

Post COVID-19 Recovery in Informal Settlements in the UNECE Region

Background paper on energy efficiency, renewable energy, and minimum performance standards in relation to informal settlements

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Structure:

1. Ways to ensure access to affordable and modern energy in informal settlements
2. Specific requirements of energy efficiency and renewable energy projects implementation for the informal settlements in selected cities
3. Minimum energy performance standards, as a requirement for formalization of informal settlements
4. Conclusion and Recommendations

Ensure access to affordable and modern energy in informal settlements



The study is aimed at discovering reasonable energy access opportunities for the informal settlements, which supposed to have a specific owner with identified needs in sustainable energy supply

Ensure access to affordable and modern energy in informal settlements

One of the areas that needs to be addressed for informal settlements is access to affordable and modern energy.

This includes issues of:

- energy efficiency
- renewable energy (including off-grid solutions)
- minimum performance standards
- comfortable living conditions

All of these aspects have to be addressed when considering formalization of informal settlements

Ensure access to affordable and modern energy in informal settlements

- Due to specifics of informal settlements status, there is often no centralized connection available, and both heating and domestic hot water system are operated locally, without proper emissions quality and safety rules compliance control.
- Following possible solutions could be considered for improvement of both electrical and heating energy supply sustainability (including primary fuel requirements):
 - Implementation of subsidies (connection and consumption subsidies)
 - Improvement of the payment system (illegal connection to the grid, payments accuracy, cooperatives and distributed local level energy generation, implementation of prepaid energy scheme)

Specific requirements of energy efficiency and renewable energy projects implementation



- Specific energy requirements for the informal settlements in selected cities could be formulated as a set of minimum energy performance standards covering various aspects of energy needs in such types of buildings, that are mandatory for legalization, as well as a set of supporting measures aimed at achievement of these standards for those inhabitants who wish to formalize their buildings
- Improvement of energy efficiency is an important component of sustainable supply of electrical and heating energy for informal settlements (including access to primary fuels with low emissions)

Specific requirements of energy efficiency and renewable energy projects implementation




- Increase in energy data transparency, which will follow the process of energy efficient solutions implementation, could additionally reduce energy losses and improve quality parameters by elimination of illegal connections
- Two main types of renewable energy resources which have potential in application for heating and cooking in informal settlements of selected cities are biofuels (in particular biogas) and solar power (photovoltaics and solar water heaters)

Specific requirements of energy efficiency and renewable energy projects implementation



- Based on the results of the analysis the most applicable energy efficiency and renewable energy technical solutions for informal settlements retrofit identified
- The main activities are listed below, in descending order of priority of implementation:

Direction shows the most used EE/ renewable / technologies for informal settlements retrofit



N	Type of EE or renewable technology/measure
1	Use of EE appliance
2	Installation of new modern EE windows
3	Insulation of roof/technical floor slab
4	Installation of new electrical boilers
5	Insulation of external walls
6	Installation of new EE lamps (LED)
7	Insulation of attic/ground floor slab
8	Installation of new gas-fired boilers
9	Installation of solar collector system
10	installation of heat pumps

All relevant energy efficient solutions and measures for retrofit of informal settlements and their level of strictness and enforcement of performance in accordance with the current energy efficiency legislation in each target country presented in the report

Minimum energy performance standards as a requirement for formalization of informal settlements



- Building codes and legal regulatory requirements contain main energy performance indicators. These indicators could be divided into two categories:
 - Common energy performance indicators (CEPI)
 - Minimum energy performance standards (MEPS)

Minimum energy performance standards as a requirement for formalization of informal settlements



- It is necessary to meet the **minimum energy performance standards** and **common energy specific indicators** to ensure thermal comfort, energy efficient use of resources and define uncertain issue of the legal status of a housing property as well as uncertain permission for connection to the external communications from different local utility companies and availability of a confirmed legal form of home management (condominium, management company, group of homeowners)
- CEPI and MEPS should be applicable for informal settlements that are in the process of formalization

Minimum energy performance standards as a requirement for formalization of informal settlements



Compliance of defined MEPS with CEPI for informal settlements in selected cities

Minimum energy performance indicators		Kyrgyzstan		Montenegro		Albania		Macedonia		
		MFRIS	SFRIS	MFRIS	SFRIS	MFRIS	SFRIS	MFRIS	SFRIS	
1. Compliance with prescriptive documents and standards										
1	Energy Performance Certification (EPC)/Energy Labelling/Energy Passport	Yes(1)	NR	Yes(1)	Yes(1)	No	No	Yes(1)	Yes(1)	
2	Compliance with Energy Building Code	Yes	NR(2)	Yes	Yes	Yes	Yes	Yes	Yes	
3	Rating/certification of building materials	No	No	Yes	Yes	No	No	No	No	
4	Requirements to test building materials and products by certified test laboratories	Yes	Yes	Yes	Yes	No	No	No	No	
2. Prescriptive requirements as per as building energy codes										
1	Thermal insulation (including U-values for walls, floor, roof and windows)	Yes	NR(2)	Yes	Yes	Yes	Yes	Yes	Yes	
2	Specified thermal comfort levels for winter and summer for indoor and outdoor climate	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Recommendation to location, position of building	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Solar gains (G-values)	Yes		No	No	Yes	Yes	Yes	Yes	Yes
5	Passive solar systems and solar protection	No		Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Ventilation requirements	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Lighting efficiency	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Requirements to airtightness	No		Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Application of renewable technical solutions	No		Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Home appliance	No		Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Thermal bridges	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Notes description:										
1)	Building codes requirements strongly prevalent only for residential buildings with implemented substantial refurbishment)									
2)	The minimum energy efficiency requirements for buildings do not apply to individual residential buildings, the total area of which does not exceed 150 square meters									

Conclusions



- Improving building infrastructure and energy access for residents of informal settlements has immediate impacts on people's lives, as well as benefits for public health and the environment
- Compliance with minimum energy performance standards should be a requirement for legalization of informal settlements (with a possible grace period). This requirement should be accompanied by supporting measures aimed at achievement of these standards for the residents, who wish to formalize their construction.

Conclusions



- Changes in the existing legislation may be necessary in those countries where energy building codes do not include prescriptive requirements for improved energy efficiency. In those countries, EE solutions are rarely implemented (mostly through pilot or demonstration projects funded by international organizations), are economically inefficient, and not sustainable

Conclusions

- Based on the results of conducted analysis, the following practical measures could be implemented:
 - The legalization process and retrofit of the buildings in informal settlements of selected cities could start with measures that do not require significant initial expenditures, such as the use of energy efficient household appliances and replacement of incandescent lightbulbs with LEDs
 - Medium-cost measures for enclosing structures: installation of modern energy efficient windows and insulation of the attic floor and/or roof insulation.
 - Upgrade or installation of modern boilers
 - Wall insulation
 - Implementation of renewable energy technologies, such as solar collector systems and heat pumps

Recommendations



Target

Adequate energy services are provided to informal settlement residents, which includes making them affordable and modern, improving efficiency, using renewable energy where applicable, and complying with minimum performance standards. Availability of such energy services creates greater community resilience to pandemic and other health threats, greater equity, stronger economic opportunities and helps safeguard human rights for most vulnerable people in societies

Recommendations



Actions

1. *Identify* detailed characteristics of the energy services relied upon by the informal settlement residents. This should include a variety of energy types, efficiency, theft of energy and ways to prevent it, delivery and payment methods, sustainability, and existing gaps with the minimum performance standards that are in place.

2. *Determine* what economic, social, and health risks are posed by the current characteristics of the energy services. This should include inadequate indoor and outdoor air quality, inadequate water supply and sanitation, high energy costs, degradation of green spaces, potential fire hazards, and any other identifiable negative factors.

Recommendations



3. Study available opportunities for improving energy efficiency and reducing risks. These should include more efficient appliances, incentives for introducing energy efficiency measures (including subsidies), back-end pricing models (long-term recovery of upfront costs), flexible payment systems, energy cooperatives, appropriate balance of multiple energy sources, and modern cooking fuels. The cooperative electrification model deserves special attention.

4. Employ where appropriate renewable energy sources, as well as waste to energy, and distributed generation energy options. Distributed generation in informal settlements can be a good early step on the progression up the energy ladder as it avoids some of the major pitfalls likely faced in expanding energy infrastructure.

Recommendations



5. *Strongly consider* application of minimum energy performance standards (MEPS) for informal settlements as a prerequisite for their formalization. A grace period may be applied after formalization and registration of a residential building before a formalized settlement needs to be in compliance with MEPS. In that period, necessary steps need to be undertaken by residents and assistance should be provided by local authorities responsible for formalization.

6. *Develop* a specific framework for co-financing of energy efficiency measures and renewable energy solutions. Together with education initiatives on efficient use of heating systems and domestic appliances, this should become a core part of the post-COVID-19 recovery strategy in informal settlements, especially taking into account aspects of critical importance of sustainable energy supply during the pandemic lockdowns and restrictions.



Thank you!