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## Energy efficiency of buildings in Kosovo

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### Abstract

The energy efficiency in Kosovo is characterized by a high degree of unsustainability. Figures show high spending on electricity, mostly in household sector. However, the focus of this study is on the intervention and investment in the energy efficiency of public buildings. Such initiative has to meet local requirements on energy efficiency. Nevertheless, the implementation program has been hindered by several obstacles.

This study is aimed at presenting the current situation and measures undertaken to improve the energy efficiency of public buildings. The research was conducted by analysing a set of statistical data and interview results.

*Key words: Kosovo, energy efficiency, investment, interventions, private and public buildings*

## Energetska učinkovitost u zgradama na Kosovu

### Sažetak

Energetsku učinkovitost na Kosovu karakterizira visok stupanj neodrživosti. Podaci pokazuju visoku potrošnju električne energije, najviše u sektoru kućanstava. Međutim, fokus ovog istraživanja je bio na intervenciji i ulaganju u energetska učinkovitost u javnim zgradama. Takva inicijativa treba ispuniti zahtjeva za lokalnih propisa za energetska učinkovitost, međutim, program provedbe doživio je nekoliko prepreka.

Istraživanje se provodi kako bi se prikazao trenutni status inicijative i primjenjene mjere energetske učinkovitosti u javnim zgradama. Istraživanje je provedeno analizom skupa statističkih podataka i intervjuja.

*Ključne riječi: Kosovo, energetska učinkovitost, investicije, intervencije, privatne i javne zgrade*

## 1 Introduction

Energy efficiency is no longer a new term for the public. Over the past four decades, the concept of energy efficiency has been increasingly accepted and used by the society worldwide [1]. But for Kosovo this was considered too utopian: after 1999, it became clear that, while Kosovo has substantial reserves of lignite, its two major electricity generating plants (Kosovo A and Kosovo B) were of obsolete design, insufficient capacity and were poorly maintained [2].

Ninety-seven percent of all energy produced in Kosovo comes from this source and so, if coal reserves run out, Kosovo will essentially no longer be able to produce energy. Planning has also long been underway to develop a new Kosovo e Re power plant to help meet Kosovo's energy demands, although timescales for this project keep slipping [3]. Moreover, investments in energy efficiency in Kosovo, similar to all other investments in general, have been lacking for almost two decades during the period of repression. Due to geopolitical developments, the war and numerous economic problems, Kosovo can arguably be ranked as one of the least developed countries in the region concerning energy efficiency. The absolute majority of houses in Kosovo, including old and new buildings, do not meet energy efficiency standards. Furthermore, a large part of the houses and apartments in Kosovo use electrical energy for heating, as well as inefficient appliances, causing energy efficiency to be at an alarmingly low level. Kosovo authorities have begun planning and drafting public policies related to efficiency, based more on the requests made by the European Union than on the basic needs for energy [4].

On the other hand, the initial legal framework, based on which Kosovo attempted to regulate the problem of Energy Efficiency, was the Law on Energy No. 2004/8 enacted in 2004. In this period of time, and in the scope of continued legal efforts, the issue of Energy Efficiency is addressed by three primary regulations for energy sector: the Law on Energy, the Law on Electricity, and the Law on the Energy Regulator [5]. In 2011, the first Law on Energy Efficiency was approved together with some Administrative Instructions related to this field. In 2018, the new law on Energy Efficiency was also approved.

Before the first law on Energy Efficiency in 2010, the First National Energy Efficiency Action Plan (NEEAP) was approved with the goals of achieving energy saving target of 9% from final energy by 2018. Energy saving in buildings has been proclaimed a key action step to achieve this target [6].

In this respect, Kosovo is facing the challenges of development in the field of Energy Efficiency, and has been receiving assistance from donors such as the European Bank for Reconstruction and Development (EBRD), Budget of Republic of Kosovo (BRK), United States Agency for International Development (USAID), United Nations Development Programme (UNDP), European Commission etc., who invest and

assist the country in various areas but mainly in auditing, legislation and investment in concrete projects such as public buildings. There have been some initiatives and some residential real estate businesses which continue to benefit through bank loans at lower rates, while there has also been some support for citizens who make investments in energy saving.

## 2 Electric energy, misery for postwar Kosovo

According to the World Bank report from 2013, Kosovo is one of the poorest countries in Europe, with almost a third of the population living below the poverty line and one in ten people living in extreme poverty. The average per capita income is about one-tenth that of the EU and Kosovo has one of the highest unemployment rates in Europe [7]. Despite that, Kosovo's lignite reserves are Kosovo's biggest natural resource [8]. It has more than 14 billion tons of lignite reserves, the fifth largest lignite reserves in the world [2]. However, Kosovo cannot produce enough electricity for its residents because the system of incineration and distribution is quite old. In the post-war period, Kosovo has been faced not only with lignite problems but also with the development of fast and uncontrolled construction activity. The practice of avoiding the permitting procedure and development of design documentation has resulted in the use of cheaper materials more suitable materials for investors. Thus the present residential sector in Kosovo accounts for the largest energy consumption, so that only in the first quarter of 2019 this figure goes to 59% [9]. of the total energy consumption. With 67% of households without insulated roofs, 52% without double-glazed windows, and 69% living in privation without insulated walls, there is a clear need to reduce the energy efficiency gap found in the present-day Kosovo context. Still, the issue is exacerbated by the increasing electrical energy demand with the 47.49% rise in 14 years and the inability of the government to tackle this problem head-on [10]. The total floor area of the building stock of Kosovo is estimated at 45 million m<sup>2</sup>, while public buildings occupy a total floor area of just over 2 million m<sup>2</sup> [11].

By 2012, the implementation of energy efficiency measures has started in public institutions and various social sectors that they manage, according to a model that is implemented in the EU member states [3]. Investments are usually made on these concrete projects. The need to achieve mandatory comfort levels in buildings, in line with the EU Directives on the energy performance of buildings, means that renovation of the existing building stock has to be given a high priority in Kosovo. So far little research has been done on energy performance of buildings in Kosovo, and there are no clear energy standards and regulations [12]. Although laws such as the energy performance in buildings or energy efficiency Law are partially in line with the Directives such as No. 2010/31 and 2012/27/EU of the European Parliament

and of the Council on Energy Efficiency, Kosovo still does not have a Building Code and so far many interventions are based on the 1995 JUS ex-Yugoslav standard. U-Values for various building categories according to JUS standard, applied in Kosovo in certain cases, are given in the following table.

**Table 1. Reference U-values for components of buildings in residential sector and for the components of tertiary buildings before and after renovation [9]**

	Construction Period															
	1960-1998								2002-							
	wo*		Ba		ce		wi		wo		ba		ce		wi	
	before	after	b.	a.	b.	a.	b.	a.	b.	a.	b.	a.	b.	a.	b.	a.
Individual houses	1.47	0.34	1.71	0.52	1.48	0.36	4.18	2.8	1.1	0.35	0.75	0.75	1.22	0.36	2.97	2.8
BLOCKS up to 3 floors	1.07	0.34	1.71	0.53	1.21	0.36	4.18	2.8	0.84	0.84	0.95	0.52	1.16	0.36	2.8	2.8
BLOCKS over 3 floors	1.91	0.38	1.71	0.53	1.48	0.36	4.22	2.8	0.88	0.88	0.92	0.73	0.52	0.52	2.8	2.8
Commercial/Industrial	1.57	0.34	1.71	0.34	1.48	0.35	4.2	2.8	1.2	0.35	0.81	0.65	1.21	0.36	2.8	2.8
Public building	0.9	0.4	2.9	0.54	2.09	0.35	5.1	2.8	0.44	0.44	0.74	0.74	0.23	0.23	2.8	2.8
Universities and schools	1.15	0.32	1.28	0.58	1.24	0.4	5.1	2.8	0.46	0.46	0.65	0.65	0.61	0.61	2.8	2.8
Hospitals and HC	0.97	0.49	1.84	0.56	1.62	0.35	5.1	2.8	0.46	0.46	0.78	0.78	0.52	0.52	2.8	2.8

\*) wo- wall; ba- floor; ce- ceiling, wi- window; b.- before; a.- after

**Table 2. Proposal of Requirements for Energy Performance [14]**

		1) BLOCKS - 5 floors (1960-1969)		2) BLOCKS - 9 floors (1970-1979)		3) BLOCKS - 11 floors (2000-2017)	
	BLOCKS	Current condition		Standard improvement		Advanced improvement	
External wall	1		U = 1.864 W/m²K		U = 0.327 W/m²K		U = 0.180 W/m²K
	2		U = 0.677 W/m²K		U = 0.235 W/m²K		U = 0.142 W/m²K
	3		U = 0.289 W/m²K		U = 0.289 W/m²K		U = 0.180 W/m²K
Windows	1		U = 3.5 W/m²K		U = 1.6 W/m²K		U = 1.0 W/m²K
	2		U = 2.8 W/m²K		U = 1.60 W/m²K		U = 1.0 W/m²K
	3		U = 1.40 W/m²K		U = 1.40 W/m²K		U = 1.0 W/m²K
Floor	1		U = 1.339 W/m²K		U = 0.316 W/m²K		U = 0.176 W/m²K
	2		U = 0.90 W/m²K		U = 0.344 W/m²K		U = 0.185 W/m²K
	3		U = 0.338 W/m²K		U = 0.338 W/m²K		U = 0.193 W/m²K
Roof	1		U = 4.134 W/m²K		U = 0.365 W/m²K		U = 0.160 W/m²K
	2		U = 0.565 W/m²K		U = 0.221/m²K		U = 0.148 W/m²K
	3		U = 0.361 W/m²K		U = 0.357 W/m²K		U = 0.189 W/m²K

Over the years Ministry of Environment and Spatial Planning – MESP has published documents for public hearing, namely the guidelines for implementing minimum energy performance requirements for existing buildings in residential sector. Therefore, concrete examples are presented according to these guidelines: current condition, standard improvement, and advanced improvement, for which the targets are to be revised in 2023. These proposals are given only in the form of guidelines and not as administrative instructions. MESP has provided some of the guidelines through concrete housing projects which are presented in table below.

Although Kosovo Agency for energy efficiency, and the Certification Commission of Energy Auditors and Managers, have been established [3], no certificate for energy performance of buildings has been issued so far. According to the Ministry of Economic Development, Kosovo currently has 52 persons who have been trained and certified as energy auditors [14].


On the national level, in order to achieve the 9% energy saving targets by 2018, Kosovo has been increasingly considering the issue of energy efficiency as an issue of high priority [3]. Thus, the first and second medium-term action plans have already been implemented and foreseen 6% energy savings have been achieved [15]. According to an interview with Mr. Sekiraga about the third intermediary plan for energy efficiency 2016-2018, only 3% remain for full completion of the planned energy savings in 2018. Based on the National Renewable Energy Action Plan of the Republic of Kosovo 2011-2020, Kosovo intend to save 25% of energy until the year 2020 [16]. Until now, the efficiency has only been seen as a target to be met in Kosovo; as an international obligation to be met as part of being Energy Treaty Party for the Establishment of the Energy Community. We have seen less efforts in tackling energy efficiency not just as number and target but as one of the energy sources that can be counted on in future energy projections [17].

### **3 Energy efficiency investments in public buildings**


Buildings use up a great deal of energy to provide comfortable environments for their occupants. Various definitions and descriptions of human comfort are used as the baseline against which building performance is evaluated [18]. Many public buildings in Kosovo are outdated i.e. more than half of buildings were built in the period 1970-1985 and immediate investments are required for their thermal insulation, efficient dual-or triple window glass, and efficient space heating and hot water systems, to maintain the value of the property and to improve the comfort of the building occupants [6]. According to the KAEE, there have been interventions since 2012 to improve energy efficiency in more than 70 buildings from the BRK and various donors [19]. Even though the potential to save energy in the entire building stock in Kosovo is estimated to be about 45% of the total current energy

consumption for these buildings [20], according to Mr. Sekiraqa, the savings of 20% were obtained after implementation of measures for the improvement of energy efficiency in some buildings [19]. The following tables, based on the audit report, give details of measures aimed at improving energy efficiency on three projects monitored by KAEE.


**Table 3. National and administrative institute in Prizren, Kosovo [19]**

National and administrative institute in Prizren	Year of construction	Type of building	Number of floors	General condition	Interventions (2002-2004)
	1974	Institute - Hospital	4	Relatively good	Roof and windows
	Energy efficiency measures implemented	External walls, roof, lighting, electricity for cooling and heating, pipe insulation, boiler, other electrical equipment			
	Total investment in the building where 92,862 Euro, savings 14,618 Euro/year, PBP (simple return funds period) = 5.21 years, IRR (internal rate of return) = 24.6 %, NPV (net present value) = 217,842 Euro.				

**Table 4. Municipal Administration in Prizren, Kosovo [19]**

Municipal Administration in Prizren	Year of construction	Type of building	Number of floors	General condition	Interventions (2010)
	80's	Administrative building	5	Relatively good	Roof
	Energy efficiency measures implemented	External walls, lighting, electricity for cooling and heating, pipe insulation, boiler, other electrical equipment			
	Total investment in the building where 98,044 Euro, savings 12,576 Euro/year, PBP (simple return funds period) = 5.99 years, IRR (internal rate of return) = 24.6 %, NPV (net present value) = 217,842 Euro. Saving 58 [kWh/year/m <sup>2</sup> ] or 28 %				

**Table 5. Specialist Ambulance - Hospital in Peja, Kosovo [19]**

Municipal Administration in Prizren	Year of construction	Type of building	Number of floors	General condition	Interventions (2010)
	1978	Hospital	2	good	doors, windows, roof
	Energy efficiency measures implemented	External walls, lighting, electricity for cooling and heating, pipe insulation, boiler, other electrical equipment			
	Total investment in the building where 145,240 Euro, savings 20,961 Euro/year, PBP (simple return funds period) = 8.19 years, IRR (internal rate of return) = 16 %, NPV (net present value) = 188,833 Euro.				

### 3.1 Activities financed to improve energy efficiency

#### BRK-funded projects:

- Energy audit to public service buildings, for 2011-2016, for each year: € 144,000.00.
- Public Campaign on energy efficiency and RE Sources (RES), for 2011-2016: € 50,000.00 per year.

#### Projects funded by donors / borrowings:

- Supervision, monitoring, verification and evaluation of energy efficiency measures in schools and hospitals in Kosovo (Funded by the European Commission in the amount of 15.6 M Euro. The project has been implemented and measures will be introduced in 63 schools and 2 hospitals).
- Study and implementation of energy efficiency measures in public buildings of the centre level, funded by WBIF (Western Balkans Investment Framework)/WB. The amount of funding is 31 M Dollar: design and bidding documents were prepared for the implementation of energy efficiency measures for the first 19 buildings.
- Implementation of energy efficiency measures in municipal public buildings financed by WBIF/KfW. The amount of financing is 7.5 M Euro.
- Support for the private sector and residential energy efficiency measures, financed by the EBRD, the amount of funding is € 12 M. (Emphasis will be given to private sector, where only the first contracts are made with a commercial bank TEB (value € 5M) and Kosovo Rural Lending KRL (value € 1.5M). The project is in the implementation phase.
- The UNDP have been developing projects to promote energy efficiency and two municipalities were assisted in drafting the Municipal energy efficiency Plans 2014-2020 as well as concrete measures for public lighting in the municipality.
- Five municipalities were assisted through USAID in drafting municipal plans for energy efficiency, while ten municipalities were supported in the implementation of energy efficiency measures [6].

According to the KAEE, most of the initiatives included “soft” measures (technical assistance, awareness, realization of various studies) while the level of implementation of “difficult” projects (i.e. physical investments) has been low [21].

Kosovo has created an energy efficiency fund this year to make it possible to complete energy efficiency measures and, according to the KAEE, energy efficiency measures in public buildings have been implemented since 2010 for 70 buildings, which includes the audit process (lighting, heating, thermal insulation of facades, roof insulation, doors and windows etc.). Most of these buildings are either under con-



struction or are in the process of being monitored. According to relevant interviews, energy efficiency savings realised for these buildings amount to approximately 0.7 ktoe<sup>1</sup> or 56,172,900.00 euros. The KAEE indicates that the proposed measures for improving or reducing energy consumption have in most cases failed to achieve the expected results. This phenomenon occurs for various reasons and a major one is certainly an inadequate description of material characteristics for intervention. Moreover, characteristics of domestic products are not verified since Kosovo has no institution that tests and certifies compliance of products with national standards.

### 3.2 Kosovo energy efficiency and renewable energy projects by world bank

Through the Energy Efficiency and Renewable Energy Project for Kosovo, the World Bank has formulated objectives to:

- reduce energy consumption and fossil fuel use in public buildings through energy efficiency and renewable energy investments
- enhance the policy and regulatory environment for renewable energy and energy efficiency [22].

Some of these projects are presented in Table 6.

**Table 6. List of 6 out of 26 latest projects in Kosovo, related to the World Bank's Energy efficiency and renewable energy project [22]**

DOCUMENT TITLE	DATE	REPORT NO.	DOCUMENT TYPE
Invitation for Bids	June 17, 2019		Notice
REOI for RE support	June 17, 2019	Notice	
Disclosable Version of the ISR - Kosovo Energy Efficiency and Renewable Energy Project -P143055 - Sequence No : 10	June 14, 2019	ISR36832	Implementation status and results report
Disclosable Version of the ISR - Kosovo Energy Efficiency and Renewable Energy Project - P143055 - Sequence No : 10	May 4, 2019	ISR36832	Implementation status and results report
Disclosable Version of the ISR - Kosovo Energy Efficiency and Renewable Energy Project -P143055 - Sequence No : 09	Nov. 9, 2018	ISR34316	Implementation status and results report
Kosovo P143055-IDA5508XK Energy- Efficiency and Renewable Energy Project (KEEREP) Dec 31-2017 Audit Report	Sep. 23, 2018	AUD0016993	Auditing document
Disclosable Version of the ISR - Kosovo Energy Efficiency and Renewable Energy Project - P143055 - Sequence No : 08	May 11, 2018	ISR32433	Implementation status and results report
Disclosable Version of the ISR - Kosovo Energy Efficiency and Renewable Energy Project -P143055 - Sequence No : 07	Dec. 7, 2017	ISR30472	Implementation status and results report

1 1 ktoe = 11630000 kWh. Electricity price for 2018 in Kosovo was 6.9 cent per MWh, 8,141,000 X 6.9 = 56,172,900.00 euros

### 3.3 Concrete actions in the Municipality of Prishtina related to energy efficiency

According to an interview with Prishtina Municipality officials, the capital city of Kosovo has had more opportunities, compared to other municipalities, to benefit from various energy efficiency grants. In this respect, a Memorandum of Understanding was signed with the EBRD in previous month about auditing and preparation of projects for municipal buildings such as schools, HC, kindergartens, etc. and, after completion of this work, the tendering will be carried out by the Municipality of Prishtina. Moreover, the municipality has developed various policies for increasing energy efficiency. In 2015, the Mayor of the Municipality decided to change the procedure of construction permitting, which enables expansion of the construction footprint by 10% compared to the footprint determined in the framework of urban development plans. However, this is subject to fulfilment of eight points defined in the decision (building orientation, greenery, use of renewable sources of electricity and heat such as wind, sun, water etc., use of efficient ventilation and cooling practices, wastewater recycling, wastewater treatment, use of sustainable materials, management of waste). Furthermore, the Municipality of Prishtina does not collect public tax for the thickness of thermal insulation in buildings in the process of issuing construction permits. However, in order to allow investors to apply the most extensive thermal insulation layer on the external façade, the municipality can plan the thermal insulation on the building surface outside the regulation line, as it is not determined by legislation which thickness should be the minimum one. Consequently, to stimulate investors to invest more, the fee for building permits does not include the cost for the area covered by thermal insulation.

This year, the Municipality of Prishtina has also finalized the Prishtina Sustainable Urban Mobility Plan - SUMP project, developed by the company Mott MacDonald. As to private sector, The EBRD has invested more than €225 million in 51 projects in Kosovo [23]. Thank to these bank loans, over 3,100 households in densely populated Kosovo are cutting their energy bills and enjoying more comfort at home after investing in energy-saving improvements through the Kosovo Sustainable Energy Projects (KoSEP) [23].

It was established in an interview that a house owner Mr. Qerimi invested about € 13,000 in 2014 in thermal insulation of the house (15cm) through a Procredit Bank loan. He replaced dual window glass and insulated the roof, consequently saving about 25% of electricity compared to the period before the intervention. Mr. Qerimi stated that “he is very pleased that the house is much warmer and more comfortable” [24].



Figure 1. Home of the Qerimi family before and after the intervention [24]

## 4 Conclusion

The data collected show that Kosovo needs to work harder to improve its professional capacity in the field of energy efficiency. This can be done through recruitment, training, or obtaining expertise from abroad. Therefore, energy efficiency policies should be closely related to relevant regulations, and to activities aimed at increasing awareness of citizens in this area. On the national and local levels, the government and municipalities should create plans for the development, implementation, and monitoring of energy efficiency measures, including finalisation of legal framework for this field.

Moreover, considering interventions for increasing energy efficiency in public buildings based on the findings of the audit report, in my opinion, the cost-benefit analyses and monitoring have not been conducted on a regular basis, which must in fact be done to see exactly where the energy losses occur, and whether the expectation for energy savings has been fulfilled according to the precautionary measures specified in the audit report.

On the other hand, national level authorities need to take concrete actions to enable introduction of certificates for the energy performance of buildings, to accelerate procedures for the adoption of the construction code, and to develop policies for incentives or support to private investments in energy efficiency. For example, lower interest rates on energy efficiency loans are a very good incentive, which would certainly have a positive impact. In addition, the use of local materials in construction creates financial boost and fosters growth of national economy. In my opinion, awareness about the energy efficiency should also be increased in residential sector. However, the policies, programs and incentives leading to a sustainable energy efficiency system remain the most important part of efforts to improve the country's standards in the field of energy efficiency.

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