



Regional and national studies on gap analysis between the performance objectives set forth in the Framework Guidelines for Energy Efficiency Standards in Buildings and Implementation of Current Energy Efficiency Standards

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Study on gap analysis between the performance objectives set forth in the Framework Guidelines for Energy Efficiency Standards in Buildings and current energy efficiency standards and their implementation in the countries of South-Eastern and Eastern Europe, the Caucasus, Central Asia, and in the Russian Federation



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The study:

- looks at the implementation of energy efficiency standards in 17 countries
- analyses whether the actual situation corresponds to the objectives of the Framework Guidelines for Energy Efficiency Standards in Buildings
- highlights gaps between the existing requirements for energy efficiency standards in buildings and enforcement of those standards
- identifies barriers to adopting and implementing the high-performance standards in buildings in the countries
- provides recommendations as opportunities to bridge the existing gaps

Available online: https://unece.org/sites/default/files/2021-06/Study_on_Gap_Analysis_07.06.2021.pdf

Common elements based on sub-regional SWOT analysis

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<p>Common strengths:</p> <ul style="list-style-type: none"> • The project countries have quite well-developed framework legislation, including energy efficiency laws, energy development strategies and energy efficiency programs, NEEAPs (except in the Central Asian countries). • Building energy codes were adopted, where in many countries they are mandatory. • Some countries have adopted laws on energy performance in buildings and energy efficiency in buildings. • Energy labelling requirements are present in most of the countries. • Financial incentives, such as subsidies, soft loans, tax exemption or reductions are present in most of the countries. 	<p>Common weaknesses:</p> <ul style="list-style-type: none"> • Out of 17 project countries, the residential sector is the largest energy consumer in eleven countries and the second largest in six countries. • High energy consumption in the existing building stock is a problem in all project countries. • Energy consumption has recently increased for heating and cooling in many countries. • Lack of ESCO activities in some countries, or absence of ESCO market in the other project countries; absence of EPC in many project countries too. • Azerbaijan and Turkmenistan have not adopted energy efficiency legislation. • Specific incentives for improving compliance with building energy codes are absent in some countries.
<p>Common opportunities:</p> <ul style="list-style-type: none"> • Operations by the energy agencies to monitor and implement EE measures and activities are existing in seven countries (out of 17). The agencies are established in South-Eastern Europe, Eastern Europe and in the Russian Federation. In the Caucasus and Central Asian regions, the energy agencies are not established. • Mandatory regular inspections for heating and AC systems have been introduced in most of the project countries. • The energy tariffs have been increased in Armenia, Ukraine and Uzbekistan. • Development on energy efficiency related legislation is on the way in Azerbaijan (draft law on energy efficiency in Azerbaijan), Georgia (new laws on energy efficiency in buildings, on energy efficiency and on energy labeling) and Turkmenistan (draft Energy Strategy for 2030) 	<p>Common threats:</p> <ul style="list-style-type: none"> • Low energy prices in many countries lead to absence of driving force for energy efficiency improvement in buildings. • Mandatory energy performance monitoring requirements are absent in many project countries. • Penalties for non-compliance with building energy codes are also absent in many project countries. • Energy agencies are not established in Bosnia and Herzegovina, Montenegro, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

FINDINGS: Conformity of Energy Efficiency Standards with the Framework Guidelines

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Country	Thermal characteristics and geometry of the building (envelope and internal partitions)	Air-tightness	Space heating system and hot water supply units	Air-conditioning system(s)	Mechanical and natural ventilation	Built-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	Thermal bridge
South-Eastern Europe										
Albania	X	X	X	X	X	X	X	X	X	X
Bosnia and Herzegovina	X	X	X	X	X	X	X	-	X	X
Montenegro	X	X	X	X	X	-	X	X	X	X
North Macedonia	X	X	X	X	X	-	X	X	X	X
Serbia	X	X	X	X	X	-	X	-	-	X
Eastern Europe and the Russian Federation										
Belarus	X	X	X	X	X	X	X	X	X	X
Republic of Moldova	X	X	X	X	X	X	X	X	X	X
Ukraine	X	X	X	X	X	X	X	X	X	X
Russian Federation	X	X	X	X	X	X	X	-	X	X
The Caucasus										
Armenia	X	X	X	X	X	X	X	X	X	X
Azerbaijan	X	X	X	X	X	X	X	X	X	X
Georgia	-	-	-	-	-	-	-	-	-	-
Central Asia										
Kazakhstan	X	X	X	-	-	-	X	-	X	X
Kyrgyzstan	X	-	X	X	X	-	-	X	-	-
Tajikistan	No data									
Turkmenistan	X	-	X	X	-	-	X	-	X	X
Uzbekistan	X	X	X	X	X	-	-	X	X	X

Overview of existing **performance-based requirements** in building energy codes:

- Technical requirements are mostly observed in the countries of South-Eastern Europe, Eastern Europe and in the Russian Federation.
- They are less present in the Central Asian countries.
- Such requirements are not present in Georgia.

FINDINGS: Conformity of Energy Efficiency Standards with the Framework Guidelines

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Country	Use of IPMVP	Use of Energy Performance in Buildings standards	Use of software used for compliance verification	Assessment of post-construction requirement of the thermal bridge	Air-tightness testing	Use of individual energy metering and control units
South Eastern Europe						
Albania	-	-	-	-	-	-
Bosnia and Herzegovina	X	X	-	-	-	-
Montenegro	-	-	X	-	-	-
North Macedonia	-	-	-	-	-	-
Serbia	-	-	-	-	-	-
Eastern Europe and the Russian Federation						
Belarus	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-
Ukraine	-	X	-	X	-	-
Russian Federation	X	-	X	X	-	-
The Caucasus						
Armenia	-	-	-	-	-	-
Azerbaijan	X	X	-	-	-	-
Georgia	-	X	-	-	-	-
Central Asia						
Kazakhstan	-	-	-	-	-	-
Kyrgyzstan	-	-	-	-	-	-
Tajikistan	No data					
Turkmenistan	-	-	-	-	-	-
Uzbekistan	-	X	X	-	-	-

Overview of requirements to identify the energy performance gap in the countries:

- Requirements for assessment of post-construction requirement of the thermal bridge and air-tightness testing are almost not present in the countries.
- IPMVP is used only in Bosnia and Herzegovina, Russian Federation, and Azerbaijan.
- EPB standards are used in Bosnia and Herzegovina, Azerbaijan, Georgia, Ukraine and Uzbekistan.
- The software for compliance verification is applied in Montenegro, Russian Federation, and Uzbekistan.

FINDINGS: Conformity of Energy Efficiency Standards with the Framework Guidelines



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Framework Guidelines	New buildings	Existing buildings
<ul style="list-style-type: none"> ➤ The “total primary energy use in buildings’ conditioned spaces, including heating, ventilation, cooling and hot water, can be limited to <u>45 kWh/m2a</u> or, including plug-in loads (appliances), to <u>90 kWh/m2a</u>.” ➤ “Limiting building heating and cooling requirements to <u>15 kWh/m2a</u> in new builds and to <u>25 kWh/m2a</u> for retrofit projects (final energy in conditioned space) each reduces energy needs sufficiently...” 	<p>Construction of the new buildings can lead to energy efficient improvements and staying within the limits indicated in the Framework Guidelines is possible. That will, however, require the observation of the performance-based requirements in the buildings and ensuring the compliance with the building energy codes.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> ✓ In Belarus, in some recent residential buildings constructed in Minsk a heat demand was indicated as 39,5 kWh/m2a for the entire building, however the recalculated energy demand for the entire building was calculated with 56 kWh/m2a. ✓ In the Russian Federation, the heating energy intensity for new multi-family high buildings was 77 kWh/m2a. ✓ In Kyrgyzstan, the thermal requirements for multi-apartment buildings, depending on the number of storeys, ranged from 64 to 78 kWh/m2a. However, the average space heat demand for multi-family apartment buildings constructed after 2004 was 100-110 kWh/m2a. 	<p>The existing buildings in all countries consume high amount of energy.</p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> ✓ In Bosnia and Herzegovina, on average, residential buildings consumed more than 200 kWh/m2a, while private households consume as much as 350 kWh/m2a. ✓ In Armenia, the buildings constructed in 1960s-1980s consume from 140 to 210 kWh/m2a. ✓ In Azerbaijan, the average energy consumption of residential buildings in 2017 was 276 kWh/m2a. ✓ In Georgia, the energy demand for heating individual houses is between 200-410 kWh/m2a. ✓ In Kazakhstan, the consumption of heat by residential buildings is on average 273 kWh/m2a. ✓ In Tajikistan, the requirement for heat energy of the buildings was estimated minimum as 148 kWh/m2a. For single-family houses with less efficient space-heating systems the consumption is between 220-244 kWh/m2a. <p>The examples of residential building retrofits, however, show that the potential to reduce energy consumption is also very high.</p>

FINDINGS: Existing Barriers

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A gap between energy efficiency policies potential and effective achievement exists mainly due to barriers affecting those energy efficiency policies and measures



Source: Institute for Building Efficiency, WR

The three main categories of barriers were identified:

- regulatory and institutional
- economic (financial and market barriers)
- behavioural (awareness, advice and skills)

RECOMMENDATIONS:

Opportunities to bridge the gap

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Strategic guidance:

- Governments should develop comprehensive and long-term building code strategy, gradually increasing its strictness.
- Governments should ensure the introduction of performance-based approach in the building energy codes & other EE standards.
- The building energy codes should be frequently evaluated, revised & improved in order to understand the existing strengths & eliminate weaknesses of EE policy design & implementation.
- EE policies should be developed & adjusted to different regional contexts & institutional realities within each country.
- Governments should set up targets for increasing the share of new high-performant buildings.
- Governments should set up ambitious timeline & targets for renovation of the existing buildings.

Design and construction:

- Governments should aim for net-zero energy consumption in new buildings.
- Comprehensive retrofits of existing residential & non-residential buildings should be planned & undertaken to reduce energy requirements & increase energy savings in buildings.
- The minimum energy performance standards should be mandatory for both new & existing buildings in all countries.
- The high costs of EE technologies may discourage consumers to install them. The Governments should introduce tax exemption or reduction to provide the initial incentive for purchase of energy saving technologies.
- Financial incentives should be introduced to encourage investment in the long-lasting high efficiency improvements.
- The stakeholders in the building sector should be educated on the importance of building energy codes in order to increase support for compliance and effective implementation of the EE policy.

Management:

- Energy agencies should be established in those countries where they do not exist.
- The baseline data on energy demand should be available to measure the success in implementation of EE policies.
- The energy performance certification of buildings should be applied as an obligatory measure. The energy rating for buildings should also be introduced.
- The building energy labels or certificates should be required at the sale or rental of properties.
- The efforts to develop or improve ESCO market should be undertaken in all countries.
- Energy pricing should be used as an effective tool for influencing the energy use behaviour. Removal of subsidies to energy use & diversification of pricing measures should be used to enhance the attractiveness of investments in energy efficiency.
- Strong compliance mechanisms & proper monitoring mechanisms should be established to ensure the effective building codes enforcement.
- Low interest loans for EE technologies & building constructions & retrofits should be introduced as important instrument in promoting EE.

National studies with a more detailed gap analysis in Armenia, Kyrgyzstan, and the Republic of Moldova



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- ✓ Energy efficiency potential assessment (government institutions, existing programmes/projects, driving forces for introduction of EE measures, legislation and policies, existing challenges)
- ✓ Analysis of the energy performance of buildings in the countries
- ✓ Implementation of current building energy efficiency standards in the countries
- ✓ Gap analysis:
 - between performance objectives of the Framework Guidelines and the requirements of existing EE standards in buildings
 - between the requirements of existing EE standards in buildings and their actual implementation
- ✓ Country-specific recommendations on the possibilities to bridge the gap and enhance national capacity to develop and implement energy efficiency standards for buildings

Available in English and Russian at: <https://unece.org/sustainable-energy/regional-advisory-services/gap-analysis-and-national-studies>

Examples of recommendations from the national study in Armenia

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EXISTING GAPS	RECOMMENDED ACTIONS
Need to complete legal-regulatory reforms and enforcement	<ul style="list-style-type: none"> • Harmonization with EU Acquis • Enhance capacity building • Market liberalization and integration in regional markets
Insufficient technical and institutional capacities of EE promoters	<ul style="list-style-type: none"> • TA to improve capacity of EE promoters • Internalization and quantification of non-monetary benefits
Lack of tailor-made, affordable financing schemes for upscaling investments in building EE	<ul style="list-style-type: none"> • Low interest debt financing • Grant co-financing • Leveraging of national social services • Guarantee vehicles
Lack of adequate resources to overcome barriers for country-wide public building energy efficiency roll-out program	<ul style="list-style-type: none"> • Expansion of lending schemes to public and municipal infrastructure energy efficiency • Grant co-financing • Design an exemplary energy efficiency upgrade campaign • Public Energy Management Program
Untapped market for multi-apartment residential building EE investments	<ul style="list-style-type: none"> • Grant technical assistance for developing enabling investment environment • Grant co-financing for concessional lending • Credit guarantees to reduce the imposed margins
Absence of EE product and service delivery mechanisms for rural households leading to fuel poverty and dramatic deforestation	<ul style="list-style-type: none"> • Grant technical assistance for developing enabling investment environment • Grant co-financing for concessional lending • Credit guarantees to reduce the imposed margins • Monetize the benefits of mitigated deforestation
Lack of awareness on the benefits of energy efficiency among decisions makers, service vendors and end-users	<ul style="list-style-type: none"> • Nationwide public outreach campaign

Examples of recommendations from the national study in Kyrgyzstan

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Strategic recommendations aim to determine/consolidate the position and views on the problems of energy conservation in the country, determine the ways and tools for solving the problems.

Examples:

- *Assign the governmental entity responsible for the policy and coordination of activity in the field of EE*
- *Establish an entity responsible for international collaboration and certification of materials, goods, equipment, and suppliers*
- *Conduct analysis of existing documents related to energy and EE, review and adjust them*
- *Develop/adopt a program on EE aiming at net-zero consumption, which is focused on the conservation and rational use of all energy resources*
- *Introduce incentives for entities and private sector that increase EE*
- *Popularize the program on EE, develop long term awareness program...*

Technical recommendations for individual family houses and apartments need to be implemented after the strategic recommendations.

Examples of recommendations from national study in the Republic of Moldova:



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- Need to take more actions to implement national targets into the high-performance building projects. Activities of the Ministry of Economy and Infrastructure needs to be updated in accordance with the NDC2 climate targets.
- Initial incentive for purchase of energy saving technologies should be introduced. Financial incentives should be introduced to encourage investment in the long-lasting high efficiency improvements, including ESCO contracting.
- Certification of existing residential and non-residential buildings should be implemented in market model. The minimum energy performance standards should be updated and implemented for both new and existing buildings.
- Digital tools should be considered to enhance flexibility and clean energy deployment.
- Stakeholders in the building sector should be educated on the importance of building energy codes.



Thank you for your attention!

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