framework of buildings (www.normitalkoot.fi). The findings of the increasing costs were mainly caused by the regulations concerning the fire safety; the car parking; the air-raid shelters; the accessibility of the disabled people; and some activities of the public authorities during the construction process. The study still mentions that some people have felt the energy certificate to be an extra cost.

Since 1985 Finland's National Building Code has included guidelines for calculating the power and energy demand for the heating and cooling of buildings. These guidelines could be used for calculations for all building types. The calculation method was refined because of the implementation of the EPBD. It follows the main principles of EN13790. The new calculation method was published in the National Building Code in June 2007. The current calculation methodology does not contain primary energy calculation, but foreseen 2012 revision of the regulatory framework will introduce the overall energy calculation.

The current regulatory framework is energy source neutral in Finland. The regulations themselves do not promote or hinder using of a certain fuel in the building heating. The normal market mechanism (availability, fuel prices and investment costs) has taken care of the selection of the heating type. Some cities do promote a local district heating, because of its high total efficiency, especially, if the local power plants are type of a Combined Heating and Power.



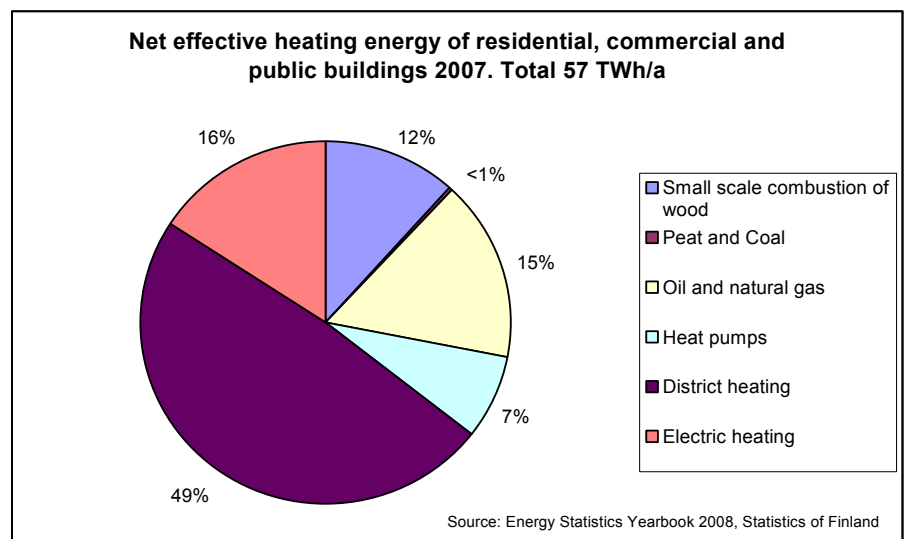
A snapshot of a heat recovery product data used in Finland. A voluntary certification (VTT Product Certificate),

<http://www.vtt.fi/service/exp/certification/index.jsp?lang=en>

The current calculation method supports the following renewable energy forms:

- > ventilation heat recovery
- > heat pumps (ground source, exhaust air and air-to-water)
- > biomass boilers (pellets, wood chips, chopped firewood)
- > free cooling, night ventilation

Current status in the Finnish building stock is that renewable energy sources are mainly used in the single family houses (wood). Some larger scale district heating plants use also biomass, but its share is only 12% of the fuel consumption of the district heat and the combined heat and power in Finland. The increasing number of heat pumps (air-to-air, ground source, exhaust air) has been installed to heat the single family houses in the last decade. The share of the renewable energy forms (hydro, wind and wood fuels) in the Finnish electricity production is 25%.



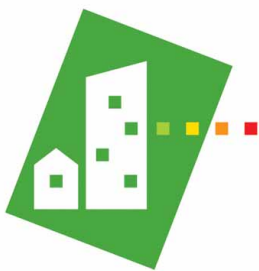
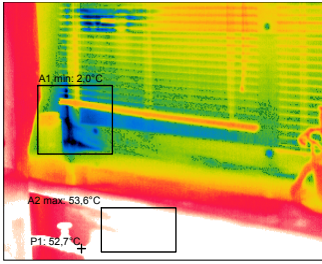
2 > Compliance and control¹

EP REQUIREMENTS COMPLIANCE AND CONTROL

The main responsible person in the building process is the principal designer in Finland [2]. His/her duty is to ensure the sufficient quality and comprehensiveness of the designs for the building project. The principal designer is responsible to the building supervision authorities for carrying out his duties in an appropriate manner during the building project's design stage and during the construction work. The control framework is strong according to the law. The municipality grants a building permit when the design of the building presented by the principal designer complies with the Building Code and when the requirement for validity of the actors in the construction project is fulfilled. If the compliance is not met in the realisation phase, the building can be put to a prohibition of use as an extreme measure, but these kinds of measures are rare. The observed incompliance is normally corrected during the implementation phase.

Some subcomponents concerning the energy efficiency of the building are checked voluntarily by the construction company in the realisation phase. These checks (for example: a thermography, a pressure test) are part of the normal quality control of the construction work, but this depends

¹ Compliance means the fulfilment of EP requirements and EP certification process while control is the mechanism for checking the compliance.



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Logo of the energy certification info campaign.



mainly on the customer demand and the undertaking company. Some construction companies have better quality control than others. The control framework in the realisation phase is strong and the building supervision authorities may require third party expert opinion, if there is a doubt of the energy performance of a certain building component.

The requirements on maximum heat losses of the whole building (building envelope, ventilation and infiltration) contain detailed numbers to fulfil, but there are quite rare detailed (=numerical) requirements for the HVAC-systems in Finland. This means that in most cases the HVAC designer selects the detailed parts of the system solution in the design process from the catalogue of current design practice. The HVAC system details are rarely checked in the realisation phase, because of the lacking numbers to compare with. There are some exceptions concerning the HVAC-system efficiency:

- > limiting guideline value max. 2.5 kW/m³/s for the specific fan power of the ventilating system as a whole (electrical efficiency)
- > limiting guideline value of thermal resistance of the pipe insulation is 1 m²K/W
- > limiting guideline value of thermal loss of the heat storage by the storage size
- > boiler efficiency (oil, gas) must be compliant according to European Council directives 92/42 and 93/68 (Boiler Directive). The boiler has to be CE marked and its minimum efficiency requirement is a "One star"
- > the minimum ductwork tightness class should be class B (classification in EN 12237)

EP certification COMPLIANCE AND CONTROL

The quality control procedure of the EP certification is not regulated by the legislation, but the legislation allows the Ministry of the Environment to gather relevant information about the certificates and prices of certificates from the qualified experts. Qualified experts have to keep an archive of the certificates they have issued for 15 years. The local building supervision authority also has to keep an archive of the certificates issued for new buildings that have been issued a building permit. It is possible for the Ministry to access these archives to conduct periodic checks of the certificates. A national centralized database is under development for energy certificates. The system will be ready at the end of 2009.

Qualified experts for certification have the authority to issue so-called Separate Certificates. They must be architects, engineers or technicians with education in building, HVAC or electrical engineering. The professional examination can be replaced by at least three years' experience in energy efficiency in the building sector. Qualified experts must pass an exam arranged by an accreditation body. The exam tests their knowledge of the certification legislation and the certification system itself. Attendance at training courses is not mandatory.

Qualified experts for certification will get an accreditation that is valid for 7 years. Qualified experts can act on an individual basis or can be integrated with public or private organizations. By March 2009, there were 360 qualified experts for energy certification. The Ministry of the Environment has designated two accreditation bodies, FISE Oy and Kiinteistöalan Koulutuskeskus (Kiinko) to approve qualified experts. Other professionals who can issue energy certificates (e.g. principal designers, property managers, chairpersons of housing company boards and energy auditors) do not need accreditation according to the Act on Energy Certification of Buildings.

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The construction professionals, energy auditors and qualified experts are typically skilled enough to issue a certificate. The chairpersons of housing company boards can be non-professional and also the independence is a question mark ending in some uncertainty of certificates issued by them.

There are several service providers issuing energy certificates and some sort of price balance has been found on the market in Finland. The price of the separate certificate of an old building begin from 250 € for a single-family houses and 500 € for an apartment building. The energy certificate of a single-family house for the building permit is close to 120 €.

The state supports energy efficiency improvements, low-CO2 investments and renewable use in heating systems with three ways:

- > an incentive for housing companies (more than 3 apartments)
- > an incentive of material costs for low income households (less than 3 apartments)
- > a tax deduction for households purchasing services

The state budget allocates incentive for housing companies (10-15 %) funds of repairs of buildings and specifically targeted energy repairs; for example: changing the old heating system to district heating or to wood based boiler or to ground source heat pump; and installing a solar heating system or an outdoor air heat pump as an auxiliary heating system. The state also supports the low-income households with an optional up to 25% incentive of material costs of energy efficiency repairs.

There is a tax incentive for domestic employment of various service providers. A household may deduct 30 % of personal salary costs or 60 % of company provided services (but not of materials) in personal taxation. The deduction is applicable for acquisitions of labour (services) at home. This incentive can be allocated to energy improvement works, but the amount (annual maximum of 3000 €/person) can be small, if larger investments wanted to be started.

3 > References

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