

9th Forum on Energy for Sustainable Development «4th meeting of the JTF on EE Standards in Buildings» Kiev, 13 November 2018











Mapping of Energy Efficiency Standards in Buildings in the UNECE Region





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Mapping of Energy Efficiency Standards in Buildings: objectives

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To examine the current status of the energy efficiency standards in buildings in the UNECE region

To form a basis to improve knowledge of UNECE member States of existing energy efficiency standards in buildings

To collect best practices related to existing standards

To provide a gap analysis and harmonization of data and standards

To prepare an initial assessment of energy efficiency technologies in buildings in relation to the existing standards (currently is being prepared)

Mapping of Energy Efficiency Standards in Buildings: methodology

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Questionnaire (26 January-28 February

2018)

Collecting information from 56 member States on the current status of the energy efficiency requirements and technologies in building codes

Desktop Study

Review of relevant policy documents, previously published studies, technological developments and best practices related to existing standards across countries of the UNECE region

Consultation with the members of the JTF

Collection of feedback and comments from the members of the Joint Task Force on Energy Efficiency in Buildings

Mapping of Energy Efficiency Standards in Buildings: survey

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•name

- address
- contact details
- country
- organization

Part 1 general information

- Existing standards
- •Type of building covered
- Stringency
- •Energy performance gap
- •Kind of presciptive requirements
- Inspections

Part 2: Building Energy Codes

- •Type of buildings covered by EPC
- Policy requirements level for EPC
- Existence of national registry database for EPC

Part 3: Energy Performance Certification

- Existence of requirements
- Requirements to test the building materials

Part 4: Building Materials and Products

- •Existence of incentives for compliance
- •Penalities for non compliance
- Monitoring of energy performance in building energy codes

Part 5:

Requirements for enforcement and compliance

- Deployment of technologies
- Which technologies exist
- Recent trends

Part Six – Energy Efficiency Technologies



Mapping of Energy Efficiency Standards in Buildings: gap analysis

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Objective: to evaluate the most effective policies and identify best practices to help member States learn from one another



Comprehensiveness and stringency of the building energy codes

Technical requirements of the building energy codes

Comprehensiveness and stringency of the EPC

Enforcement mechanisms, including incentive packages and penalties

Energy efficiency materials and products requirements in building energy codes

Mapping of Energy Efficiency Standards in Buildings: country profiles

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Poland

The residential sector in Poland is dominated by incluidual pronent (~ 90%), followed by Cooperative property (-20%). In addition to relevant government agencies, energy agencies, such se the National energy efficiency Agency, play an important role in promoting energy efficiency in the country's housing stock. In Poland, as early as 1994, a law was adopted that establishes requirements for buildings in terms of minimum requirements for energy efficiency, thermal insulation and other requirements relating to energy saving. In the development of the use of renewable energy in 2012 adopted a Resolution that prescribes to analyze the gossibility of the use of decentralized systems of energy supply based on renewable energy sources [27, 36].

Building Energy Codes Stringency and Coverag

Family residential building

production buildings)

new non-residential existing residential

Stringency: Mandatory

Lighting Interior, Humidiffestion

and windows)

Verdiction or air quality

Solar gains (G-values)

Bollerià C system

Space Heating System (3017):

Space Cooling System (2017):

Insulation (2017):

Daylighting regulrements

àir-rightness

existing non-residential

Single-family residential building

Multi-family residential building

Collective residential building (Apartment blocks)

End-uses energy: Space heating, Ventilation, Lighting Interior, Water

heating, Appliances, Auxiliary devices, Space cooling, Water heating,

Specified thermal comfort levels for summer and winter

Antifolal lighting system, lighting density

U-values (W/mg: Kit Roof, freth - 0.19-0.70; Esserval Wall, freth -

0-13-0.8; (hearnal Wall-1.0; Floor on the ground, 1960) -0.50-1.5; Window, 1960) -1.1-1.8; Door -1.5; Skylighas, 1960) -1.3-1.5;

agaze Hearing ayeam (2011). SPL::v Values (KWh/m*year) for hearing, ventilation and hot utility yease: Single-family residential building-65; http://tamily-residential

building-65; Collective residential building-65; Health-care building -

ΔΕΡ» Values (kil/him*-year): Single-family residential building and

290: Public buildings-90: Warehouse and production buildings-90

Commercial buildings (Health-care building, Warehouse and

Public buildings (Health-care building, Warehouse and production buildings)

Main regulatory documents related to building energy

Technical regulations: Energy Savings and Thermal insulation (2002) The Scr of 7 July 1996, Constructive Law. The Scr of 29 Sugget 2014, The Energy Performance of Buildings Law Economy of 25 April 2012 concerning the detailed scope and form of

l'erformance-based requirements in building energy

- Thermal characteristics and geometry of the building
- (enteloge and internal partitions, etc.
- Space heating system and hot water supply units
- Air-conditioning system(s) Mechanical and natural ventilation
- Bulb-in lighting system
- Design position and orientation of buildings
- Passive solar systems and solar protection indoor and outdoor olimatic conditions
- Passive cooling
- Heat recovery Thermal bridges

Sebagas Noders

Energy Performance Certification (EPC)/Energy Labelling/Energy Passport of the building

- Single family houses Agamment blocks
- Commercial buildings Public buildings
- new residential
- new non-residential
- existing residential

Stringency: Mandatoni

EPGD Energy Performance Certificate (2009)

Building Nationals and Products

Reting/certification of building materials: No data

Harmonization with other sechnical associants: No data

Regularments to test building materials and products by certified terlaborasories: No data

Nutritarnly residential building-10: Collective residential building. Health-care building and Public buildings-05. Water Heating System: EPLin Values, mean partial EP maximum.

value ratio for heading, ventilation and hot utility water. ee (1995), Maximum cooling demand (kilkhim' year Lighting (2017): EP. Values (WWh/m²-year): Single-family residential cooling-15; snace hearing-15; total primary energy-120. Voluntary building and Multi-family residential building-0: Collective residential building, Health-care building, Public buildings and Warehouse and production buildings - forts = \$500 EP. = \$0; for this \$500 EP. = 100.

Exterence of national registry database for EPC in your country: Yes

Requirements for regular inspection of heating and air/sonditioning

Pangitias, incantivas and other machanisms for improving compliance

Energy performance monitoring requirements: No data

Slovakla



The housing sector of Slovakia took third glace in the overall balance of energy consumption of the country. The need to develop a strategy for the reconstruction of residential and non-neel/serial buildings in Slovakia follows from Directive 2012/27/EC of the Suropean Parliament and of the Council of 35 October 2012 on energy efficiency. A systematic approach to the reconstruction of buildings was made in the late 1990s, when it was found that many facilities built between 1990. and 1992 had insufficient thermal protection of structures and technical facilities of buildings had a high degree of wear and sear. For such buildings, there was a need to replace attustures with quality components to create the necessary security and well-being in these buildings [29].

Main regulatory documents related to building energy

MTC SR: SSSICCOS Coll. Act on the Energy Performance of Buildings and an Amendments to Certain Acts - 900/2012 Col Ast arrending Ast no. \$55,0005 Cpl. on the Energy Performance of

Buildings and on Amendments to some Loss as amended and amending. IBO, European and Signak Technical norms, Plan for the responsion of relevant (gubilo) buildings, Update of the Energy Performance of Suilding.

The first law act to energy performance of buildings was

l'erformance-based requirements in building energy codes

- Thermal characteristics and geometry of the building
- (enteliane and Internal partitions, etc.)
- àir-conditioning system(s) Mechanical and natural ventilation
- Bulb-in lighting system (mainly in the non-residential sector)
- Pagetive solar systems and solar protection
- Indoor and outdoor climatic conditions
- Thermal bridge, mandatory regularment to access post-construction regularment of the thermal bridge: Yes

The editing standards for determining the energy characteristics of the buildings in onersion are sufficiently accurate: Ves.

Energy Performance Certification (EPCI/Energy Labelling/Energy Passport of the building

- Single family houses Agenment blocks
- Commercial buildings
- new non-negligated at

new residential

Extenses of national registry database for EPC: Yes
Type of energy that the EPC refer to: Total primary energy, Nonrenewable primary energy.

Extension of national regions database for EPC: Yes

Building Nationals and Products

Rading/certification of building materials: Ves

Harmonization with other technical standards: European Union

Requirements to test building materials and products by certified test

Building Energy Codes Stringency and Coversor

- Single family houses
- Anartment blocks Commercial
- Public buildings
- new pro-regidential
- new regidential
- Existing residential [e.g. after substantial
- Existing non-residential (e.g. after substantial

The buildings covered by the energy codes: They are segerated by residential and nonresidential for the means more detailed breakdown.

Stringency: Mandatory

Prescriptive requirements in building energy codes

- Thermal insulation (including U-values for walls, floor, roof and windows?
- Specified thermal comfort levels for winter and
- Solar cains (G-values)
- External solar protections
- Ventilation or air quality
- Periodic transmittance and time lag of walls and
- Vertilation for summer comfort
- Solar absorbance of external surfaces (e.g. cool paintings for roofs and streets)
- Daylighting requirements
- Artificial lighting system, lighting density
- Renewables
- Thermal bridges

Requirements for enforcement and compliance

Requirements for regular inspection of heating and AIC yatems: Yes, for both heating and A/C system

Your country have specific incentives that complement or motivate compliance with building energy codes: Yes Financial support. Fines for non-compliance.

Also possible: Refusal for occupancy or construction permit Energy performance monitoring requirements: Yes

Armenia



Armenia introduced in 2018 a mandatory building energy code with the adoption of a new regulation "Thermal Protection of Buildings", which was developed based on Russian Building Energy Code from 2003 (updated in 2012) and European codes and methodologies. It links building envelope construction and heat loses with established energy limits, taking into account differences in climatic conditions. It also includes a irement for a building energy gazagort and an energy efficiency label with energy efficiency classes (30)

Main regulatory documents related to building energy

Law on Brandardization, &L-21 (09:88-2012)

- Law on Technical Regulation, SL-19 (09:02:3013)
- Law on Licensing, the AL-192 (30.05.2001)
 Law on Energy String and Ransavable Energy, AL-122 (3004)
 National Program on Energy Soving and Renewable Energy (2007)
- National Energy Efficiency Action Plan (2010) Amendment to RA Energy Saving and Renewable Energy Law (2016).
- 2013-0017 Climate zones, Sub-regions

- Performance-based requirements in building energy codes
- Thermal characteristics and recovery of the building (entelope and internal partitions, etc.)
- àir-righmess
- Althoughting the suggested
- Space heating system and hot water supply units
- Machanical and payoral vanciation Bulls-in lighting system (mainly in the non-residential sector)
- Design position and orientation of buildings
- Passive solar systems and solar protection

Indoor and outdoor climatic conditions

The subset of ISA CDS transferter Cult sec of ACN CDS transferts in

Software used for compliance particular: Vac

The gap between predicted and actual performance levels: 60-90% There is mandatory requirement to assess gost-construction regularment of the thermal bridge: Yes

There is mandatory requirement for air tightness region: Ves

Energy Performance Certification (EPC)/Energy abelling/Energy Passoort of the building

- Single family houses ágamment blocks
- Commercial
- Public buildings
- new residential

actisting non-recidential
 Type of energy that the EPC refer to: Total primary energy;

Stringency: Mised (both voluntary and mandatory)

Exterence of national regions database for EPC: No

Building Nationals and Product

Rading/centification of building materials: Ves

Harmonization with other technical standards: European Union standards

Requirements to test building materials and products by certified test laboratories: Ves

Building Energy Codes Stringency and Coversor

- Single family houses
- Anartment blocks
- Commercial Public buildings
- new pop-residential new residential
- Existing residential (e.g. after substantial
- Existing non-residential (e.g. after substantial

Stringency: Mixed (both voluntary and mandatory)

The construction objects in the Republic of Armenia are divided into fine categories depending on their scale, significance, significance and complexity, as well as the safety of citizens and the environment. 1) low-risk objects: Category I; 2) objects of medium risk category II; 2) objects of medium risk category III. category; (i) high-risk objects - category fir; 5) objects with the

highest degree of risk - category V Mandatory measures to ensure the enemy efficiency of buildings are essablished by the Decree of the Government of the Renable of Armenia, indicators for assessing energy efficiency and energy consumption in building codes have not yet

(Residential and public buildings: walls - 0,00-0,59 floors - 000-0,97 roots -0,00-0,40 windows - 2,00-0,39)

Energy use for, heating, cooling, hot water, lighting,

- Prescriptive requirements in building energy codes Thermal Insulation (Including Usualues for walls, floor
 - roof and windows Albeichengen

ventilation. Total primary energy use.

- Solar gains (G-values)
- Viewflation or air quality
- Daylighting requirements
- Periodic transmissance and time lag of walls and roof Artificial lighting avegent, lighting density

Requirements for enforcement and compliance

Requirements for regular inspection of heating and AIC. systems: Yes, for heating systems only

Penalties, incentives and other mechanisms for improving

Energy performance monitoring requirements: No

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Mapping of Energy Efficiency Standards in Buildings: recommendations

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- 1. To harmonize building codes and coverage of all kinds of buildings
- 2. To create a national EE target
- 3. To strengthen the requirements for insulation, ventilation and technical installations
- 4. To introduce or strengthen quality assurance measures, especially during the early stage of the certification process
- 5. To establish proper (electronic) monitoring systems of compliance, enforcement and quality control processes through a qualified workforce
- 6. To establish a regular inspection of boilers and air-conditioning systems
- 7. To continuously monitor, analyze and adjust energy usage in building energy codes
- 8. To create incentives for companies for improving EE through appropriate policies, tax incentives and low-interest loans
- 9. To facilitate the harmonization process of energy efficient materials and products testing and certification
- 10. To assist in the establishment of new harmonized building materials test mechanisms
- 11. To make codes publicly available



Thank you!











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