Draft Final Report

National Building Energy Efficiency Study for Kosovo

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Abbreviations

TERM	DESCRIPTION
AKM	Association of Kosovo Municipalities
CDM	Clean Development Mechanism
CHP	Combined Heat and Power
CI	Confidence Interval
CL	Confidence Limit
CoC	Chamber of Commerce
CPB	Central Government Public Building
EC	European Commission
ECM	Energy Conservation Measure
ECS	Energy Community Secretariat
ECSEE	Energy Community of South East Europe
ECT	Energy Community Treaty
EE	Energy Efficiency
EnCT	Energy Community Treaty
EPBD	Energy Performance of Buildings Directive
ERO	Energy Regulatory Office
ESCO	Energy Services Company
ETS	Emission Trading System
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GHG	Green House Gas
GIZ IS	International Services Department of the *Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH*
GoK	Government of Kosovo
HDD	Heating Degree Day
HVAC	Heating, Ventilation and Air-Conditioning
IRR	Internal Rate of Return
JI	Joint Implementation
KEEA	Kosovo Energy Efficiency Agency
KEEAP	Kosovo Energy Efficiency Action Plan
KEDS	Kosovo Electricity Distribution and Supply
KEK	Kosovo Energy Corporation (Korporata Energjetike e Kosovës)
KES	Kosovo Energy Strategy
KfW	KfW Bankengruppe
ktoe	Thousand tons of oil equivalent
KOSTT	Kosovo Transmission System and Market Operator
KRPP	Kosovo e Re Power Plant
KSA	Kosovo Statistic Agency
MED	Ministry of Economic Development
MEM	Ministry of Energy and Mining
MESP	Ministry of Environment and Spatial Planning
MLGA	Ministry of Local Government Administration
MoF	Ministry of Finance

MPA	Ministry of Public Administration
MPB	Municipal Public Building
MTI	Ministry of Trade and Industry
NALAS	Network of Associations of Local Authorities of South-Eastern Europe
NEEBS	National Building Energy Efficiency Study
NEEAP	National Energy Efficiency Action Plan
NFG	Norwegian Forestry Group
NGO	Non-Governmental Organization
NPV	Net Present Value
PCB	Private/Commercial Building
RD&D	Research, Development and Demonstration
RES	Renewable Energy Sources
SME	Small and Medium Enterprise
SoS	Security of Supply
STM	Stabilization Tracking Mechanism
TPP	Thermal Power Plant
UNMIK	United Nations Mission in Kosovo
WTA	Walk-Through Energy Audit
WB	The World Bank

1 Executive Summary

1.1 Project Background

The overall objective of this project was to prepare a detailed and comprehensive study to support the National Building Energy Efficiency Program, a concept that has been alluded to in previous government documentation (e.g. the Energy Strategy of Kosovo, 2009-2018[1] and the Kosovo Energy Efficiency Action Plan, 2010-2018). The execution of the study involved the following tasks:

- Estimating the technical potential for EE measures across the entire building stock of Kosovo;
- Identifying a range of cost-effective EE measures;
- Assessing the level of investment needed to realize these measures;
- Identifying impediments to the effective implementation of EE measures - institutional, legal, regulatory, and financial and market barriers - and developing strategies to overcome them
- Proposing a preliminary list of suitable options to support the delivery of the estimated potential;

This study falls into five distinct sections:

- A description of the economic, institutional and legal background to energy efficiency in Kosovo (Chapters 2 to 4);
- A review of the data sources and methodologies used for the Market Assessment (Chapters 5 to 8);
- The Market Assessment - a study of the market potential for energy efficiency, covering the entire building stock of Kosovo, including residential, private and public (central and municipal) buildings (Chapters 9 and 10);
- An analysis of barriers that restrict the implementation of energy efficiency measures in each building sector, a review of international experience and a list of potential options for mitigating each of the barriers (Chapters 11, 12 and 13);
- A summary of the main conclusions of the study (Chapter 14).

This study has been prepared under the World Bank Institute (WBI) regional capacity-building program to inform the government stakeholders on EE potential in the building sector and provide inputs to the adopted target for reduction of energy consumption of the commercial and services sector as set under the KEEAP.

1.2 Summary of Key Findings

According to the Energy Balance issued by the Ministry of Economic Development, primary energy supply in Kosovo in 2010 was 2,184 ktoe, representing a growth rate of 3.6% p.a. since 2003. Final energy consumption for 2010 was 1,111 ktoe.

Overall, the building sector, which consists of the Household and Services (public and private) Sectors accounts for 48% of energy consumption and represents the largest share of Kosovo's

[1] The Energy Strategy document identifies EE as one of the strategic objectives for the period 2009 - 18, envisaging the development of a comprehensive institutional and legal framework in compliance with European EE Directives

final energy consumption. Biomass (45%) and electricity (44%) were the main fuels used by the Household Sector, while for the Services Sector electricity was the main energy source (52%), followed by petroleum products (38%).

The total floor area of the building stock of Kosovo is estimated to be 45 million m². About a third of the entire building stock is accounted for by one storey residential buildings and the residential building sector itself has a total floor area of just below 35 million m², followed by the private building category with almost 8 million m² , while public buildings have a total floor area of just over 2 million m². Figure 1-1 below illustrates the share of total floor area accounted for by each building sector.

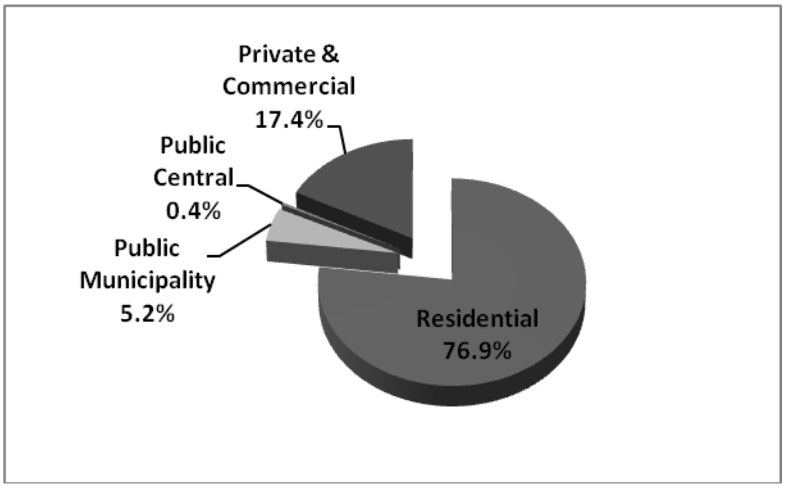

Figure 1-1: Floor area by building sector

Building Sector	Building Sector Total Area [million m²]	Building Sector Total Area [%]	Energy Savings Potential of Building Sector as % of Final Energy Consumpt.	Energy Savings Potential of Building Sector as % of Primary Energy Supply	Total Energy Savings Potential [ktoe]	Total CO_2 Reduction Potential [thousand ton/year]
I. Residential	**34.72**	76.9%	**45%**	**7.86%**	**171.74**	**2236.76**
II. Public Municipality	**2.36**	5.2%	**32%**	**0.77%**	**16.77**	**35.96**
Schools	1.69	3.7%	37%	0.50%	10.90	23.37
Health Buildings	0.39	0.9%	37%	0.15%	3.35	7.18
Other Buildings	0.28	0.6%	30%	0.11%	2.52	5.40
II. Public Central	**0.18**	**0.4%**	**49%**	**0.16%**	**3.60**	**10.28**
Central Hospitals	0.05	0.1%	45%	0.05%	1.12	3.20
Central Government	0.14	0.3%	50%	0.11%	2.49	7.08
II. Private & Commercial	**7.86**	**17.4%**	**46%**	**2.15%**	**46.95**	**102.04**
TOTAL	**45.12**	**100.0%**	**20.07%**	**10.94%**	**239.05**	**2385.03**

Table 1-1: Summary of Energy Savings Potential by Category of Building

The overall savings potential of the building sector in Kosovo is almost 11% of primary energy supply and 20.07% of final energy consumption for 2010. Total energy savings for the whole building stock are almost 45% of the total combined energy consumption of the household and service sectors. By realizing the energy efficiency potential in the building sector as presented in Table 1-1 above, Kosovo can save 239 ktoe, made up of the following contributions:

- 116 ktoe of electricity;
- 76 ktoe of fuel wood.
- 35 ktoe of diesel and heating oil by-products;

- 7 ktoe of coal/lignite;
- 5 ktoe of heat;

The monetary value of these energy savings (at actual prices) is presented in Table 1-2 below. The benefit of these energy savings would not be restricted to just the building sector, but would spill over to the economy as a whole.

Energy Commodity	Residential Buildings			Public and Private Service			TOTAL
	Energy price €/kWh	Energy saving GWh	Energy saving value € m.	Energy price €/kWh	Energy saving GWh	Energy saving value € m.	Energy saving value € m.
Coal	0.0114	45.03	0.51	0.0126	36.27	0.45	0.97
Oil by-products	0.1251	188.89	23.64	0.1126	221.93	25.00	48.64
Fire wood	0.0307	587.28	18.03	0.0307	299.81	9.20	27.24
Electricity	0.0802	1142.0	91.63	0.1298	202.72	26.31	117.94
Heat	0.0542	34.12	1.85	0.0597	22.19	1.32	3.17
TOTAL			**135.68**			**62.30**	**197.99**

Table 1-2: Monetary value of energy savings (actual prices)

The market assessment carried out for this study identifies a significant level of potential energy savings that could be achieved in Kosovo by implementing energy efficiency measures in the country's building stock. Realizing the full energy saving potential based on cost effective measures would require a total cumulative investment of €1.367 billion (see Table 1-5) and, as is shown in Table 1-2 above, this would generate annual cost savings to investors and end-users of about €198 million, meaning that the savings would cover the cost of the measures within about 7 years. This conclusion would justify the implementation of all the cost effective EE measures proposed in Section 10 of this study.

Table 1-1 shows that the largest contribution to the energy saving potential comes from the residential sector (72%), followed by the private and commercial sector (20%). Although the total energy saving potential of municipal and central public buildings is low in comparison with the other two sectors (8%), public buildings at present provide the best opportunities for achieving real energy savings because in many cases they already meet the required comfort levels. This fact suggests that any energy efficiency program should begin with the implementation of measures in public buildings and the energy savings and financial benefits resulting from the introduction of EE measures in municipal and central public buildings are presented in Table 1-3 below.

Despite their relatively low savings potential, launching the EE implementation program in the central and municipality public building sectors would give a strong message that the government is prepared to lead by example and it would provide a showcase for encouraging other EE initiatives in Kosovo. This in turn would help to foster a market for EE goods and services and create better access to public and donor funds. On the supply side (that is, in the provision of goods and services that improve EE, such as the installation of efficient heating and cooling systems, solar hot water systems, efficient light bulbs, etc), a successful implementation program will create real opportunities for construction, heating and air conditioning companies and they will be incentivized to improve their skills and knowledge in order to win future business. After completing a number of EE implementation projects successfully, the experience of other countries suggests that some of these companies will evolve and transform into ESCOs. Secondary legislation to support the ESCO contracting framework would need to be prepared, as required by the Law on Energy Efficiency, to provide an enabling environment for the uptake of ESCO business.

Energy Commodities	Municipality Public Buildings			Central Public Buildings		
	Energy price €/kWh	Energy saving GWh	Energy saving value € m.	Energy price €/kWh	Energy saving GWh	Energy saving value € m.
Coal	0.0126	9.04	0.11	0.0126	1.94	0.02
Oil by products	0.1127	55.28	6.23	0.1127	11.87	1.34
Fuel wood	0.0307	74.68	2.29	0.0307	16.04	0.49
Electricity	0.1298	50.49	6.55	0.1298	10.85	1.41
Heat	0.0597	5.53	0.33	0.0597	1.19	0.07
Total		**195.01**	**15.52**		**41.89**	**3.33**

Table 1-3: Energy savings, municipal and central public buildings (actual prices)

The calculations in Section 10 show that in order to realize the potential level of energy savings in municipal and central governmental buildings would cost €61.68 million and €17.63 million respectively. Table 1-3 shows that the investment value of cost effective energy savings comes to €15.52 million for municipal buildings and €3.33 million for central buildings.

These figures have been used in Chapter 10 to show that the EE measures proposed for the municipal and central building sectors offer attractive weighted average payback periods - 4.0 years and 5.3 years respectively - and therefore the GoK, with the assistance of IFIs and commercial banks, should consider as a priority the implementation of an investment program for public sector buildings.

The combined energy consumption of municipal and central public buildings is 44.03 ktoe and the annual energy expenditure for the sub-sector is about €41 million per year. The value of energy expenditure for each public building sub-sector is given in Table 1-4. At municipality level, the share of total energy expenditure on schools is 53.3%, on health service buildings 18.3% and is 11.7%, for other buildings. For central hospitals the share is 5% and 11.7% for central governmental buildings.

MUNICIPALITY AND CENTRAL PUBLIC BUILDINGS	Building Sector Total Area (m^2)	Energy Consumption (ktoe)	Energy Expenditures (€ m.)	Energy Savings (ktoe)	Energy Savings (€ m.)
I. Public Municipality	**2,360,000**	**36.69**	**33.96**	**16.77**	**15.52**
Schools	1,690,000	23.48	21.73	10.90	10.09
Health Buildings	393,000	8.07	7.47	3.35	3.10
Other Buildings	277,000	5.14	4.75	2.52	2.33
II. Public Central	**182,000**	**7.34**	**6.79**	**3.60**	**3.33**
Central Hospitals	46,000	2.20	2.04	1.12	1.03
Central Government	136,000	5.14	4.75	2.49	2.30
TOTAL	**2,542,000**	**44.03**	**40.75**	**20.37**	**18.85**

Table 1-4: Energy Consumption, Expenditures and Savings for Public Buildings (municipal and central)

Table 1-4 also shows that annual savings for public buildings could reach €18.85 million. Energy savings in schools account for 53.5% of the total, health service buildings for 16.5% and other municipality buildings, 12.3%. Central hospitals contribute 5.5% of total savings and central governmental buildings, 12.2%.

Table 1-5 presents the total investment required to finance all cost effective measures, for each sector - and for municipal and central public building sub-categories and the specific investment in **€** per m^2. The results show that specific investment ranges from 49 to 114 **€**/m^2. Although the shortest weighted average pay back period is recorded for private and commercial buildings, that is because this sector pays relatively higher electricity prices (that is, closer to short marginal cost reflective levels) compared to the residential and public building sectors. Taking account of this fact confirms the importance of starting the EE/RES program with the public building stock sector which produces comparable – and in some sub-categories, superior - pay back periods.

Building Sector	Building Sector Total Area [million m²]	Total Investment for cost effective EE Measures (€ m.)	Penetration ratio for building stock where EE/RES measures will be implemented in 2020	Total Specific Investment (€/m²)	Weighted Average Sectoral Pay Back Period (Years)
I. Residential	**34.72**	**1124**	**46.10%**	**71.35**	**8.2**
II. a Public Municipality	**2.36**	**61**	**41.78%**	**62.55**	**4.00**
Schools	1.69	47		66.59	4.66
Health Buildings	0.39	9		54.56	2.92
Other Buildings	0.28	5		49.19	2.41
II.b Public Central	**0.18**	**18**	**86.68%**	**111.75**	**5.30**
Central Hospitals	0.05	4		103.33	3.99
Central Government	0.14	14		114.60	5.87
II. c Private & Commercial	**7.86**	**175**	**52%**	**42.80**	**3.73**
TOTAL	**45.12**	**1378**	**46.51%**	**58.75**	**6.96**

Table 1-5: Total (€ m.) and specific investment (€/m²) and payback period (years), for all cost effective measures, for each sector (and for municipal and central public building sub-categories),

Figures 1-2 and 1-3 below show that the residential sector has the largest investment need and that the cumulative total required by 2020 is approximately €1.12 billion based on cost effective measures. Private and commercial buildings come next, followed by municipal public buildings and then central public buildings, with cumulative investment requirements of €175 million, €62 million and €18 million respectively.

Estimates obtained at the end of 2012 indicate that the World Bank is planning to spend €32.5m on EE and RE activities in Kosovo where it is still not defined the envelope to be dedicated to EE. KfW/WBIF €7.5m would be spent on public sector EE projects in the near term, in addition the grant support of €10m being provided by the EU. Assuming €16m would be dedicated from the planned World Bank's project, this means that a total of €33.5m is earmarked for around 2000 public sector buildings, an average of around €38,750 per building. This is a significant sum in the context of Kosovo - potentially sufficient to cover most of the needs of the public sector – and the figure corresponds closely with the total cumulative investment requirement of €80 million for municipal and central public buildings given in the previous paragraph (€62 million and €18 million respectively).

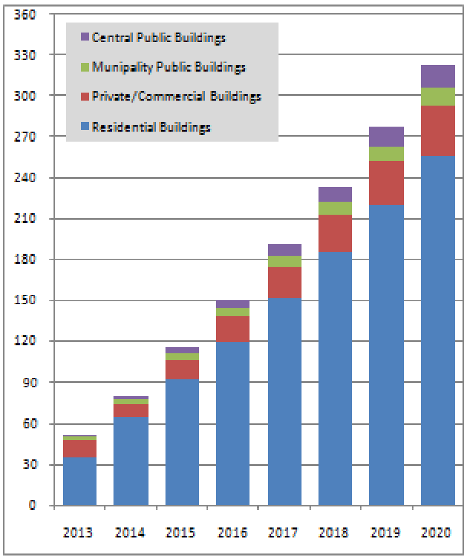

Figure 1-2: Annual EE investment in each sector (€ million)

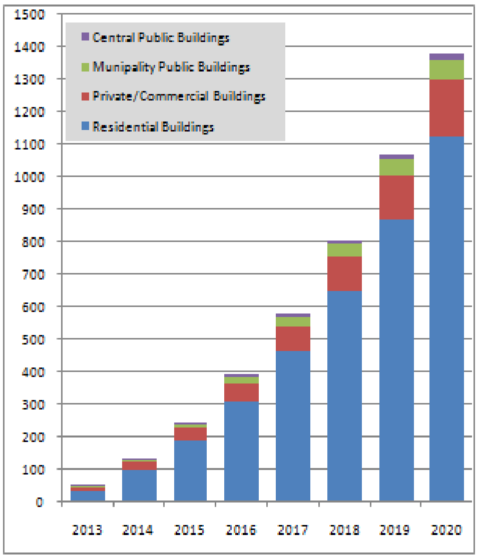

Figure 1-3: Cumulative EE investment in each sector (€ million)

Figure 1-4 below shows the growth of Kosovo GDP and the ratio of the annual investment requirement to GDP. The figure shows that the level of investment needed to realize the energy saving potential stands at around 1% of GDP in 2013, rising to 3.8% in 2020. Carrying out these investments will generate many benefits for the Kosovan economy, including increased energy savings, reduced energy imports and a lower trade deficit, increased life of retrofitted buildings, growth in the number of business and in employment and a reduction in GHG and acid rain emissions.

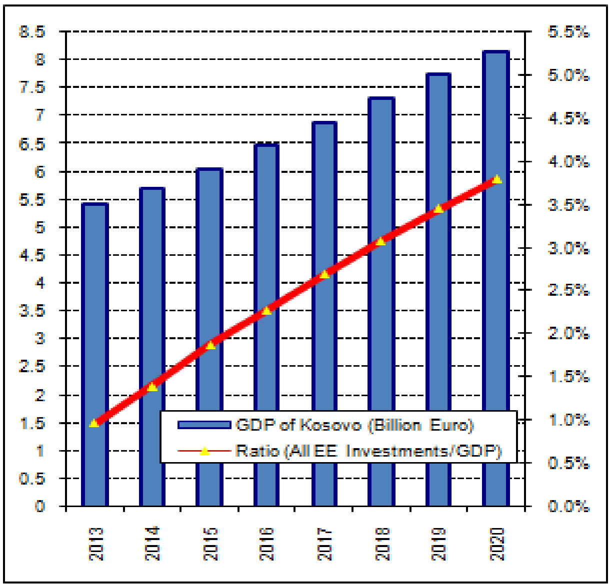

Figure 1-4: Trend in development of Kosovo GDP and Ratio of annual EE investment requirement (€ million) to GDP

Source: "World Economic Outlook Data" International Monitory Fund, May 2012 (GDP data)

The available evidence shows that the building sector of Kosovo provides significant opportunities for realizing energy saving. Since space heating accounts for the major share of energy consumption in buildings, most energy saving potential is associated with thermal insulation, heat loss reduction and the introduction of efficient boilers. More than half of the Kosovo building stock was constructed in the period 1970 to 1985, which is reflected in the relatively high specific heat consumption of these buildings. The current level of heat consumption in Kosovo is estimated to be about 219 kWh/m^2 year, compared to 80–150 kWh/m^2 year in Western Europe, which indicates that there is a significant opportunity for EE improvements.

In order to exploit the existing energy saving potential, any supporting legislation and programs must take advantage of existing EE market drivers. One such driver that has become increasingly important in recent years is energy security. Despite increased use of local energy resources, such as lignite and biomass, Kosovo depends totally on imports of oil by-products and to a lesser degree on imports of electricity, which overall accounted for about 25% of its energy needs in 2010. The introduction of EE measures can enhance energy security by (a) reducing imports of oil by-products and thereby reducing the trade deficit; (b) cutting down on the consumption of fire wood and thereby preventing deforestation; and (c) minimizing the volume of electricity imports, thereby reducing the need for government subsidies. (Government subsidies to the electricity sector between 2007- 2011 amounted to about €460 million[2].)

Economic growth requires reliable electricity supply and in 2012 Kosovo had available around 800 MW of dependable operating generation capacity. However, in 2011 peak demand was 1150 MW, with the shortfall being partially met by energy imports (€ 55 million in 2011) which were 50% funded with grants from the GoK (€27 million) and the system was kept in balance by load shedding. Demand is currently projected to increase to over 2,000 MW by 2028 with import costs forecast to be in the range of €200-400 million/year by 2017 (or 13 to 26% of the 2011 national budget)[3]

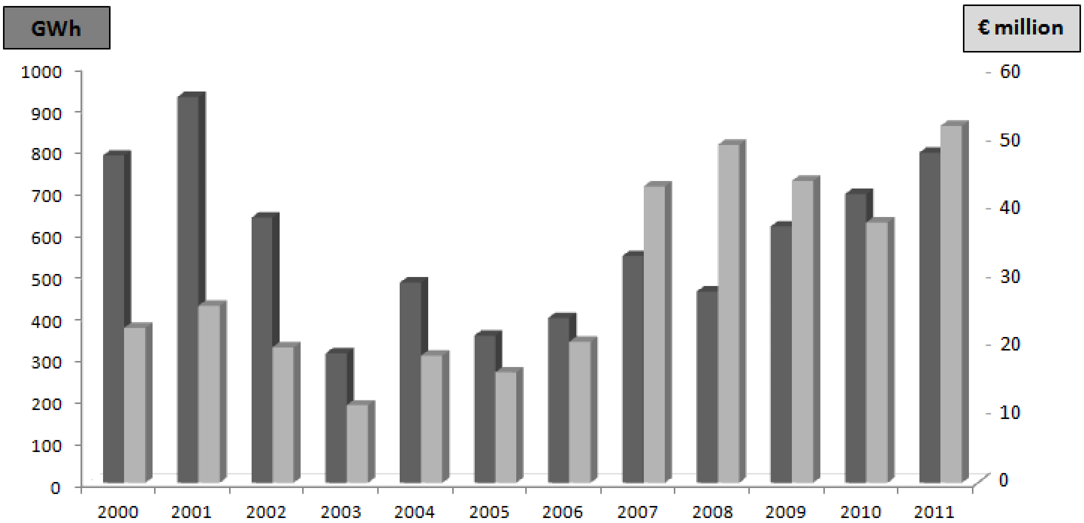

Figure 1-5: Volume (GWh) and cost (€ million) of KEK power imports., 2000 - 2011

Source: 'KEK Performance: Where we've Been and Where we are Going' - Arben Gjukaj, Managing Director KEK, June 2012)

Potential savings, as estimated in the market assessment, indicate an energy reduction potential of about 11%, which represents an import reduction of 44%. On the basis of international benchmarks, the cost of implementing EE measures is roughly half the cost of building new energy supply facilities. Moreover, EE measures can be introduced more rapidly.

Improvement of the fiscal balance is a high priority for the GoK, especially given the current economic situation. EE measures represent an opportunity for the government and the public

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[2] 'KEK Performance: Where we've Been and Where we are Going' - Arben Gjukaj, KEK Managing Director, June 2012

[3] Ibid.

sector to reduce their energy budget expenditures, which currently total €40.75 million per year. It has been estimated that the public sector can save €18.85 million per year by investing in EE. This would be a cost-effective measure because investments made in order to improve government facilities will pay for themselves through savings at the national level. In addition, if the government wishes to consider the introduction of financial incentives to support the development of an EE market, these incentives can be partially offset by reducing subsidies on domestic energy sales.

EE investments have a positive economic impact since they contribute to the development of a modern industry that offers jobs and a range of business development opportunities. They also generate revenues from increased taxation on the construction work required for EE implementation, which creates a positive situation, whereby the GoK's need to optimize tax revenues is supported by the development of an EE market with its various associated social and environmental benefits.

The need to achieve mandatory comfort levels in buildings in line with EU Directives on the energy performance of buildings means that renovation of the existing building stock carries a high priority in Kosovo. Old buildings require immediate investment in thermal insulation, the introduction of efficient double/triple glazed windows and the introduction of efficient space heating and hot water systems. Important energy savings have been identified for other energy services, such as cooking, lighting and in the use of other electrical appliances. This presents an opportunity for the GoK to ensure that such renovations are realized in an energy-efficient way that contributes to the Kosovo's sustainable economic development. In addition, renovating old and damaged buildings will contribute to the achievement of the NEEAP's 1% p. a. energy savings target for the period up to 2018.

Figure 1-6 compares the detailed 'bottom-up' energy savings calculations carried out in Section 10 for the public building stock (including central and municipal categories) with the 'top down' KEEAP energy savings target for whole economy of Kosovo. As mentioned in Chapter 5, the energy saving target for whole of Kosovo is 9% and the analysis carried out in Chapter 10 (and summarized in Figure 1-6 below) shows that the public building stock alone could cover 18.24% of this target or, in absolute terms, 1.64% of the 9%. This is a significant contribution and highlights the fact that starting EE implementation in the public building sector will have an important impact on reaching the KEEAP energy savings target.

Figure 1-7 compares the detailed 'bottom-up' energy savings calculations carried out in Section 10 with the KEEAP energy savings target for the whole of Kosovo. The ratios between the total energy saving potential calculated for this study and the KEEAP energy savings targets over the period to 2020 show that the energy saving potential calculated in this study ranges from being 2.35 to 2.63 times higher than the energy saving targets set in the KEEAP. The reason for this difference is related to the fact that the analysis carried out for this study is based on a 'bottom up' methodology, whereby the EE potential for each energy service has been estimated across the whole Building Stock of Kosovo. On the other hand, the evaluation of EE potential for the KEEAP was based on a 'top down' approach, with the target level for each sector constrained so as to achieve the overall EE target.

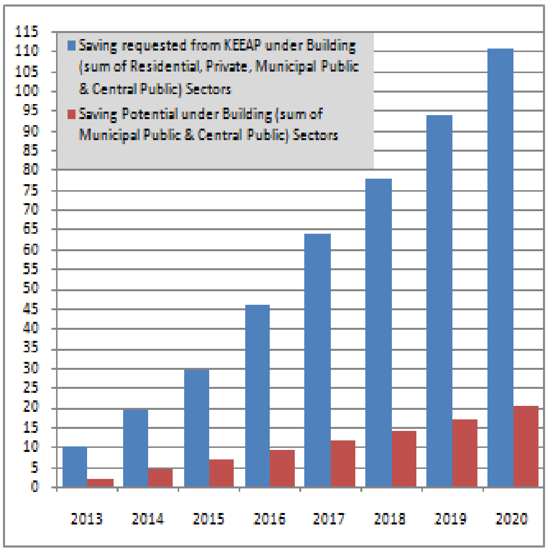


Figure 1-6: Cumulative energy savings potential for the public building stock (including municipal and central categories) and KEEAP energy savings targets for Kosovo (ktoe)

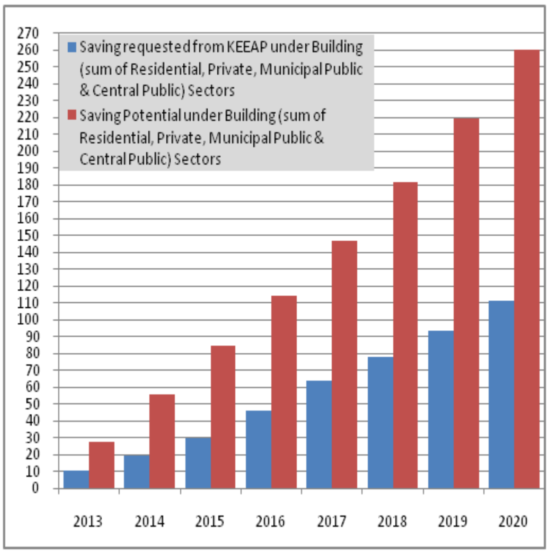


Figure 1-7: Cumulative energy savings potential and KEEAP energy savings targets for the whole Building Stock of Kosovo (ktoe)

The KEEAP targets were set by the Kosovo Government, which took into consideration the process for EU accession and this study, by quantifying energy savings in detail, will help with the preparation of the Second Kosovo Energy Efficiency Action Plan. This situation creates a 'virtuous spiral' as national priorities, such as EU accession and renovation of the building stock, are supported and strengthened by the development of an energy-efficient economy.

Implementation of EE measures represents an economically rational response to energy scarcity and increasing energy prices - as well as to environmental concerns. Yet in all sectors the uptake of loans to pay for EE investments is not as enthusiastic as might be expected. Therefore, the second part of the study provides an analysis of the barriers that are constraining the implementation of EE measures in Kosovo, based on the views of various local and international experts working in this area.

Total CO_2 reductions have been calculated based on the energy savings for each sector and using IPCC (1996-revised methodology) Tier 1 emission factors presented in Table 10-13. The introduction of all EE measures for all energy services in the residential sector will bring a CO_2 reduction of 2.385 million tons per year in 2020 (See Figure 1-8).

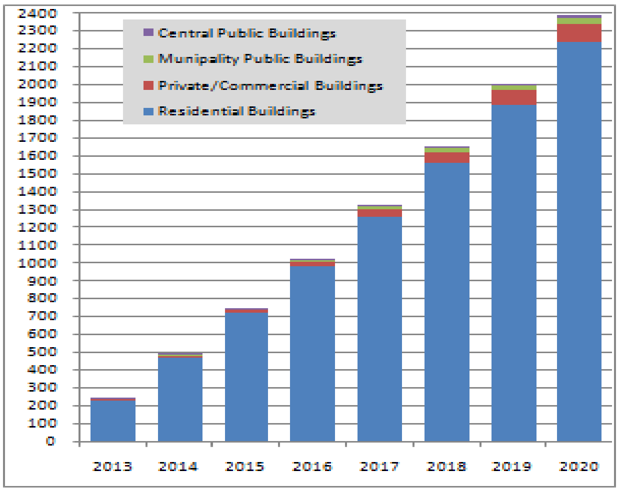


Figure 1-8: Cumulative CO_2 reduction potential for whole Building Stock (thousand ton/year)

The barriers have been classified according to the building sector they apply to - residential/commercial, public or 'cross-sector' – and according to their origin – economic, institutional, legal and regulatory, financial. The focus of the study was on barriers that can be addressed by specific interventions at the microeconomic level, rather than on macroeconomic barriers, such as the state of the national economy, which cannot be addressed by one or two specific actions. The severity of barriers differs between the various building sub-sectors, so that for example, the low-income segment of the residential market will experience more problems in securing finance and will be less able to invest in the repair and renovation of buildings.

The barriers summarized in Table 1-6 below are discussed in detail in Section 11, in terms of their impact, potential remedies and which organizations should be responsible for mitigating them. Some barriers could be addressed by the introduction of financial mechanisms, such as grants, 'soft' interest rates, guarantee schemes, dedicated funds, credit lines, more efficient procedures for financial institutions and so on. In some circumstances, successful financing programs can serve as a mechanism to remove other barriers from the market, although the removal of other barriers may also require legislative or organizational change, adjustments in the institutional framework. An important pre-requisite for a successful EE implementation program is the development of an environment that facilitates the growth of a local EE market and this objective has to be supported through the delivery of a broad range of awareness raising and capacity building activities.

One of the important conclusions of this study is that the principal challenge facing the energy efficiency sector in Kosovo today is to develop market driven financing mechanisms that will incentivize energy users from across the entire building stock of Kosovo to invest in energy efficiency measures. Reliance on government supported schemes - and therefore pressure on public funds – will thereby be reduced and the government's role can then be focused on developing legal and regulatory frameworks that facilitate these market mechanisms.

The cost benefit analyses of the buildings that were audited for this study show the most profitable energy efficiency measures to be the introduction of EE lighting, the introduction of thermal insulation to outside walls and the introduction of new space heating systems. Another important finding of the cost benefit analyses is that, in all cases, the Economic IRR is higher than the Financial IRR, which demonstrates the importance of increasing energy prices (especially electricity, lignite and fire wood) to the level of their long-run marginal costs of supply without interruption.

In a relatively low-income economy, many householders and small businesses need access to capital at zero or very low cost. According to the Statistics Agency of Kosovo (November 2012) the average monthly wage in the budget (public) sector of Kosovo in 2011 was €368[4], so inevitably many householders are not in a position to take up loans for improvement of buildings on commercial terms and have higher priority needs to attend to, such as provision of food, clothing and transport. According to information provided by the banks, the typical EE loan currently averages between €5,000 and €6,000 at a 'special' (discounted) interest rate of around 10%.

A number of finance sourcing models have operated in the SEE region and clearly, the effectiveness of any particular one depends upon which sector is being targeted and how well it is suited to local conditions. The options that were considered by this study included national and municipal budget resources, international donor resources, commercially based transactions and hybrid arrangements involving some or all of the above.

4 http://esk.rks-gov.net/ENG/labour-market/tables

Economic	Institutional	Legal and Regulatory	Financial
RESIDENTIAL AND COMMERCIAL SECTOR			
✓ **Barrier RE1**: Market distortions in local energy markets mean that the prices of some fuels do not reflect the true costs of production (e.g. firewood, lignite).	✓ **Barrier RI1**: Many households adhere to traditional methods of cooking and space and water heating, either because of lack of awareness or for security of supply reasons, where power cuts are common.	✓ **Barrier RLR1**: Since 2000, many new 'illegal' buildings have been constructed (up to 50% of new build) without the required building permission.	✓ **Barrier RF1**: Inability to access the loan market. Absence of affordable EE financing schemes for lower income households due to high interest rates and overcollateralization
		✓ **Barrier RLR2**: Owners' Communions (Housing Associations) are not being established due to a lack of secondary legislation. Current structures to deal with 'common areas' in buildings are proving ineffective.	✓ **Barrier RF2**: High level of commercial losses and non-payment of energy bills diminish the incentive to invest in EE measures.
		✓ **Barrier RLR3**: Electricity and heat tariffs are (a) not yet cost-reflective, (b) tariffs are subsidized and (c) some inefficient tariff structures persist (e.g. Tariff Group 7, for customers without meters, charges a fixed amount/consumer/month, on the basis of 'evaluated consumption').	
PUBLIC SECTOR			
✓ **Barrier PE1:** EE is not a top priority for municipality mayors - water supply, waste disposal, sewage treatment are considered more important.	✓ **Barrier PI1:** The demands of the decentralization process place an increasing burden on municipalities while their resources are frozen or being reduced. There is insufficient EE expertise and insufficient resources at municipal level.	✓ **Barrier PLR1:** Budgetary rules do not allow municipalities to benefit from any energy savings they achieve in the longer term – each year's budget allocation is based on the previous year's outturn and energy savings cannot be used for investment purposes.	✓ **Barrier PF1:** The Law on Public Debt imposes various restrictions on municipalities' ability to borrow money, principally the need to have two consecutive years of unqualified accounts. As municipalities were unable to borrow in the past they have no credit history for the banks to evaluate.
		✓ **Barrier PLR2:** Energy savings may be deferred due to compliance with Technical Regulation Nr. 03/2009, which states that 'energy sustainability' requires the achievement of planned comfort levels in public buildings, as well as energy efficiency.	✓ **Barrier PF2:** Central govt. budgetary constraints limit investment opportunities, particularly in the current economic climate.
		✓ **Barrier PLR3:** Law on Public Procurement requires government tenders to take account of positive EE related aspects, but it is not being implemented because the necessary secondary legislation is not in place.	

Economic	Institutional	Legal and Regulatory	Financial
CROSS-SECTOR			
✓ **Barrier XE1**: Under-developed local EE business infrastructure. SMEs tend to operate individually, except on an ad hoc basis when there is a perceived need.	✓ **Barrier XI1**: Inadequate data and institutional capacity to monitor, verify and evaluate the impact of EE programs.	✓ **Barrier XLR1**: The Kosovo Energy Efficiency Agency is inexperienced and under resourced relative to its responsibilities and obligations.	✓ **Barrier XF1**: High level of transaction costs (in terms of both money and time) for EE investments.
✓ **Barrier XE2**: Absence of ESCOs and ESCO based schemes from the local market due to an immature market and ambiguities in the legislative framework, including the public procurement rules.	✓ **Barrier XI2**: Lack of impartial, professional, detailed technical information concerning EE investments.	✓ **Barrier XLR2**: The Law on Energy Efficiency laid down procedures for setting up a national EE fund to promote EE and RES projects. However such a fund is not permissible under existing legislation which only allows for the existence of a single national investment fund	✓ **Barrier XF2**: Lack of funding for energy auditors and energy audits.
	✓ **Barrier XI3**: Lack of a comprehensive and reliable EE data base for Kosovo.		
	✓ **Barrier XI4**: Lack of effective donor coordination on both current and future EE issues and plans.		

Table 1-6: Summary of the main barriers to the implementation of EE measures in Kosovo, by Sector

National and municipal budget resources can be used to support Public Investment Programs that deliver infrastructure improvements, or Special Funds, long-term financing schemes set up to facilitate implementation of, for example, EE projects. Funding from international donors is typically used to provide grants, loans and technical assistance. Commercially based transactions include bank loans, ESCOs or other private sector initiatives involving, for example, utilities, manufacturers or service providers.

Several of the models that have been used to disburse funds on a commercial basis are based upon a variant of the ESCO concept – that the cost of an investment in EE can be more than covered by the energy savings that it generates. Piloting the use of simplified ESCO contracts within donor programs should be given a high priority in Kosovo, as it is important to use limited donor funds to not only upgrade the energy efficiency of selected buildings but also to facilitate the development of EE service providers, such as ESCOs.

Hybrid arrangements combine some or all of the other sources of finance to produce a financial mechanism that in some way mitigates the risk or financial costs for at least one of the parties involved, for example:

- Provision of grants by donor agencies to 'soften' commercial loans;
- Establishment of an EE 'credit line' by a donor agency with funds channeled to customers through local commercial banks;
- Partial credit guarantees to cover commercial loans.

In the medium- to long-term, EE investments have to be financially sustainable and generate sufficient savings to ensure repayment of loans. However, in the short-term the reality is that because of market distortions - which mean that consumers do not pay fully cost-reflective energy prices - and the fact that many public and private buildings do not deliver minimum comfort levels to their users, these conditions are unlikely to be met in every case.

Specifically, the "Technical Regulation on Thermal Energy Savings and Thermal Protection in Buildings" (June 2009, but due to be revised later this year) sets minimum standards for heating levels in public, residential and commercial buildings and all refurbished buildings and refurbishing measures in Kosovo must comply with it. The implication of this Regulation is that EE savings can only be made after the specified comfort levels have been achieved, which in certain circumstances may mean that in the short-term energy costs will increase.

Table 1-7 summarizes the recommended options for implementation. The review of international experience in Chapter 13 indicates that the prevailing market conditions in Kosovo need to be improved in order to support and facilitate the introduction of innovative financing schemes involving private sector participants. Hence, it is proposed that the following actions identified in the Table below should be examined in more detail in the second phase of this study.

Proposed Actions	Description
Implement a program of EE measures targeted at the public building sector, starting with central government buildings and follow-up with a program aimed at municipality buildings.	Such a program will demonstrate; • the commitment of the GoK to EE • the benefits of EE • the capability of all those involved in the sector It will give confidence to the business community in general that the EE is a credible business area with prospects for growth and potential rewards for all participants.
Prepare a program of work to remove, or at least minimize the barriers that restrict the implementation of EE measures.	Focus on removing the main non-financial barriers, particularly in the Residential and Private/Commercial building sectors: • Establish an effective legal framework to support the formation of strong Housing Associations • Establish an acceptable legal basis for a workable EE Fund • Strengthen the Energy Labeling scheme • Coordinate, inform and mobilize the supply side of the EE market • Devise a scheme to trade-in inefficient wood ovens in exchange for efficient ones • 'Fast-track' legalization of buildings without permits if owners implement EE measures
Develop a favorable legal and regulatory framework	Promote a flexible supply side to the EE market, featuring a large number of (local) players, transparent in its transactions and providing accessible and easily understood information • Ensure the efficient operation of local fuel commodity markets • Eliminate subsidies and distortions • Take account of positive EE aspects in public procurement procedures • Develop the legal and financial infrastructure to facilitate entry of ESCOs
Review the options for innovative financial mechanisms for funding EE schemes	On the basis of a review of international case studies, the following options should be investigated further in terms of their relevance and applicability to the Kosovan situation: • The Bulgarian Energy Efficiency Fund • The Bulgarian Energetic and Energy Saving Fund • The Lithuanian Program for the Modernization of Multi-family Buildings Further research is required to assess delivery mechanism, including: • Establish the aspirations and capabilities of local companies in Kosovo • Identify the characteristics of a workable and legally acceptable EE Fund • Assess the possibility of channeling donor funds to consumers through means other than the banks (e.g. KEDS, Housing Associations)
Maintain an on-going EE information campaign, directed at all market sectors and sub-sectors and customer groupings	This will ensure there is a well-informed and robust demand side to the EE market
Ensure the efficient management and operation of the energy efficiency sector	Secure resources needed to establish a strong, independent and properly resourced KEEA, which can effectively manage and coordinate activities in the sector, meet its obligations to the GoK and to the ECT, maintain a reliable and comprehensive data base and play a central role in coordinating the work of donor agencies.

Table 1-7: Summary of options for implementation

Section 1-Background Analysis

2 Introduction

2.1 The Energy Sector of Kosovo

Following the disruption caused by the 1998–99 war, Kosovo has been struggling to come to terms with an unsustainable electricity supply industry. The energy sector suffers from a significant shortfall in funding and the combination of incomplete billing, low collection rates and high commercial and technical losses continues to put a strain on the electricity utilities' finances. Against a background of inefficient use of and increasing demand for energy, the quality of electricity supply in Kosovo remains sub-standard and consumers continue to experience sporadic power cuts. There is a large backlog of necessary investments that are required if the sector is to deliver the quality of energy supply needed to drive economic development.

In October 2005, subsequent to UNMIK signing the Treaty, the Republic of Kosovo became a party to the Energy Community Treaty (ECT), which established the Energy Community of South East Europe (ECSEE). The Treaty requires the Contracting Parties to implement the *acquis communautaire* and provides for the creation of a single energy market. Kosovo has been a potential EU candidate since 2008 and has gradually strengthened its structures for dealing with the European integration processes. A National Council for EU Integration chaired by the President was established, the objective of which is to mobilize Kosovo institutions to deliver on its EU reform agenda. In its annual enlargement report released in October 2012[5] the European Commission said that EU countries can sign a pre-accession pact – the Stabilization and Association Agreement (SAA) - with Kosovo.

The main energy sources for both space and water heating in Kosovo are biomass (mainly firewood) and electricity, each accounting for around 40% of consumption. The high consumption of firewood results in deforestation, giving rise to adverse environmental, economic and health impacts. Electricity generated from indigenous lignite is used inefficiently and there are wide seasonal variations in demand. These exacerbate power supply interruptions and create the need for expensive imports of electricity, especially during the heating (winter) season.

In recognition of the importance of meeting these various challenges, the Government of Kosovo (GoK) embarked on an ambitious energy sector reform plan and a package of key laws on energy, electricity and the energy regulator was adopted in October 2010. Following approval of the Law on Energy Efficiency by the Assembly in June 2011, some progress has been made in terms of meeting regulatory and legislative objectives. The KEEA has been established and a few donor funded EE projects have been implemented, but there is still a lot to be done to fully realize potential energy savings. In October 2012, the state-run KEK power distribution business was sold to a Turkish consortium for €26.3 million in an attempt to reduce losses and recover some of the debts owed to the company.

In parallel with the initiatives aimed at strengthening the energy sector, the Government of Kosovo initiated a process of local government reform and decentralization. The process

5 http://ec.europa.eu/enlargement/pdf/key_documents/2012/package/ks_feasibility_2012_en.pdf

involved ratification of new laws, reform of the local finance system, establishment of new municipalities and the transfer of competencies and resources from central to local government, supported by local capacity building to facilitate efficient self-government. In recognition of the fact that significant investment is required in the municipal infrastructure, the Law on Public Debt came into force in 2010, allowing local government to take up commercial loans and setting out the conditions under which municipalities can borrow money.

2.2 Energy Efficiency in Kosovo

According to Article 35 of the Treaty, the Energy Community may adopt measures to foster energy efficiency. The EC Ministerial Council established a Task Force on energy efficiency issues in December 2007, which became operational in January 2008 and in applying the objectives set out in the EnCT, MEM was obliged to draft a National Action Plan on Energy Efficiency, entitled the Kosovo Energy Efficiency Action Plan (KEEAP), a long-term document, drafted and implemented at national level and covering the period 2010 to 2018. The first KEEAP was approved in principle by the Energy Secretariat in November 2010. In April 2011 a National Energy Efficiency Action Plan for the period 2010 – 2018, prepared by the former Ministry of Energy and Mining, was approved by the Government Assembly of Kosovo and in June 2011 the new Law on Energy Efficiency was approved by Parliament. As well as aligning with the *acquis* on energy labeling, eco-design, energy performance of buildings and energy end-use efficiency, the Law also provided the legal basis for the Energy Efficiency Agency and for the establishment of a fund to promote energy efficiency and renewable energy projects.

Based on the requirements of Article 4 (2) of Directive 2006/32/EC, the First Kosovo Mid-Term Energy Efficiency Action Plan for the period 2010-2012 was published in September 2011. It proposed an 'Intermediate Indicative Target for Energy Saving for Kosovo' for the mid-term, which was set with reference to the General Indicative Target for Energy Saving for 2018. The Intermediate Target adopted for 2012 is to reduce the average consumption recorded during the five-year period 2003-2007 (excluding air transport consumption) by 3%.

2.3 The National Building Energy Efficiency Study

The results of the NEEBS will show how EE measures can be most effectively implemented in Kosovo in order to enhance the sustainability of the building sector. The Study will help the GoK to bring tangible financial and environmental benefits to the citizens of Kosovo, as follows:

- Average energy consumption in the building sector is targeted to fall by 15-30% as a result of the EE program;
- Electricity and fuel imports will decrease and this will help to cut Kosovo’s trade deficit;
- Electricity savings will increase the security of energy supply in Kosovo;
- In the majority of cases, the owners of buildings with EE measures installed will use less energy for heating and will therefore see a reduction in their energy bills;
- People using buildings equipped with EE measures will enjoy better building services and higher standards of comfort;
- Heating systems in residential sector buildings in Kosovo use wood and electricity, while the services sector uses diesel, *mazut* and coal as well as wood and electricity. Following the implementation of an energy efficiency program, the consumption of energy commodities in buildings will decrease and the problem of deforestation will be mitigated;
- The resulting reductions in CO_2 emissions and pollution will have a direct and positive impact on the environment.

3 Background to the Study

3.1 The Socio-Economic Environment

Since independence was declared in 2008 the Government of Kosovo has had to deal with a succession of difficult issues, both in terms of the overall economic situation and particularly within the energy sector. In the period 2006 to 2011 the GDP of Kosovo (at current prices) increased from €3,120 million to €4,776 million, while GDP per capita went up from €1,875 to €2,650[6], the lowest in Europe.

The socio-economic and political impact of the (global financial) crisis has been fairly limited in the case of Kosovo[7], which can be attributed to the very low starting level and to Kosovo's limited integration with the global economy.

Over the past few years Kosovo has started to make the transition towards becoming a market-based economy and maintaining macroeconomic stability, but it is still highly dependent on the international community and its Diaspora for financial and technical assistance. Remittances - mainly from Germany, Switzerland and the Nordic countries - are estimated to account for about 10% of GDP and donor-financed activities and aid for approximately 7.5%[8]. However, with international assistance, the GoK has been able to privatize 50% of its state-owned enterprises (or over 90% in terms of their value).

In 2006, in order to facilitate integration into regional economic structures, UNMIK, on behalf of Kosovo, signed its accession to the Central European Free Trade Area (CEFTA). In July 2008, Kosovo received pledges of $1.9 billion from 37 countries in support of its reform priorities and in June 2009, joined the World Bank and International Monetary Fund. GoK continues to work with the international community on measures to improve the business environment and attract foreign investment.

The population of Kosovo stands at around 1.7 million and is one of the youngest in Europe: about half the population is under 25 years of age and about 20% is aged between 15 and 25 years. Whilst an estimated 45% of the population is unemployed[9], the unemployment rate for the EU (27) in 2010 was 9.5%, rising to 11.2 % in the summer of 2012, with the highest levels being recorded in Spain (24.8%) and Greece (22.5%). In 2010, it was estimated that 30% of the population was living below the poverty line[10]. Poverty levels in urban and rural areas are almost equal, but vary widely across Kosovo's regions.

Therefore, despite the improved growth rates recorded in recent years, the GDP of Kosovo still stands at a very low level. This fact combined with the very high unemployment rate, means that there are large sections of the population who cannot take advantage of commercial loans because their creditworthiness is low and their ability to repay loans is limited.

6 Series 3: Economic Statistics, GDP by expenditure approach (2004-2011), Kosovo Agency of Statistics (KAS), September 2012
7 South East Europe after the Economic Crisis: a New Dawn or back to Business as Usual? LSE – Research on South Eastern Europe, European Institute (2010), edited by *Will BARTLETT* and *Vassilis MONASTIRIOTIS*
8 https://www.cia.gov/library/publications/the-world-factbook/geos/kv.html (Page last updated on 04.10.12)
9 ibid
10 ibid

3.2 Development of the Building Stock of Kosovo

Traditional homes in Kosovo were built to house large extended families. Albanians built 'kullas', houses made of stone, often with an inner courtyard protected from outside view. Climatically, 'kullas' are better suited to the local weather – cold, harsh winters, hot summers - than modern houses. The thick walls, up to one meter wide and constructed of solid stones or bricks, have a high thermal capacity and the roofs have good thermal insulating properties, being constructed of wood and stone. These traditional buildings are also warmer in winter and cooler in the summer due to their high thermal resistance.

As a result of the destruction that occurred in the region during the 1998–99 conflict, more than 50,000 houses have had to be rebuilt in Kosovo. Many of the newer buildings are taller than the traditional structures but they are still intended to house extended families. These modern houses need a considerable energy input for winter heating and households have become increasingly dependent on electricity and wood burning stoves to provide it.

Given the present unreliable electricity supply, wood burning stoves are extensively used, but many of these are inefficient in the way they convert energy. Consequently, large numbers of trees are being cut down each year to provide for heating in winter and as they are not being replaced, the Kosovo Heating Strategy 2011-2018 forecasts that, in the absence of any remedial action, deforestation – i.e. when depletion of forests exceeds their replenishment - could begin in 2014.

In 2002 the Norwegian Forestry Group (NFG) and the FAO implemented the first nation-wide Kosovo forest inventory, which showed that approximately 42 % of Kosovo is covered by forest and that small landowners own some 32 % of this area, while 68% is publicly owned. According to NFG estimates, uncontrolled logging occurs in 35% of forest areas and around 100,000 m^3 of wood are lost each year due to illegal practices[11]. Implementation of a second national forest inventory by NFG started in 2012 and should be completed in 2013[12].

The construction characteristics of building units, in terms of insulating materials and quality of windows and doors, have tended to improve in recent times. In general, buildings constructed since 1999 achieve mandatory construction standards, while buildings constructed before 1999, particularly those in the public sector, are characterized by poor overall thermal insulation quality, especially in respect of attics, external walls and windows.

Based on the results of CENSUS 2011, almost every household in Kosovo owns its own home and house renting is very rare (2 - 3%). Almost all dwellings (99%) are electrified, but as noted above, wood stoves are often used for space heating, especially in rural areas. However, in the multi-storey apartment blocks found in the larger cities, the penetration of electricity is gradually increasing and in three cities - Pristina, Gjakova and Mitrovica - about 10% of all apartments are heated by district heating schemes, although since the quality of service is so poor, it is always necessary to have an AC or electrical heater back-up system.

Most households in urban areas have central piped water, while most rural households get their water from wells. About 90% of hot water is provided via electrical boilers, the rest be produced by heating water on wood stoves. Until now only a very few households have installed solar water heater systems.

11 Illegal wood-cutting - one of Kosovo's most difficult rule of law issues, 17 September 2012 (http://www.eulex-kosovo.eu/en/news/000383.php)

12 http://nfg.no/article.cfm?ID_art=39&ID_kanal=1

Most walls are made of bricks or cement blocks and about one in four houses in Kosovo is damaged in some way. According to the preliminary results of 'CENSUS 2011', the current total population of Kosovo consists of 1.7 million people, living in 308,434 residential buildings units which provide 403,000 dwellings, of which about 95,000 are uninhabited. Most households have between 2 to 4 bedrooms.

According to a EUROSTAT survey, the average number of apartments per building in South East Europe and Kosovo has been estimated at 5.4 in urban areas and 1.3 in rural areas. These values are typical of the situation existing in the early 2000s and may be expected to change very significantly in urban areas over the next two decades, as increasingly large apartment buildings are constructed in order to cope with the strong trend of migration to cities. The commercial/industrial building stock consists of about 57,000 units, 91% of which are heated. In terms of construction characteristics, this category does not differ substantially from the residential building stock, although there are clear differences in terms of the fuels used for space heating. Electricity, light fuel oil and LPG are the dominant fuels (over 80% of the total), whereas wood has a minor role (12%), with district heating and lignite covering the remaining demand.

The public building stock of Kosovo (schools, universities, hospitals, health centers, government buildings, etc.) includes some 1,800 buildings. Most parts of public buildings are fully heated, with fuel oil, district heating (derived heat), coal (lignite) and electricity being the most common space heating fuels (see Table 3-3). Since most of these buildings date back to the pre-1999 period, their construction characteristics are relatively poor.

During the decade following the 1998-99 conflict, significant sums of money have been sent to Kosovo from expatriates living in EU countries and evidence of new construction can be seen everywhere in Kosovo, both in urban and in rural areas. However, this construction boom has been characterized by large numbers of 'illegal' buildings, the problem being that Kosovo has not yet developed an efficient system that facilitates the legal construction of new properties. Illegal construction is widespread: new top-floors have been added to apartment blocks (even though Kosovo is in an earthquake zone), homes have been built in public parks and some new buildings encroach onto roads or sidewalks and other public spaces. In Pristina, entire neighborhoods have been built illegally, with no consideration given to a sustainable future - the local river serves both as a sewer and as a rubbish dump. Steps are being taken to establish an enforceable system that will effectively regulate the construction industry in Kosovo, but until the necessary laws and bodies are in place, uncontrolled building activity is likely to continue.

One important issue concerns the reconstruction of the national cadastre, or land register, which is an official database that records details of land ownership in Kosovo. Many cadastral records have been retained by Serbia and the Kosovo Cadastral Agency (KCA), which was established by UNMIK in 2000 under the Ministry of Environment and Spatial Planning, is carrying out the task of creating a new cadastre.

3.3 The Energy Sector of Kosovo

3.3.1 Structure of the Energy Sector

The process of energy market liberalization began in June 2004 when three key laws were introduced by UNMIK, the Law on Energy, the Law on Electricity and the Law on the Energy Regulator. The last of these established the Energy Regulatory Office (ERO), which was charged with developing the regulatory framework to enable the creation of a competitive and transparent energy market. In December 2004 a new Ministry of Energy and Mines (MEM) was established responsible for developing strategies and policies for energy and mining sector development. (Under the new Government structure adopted at the start of 2011, the Energy Sector is now the responsibility of the Ministry of Economic Development.)

In 2008, the Government of Kosovo approved the unbundling of the electricity distribution and supply network from KEK into a separate business, KEK Electricity Distribution and Supply (KEDS), which was then to be privatized through a competitive international tender. KEDS was responsible for the development and maintenance of the distribution network and providing metering, billing and other customer services to around 416,000 LV customers. In October 2012, the GoK finally sold KEDS to the Turkish consortium *Çalik-Limak*, in the hope that private ownership would improve efficiency, raise service standards and reduce technical and commercial losses.

3.3.2 Energy Strategy

In 2010, the Kosovo Assembly approved a new energy strategy for the period up to 2018, which aims to:

- Increase the security of energy supply in general and of electricity supply in particular;
- Meet Kosovo's energy demand in an environmentally sustainable manner.

The overall strategy is based on achieving the following objectives:

1. Decommission Kosovo A by 2017 to comply with the Energy Community Treaty.
2. Expand power generation capacity:
   - Invite private sector investment in a new lignite-fired power plant, 'Kosovo e Re', consisting of 2 x 300 MW units
   - Develop a new lignite mine (Sibovc south) to provide fuel for Kosovo e Re;
   - Engage private investment in the (separate) rehabilitation and environmental upgrade of Kosovo B back to its original rating of 2 x 340MW
3. Complete the privatization of KEDS.
4. Increase Energy Efficiency by implementing the Energy Efficiency Law and undertaking pilot projects.
5. Develop Kosovo's renewable resources through private investment in projects such as small hydropower plants, wind and utilization of solar energy for preparing hot water, etc.
6. Participate in the development of the regional energy market.

3.3.3 Heat Strategy

In August 2011 the Ministry of Economic Development issued the Republic of Kosovo Heating Strategy 2011-2018[13].

The strategic objectives set out for the Heating Sector were as follows:

1. Reduce consumption of electricity for heating by developing district heating systems;
2. Create positive incentives to encourage the use of alternative energy sources and RES for heating, thereby exerting a positive impact on the environment and promoting sustainable development of the sector;
3. Create conditions that will facilitate the use of energy efficient heating appliances and improve the thermal performance of the building stock.

In respect of the third objective, which specifically relates to energy efficiency in buildings, the following measures were recommended as a means of achieving this objective:

- Implement the Demand Side Management Program;
- Adjust the electricity tariff structure to incentivize:
  - i) replacement of existing home appliances with new technologies – e.g. thermal pumps for heating/cooling;
  - ii) replacement of electrical appliances for heating with equipment with accumulation (energy storage) capacity;
- Set up a labeling system for heating appliances which rates every piece of equipment according to its energy efficiency level;
- Establish an inspection system to ensure all suppliers of furnaces and heating equipment in Kosovo meet energy efficiency and environmental protection standards, as determined by the law;
- Implementation of the Construction Law by relevant institutions such as Municipalities and the MESP and ensuring thermal insulation conforms with required standards in cases of new construction;
- Increasing the efficiency of buildings by applying the Technical Regulation on Thermal Energy Savings and Thermal Protection in Buildings and the European Directive on energy performance of buildings, based on the specific conditions in Kosovo;
- Encouraging schemes in residential buildings to replace existing windows with double or triple glass windows and existing water heating systems with the solar powered systems.

3.3.4 District Heating and CHP

3.3.4.1 District Heating Possibilities

District heating is defined as the supply of space and water heating to a number of buildings from a central heating plant, or group of heating plants, which are linked to each other. In some cases, these may be Combined Heat and Power (CHP) plants. At present, Kosovo has three district heating systems - in Pristina, Gjakova and Mitrovica -, which deliver heat to a maximum of 5 - 7% of the building stock in those cities. With the help of a KfW loan, it is planned that Kosovo B will be transformed into a CHP type facility to supply a large part of Pristina with heat and so increase the proportion of customers connected to the DH network.

13 http://mzhe.rks-gov.net/repository/docs/Strategjia_e_Ngrohjes_2011-2018-Eng.pdf

District heating systems may vary in size, from those serving a small group of houses to those covering a whole metropolitan area. Any kind of fuel or any source of waste heat may be utilized in a district heating system and systems over a certain size may be supplied by more than one heating station, possibly using different kinds of fuel. The pipeline network can consist of both large lines, linking major plants with population centers, as well as smaller lines distributing heat to individual users.

The construction of district heating systems requires large investments in capital-intensive installations, not only production units, but also long and well-insulated transmission and distribution pipelines. The stability of future heating costs is an important factor for DH consumers, since fuel costs constitute only about 15-25% of the total heating cost.

The most favorable conditions for financing investment in District Heating schemes are to be found in utilities, which have been gradually built up over many years and are in need of rehabilitation. The more rapidly that consumers can be connected to the heating network, the better the economics of the operation. This is the biggest challenge in developing the district heating systems of Pristina (Termokos), Gjakova and Mitrovica. The situation is even more challenging in light of the fact that since 1999 most new buildings have been built with almost no regard being given to the development of district heating networks. In principle, DH companies compete in the market and balance their tariffs against those of competitors, such as oil-, gas- and in the case of Kosovo, electricity-based central heating systems - but the market is invariably distorted by energy policy measures such as taxation, subsidies and regulations - including laws relating to heat supply.

3.3.4.2 Combined Heat and Power Possibilities

CHP or co-generation is defined as the simultaneous production of electricity and heat from the same fuel. Almost all CHP schemes should be capable of incorporating district heating. The basic argument in favor of CHP is that it should be possible to obtain an advantage by generating electricity locally while at the same time making use of about two-thirds of the waste heat. Other specific benefits can be detailed as follows:

- Improved national energy efficiency and preservation of fossil fuel reserves (non-renewable energy);
- Local generation of electricity reduces the technical losses on transmission and distribution networks;
- Reduction in environmental pollution resulting from lower GHG and acid rain gas emissions;
- Increased investment in industry and the service sector, leading to more jobs.

The reasons why DH and CHP are not used more widely in industrial and public buildings and in multi-storey building blocks are largely economic and relate to the financial evaluation of the capital investment. The detailed points that need to be considered are as follows:

- If the owners of a public building decide to invest in a connection to a DH/CHP plant then they commit to a long-term course of action that involves expenditure over a number of years. At present, the existing DH/CHP companies in Kosovo are not very reliable and cannot guarantee a proper and secure supply of heat. It may therefore seem less risky for a consumer to simply purchase electricity from the national grid and generate heat from his own boiler rather than to purchase both services from a CHP facility.
- Apart from the capital costs of the prime power motor, there are significant costs associated with distributing heat through pipelines. Unless the heat consumer is relatively near to the prime mover motor, distribution costs may be a significant part of the initial investment. Given the actual conditions in the main cities of Kosovo where

many buildings have been constructed without regard to basic urban planning standards, the cost of putting down transmission and distribution heating pipes is very high and leads to very high connection costs. This trend is evident in many Kosovan cities and it is one of the most significant barriers holding back the penetration of DH systems.

- Any change in consumer behavior (for example, a reduction in energy demand through demand-side energy efficiency measures) may result in a change in the demand for heat or power, which in turn changes the cost per unit from that which was initially calculated for the original installation.

Based on a consideration of all the above issues, international experience has shown that DH/CHP can be a good option for large public buildings, especially when there is a group of such buildings situated in close proximity to one another and new buildings have been constructed with due consideration being given to the layout of district heating distribution pipes. It is important to point out that this is not the case in many of the biggest cities of Kosovo: Prizren, Gjakova, Mitrovica, Peja, Ferizaj and Gjilan. Moreover, the requirement to plan for the efficient expansion of DH systems has been undermined by the large number of new buildings put up without the necessary permits and planning permissions in recent years.

If, however, a building is located in an area served by an existing scheme that is going to be refurbished, then it should not be difficult to revert to taking supply from the improved DH system and reallocating the back-up heating system to other buildings which cannot benefit from DH because of their remote location.

On 14 November 2012, the agreements for a €25 million loan and grant package to improve the district heating system in Prishtina were signed by the GoK. Together with the German federal government which provided the loan element through KfW, the EU Commission participated in the financing with a grant of €13.8 million. In addition to the rehabilitation of the existing district heating network, the money will be used to finance the construction of a CHP system in the Kosovo B TPP and its connection via a pipeline to the district heating system in Prishtina.

Since the TOR of this project did not include an analysis of the planned expansion and refurbishment of the Termokos DH network in Pristina and the DH System of Gjakova, it has not been possible to estimate, which buildings would benefit, when and by how much. Moreover, the benefits of demand-side EE measures will apply equally to all energy consumption, whatever its source and any energy savings that result from improvements in DH should be credited to DH.

3.3.5 Energy Balance

The electricity supply industry in Kosovo is currently unable to meet its customers' demand for power. Insufficient investment in new plant capacity coupled with inadequate maintenance of existing capacity has led to a substantial shortfall in electricity supply. The overall result is that energy shortfalls have to be met either by shedding load or by purchasing (expensive) imports of electricity (€55 million in 2011, funded partially by a €27 million grant from GoK).

Figure 3-1 on the following page illustrates recent trends in the growth of demand for electricity in Kosovo. Electricity consumption and peak demand increased by more than 90% between 2000 and 2010, with electricity consumption increasing at an average rate of just below 7% per annum and peak demand at an average rate of nearly 6% per annum.

The residential sector accounts for around 63% of electricity demand in Kosovo and technical and non-technical losses on the network remain high, in the order of 40% of gross electricity consumption. The total installed generation capacity of the power system is just over 1.5 GW (about 920 MW net of losses). The two TPPs, Kosovo A and Kosovo B contribute most of the generation – about 95% - with a net operating capacity ranging between 840 and 900 MW.

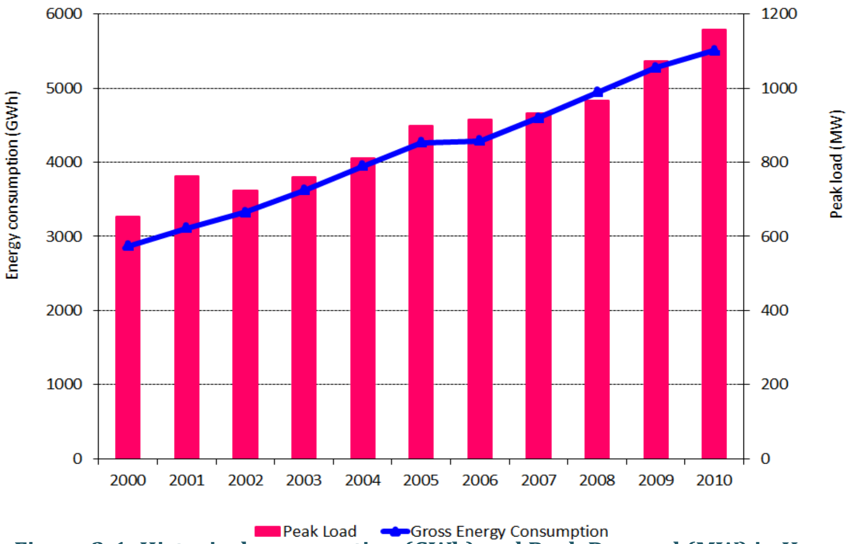


Figure 3-1: Historical consumption (GWh) and Peak Demand (MW) in Kosovo

The largest and oldest power plant, Kosovo A, is both unreliable and inefficient and at present, its available capacity is about 350 MW. It is to be closed down by the end of 2017 at the latest, but it is not certain when the replacement "Kosova e Re" facility - which will have an installed capacity of 600 MW – will come on line. Kosovo B, although newer than Kosovo A, suffers from mechanical and electrical problems that result in frequent forced outages of both of its units. These have been down-rated due to their poor operating condition and so the total net capacity of Kosovo B is now in the order of 540 MW. Imports of electricity via regional interconnectors have been very important to Kosovo and since 2001, the volume of imports has ranged between 5% and 17% of total annual consumption.

A recent analysis of the supply-demand balance commissioned by the World Bank[14] suggests that Kosovo will need about 950 MW of new, firm capacity by 2017, around 1000 MW by 2019 and about 1500 MW by 2025.

Since Kosovo has no natural gas and oil reserves, no access to natural gas and oil pipelines and no oil processing facilities, the World Bank Background Paper[15] suggests that hydro and renewables can provide some of the required firm capacity. It assumes that 305 MW of firm capacity could be supplied by hydropower plant and a further 170 MW of firm capacity by other renewables (small hydro, wind, biomass and biogas). But even if all of this renewable capacity could be built by 2017, there would still be a remaining gap for firm base-load capacity which averages about 600 MW in the period 2017-19, and grows to about 1,000 MW by 2025.

Part of this gap will have to be filled by thermal plant, but clearly, reducing the potential gap by using each kWh of energy more efficiently is of vital importance. Energy efficiency - and better use of renewable energy sources - are therefore urgent priorities for Kosovo if its citizens are to enjoy good quality, uninterrupted 24-hour energy supply in the future.

14 World Bank Background Paper: Development and Evaluation of Power Supply Options for Kosovo, December 2011

15 ibid

Ministry of Economic Development recently issued the energy balance for 2011[16] which is presented in Table 3-1. As in previous years, the supply side data is considered reliable, whereas the consumption data is less certain and includes several estimates for the residential and service sectors. Figures relating to the supply and consumption of biomass - the MED is the only source of information on biomass - in both the above mentioned sectors are highly uncertain (although the situation is very similar in all Western Balkan countries and this is not a unique problem for Kosovo). That point, however, is especially relevant for this study, since firewood represents an important fuel source for space heating in both the residential and the commercial sectors.

Energy Source	ktoe	%
Coal	1623.49	64.8
Petroleum products	591.56	23.6
Biomass	241.93	9.7
Electricity imports	38.27	1.5
Hydro	9.00	0.4
Solar	0.63	~
Wind	0.02	~
Biofuel	0.13	~
Total	**2505.03**	**100.0**

Table 3-1: Primary Energy Supply in Kosovo, 2011
Source: MED, Energy Balance 2012

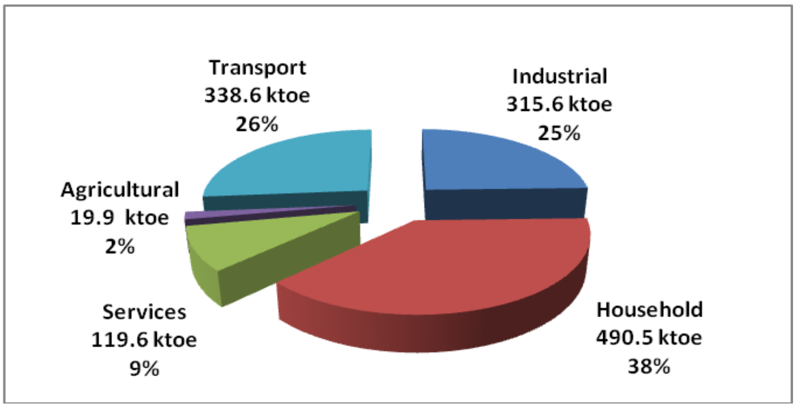


Figure 3-2: Final energy consumption by Economic Sector, 2011
Source: MED, Energy Balance 2012

In Figure 3-2 above, shows that the combined consumption of these two sectors (residential and services) - on space and water heating, cooking, lighting, household appliances and electronic equipment - is 610.08 ktoe. This figure represents 48% of total consumption and provides an initial indication of the potential savings that can be realized by implementing energy efficiency measures in buildings. (Chapter 10 provides a full analysis of the savings potential of the two sectors.)

Table 3-2 below shows that biomass and electricity are the main fuels used by the Residential Sector, while for the Services Sector electricity is the main energy source, followed by petroleum products. At present there are many diesel generators installed in Kosovo to provide back-up supplies during power cuts.

16 Annual (Realized) Energy Balance of Republic of Kosovo For The Year 2011 (http://mzhe.rks-gov.net/repository/docs/balanca_eng11.pdf)

In the Residential Sector, biomass and electricity consumption will be the sources most affected by implementation of energy efficiency measures. However, since both these sources are under-priced at present, the potential for end-users to make direct financial savings will be reduced compared with theoretical/'economic' potential.

Source	Residential Sector		Services Sector	
	ktoe	%	ktoe	%
Coal	23.32	4.8	3.92	3.3
Petroleum products	25.82	5.3	46.06	38.5
Biomass	222.36	45.3	6.37	5.3
Electricity	216.85	44.2	61.72	51.6
Solar energy	0.19	0.0	0.44	0.4
Derived heat	1.98	0.4	1.06	0.9
Total	**490.51**	**100.0**	**119.57**	**100.0**

Table 3-2: Energy Consumption in the Household and Services Sectors 2011
Source: MED, Energy Balance 2012

For the Services Sector the highest energy consumption is of electricity and petroleum products and there are significant opportunities in private and public buildings to make energy savings.

3.3.6 Trends in Energy Prices

Whilst some energy prices in Kosovo are regulated (electricity and district heating), others are determined by international market forces (petroleum products). According to the Electricity Law, a full opening of the market, with all customers free to choose between alternative suppliers, will be in force by 2015.

Current electricity tariffs (as of 1st June 2012)[17] include three categories of tariffs for households. The most common tariff ('2-value meter') applies for three consumption bands: up to 200 kWh/month, 200-600 kWh/month and over 600 kWh/month. The tariff is further divided into high season (1 October- 31 March) and low season (1 April - 30 September) and within these seasons there are separate tariffs for peak and off peak periods, giving a total of 12 different pricing categories. The prices quoted here do not include VAT or any other taxes. Many EU countries do impose taxes on electricity – especially for households – whereas in Kosovo there are no taxes on electricity except for VAT at 16%.

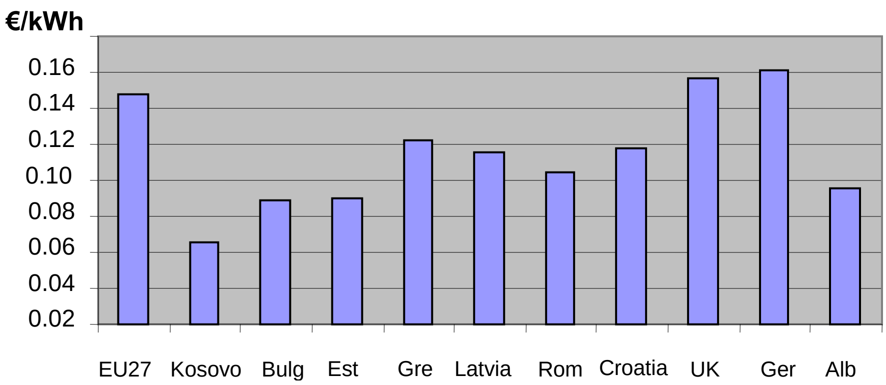


Figure 3-3: Electricity Tariff for Households €/kWh, June 2012 (Excl. VAT and taxes)

17 http://kek-energy.com/en/furFaturimi.asp

Source: KEK and Eurostat. Consumer with annual consumption of 5,000 kWh/year.
EU Figures for 2011: Kosovo (two-value meter) and Albania for 2012.

Figure 3-3 shows that for the sample of countries selected, Kosovo has the lowest household electricity tariffs for the residential customers. If taxes are included, the difference is even higher, because many EU countries impose taxes on electricity for households.

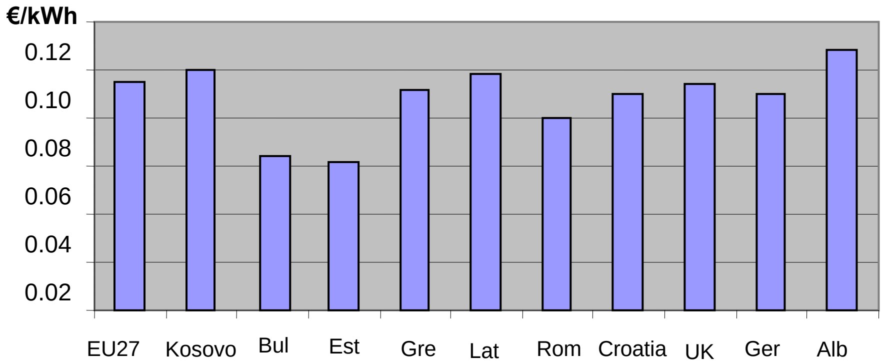


Figure 3-4: Electricity Tariff for Enterprises €/kWh, June 2012. (Excl. VAT and taxes-DH not significant)
Source: KEK and Eurostat. Consumer with annual consumption of 500 MWh/year supplied at 0.4 kV.
EU Figures from 2011. Kosovo and Albania 2012.

From Figure 3-4 above it would appear that the electricity tariff for enterprises (including commercial buildings) in Kosovo is closer to the levels recorded in other countries. The price is even higher than the average of the 27 EU countries. The most important other fuel prices to consider are those of firewood, LPG, kerosene and gas/diesel. The markets for these fuels are not regulated and therefore prices reflect market conditions. Table 3-3 below presents the prices of the fuels most commonly used in the building sector. The price of firewood in urban areas is known, but it should be noted that in rural areas the price of firewood is difficult to establish because there are many informal local markets, self-collection is common and the heating value of the wood can differ considerably. Moreover, the price of firewood is not cost reflective, in the sense that it does not usually include preparation, transport, treatment, and replacement and deforestation costs. According to 'WP3 – Wood fuel price statistics in Europe' (published by EUBIONET3, August 2011) European price data is available but not at an EU level and there are wide variations in wood price statistics between European countries.

Fuel	Price in Kosovo	Price in EU
Diesel oil	1.31 €/liter	1.12 €/liter
Coal for heating	20 €/ton	No structured data available. Steam coal bulk approx. 75 €/ton
LPG	0.6 – 0.7 €/liter	0.8 €/liter
Firewood	35 - 45 €/m³ (4.8 - 8.6 €/GJ)	Approx. €3 - €14*
Wood pellets	120-150 €/ton (7.5 – 9.4 €/GJ)	200-250 €/ton (12.5 – 15.7 €/GJ)

Table 3-3: Retail price of fuels commonly used in buildings, 2012 (Taxes included-DH not significant)

Source: Diesel/LPG: Europe,s energy Portal, 2012; Coal is locally produced and therefore cheap. Wood: EU Bionet. Solutions for biomass fuel, market barriers and raw material availability. 2010 Swedish University of Agricultural Services – limited number of observations across Europe. For Kosovo own estimates by Eptisa, August 2012.
**No common EU statistics.*

Diesel and LPG price comparisons between Kosovo and the EU are relatively straightforward as official statistics are readily available and the data confirms that there is price convergence between these markets. For firewood, however, there are no official statistics and very little reliable data. The EU price shown in Table 3-4 is based on a limited Swedish study and indicates that prices vary widely, partly because the quality, humidity and heating value of firewood can differ considerably and partly because there are so many local markets. There is also a lot of illegal woodcutting in Kosovo, which distorts the local market. Nevertheless, the price of legally traded firewood in Kosovo lies at the lower end of the range for the EU. The Kosovo coal price is very low, since it is a low quality coal, lignite. The low price of coal can also be partly explained by the proximity of the market to the mines where it is extracted. It should also be noted that some residential consumers do not buy lignite at all, but simply go out and gather it free of charge, while others get their supplies from informal ‘micro mines’ which operate outside of the official Kosovo coal retail industry.

4 Institutional and Legal Framework

4.1 The Energy Community Treaty and EU Directives

In October 2005, the Republic of Kosovo became a party to the Energy Community Treaty (ECT). The Treaty provides for the creation of an integrated energy market (electricity and gas) between the European Community and the contracting parties. The objectives of the Energy Community are:

- to create a stable legal and market framework capable of attracting investment in order to ensure a stable and continuous energy supply;
- to create a single regulatory space for trade in network energy;
- to enhance security of supply in this space and develop cross-border relations;
- to improve energy efficiency and the environmental situation related to network energy and develop renewable energy sources;
- to develop network energy market competition.

The permanent Secretariat, based in Vienna, provides administrative support to the other institutions of the Energy Community and reviews proper fulfillment by the parties of their various obligations.

The following are the key EU directives that directly address or have an influence on energy efficiency issues:

- Energy Performance in Buildings
- Energy End-use Efficiency and Energy Services Directive
- Energy Labeling of Household Appliances

4.1 The Legal Framework in Kosovo

There are five laws in Kosovo that cover energy efficiency issues:

- *Law on Energy Efficiency*
- *Law on Energy*
- *Law on Electricity*
- *Law on the Energy Regulator*
- *Law on Construction*

These five pieces of primary legislation are supplemented by a tranche of secondary legislation on energy efficiency in the form of administrative instructions.

4.1.1 The Law on Energy Efficiency

The Assembly of the Republic of Kosovo approved the Law on Energy Efficiency in June 2011. The Law determines the obligations of the Ministry of Economic Development and of the Municipalities in preparing EE action plans, setting up the EE Agency and funding EE initiatives.

According to article 4, paragraph 1 of the Law, the Ministry of Economic Development was required to establish the Kosovo Energy Efficiency Agency and according to paragraph 2 is required to establish a Commission for Certification of EE Auditors. The Ministry is also obligated to submit the Kosovo Energy Efficiency Plan to the Government for approval in compliance with Directive 2006/32/EC and then to review it every three years.

A view has developed within the energy sector that the legal framework for energy efficiency is inadequate and in certain instances, impractical. Many of the measures, obligations and objectives in the EE Law are not regulated by the Law directly, but by secondary legislation not all of which is yet in place. A notable deficiency of the Law is that it does not provide incentive measures for efficient energy consumers while on the other hand, there are no penalty provisions for failing to comply with the Law or for disregarding EE objectives.

Consequently, on 6 December 2012 the 'Report on Monitoring the Implementation of the Law on Energy Efficiency' prepared by the Committee on Economic Development, Industry, Infrastructure and Trade was approved by the Assembly. The Report includes six general recommendations concerning the steps that must be taken in order to progress the amendment of the Law:

1. the GoK to include the amendment of the Law on EE in its legislative strategy for 2013;
2. within three months of the date of approval of this Report, GoK and MED to issue all necessary secondary legislation for implementation of this Law;
3. the GoK to allocate a sufficient budget for funding and co-funding projects to implement EE measures, to become more active in attracting grants from international donors and to invest in this field. In addition, a priority of the MED should be strengthening the administrative capacities of the KEEA;
4. the KEEA should undertake awareness campaigns highlighting the importance of EE;
5. the municipalities to draft their EE plans on energy efficiency within 6 months of the approval of this Report;
6. establish a proper cooperation between the KEEA and the municipalities.

4.1.2 The Kosovo Energy Efficiency Agency

The Agency was established in April 2012 with a complement of four officers who are currently working to implement the Energy Efficiency Law. It is headed up by a Chief Executive Officer and consists of 3 divisions: the Planning Division, the Promotion and Project Development Division and the Monitoring and Reporting Division. Although the Law envisages an independent KEEA, its lack of financial resources suggests that for the foreseeable future at least, the Agency will have to remain within the organizational framework of the MED.

One of the activities currently in progress is the establishment of a Commission for Certification of Energy Auditors, building on the experience of the 50 existing energy auditors who were trained under a previous technical assistance program. After 3 years, the auditing activity is to be developed by a non-public sector organization. Furthermore, with the support of GIZ-IS, the KEEA is working on the establishment of regional energy offices which would be independent of the municipalities. These could be structured in the form of NGOs, funds or organizations of public or private or mixed status.

4.1.2.1 Municipal Energy Efficiency Plans

Article 9 of the Law describes the responsibilities of the Municipal Energy Offices in developing Municipal Energy Efficiency Plans and Municipal Energy Efficiency Plan Implementation Progress Reports, as instructed by the KEEA. Both documents have to be adopted by the Municipal Assembly and subsequently delivered to the KEEA. GIZ_IS is currently working with the KEEA on the preparation of ten municipal energy plans under an EU-funded project 'Promoting EE and RES in Kosovo' which was launched in the second half of 2012.

4.1.2.2 Energy Efficiency Measures Funding

Article 11 of the Law states that the Ministry should support the measures defined in the Kosovo Energy Efficiency Plan. This support includes seeking financial support from the Kosovo Budget, from international organizations, which run programs for promoting energy efficiency and, where possible, from the inclusion of energy efficiency funding in bilateral co-operation agreements. To support measures for promoting energy efficiency defined in municipality EE plans, municipalities should explore funding possibilities within the Municipal Budgets or through donations. As the Budget Law of Kosovo only allows for the existence of a single national fund, under current legislation a dedicated EE fund is not permitted. An initial review of the legal situation by the MED suggests that this constraint cannot be lifted unless changes are made to the primary legislation.

4.1.3 The Law on Energy

The Assembly of the Republic of Kosovo approved the Law on Energy in October 2010. Some of the references that it makes to energy efficiency issues are set out below:

- Article 6 - 6.7. improving energy efficiency and encouraging energy conservation measures consistent with energy efficiency targets;
- Article 6 - 6.8. encouraging the adoption of real-time demand management technologies, such as advanced metering systems;
- Article 8 - Energy Efficiency Policy
  1. Energy Efficiency Policy shall be an integral part of the Energy Strategy, and its scope and content shall be consistent with Kosovo's obligations under the Energy Community Treaty and other legislation.
  2. The purpose of the Energy Efficiency Policy shall be to improve the energy efficiency and the use of energy saving potentials with a view to achieving an optimal level of energy efficiency in Kosovo.
- Article 9 - Implementation of Energy Efficiency Policy
  - 1.3. Foster improvements in the energy efficiency level of buildings, and arrangements for energy certification of buildings;
  - 1.4. Encourage an energy audit process and local energy saving development plans;
  - 1.5. Publish information on energy efficiency levels and developments.

4.1.4 The Law on Electricity

The Law on Electricity was also approved in October 2010. It defines the functions of different parts of the electricity market and prepares for market opening, in line with EU requirements. Some of the articles in the Law refer to energy efficiency, but it is not the main theme of this law.

- Article 16 on distribution is relevant in this context:
  - Sec. 1.8 - Gives priority to dispatch of renewable energy resources and co-generation. The clause on co-generation will help to improve energy efficiency, as will the planned rehabilitation of Kosovo B TPP.
  - Sec. 1.14 - States that tariffs shall provide efficient economic signals to system users.
  - Sec. 1.6 - States that distribution companies shall assist municipalities in preparing their plans, programs and development strategies.
  - Sec. 7 - States that tariffs shall be developed in a cost-reflective way.
  - Sec. 9 - States that illegal connections shall be disconnected.

Furthermore, the Law specifies the steps that need to be taken in order to develop a more competitive market. All customers will be eligible for alternative supplies by the 1st January 2015 and third parties shall have freedom of access to the grid. The Law also defines a range of consequences for illegal connection, ranging from large fines to imprisonment.

4.1.5 The Law on the Energy Regulator

This Law was approved in 2010 and the regulatory institutions it established are now functioning effectively. The Regulator is responsible for reviewing and approving tariff-setting methodologies and for evaluating and approving tariff proposals, which includes the implementation of loss reduction measures. Currently, the ERO is managing the transition from a single year to a multi-year tariff setting methodology.

The tariff revision approved by the Energy Regulator in June 2012 represented an increase of 8.9% over 2011 prices. According to the Regulator, the new tariff will allow the government to reduce its subsidy to KEK to €13 million. The subsidy is used to hold down prices to residential sector customers, but the Regulator's intention is that by 2014 tariffs will be cost-reflective with no more cross-subsidies.

4.1.6 The Law on Construction

The Law on Construction (2004) is the responsibility of the Ministry of Environment and Spatial Planning, within which lies the Housing and Construction Department. The Law contains some important features that relate to the energy performance of buildings.

In 2009, the Technical Regulation on Thermal Energy Saving and Thermal Protection in Buildings was approved. The regulation establishes norms for the thermal performance of buildings and sets the standards to be used for calculating the relevant parameters both for new buildings and for renovation work costing more than 25% of the value of the building. The Law on Construction, adopted on 31 May 2012, requires the implementation of energy efficiency measures in the construction of buildings. Article 6 of the Law recognizes that EE measures are one of the objectives of The Unified Construction Code of the Republic of Kosovo and according to Article 27 building developments must incorporate EE measures and each user of a new building is obliged to obtain a utilization certificate, which is conditional on demonstrating implementation of EE measures. According to the new law, a revised version of the Technical Regulation on Thermal Energy Saving and Thermal Protection in Buildings will be produced, a major task because of the level of detail and complexity involved in incorporating the European Standard. The Regulation also puts responsibility on municipality building administrators to enforce and process building permits.

An interesting element of the new law concerns potential remedies for establishing the legal status of buildings constructed without proper building permits. In the years following the 1998-99 conflict, formal planning processes were implemented in a very slow and bureaucratic manner, in part because of the lack of official documentation relating to property ownership. As a result, it has been estimated that in Kosovo about 50% of new buildings (i.e. built since 2000) are illegal, in the sense that they were constructed without obtaining the necessary permission.

Section 2-Review and Methodology

5 Summary of the KEEAP 2010–2018 and its application to the Building Stock of Kosovo

5.1 General EE Targets in the KEEAP

In fulfilling its mandate to coordinate local legislation with EU legislation on energy efficiency and in conformity with the requirements of Article 4 (2) of Directive 2006/32/EC, the Government of Kosovo adopted Administrative Instruction No.2008/15 on the Promotion of Utilization of Efficient Energy by Final Consumers and Energy Services. In applying the objectives set by the ECT, the Ministry of Economic Development was obliged to prepare a National Action Plan on Energy Efficiency, entitled the Kosovo Energy Efficiency Plan (KEEAP). The KEEAP is a long-term document, prepared and implemented at national level and covering the period 2009 – 2018 but containing indicative energy savings targets for the long-, medium- and intermediate term. The Intermediate Indicative Target for Energy Saving for Kosovo for the period 2010-2012 was set with reference to the General Indicative Target for Energy Saving for 2018. The Intermediate Target adopted for 2012 was to reduce the average consumption recorded during the five-year period 2003-2007 (excluding air transport consumption) by 3% and by 9% for the year 2018.

Figure 5-1 below shows how the profile of the energy savings targets set in the KEEAP develops over the planning period to 2018. Figure 5-2 shows how total energy savings are forecast to increase over the planning period (using KEEAP assumptions concerning growth patterns observed in other developed countries and a macro-economic scenario, which assumes average GDP growth of 3.1% p.a. for the period 2008-2018).

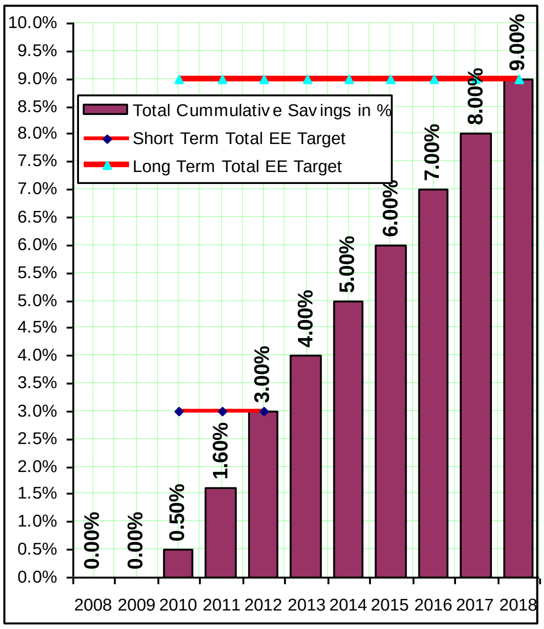


Figure 5-1: Planned Short- & Long-Term EE Targets (cumulative savings as % of final consumption)

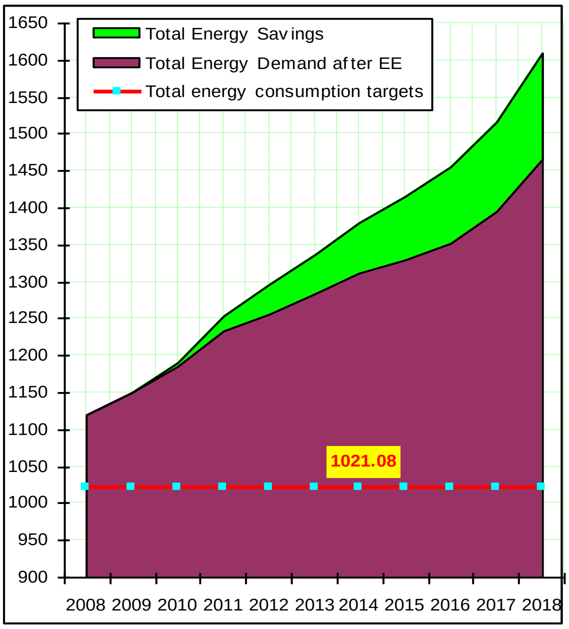


Figure 5-2: Planned Short- & Long-Term EE Targets (ktoe)

The sectoral allocation of the national targets was primarily based on the following factors:

- The contribution of the individual sectors to final energy consumption;
- The potential for efficiency improvements;
- The relative economic efficiency of different EE measures within different sectors (i.e. prioritize promotion of the most effective measures).

The household and transport sectors account for the largest share of final energy consumption in Kosovo. However, as noted in the third bullet point above, the allocation of the disaggregated targets was not made solely based on these overall shares, but also took account of the anticipated impact of the proposed EE measures. The final distribution of the intermediate energy saving target, by sector, is presented in Table 5-1 below.

Indicative Energy Saving Target			
SECTOR	**%**	**ktoe**	**GWh**
Residential	40.0	12.8	144
Services	30.0	9.6	108
Industry	25.0	8.0	90
Transport	4.5	1.4	52
Agriculture	0.5	0.15	6
Total	**100**	**31.95**	**400**

Table 5-1: Intermediate energy saving targets by sector, 2010-2012
Source: KEEAP approved on Administrative Instruction No.2008/15

The Table shows that the Household (Residential) and Services sectors will have to deliver 70% of the overall target intermediate savings, while Industry, Transport and Agriculture need to contribute the remaining 30%. These three sectors are considered to be more receptive to public awareness raising campaigns rather than to meeting concrete obligatory measures. Figures 5-3 and 5-4 below summarize the relative and absolute energy savings required from each economic sector in order to reach the objectives described in the sections above.

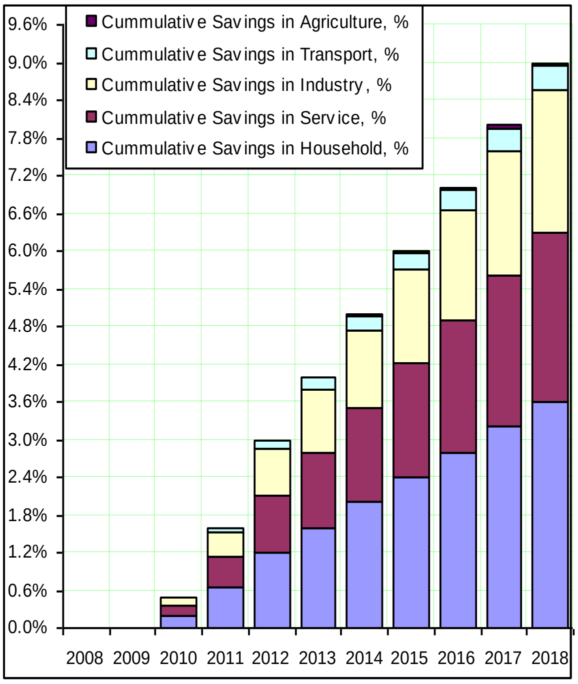


Figure 5-3: Planned cumulative EE Savings (%) for each sector

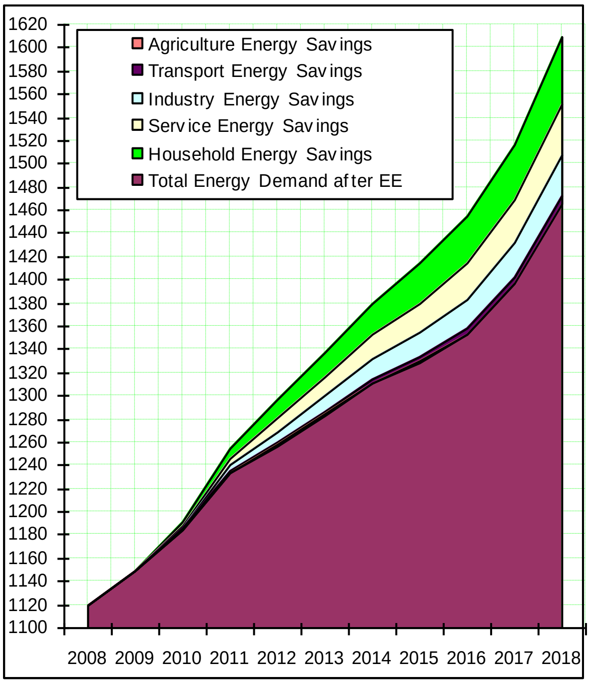


Figure 5-4: Planned EE savings for each sector (ktoe) and Total Energy Demand post-EE measures

On 1st June 2012, the Ministry of Economic Development submitted its 'Report on monitoring the implementation of the 1st NEEAP 2010 - 2012'. Table 5-2 on the following page shows the indicative energy savings targets that were agreed for 2012 and 2018, as well as the energy savings achieved in the period 2010 – 2012 and an estimate of energy savings expected in 2018.

The Report states that because of the underdeveloped capacities and institutional framework in Kosovo for the development and implementation of EE measures, the 3% target for 2012 is considered to have been over ambitious. The KEEA Report on Monitoring Implementation of the first NEEAP anticipates that the 3% target for 2012 will be met following the transposition of Directive 2002/91/EC and 2010/31/EU on energy performance of buildings and compulsory energy auditing measures for improving EE in government buildings.

At the beginning of 2013 the Kosovo Energy Efficiency Agency will deliver a revised version of its first report to the Energy Secretariat on the level of implementation of EE measures and the extent to which targets are being met by each sector. The above-mentioned Report shows that to date most initiatives have involved 'soft' measures (i.e. new laws and regulations) and that the level of implementation of 'hard' projects (i.e. physical investments) is low. In the absence of an established formal monitoring scheme, the savings reported for 2012 represent the best estimates of the KEEA experts.

Sector	2012 (ktoe)		2018 (ktoe)	
	Target*	Savings from measures**	Target*	Estimated savings from measures**
Residential	12.80	9.94	30.64	37.46
Services	9.60	10.11	12.26	30.54
Industry	8.15	n/a	24.84	n/a
Transport	1.40	n/a	24.15	n/a
Total	31.95	20.05	91.89	68.0
Savings as % of base consumption	3%	2.2%	9%	7.3%

Table 5-2: National Indicative Targets and their accomplishment (ktoe)

*Source: *1st KEEAP; ** Report on the implementation of the 1st NEEAP, 2010-2012, Kosovo*

An initial draft of the '2nd NEEAP 2013 - 2015' is being prepared by the KEEA and is expected to be ready by the beginning of April 2013. Then this document will be submitted to the Energy Secretariat at the end of June 2013.

6 Data Sources

6.1 Sources of Data

6.1.1 The Building Stock of Kosovo

The MEM/MED, supported by EU technical assistance for the preparation of the KEEAP during the period 2009-2010, carried out extensive work on data collection for all economic sectors in general and for the building stock in particular. This work involved Kosovo's 11 largest municipalities and included four intensive workshops and six months of data collection for three categories of building: residential, public and private. Based on this deep analysis the KEEAP documentation was prepared and submitted to the Energy Secretariat which commented that the work was well done from a quantitative point of view, especially for the residential and service sectors. The KEEAP became a legal document following its subsequent approval by the Kosovo Government.

In December 2011, the Ministry of Economic Development finalized "The Study of the Public Building Stock for Energy Audit" prepared by Elegancacom Consortium & B2B Consulting Companies. The first five chapters contain a general analysis relating to energy efficiency legal frameworks, legal aspects of energy audits and the methodology for calculation of energy consumption.

In Chapters 6 and 7 the study deals with central buildings and with municipality buildings respectively, classifying buildings according to three categories based on their level of energy consumption (but without identifying which year the consumption figures relate to). Chapter 8 considers public company buildings only and commercial and private services are not analyzed at all. This study was the first one in Kosovo that attempted to categorize buildings according to their age. But since the information was almost impossible to collect (many records were lost or destroyed during the 1998 conflict) the study just provided a simple and general indication that buildings were built in the period 1930 to 2009.

Chapters 6 to 8 lack information regarding the status of each building from a thermodynamic point of view and the concept of heating/cooling degree days was not used. The only information available relates to the overall consumption of energy commodities (without mentioning which year the values were recorded). Those three chapters, however, do not mention energy consumption for each energy service, such as space heating, space cooling, cooking, lighting, water heating and electrical appliances.

Also missing is the baseline analysis (energy demand needed to reach comfort levels) and proposals for introducing EE measures to evaluate the energy saving potential. As a first attempt, this study has tried to collect building stock inventory for the public building sector and more detailed studies should follow in future.

Therefore the conclusion of the extensive research carried out for this study is that there is only one accepted source of original data on the building stock of Kosovo. This is the information collected from the majority of, but not all, municipalities in preparing the Kosovo Energy Efficiency Action Plan 2010 – 2018. These data are the most important source of information, because they are complete and because they breakdown the building stock between the sub-categories for each sector: residential, public (municipal and central) and private services. A second source of information, used for the purposes of checking and verification of the overall building stock data, is provided by the results of CENSUS 2011. The CENSUS 2011 data only gives the total number of residential buildings in Kosovo and not their breakdown according to each sub-category and it does not provide any information relating to the private and public service sector building stock. Neither of the above mentioned sources provides data regarding the age of buildings. The process of preparing the second KEEAP, including updating of the building stock database, has started and is to be finalized by June 2013.

6.1.2 The Energy Balance (Demand Side Data)

Although the existing information on Kosovo energy supply is considered reliable, the demand-side data is not. This is because there has only been, very limited energy consumption survey carried out in Kosovo and that was in 2007[18].

There is no dependable database of energy consumption for the residential/public/private building sectors for each energy service (space heating, space cooling, lighting, cooking, and water heating and electrical appliances) that would be sufficient to support the production of a reliable energy balance to be used for the evaluation of EE potential for the above-mentioned respective sectors.

Neither the Ministry of Environment and Spatial Planning nor the Ministry of Economic Development have any other energy consumption data for the building stock of Kosovo in a form that could have been used in this study. Various other organizations, such as the Association of Kosovo Municipalities, Association of Architects, university departments and District Heating Companies did not have any relevant data available.

6.2 Data Gaps

The present study filled the gaps resulting from the lack of data on energy consumption for the three building sectors for each energy service by using information obtained from the 71 walk-through energy audits that were carried out by the project team, the 30 public building audits provided by the KfW/EU Project "Implementation of Energy Efficiency Measures in Public Buildings"[19] and the 5 audits of central government buildings prepared by the EU-funded 'Training for Energy Auditors' project (described in Annex 8). Some general information on 42 central government buildings was supplied by the Ministry of Public Administration (Annex 1), but it did not include full details of areas, structures and fuel consumption information.

These audits provide an analysis of the energy consumption patterns for each energy service, for each category of building, in each region, for each sub-sector. However, since the number of buildings in the sample is low, the data collected has been used in conjunction with the (limited) energy balance and other information that was used in the preparation of the KEEAP in order to provide a clearer picture of the overall situation in the building sector. Based on the data collected from the WTAs, it was possible to use a 'bottom-up' approach to estimating energy consumption and for forecasting the residential and public and private service sector demand for each energy service the for the period 2011-2020.

6.3 Primary Data (WTAs)

The market assessment carried out for this study was based on a stratified sampling strategy according to which the building stock of Kosovo was broken down into three basic sub-sectors:

18 "Energy Survey for Residential, Service, Industry Sectors for establishing Kosovo Energy Balance" – MEM Project, 2007

19 Infrastructure Projects Facility in the Western Balkans; Europe Aid/124605/C/SERMULTI (supported from KfW/EU); "Implementation of Energy Efficiency Measures in Public Buildings", January 2012

- *Residential Buildings*
- *Public Service (central government and municipality) Sector Buildings*
- *Private Service (non-residential) Sector Buildings.*

The subsequent analysis then required walk-through energy audits to be carried out to collect data relating to the following building characteristics:

- *Building type, according to materials used and method of construction;*
- *Surface area of the building;*
- *Geographic location of the building;*
- *Age of the building;*
- *Usage patterns (public, staff and client behaviors);*
- *Identification of equipment available for delivering energy services, such as space heating, space cooling, water heating, lighting, cooking and other domestic electrical appliances.*

The walk-through energy audits were conducted in the 71 selected buildings (46 residential, 20 commercial and 5 central government) provide a picture of the energy consumption patterns for each energy service, for each category of building, for each sub-sector, in each region. Year 2010 was agreed with the WB as the base year for the study and 2020, the EU target year for the 20/20/20 initiative, was taken as the end of the forecasting period. Based on the data collected from the energy audits, a 'bottom-up' approach has been taken to estimating energy consumption and for forecasting the residential, public and private sector demand for each energy service for the period 2013-2020.

Information relating to appliance ownership levels, consumer energy consumption patterns, potential energy saving measures and so on, was collected from each of the buildings audited using the questionnaire that appears in Annex 2. The two principal objectives of this questionnaire were, firstly, to obtain information regarding energy consumption and equipment penetration for each energy service and utilization for each category of building and secondly, to identify the most effective EE measures for the various types of building. The questionnaire results provided the starting point for extrapolating the penetration ratios for each EE measure in order to evaluate EE potential for each energy service for 2020 for each of the two building sectors (residential, public and private services).

6.4 Secondary Data

Secondary data is existing data that the KEEA allowed this study to make use of. As stated above in paragraph 6.2, it includes a total of 35 public building audits carried out by other projects in the past: 5 audits of central government buildings from the 2009 'Training for Energy Auditors' project and 30 audits of municipality buildings from the KfW/EU 2011/12 project 'Implementation of Energy Efficiency Measures in Public Buildings'. Further details of these audits are given in Section 8.3.2.

Apart from its limited public building energy audit data base and the KEEAP data, the KEEA does not have any other information relating to absolute or relative energy commodity consumption by each energy service for the residential and private building stock.

7 Energy Audits

7.1 Theory and Principles

The new Law on Energy Efficiency in Kosovo, which was approved on 22 July 2011, defines an energy audit as a systematic procedure to obtain:

> *"Adequate knowledge of the existing energy consumption profile of a building or group of buildings, of an industrial operation, installation or of a private or public service; identification of opportunities for energy savings with cost-effective; and to report the findings"*

The methodology used for the walk-through energy audits is based on the international standard recommended for the EU Certified Energy Auditors Project (2011) and for the KfW/WBIF project, 'Implementation of EE Measures in Municipality Buildings' (Jan 2012). The walk-through audit process is described in more detail in Section 7.3.

7.2 Size and Selection of Samples

The choice of sampling technique is a key component of the overall project methodology, since the portfolio of selected buildings has to be representative of the entire building stock of Kosovo. In order to reflect geographic and climatic diversity, a simple methodology was developed to divide the municipalities of Kosovo into three representative regional groupings, utilizing the concept of 'Heating Degree Days'[20]. Although no official HDD data exists for Kosovo, estimates have been prepared by the Consultant for the purposes of this project. (A detailed analysis of the methodology is presented in Annex 12). The annual heating energy requirement of a building is defined by the formula:

$Q_{annual} = 24*HDD*Gv*V$

Where:
- 24 = number of hours per day
- HDD =Heating Degree Days
- Gv = Total Volumetric Heating Losses for a building (a function of the construction materials used and the form of the building, expressed in terms of the Area: Volume ratio)
- V = the volume of the building

Heating Degree Days are the most important parameter used in calculating the space heating energy demand for buildings. It is significant that in the Administrative Instruction "Technical regulation on thermal energy saving and thermal protection" referred to in Section 4.2, values of HDDs are not given - an important gap in the regulation. This project has therefore calculated HDDs for the most important municipalities, based on long-term external average air temperatures. These values are presented in Annex 12. Figure 7-1 and Table 7-1 present HDDs for each municipality, based on calculations performed by the consultant.

20 A heating degree-day is a parameter that reflects the demand for energy required to heat a building based on measurements of outside air temperature. The heating requirements for a given building at a specific location are assumed to be directly proportional to the number of HDDs at that location.

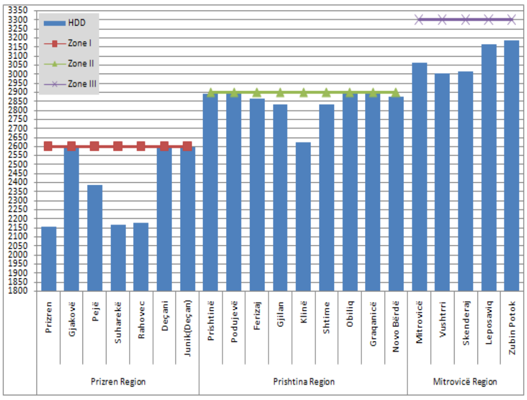


Figure 7-1: HDD (⁰C) for some municipalities of Kosovo

Municipality	HDD (⁰C)	Municipality	HDD (⁰C)
Shtime	2830	Zubin Potok	3185
Obiliq	2890	Prizreni	2157
Graqanicë	2892	Ferizaj	2862
Novo Bërdë	2875	Gjakovë	2589
Suharekë	2168	Gjilan	2832
Rahovec	2176	Peja	2384
Deçani	2598	Prishtinë	2890
Junik(Deçan)	2596	Klinë	2621
Vushtrri	3004	Podujevë	2900
Skenderaj	3015	Mitrovicë	3064
Leposaviq	3165		

Table 7-1: Calculated HDD (⁰C) for some municipalities of Kosovo

For the purposes of introducing standard HDD data and geographic diversity into the sampling process, this study classifies the building stock of Kosovo according to three municipal groupings (agreed with MED and KEEA), Mitrovica, Pristina and Prizren[21], as illustrated in Figure 7-2 below.

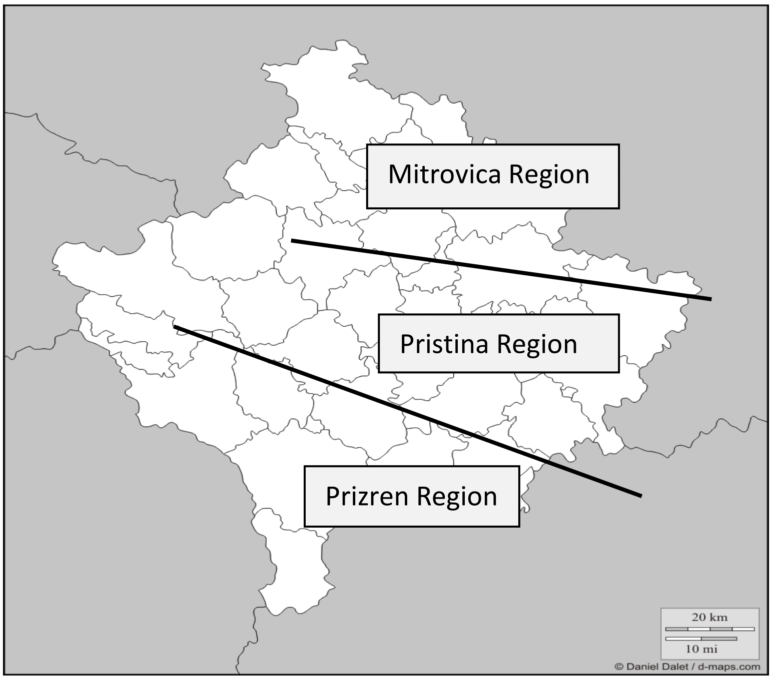


Figure 7-2: Regional classification of Kosovo for sampling purposes

An effective sampling methodology needs to reflect the different levels of energy efficiency and the different energy needs of buildings:

- *From different geographic locations in Kosovo,*
- *From different building sub-sectors,*
- *From within the same sub-sector.*

---

[21] **Prishtinë Region:** Prishtinë, Podujevë, Ferizaj, Gjilan, Lipjan, Gllogovc, Malishevë, Kamenicë, Viti, Klinë, Fushë Kosovë, Kaçanik, Shtime, Obiliq, Graqanicë, Novo Bërdë, Ranillug, Partesh. All these municipalities have HDDs in the range 2601-2900 ⁰C.
Prizren Region: Prizren, Gjakovë, Pejë, Suharekë, Rahovec, Deçani, Dragash, Shtërpcë, Hani I Elezit(Kaçanik), Junik(Deçan), Mamusha, Kllokot. All these municipalities have HDDs in the range 2100-2600 ⁰C.
Mitrovicë Region: Mitrovicë, Vushtrri, Skenderaj, Istog, Leposaviq, Zveçan, Zubin Potok. All these municipalities have HDDs in the range 2901-3350 ⁰C.

According to the KEEAP and CENSUS 2011, there were approximately 310,000 residential buildings in Kosovo in 2011, over 55,000 commercial buildings and around 1,800 municipal and central public buildings. Therefore, even with the data on public sector buildings that the KEEA made available, the 106 energy audits that have been included in this study have to represent a population of some 370,000 residential, public and private service sector buildings.

Statistical theory indicates that for a full sampling process (CL 95%/CI 5%) over 300 audits would have to be carried out for each of the three building sectors. For a confidence interval of 10%, this figure reduces to around 100 audits for each sector. (NB the relationship between population size and the target sample size is not linear.)

Clearly, this level of analysis was beyond the resources of the project. However, Table 7-2 shows the confidence intervals at the 95% level of confidence for the actual sample sizes that were used in the study for each sub-sector of the building stock. For both the residential and the public building sectors the confidence interval is 15%, while for the commercial sector it is 22%. For the residential sector, for example, this means that we can be 95% sure that the true population values lie within plus or minus 15% of the values recorded in the audits.

Sector	Confidence Level	95%	95%	95%
	Confidence Interval	15%	22%	15%
	No. of buildings (approx.)	Actual Sample Size	Actual Sample Size	Actual Sample Size
Residential	308,500	46		
Private	58,100		20	
Public	1,800			40

Table 7-2: Confidence intervals for actual sample size at the 95% confidence level

Since the sample, size was very small and the project timetable very tight, a pragmatic approach was adapted to the selection of buildings for auditing. As there is, no electronic comprehensive database of the building stock of Kosovo the final selection was made by approaching owners of the various categories of buildings who were known to the project team in each of the three regions, thereby expediting the whole process. In each region, three or four possible candidate buildings were identified in each category and the final selection was made based on which owners were the first to agree to an energy audit being carried out in their building.

It was subsequently decided to include five central government administrative buildings in the list of buildings to be audited and these were selected following discussions with the Ministry of Public Administration (the selection process is outlined in Annex 4).

7.3 The Energy Audit Process

The walk-through energy audit process followed in this study was based on and it is consistent with the conventional methodology used in different above-mentioned EU projects and it is consistent with ENSI proposed methodology[22]. AWTA is the simplest and quickest type of audit and involves minimal interviews with site-operating personnel, a brief review of facility utility bills and other operating data, as well as a walk-through of the different energy systems to become familiar with the building construction structures (especially for the outside envelope), system operations and to identify obvious areas of energy inefficiency. Annex 5 contains an outline of the main stages in the Walk-Through Audit process.

[22] Study carry out from ENSI Company on EE in Buildings in the Contracting Parties of the Energy Community (February 2012)

Following the WTA, a list of prioritized energy conservation measures requiring further consideration was drawn up, indicating for each one the energy saving, the respective investment required and providing a cost-benefit analysis (showing both economic and financial indicators). While the level of detail is not sufficient to reach a final decision on the actual implementation of the proposed measures, it is sufficient to allow prioritization of energy efficiency measures and to evaluate the energy saving potential for each energy service and for each building category.

7.4 The Audit Report

As inputs to the WTA reports, the energy auditors collected detailed data recording:

- *The type of building;*
- *The reference climate zone;*
- *The heated floor area;*
- *Structures/building materials for each area;*
- *Type of the windows and outside doors*
- *Types and ages of space heating, space cooling, water heating, cooking, lighting and electrical appliances equipment/systems*
- *The consumption of electricity;*
- *The consumption of heat energy;*
- *The expenditure on fuel.*

The relevant actual energy consumption, baseline energy demand without introduction of EE measures (but fulfilling comfort levels), energy demand with introduction of EE measures (but fulfilling comfort levels) and the respective energy saving values for each EE measure were calculated for each building. Than above mentioned values together with investment values and respective energy prices were used to determine:

- *Energy savings in kWh/m^2 year (consistent with achieving mandatory comfort levels);*
- *Financial and Economical Internal Rate of Return (IRR)of each EE measure;*
- *Financial and Economical Net Present Value (NPV)of each EE measure;*
- *Simple payback period;*
- *Overall total investment value of the whole package of EE measures.*

One of the walk-through audits produced for this Study is presented in Annex 6.A list of all the buildings audited under this project and of buildings audited by other projects but included in the analysis for this project, is presented at Annex 13.

7.5 Calculating Actual Specific Energy Consumption

The actual energy consumption based on monthly bills for electricity, fuels and heat over a two-year period were used to determine energy consumption in kWh/m^2 year. The first step involved carrying out walk-through audits for all buildings in the sample. After each energy audit, the report was finalized by certified local energy auditors and a quality control exercise was carried out for all reports by the key international experts on the project.

7.5.1 Residential Building Sector

Processing data from the residential sector shows that actual energy consumption (kWh/m^2, year) for all 46 buildings for each of the three regions fluctuated between 50 and 550 kWh/m^2 year according to the respective sub-categories of the residential building stock (Figure 7-3). Weighted actual average specific energy consumption values for three regions and for the whole residential building stock of Kosovo are presented in Figure 7-4.

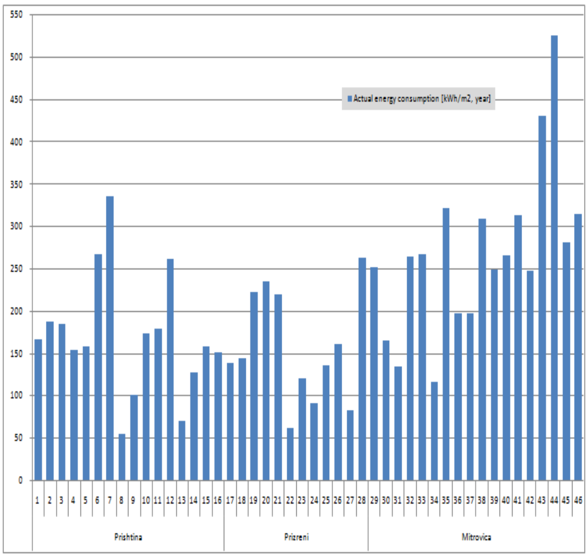


Figure 7-3: Actual energy consumption (without EE and without achieving comfort levels) (kWh/m^2, year) for all 46 buildings for the three regions

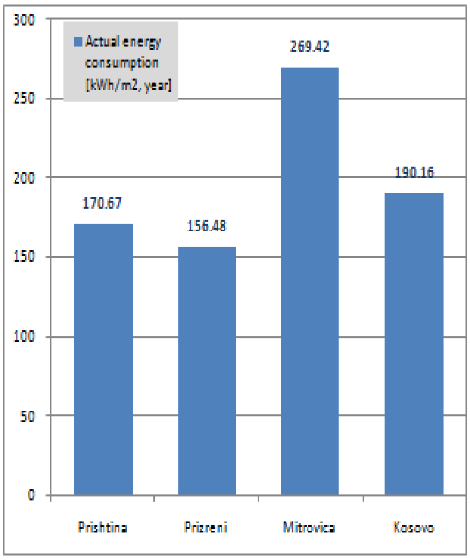


Figure 7-4: Average actual energy consumption (without EE and without achieving comfort levels) (kWh/m2, year) for the three regions and for Kosovo

7.5.2 Municipality Public Building Sector

In order to analyze energy consumption in the Public Building Stock, 30 audits from across the three regions of Kosovo were reviewed based on the other projects mentioned above. Processing of the data shows that the actual energy consumption for all municipality public buildings in each of the three regions fluctuated from a minimum value of 70 (kWh/m^2 year) up to 605 (kWh/m^2 year) - results are shown in Figure 7-5. Weighted actual average specific energy consumption values for three regions and for the municipal public building stock of Kosovo are presented in Figure 7-6.

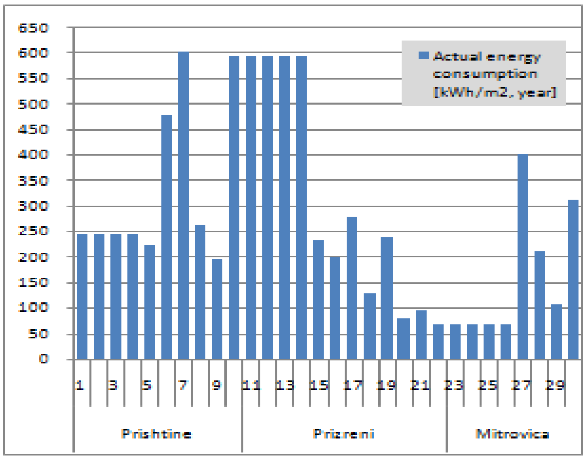


Figure 7-5: Actual energy consumption (without EE and without achieving comfort levels) (kWh/m^2, year) for all 30 buildings for the three regions

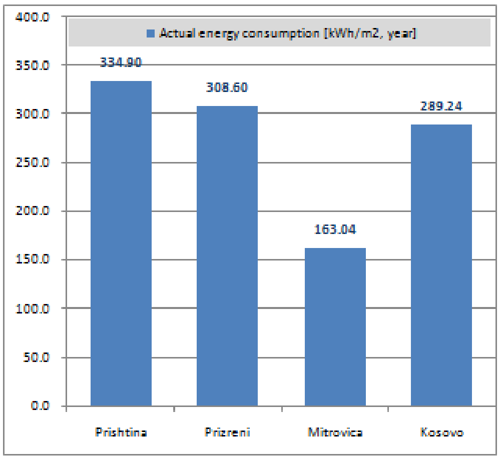


Figure 7-6: Average Actual energy consumption (without EE and without achieving comfort levels) (kWh/m2, year) for the three regions and for Kosovo

7.5.3 Central Public Building Sector

Processing energy audits of ten central public buildings shows that the actual energy consumption fluctuated from a minimum value of 120 (kWh/m² year) up to 500 (kWh/m² year) as shown in Figure 7-7. Weighted actual average specific energy consumption values for central public buildings stock of Kosovo are presented in Figure 7-8.

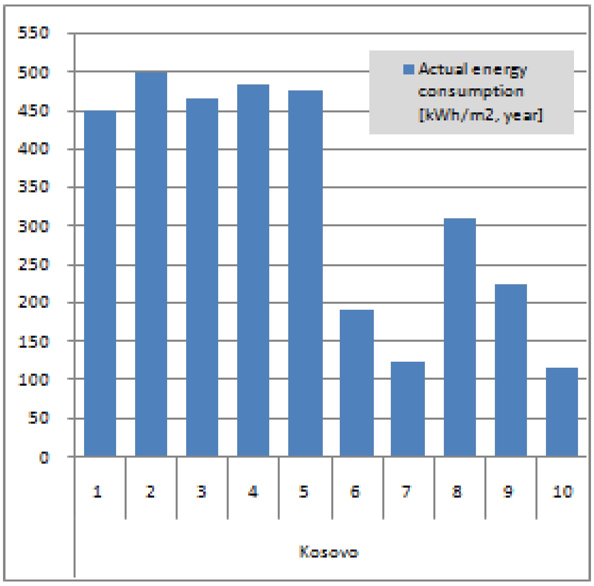


Figure 7-7: Actual energy consumption (without EE and without achieving comfort levels) (kWh/m², year) for all 10 buildings

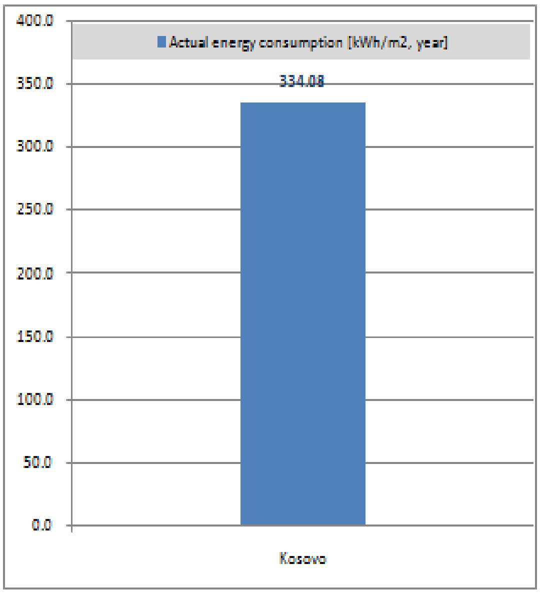


Figure 7-8: Average Actual energy consumption (without EE and without achieving comfort levels) (kWh/m², year) for Kosovo

7.5.4 Private and Commercial Building Sector

Processing the energy audits of 20 private and commercial buildings shows that the actual energy consumption fluctuated from a minimum value of 75 (kWh/m² year) up to 800 (kWh/m² year) within the three regions and results are shown in Figure 7-9. Weighted actual average specific energy consumption values for the private and commercial building stock for three regions and for whole Kosovo are presented in Figure 7-10.

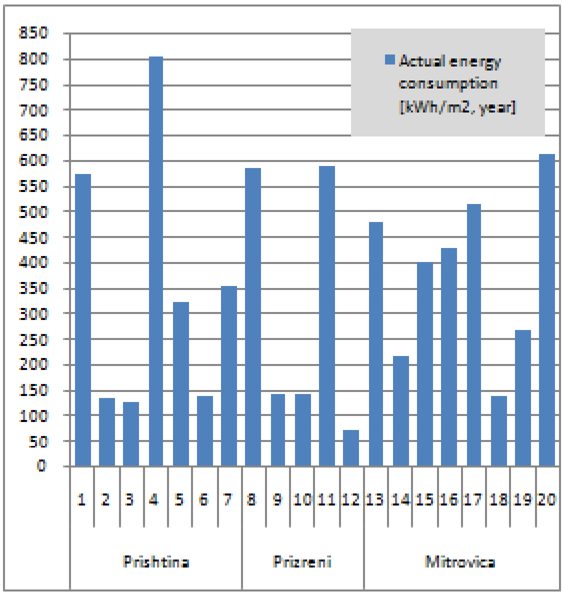


Figure 7-9: Actual energy consumption (without EE and without achieving comfort levels) (kWh/m², year) for all 20 buildings

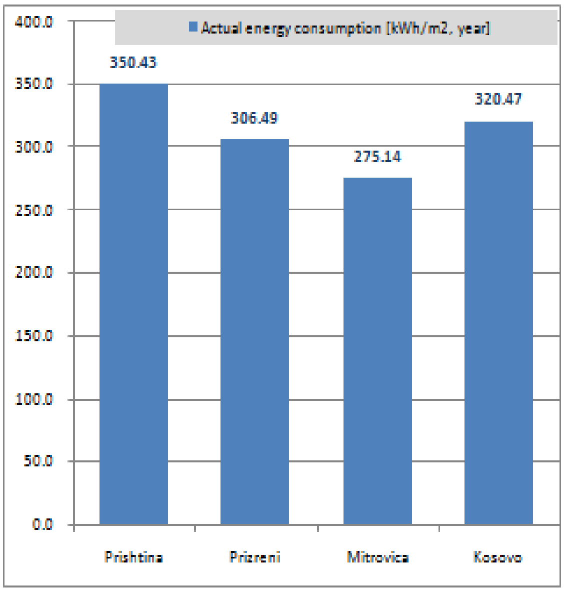


Figure 7-10: Average actual energy consumption (without EE and without achieving comfort levels) (kWh/m2, year) for 3 regions and for whole Kosovo

7.6 Calculating Baseline Specific Energy Consumption

The calculation of energy demand required to achieve baseline conditions (i.e. the amount of heating needed throughout the whole building area, for all the hours and all the days of the heating season to reach the internal base temperature of 17.5 ^{0}C) has been based on a number of key parameters: the general geometrical data for each building, an analysis of the thermodynamic characteristics of all building materials used in different categories of building, the method of construction and the ratio of the outside area to the total volume.

Calculations were carried out for securing total comfort for each of the energy services provided, particularly the HVAC system/s. Estimates were made of heat transfer coefficients (through walls, roof, windows and doors, i.e. the exterior envelope of each category of building), as well as estimates of the efficiency of the heating system. Total energy demand for the baseline specific unit area were then calculated, including all other energy services, such as space cooling, water heating, lighting, electrical appliances and cooking. The same methodology has been used for all four building sectors and the results are presented in the following sections.

7.6.1 Residential Building Sector

Firstly, baseline energy demand was calculated and compared with actual energy consumption. Analysis shows that in most cases actual energy consumption is lower than the baseline energy demand required to achieve full comfort levels. In order to understand from a quantitative point of view what the actual level of comfort is, the collected data has been processed and the results are shown in Figures 7-11 and 7-12.

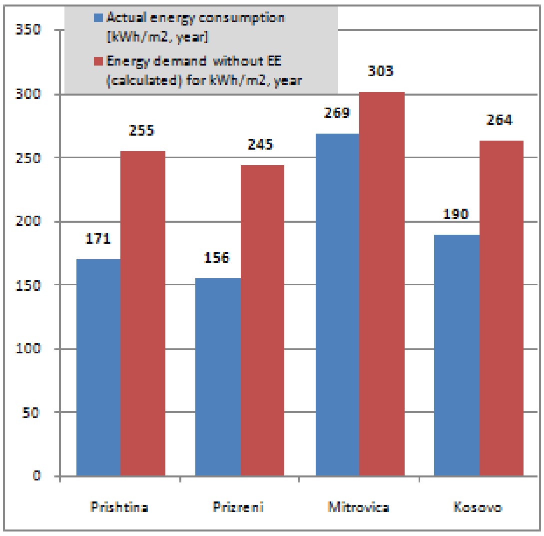


Figure 7-11: Actual average regional energy consumption (without EE and without achieving comfort levels) and baseline energy demand (without EE but achieving comfort levels) (kWh/m², year)

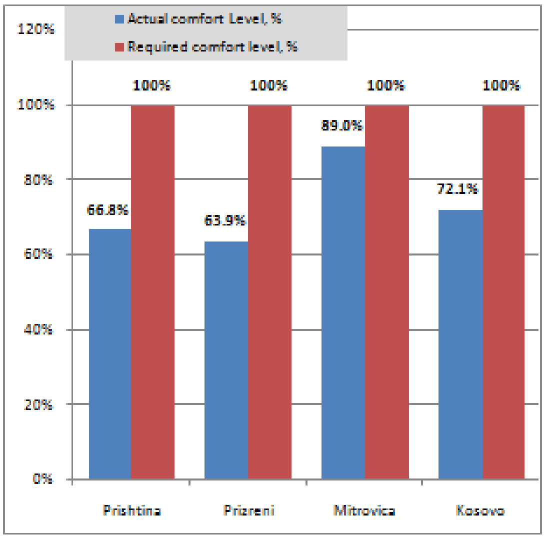


Figure 7-12: Actual level of comfort (without EE) and target comfort level, expressed in relative terms (%)

The first conclusion of this analysis is that the actual comfort levels range between 64% to 89% of target comfort levels in residential buildings in the three regions and consequently for the whole residential sector of Kosovo.

7.6.2 Municipality Public Building Sector

The baseline energy demand calculated for municipality buildings was also compared with the actual values recorded. Analysis show that for municipal public buildings in Pristina and Prizren, actual energy consumption in most of the cases is higher than the baseline energy demand required achieving full comfort levels. The results are presented in the Figures 7-13 and 7-14.

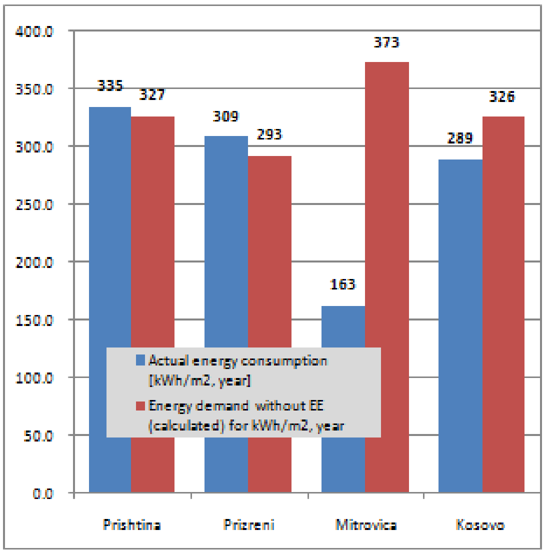


Figure 7-13: Actual average regional energy consumption (without EE and without achieving comfort levels) and average baseline energy demand (without EE but achieving comfort levels) (kWh/m^2, year)

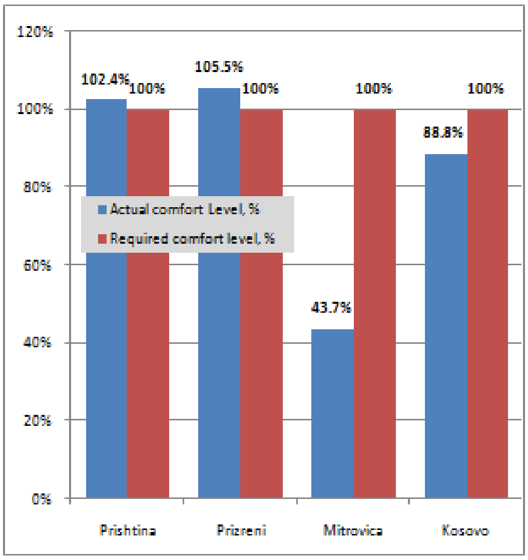


Figure 7-14: Actual level of comfort (without EE) and target comfort level, expressed in relative terms (%)

Municipal public buildings in two regions (Prishtina and Prizren) have actual comfort levels higher than 100%, which means that energy services in those buildings are secured inefficiently and introducing EE measures will bring real energy savings.

7.6.3 Central Public Building Sector

Most central public buildings are located in Prishtina and they are included in this study as a single group for whole of Kosovo. Analysis shows that for central public buildings the actual energy consumption in most cases is higher than the baseline energy demand required to achieve full comfort levels. Results are shown in Figures 7-15 and 7-16.

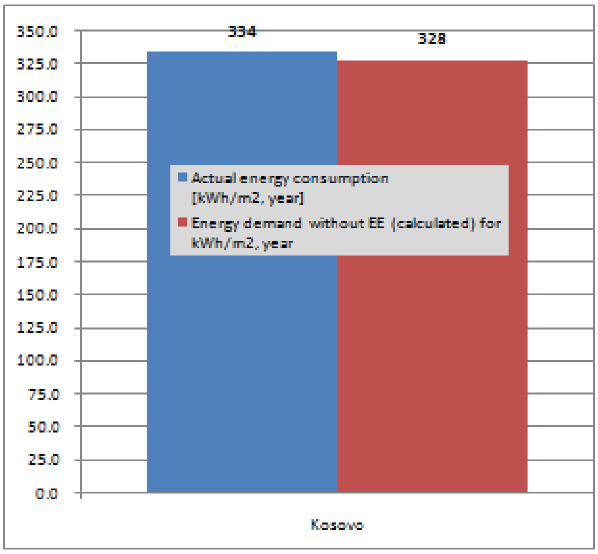


Figure 7-15: Actual average regional energy consumption (without EE and without achieving comfort levels) and baseline energy demand (without EE but achieving comfort levels) (kWh/m^2 year)

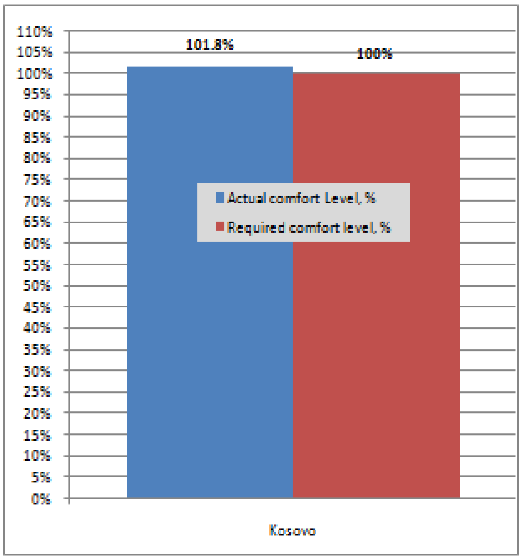


Figure 7-16: Actual level of comfort (without EE) and target comfort level, expressed in relative terms (%)

Figure 7-16 shows that as a group, central public buildings enjoy actual comfort levels higher than 100%, which means introducing EE measures will result in real energy savings.

7.6.4 Private and Commercial Building Sector

Energy consumption in private and commercial buildings depends on their load factor and international experience shows that energy consumption per m² is higher than in residential buildings. Analysis of private and commercial buildings shows that in most cases actual energy consumption is slightly lower than the baseline energy demand required for achieving full comfort levels. Results are summarized in Figures 7-17 and 7-18.

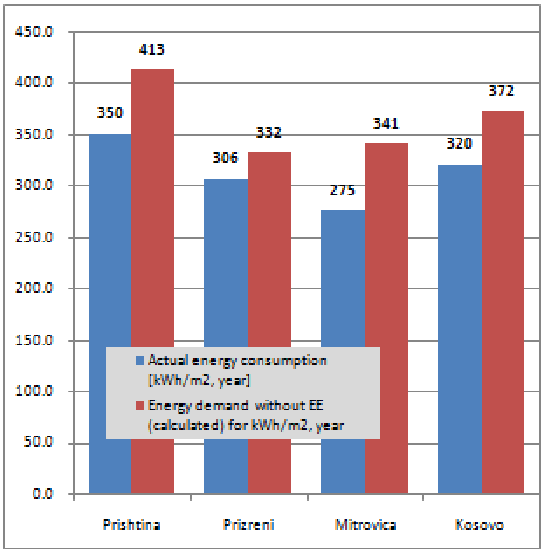


Figure 7-17: Actual average regional energy consumption (without EE and without achieving comfort levels) and baseline energy demand (without EE but achieving comfort levels) (kWh/m², year)

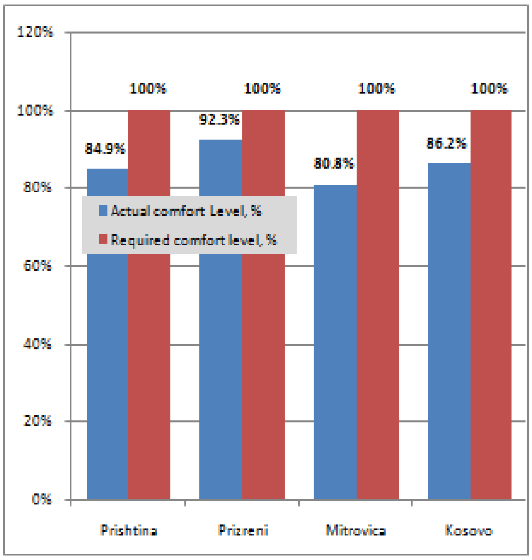


Figure 7-18: Actual level of comfort (without EE) and target comfort level, expressed in relative terms (%)

The conclusion of this analysis for the three regions and for the whole Kosovo is that the actual comfort levels in private and commercial buildings range between 80.8% and 92.3%.

7.7 Energy Efficiency Measures introduced in Building Stock

After calculating actual consumption (estimated from bills paid for different energy commodities) the next step in the energy audit process is to establish a baseline energy scenario for each of the six energy services for each building. This is followed by the final and most important stage of the process, which is the derivation of an energy efficiency scenario for each of the six energy services. These scenarios are built up by introducing all the standard EE measures that are presented below according to the needs of each building and reaching full comfort levels.

In order to standardize the calculations, the auditors evaluated the impact of introducing each EE measure from a demand and a supply point of view. This was done by estimating the heat losses from the buildings in question, based on their geometry and construction structures, together with the average number of heating and cooling degree-days in each of the three regions of Kosovo. The selection of EE measures was based on:

- Analyzing most of the energy audits that have been undertaken in previous projects in Kosovo and other countries which show the most attractive financial indicators (FIRR and PBP).
- The recommendations of the GIZ Open Regional Fund Report for all Balkan countries, 'Preparation of methodology for M&V of energy savings – development of bottom-up methods' (June 2011)
- The EE measures given below, which have been selected in accordance with the EU recommended guidelines[23] and Energy Community Secretariat guidelines contained in the ECS/ENSI study "Energy Efficiency in Buildings in the Contracting Parties of the Energy Community" Final Report – February 2012:
    1. *Refurbishment of the building envelope by introducing thermal insulation of outside walls;*
    2. *Refurbishment of the building envelope by introducing thermal insulation of the roof;*
    3. *Substitution of existing windows by double/triple glass windows;*
    4. *Replacement of heating supply systems;*
    5. *Replacement of water heating electrical boiler/equipment;*
    6. *Replacement of water heating equipment with Solar Water Heating Systems;*
    7. *Replacement of air conditioning split systems (<12kW);*
    8. *Replacement of household appliances (washing machines, refrigerators etc.);*
    9. *Replacement of lighting (introducing efficient light bulbs);*
    10. *Replacement of household cooking stoves.*

It is important to note that the EE measure "New buildings to be constructed according to energy building codes" has not been quantified for the time being because the Ministry of Environment and Spatial Planning, in collaboration with the Ministry of Economic Development, will prepare a New Energy Building Code at the end of the year. This new energy building code will be based on the requirements of the new EU Directive on the Energy Performance of Buildings. Once the Code has been implemented it will be a straightforward task for the KEEA to include this measure for new additions to the building stock by following the methodology presented in Annex 14.

7.8 Turnkey Investment Values for each of the Energy Efficiency Measures introduced

Calculation of the investment value of each EE measure for the different building sectors is part of the energy audit report process. Table 7-2 presents the investment value of each EE measure based on average turnkey values recorded by the auditors in the local market.

[23] EU "Guiding principles for applying the harmonized bottom-up calculation model", June 2009

Energy Service	EE Measure	Investment (€/unit)	Residential	Private Commercial	Municipal Public	Central Public
Space Heating	Thermal insulation, outside walls	Euro/m²	20	20	18	18
	Thermal insulation, roof	Euro/ m²	35	35	32	32
	EE windows	Euro/ m²	100	100	90	90
	EE heating supply systems	Euro/ m²	35	35	32	32
Water heating	EE water heating elec. boiler	Euro/unit	200	200	2000	4200
	Solar Water Heating Systems	Euro/unit	1600	1600	15000	3200
Cooking	EE cooking stoves	Euro/unit	350	450	4000	8000
Lighting	EE lighting bulbs	Euro/unit	5	5	5	5
Electric Applian.	EE refrigerators	Euro/unit	350	400	3500	7000
	EE washing machines	Euro/unit	450	550	4500	8000
AC	EE air conditioning systems	Euro/unit	700	850	10000	20000

Table 7-3: Investment value for each EE measure on a turnkey basis

The unit investment values in Table 7-2 above have been used to calculate total investment values for each of the audited buildings and as basic data for calculating integrated investment, values for the building stock sector for each energy service (see Chapter 10).

7.9 Calculating Specific Energy Efficiency Consumption and Energy Savings

The next step of the energy audit process is calculation of energy demand for the EE case; i.e. introducing EE measures for each energy service and reaching the same comfort level conditions as in the baseline scenario. Total energy demand for the EE case for specific unit areas was then calculated, for all 10 energy saving measures for all six energy services. The same methodology has been used to calculate the specific energy efficiency demand for all four building sectors and the results are presented in the following sections.

7.9.1 Residential Building Sector

Figures 7-19 and 7-20 present specific energy demand after the introduction of EE measures, specific actual energy consumption and specific baseline energy consumption for all residential building stock categories.

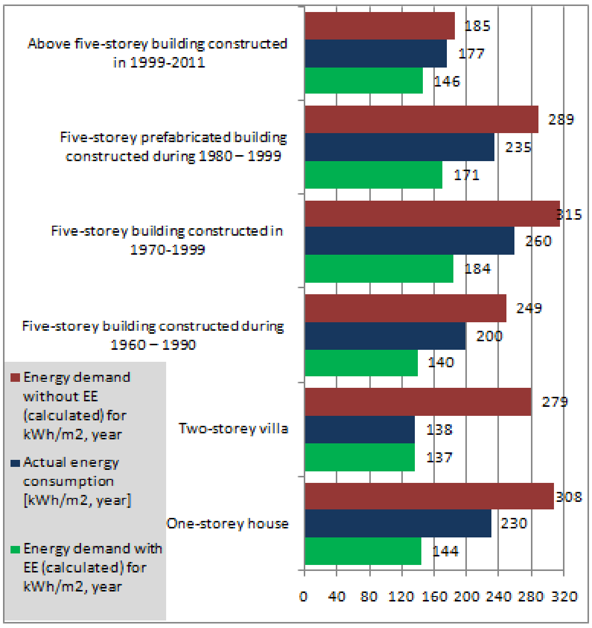


Figure 7-19: Specific actual, baseline and efficient energy demand for all categories of residential buildings (kWh/m² year)

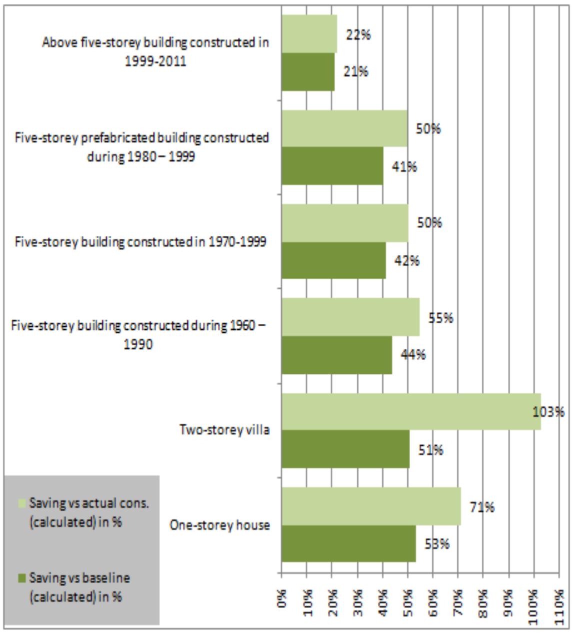


Figure 7-20: Energy saving ("Actual-EE" and meeting comfort level) and savings ("BL-EE" and meeting comfort level) for all categories of residential buildings (%)

Analysis of the above figures shows that energy savings potential lies in the interval 21-53%. The specific efficient energy demand values for all building types are lower than actual specific energy consumption, which shows that introduction of EE measures will bring both achievement of comfort levels and real energy savings.

7.9.2 Municipality Public Building Sector

Figures 7-21 and 7-22 show specific energy demand after the introduction of EE measures, specific actual energy consumption and specific baseline energy consumption for all categories of the municipal public building stock.

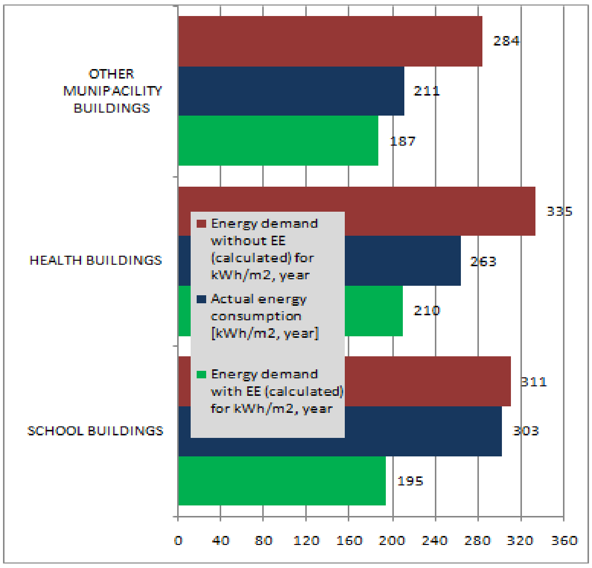


Figure 7-21: Specific actual, baseline and efficient energy demand for all categories of municipal public buildings (kWh/m² year)

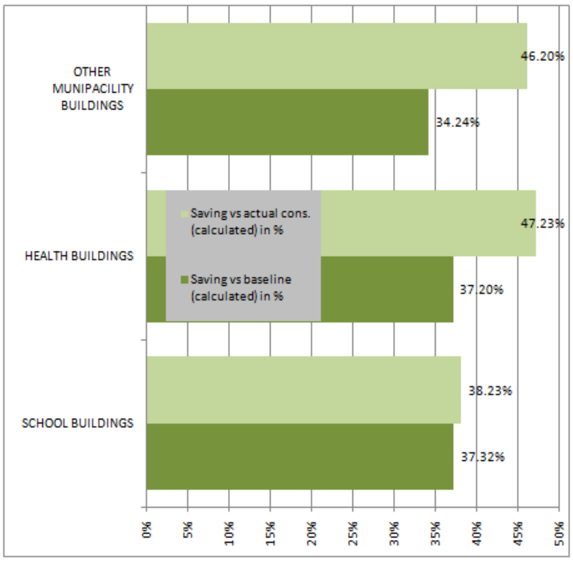


Figure 7-22: Energy saving ("Actual-EE" and meeting comfort level) and savings ("BL-EE" and meeting comfort level) for all categories of municipal public buildings (%)

Analysis of figures above shows that the energy savings potential is in the interval 34-37%. The specific efficient energy demand values for some types of municipal building are higher than the actual specific energy consumption, which shows that introduction of EE measures will bring real energy savings and also deliver comfort levels.

7.9.3 Central Public Building Sector

Figures 7-23 and 7-24 show specific energy demand after the introduction of EE measures, specific actual energy consumption and specific baseline energy consumption for all central public building stock categories.

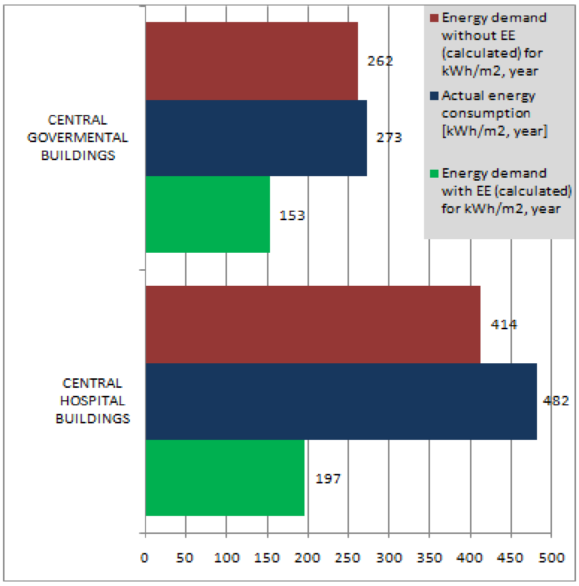


Figure 7-23: Specific actual, baseline and efficient energy demand for all categories of central public buildings (kWh/m² year)

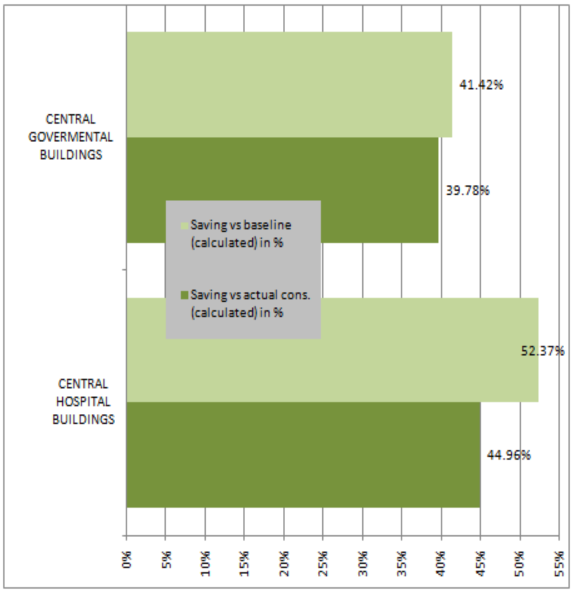


Figure 7-24: Energy saving ("Actual-EE" and meeting comfort level) and savings ("BL-EE" and meeting comfort level) for all categories of central public buildings (%)

Figure 7-24 shows that energy savings potential lies in the interval 40-45%. The specific efficient energy demand values for some types of central government building are higher than actual specific energy consumption, which shows that introduction of EE measures will bring real energy savings also reached comfort level.

7.9.4 Private and Commercial Building Sector

Figures 7-25 and 7-26 show specific energy demand after introduction of EE measures, specific actual energy consumption and specific baseline energy consumption for all private and commercial building stock categories.

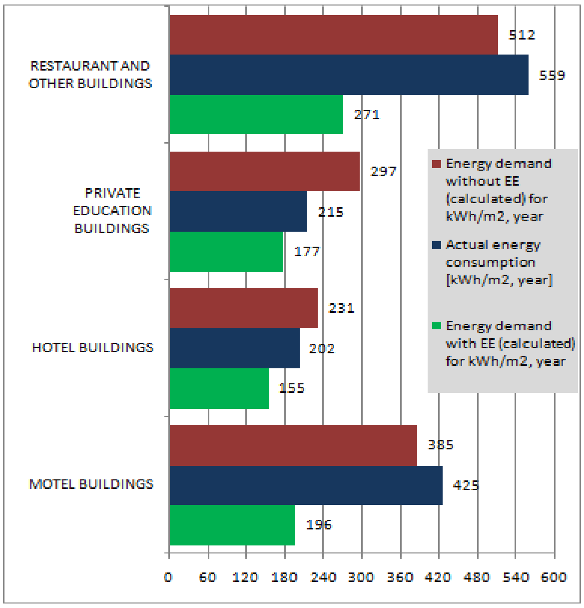


Figure 7-25: Specific actual, baseline and efficient energy demand for all categories of private commercial service buildings (kWh/m² year)

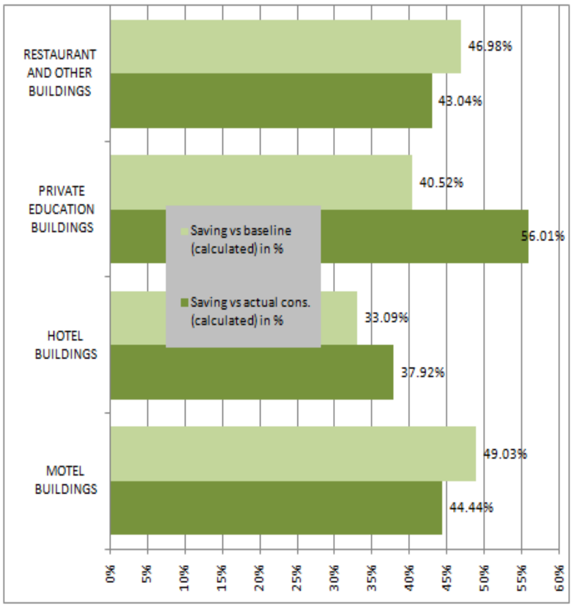


Figure 7-26: Energy saving ("Actual-EE" and meeting comfort level) and savings ("BL-EE" and meeting comfort level) for all categories of private commercial service buildings (%)

Figure 7-26 shows that the energy savings potential is in the interval 38-56%. The specific efficient energy demand values for some commercial buildings (motels and restaurants and other buildings) are higher than actual specific energy consumption, which shows that the introduction of EE measures will deliver comfort levels as well as real energy savings.

Figure 7-27 summarizes all the results for all the building stock sectors. Analysis of the data shows the actual specific energy consumption for the whole Kosovo building stock to be 219 kWh/m² year and specific energy demand (meeting comfort levels, without EE) 286 kWh/m² year. Specific energy demand (meeting comfort levels, with EE) is 159 kWh/m² year. These results indicate that introduction of EE measures at a national level will bring comfort and real energy savings. Furthermore, the need for energy imports (oil by-products and electricity) and load shedding will be reduced and CO_2 emissions will be cut.

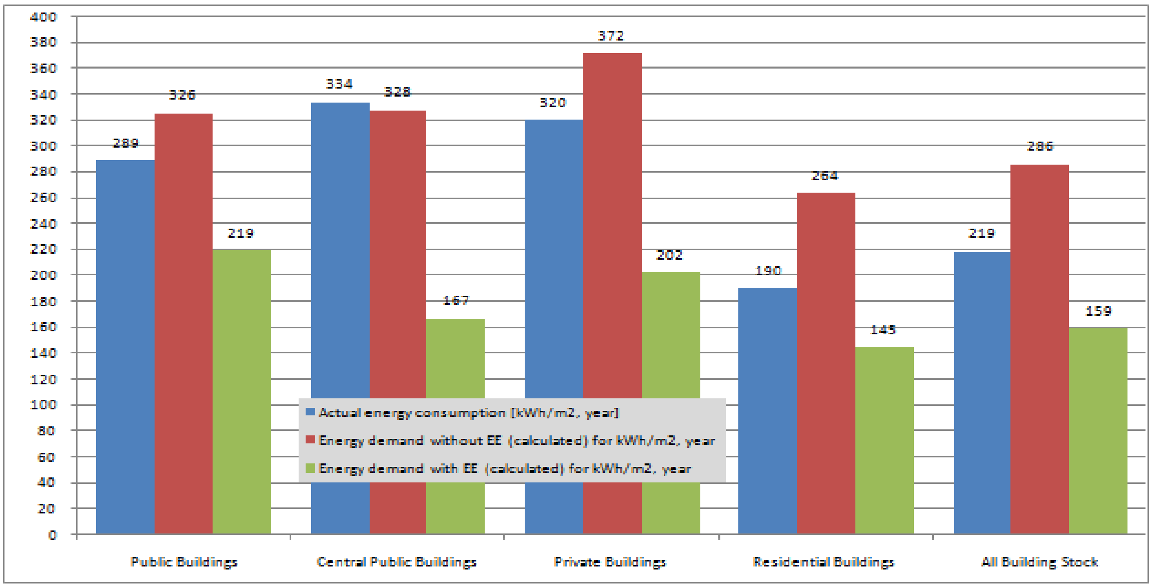


Figure 7-27: Actual specific energy consumption, energy demand without EE and with EE (meeting comfort levels) for all categories of buildings for the entire building stock of Kosovo (kWh/m² year)

7.10 Cost Benefit Analysis of Energy Efficiency Measures

- For each building that was audited, the energy auditors calculated energy savings, evaluated the respective investment costs for each EE measure and finally carried out cost-benefit analyses to determine the Financial Internal Rate of Return (FIRR, expressed in %), Economic Internal Rate of Return (EIRR, expressed in %) and Pay Back Period (PBP, in years). The energy commodity prices used for the financial and economic analyses are presented in Annex 10. The financial calculation used a discount rate of 10% and it was assumed that investments would be 100% secured through loans at that rate of interest. Table 7-28 shows a summary of the results by giving the minimum and maximum values of the financial and economic indicators for the four building stock sectors. When interpreting the results presented in Table 7-28 it is important to keep in mind the fact that the sample sizes used in this analysis were small and that the estimated energy savings depend not only upon whether comfort levels are already being achieved, but also upon the mix of fuels used to provide different energy services, the fuel prices themselves and actual energy consumption in each building: The maximum payback periods (and minimum values of FIRR) for the introduction of: 1) thermal insulation of outside walls, 2) thermal insulation of roofs/terraces, 3) inefficient windows, and 4) EE heating boilers have been recorded for buildings (some residential, some small municipal public buildings and some private and commercial buildings) which deliver space heating through coal (1.14 Euro cent/kWh) and fuel wood (3.07 Euro cent/kWh). Buildings with minimum payback periods (and maximum values of FIRR) are those which secure space heating through district heating (5.97 Euro cent/kWh), electricity (8.02 Euro cent/kWh for residential and 12.97 Euro cent/kWh for public buildings, including VAT) and oil by-products (11.4 Euro cent/kWh).
- Maximum payback periods for the introduction of solar hot water systems occur in those buildings (some residential, some small municipal public buildings and some private and commercial buildings) which secure hot water energy consumption through coal, fuel wood and where the cost of installing a solar water heating system is very high.
- Maximum payback periods for the introduction of: 1) new EE refrigeration, 2) new EE washing machines, and 3) new EE air conditioning were recorded for buildings (some residential, some small municipal public buildings and some private and commercial buildings) which secure such services at low electricity prices and pay very high prices for the equipment itself.

As is shown in Table 7-4, some of the low IRR/PBP values that were recorded were due to structural deficiencies in the buildings concerned (e.g., roofs requiring total replacement, largely for stability/safety reasons and to eliminate damp and leakages rather than for EE benefits). Similar factors could be cited for improving the stability of outside walls, the quality of windows, improving hot and cold water supply, sewage systems, toilets and other civil and mechanical/electrical interventions which are not directly related to EE measures. These are important issues to address, because without them the life of EE measures will be significantly reduced, the estimated EE potential will not be reached and investments will not yield any benefits. In such cases, very large investments are required and this will have a bigger impact on the variability of PBP than will the type and price of fuel. The worst situation (very poor IRRs/PBPs) occurs in buildings which have a large need for supporting investment (which is not related directly to EE measures), which use a low price energy commodity and which only partly achieve mandatory comfort levels.

Under this analysis, which is presented in Section 10, the EE potential clearly differentiates between the technical potential (i.e. implementation of all EE measures) and the financial EE potential (i.e. implementation of only cost-effective EE measures). The penetration ratios (presented in Section 10) for various categories of building have only been included for those EE measures which have a PBP of less than 10 years, excluding EE lighting. In most of the cases presented, the PBP for EE lighting is less than 3 years, but in some cases it is higher. This happens where in addition to introducing EE bulbs, there is a need to improve an ageing electrical system or in the case of private buildings, where investments in EE lighting are mixed with investments in electrical advertising equipment.

So the EE potential presented in Section 10 includes only cost-effective measures (i.e. those measures with a PBP of less than three years for EE lighting and of less than 10 years for all other EE measures).

EE measures introduced	Residential Buildings			Municipal Public Buildings			Central Public Buildings			Private and Commercial Buildings		
	FIRR	EIRR	PBP	FIRR	EIRR	PBP	FIRR	EIRR	PBP	FIRR	EIRR	PBP
Thermal Insulation of Outside Walls	2% - 35%	20% - 43 %	3.6 - 45	4% - 31%	17% - 33%	3.4 - 24	25 % - 47%	25% - 32%	2.4 - 4.2	8% - 26%	20% - 34%	4.3 - 12.6
New EE Windows and outside doors	1% - 23%	7% - 40%	5 - very long	5% - 21%	15 % - 28%	5.2 - 20	14%- 34%	18% - 34%	3.3 - 7.1	1% - 22%	22% - 27%	4.8 - very long
Thermal Insulation of roof	0% - 26%	16 % - 32 %	4 - very long	3% - 24%	11% - 28%	4.3 - 33.3	13% - 121%	13% - 27%	0.2 - 3.5	1% - 14%	7% - 19%	7.5 - very long
Replacement heating supply system	15% - 34%	17 % - 41 %	3.5 - 7.4	13% - 31%	15% - 35%	3.3 - 7.5	11%- 24%	15%- 29%	4.2 - 9.4	2% - 12%	20% - 35%	8.5 - very long
Replacement electric water heating boiler	23% - 31%	12 % - 46 %	3.3 - 5.2	21% - 34%	25% - 36%	3.2 - 4.8	12% - 19%	15%- 23%	5.4 - 8.5	9%- 15%	14%- 24%	7.5 - 11.5
Solar water heating system	6% - 20%	7 % - 22%	5.4 - 13.5	8% - 27%	14% - 29%	3.8 - 12.5	12% - 28%	14% - 21%	3.5 - 7.2	7% - 37%	10% - 45%	3.3 - 14.8
Replacement cooking stoves	10% - 24%	12 % - 26%	4.6 - 10	13% - 27%	18% - 29%	3.8 - 8	14%- 29%	15%- 26%	3.4 - 5.2	13% - 17%	20% - 24%	5.6 - 7.6
Replacement or new installation of lamps	20% - 61%	25 % - 86 %	1.2 - 5	21% - 60%	26% - 64%	1.45 - 4.7	16% - 63%	23% - 69%	1.2 - 7.2	14% - 63%	15% - 69%	1.2 - 7.2
Introducing new EE refrigeration	7% - 38%	14 % - 47 %	2.8 - 14.3	11% - 26%	14% - 29%	4 - 9.2	19%- 27%	11%- 19%	3.5 - 5.4	6% - 18%	13% - 39%	5.2 - 16.4
Introducing new EE washing machines	5% - 32%	10 % - 37 %	3.4 - 20	13% - 22%	16% - 26%	4.8 - 7.4	14%- 26%	10%- 18%	4.2 - 7.0	3% - 21%	15% - 28%	5.2 - very long
Introducing new EE air conditioning	0% - 13%	8%-17%	7.8 - very long	2%- 17%	12%- 23%	6 - very long	35% - 38%	37% – 42%	2.5 - 3.1	3% - 11 %	5% – 18%	9.2 - very long

Table 7-4: Summary of cost benefit analysis – maximum and minimum values of financial and economic indicators

8 Outline Methodology

8.1 General Assumptions

The methodology used for estimating energy savings potential is based on the main guidelines of ECS Study carried out by ENSI Consultant Company "Energy Efficiency in Buildings in the Contracting Parties of the Energy Community (Final Report February 2012)" and consisted of the following stages:

1. *The sampling process;*
2. *Conducting walk-through audits for all categories of buildings;*
3. *Ranking all EE measures to select the most effective options for each sub-category of building and each energy service, and*
4. *Extrapolation of results to the whole building sector (and its sub-sectors) in order to calculate total energy saving potential and to compare it with the respective KEEAP EE targets for residential and service sectors.*

8.2 Categories and Definitions

For the purposes of this Report, the building stock of Kosovo was classified according to the following three basic sub-sectors:

- *Residential Buildings*
- *Public Service (central government and municipality) Sector Buildings*
- *Private Service (non-residential) Sector Buildings.*

8.2.1 Residential Sector

Household buildings in Kosovo exhibit a wide diversity of architecture, construction techniques and building materials. For the purposes of this study, the residential sector was sub-divided into six basic types of building whose essential characteristics are as follows:

1. One-storey house:
   a) constructed entirely from red-brick (as a sub-group, stone wall constructions are included in this group)
   b) constructed with a tile covered roof
   c) constructed with a plain concrete roof
2. Two-storey villa with a surface area of more than 100 m^2/storey:
   a) constructed entirely from red-brick (as a sub-group, stone wall constructions will be included in this group)
   b) constructed with a tile covered roof
   c) constructed with a suspended floor
3. Up to five-storey building constructed between 1960 and 1990:
   a) constructed with silicate-brick
   b) constructed with holder-walls 38 cm. thick
   c) constructed without columns
4. Up to five-storey building constructed between 1970 and 1999:
   a) constructed entirely from red-brick

   b) constructed with holder-walls 38 cm. thick
   c) constructed with anti-seismic columns
5. Up to five-storey prefabricated building constructed between 1980 and 1999:
   a) constructed with prefabricated walls 25 cm. thick
6. Over five-storey building constructed between 1999 and 2008:
   a) constructed entirely from red-brick
   b) constructed with walls 25 cm. thick
   c) constructed with iron-concrete and anti-seismic columns

The six building types listed above account for about 60-70% of the total residential building stock and all other types of residential building can be represented by one these six standard types. For example, from a thermal dynamic point of view, a three-storey building constructed in 2005 is similar to the Type 2 building and apartments in big residential blocks in cities would be classified as Type 6. Smaller apartment blocks are included in multi-storey buildings, under building Types 3, 4 and 5.

Estimates of thermal conductance (based on KEEAP and a GIZ regional study[24]) adjusted for the type of building materials used in Kosovo, have been used for calculating the energy demand of buildings. Houses of a brick construction and having a thickness typical of the majority of houses in South East Europe, including Kosovo, have a thermal conductance ranging from 0.872W/m^{3o}K for large buildings with around 20 apartments, to 2.151 W/m^{3o}K for detached single houses. Estimated average values for residential buildings constructed in the early 1990s in urban and rural areas are 1.51 W/m^{3o}K and 2.08 W/m^{3o}K respectively, with an average of 1.86 W/m^{3o}K for the whole housing stock. These values, however, make no allowance for heat losses due to poor maintenance, holes in walls, broken or non-existent window panes, etc.

8.2.2 Private Sector

The Private/Commercial Service Building Sector is a developing sector in Kosovo. In many instances, the private sector has experienced modernization and qualitative improvements. This group of businesses includes activities such as hotels, restaurants, banks, tourist agencies, consultancies and insurance offices, etc., as well as many private services that operate in parallel with the public sector, such as education, culture, health, etc. Many of these businesses are aiming to introduce modern energy efficiency technology, but improvements are still needed to ensure the efficient utilization of such technology. However, it should be noted that the Private Service Sector also includes some traditional repair-service workshops and small shops and restaurants. The most important building private sector categories for the purposes of this analysis are as follows:

- *Motels/hotels with less than 20 rooms*
- *Hotels with more than 20 rooms*
- *Private schools*
- *Restaurants and all other service buildings not included above*

8.2.3 Public Sector

Ownership of the Public Building Stock of Kosovo is shared between Central and Local Government. The following are the most important categories of public building:

24GIZ Regional Study: Monitoring, Evaluation and Verification of EE Measures, 2011

- *Central University (central)*
- *Central Hospitals (central)*
- *National Government Central Buildings*
- *Municipality buildings*
- *Regional Hospitals (central)*
- *Kindergartens (municipal)*
- *Child day-care centers (municipal)*
- *Dormitories at educational institutions (central or municipal)*
- *Schools (municipal)*
- *Universities (central) and colleges (central or municipal)*
- *Museums and galleries (central or municipal)*
- *Libraries (central or municipal)*
- *Cultural centers (central or municipal)*
- *Sports halls (central or municipal)*
- *Orphanages (municipal)*
- *Homes for the elderly(municipal)*
- *Local Hospitals (municipal)*
- *Clinics (central or municipal)*
- *Courts (central or municipal)*
- *Prisons (central)*
- *Emergency services (police, fire and ambulance stations - central or municipal)*

8.3 Data Collection

8.3.1 Primary Data - Energy Audits

The primary data included in this study is the data collected from the energy audits described in Sections 7.3 and 7.4.

8.3.2 Secondary Data – Audits from other projects

The secondary data included in this study is the data collected from energy audits carried out by other projects but utilized in this study in order to increase the size of the sample analyzed. The Kosovo Energy Efficiency Agency agreed to make its public building energy audit data base available to the project and a total of 35 audits carried out by two previous projects has been incorporated into the analysis:

- *5 audits of central government buildings from the 'Training for Energy Auditors' project (ECLO/Danski-Kantor - 2009/10);*
- *30 audits of municipality buildings from the 'Implementation of Energy Efficiency Measures in Public Buildings' project (WBIF/KfW - 2011/12).*

8.3.2.1 Central Government Buildings

Table 8-1 below presents the sample of 5 public sector buildings owned and managed by central government that has been made available to the study by the KEEA.

Region	Name of Central Building
Prishtina	Surgery Clinic – Prishtina
	Student Center – Prishtina
	Gjilan Regional Hospital
Prizren	Gjakova Regional Hospital
Mitrovica	Mitrovica Regional Hospital

Table 8-1: Central Government buildings sample by Region/Municipality

8.3.2.2 Municipal Buildings

The 'Implementation of Energy Efficiency Measures in Public Buildings' project (WBIF/KfW - 2011/12) provided energy audit results for 30 public buildings drawn from across 7 of the 9 municipalities which were actually eligible to take loans in 2012 (Pristina and Prizren) or potentially eligible in 2013, subject to receiving an unqualified audit opinion in 2012 (the 5 other municipalities in Table 8-2 below).

Region/Municipality	No. of Projects	% of Total
Pristina	**13 (11 ES + 2 HCC)**	**44%**
Pristina	8 (6 ES+ 2 HCC)	27%
Ferizaj	2 (2 ES)	7%
Gjilan	3 (3 ES)	10%
Prizren	**10 (6 ES + 3 HS + 1 Dorm)**	**33%**
Prizren	6 (4 ES + 2 HS)	20%
Gjakova	4 (2 ES + 1 HS + 1 Dorm)	13%
Mitrovica	**7 (4 ES + 1 HS + 1 HCC + 1KG)**	**23%**
Skenderaj	5 (3 ES + 1 HS + 1 HCC)	16%
Vushtrri	2 (1 ES + 1 KG)	7%
Total	**30**	**100%**

Table 8-2: Municipality buildings sample by Region/Municipality

The 30 buildings were selected from among 100 proposals submitted by the municipalities themselves on the basis of criteria designed to identify the most promising investments. Table 8-3 shows the mix of the selected buildings in terms of function and regional distribution.

Type of Building	No. of Projects	% of Total
Elementary School (ES)	21	70%
High School (HS)	4	14%
Health Care Centre (HCC)	3	10%
Kindergartens (KG)	1	3%
Dormitory (Dorm)	1	3%
Total	**30**	**100%**

Table 8-3: Municipality buildings sample by Type of Building

8.4 Extrapolation

The final phase of the assessment of EE potential in the building stock of Kosovo is the extrapolation of the results obtained from the primary and secondary audits for the various building sub-sectors. The results obtained from the stratified samples examined in the study were applied to the overall population of buildings in Kosovo using a standard spread sheet approach, as described in Chapter 10.

The information collected from the energy audit questionnaires provides a starting point for extrapolating the penetration ratios for each EE measure in order to meet the 2020 EE sector targets for each of the three building sectors (residential, public and private services).

The extrapolation process utilizes the following data:

- The Energy Balance for 2010, including final energy consumption for residential and service sectors based on the yearly energy balance prepared by the MEM/MED;
- Consumption on Energy Services for residential and service sectors for the year 2010, prepared for the KEEAP;
- The Energy Balance for 2011, including final energy consumption for residential and service sectors based on the yearly energy balance prepared by the MEM/MED;
- Energy Audits for the year 2012 carried out by this study;
- Forecast of final energy demand for each year of the period 2011-2018 for residential and service sectors taken from the KEEAP (see Sections 5.2 and 5.3).

And is based on the following assumptions:

- An assumed forecast growth rate of the building stock for each building sub-sector of x% p.a., varying by region (see Section 10.1 to 10.3);
- A linear increase of y% p.a. in the market penetration of each EE measure, varying according to each measure (see Section 10.4);
- Penetration values of EE measures for the year 2020 are based on the average energy efficiency of each measure as defined in the energy audit for each subsector/region (see Section 10-4);
- Forecasts of the final energy demand for each year of the period 2019-2020 for the residential and service sectors are calculated assuming a continuation of the trends used in the KEAAP for the years 2017 and 2018.

Before carrying out the extrapolation process, it is necessary to calibrate the WTA data with the 2010 (base year) national energy balance and KEEAP data for each sector. The calibration and extrapolation methodology is presented in the Annex 15.

Section 3-Market Assessment

9 The Base Year (2010)

9.1 The Existing Building Stock

9.1.1 Residential Building Stock

Using data from the KEEAP and by drawing on data collected for "CENSUS 2011" it has been possible to apply the residential sector categorization scheme described in Section 8.2.1 across the three regions of Kosovo. Using data from the KEEAP and "CENSUS 2011" analysis, the following table 9-1 presents the number of residential buildings classified according to category, for each of the three defined regions of Kosovo.

Residential Building Category	Kosovo
One story house	126,795
Two storey villa>100m²/storey	103,106
Up to five storey building 1960-1990	30,991
Up to five storey building 1970-1999	17,357
Up to five storey building 1980-1999	5,940
Up to five storey building 1999-2011	24,246
Total	**308,434**

Table 9-1: Number of residential buildings according to building category, 2010

Four variables are particularly significant in evaluating the energy demand for space heating and air conditioning in residential buildings: the volume of the building (which is dependent on the living space area and the height of the house), heating degree-days, the thermal conductivity of walls and roofs and ventilation losses (through windows and doors) and heating hours. From Figure 9-1 below it can be seen that Kosovo has a low level of per capita living space (higher only than Albania) compared to other countries in Central and South East Europe[25]. Of course, a house which has a large area and volume will have a higher energy demand for space heating and space cooling, as described in the following sections.

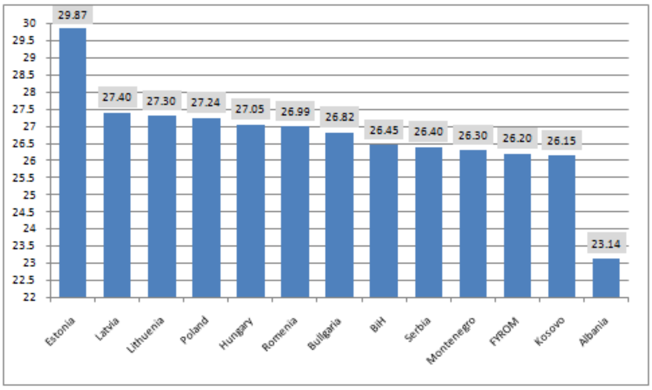


Figure 9-1: Average living space per capita in Central and SE Europe (m²/inhabitant)
Source: EUROSTAT, 2008

25 Eurostat Study, 2008

According to the preliminary results of 'CENSUS 2011', the current population of Kosovo consists of 1.7 million people, living in 308,434 residential buildings. These buildings provide 403,000 dwelling units, of which about 95,000 are unoccupied (the difference being accounted for by the unused houses of Kosovan emigrants). Thus the total number of residential buildings – 308,000 - is the same for NEEAP as it is for CENSUS 2011 which indicates that the KEEAP data can be used with confidence. The total floor area of all residential buildings is currently estimated to stand at around 35 million m^2 and the occupied - and therefore energy consuming - building stock area is about 29 million m^2. The 'CENSUS 2011' data has been used to calibrate the KEEAP data on the number of residential buildings and the total area of households, as presented in Table 9-2.

Residential Building Category	Kosovo (10^6 m^2)
One story house	14.292
Two storey villa>100m^2/storey	11.635
Up to five storey building 1960-1990	3.459
Up to five storey building 1970-1999	1.94
Up to five storey building 1980-1999	0.684
Up to five storey building 1999-2011	2.708
Total	**34.718**

Table 9-2: Total area of residential buildings (million m^2) by category, 2010

Source: 1st KEEAP/'CENSUS 2011'

9.1.2 Existing Public Building Stock

Based on adjusted information from the KEEAP, it is possible to disaggregate the public building stock and determine an estimate for the total number of buildings according to each of the main categories. This information is presented in Table 9-3. According to preliminary data provided by the Statistical Office of Kosovo, the total number of buildings in the Public and Private/Commercial Service Building Stock for the year 2010 was approximately 59,000, covering a floor area of 10.55 million m^2. Based on adjusted data from the KEEAP analysis, Table 9-3 presents the number of public buildings, by category for the base year, 2010.

Public Building Category	Kosovo
Elementary School	354
High School	193
Health Care Centre	494
Kindergarten	286
Dormitory	248
Administrative Central Government Public Buildings	85
Administrative and Other (not included above) Municipal Public Buildings	160
Total	**1,820**

Table 9-3: Total number of public buildings, 2010

Source: 1st KEEAP

These numbers were used to calibrate the figures for the floor area of the public building stock, as presented in Table 9-4.

Public Building Category	Kosovo
Elementary School	0.571
High School	0.259
Health Care Centre	0.393
Kindergarten	0.461
Dormitory	0.398
Administrative Central Governmental Public Buildings	0.171
Administrative and Others (not included above) Municipal Public Buildings	0.208
Total	**2.461**

Table 9-4: Total area of public buildings (million m²), 2010

Source: 1st KEEAP

9.1.3 Existing Private Building Stock

Drawing on the KEEAP analysis, Table 9-5 summarizes the number of private service buildings in each of the three defined regions of Kosovo, according to category of building.

Private Building Category	Kosovo
Motels/Hotels<20 rooms	375
Hotels > 20 rooms	94
Private Schools	82
Restaurants/Shops	57,585
Total	**58,137**

Table 9-5: Total number of private buildings by category, 2010

Source: 1st KEEAP

Based on information provided for the 1st KEEAP, this data has been used to calibrate the number of and total area of private sector buildings, as presented in Table 9-6.

Private Building Category	Kosovo
Motels/Hotels<10 rooms	0.051
Hotels > 20 rooms	0.013
Private Schools	0.011
Restaurants/Shops	7.79
Total	**7.864**

Table 9-6: Total area of private sector building stock (million m²) by building category, 2010

Source: 1st KEEAP

9.2 Base Year Energy Consumption

Energy resources are consumed in all of Kosovo's economic sectors; by households, by public and private services and by industry, transport and agriculture. The relationship between the economic development of a country and its energy demand is considered a key one and involves many economic, social and technological factors. The interaction between them provides the basis for an understanding of the challenges facing the energy sector in Kosovo and of what is needed in order to ensure a reliable energy supply that meets total demand at the lowest cost, thereby creating the conditions required for sustainable economic development.

Currently, energy intensity in Kosovo is at a relatively high level. Kosovo's total primary energy supply per unit of GDP in 2010 was estimated at 412 toe/US$ million (PPP), compared to an EU 15 country average of 171 toe/US$ million[26]. That means macroeconomic production, represented by the Gross Domestic Product (GDP), has been very low. Reasons for this are related to the low level of industrial development of Kosovo, the use of old technologies compared to other Central and Eastern European countries and a large share of energy consumption being accounted for by the residential sector. Table 9-7 presents an overview of energy consumption in Kosovo for the year 2010, disaggregated by energy source and energy consumption sector.

Primary Energy Source	ktoe	%
Coal (lignite)	1422.44	65.12%
Oil by products	530.25	24.27%
Biomass (fuel wood)	221.39	10.13%
Hydro & import of electricity	9.85	0.45%
Solar Energy	0.50	0.02%
Total	**2184.43**	**100.00%**

Table 9-7: Total Primary Energy Supply for Kosovo, 2010

Source: MED, Energy Balance, 2010

9.2.1 Final energy consumption for the residential sector

Residential sector consumes the largest share of energy resources in Kosovo, accounting for 32.8%. As a consequence, it is important to analyze the potential for energy savings in electricity, biomass, oil products (including LPG) and coal for each of the six service categories. Table 9-8 below shows residential sector final energy consumption for the year 2010.

Final Energy Consumption for the Residential Sector	ktoe	%
Coal (lignite)	8.59	2.26%
Oil by products	36.03	9.46%
Biomass (fuel wood)	112.02	29.40%
Hydro & import of electricity	217.83	57.17%
Solar Energy	0.09	0.02%
Heat	6.42	1.68%
Total	**381.00**	**100.00%**

Table 9-8: Final Energy Consumption for the Residential Sector, 2010

Source: MED, Energy Balance, 2010

The residential sector has been the biggest consumer of electricity and the excess demand of the sector is one of the main reasons why Kosovo is suffering from the security of supply point of view. The shortfall in supply has resulted in the (often illegal) large scale cutting-down of fuel wood and the overloading of electricity transportation infrastructure (sub-stations, transmission and distribution lines).

26 USAID, Energy Demand Planning for SE Europe 2005-09

9.2.2 Final energy consumption for Public and Private Service Sectors

The Service Sector is divided into two sub-sectors, Public and Private Service; but there is no separate energy balance data for each of them. The Public Service Sector has a traditional experience of heat demand, based mainly on old technology, installations and organization, but in some cases new schemes have been introduced. It should be underlined that space heating, hot water and lighting for both sub-sectors are generally provided at low quality, due to old energy infrastructure in public service institutions and the lack of an adequate budget for maintenance of energy systems. Table 9-9 shows energy consumption data for the public and private service sectors for the year 2010.

Final Energy Consumption on Service Sector	ktoe	%
Coal (lignite)	6.80	4.63%
Oil by products	41.60	28.35%
Biomass (fuel wood)	56.20	38.29%
Hydro & import of electricity	38.00	25.89%
Solar Energy	0.17	0.12%
Heat	3.99	2.72%
Total	**146.76**	**100.00%**

Table 9-9: Final Energy Consumption for the Service Sector, 2010

Source: MED, Energy Balance, 2010

The energy demand of the services sector is shared between three main energy commodities: oil by-products, biomass and electricity, with very little contributed by coal, district heating and solar energy.

Both individual heating (wood stoves in each room) and central heating systems have been utilized in public buildings and the fuel they used has evolved over time. At first, all buildings were heated using wood, but then central heating was gradually introduced, initially in large buildings such as hospitals, boarding schools, central and local institution buildings, and so on. Coal was the main source of fuel used in these buildings, with a small amount of light fuel oil also being burned. The majority of these central heating systems were supplied by boilers with efficiencies typically ranging between 60% and 65%. Individual stoves fuelled almost entirely by firewood however, have usually heated crèches, kindergartens, schools and other smaller buildings. Nevertheless, this type of heating has not proved capable of providing normal comfort conditions inside these buildings. Since the year 2000, Kosovo has started to make use of heat pumps/AC.

Since the turn of the century, many changes have occurred in the way that public buildings are heated. In many cases, the poor comfort levels achieved by traditional heating methods could only be improved through the introduction of electrical heating. This solution, however, resulted in high and uncontrolled consumption of electricity, a poor quality of heating and inefficient investment. The situation then deteriorated, as the power supply system found it increasingly difficult to meet the increase in demand. As a result, many buildings are nowadays only partially heated and they are heated for a restricted number of hours[27].

From the demand point of view, the existence of poorly insulated buildings, with open or damaged doors and windows and sometimes heated by two separate systems, results in high levels of energy consumption for heating purposes. Fuel management in Kosovo is poor. Fuel

27 ' Kosovo's household energy efficiency and fuel supplies', *Brian H. Bowen, James A. Myers, Agon Nixha*. Interational Journal of Energy Sector Management, Vol. 5, No. 4, 2011, pp545-563

consumption is not monitored, either as a function of time or of comfort and sometimes the wrong kind or quality of fuel is delivered to a building – for example, heavy instead of light fuel oil – resulting in damage being done to combustion systems.

Electricity services provided in public buildings vary according to the type and the purpose of the building, but can include lighting, space heating, powering of electric equipment, ventilation and air conditioning, cooking and production of hot water. Based on an approximate analysis, over 50% of electricity consumption in public buildings is used for heating purposes. It should be noted that that consumption is going to increase in future because public buildings still deliver a low quality of heating, especially municipal buildings. In future, as standards of living increase, fuel and electricity consumption will also increase and for this reason, it is necessary to consider how space heating in public buildings could be delivered in a more efficient way.

The introduction of EE measures in public buildings, such as thermal insulation, efficient windows and installation of efficient (non-electrical) space heating systems, should generate sufficient energy savings to pay back the investment costs within a reasonable number of years. It would also permit the constrained Kosovo power system to improve its performance and release resources for industrial use, thereby supporting the economic development of country. Secondly, the savings in operating costs resulting from reduced fuel bills may be put to other uses and relieve the pressure on limited budgets. Finally, investment in EE measures in public buildings will help the GoK to implement the Energy Efficiency Action Plan and to fulfill the targets that have been set.

9.3 The Energy Efficiency Market in Kosovo

9.3.1 Suppliers

In North America and Western Europe, the key benefits of EE and RES initiatives are considered the economic stimulus and commercial opportunities that the introduction of these technologies provides. That is why private sector participation is essential: it is no use developing ambitious programs if they cannot be delivered and there must be a sustainable supply side to the market, to deliver the necessary skills, equipment, materials, installation, repairs and maintenance services.

However, local suppliers of energy efficiency goods and services were reluctant to discuss their business capabilities in abstract terms. Their attitude has been that if a firm proposal were put to them then they would be willing to provide details of the scope, quality and cost of their products.

It has been observed that SMEs tend to operate individually and do not always work within developed frameworks, except on an ad hoc basis when there is a perceived need[28]. There are few strong and well-established trade associations in Kosovo and there is little coordination of groups which may share a common interest, either at present or in the future. The fragmented nature of the private sector prevents strong private-public partnerships or the formation of clusters to deliver services, leading to a lack of commercial and professional expertise to implement EE measures (equipment, materials, installation, repair, maintenance, energy auditing, commercial forestry, fuel efficient ovens, recycling, etc.). The absence of a strong supply side is not conducive to creating confidence in the EE sector and discourages the private sector innovation, for example the establishment of ESCO type companies.

[28] ‘Decentralisation, power of local self-government and multi-level dynamics in Peja/Pec Municipality’, Adrian Zeqiri, CeSPI, June 2010 (See Net Programme)

In 2012 GIZ supported research into EE supply companies in three municipalities. Initial findings indicate that while the public is aware of the potential for EE savings, their knowledge comes from suppliers and not from experts. So in general, people are aware of the overall EE picture, but not of the detail and when making purchasing decisions, are guided by price rather than quality. For example, the researchers observed that thermal insulation salesmen did not necessarily always provide the best solution for the customer because they did not take account of the requirements in different climatic zones but simply followed a set formula. It was also recorded that 65% of 'energy efficient' light bulbs examined were of inferior quality. Hence there is a need for a suppliers' code of practice, for the provision of expert advice and for the effective implementation of energy labeling procedures.

A striking feature of the detailed audits of public buildings that were made available to the study by the KEEA is the amount of poor quality work that they identified. A review of the data provided showed that 25 of the 30 audited public buildings had significant renovation work done to them within the last ten years and in 18 cases that work was rated as being of an unsatisfactory standard, with recently installed equipment often requiring major servicing or even total replacement. In future, all implementation projects must include arrangements to ensure that quality control of the highest order is maintained throughout the entire implementation phase. Financial resources are assigned to projects to achieve concrete quantitative results within a fixed time frame – therefore it is important to create a system for monitoring of project implementation supervision.

9.3.2 Building Products and Materials

Most energy efficient construction materials, such as windows, insulation materials and other types of equipment are available in Kosovo, although not always competitively priced in comparison with similar products that can be imported from within the SEE region. However, there is no system in place for verification of the stated quality of these products in relation to actual energy performance.

Promotion of local suppliers, consultants and service providers is not only beneficial in terms of energy efficiency but also for the growth of the country's economy. In general, provision of energy efficiency measures is labor intensive and will therefore contribute to improved employment opportunities. Several of the EU schemes established for promotion of EE in buildings have been specifically launched because of their positive effect on economic growth and employment.

Most companies working in this area are SMEs and could benefit from financial schemes for business expansion and capacity building on technical standards and energy performance requirements. An example could be the Danish support scheme for professionals, which provides advice on the installation of equipment and on maintenance and performance levels. The scheme is quite small-scale and offers a web page that provides information on different energy efficiency products, their performance and sets out guidelines for installation. The scheme is operated based on a tender issued by the Danish Ministry of Energy.

An information service to provide updates on the new 'energy performance in buildings' requirements would be an effective mechanism for improving the awareness of professionals working in the field of energy efficiency, such as installers, architects and engineers useful to provide. Such a service should be delivered by MESP/DOC in cooperation with the newly trained auditors, supported by technical assistance from bilateral donors or others and organized by a professional organization, such as the Chambers of Commerce.

9.3.3 The Commercial Banks

9.3.3.1 Eko Loans

In 2009, in order to support the Kosovo Energy Efficiency Action Plan, 2010-2018, the German State Development Bank, KfW, introduced a new loan product. The bank funded a credit loan, which has been extended to households and small- and medium-size enterprises via two local banks: ProCredit Bank and Raiffeisen Bank. These 'Eko' loans have been used to finance investments in energy saving measures such as the installation of better-insulated windows, more efficient water heaters and better heating systems[29]. The maximum loan amount offered by the scheme was set at €10,000, but in the event, the value of the average loan has been between €5000 and €6000. Over the period of the scheme, the lending interest rate in Kosovo – the rate charged by banks for private sector loans (and which is then adjusted according to the creditworthiness of borrowers and the objective of the financing) – has fluctuated between 13.5% and 14.5%[30]. The Eko loan project is scheduled to continue until the end of 2014.

The introduction of the scheme was unfortunately timed, coming just a few months after the height of 2008 financial crisis, which led to high levels of liquidity in the banking sector. As a result, the major commercial banks in Kosovo are not at present very interested in drawing on credit lines from IFIs since they can provide the necessary finance from their own capitalization.

However, it is informative to compare the different approaches that the two banks adopted in implementing the Eko loans scheme. While they are willing to discuss the concepts and principals involved in their Eko loan operations and to share high-level aggregate data, for reasons of commercial confidentiality, the banks have been reluctant to discuss their operations in detail.

Raiffeisen Bank

Raiffeisen decided to enter into the framework agreement with KfW in the summer of 2008 and KfW provided training to 60 members of staff on administration of EE loans, developing templates, standard calculations and set procedures. To ensure that a good standard of quality was maintained for labor and materials, the bank signed MoUs with materials suppliers (doors, windows, etc.) and offered its Eko loans at a 2% discount on its standard lending rates, which have remained at around 12% for the last two years.

Initially the emphasis was put on making loans to private individuals (but only Raiffeisen account holders were eligible), since these are safer than loans to the commercial sector, but demand for the product did not materialize. Neither was there any significant interest shown by the SME sector. Raiffeisen believes this was due a combination of factors: competition provided by ProCredit, the fact that €15k loans could be secured on better commercial terms and the onerous burden in terms of form filling that the loan application process required.

Prior to a loan being issued the client had to come to the bank (never the other way round) with an investment plan, photographs and details of the equipment. Raiffeisen provided advice on standards, thickness of insulation, quality of windows, A-class appliances and so on. Overall, it is clear now that the application process was too cumbersome relative to other loans.

In 2010, Raiffeisen applied for and received an exemption from the German government permitting the bank to make a major loan to NewCo Ferronikelli for installing EE measures

29 http://www.procreditbank-kos.com/en-us/Eco-loans
30 http://data.worldbank.org/indicator/FR.INR.LEND

(new dryer, new burner and one modern line for oxygen production) and the purchase of environmental clean-up equipment backed by Eko loan funds. That loan lifted the disbursement level up from 52% to 80%.

With an expectation that energy prices will continue to rise, Raiffeisen is optimistic about the future of EE. The bank wants to attract responsible, low risk customers, but recognizes that too many forms and bureaucratic procedures turn customers away. However, it can only effectively monitor large loans and not personal ones because that is expensive. The view is that only a small proportion of total market has been penetrated so far and potential clients need more incentives - not just awareness raising, as there have already been many campaigns, but interest subsidies for the banks and tax subsidies for customers. In order to build up its expertise in the sector, Raiffeisen will work with EE agencies for three more years.

ProCredit Bank

After ProCredit decided to go ahead with the Eko scheme, KfW provided funding for product design, development of reporting and monitoring systems, training for lending officers, and production of manuals, promotions and marketing campaigns. The bank tailored its product specifically to meet the needs of the household market and personal clients were offered a 1% to 1.5% discount on the standard home improvement loan for which the bank charged around 12%.

However, at the start, there was little interest in the scheme and awareness of EE issues was not high, so the bank decided to launch a global EE marketing campaign. Because the concept of environmental benefits was considered too abstract to be an effective selling point, the campaign took on a pragmatic character, emphasizing the tangible financial benefits that could be achieved. Brochures explaining Eko loans were produced and 10,000 copies of a booklet on 'Green Homes' were distributed to elementary schools. Eventually the take-up rate improved and the whole fund was used up. The bank estimates that 80% of its loans went to households and 20% to SMEs.

ProCredit is moderately satisfied with start of the EE market, but its view is that the supply side of the business needs to be more involved in the process, for example, with joint promotion of windows, insulation materials and boilers. Awareness raising campaigns alone are not sufficient; customers require specific and detailed information. Good technicians are needed in the field to recommend optimal solutions in an independent and professional manner. The bank is now planning to double its Eko loan portfolio, but will fund it from its own resources. It is preparing to start a campaign publicizing EE loans in February/March 2013 and in the second half of the year, it plans to target SMEs.

Customers applying for a loan do not have to guarantee any particular level of energy savings, but at least 75% of their investment must be spent on EE related materials. Any client wanting a home improvement loan must bring an investment plan, detailing the type of investment, the approximate cost, where the materials will be purchased and so on. ProCredit does have a database of approved suppliers and if a client does not have an EE based improvement plan, then ProCredit will advise them. Unlike Raiffeisen ProCredit makes a site visit for every loan, then a further monitoring visit to confirm that implementation is going as planned.

There is no system for post-implementation monitoring, just a check that the investments made are in line with what was requested. However, ProCredit said it is considering some kind of monitoring in the future, perhaps on a sampling basis – householders do not like the idea of reporting with information. The bank said it is difficult to calculate the impact of these Eko loans on household savings, but in future it could make its data available to the KEEA.

Conclusions

Both banks reported that since the scheme commenced in 2009 they had each processed around 2,000 loans worth around €10million, making the value of the average EE loan just over €5000. However, although these schemes have operated reasonably well, they are limited in their extent. With interest rates in the range 10% to 12% and disposable household income at low levels, the 4000 loans that have been made to households and small businesses, represent just over 1% of the potential market. Making improvements to the building envelope is normally quite expensive and with an average loan in the region of €5-6,000, repayment, with interest, can be quite onerous, especially for less well-off households.

In principle, anyone can apply for an Eko loan, but most successful applicants are account holders already, since the banks know the account history of their customers. So loans generally go to existing customers but also to employed adults, particularly salaried people. Each applicant has to complete a checklist for the bank, explaining how the loan will be used. Raiffeisen actually requires each applicant to prepare a detailed investment plan, the complexity of which is now considered to be a potential barrier to the uptake of loans. Pro Credit tries to minimize the bureaucratic aspects of the process and does not go into detail on the proposed use of the loan – their position is that the bank's main business is lending money.

The main barriers mentioned by the banks were a lack of interest in EE and the lack of sharp economic incentives, mainly the result of low energy/electricity prices. Pro Credit's overall assessment of the market for EKO loans is that energy efficiency does not have a high priority for households and the services sector is more interested in maximizing business profits rather than savings. Monitoring of how loans are used and of the energy savings realized is minimal. Some spot checks are carried out, but at present, there is no systematic loan monitoring and evaluation process. Pro Credit said that they would introduce a more rigorous evaluation scheme in 2013. However, the costs of closely monitoring and evaluating a large number of small loans can become prohibitive and erode profitability.

9.3.3.2 Municipality Lending

Up to now, no one has issued loans for Public Building Stock. The Law on Public Debt which clears the way for municipalities to apply for loans was approved in 2010 and there is still no practical experience of its operation. There is no municipal credit market in Kosovo at the moment and so the local commercial banks have not been able to build up a municipal portfolio and they have no historical data available that would provide the basis for a reliable assessment of the risks involved in lending to municipalities. To varying degrees, the banks are willing to consider lending money provided by donor banks to the municipalities for EE and other projects, but at any moment in time they have to take account of the overall situation and the requirements of their shareholders.

But as the notion of lending to local government is so new and untested, the banks do have several major issues that need to be resolved before they will participate in such a market. For example, the new Law is not well understood and is seen to be rather restrictive as well as complex and unwieldy. There is a lack of clarity in the relationship between central government and the municipalities and it is not clear how much independence and autonomy the municipalities actually enjoy. Uncertainty in respect of the ownership of municipal assets - and therefore the lack of secure collateral - is another important issue. And there is general agreement in the banking sector that before the municipalities can participate in the credit market they must receive extensive training in the relevant legal, financial and administrative skills.

9.4 Energy Efficiency Projects in Kosovo

9.4.1 On-going Energy Efficiency Projects

The Kosovo Energy Efficiency Agency is the focal point for all EE related projects and initiatives. At present, the Agency is overseeing the following projects:

1. Promotion of EE measures in households through 'Eko' loans financed by KfW (€20 m) and implemented by ProCredit Bank and Raiffeisen Bank – on going to 2014. As described in Section 9.3.3.1, Kosovo is among the partner countries involved with the German State Development Bank KfW, which provided the ProCredit and Raiffeisen Banks with a credit loan to finance energy efficiency schemes for the wider population of Kosovo. To promote the scheme, the banks issued a range of publicity materials, including some general information relating to EE on their websites[31].
2. Installation of efficient public lightning in public facilities, financed by MEM/MED and GIZ (€572k) – completed in 2012. In June 2011 the MED and GIZ signed a memorandum of understanding which set out arrangements for co-funding a project on efficient lighting in public facilities at municipal level. The purpose of the project is to contribute to the modernization of lighting in public facilities and street lighting by replacing inefficient light bulbs with efficient ones. The project, which is being co-funded by MED, GIZ and the municipalities, is being implemented over a two-year time frame and encompasses five municipalities - Pristina, Mitrovica, Ferizaj, Podujevo and Gjilan. Another beneficiary will be one of the dormitories at the University of Pristina. This project will contribute to the achievement of the targets set in the National Energy Efficiency Plan.
3. Study and Implementation of EE measures in Municipalities (63 schools and 2 hospitals), financed by EU (€15.6 m) - implementation delayed. This is the EU's main energy efficiency project. The beneficiaries are the selected municipalities and the Ministry of Health. The project, which started in March 2011, involves implementing EE measures in some 33 municipalities in buildings which had been pre-selected by the Ministry of Local Government Administration and the EC Liaison Office and handed over to the contractors for audit. The project is grant funded. Implementation was due to commence in September 2012 and three foreign companies were contracted to carry out the works. However, due to time and budget constraints, the quality of the energy audit data was limited. Only the overall geometry of buildings and total investment requirements were evaluated and there was no baseline scenario analysis to facilitate monitoring and no detailed energy audit reports were prepared. The implementation project has now been put on hold, while the data collected in the audits is re-assessed. The NBEES project has only been provided with the names of the buildings visited by the auditors (Annex 3) and no other information has been made available.
4. Feasibility Study and Implementation of EE measures in public buildings at municipality level, supported by KfW/EU/WBIF (€7.5 m) - Study ended 2012, implementation to begin in 2013. The 'Implementation of Energy Efficiency Measures in Public Buildings' project ran from April 2011 to January 2012. Subject to a successful application to the WBIF for further funding, the implementation phase of the project could begin this year and continue over the following 48 months. It is planned that a KfW loan, supported by investment incentives and Technical Assistance funded by WBIF grants will be made available to eligible municipalities to finance the implementation of the recommended measures in 30 selected buildings. It was originally envisaged that the loans provided by KfW would be disbursed to municipalities via the Kosovan banking sector. However, to facilitate the execution of the project, KfW changed the loan disbursement mechanism, so that KfW funds will be

31 For example, see the ProCredit website http://www.procreditbank-kos.com/?cid=2,139

channeled to the participating municipalities via the Government through one of its Ministries rather than via the commercial banks. The results of the energy audits which were performed by the project auditors show that when the EE measures are in place and all 30 selected buildings are operating at their planned comfort levels, total annual energy savings could amount to over €650,000. Moreover, the auditors calculated that because of introducing EE measures in these 30 public buildings, it would be possible to reduce the total volume of GHG emissions by more than 3,600 tons of CO_2 equivalent/year.

5. ‘Promoting EE and RES in Kosovo’, technical assistance for capacity building, funded by EU (€1.5 m) - ongoing to 2014. The purpose of this project is to support the relevant Kosovo institutions at central and local level in enhancing the legal framework and developing policies and action plans to increase energy efficiency and the use of renewable energy sources. The anticipated results of this project include the updating, monitoring and evaluation of the National Energy Efficiency Action Plan, the preparation of municipal energy plans, completion of the Kosovo RES Plan, improved energy planning capacity at the beneficiary institutions, better cooperation between central and local level in the EE and RES planning processes and the transposition of EU Directives on the energy performance of buildings and on renewables into the national legal framework/ secondary legislation as required by the Energy Community Treaty.
6. Program of 48 audits of municipal buildings. In 2012 the MED commissioned a program of 48 energy audits of municipal buildings (which are also listed in four groups Annex 3)). The program was completed in December 2012 and the audits are now in the process of being reviewed and evaluated.
7. National Building Energy Efficiency Study for Kosovo, to be followed by implementation program of EE measures, supported by WB/EC (€10.7 m)
8. Public Campaign on Energy Efficiency (EE) and Renewable Energy Sources (RES), financed from budget of Republic of Kosovo.
9. EBRD projects. The EBRD has been in discussion with various commercial banks in Kosovo concerning the creation of a €15 million credit line for the private sector, which includes a 20% grant contribution from IPA/2008. The initial intention was that the funding should focus entirely on the commercial sector, but the inclusion of households is now also being considered. However, there is a difficulty in implementing the scheme, in that the local banks are showing little or no interest in participating in the scheme. They have sufficient funds of their own and prefer to utilize these in order to retain the full margin for themselves, as well as avoiding all the administrative requirements for documenting the loans. The banks are probably also reluctant to participate because the subsidized loans would compete with their own purely commercial loans. In light of these difficulties EBRD is therefore considering a microloan scheme targeted on rural areas. It is envisaged that loans might be in the range of €5,000 to €10,000 - which is rather high from the perspective of traditional microloan arrangements - and be disbursed through NGOs which are active in Kosovo. The loans would be earmarked for house improvements and also agricultural production. However, these plans are only in the “concept” phase. EBRDs assessment of the situation is that the need for energy efficiency projects in Kosovo is huge, but that under current market conditions it is difficult to channel finance to costumers.

9.4.2 Previous Energy Efficiency Projects

10. The GIZ project “Modernization of Municipal Services” (MMS) ran from 2006 to 2012. Annex 7 shows a list of 56 EE projects implemented by GIZ during the life of the project. The main focus of the project was a program of small municipal investments in the field of energy efficiency, jointly financed by the 20 participating municipalities and through a fund established by GIZ and AKM. The project did not involve any detailed energy audits but consisted of a series of individual investments in EE projects in public buildings: schools,

clinics and municipal buildings. Investment costs were normally shared equally between the co-financers and capped at €40,000. Projects included refurbishment of public buildings (doors, windows, thermo-insulation and installation or upgrading of central heating systems) and modernization of street lighting. The total joint investment was in the order of €2.5 million and resulted in energy savings of around 0.4 ktoe. The project also included “Improvement of Energy Efficiency in Kosovo” which aimed to improve awareness on utilization of energy saving technologies as well as a program to improve local waste management. The project is now drawing to an end.

11. The ‘Assistance to the Ministry of Energy and Mining’ was a two-year EU-funded project which ran from 2009 to 2011. Included amongst its objectives was (a) to strengthen the capacity of MEM staff to revise and update policies and programs on energy efficiency and renewable energy sources and (b) to incorporate the requirements of the Energy Community Treaty in the area of energy efficiency. The Project assisted MEM with the preparation of the National Action Plan on Energy Efficiency as well as training key staff in MEM’s Energy Efficiency and Renewable Energy Sources Division. In the course of carrying out these tasks, the Project developed, in accordance with EU regulations, an Energy Labeling Scheme that included eight types of major domestic electrical appliance and identified the changes to primary and secondary legislation that would be needed to allow for the enforcement of domestic appliance labeling. A “Manual of Energy Efficiency for Small and Medium Enterprises (SMEs) and Light Industry” was produced to promote energy savings by setting out a list of practical steps explaining how businesses can reduce energy bills. The Manual was made available to small businesses throughout Kosovo. The project also produced a booklet entitled “EU Assisting Energy Sector reforms in Kosovo” which summarized the progress that was being made in the areas of energy efficiency, renewable energy sources and the environment and a ‘Project Factsheet’, describing the work and the specific achievements of the project.

12. Annex 8 contains information on three previous EU-financed EE-related initiatives:
   - Training for Energy Auditors (Sept. 2009 – Sept. 2010),
   - Implementation of Energy Efficiency Measures in Public Buildings (April 2009 – Feb. 2011) and
   - Public Awareness Campaign for Energy Efficiency and Renewable Energy Resources (Sept. 2009 – Dec. 2010).

   The purpose of the EU-funded “Public Awareness Campaign for Promoting Energy Efficiency and Renewable Energy Resources in Kosovo” project was to develop and implement a media campaign to help raise awareness of the benefits of Energy Efficiency and of using Renewable Energy Sources.

   The campaign focused on promoting ways to save electricity in buildings and on the benefits accruing from investments such as those made in a number of EU pilot projects (four schools and one hospital). The subject of the main leaflet of the campaign was ‘Energy Efficiency Measures in Buildings’.

   The publicity material produced by the project highlighted the fact that not only did these investments make it much cheaper to ensure comfortable temperatures in the schools and hospitals, but that this was resulting in higher school attendance and enhanced performance levels.

   Just before the project ended in December 2010, a survey was carried out to evaluate the impact of the campaign and of the relative effectiveness of the different tools used. The results of the survey showed that awareness of energy efficiency and related issues is still at a very low level in Kosovo.

   The survey concluded that leaflets are a very useful way to disseminate more detailed information, even though it is difficult to distribute them across large parts of the population**.** Leaflets are easy and relatively inexpensive to produce at low cost and provide the only easy means of conveying practical instructions on how to save energy.

Section 4-Analysis of Barriers

10 Potential for EE Measures

10.1 Building Stock Projections

10.1.1 Total Existing and Future Residential Building Stock

Table 10-1 below shows the projected increase in the number of apartments up to 2020, taking account of the fact that the Kosovo Energy Efficiency Action Plan forecasts an annual growth rate to 2020 of 1.97% - 2.30%.

Kosovo	2010	2015	2020
One story house	126,795	140,373	151,669
Two storey villa>100 m^2/storey	103,106	113,624	122,393
Up to five storey building 1960-1990	30,991	34,315	37,074
Up to five storey building 1970-1999	17,357	19,240	20,789
Up to five storey building 1980-1999	5,940	5,940	5,940
Up to five storey building 1999-2011	24,246	26,910	29,091
Total	**308,434**	**340,393**	**366,956**

Table 10-1: Forecasted number of residential buildings, by category for whole Kosovo

Source: KEEAP

Figure 10-1 shows the total area of households for the whole of Kosovo and the average living area (in square meters) per family for the period 2010-2020.

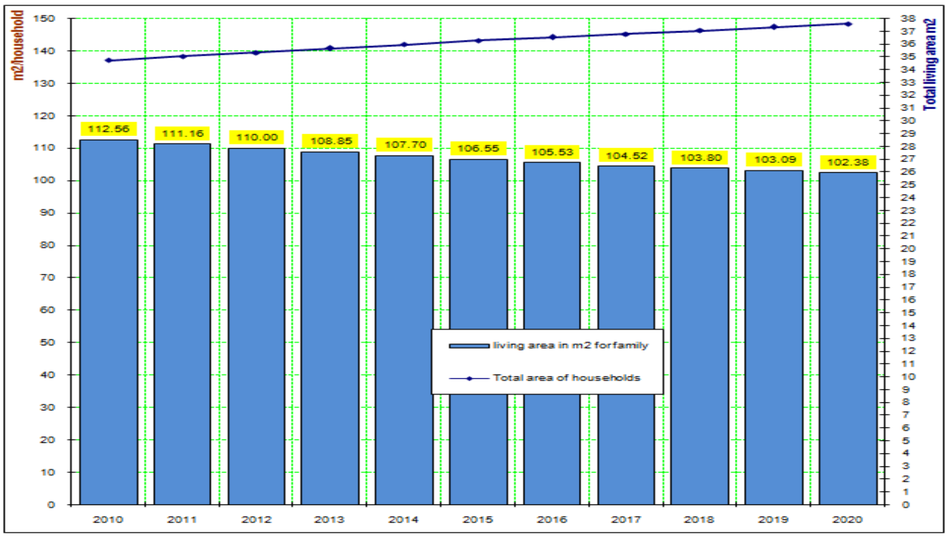


Figure 10-1: Total living area of all residential buildings in Kosovo (m^2) and average household living area (m^2/family)

The total living area is forecast to increase from 34.7 million m^2 (and 112.6 m^2/household) in 2010 to 34.7 million m^2 (and 102.4 m^2/household) in 2020 (KEEAP). The reduction in average living area (m^2/family) is not unexpected, taking into consideration the trend towards increased construction costs and smaller but more numerous family units. The 'CENSUS 2011' data has been used to calibrate the KEEAP data on the number of residential buildings and the total area of households, as presented in Table 10-2.

Kosovo	2010	2015	2020
One story house	14.292	14.913	15.429
Two storey villa>100m²/storey	11.635	12.144	12.569
Up to five storey building 1960-1990	3.459	3.620	3.755
Up to five storey building 1970-1999	1.940	2.033	2.112
Up to five storey building 1980-1999	0.684	0.721	0.753
Up to five storey building 1999-2011	2.708	2.839	2.953
Total	**34.718**	**36.269**	**37.570**

Table 10-2: Total area of residential buildings (million m²) for whole Kosovo

Source: KEEAP/'CENSUS 2011'

10.1.2 Total Existing and Future Increase Public Building Stock

According to preliminary data provided by the KEEAP and Statistical Office of Kosovo, the total Public and Private/Commercial Service Building Stock for the year 2010 was approximately 59,000, covering an area of 10.55 million m². Using this information together with adjusted data from the KEEAP, which can be used to breakdown the public building stock to derive the total number of buildings for each region, it is possible to calibrate the figures relating to the number and the area of public buildings (central and municipal) for the period 2010-2020.

Based on adjusted data from the KEEAP analysis, Table 10-3 presents the number of public buildings, by building category, for the whole of Kosovo.

Kosovo	2010	2015	2020
Elementary School	354	354	355
High School	193	276	367
Health Care Centre	494	527	548
Kindergarten	286	286	286
Dormitory	248	247	248
Administrative Central Governmental Public Buildings	85	98	111
Administrative and Other (not included above) Municipal Public Buildings	160	170	180
Total	**1,820**	**1,960**	**2,093**

Table 10-3: Total number of public buildings for Kosovo, 2010-2020

Source: KEEAP

Figure 10-2 provides details of the total area of the entire public building stock of Kosovo and shows the average area per public building for the period 2010-2020.

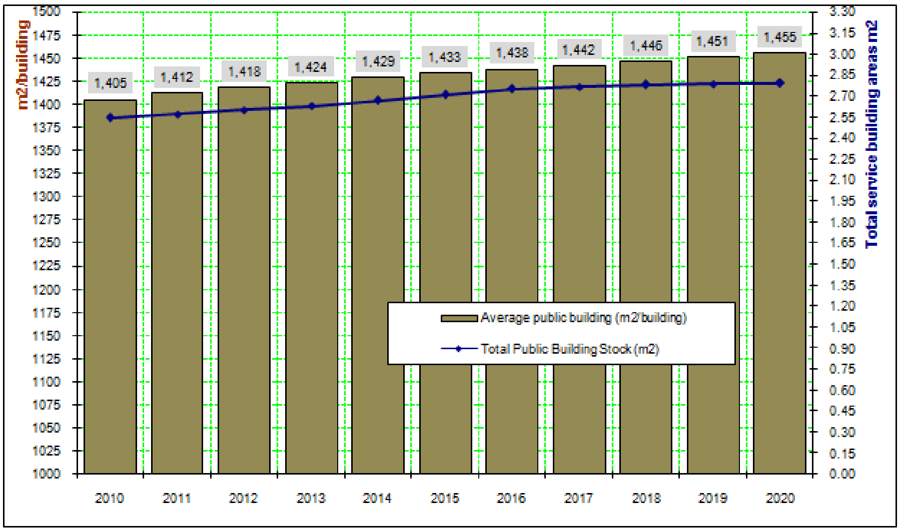


Figure 10-2: (a) Total area (million m²) and (b) average area (m²/building) of all public buildings in Kosovo, 2010 -2020

Source: KEEAP

These numbers were used for calibrating the total area for each public building sub-category, as presented in Table 10-4 Table 10-3 shows that the net number of elementary schools is expected to remain almost constant over the period 2010 -2020, while the total floor area for this category declines, as shown in Table 10-4. This is explained by the restructuring of the elementary school system, with some old schools in remote areas with small numbers of children (due to internal emigration of the population to the bigger cities) being demolished and new schools being built which increase the effectiveness of space utilisation, reducing the unit space per child. The same patterns are being shown in kindergartens, dormitories and health care centres.

Kosovo	2010	2015	2020
Elementary School	0.574	0.569	0.550
High School	0.312	0.443	0.567
Health Care Centre	0.397	0.399	0.356
Kindergarten	0.463	0.460	0.444
Dormitory	0.400	0.398	0.384
Administrative Central Governmental Public Buildings	0.183	0.214	0.246
Administrative and Other (not included above) Municipal Public Buildings	0.213	0.227	0.240
Total	**2.543**	**2.708**	**2.788**

Table 10-4: Total area of public buildings (million m²) for the whole of Kosovo, 2010-2020

Source: KEEAP

10.1.3 Total Existing and Future Private Building Stock

Using data from the KEEAP it is possible to breakdown the stock of private buildings by region, as presented in Tables 10-5 below.

Kosovo	2010	2015	2020
Motels/Hotels<10 rooms	375	384	394
Hotels > 20 rooms	94	96	98
Private Schools	82	95	109
Restaurants/Shops/Other	57,585	61,440	63,761
Total	**58,137**	**62,016**	**64,361**

Table 10-5: Total number of private buildings in whole Kosovo, 2010-2020

Source: KEEAP

Figure 10-3 below shows the total area of the entire stock of private service buildings in Kosovo and the average area of a private service building during the period 2010-2020.

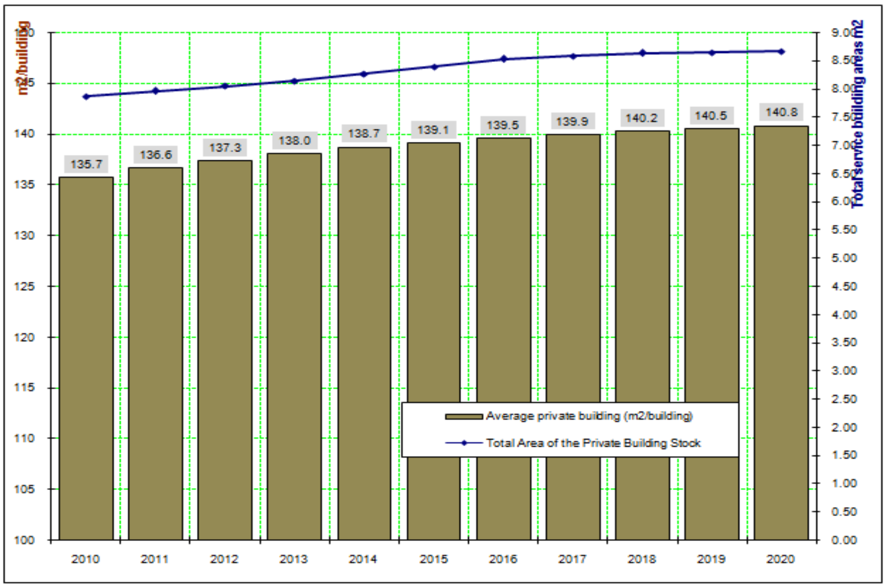


Figure 10-3: (a) Total area (million m²) and (b) average area (m²/building) of all private service buildings for the period 2010-2020

Source: KEEAP

These numbers were used to calibrate the number and the total area of private sector buildings, as presented in Table 10-6. While Table 10-5 shows that net number of hotels is increasing Table 10-6 indicates that the total net area of this category remains fairly constant. This can be explained by the fact that new and replacement hotels utilize space more efficiently and reduce the unit space per client.

Kosovo	2010	2015	2020
Motels/Hotels<10 rooms	0.051	0.052	0.053
Hotels > 20 rooms	0.013	0.013	0.013
Private Schools	0.011	0.013	0.015
Restaurants/Shops/Others	7.79	8.316	8.586
Total	**7.864**	**8.394**	**8.668**

Table 10-6: Total area of the private service building stock (million m²), in the whole of Kosovo, by category of building, 2010-2020

Source: KEEAP

10.2 Forecast Energy Demand

10.2.1 Methodology for Forecasting Baseline Energy Demand for the Building Stock of Kosovo

The energy consumption of buildings has been divided into six categories with widely differing characteristics: space heating, space cooling, water heating, cooking, lighting and electrical appliances. The methodology of forecasting baseline energy demand for each energy service is described in detail Annex 15 (calibration for the base year, 2010, and extrapolation for the period 2011-2020).

In addition, the energy data from all the WTAs has been processed to get an understanding of the actual levels of actual energy consumption and baseline energy demand (without EE but achieving comfort levels) for securing all six energy services in each region.

This information is presented in Tables 10-7 and 10-8.

Kosovo	Share of Energy Service (actual energy consumption) in %						
	Space heating	Space Cooling	Water Heating	Cooking	Lighting	Elec. Applian.	Total
Residential Buildings	69.16%	0.66%	7.74%	5.79%	6.56%	10.08%	100%
Public Buildings	77.71%	1.58%	8.97%	2.51%	2.04%	7.18%	100%
Private Buildings	84.52%	2.29%	7.66%	0.96%	1.41%	3.15%	100%

Table 10-7: Share of Actual Energy Consumption (actual energy consumption) in %

Kosovo	Share of Energy Service (baseline energy demand service) in %						
	Space heating	Space Cooling	Water Heating	Cooking	Lighting	Elec. Applian.	Total
Residential Buildings	76.26%	0.08%	6.43%	4.16%	5.93%	7.13%	100%
Public Buildings	84.52%	2.29%	7.66%	0.96%	1.41%	3.15%	100%
Private Buildings	55.35%	7.46%	13.56%	10.47%	6.68%	6.48%	100%

Table 10-8: Share of Baseline Energy Demand (without EE but achieving comfort levels) in %

Analysis of the data shows that the share of actual energy consumption accounted for by space heating - which is the largest energy service and the only one defined in terms of comfort levels - is lower (for residential and public buildings) than its share of energy demand (that is, without EE measures but achieving target comfort levels). This confirms that comfort levels are not being met in the residential sector. Shares presented above in Tables 10-7 and 10-8 are used for calculating absolute values for each energy service in the residential sector.

10.2.1.1 Space Heating

The 'baseline (or business as usual)' energy demand for space heating was estimated as part of the walk-through energy audit process using a standard model based on the calculation of thermal losses from the building envelope, the required heating components (boiler, burner, heating panel, etc.) and the following preliminary calculations:

- Building volumes: the calculation of the volume of each building was based on data presented in Tables A16-2/3/4/6/7/8 (residential); A17-2/3/4/6/7/8 (public); A18-2/3/4/6/7/8 (private) and an assumption that the average height of houses/apartments/buildings is 3m.
- Thermal losses were calculated using a simple thermo dynamic model based on the characteristics of the building envelope. The structure of each element in contact with

the outside environment - walls, ceilings, windows and external doors - was taken into consideration. The level of energy demand (kW) required to guarantee the space heating capacity needed was calculated first and then after that, the annual thermal energy demand (kWh) was calculated.

- The U-value [W/m² °C] of a building depends mainly on the type of materials used for each element of the external envelope (walls, ceilings, windows and outside doors), the ratio of the outside surface area to the volume of the building, the number of floors it contains, the ratio of windows to wall area and the structural design of the building. Thus, the U-value coefficient [W/m² °C] for an existing building is determined from an analysis of the geometry and thermal characteristics of each of its elements. Based on these coefficients and on the size of the external areas, the annual thermal energy demand was calculated for each building.
- The heating degree-days for each of three regions of Kosovo used in this study were defined based on average outside temperatures and are discussed in more detail in Chapter 7 and Annex 12.
- The calculation of additional thermal losses depends upon the operation of the space heating system, the average heat transfer coefficient from the building and the orientation of the building. From the studies carried out, such additional thermal losses (the 'r' coefficient) were determined according to the different types of use of a building. An 'r' coefficient in the range 1 to 0.6 represents a building that experiences space heating interruptions during the day and/or at weekends (for example schools, law courts, other institutions, etc). The 'r' coefficient has a high value for hospitals and recreational centers, which are in constant use, and a low value for household buildings.

10.2.1.2 Water Heating

To analyze energy consumption for the production of sanitary domestic hot water, a simple standard model was prepared and used in the WTA process, based on an assumption that each person in a household/hospital/kindergarten/dormitory, etc. takes one shower every day. The standard hot water temperature was taken as 40° C and the average daily hot water quantity per person as follows: 40 liters for showering, 10 liters for personal hygiene, 10 liters dishwashing, plus an allowance for laundry needs. Based on the average number of persons in each household and on the average temperature of cold water each month, household hot water needs (for showers, personal hygiene and dishwashing) were calculated.

10.2.1.3 Cooking

To meet cooking energy demand throughout the year, buildings in Kosovo consume electricity, firewood or/and LPG. The main assumption used in estimating cooking energy demand was that the energy intensity is 16 to 20 kWh/month/occupant, as recommended in various EU studies.

10.2.1.4 Lighting

The calculations relating to electricity demand for the baseline scenario on lighting are based on the share of total energy consumption for this service derived from an analysis of the whole portfolio of buildings audited.

10.2.1.5 Electrical Appliances

Standard electrical appliances include radio, TV, videos, washing machines, refrigerators, music players, computers and water pumps. The calculations relating to electricity demand for the baseline scenario on electrical appliances are based on the share of total energy consumption for this service derived from an analysis of the whole portfolio of buildings audited (Table 10-8).

10.2.1.6 Air Conditioning

Energy demand for cooling purposes has been calculated based on its share of demand identified in Table 10-8 above, after processing the residential building audits.

10.2.2 Forecast of Baseline Energy Demand for the Residential Building Stock

10.2.2.1 Space Heating

Based on the methodology described above, the space heating energy demand for the residential building stock was calculated for the baseline scenario up to the year 2020, in ktoe and in GWh.

This information is summarized in Figures 10-4 and 10-5 below.

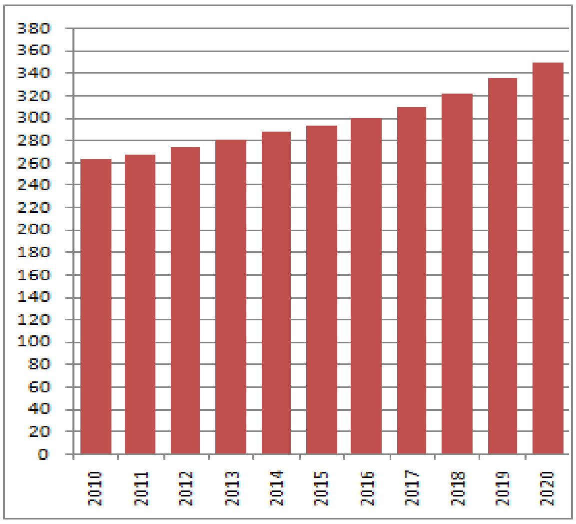


Figure 10-4: Space Heating Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

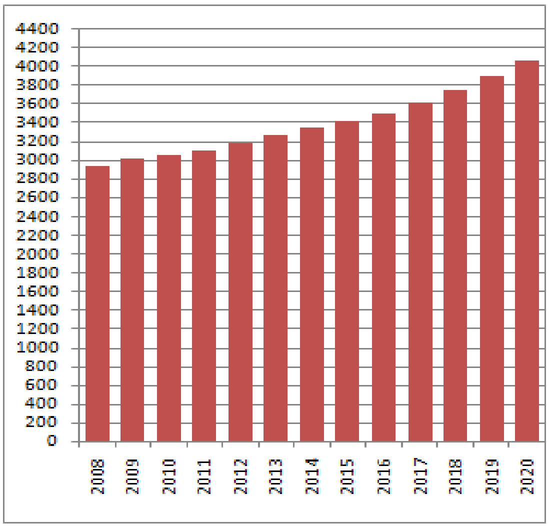


Figure 10-5: Space Heating Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

10.2.2.2 Water Heating

Based on the 'Share of Energy Services' data (Table 10-8) and the household building stock data, the hot water heating energy demand for the baseline scenario up to 2020 has been calculated and the results (in ktoe and GWh) are shown in Figures 10-6 and 10-7 below.

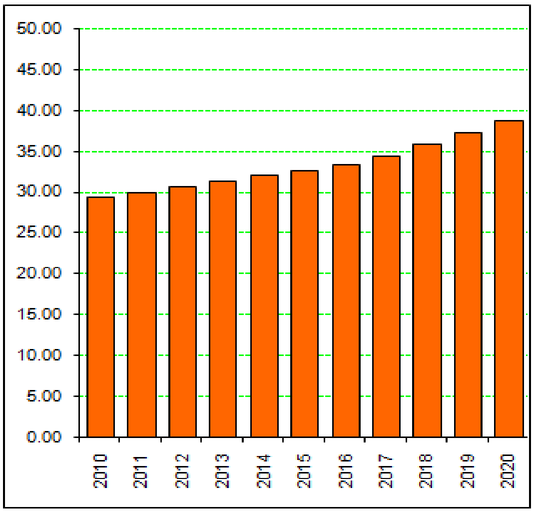


Figure 10-6: Water Heating Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

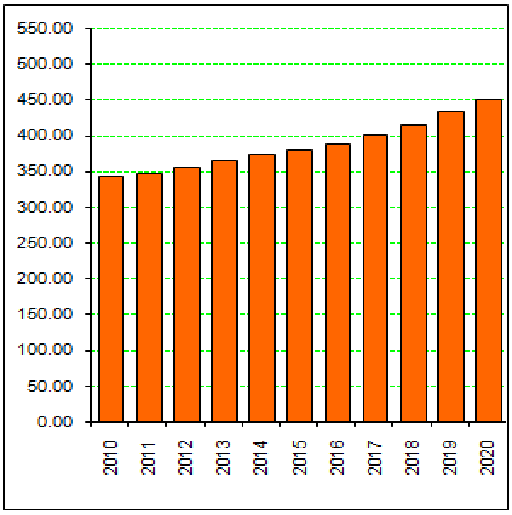


Figure 10-7: Water Heating Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

10.2.2.3 Baseline Energy Demand Forecast for All Services

After the calculation of baseline energy demand for all end-user services (the calculations and results for cooking, lighting, electrical appliances and space cooling (AC) are presented in Annex 19), it is then possible to aggregate the individual forecasts of energy demand for the entire residential building sector of Kosovo. The total energy demand forecast up to the year 2020 is shown in Figures 10-8 and 10-9 below, both in ktoe and GWh.

A final analysis of the baseline scenario reveals that space heating is responsible for the biggest share of energy consumption in the household building stock, followed by water heating. These conclusions imply that the implementation of energy efficiency measures related to these two energy services - space heating and water heating - should be prioritized, since, as the energy audits have shown, they offer the best financial returns.

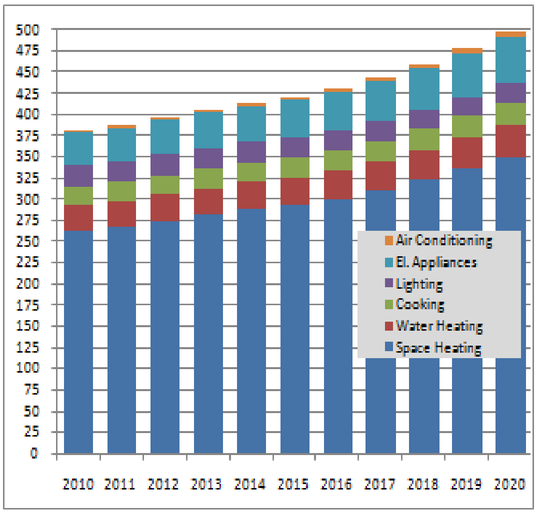


Figure 10-8: Energy Demand for all Residential Building Stock end-users according to the Baseline Scenario (ktoe)

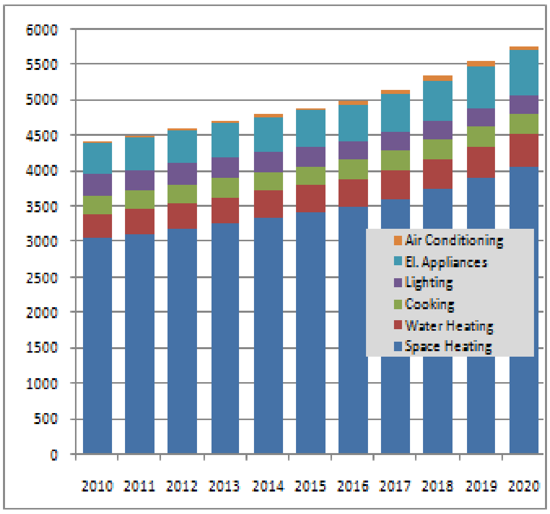


Figure 10-9: Energy Demand for all Residential Building Stock end-users according to the Baseline Scenario (GWh)

10.2.3 Forecast of Baseline Energy Demand for the Public Building Stock

10.2.3.1 Space Heating

Based on the methodology described in the previous sections and using data on the public building stock, the space heating energy demand for the baseline scenario up to 2020 has been calculated and the results are shown both in ktoe and GWh in Figures 10-10 and 10-11.

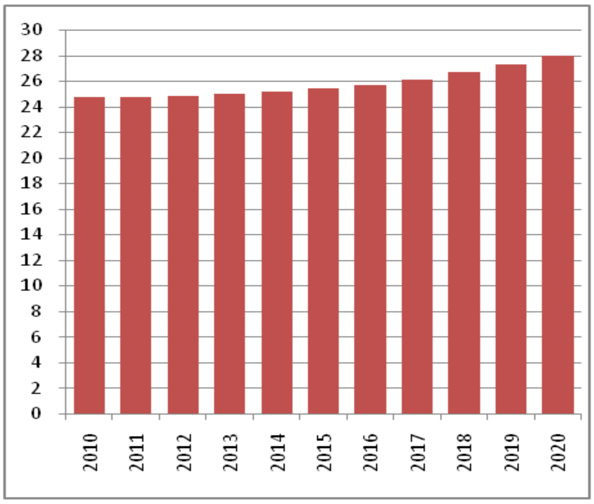


Figure 10-10: Space Heating Energy Demand of Public Building Stock according to Baseline Scenario (ktoe)

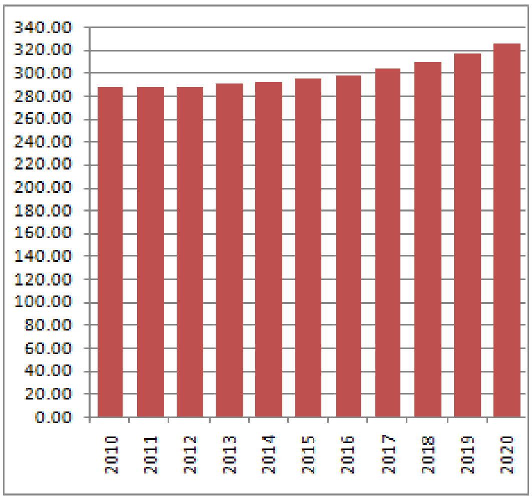


Figure 10-11: Space Heating Energy Demand of Public Building Stock according to Baseline Scenario (GWh)

10.2.3.2 Water Heating

Based on the service shares in Table 10-8 and data on the public building stock, the water heating energy demand for the baseline scenario up to 2020 has been calculated and the results are shown both in ktoe and GWh in the two Figures 10-12 and 10-13.

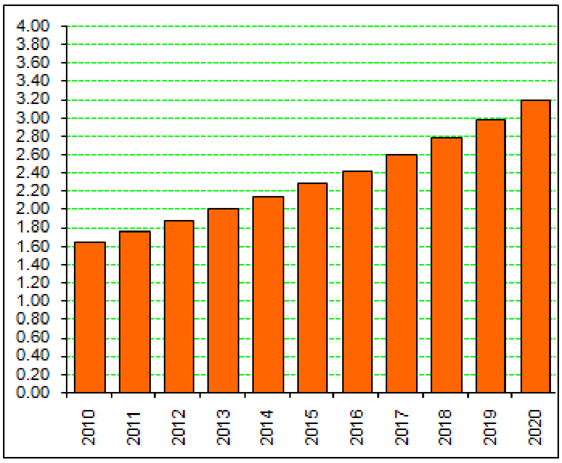


Figure 10-12: Water Heating Energy Demand of Public Building Stock according to Baseline Scenario (ktoe)

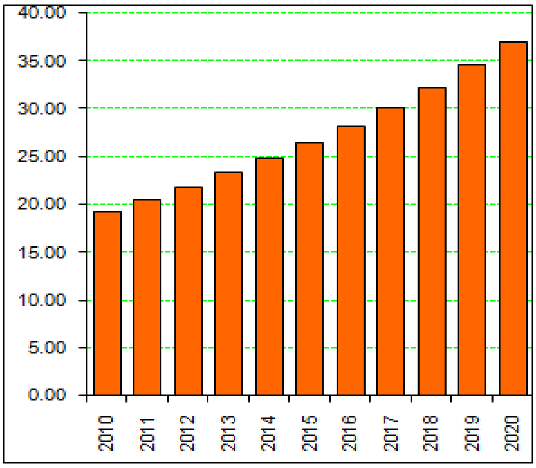


Figure 10-13: Water Heating Energy Demand of Public Building Stock according to Baseline Scenario (GWh)

10.2.3.3 Baseline Energy Demand Forecast for All Services

After the calculation of baseline energy demand for all end-user services (the calculations and results for cooking, lighting, electrical appliances and space cooling (AC) are presented at Annex 20), it is then possible to aggregate the individual forecasts of energy demand for the whole of the public building stock for the baseline scenario, as shown in Figures 10-14 and 10-15.

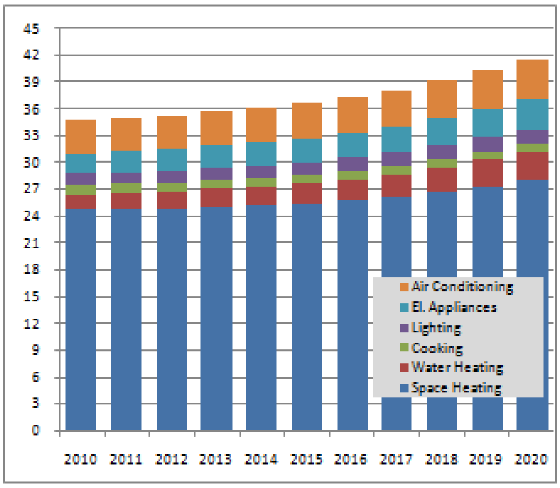


Figure 10-14: Energy Demand for all end-users of Public Building Stock according to Baseline Scenario (ktoe)

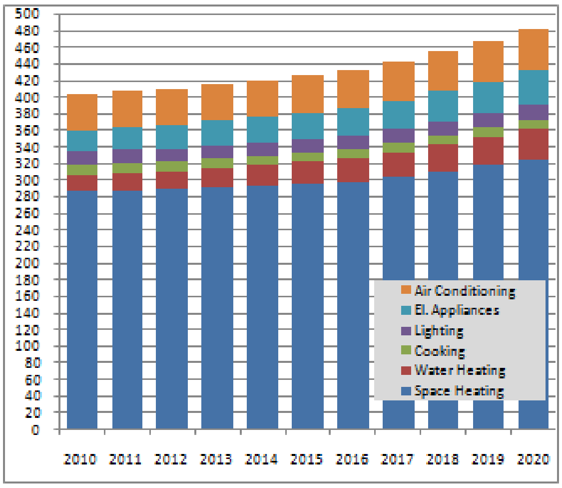


Figure 10-15: Energy Demand for all end-users of Public Building Stock according to Baseline Scenario (GWh)

The final analysis of the public building stock baseline scenario shows that for this sub-sector too, space heating takes the biggest share of energy consumption, with air conditioning second and hot water third. These conclusions show that the highest priority should be put on promoting energy efficiency measures in these three energy services, since the energy audits show that they have the highest financial profitability.

10.2.4 Forecast of Baseline Energy Demand for the Private Building Stock

10.2.4.1 Space Heating

Space heating energy demand for the baseline scenario up to 2020 has been calculated and the resulting values, both in ktoe and GWh, are shown in Figures 10-16 and 10-17.

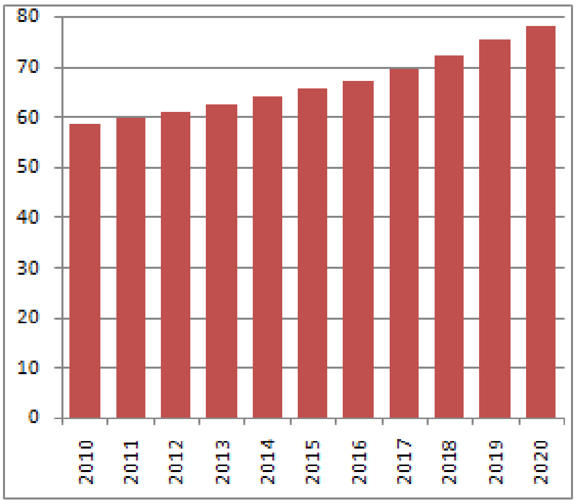


Figure 10-16: Space Heating Energy Demand of Private Building Stock according to Baseline Scenario (ktoe)

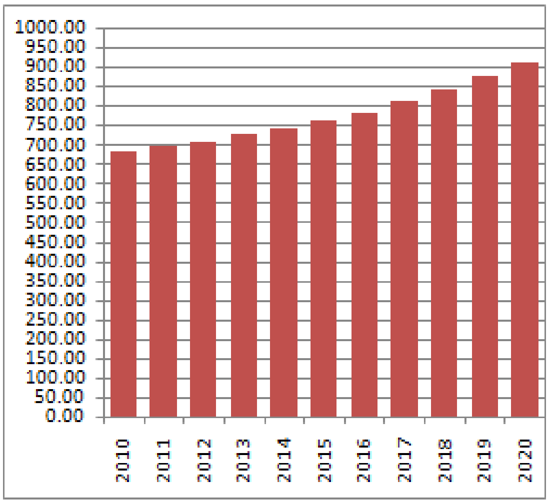


Figure 10-17: Space Heating Energy Demand of Private Building Stock according to Baseline Scenario (GWh)

10.2.4.2 Water Heating

Water heating energy demand for the baseline scenario up to 2020 was calculated and the results are shown in ktoe and GWh in Figures 10-18 and 10-19.

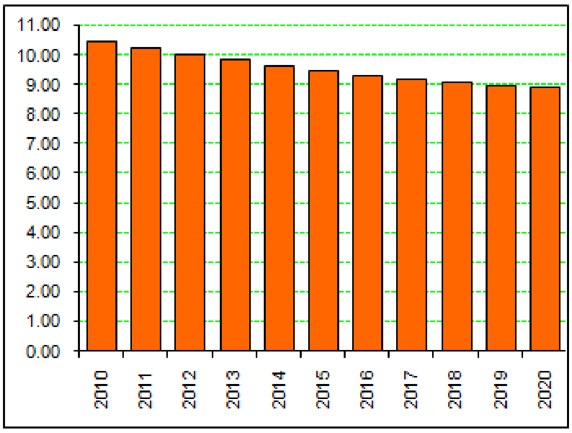


Figure 10-18: Water Heating Energy Demand of Private Building Stock according to Baseline Scenario (ktoe)

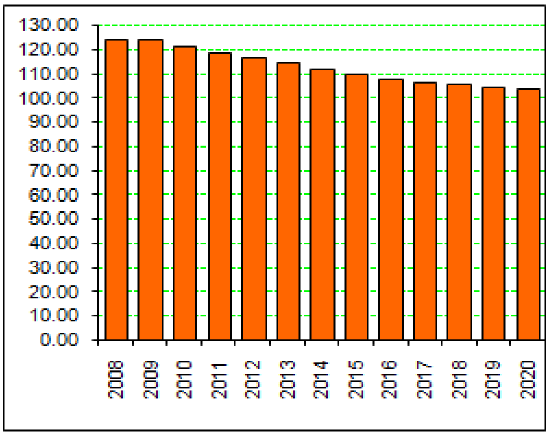


Figure 10-19: Water Heating Energy Demand of Private Building Stock according to Baseline Scenario (GWh)

10.2.4.3 Baseline Energy Demand Forecast for All Services

After the calculation of baseline energy demand for all end-user services (the calculations and results for cooking, lighting, electrical appliances and space cooling (AC) are presented at Annex 21), it was possible to aggregate the individual forecasts of energy demand for the entire private building stock for the baseline scenario and this is illustrated in Figures 10-20 and 10-21.

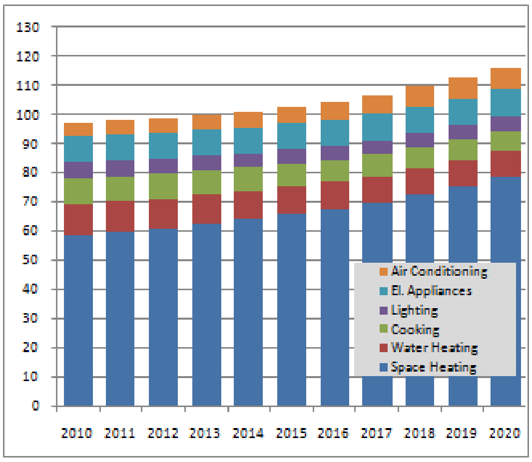


Figure 10-20: Energy Demand for all end-users of Private Building Stock according to Baseline Scenario (ktoe)

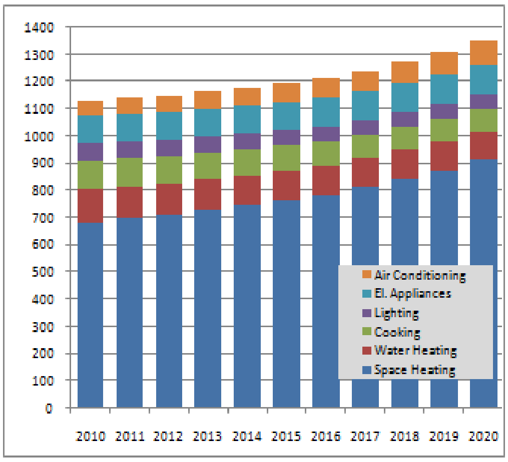


Figure 10-21: Composition of Energy Demand for all end-users of Private Building Stock according to Baseline Scenario

A final analysis of the baseline scenario for this subsector shows that space heating accounts for the largest share of energy consumption in the private building stock and that the second largest energy service is hot water.

10.3 Calculation of Energy Savings

Annex 9 provides a description of the various measures that are available to realise energy savings in public buildings and to raise comfort levels, both in winter and in summer, by reconstruction and maintenance of the building envelope: outside walls, roof, outside windows and doors, energy systems for heating, cooling, water heating, cooking and lighting. The EE measures described in Annex 9 have been selected in accordance with EC advisory documents (June 2009), the recommendations from an ECS Study (carried out by the ENSI Company in

February 2012) and a GIZ study for all Balkan countries, including Kosovo, entitled 'Preparation of methodology for M&V of energy savings – development of bottom-up methods' (June 2011).

10.3.1 Evaluation of the EE potential for the Residential Building Stock

10.3.1.1 Space Heating

Based on the processing of all energy audits for each region and for the whole residential building stock of Kosovo, the weighted average energy efficiency potential for space heating for all buildings in the sector has been calculated as 46.1% (See Table 10-9 below).

Country	Energy efficiency potential for space heating for the residential sector
Kosovo	**46.10%**

Table 10-9: Energy efficiency potential for space heating for the residential sector

An energy efficiency scenario has been established based on this result, which assumes that the penetration trend will be linear, starting from 2013 and reaching its full potential in 2020. The results of the aggregated calculations for the whole of the residential building stock are presented in Figure 10-22.

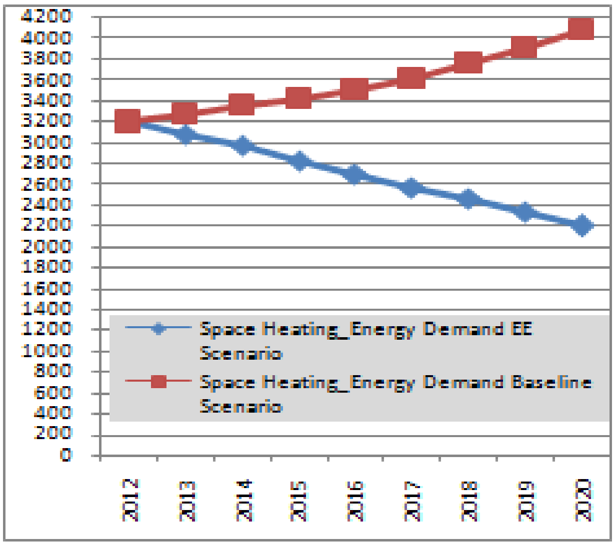


Figure 10-21: Energy Demand for BL, EE Scenarios (without and with EE measures respectively) for Kosovo (GWh)

The absolute savings potential calculated above will be secured by the introduction of the four most important EE measures identified in the previous section and the shares of each of these individual measures are presented in Table 10-10.

EE Measure	Thermal insulation of the outside walls	Thermal insulation of the roof	Introduction of EE (double/triple) windows	Introduction of EE heating supply system
Share	25%	25%	30%	20%

Table 10-10: Contribution/shares of each EE measure to energy savings (%)

The shares presented in Table 10-10 are based on the recommendations of the February 2012 ECS study and the experience of the consultant, since there is not yet an established monitoring scheme for EE measures in Kosovo (although this year the KEEA, with support from an EU funded project, has started to work on one scheme). After the establishment of a monitoring and verification scheme for EE measures (with further support from a proposed GIZ project carried out under the Open Regional Fund) actual energy savings and their respective shares will be available.

Introducing thermal insulation of outside walls

The formula A14-1 presented at Annex 14 provides for the evaluation of annual energy savings resulting from improvements in the building envelope and the heating system. The unitary final energy savings have been calculated based on the difference in the specific heat demand before and after implementation of the refurbishment measure. The savings are expressed in kWh/m^2 per year. The total final energy savings in kWh/household in a year are calculated by multiplying the measured unitary annual energy savings per m^2 by the total useful floor area of the refurbished building. The total energy savings achieved by this measure were calculated based on the average residential living area of 108 m^2 and a total outside wall area of 112.7 m^2. Energy saving/household is 6,883 kWh/year and to reach the absolute savings target of 375.2 GWh in 2020 will require the thermal insulation of the outside walls of 54,517 households.

Each of the energy audits that was carried out incorporated an investment evaluation section that included the actual local costs of EE measures on a turnkey basis. Investment unit prices on a turnkey basis (see Table 7-2) have been used to calculate the total cost of the investment required to reach the above-mentioned energy saving potential. Figures 10-22 and 10-23 show graphically the number of households to be fitted with thermal insulation of outside walls together with the total investment cost.

Introducing thermal insulation of roof/terraces

The total energy savings that can be achieved by this measure have been calculated using formula A14-2 (see Annex 14) assuming an average living area of 108 m^2 with a total roof area of 146 m^2. The energy saving for one unit/household is 5,506 kWh/year and to reach absolute savings of 375.2 GWh in 2020 requires the thermal insulation of 68,146 roofs/terraces.

Investment unit price on a turnkey basis (Table 7-2) has been used to calculate the total investment required to achieve the potential saving identified above. Figures 10-22 and 10-23 show graphically the number of households that need to have roof insulation fitted and the total investment cost.

Substitution of existing windows with double/triple glass windows

Formula A14-3 presented at Annex 14, is used in the calculation of the annual energy savings that result from the substitution of existing windows by efficient windows, with double or triple glass and a plastic frame. The total energy savings achieved by this measure are calculated based on an average living area of 108 m^2 and a total window area of 13.3 m^2. The energy saving for one household is 4,129 kWh/year and to reach absolute savings for 2020 of 562.8 GWh, 136,292 households need to be fitted with EE windows.

The investment unit price, based on the turnkey concept, given in Table 7-2, has been used to calculate the total investment needed to realize the above-mentioned energy savings potential. Figures 10-22 and 10-23 show graphically the number of households where installation of EE windows will be implemented and the respective investment needed.

Replacement of heating supply systems

Formula A14-6 (Annex 14) provides for the evaluation of annual energy savings derived from the replacement or new installation of heating supply systems in residential and tertiary (service) sector buildings. The unitary annual energy savings are calculated on the basis of the change in efficiency of the heating system after its replacement, multiplied by the specific heat demand and the heated useful floor area (in kWh/unit*year) per building. The calculation of total energy savings achieved by the introduction of an EE heating system is based on an average living area of 108 m^2.

The energy saving for one household is estimated to be 7,708 kWh/year and to reach absolute savings of 375.2 GWh in 2020, EE heating systems need to be installed in 48,676 households. The investment unit price is given in Table 7-2 on a turnkey basis and has been used for calculating the investment needed to reach the savings potential mentioned above. Figures 10-23 and 10-24 show the number of households where EE heating systems would have to be introduced and the total investment needed.

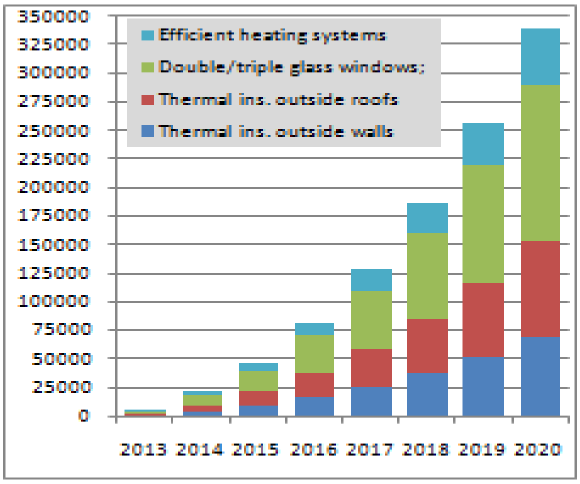


Figure 10-23: Cumulative number of HH where the respective EE measures need to be introduced in order to realise space heating service energy saving potential

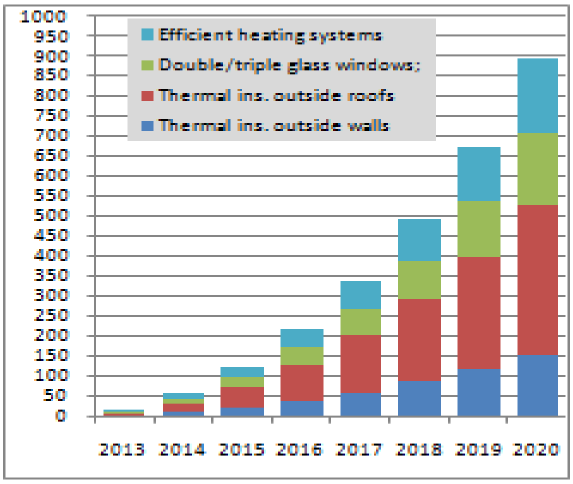


Figure 10-24: Cumulative investment (€million) for the respective EE measures that need to be introduced to realise space heating service energy saving potential

10.3.1.2 Water Heating

The energy efficiency potential for domestic water heating for the residential sector has been calculated for each of the 46 audited buildings and Table 10-11 presents the results for each region and a weighted average for the entire residential building stock.

Country	Energy efficiency potential for water heating for the residential sector
Kosovo	15.68%

Table 10-11: Energy efficiency potential for the water heating service in the residential sector

An energy efficiency scenario was established based upon the EE potential figure shown above and on the assumption that this potential will be reached in 2020 according to a linear trend line between 2013 and2020. The results of the calculations are presented in Figure 10-25.

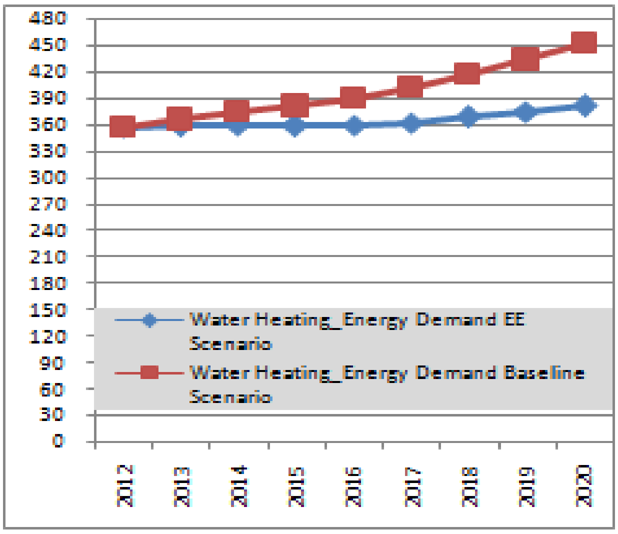


Figure 10-25: Energy Demand for BL and EE Scenarios (without and with EE measures) for Kosovo (GWh)

The absolute saving potential calculated above will be secured by the introduction of the two most important EE water heating measures identified above and their shares are presented in Table 10-12. These shares are based on the recommendations of the ECS study from February 2012 and consultant's experience, since no monitoring scheme for EE measures in Kosovo has yet been established.

EE Measure	Introducing EE Electrical Water Heating Boilers with A label	Introducing Solar Water Heating Systems
Share	70%	30%

Table 10-12: Contribution/shares of each EE measure in %

Replacement of old water heating electrical boilers with efficient ones

Formula A14-7 described in Annex 14 provides for the evaluation of annual energy savings derived from the replacement of old water heating electric boilers - or the installation of new ones - in existing residential buildings. Energy savings for one household are 363.7 kWh/year and to reach absolute savings of 49.5 GWh in 2020 needs the introduction of EE 'A label' electric boilers in 136,146 households. The average cost of an 'A label' category electric boiler is approximately €200/boiler as shown in Table 7-2. This value has been used in the calculation of the investment required to reach the potential savings figure quoted above. Figures 10-25 and 10-26 show graphically the number of households where this technology should be implemented and the total investment needed.

Solar water heating

Formula A14-8 presented at Annex 14 provides for the evaluation of annual energy savings derived from the installation of solar panels for water heating in existing or new residential and tertiary buildings. The energy saving for one household is 1,206.6 kWh/year and to reach targeted savings of 21.22 GWh for 2020, SWHS have to be introduced into 17,590 households. In addition, the average cost of a new efficient SWHS in the Kosovo market is approximately €1600/unit (Table 7-2). Figures 10-26 and 10-27 show graphically the number of households where new SWHSs have to be installed and the total investment funds needed.

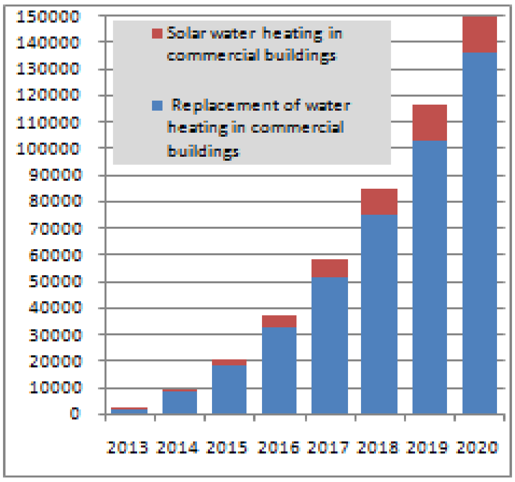


Figure 10-26: Cumulative number of households where respective EE measures will be introduced to realise water heating service energy saving potential

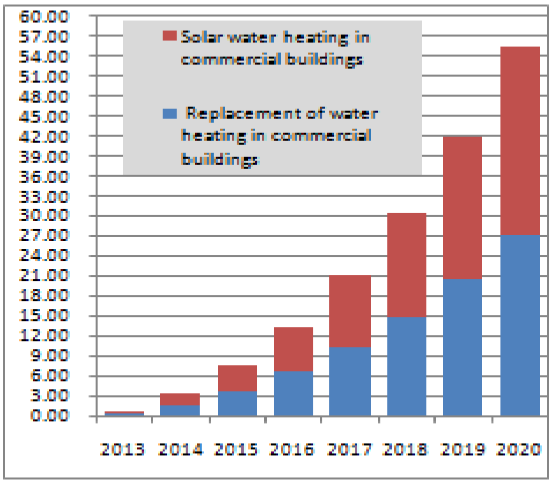


Figure 10-27: Cumulative investment (€million) for respective EE measures to be introduced to realise water heating service energy saving potential

Total potential for energy savings

The energy saving potential for each EE measure introduced relating to cooking, lighting, electrical appliances and space cooling (AC) services is presented at Annex 22. The total potential for all energy savings in the residential sector for each year is given by the sum of the energy saving potential of each of the EE measures quantified above and their respective values in GWh/year are presented in Figure 10-28. The results show that the highest energy savings come from the implementation of EE measures for space heating services and that the total energy saving potential is around 80% of the whole energy demand of the residential building stock of Kosovo.

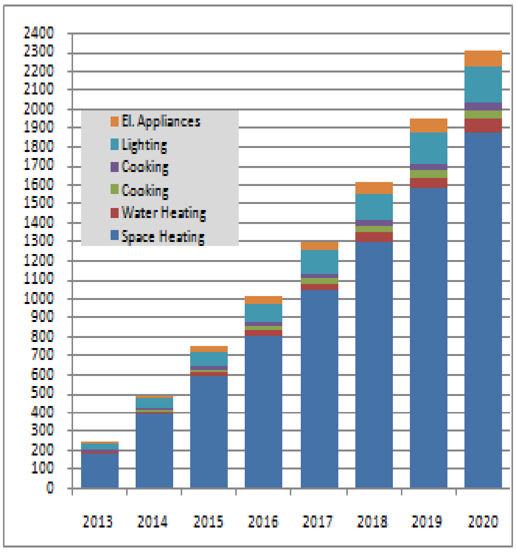


Figure 10-28: Cumulative energy savings potential for Residential Sector (GWh)

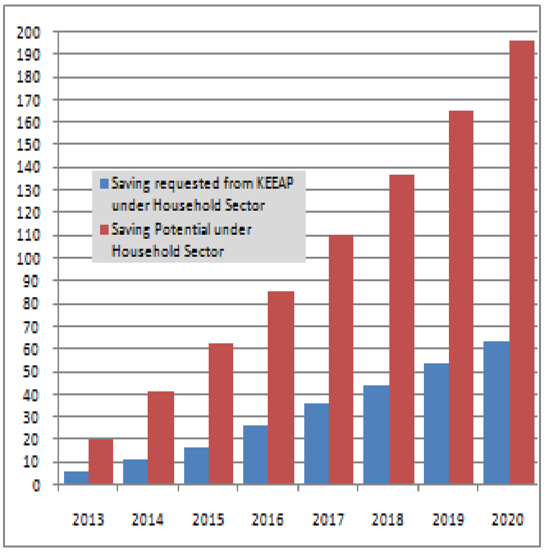


Figure 10-29: Cumulative energy savings potential and energy savings targets for the Residential Sector targets (ktoe) set by the KEEAP

One other important parameter has also been calculated, namely the ratio between total residential energy saving potential and the energy saving targets for the residential sector required by the KEEAP. Analysis of this parameter leads to an important conclusion: energy saving potential is 3.1 to 3.5 times higher than the energy saving targets that were set using the predominantly top-down approach in the NEEAP (Figure 10-29).

Total potential for CO_2 reductions

Total CO_2 reductions have been calculated based on the energy savings presented in Figure 10-13 and using IPCC (1996-revised methodology) Tier 1 emission factors presented in Table 10-13.

Fuel	Carbon Dioxide (CO_2) (ton/TJ)
Coal & Lignite	92.6134
Natural Gas	55.8195
LPG	72.6733
Kerosene	72.4533
Diesel	72.4533

Table 10-13: IPCC (1996-revised methodology) Tier 1 emission factors for all fuels consumed in the Residential Sector.

The introduction of all EE measures for all energy services in the residential sector will bring a CO_2 reduction of 2.24 million tons per year in 2020. (See Figure 10-30).

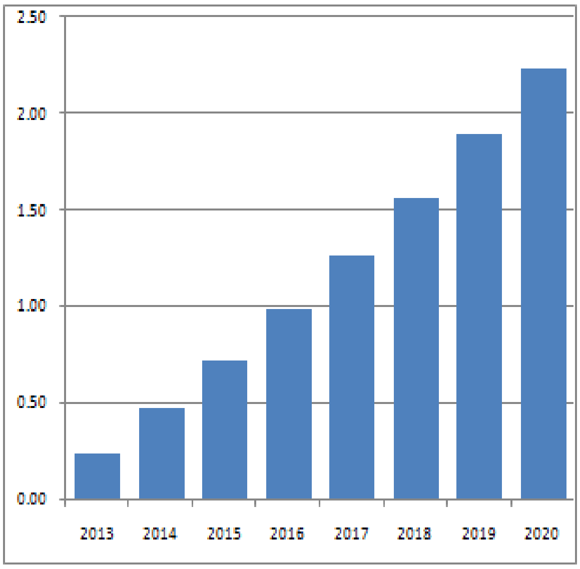


Figure 10-30: Cumulative CO_2 reduction potential for the Residential Sector (million ton/year)

Total investment requirement

The total investment required to reach the calculated energy savings potential for the residential sector for each year is given by the sum of the investments for each individual EE measure quantified above. The cumulative values in € million/year are presented in Figures 10-31 and 10-32. Analysis of the figures shows that the highest investments are required for introducing measures to increase EE in space heating.

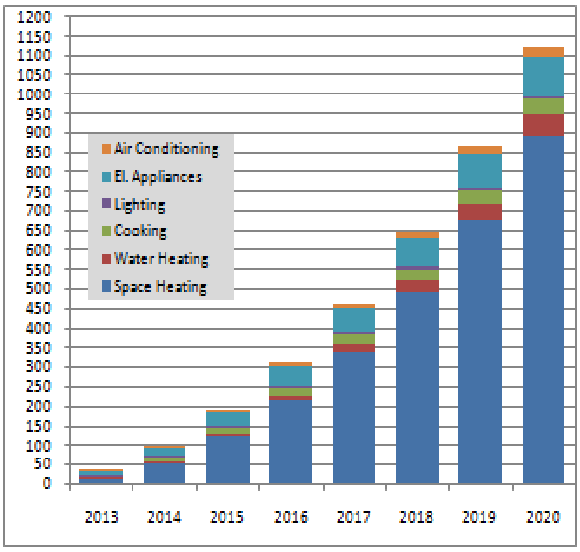


Figure 10-31: Cumulative investment for each EE measure for each energy service in the Residential Sector (€million)

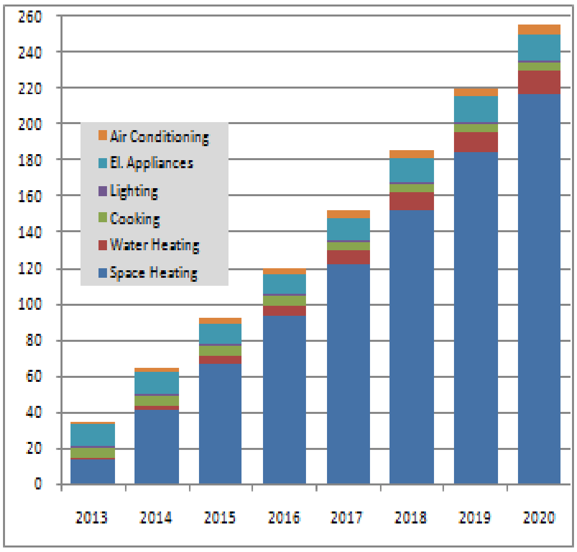


Figure 10-32: Yearly investment required for each EE measure for each energy service in the Residential Sector (€million)

Comparison between KEEAP's residential target and the evaluated EE potential

The final parameter calculated was the ratio between the yearly EE investment requirement and yearly Kosovo GDP, which is presented in Figure 10-33. Analysis shows that in order to reach the residential energy saving potential, it would be necessary to invest 4.04% of total GDP for the year 2020.

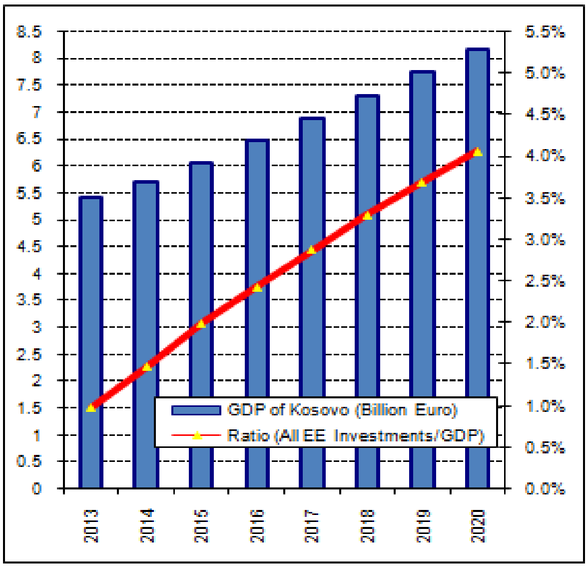


Figure 10-33: Forecast Kosovo GDP and the ratio between the required annual EE investment for the residential sector and annual GDP

Source: "World Economic Outlook Data" International Monitory Fund, May 2012 (GDP data)

10.3.2 Evaluation of the EE potential for the Municipal Public Building (MPB) Stock

30 municipal public building energy audits carried out under the WBIF analyzed actual energy consumption, baseline and EE energy demand scenarios, energy savings, GHG reduction and investment for each EE measure (as described in Annex 9), for each energy service.

10.3.2.1 Space Heating

Energy efficiency potential for space heating for MPBs has been calculated for each of the 30 buildings and the results are shown in Table 10-14 below.

Country	Energy efficiency potential for space heating for MPB
Kosovo	41.78%

Table 10-14: Energy efficiency potential for space heating service for MPB

BL and EE scenarios have been established for each region based on the above-mentioned potential and the results are presented in Figure 10-34.

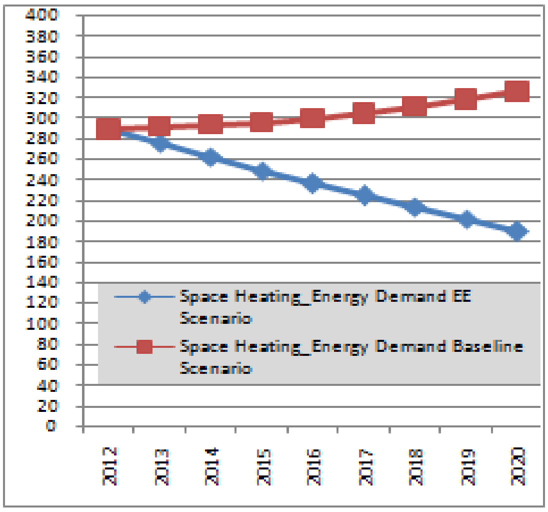


Figure 10-34: Energy Demand for BL, EE Scenarios (without and with EE measures) for MPBs of Kosovo (GWh)

The absolute value of the saving potential calculated above will be secured by the introduction of four of the most important EE measures and their shares of total consumption are assumed to be as presented in Table 10-10.

Thermal insulation of the outside walls

The total energy savings achieved by this measure were calculated based on an average MPB floor area of 1,297 m² and a total outside wall area of 1,102 m². The energy saving for each MPB is 110,402 kWh/year and to reach absolute savings of 27.22 GWh in 2020 the outside walls of 247 MPBs will need to be thermally insulated. The unit price of thermal insulation (installed on a turnkey basis) used for the calculations is shown in Table 7-2. Figures 10-35 and 10-36 show the number of MPBs where thermal insulation of outside walls will be implemented and the total investment funding needed.

Thermal insulation of roof/terraces

The total energy savings achieved by this measure have been calculated based on an average MPB floor area of 1,297 m² and a total roof area of 1,686 m². The energy saving for one MPB is 88,322 kWh/year and to reach absolute savings in 2020 of 27.22 GWh, 308 MPBs need to be fitted with thermally insulated roofing. The unit price of thermal roof/terraces insulation (on a turnkey basis) used for the calculation of investment costs is approximately €32/m² as shown in Table 7-2. Figures 10-35 and 10-36 show the number of MPBs where thermal roof/terraces insulation will be implemented and the size of the investment needed.

Substitution of existing windows MPBs with EE windows

The total energy savings achieved by this measure have been calculated based on an average MPB floor area of 1,297 m² and total window area of 140 m². The energy saving for one MPB is 66,241 kWh/year and to reach absolute savings of 40.83 GWh in 2020, EE windows need to be introduced in 616 MPBs. The price of EE windows (as a turnkey concept) used in calculating the cost of purchasing and installation is approximately €90/m², as presented in Table 7-2. Figures 10-35 and 10-36 show graphically the number of MPBs where installation of EE windows will be needed and the total investment cost.

Replacement of heating supply equipment with efficient one

Energy savings for one MPB are 113,935 kWh/year and to reach absolute savings for 2020 of 27.22 GWh, EE heating systems will have to be installed in 247 MPBs. The average cost for heating systems in the Kosovo market has been taken to be €32/m² (Table 7-2). Figures 10-35 and 10-36 show graphically the number of MPBs where EE heating systems will be implemented and the total investment required.

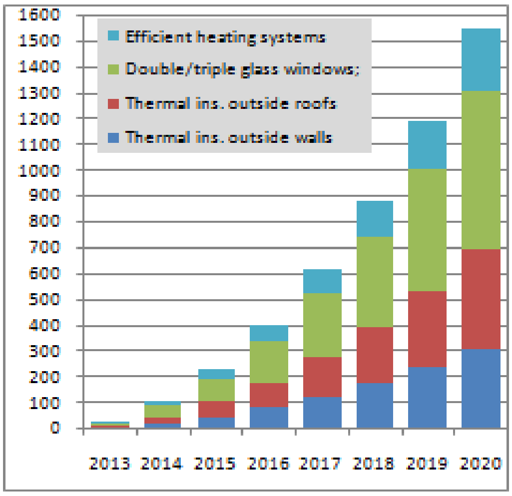


Figure 10-35: Cumulative number of MPBs where respective EE measures will be introduced to reach space heating service energy saving potential

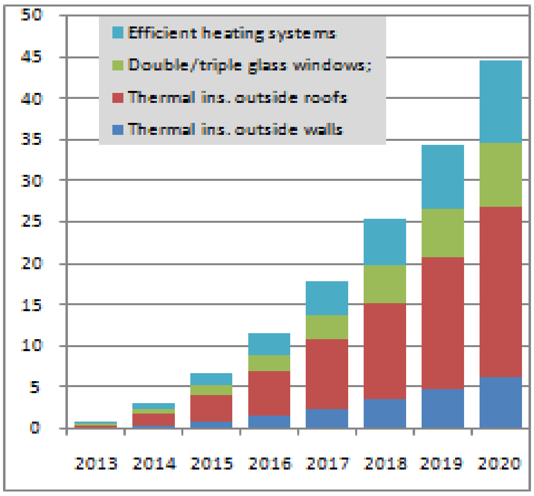


Figure 10-36: Cumulative investment (€ million) for respective EE measures to be introduced to MPBs to reach space heating service energy saving potential

10.3.2.2 Water Heating

Energy efficiency potential for space heating for MPBs has been calculated for each of 30 buildings and the results are presented in Table 10-15.

Country	Energy efficiency potential for water heating for MPB
Kosovo	43.76%

Table 10-15: Energy efficiency potential for water heating service inMPBs

The energy efficiency scenario has been established based on the EE potential noted above and the results of the calculations are presented in Figure 10-37.

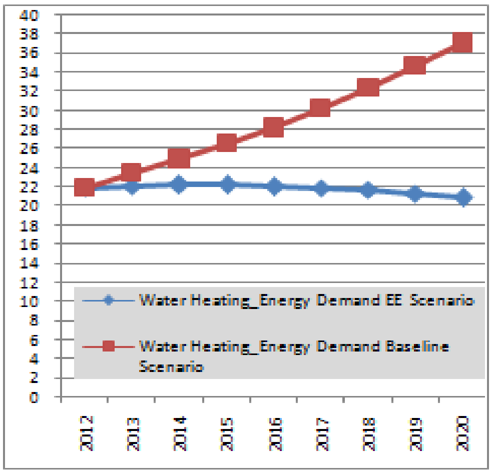


Figure 10-37: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The saving potential calculated above will be achieved through the introduction of the two the most important EE measures mentioned above and their shares are presented in Table 10-16.

EE Measure	Introducing EE Electrical Water Heating Boilers with Category A label	Introducing Solar Water Heating Systems
Shares	40%	60%

Table 10-16: Contribution/shares of each EE measure in percentage for water heating in MPBs

Introducing new EE water heating systems

Energy savings from the introduction of new EE water heating systems for one MPB are 8,939 kWh/year. To reach absolute savings for 2020 equal to 6.49 GWh, EE water heating boilers will need to be installed in 727 MPBs. Figures 10-38 and 10-39 show the number of MPBs where this technology needs to be implemented and the respective investment needed.

Solar water heating

The energy saving for one unit/MPB is 19,548 kWh/year and to reach absolute savings for 2020 equal to 9.74 GWh, SWHS have to be installed in 499 MPBs. Figures 10-38 and 10-39 show graphically number of MPBs where Solar Water Heating Systems have to be introduced and the investment needed to finance this.

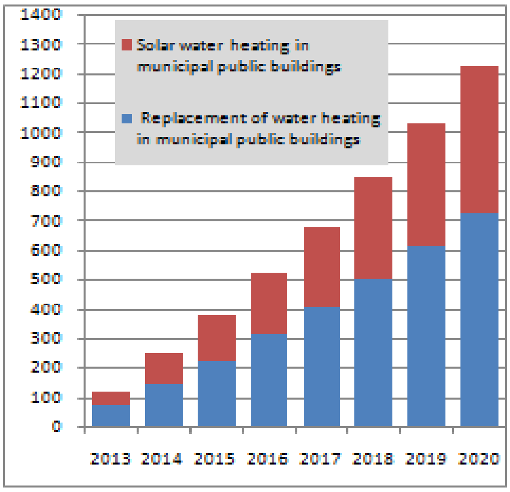


Figure 10-38: Cumulative number of unit/HH where respective EE measures will be introduce to reach energy saving potential into water heating service

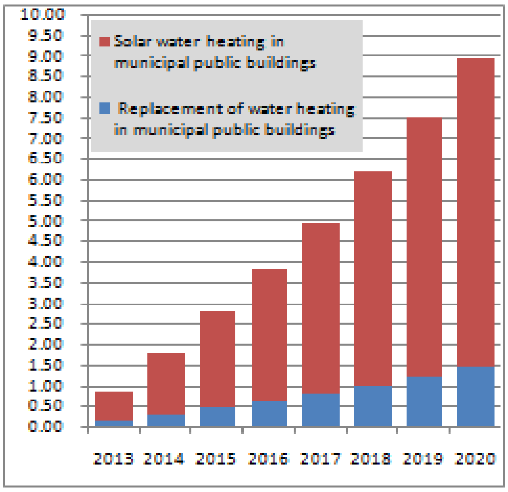


Figure 10-39: Cumulative investment (€million) for respective EE measures to be introduce to reach energy saving potential into water heating service

10.3.2.3 Total potential for energy savings

The total annual potential energy savings for MPBs for 2013 - 2019 are given by the sum of the energy saving potential for each of the EE measures quantified above. These values are presented in Figures 10-40 in GWh/year. Analysis of the figures shows that the highest energy savings come from implementation of space heating EE measures and that the total energy saving potential is almost 80% for all Kosovo MPBs.

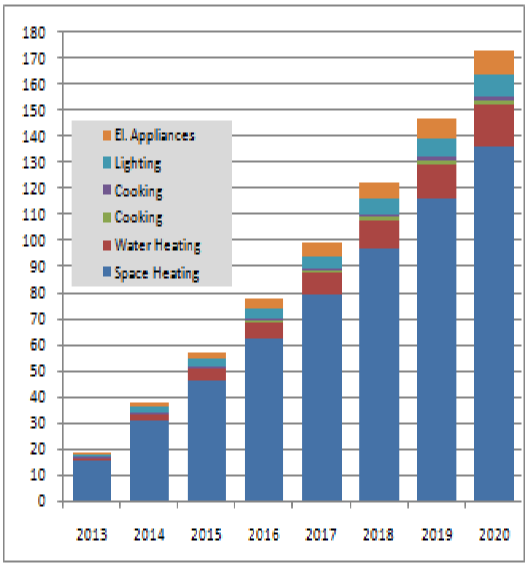


Figure 10-40: Cumulative energy savings potential for MPBs (GWh)

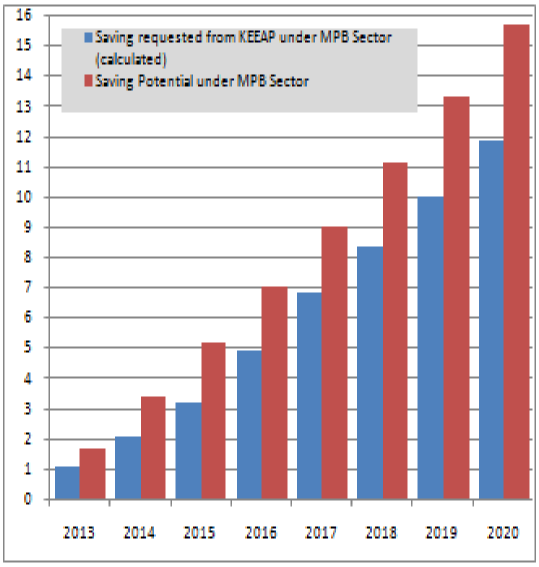


Figure 10-41: Cumulative energy savings potential and requested energy savings according to KEEAP for MPB targets (ktoe)

One other important parameter has been calculated as well as: the ratio between total MPBs energy saving potential and the energy saving targets for this sector set by the KEEAP. Analysis of this parameter shows that the energy saving potential is 1.38 times higher than the energy savings required (Figure 10-41).

10.3.2.4 Total potential for CO_2 reductions

Based on the energy savings presented in Figure 10-39 and using IPCC (1996-revised methodology) Tier 1 emission factors (Table 10-13), total CO_2 reductions have been calculated for MPBs and are shown in Figure 10-42.

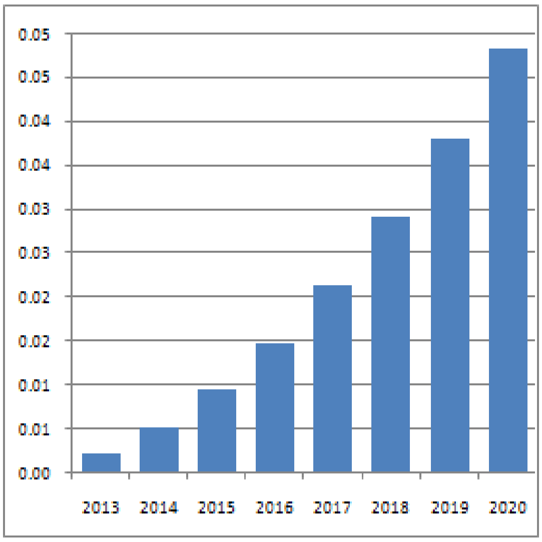


Figure 10-42: Cumulative CO_2 reduction potential for the MPB Sector (million ton/year)

10.3.2.5 Total investment requirement

The total investment costs (€million/year) required to reach the energy savings potential for MPBs are presented in Figures 10-43 and 10-44. Analysis of these figures shows that the highest investment is required for the introduction of EE measures in space heating.

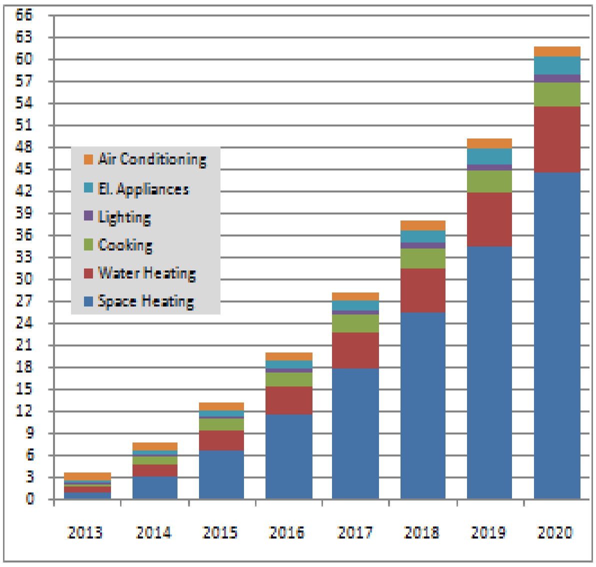


Figure 10-43: Cumulative investment for each EE measure on each energy service for the Municipal Building Sector (€ million)

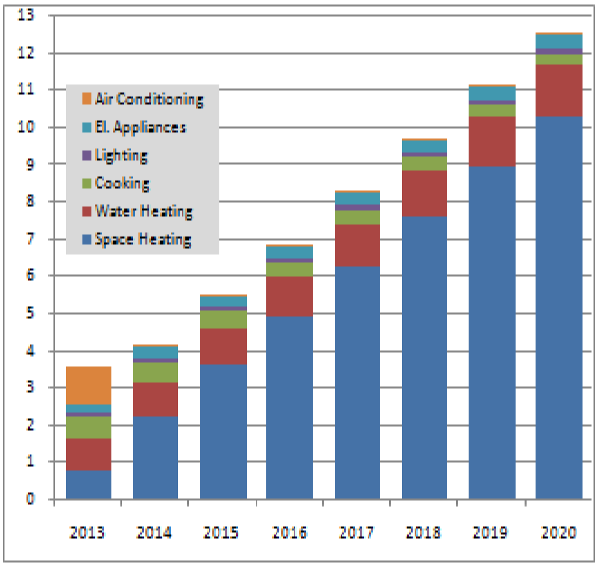


Figure 10-44: Yearly investment for each EE measure on each energy service for the Municipal Building Sector (€ million)

10.3.2.6 Comparison between KEEAP's MPBs target and evaluated EE potential

The final parameter to be calculated is the ratio between the annual MPB sector EE investment requirement and yearly Kosovo GDP as shown in Figure 10-45. Analysis shows that in order to reach the completely MPBs energy saving potential it is needed to be invested 0.15% of completely yearly GDP for the year 2020.

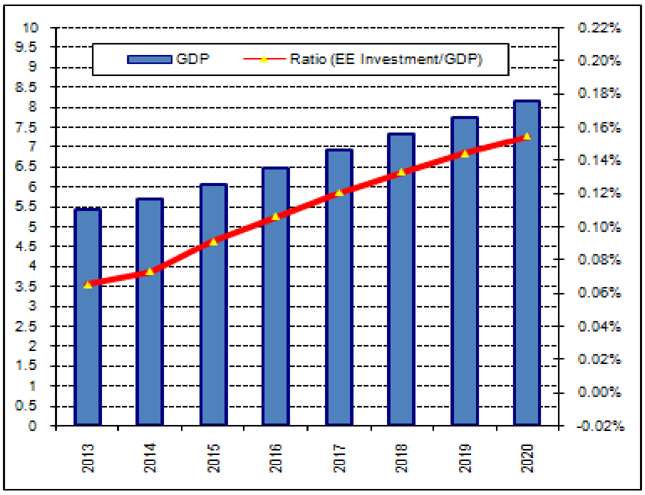


Figure 10-45: Forecast Kosovo GDP and the ratio between the required annual EE investment for MPBs and annual GDP

Source: "World Economic Outlook Data" International Monitory Fund, May 2012 (GDP data)

10.3.3 Evaluation of the EE potential for the Central Public Building Stock

All measures described in Annex 14 have been used for this building sub-sector. It is important to point out that since 70% - 80% of central public buildings are located in Prishtina they have been treated as a single group for the whole of Kosovo.

10.3.3.1 Space Heating

The EE potential for space heating in CPBs has been calculated for each of the 10 buildings included in the sample and the average value is estimated at 50.4%. BL and EE scenarios have been established based on this potential and the results for the whole central public building stock of Kosovo are presented in Figure 10-46.1, for central hospital buildings in Figure 10-46.2 and for central government buildings in Figure 10-46.3.

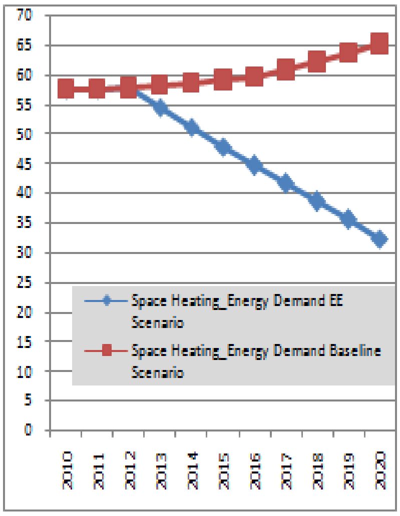


Figure 10-46.1: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Public Buildings of Kosovo (GWh)

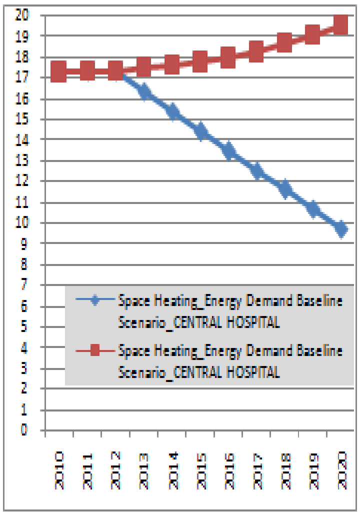


Figure 10-46.2: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Hospitals Buildings of Kosovo (GWh)

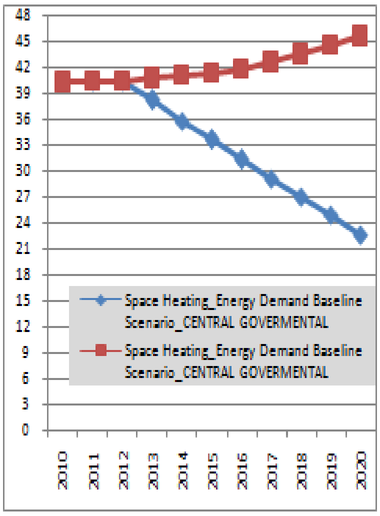


Figure 10-46.3: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Governmental Buildings of Kosovo (GWh)

The absolute value of the saving potential calculated above will be secured by the introduction of the four most important EE measures in the two groups of central buildings and their shares are assumed to be the same as presented in Table 10-10.

Thermal insulation of the outside walls

The total energy savings achieved by this measure has been calculated based on an average CPB floor area equal to 2,147 m^2 and with a total outside wall area of 2,203 m^2. The energy saving per CPB is 151,438 kWh/year and to reach absolute savings for 2020 of 6.57 GWh, 43 CPBs need to have their outside walls thermally insulated. Figures 10-45.1,2,3 and 10-46.1,2,3 show graphically where thermal insulation of outside walls will be implemented in CPBs and the respective investment needed.

Thermal insulation of the roof in existing central public buildings

The total energy savings achieved by this measure has been calculated based on a total roof area of 3,113 m^2. The average energy savings for one CPB are 90,862 kWh/year and to reach absolute savings for 2020 equal to 9.85 GWh, the roofs of 54 MPBs need thermal insulation. Figures 10-45.1,2,3 and 10-46.1,2,3 show where thermal insulation of roofs will be implemented and respective investment cost.

Substitution of existing windows with EE windows

The total energy savings achieved by this measure has been calculated based on a total window area of 281 m^2. The energy saving for one CPB is 121,150 kWh/year and to reach absolute savings for 2020 of 6.57 GWh, EE windows have to be installed in 54 CPBs. Figures 10-45.1,2,3 and 10-46.1,2,3 show graphically where installation of EE windows will be implemented and respective investment needed.

Replacement of heating supply equipment

The energy saving for one CPB is 165,270 kWh/year and to reach absolute savings of 6.57 GWh in 2020 requires the introduction of EE heating system at 41 CPBs. Figures 10-47.1,2,3 and 10-48.1,2,3 show graphically where introduction of EE heating systems will be implemented and the respective investment needed.

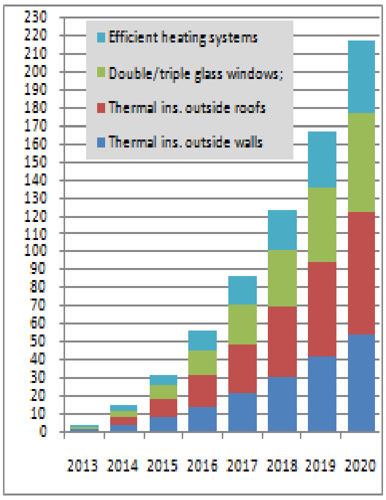


Figure 10-47.1: Cumulative number of unit/CPBs where respective EE measures will be introduce to reach energy saving potential into space heating service

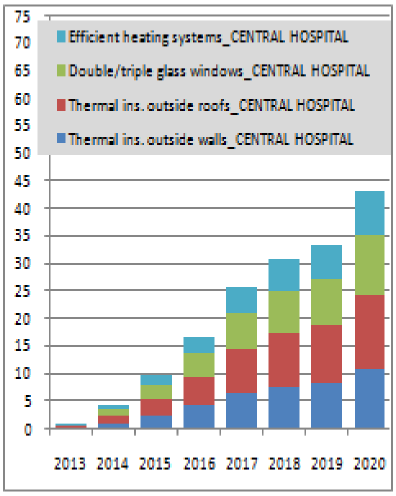


Figure 10-47.2: Cumulative number of unit/Central Hospitals where respective EE measures will be introduce to reach energy saving potential into space heating service

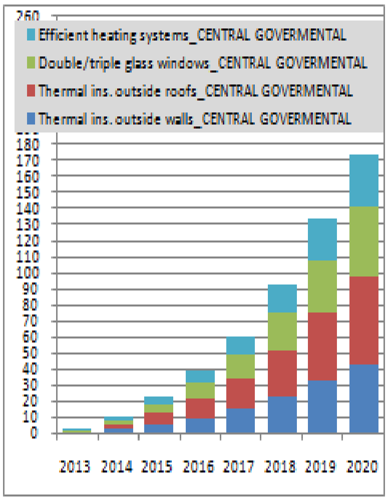


Figure 10-47.3: Cumulative number of unit/Central Gov. Buildings where respective EE measures will be introduce to reach energy saving potential into space heating service

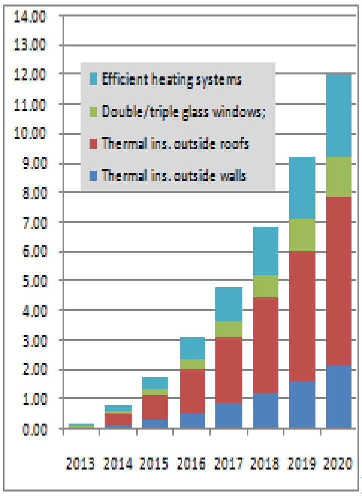


Figure 10-48.1: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into space heating service

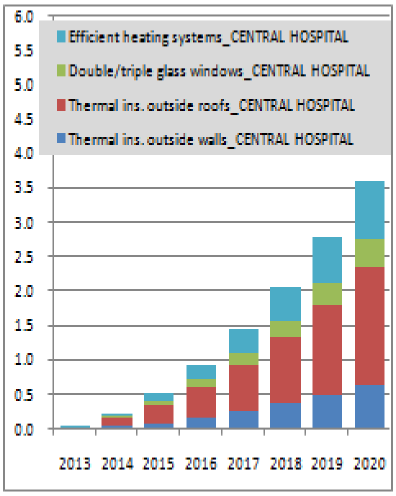


Figure 10-48.2: Cumulative investment (Million Euro) for Central Hospitals for respective EE measures to be introduce to reach energy saving potential into space heating service

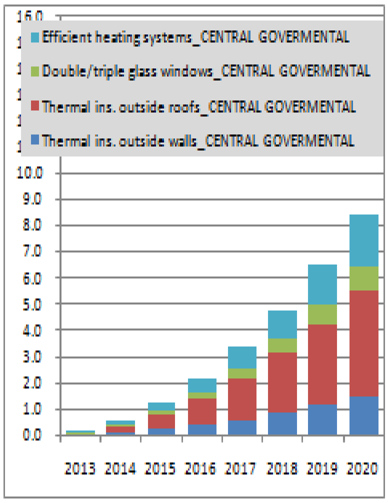


Figure 10-48.3: Cumulative investment (Million Euro) for Central Gov. Buildings for respective EE measures to be introduce to reach energy saving potential into space heating service

10.3.3.2 Water Heating

The space heating EE potential CPBs has been calculated for each of the 10 audited buildings and the result shows that average value is about 41.3%. An EE scenario has been established based on the above-mentioned methodologies and the results of these calculations are presented in Figures 10-49.1,2,3.

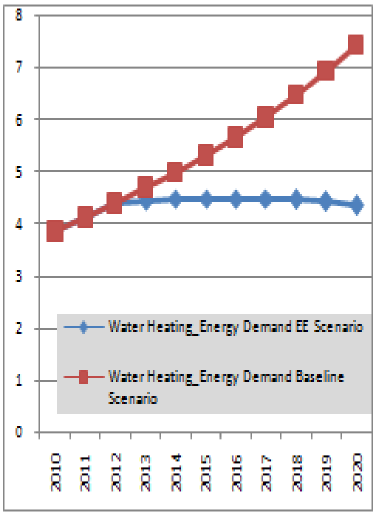


Figure 10-49.1: Energy Demand for BL, EE Scenarios (without and with EE measures) for whole Kosovo (GWh)

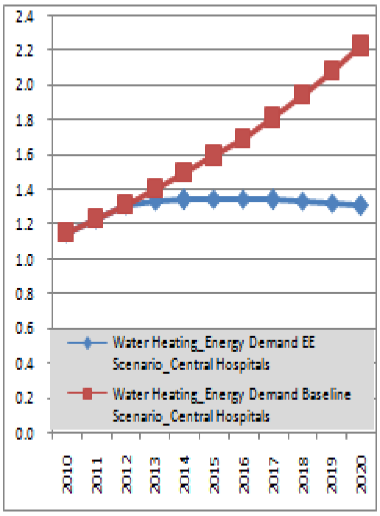


Figure 10-49.2: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Hospitals of Kosovo (GWh)

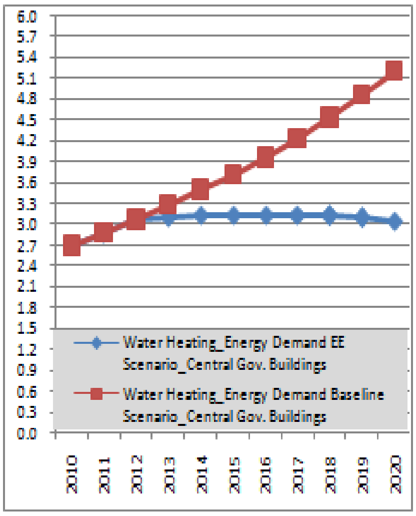


Figure 10-49.3: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Gov. Buildings of Kosovo (GWh)

The absolute value of the saving potential calculated above will be secured by the introduction of the two most important EE measures mentioned above and their respective shares are presented in Table 10-17.

EE Measure	Introducing EE Electrical Water Heating Boilers with Category A label	Introducing Solar Water Heating Systems
Shares	40%	60%

Table 10-17: Contribution of each water heating EE measure in CPBs

Replacement of EE water heating systems

The energy savings resulting from the introduction of new EE water-heating systems in one CPB amount to 13,984 kWh/year and to reach absolute savings for 2020 equal to 0.92 GWh, EE water heating boilers have to be installed in 33 CPBs. Figures 10-50.1,2,3 and 10-51.1,2,3 show graphically CPBs where the introduction of this technology will take place and the respective investment needed.

Solar water heating in central public buildings

Energy saving for one CPB is 23,114 kWh/year and to reach absolute savings of 2.14 GWh by 2020, SWHS have to be introduced in 46 CPBs. Figures 10-50.1, 2, 3 and 10-51.1,2.,3 show the number of CPBs where SWHS need to be installed and the respective investment needed.

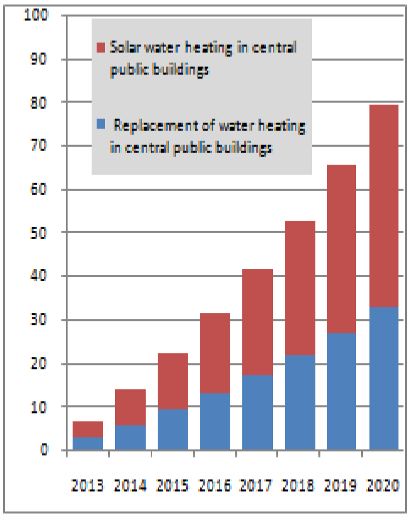


Figure 10-50.1: Cumulative number of unit/CPBs where respective EE water heating service measures to reach energy saving potential

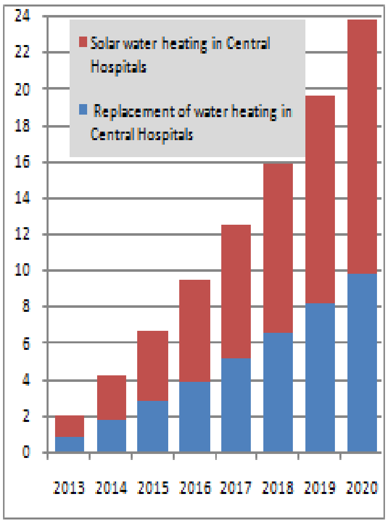


Figure 10-50.2: Cumulative number of Central Hospitals where respective EE water heating service measures to reach energy saving potential

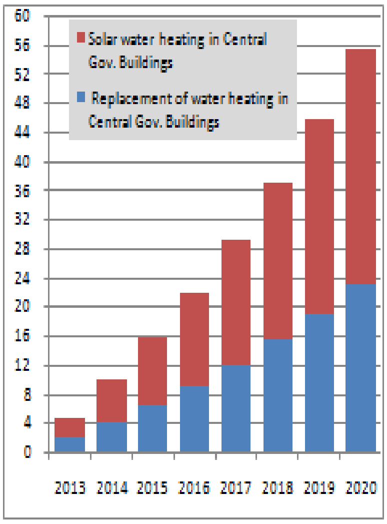


Figure 10-50.3: Cumulative number of Central Gov. Buildings where respective EE water heating service measures to reach energy saving potential

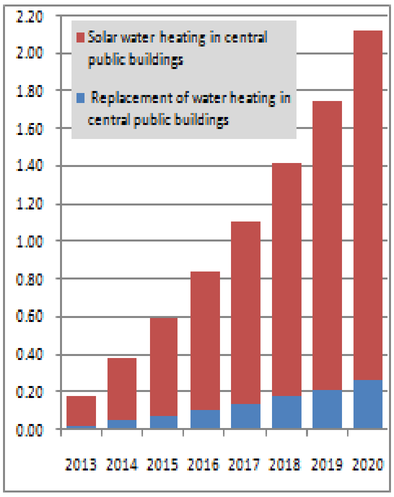


Figure 10-51.1: Cumulative investment (€million) for respective EE measures to be introduce to reach energy saving potential into water heating service

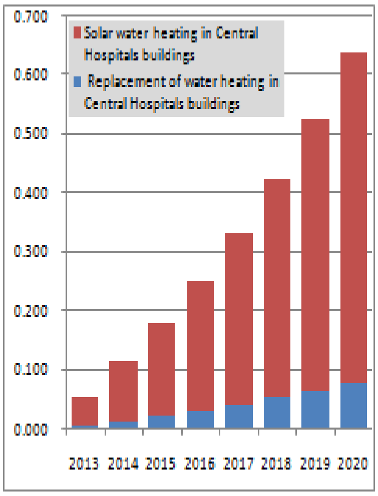


Figure 10-51.2: Cumulative investment (€million) for respective EE measures to be introduce on Central Hospitals to reach energy saving potential into water heating service

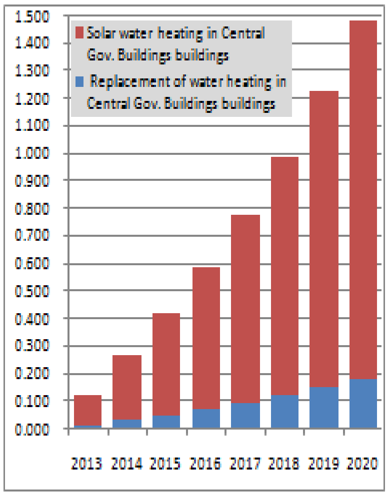


Figure 10-51.3: Cumulative investment (€million) for respective EE measures to be introduce on Central Gov. Buildings to reach energy saving potential into water heating service

Total potential for energy savings

The total potential annual energy savings for CPBs are equal to the sum of the energy savings potential for each of the EE measures quantified above. Their respective values in GWh/year are presented in Figure 10-52, which shows that the energy saving potential of CPBs is 45.82% for the whole of Kosovo.

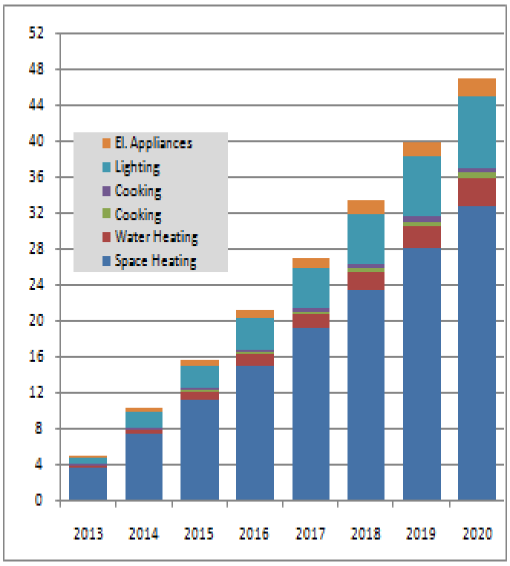


Figure 10-52: Cumulative energy savings potential for CPBs (GWh)

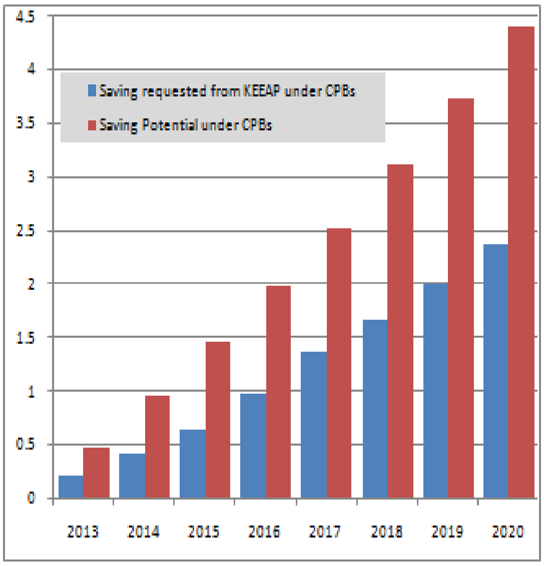


Figure 10-53: Cumulative energy savings potential and requested energy savings according to KEEAP for CPB targets (ktoe)

Analysis of the ratio between the total CPB energy saving potential and the energy saving targets required from this sector according to the KEEAP shows that the energy saving potential is 1.85 times higher than the energy saving target required (Figure 10-53).

Total potential for CO_2 reductions

The potential CO_2 reduction has been calculated and presented in Figure 10-54, based on the energy savings presented in Figure 10-50 and using IPCC (1996-revised methodology) Tier 1 emission factors as shown in Table 10-13.

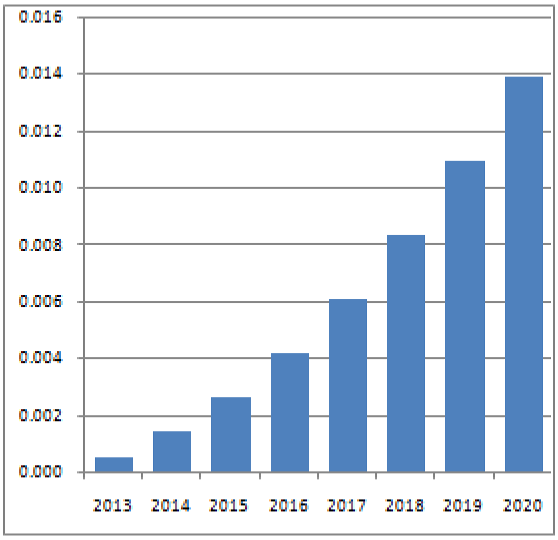


Figure 10-54: Cumulative CO_2 reduction potential for CPB Sector (Million ton/year)

Total investment requirement

The total investment requirements to achieve the above-mentioned energy savings potential for CPBs are presented, in € million/year, in Figures 10-55 and 10-56. The total cumulative investment value for CPBs is approximately €17.6 million.

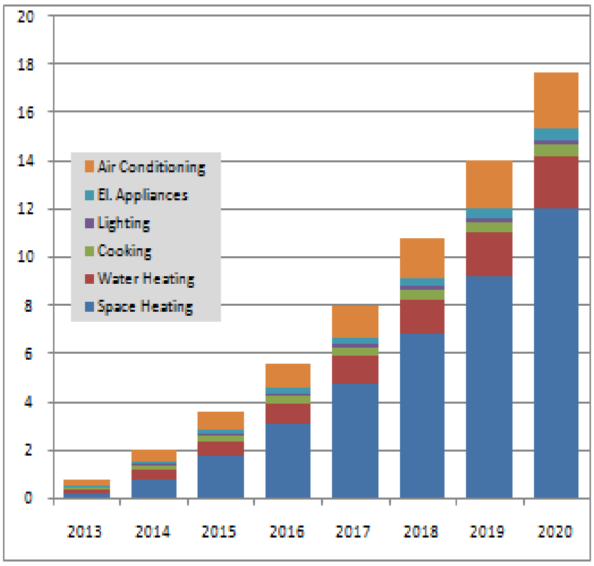


Figure 10-55: Cumulative investment for each EE measure on each energy service for CPBs Sector (€ million)

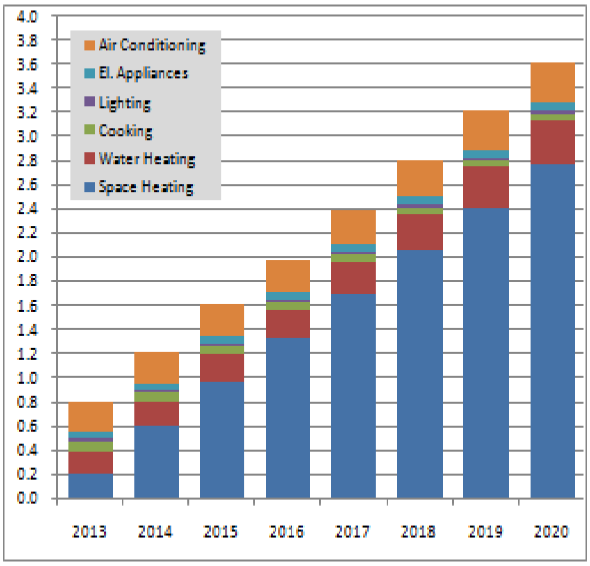


Figure 10-56: Yearly investment for each EE measure on each energy service for CPBs Sector (€ million)

10.3.3.3 Comparison between KEEAP's CPBs target and evaluated EE potential

The last parameter to be calculated is the ratio between annual EE investment requirements and annual Kosovo GDP. This is presented in Figure 10-57 and analysis shows that in order to reach the full CPB energy saving potential, 0.05% of GDP for the year 2020 needs to be invested the measures described.

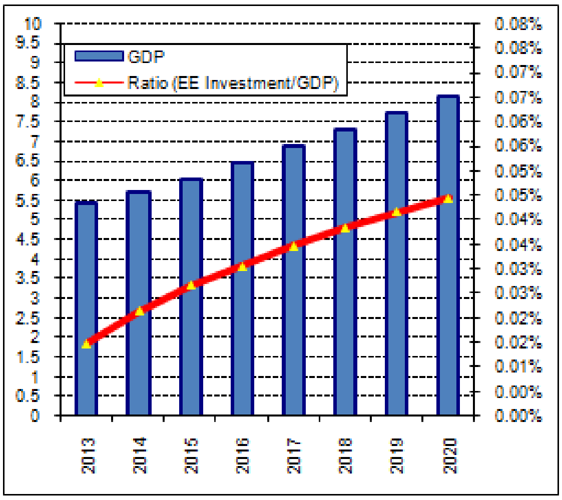


Figure 10-57: Forecast of Kosovo's GDP and of the ratio between MPBs annual EE investment requirement and GDP

10.3.4 Evaluation of the EE potential for the Private Building Stock

All he measures described in Annex 14 have been used in carrying out the calculations for the Private/Commercial building sub-category of buildings.

10.3.4.1 Space Heating

The energy efficiency potential for space heating in PCBs has been calculated for each of the 20 buildings included in the sample and the results are presented in Table 10-18.

Country	Energy efficiency potential for space heating in PCBs
Kosovo	40.50%

Table 10-18: Energy efficiency potential for space heating service for PCBs

BL and EE scenarios have been established for each region based on the above-mentioned potential. The results are presented in Figure 10-58.

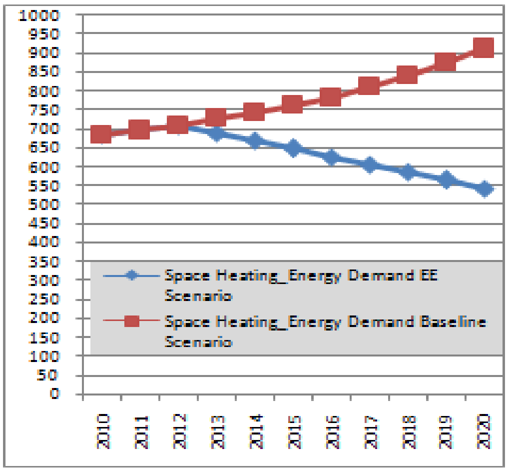


Figure 10-58: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The saving potential calculated above will be secured through the introduction of the four most important EE measures and their shares are assumed to be as presented in Table 10-10.

Thermal insulation of the outside walls

The total energy savings achieved by this measure were calculated on the basis of an average PCB floor area of 135 m² and with a total outside wall area of 122.5 m². Average energy savings per PCB are 10,693 kWh/year and to reach absolute savings for 2020 equivalent to 73.89 GWh thermal insulation of outside walls needs to be installed in 6,911 PCBs. Figures 10-59 and 10-60 show where thermal insulation of outside walls will be implemented and the respective investment needed.

Thermal insulation of the roof in existing private buildings

The total energy savings achieved by this measure were calculated based on an average PCB floor area of 135 m² and with a total roof area of 162 m². Energy saving for one PCBs averages 8,554 kWh/year and to reach absolute savings for 2020 equal to 73.89 GWh, thermally insulated roofs are needed in 8,639 PCBs. Figures 10-59 and 10-60 show graphically where thermal insulation of roofs will be implemented and respective investment funding needed.

Substitution of existing windows with EE models

The total energy savings achieved by this measure have been calculated on the basis of an average PCB floor area of 135 m² and with a total window area of 15.6 m². Energy savings for one PCB come to 6,415 kWh/year and to reach absolute savings for 2020 of 110.84 GWh EE windows must be introduced in 17,277 PCBs. Figures 10-59 and 10-60 show where installation of EE windows will be implemented and respective cost of such an investment program.

Replacement of heating supply equipment

The total energy savings resulting from the introduction of EE heating systems was calculated based on an average living area of 135 m². The average energy savings per PCB are 11,120 kWh/year and to reach absolute savings for 2020 of 73.89 GWh, EE heating systems have to be installed in 6,645 PCBs. Figures 10-59 and 10-60 show where the introduction of EE heating systems will be implemented and the respective investment needed.

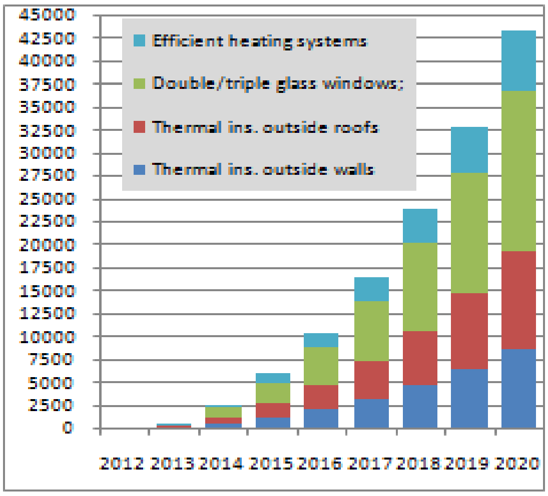


Figure 10-59: Cumulative number of unit/MPBs where respective EE measures will be introduce to reach energy saving potential into space heating service

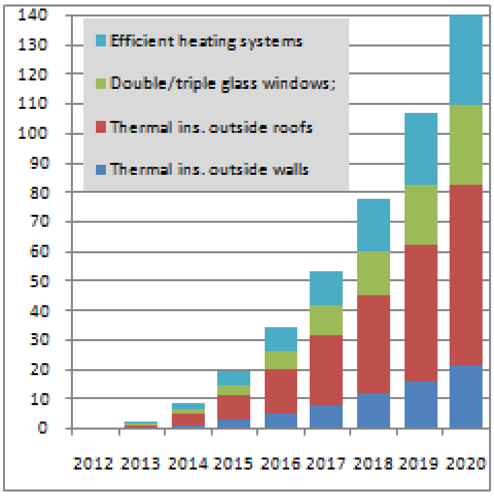


Figure 10-60: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into space heating service

10.3.4.2 Water Heating

The energy efficiency potential for space heating in PCBs has been calculated for each of the 20 buildings audited and Table 10-19 presents the results.

Country	Energy efficiency potential for water heating for MPB
Kosovo	52.00%

Table 10-19: Energy efficiency potential for water heating service for PCBs

An energy efficiency scenario has been established based on the above-mentioned potential and the results of those calculations are summarized in Figure 10-61.

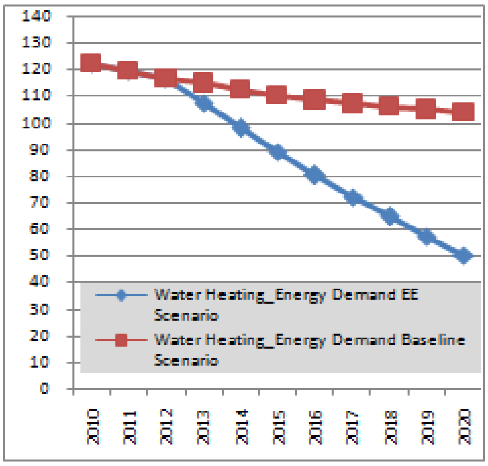


Figure 10-61: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The absolute value of savings potential calculated above will be secured following the introduction of the two most important EE measures and their shares are presented in Table 10-20.

EE Measure	Introducing EE Electrical Water Heating Boilers with A label	Introducing Solar Water Heating Systems
Share	40%	60%

Table 10-20: Contribution/shares of each EE measure in percentage for water heating into PCBs

Replacement of water heating

Energy savings resulting from introduction of new EE water heating systems for one PCB are 1,315 kWh/year and to reach absolute savings for 2020 equal to 21.62 GWh, EE water heating boilers must be introduced into 16,439 PCBs. Figures 10-60 and 10-61 show where this technology must be introduced and the respective investment needed.

Solar water heating

Energy savings per PCB are 3,420 kWh/year and to reach absolute savings of 32.44 GWh by 2020, SWHSs need to be installed in 9,488 PCBs. Figures 10-62 and 10-63 show graphically the number of PCBs where SWHS need to be installed and the associated investment needs.

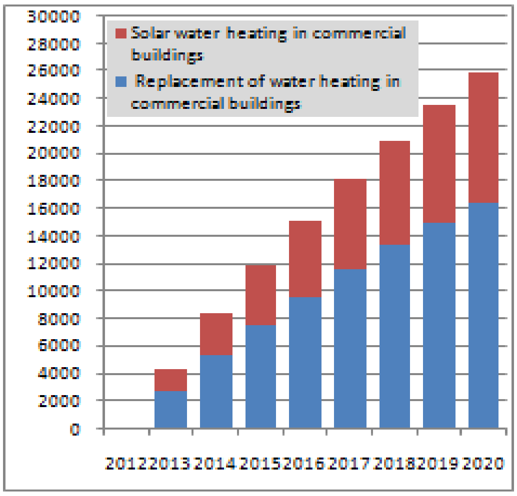


Figure 10-62: Cumulative number of unit/HH where respective EE measures will be introduce to reach energy saving potential into water heating service

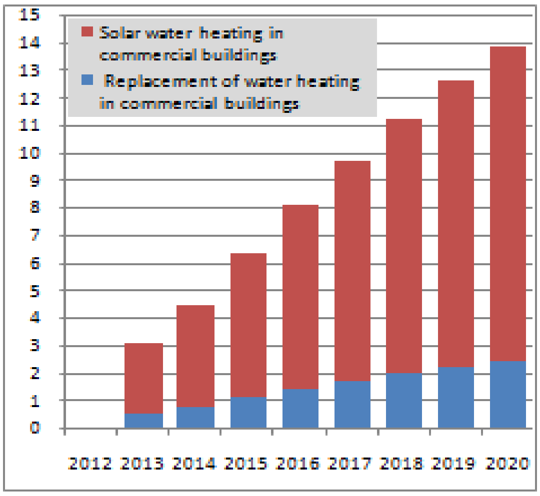


Figure 10-63: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into water heating service

Total potential for energy savings

The total potential energy savings for PCBs for each year are given by aggregating the energy saving potential of each EE measure quantified above. The total values, in GWh/year, are presented in Figure 10-64. Analysis of the figure shows that total energy saving potential of PCBs is almost 37.65% for the whole of Kosovo.

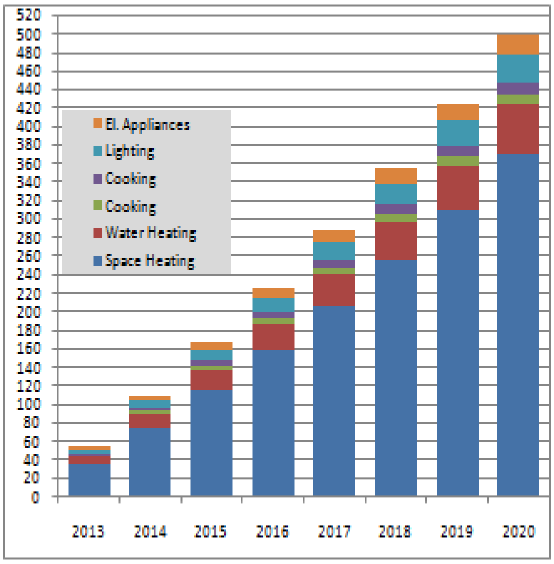


Figure 10-64: Cumulative energy savings potential for PCBs (GWh)

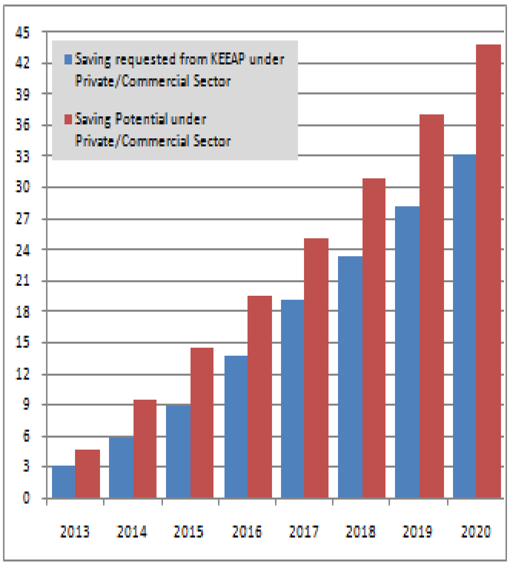


Figure 10-65: Cumulative energy savings potential and requested energy savings according to KEEAP for PCBs targets (ktoe)

The ratio between total PCB energy saving potential and the KEEAP energy savings target for this sector has been calculated. Analysis of this parameter shows that the energy saving potential is 1.31 times higher than energy saving target set by the KEEP (Figure 10-65).

Total potential for CO_2 reductions

The total CO_2 reduction has been calculated and is presented in Figure 10-66, based on the energy savings presented in Figure 10-64 and using IPCC (1996-revised methodology) Tier 1 emission factors (Table 10-14).

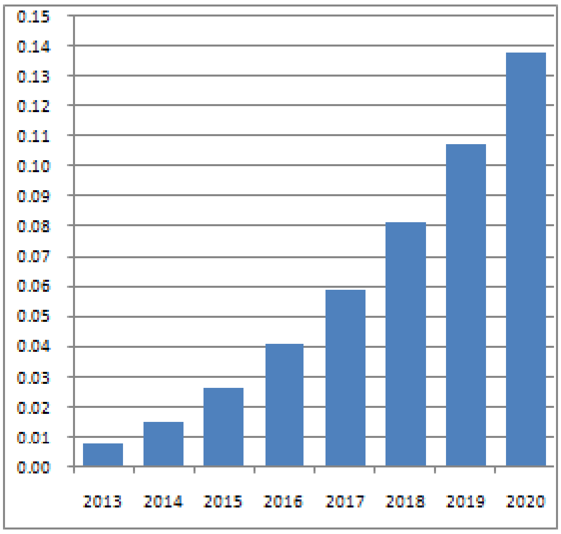


Figure 10-66: Cumulative CO_2 reduction potential for PCBs (million ton/year)

Total investment requirement

The total investment required to achieve the above-mentioned energy savings potential for PCBs will be €175 million. A breakdown of this total over the period 2013-2020, showing the investment funds required in €million/year is presented in Figures 10-67 and 10-68.

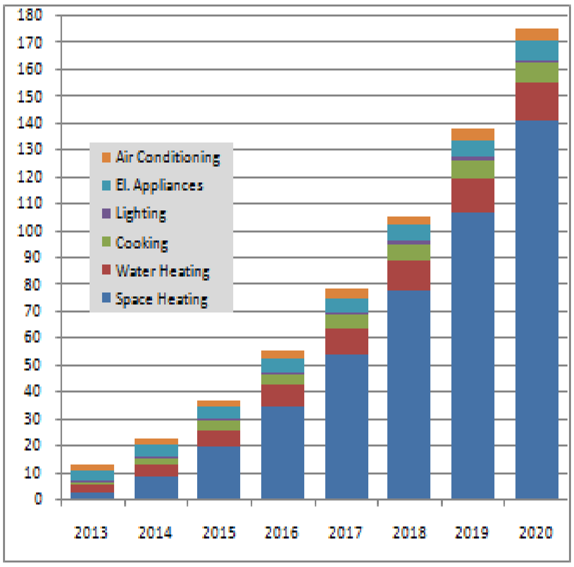


Figure 10-67: Cumulative investment for each EE measure on each energy service for PCBs Sector (€ million)

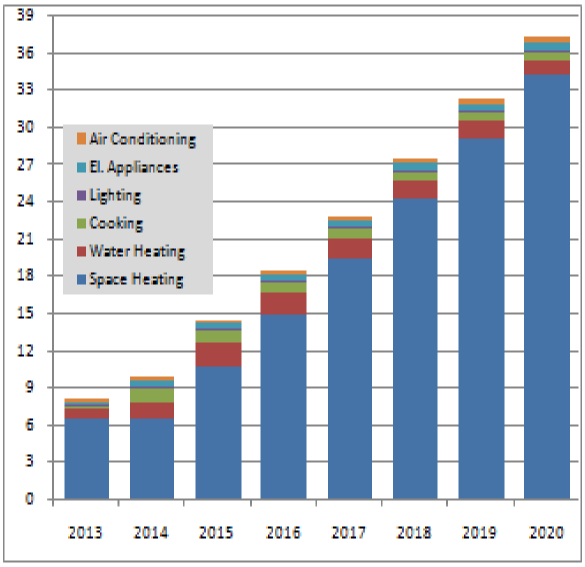


Figure 10-68: Yearly investment for each EE measure on each energy service for PCBs Sector (€ million)

10.3.4.3 Comparison between KEEAP's Private and Commercial Buildings target and evaluated EE potential

The final parameter calculated is the ratio of annual EE investment costs to annual GDP and this is presented in Figure 10-69. The analysis shows that in order to reach the full PCB energy saving potential, 0.45% of the GDP for the year 2020 needs to be invested in these EE measures.

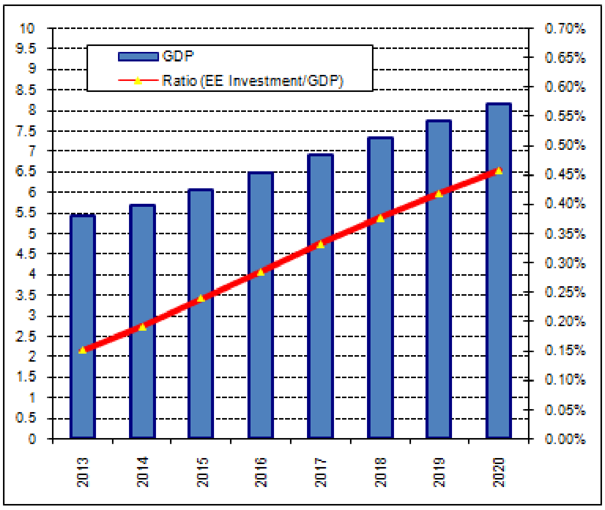


Figure 10-69: Historic & Forecast of Kosovo's GDP and ratio between EE yearly investment requested by PCBs and GDP

10.3.5 Summary of Energy Saving Potential for whole Kosovo Building Stock

As mentioned above, the Primary Energy Supply (PES) in Kosovo reached 2184 ktoe according to the Energy Balance for 2010. The building sector (residential, public, and commercial buildings) accounts for 47.5% of final energy consumption (FEC) and represents the largest share of the country's FEC. It has also been rising steadily, at an average annual rate of 3.62%, over period 2003-2011.

Total building stock in Kosovo is estimated cover **45.125** million m^2 of total floor area. The main building sector is residential, with a total area of almost 34.18 million m^2, followed by private and commercial buildings with 7.86 million m^2, municipal public buildings with 2.36 million m^2 and central public buildings with 0.182 million m^2.

Building Sector	Building Sector Total Area [10^6 m^2]	Building Sector Total Area [%]	Energy Savings Potential of Building Sector [%] vs Final Energy Consumption	Energy Savings Potential of Building Sector [%] vs Primary Energy Supply	Total Energy Savings Potential [ktoe]
I. Residential	**34.178**	**75.74%**	**45%**	**7.862%**	**171.74**
II. Public Municipality	**2.360**	**5.23%**	**32%**	**0.770%**	**16.77**
Schools	1.690	3.75%	37%	0.499%	10.90
Health buildings	0.397	0.87%	37%	0.154%	3.35
Other buildings	0.273	0.61%	30%	0.115%	2.52
II. Public Central	**0.182**	**0.40%**	**49%**	**0.165%**	**3.60**
Central Hospitals	0.046	0.11%	45%	0.051%	1.12
Central Government	0.136	0.29%	50%	0.114%	2.49
II. Private & Commercial	**7.864**	**17.43%**	**46%**	**2.149%**	**46.95**
TOTAL	**45.125**	**100.00%**	**20.07%**	**10.94%**	**239.05**

Table 10-21: Summary of Energy Savings Potential Calculated per Type of Building

Overall, the savings potential of the building sector in Kosovo represents 11% of the PES. By realizing the energy efficiency potential in the building sector as presented in Table 10-21above, Kosovo can save the following energy commodities:

- 115.618 ktoe of electricity;
- 76.272 ktoe of fuel wood.
- 35.322 ktoe of diesel and heating oil by products;
- 6.991 ktoe of coal;
- 4.839 ktoe of heat;

The total value of these savings comes to 239.055 ktoe.

The economy as a whole would receive substantial additional benefits from these energy savings from the building sector and the value is expressed in financial terms with actual prices in Table 10-22.

Energy Commodities	Residential Buildings			Public and Private Service			TOTAL Energy saving value Mil €
	Energy price €/kWh	Energy saving GWh	Energy saving value Mil €	Energy price €/kWh	Energy saving GWh	Energy saving value Mil €	
Coal	0.0114	45.03	0.51	0.0126	36.27	0.45	**0.97**
Oil by products	0.1251	188.89	23.64	0.1126	221.93	25.00	**48.64**
Fuel wood	0.0307	587.28	18.03	0.0307	299.81	9.20	**27.24**
Electricity	0.0802	1142.0	91.63	0.1298	202.72	26.31	**117.94**
Heat	0.0542	34.12	1.85	0.0597	22.19	1.32	**3.17**
TOTAL			**135.68**			**62.30**	**197.99**

Table 10-22: Energy savings and expressed in financial terms at actual prices

The Market Assessment of energy savings in the Kosovo Building Stock identified a huge potential for implementing energy efficiency measures (EE) based on the 'bottom-up' engineering approach presented in this section. Achieving Kosovo's full potential would cost a total of €1.367 billion (calculated in above section for each sector and summarized on figure 10-68) and result in annual cost savings to investors and end users of about €0.198 billion (Table 10-22), which means that the savings would pay for the measures in about 6.94 years. This is a crucial conclusion and should be one of the most important parameters to justify implementation of all the EE measures presented in detail in Section 10.

Above analysis shows that the biggest energy saving potential is in the residential sector and second one in private and commercial subsectors. Analysis is presented in this chapters describes that energy saving potential in municipal and central public buildings is lower compare with two other sectors. But from other side these two sectors present in most of the cases real energy savings (because in most of the cases comfort level is already fulfill), that's why will be very important to start fist energy efficiency program with these categories of building. Table 10-23 presents energy savings and financial benefits at actual prices, within the public buildings category for both municipal and central sub-categories.

Energy Commodities	Municipality Public Buildings			Central Public Buildings		
	Energy price €/kWh	Energy saving GWh	Energy saving value Mil €	Energy price €/kWh	Energy saving GWh	Energy saving value Mil €
Coal	0.0126	9.04	0.11	0.0126	1.94	0.02
Oil by products	0.1127	55.28	6.23	0.1127	11.87	1.34
Fuel wood	0.0307	74.68	2.29	0.0307	16.04	0.49
Electricity	0.1298	50.49	6.55	0.1298	10.85	1.41
Heat	0.0597	5.53	0.33	0.0597	1.19	0.07
Total		**195.01**	**15.52**		**41.89**	**3.33**

Table 10-23: Energy savings for municipal and central public buildings expressed in financial terms at actual prices

The total value of investments required to reach the above mentioned municipal and central governmental building energy savings are respectively €61.68 million and €17.63 million; the energy savings expressed in monetary terms are respectively €15.52 million Mil Euro and €3.33 million and the payback period will be respectively 4.01 years (municipal public buildings) and 5.29 years (central buildings).

These are very important conclusions, which show once more that all the measures selected and analyzed in detail in Section 10 have a very profitable payback period for the municipal and central building sectors and therefore the Kosovo Government, supported by IFIs and Commercial Banks should start to prepare and implement such a program.

10.3.5.1 Energy Consumption, Expenditures and Savings for Public Building Categories

Total energy consumption for public municipal and central public buildings is 44.03 ktoe and the calculated annual energy expenditure in the public building sector is about €40.75 million per year. Energy expenditures for schools, health buildings and other buildings (at municipality level) and for central hospitals, central governmental buildings are respective 53.33%, 18.33%, 11.66%, 5% and 11.68%. (Absolute values of these energy expenditures have been calculated and are given in the fourth column of Table 10-24).

MUNICIPALITY AND CENTRAL PUBLIC	Building Sector Total Area (m²)	Energy Consumption (ktoe)	Energy Expenditures (€ Mil)	Energy Savings (ktoe)	Energy Savings (€ Mil)
II. Public Municipality	**2,360,000**	**36.69**	**33.96**	**16.77**	**15.52**
Schools	1,690,000	23.48	21.73	10.90	10.09
Health buildings	393,000	8.07	7.47	3.35	3.10
Other buildings	277,000	5.14	4.75	2.52	2.33
II. Public Central	**182,000**	**7.34**	**6.79**	**3.60**	**3.33**
Central Hospitals	46,000	2.20	2.04	1.12	1.03
Central Government	136,000	5.14	4.75	2.49	2.30
TOTAL	**2,542,000**	**44.03**	**40.75**	**20.37**	**18.85**

Table 10-24: Energy Consumption, Expenditures and Savings for Public Building Categories (municipal and central)

Table 10-24 shows that financial annual savings for public buildings could reach€18.85 million, where energy savings for schools, health buildings (at municipality level), other municipality buildings, central hospitals, central governmental buildings are, respectively, 53.51%, 16.46%, 12.35%, 5.48% and 12.20% (Absolute values of energy savings are shown in the final column of Table 10-24).

10.3.5.2 EE Investments required for each Building Sector

Figures 10-70 and 10-71 below show that the highest level of investment is required in the residential sector and secondly, that the cumulative total required by 2020 is approximately €1.12 billion. Private and commercial buildings come second, followed by municipal public buildings and then central public buildings with cumulative investment requirements of €175 million, €62 million and €18 million respectively.

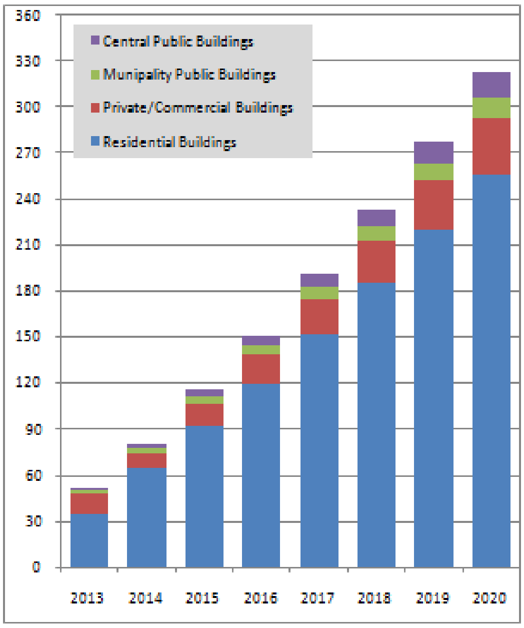


Figure 10-70: Annual EE investment in each sector (€ million)

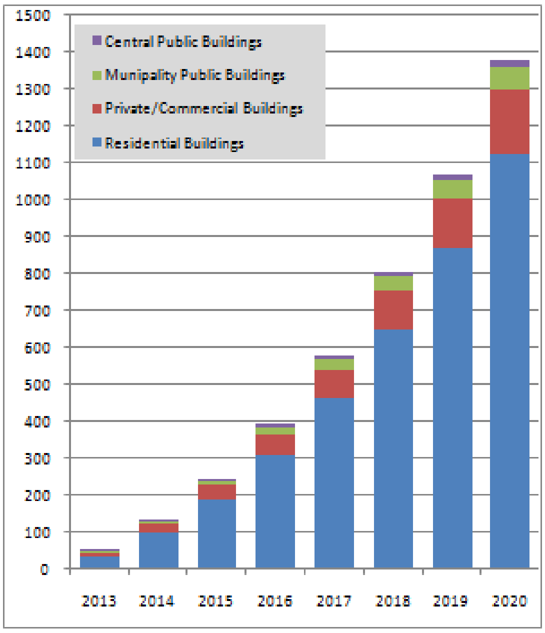


Figure 10-71: Cumulative EE investment in each sector (€ million)

Figure 10-72 below shows the trend in the development of Kosovo GDP and the ratio of the annual investment needed to GDP. The figure shows that the level of investment needed to realize the energy saving potential identified stands at around 1% of GDP in 2013 and at about 3.8% in 2020.

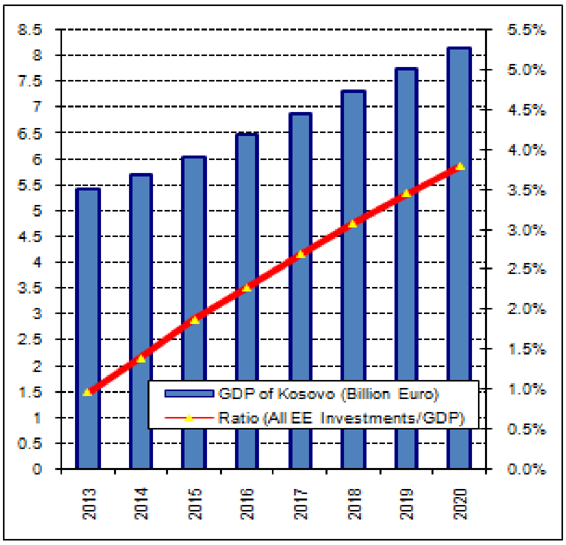


Figure 10-72: Trend in development of Kosovo GDP and Ratio of annual EE investment requirement (€ million) to GDP *Source: "World Economic Outlook Data" International Monitory Fund, May 2012 (GDP data)*

The building sector provides significant opportunities for energy savings. Space heating accounts for the biggest share of energy consumption in buildings—most energy saving potential is therefore associated with thermal insulation, heat loss reduction and the introduction of efficient boilers. More than 50-60% of the Kosovo building stock is more than 25-43 years old (i.e. constructed in the period from 1970 to 1985), which is reflected in the relatively high specific heat consumption of these buildings. The current level of heat consumption in Kosovo is estimated to be about 219 kWh/m^2 year, compared to 80–150 kWh/m^2 year in Western Europe, which indicates a substantial opportunity for EE retrofitting and improvements.

To be able to capture the existing market potential, any EE supporting legislation and programs must make good use of the existing EE market drivers and use their momentum. Energy security is a driver that has become more and more pronounced in recent years. Despite the increased use of local coal and biomass energy resources, Kosovo depends totally on imports of oil by-products and to a smaller degree on electricity imports, which overall account for about 24.72% of its energy needs (2010). The implementation of energy efficiency can contribute to improving national energy security by reducing oil by- product imports (reducing the trade deficit of the country), reducing fuel wood consumption (protecting forests), reducing electricity imports (and buying time to guarantee the electricity supply of the country until New Kosovo is commissioned and Kosovo A decommissioned). It can also mitigate the demand for imported electricity and energy price volatility, something that Kosovo has experienced for the whole period 2000-2012. The savings, as estimated in the market assessment, point to a final energy reduction potential of about 11%, which represents an import reduction of about 44.26%. The cost of implementing energy efficiency based on the international benchmarks is roughly half the cost of building new energy supply facilities - and energy efficiency can be achieved more quickly.

Improvement of the fiscal balance is a high priority for the government of Kosovo, especially in the current situation. Energy efficiency represents an opportunity for the government and public sector to reduce their energy budget expenditures, which total €40.75 million per year. It has been estimated that the public sector can save €18.85 million per year by investing in EE, a cost effective measure since expenditures made to improve government facilities will pay for themselves through savings at the national level. In addition, if the government considers financial incentives to support the development of an EE market, these incentives can be partially offset by reducing subsidies on domestic energy sales.

EE investments have an overall positive economic impact since they go towards developing an industry that offers good jobs. They also create revenue from increased taxation on the construction work required for EE implementation. This constitutes a win-win situation, where a national imperative for fiscal optimization converges with the development of an energy efficiency market and its associated social and environmental benefits.

The need to renovate existing building stock is very urgent in Kosovo. Old buildings require immediate investment to renovate their outside walls, roofs (though the introduction of thermal insulation), introduction of efficient double/triple glazed windows, and introduction of efficient space heating and hot water systems (especially A category electrical hot water boilers and solar hot water systems). Important energy savings have been identified also for other energy services, like cooking, lighting, electrical equipment (through the introduction of EE Labeling of Equipment the Kosovo Government has already approved the respective Administrative Order for introducing a labeling system for all domestic electrical equipment). This presents an opportunity for the Kosovo Government to ensure that such renovations are realized in an energy-efficient way and contribute to the country's sustainable economic development. Furthermore, renovating these buildings will also contribute to the achievement of the National Energy Efficiency Action Plan's (NEEAP) 1% energy savings target per year for a nine year period until 2018. Figure 10-73 compares the detailed 'bottom-up' energy savings calculations carried out in Section 10 with the KEEAP energy savings target for whole Building Stock of

Kosovo (i.e. the sum of Residential, Private, Municipal Public & Central Public Sectors).. The ratio between total PCB energy saving potential and the KEEAP energy savings target for this sector has been calculated. Analysis of this parameter shows that the energy saving potential is 2.35-2.63 times higher than energy saving target set by the KEEAP.

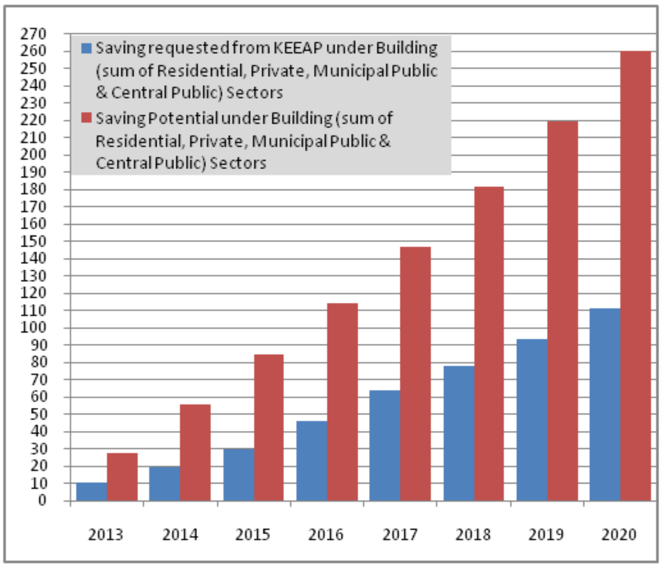


Figure 10-73: Cumulative energy savings potential and KEEAP energy savings targets for the whole Building Tock of Kosovo(ktoe)

The KEEAP targets were set by the Kosovo Government, which took into consideration the process for EU accession and this study, by quantifying energy savings in detail, under this actual study will help with the preparation of the Second Kosovo Energy Efficiency Action Plan. Here, again, national needs (for building renovation and EU accession) converge with the development of an energy-efficient economy.

11 Barriers to the Implementation of Energy Efficiency Measures, Remedies and Responsibilities

11.1 Barriers to Energy Efficiency

The results of the analysis presented in this study suggest that significant opportunities exist in Kosovo to use energy more efficiently. Efficiency in this context, means providing an equivalent energy service at lower total cost (i.e. at lower combined energy operating costs and EE implementation costs). Yet although EE measures represent an economically rational response to energy scarcity and increasing energy prices - as well as to environmental concerns - there appear to be features of energy services markets that inhibit the exploitation of efficiency opportunities.

This section summarizes some barriers to the implementation of EE measures that are specific to the current situation in Kosovo. The following three matrices focus on those barriers that can be influenced by interventions at the microeconomic level. That is, the barriers in question can be removed - or at least reduced - by taking specific remedial actions for which nominated individuals can be held responsible. Macroeconomic barriers, such as the depressed level of the national economy, whilst constituting a potential obstacle to improvements in energy efficiency, cannot be eased by one or two specific actions and therefore lie outside the scope of this analysis.

11.1.1 Economic Barriers

Economic barriers are those impediments to EE investments which can be attributed to the condition of the Kosovo economy, both in terms of wealth and in terms of its level of development. Included in this category are barriers caused by misplaced incentives and flaws in market structures.

11.1.2 Institutional Barriers

Institutional barriers are the result of inadequate or inappropriate organizational structures within the Kosovo EE market, which prevent or hinder efficient decision-making and effective implementation of investment decisions. They also include 'decisions influenced by custom tradition'.

11.1.3 Legal and Regulatory Barriers

Whilst the majority of legal and regulatory barriers to EE is a necessary part of the legislative framework and has to be accepted and complied with, there are other laws and regulations that lead to perverse or incorrect outcomes and these may need to be modified or restructured in order to facilitate the implementation of EE measures.

11.1.4 Financial Barriers

A financial barrier is one that imposes significant restrictions on capital availability for potential borrowers. Economic theory predicts that for a risk-adjusted price, the market should provide capital for all investment needs. In practice, however, some potential borrowers, for example low-income individuals and small business owners, are frequently unable to borrow at any price as the result of their economic status or credit-worthiness. This lack of access to capital inhibits EE investments by such consumers.

11.2 Residential and Commercial Sector Matrix

RESIDENTIAL AND COMMERCIAL SECTOR			
Economic	**Institutional**	**Legal and Regulatory**	**Financial**
✓ **Barrier RE1**: Market distortions in local energy markets mean that the prices of some fuel do not reflect their production costs (e.g. firewood, lignite) ✓ **Impact**: Consumers underestimate the monetary value of energy savings and make economically incorrect choices ✓ **Remedy**: Commission a 'National Wood Energy Action Plan' to examine the case for increased wood energy production and utilization. Regulate secondary (local) fuel markets and introduce taxes or levies to cover shortfall between the actual price and the cost reflective price ✓ **Responsibility**: GoK, MED, MoF	✓ **Barrier RI1**: Many households adhere to traditional methods of cooking and space and water heating, because of preference, lack of awareness or in areas where power cuts are common, for security of supply reasons. ✓ **Impact**: Use of inefficient (and possibly unsafe) equipment, inappropriate choice of fuels, deforestation ✓ **Remedy**: Implementation of educational campaigns; subsidized schemes to trade in inappropriate or inefficient equipment for superior models; improve quality of supply. ✓ **Responsibility**: KEEA, MESP, KEDS	✓ **Barrier RLR1**: Since 2000, many new 'illegal' buildings have been constructed without the required building permission. ✓ **Impact**: Buildings are constructed in an unplanned way, standards are not enforced and the development of DH schemes may be hindered. Energy performance is not monitored or enforced and often results in excessive energy consumption. ✓ **Remedy**: Increase the capacity of municipalities to process building permits. ✓ **Responsibility**: MESP, municipalities, KEEA	✓ **Barrier RF1**: Inability to access the loan market. Absence of affordable EE financing schemes for lower income households ✓ **Impact**: Low level of investment in EE in the residential and SME sectors, even in high value measures. The high EE potential of the residential sector is not realized. ✓ **Remedy**: Develop scheme for MED to provide EE improvement grants or subsidized loans with backing of IFIs ✓ **Responsibility**: IFIs and donors in cooperation with MED/KEEA
		✓ **Barrier RLR2**: Owners' Communions (Housing Associations) are not being established due to a lack of secondary legislation and current structures to deal with 'common areas' in buildings are ineffective ✓ **Impact**: Improvement loans are not being taken up and savings are not being realized, the fabric of joint dwellings continues to deteriorate. ✓ **Remedy**: Secondary legislation is needed to encourage the establishment of housing associations that represent the interests of all occupants and that can deliver improvements in the quality of buildings. Establish special funds to assist Housing Associations. ✓ **Responsibility**: MESP	✓ **Barrier RF2**: High level of commercial losses and non-payment of energy bills ✓ **Impact**: No incentive to spend money on implementing EE measures if energy is not paid for. ✓ **Remedy**: Install secure metering, KEDS to develop schemes that reward good payers, e.g. by providing technical and financial assistance with EE improvements in the home ✓ **Responsibility**: ERO, KEDS
		✓ **Barrier RLR3**: Electricity and heat tariffs are (a) not yet fully cost-reflective, tariffs are subsidized and some inefficient tariff structures persist(e.g. Tariff Group 7, for customers without meters, charges a fixed amount/consumer/month, on the basis of 'evaluated consumption'). ✓ **Impact**: EE energy savings are undervalued, reducing incentives and making loans more difficult to repay ✓ **Remedy**: Short-term, make subsidies conditional on implementation of EE measures: medium-term phase out subsidies, ERO is phasing in cost-reflective tariffs and Time of Use tariff structures ✓ **Responsibility**: GoK, ERO, KEDS	

11.3 Public Sector Matrix

PUBLIC SECTOR			
Economic	**Institutional**	**Legal and Regulatory**	**Financial**
✓ **Barrier PE1:** EE is not a top priority for municipality mayors - water supply, waste disposal, sewage treatment are considered more important ✓ **Impact:** Any available funds are spent on other projects, even though EE programs can have a better ROI than other priorities. ✓ **Remedy:** Set up dedicated funding facilities which can only be used for EE related investments ✓ **Responsibility:** IFIs, KEEA, municipalities	✓ **Barrier PI1:** The demands of the decentralization process place an increasing burden on municipalities while their resources are frozen or being reduced. There is insufficient EE expertise and insufficient resources at municipal level ✓ **Impact:** Municipal EE planning and implementation are constrained and municipalities cannot deliver good quality EE plans ✓ **Remedy:** Consider changing the basis for EE planning to a regional level (e.g. based on the RDA structure).TA to provide training to municipalities and to assist with setting up of EE planning support facility at regional level (being addressed by an EU funded project) ✓ **Responsibility:** IFIs, KEEA, municipalities	✓ **Barrier PLR1:** Budgetary rules do not allow municipalities to benefit from any energy savings they achieve in the longer term – whilst other national grants to municipalities are awarded according to set formulae, each year's budget allocation for utility bills is based on the previous year's outturn. Any savings achieved in energy costs may not be used to finance investments. ✓ **Impact:** Reduced incentive to invest in EE measures. Barrier to operation of ESCOs ✓ **Remedy:** Research possibility of making changes to the municipal budget setting process or of circumventing this constraint ✓ **Responsibility:** GoK, MoF	✓ **Barrier PF1:** The Law on Public Debt imposes various restrictions on municipalities' ability to borrow money, principally the need to have two consecutive years of unqualified accounts ✓ **Impact:** Cash strapped municipalities cannot borrow in order to finance EE projects ✓ **Remedy:** Deliver funds to municipalities via other channels, such as central government (via appropriate ministries) until borrowing criteria met ✓ **Responsibility:** IFIs, GoK, MoF, KEEA
		✓ **Barrier PLR2:** Energy savings may be deferred due to compliance with Technical Regulation Nr. 03/2009, which states that 'energy sustainability' requires achievement of planned comfort levels in public buildings, as well as energy efficiency ✓ **Impact:** Achieving comfort levels in some public buildings may initially increase energy consumption and energy costs, even if accompanied by implementation of EE measures; ESCO type arrangements cannot be applied in such a situation ✓ **Remedy:** Develop schemes to provide financial assistance to help public buildings meet minimum legal comfort levels ✓ **Responsibility:** IFIs, Ministries, municipalities	✓ **Barrier PF2:** Central government budgetary constraints limit investment opportunities., particularly in the current economic climate ✓ **Impact:** Central government cannot finance EE projects ✓ **Remedy:** Secure funding from IFIs ✓ **Responsibility:** IFIs, GoK, MoF, KEEA
		✓ **Barrier PLR3:** The Law on Public Procurement requires government tenders to take account of positive EE related aspects. But it is not being implemented because the necessary secondary legislation not in place. ✓ **Impact:** Tenders are evaluated purely on the basis of gross cost and the value of the energy saving potential of bids is ignored, ✓ **Remedy:** The secondary legislation required to implement the amendments to the Public Procurement Law has to be drafted and enforced. ✓ **Responsibility:** MoF	

11.4 Cross-Sector Matrix

CROSS-SECTOR			
Economic	**Institutional**	**Legal and Regulatory**	**Financial**
✓ **Barrier XE1**: Underdeveloped local EE business infrastructure. SMEs tend to operate individually, except on an ad hoc basis when there is a perceived need to collaborate ✓ **Impact**: The fragmented nature of the private sector prevents strong private-public partnerships or the formation of clusters to deliver services, leading to a lack of commercial and professional expertise to implement EE measures; discourages ESCOs ✓ **Remedy**: Support local businesses in identifying/developing EE market capabilities ✓ **Responsibility**: KEEA, CoC, EE companies	✓ **Barrier XI1**: Inadequate data and institutional capacity to monitor, verify and evaluate the impact of EE programs ✓ **Impact**: Lack of information on the effectiveness of EE investments and for evaluating future investments ✓ **Remedy**: TA for KEEA and municipal energy offices ✓ **Responsibility**: IFIs, KEEA, municipalities	✓ **Barrier XLR1**: The Kosovo Energy Efficiency Agency is inexperienced and under resourced relative to its responsibilities and obligations ✓ **Impact**: KEEA could fail to meet its obligations under the Energy Community Treaty and the Law on Energy Efficiency ✓ **Remedy**: Expansion of staff numbers - especially support staff (consider student interns) and TA for training ✓ **Responsibility**: IFIs, MED, KEEA	✓ **Barrier XF1**: High level of transaction costs (in terms of both money and time) for EE investments ✓ **Impact**: Prohibitively high transaction costs will discourage EE investments ✓ **Remedy**: Streamline the process - develop EE delivery mechanisms, standardize financing deals, combine smaller size projects, etc. ✓ **Responsibility**: banks, IFIs
✓ **Barrier XE2**: Absence of ESCOs and ESCO based schemes from the local market ✓ **Impact**: Customers will have to secure up-front capital in order to finance EE investments ✓ **Remedy**: Develop confidence in the EE market: create demand, make finance for EE measures more easily available, standardise contracts, support M&V procedures, revise public procurement rules to accommodate ESCO type arrangements ✓ **Responsibility**: KEEA, Chambers of Commerce, EE companies	✓ **Barrier XI2**: Lack of impartial, professional detailed technical information concerning EE investments ✓ **Impact**: Potential customers are not well positioned to make informed decisions and either make wrong decisions or are put off from investing. Lack of surveys on the quality of EE services and products means customers do not feel confident about making EE related decisions ✓ **Remedy**: TA for KEEA to establish an independent advisory body that will assist potential customers in their decision making ✓ **Responsibility**: KEEA, Chambers of Commerce	✓ **Barrier XLR2**: The Law on Energy Efficiency laid down procedures for setting up a national fund to promote EE and RES projects. However such a fund is not permissible under existing legislation, which only allows for the existence of a single national investment fund ✓ **Impact**: The absence of a fund specifically dedicated to implementation of EE measures means that loans will be used to invest in what are perceived to be higher priorities ✓ **Remedy**: Explore ways in which a dedicated fund could be set up, the existing legislation amended or other existing mechanisms tailored to the requirements of investment in EE ✓ **Responsibility**: GoK, MED	✓ **Barrier XF2**: Lack of funding for energy auditors and energy audits ✓ **Impact**: EE programs in the residential sector (310,000 buildings) may be constrained by a lack of auditors. In other sectors potential EE projects will not progress beyond the initial evaluation stage ✓ **Remedy**: In the medium-term, auditors will be self-employed on commercial terms. In the short-term, KEEA will have to secure funding from the MED/MoF to pay auditors to work on its projects ✓ **Responsibility**: KEEA, MED, MoF
	✓ **Barrier XI3**: Lack of a comprehensive and reliable EE data base ✓ **Impact**: Poor quality of decision making leading to ineffective investments ✓ **Remedy**: Donors to instigate a major long-term project in partnership with the KSA to develop a data base as required, including a long-term load research program ✓ **Responsibility**: IFIs, KEEA, Kosovo Statistics Agency		
	✓ **Barrier XI4**: Lack of donor coordination on current and future EE issues ✓ **Impact**: Replication of effort, lack of focus, conflict, confusion ✓ **Remedy**: Strengthen KEEA so it can take a leading role and establish a regular EE forum for all interested parties ✓ **Responsibility**: KEEA, Donor Agencies		

11.5 Residential and Commercial Sector Matrix

In the following section, the barriers to implementation which were summarized in matrix form above are discussed in more detail. When assigning responsibility for implementing remedies, it should be noted that these suggestions have not been discussed with the stakeholders involved and they represent the preliminary conclusions drawn from the analysis contained in this study.

For the purposes of barrier analysis it was decided that the residential and commercial sectors are sufficiently similar for them to be treated as a single grouping.

11.5.1 Economic Barriers

Barrier RE1: Market distortions in local energy markets mean that the prices of some fuels do not reflect their true production costs (e.g. firewood, lignite).

The main energy sources for both space and water heating in Kosovo are biomass - mainly firewood - and electricity, each accounting for around 40% of consumption. In many households, solid wood fuel is less expensive (and more reliable) for home space heating and cooking than electricity. Thus, at a time of economic difficulty people are turning back to wood for heating and the use of wood fuel is increasing. The information obtained during the course of the energy audits shows that because there are still many distortions in local energy markets the actual price of a particular fuel does not always reflect its true value. For example, some firewood sold on the open market is obtained through illegal logging operations, whilst even in more formal markets, the price of firewood does not fully reflect the costs of producing, treating, transporting and replacing it. Similarly, lignite is sold locally at very low prices from small-scale, unofficial mines - and in certain locations can simply be gathered by hand, free of charge. As a result, consumers make economically incorrect choices and the value of energy savings made by reducing consumption of wood or lignite or replacing them with other fuels is understated.

A 'National Wood Energy Action Plan' should be commissioned to examine the case for increased wood energy production and utilization as an environmentally friendly source of energy that is integrated within the forestry and energy programs. A second proposal is for the GoK to regulate secondary (unofficial, local) fuel markets more proactively and introduce levies as an interim measure to cover the shortfall between the actual price and the cost reflective price of the energy commodity in question. This strategy has been successfully applied in other countries, for example, in Serbia.

11.5.2 Institutional Barriers

Barrier RI1: Many households adhere to traditional methods of cooking and space and water heating, either because of preference, lack of awareness or, in areas where power cuts are common, for security of supply reasons, where power cuts are common. (Over 50% of customers fall into the 'C' category of the KEK power rationing scheme.)

Especially, but not only, in rural areas, many households choose to use inefficient (and possibly unsafe) equipment because they feel comfortable with traditional practices, know how to extract the best results from them and have adapted their daily routine to fit in with the demands of such practices. However, although using wood or lignite for fuel may be the appropriate choice in certain circumstances, the principles of energy efficiency still apply in those circumstances - an efficient wood burning stove is always preferable to an inefficient one.

Educational programs are still needed to make people aware of the consequences of their decisions, covering the benefits of using energy efficient stoves as well as broader issues, such as health and safety, illegal logging and deforestation. However, there also needs to be better regulation of the heating and cooking equipment that is being sold in Kosovo. In many towns and villages the stoves on sale, although cheap, are of poor quality and low efficiency. In order to make switching to more efficient models an affordable option, subsidized 'trade-in' schemes to exchange old inefficient equipment for new improved appliances need to be introduced at municipality level. Given the level of financial support needed, funding could be provided by equipment manufacturers, charities or NGOs rather than through major donors.

Where households retain traditional technologies as a back-up against power interruptions the argument for using energy efficient equipment still holds, but the ultimate solution depends upon improving the quality and reliability of supply.

11.5.3 Legal and Regulatory Barriers

Barrier RLR1: Since 2000, a large number of 'illegal' buildings have been constructed in Kosovo without the required building permits.

A rather informal and inefficient approach to public administration since the end of the war has resulted in a significant number of buildings being constructed without the required permits and permissions. As a result, building energy performance standards are not enforced or monitored, often resulting in excessive energy consumption.

The problem of buildings without proper permits is significant and is the result of the disruption caused by the war (damaged and destroyed buildings, lost records, relocation of citizens, etc.). It was difficult for municipalities to manage this situation and as a result it has been (unofficially) estimated by the MESP that the proportion of new buildings without a building permit could be as high as 50%. This situation has to be remedied in order to ensure that the required legal standards are secured. A law is being prepared to deal with this issue and is expected to be presented in 2013. One approach to legalization could be for the Ministry to specify that all buildings without a permit should be required to meet specific EE standards in order to be approved. Alternatively, implementing EE measures could be offered as a way of 'fast-tracking' applications. Such mechanisms would, of course, have to be supervised and monitored by auditors and municipality staff.

Interviews carried out during the course of this study suggest that the public has become used to an informal approach regarding building sector rules and regulations. A system needs to be established that ensures co-ordination between DOC, KEEA and municipal offices. It is also a prerequisite that all municipality staff dealing with building permits and procedures should be adequately trained and informed.

Barrier RLR2: There is no secondary legislation to promote the establishment of 'owners' communions' (or Housing Associations) and current structures to deal with refurbishment of the fabric of joint dwellings and 'common areas' in apartment blocks are ineffective.

The CENSUS 2011 results show that 75% of the housing stock in Kosovo consists of individual homes, while the remaining 25% consists of multi-apartment buildings or joint dwellings. The first joint dwellings in Kosovo were constructed for social housing after the Second World War and this initial phase was then followed by a period of mass construction during the 1970s and 80s. Following the period of privatization in recent years, most apartments in Kosovo are owned by their occupants rather than being rented from a private or public landlord. After privatization, the Housing Public Enterprise, which had been responsible for the management and maintenance of joint dwellings, lost its mandate and authority and the established management bodies, such as owners' societies and owners' councils lost their function. Today, many apartment blocks in Kosovo are not being managed or maintained properly and are in need of general repair and refurbishment.

In EU and accession countries in the SEE region the stimulus for programs of mass refurbishment or reconstruction has been provided by the Energy Performance of Buildings Directive and the Energy End-use Efficiency and Energy Services Directive**.** Recognizing the social and environmental problems that neglect of joint dwelling buildings was causing, the GoK approved the Law No.03/L-091 on 'Use, Management and Maintenance of Building Joint Ownership' to regulate the functioning of joint dwellings. However, the Law is not proving to be effective and measures are required to stimulate its implementation.

Secondary legislation is needed to regulate common interests in apartment blocks and to define procedures and rules for decision-making. This Law proposes the establishment of a system of administration based on management bodies such as 'owners' communions' (i.e. Housing Association), management councils and private, licensed administration companies. Establishing such bodies is a precondition for the effective management of joint dwellings. The biggest barrier to the implementation of the Law is the difficulty of bringing the occupants of buildings together and convincing them that forming an organization is to their advantage.

The Law does not state that creation of the 'owners' communion' is compulsory or voluntary – it simply proposes a form of organization, but without the mechanisms or powers to enforce it. So while the establishment of 'owners' communions' or Housing Associations has been encouraged by the Government, the effort has been largely ineffective. This is because it requires individuals to devote time and effort to running such associations and it requires all tenants in a building to agree on what projects are needed and to contribute financially towards meeting the total cost of improvements (e.g. repairs or installation of EE measures). The diverse mix of occupants in many buildings means that not all residents have the same financial capabilities and cannot afford to make equal financial contributions to pay for repairs and improvements. As result, there are no housing associations to take up loans for improvements, proposed renovation work is never undertaken, the fabric of joint dwelling buildings deteriorates and potential savings remain unrealized.

Because the financial status of a large proportion of apartment owners is poor, some government initiative is needed to stimulate activity in this area. Just waiting for the implementation of Law No.03/L-091 to happen spontaneously is not sufficient and incentives for initiating the creation of effective Housing Associations are required.

Occupants of apartment blocks need to understand that the creation of a Housing Association would improve their living conditions by improving the communal areas within the property. An effective way of creating such an understanding would be to develop financial schemes to support the implementation of EE measures during the refurbishment of a joint dwelling, but only if is specifically organized by a Housing Association or equivalent body. Both loans and grant schemes to reduce costs and help poorer tenants meet their financial obligations need to be made available. Thus the linkage between the establishment of an 'owners' communion' and some positive improvements in the living environment can be established in the occupants' minds.

Other EU countries have introduced such schemes: for example, Poland has a 'Thermo Modernization Fund' (total loans amounted to €355m in 2007) which provides a subsidy of up to 25% of the costs involved and Romania EE fund (which administered financing agreements amounting to $11.4 million in 2008) operated a similar scheme with a 67% subsidy.

Barrier RLR3: (a) electricity and heat tariffs are not yet cost-reflective, (b) tariffs are subsidized and (c) some inefficient tariff structures persist.

According to the 'Rule on Public Electricity Supplier Pricing' adopted by the Board of the ERO in September 2011[32], the Regulated Retail Tariff "shall reflect the costs of supplying different Customer Groups" and, *inter alia*, shall be set so as to "Reflect the costs of supplying different Customer Groups during different seasons and times of the day, to the extent allowed by limitations on customer metering"(Article 16, Section 8.3).

However, electricity tariffs in Kosovo are still relatively low and cross-subsidized[33]. Electricity tariffs recover the costs of production, but not the cost of investment in the system that is needed to improve the quality of supply so as to eliminate the need for interruptions - almost 60% of Kosovo is in the 'C' category for load shedding. Tariffs should reflect the marginal cost of the production, transmission and distribution of electricity. Regulatory procedures and the cost structure of the industry will give rise to different prices depending on whether they are based on average costs or on marginal costs. In Kosovo, the average electricity tariff set by the ERO is €0.053/kWh, while the full cost recovery tariff is estimated to be around €0.08/kWh[34]. The GoK also pays out extremely large subsidies to cover the cost of imports.

Some of the current residential tariff structures are inefficient due to metering constraints, in particular Tariff Group 7, according to which customers without meters are charged a fixed sum, per consumer per month, on the basis of 'evaluated consumption'. The tariff applies to a relatively small number of customers and existing customers are being moved out of this tariff category to a metered category. As stated in Section 3.3.6, Time of Use tariff structures are being promoted by ERO and KEK and these give clearer messages to consumers about the cost of the energy they are consuming and serve to enhance EE by reducing peak demand and peak energy prices.

However, there are still some elements of cross-subsidy between consumer groups, with households having a privileged status. Households currently consume 56% of all retail energy, yet only pay 66% of the cost to serve them[35]. According to the ERO, these imbalances are to be phased out by 2014 and at present, 89% of current tariffs are cost reflective. Hence, given the current tariff situation, EE energy savings are undervalued in Kosovo, reducing incentives and making loans more difficult to repay. Such mispricing creates an incentive to over-consume electricity relative to investment in energy efficiency.

District heating systems exist only in Prishtina, Gjakova and Mitrovica and meet around 3% of total heating demand. Commercial losses are high, while the existing tariffs, although not very low, do not completely cover the costs of supply.[36] Billing is carried out based on the pre-assessed heating area of each customer due to a lack of metering of supplied thermal heat. The average collection rate for the entire district heating sector in 2009/2010 was about 57% which represents a serious problem for districts heating companies in Kosovo. The current DH production system is not technically or financially sustainable.[37]

[32] Rule on Public Electricity Supplier Pricing (PES Pricing Rule), Energy Regulatory Office, 2011

[33] Background Paper: Development and Evaluation of Power Supply Options for Kosovo, World Bank, December 2011

[34] Presentation: "KEK Performance: Where we've been and where we are going", *Arben Gjukal*, Managing Director, KEK, June 2012

[35] ibid

[36] Kosovo_Energy_Strategy_2009-2018

[37] An analysis of the legal and market framework for the cogeneration in Kosovo, ERO, 15th International Research/Expert Conference, TMT 2011, Prague, Czech Republic, 12-18 September 2011

11.5.4 Financial Barriers

Barrier RF1: Lack of affordable EE financing schemes for lower income households unable to access the loan market.

Clearly, the inability to get access to capital limits EE investments by such consumers. In principle, if a consumer takes a loan in order to purchase an energy-efficient piece of equipment, its utilization should improve the borrower's net cash flow - an important component of credit-worthiness - reduce the risk to the lender and consequently should reduce the interest rate.

ProCredit Bank and Raiffeisen Bank currently issue loans at interest rates that are 1-2% below market rates (but are still relatively high at around 10%) and for the time being at least, the banks are not interested in processing international credit lines because they have enough capital of their own to lend out. So while there is a need for international banks to provide credit lines with substantially lower interest rates to stimulate the EE market, the difficult part is to make the local commercial banks interested, since IFIs normally rely on the resources of local banks for loan disbursement. This situation creates a barrier to energy efficiency, because the commercial banks - for the time being not interested in utilizing the available credit lines - are blocking the more targeted energy saving loans that the IFIs are offering.

The terms for the credit lines could be eased to compete more effectively with the banks own funds, in terms of lower interest rate and fewer bureaucratic requirements (and possibly accompanied by a guarantee scheme to the banks, so that the risk of non-payment is transferred to the donor).

Barrier RF2: Losses and non-payment of energy bills

In cases where consumers do not pay for their energy consumption, the incentive to undertake energy efficiency measures is absent, except as a by-product of measures to enhance comfort in buildings. Commercial losses in Kosovo have been reduced as a result of various actions taken by KEK, but are still high. According to KEK (June 2012), 14% of Total Energy is "unaccounted for" (commercial losses) and 9% of energy bills remain unpaid.

KEK, ERO and the newly privatized KEDS are working to improve the situation and there is an initiative in place to acquire and install 100,000 electronic meters in 2012 in order to replace existing mechanical meters, which are relatively easy to tamper with.

Schemes to incentivize and reward good payment could be devised jointly by KEK and donor agencies, whereby good payers are provided with assistance to implement EE improvements in their homes.

11.6 Public Sector Matrix

11.6.1 Economic Barriers

Barrier PE1: EE is not a top priority for municipality mayors - water supply, waste disposal, sewage treatment are considered more important

Municipalities are among the biggest consumers of energy in the public sector since they are responsible for municipal buildings, schools, health centers, cultural centers and kindergartens. However, to date, there have only been around 60 energy efficiency projects implemented across Kosovo. Municipalities do not see EE as their highest priority and any available funds are spent on other projects, for social or for political reasons, even though EE programs can have a better ROI than other priorities.

Since the administration of local government is a political process, decisions are in the hands of the local Mayors and various external constraints are encountered at the local level. Some of the factors that Mayors have cited as restricting municipality participation in EE projects are as follows:

- Lack of access to loans because the municipality has not been given an unqualified audit opinion by the Auditor General for two consecutive years;
- Energy efficiency is not a priority for the Mayor: larger cost savings can be achieved elsewhere in the Municipal Budget; Lack of internal expertise in financial and project management; Business case is not clear enough; Other priorities, like waste water management, are more important.
- To manage this barrier, it would be necessary to set up dedicated funding facilities which can only be used for EE related investments.

11.6.2 Institutional Barriers

Barrier PI1: Insufficient EE expertise and resources at municipal level.

There are 38 municipalities in Kosovo, 28 of which had a budget of below €10m. in 2010. The demands of the decentralization process are placing an increasing burden on municipalities, while their resources are frozen or being reduced.

Due to a lack of capacity, municipal EE planning and implementation are constrained in several areas. In the first place, the Law on Energy Efficiency requires the establishment of municipal energy offices. The quantity and quality of energy planning resources in the smaller municipalities is not compatible with the work load being imposed on them. The EU-funded GIZ project which started in June 2012 is to prepare municipal energy plans for up to 10 ten municipalities. This will leave 28 more municipalities in need of energy offices, either by expanding the existing TA or by setting up a new one with donor assistance. Since the present project is in its start-up phase, it would be prudent to await the first results and lessons learned before launching a more comprehensive project.

Secondly, there is a lack of municipal expertise in processing building applications. New buildings regulations are more complicated than earlier versions and training for municipal officers will be needed.

Finally, in order to remedy the situation regarding illegal buildings, municipal officers must be trained to process building applications and fully understand the new legal requirements. Upgrading of staff might be necessary, as the workload will increase with the legalization of buildings without permits.

Realistically, it should be acknowledged that energy planning and the preparation of EE plans is only a practical option for the largest municipalities and that the smaller municipalities do not have the resources or the capacity to manage such specialist work. To realize economies of scale, energy and EE planning should be carried out at a regional level, possibly employing the framework that has been developed by the Regional Development Agencies or establishing a new organizational structure that addresses the problems encountered by the large number of small municipalities. This issue is being addressed by the EU-funded GIZ project referred to above.

11.6.3 Legal and Regulatory Barriers

Barrier PLR1: Budgetary rules do not allow municipalities to benefit from any energy savings they achieve in the longer term – each year's budget allocation is based on the previous year's outturn. Section 13.3.1 of this study states the view of HEP, the Croatian ESCO, that the Croatian Budget Law needs to be modified to facilitate the repayment of EE investment costs and savings to municipalities and that the budget setting process, currently based on the previous year's costs, means that municipalities cannot benefit from EE investments in the longer term - as is the case in Kosovo.

This results in a reduced incentive to invest in EE measures, as a result of these misplaced incentives. Misplaced incentives result from transactions where the economic benefits of EE measures do not accrue to the individual or organization that is trying to save energy. In Kosovo this can describe various types of relationship, for example, under the current framework, public buildings in Kosovo are not able to retain any financial savings that they realize through EE measures in the longer term as their budget each year is set on the basis of the previous year's outturn. Moreover, the inability to retain savings potentially complicates any contractual relationship with a future ESCO, which would want to be guaranteed access to a proportion of realized energy savings. The MoF should consider whether it would be beneficial for this constraint to be relaxed or restructured in order to encourage building managers to implement EE measures.

Barrier PLR2: Technical Regulation Nr. 03/2009, which states that 'energy sustainability', requires the achievement of planned comfort levels in public buildings, as well as energy efficiency.

The "Technical Regulation on Thermal Energy Savings and Thermal Protection in Buildings" (June 2009) sets minimum standards for heating levels in public buildings and all refurbished public buildings and refurbishing measures in Kosovo must comply with it. The implication of this Regulation is that EE savings can only be made after the specified comfort levels have been achieved.

The energy audits show that many of the audited public buildings are operating below their planned comfort levels and that achieving comfort levels may initially increase energy consumption and energy costs, even if accompanied by the implementation of EE measures. In respect of public buildings - and particularly the space heating systems they use - the thermal comfort level must be taken into account when considering improvements in energy performance and energy savings.

Financial assistance schemes might be established specifically to help public buildings, such as schools, hospitals and clinics meet their obligations and deliver the levels of comfort specified in Technical Regulation Nr. 03/2009.

Barrier PLR3: The Law on Public Procurement should ensure that the process for evaluating government tenders takes account of any EE related benefits that a particular proposal will deliver. It had been proposed that from 2010 there should be a requirement for bidders to purchase equipment and vehicles based on lists of energy-efficient product specifications drawn up by the authorities and to carry out energy audits and implement the resulting EE related recommendations. However, this requirement is not being implemented because there is no secondary legislation in place for its application. As a result, tenders are evaluated purely on the basis of gross cost and the value of the energy saving potential of bids which include an energy efficiency component is ignored. The secondary legislation required to implement the Public Procurement Law has to be drafted and enforced by the Ministry of Finance as quickly as possible.

11.6.4 Financial Barriers

Barrier PF1: The Law on Public Debt imposes various restrictions on municipalities' ability to borrow money. However, for those municipalities that meet the required standards, the legal and regulatory environment appears to be favorable to municipality lending. The defined set of relationships that fixes debt ceilings and the maximum annual debt service relative to the value of collected own source revenues and general grant is conservative and therefore positive from a banking perspective. Credit enhancements are liquid and easily enforceable in case of default and the procedures that a municipality must follow in case of default are rigid. Municipalities may not incur debt unless in the previous two years that they have received unqualified audit opinions from the Office of the Auditor General as part of the mandatory annual audits. The requirement for two years of unqualified audits is appropriate, since it means that a lender can be confident of the accuracy of the financial information that is presented.

However, last year only two municipalities, Prishtina and Prizren, met this condition, which means that the majority of cash strapped municipalities are unable to borrow money in order to finance EE (or other) projects. In the short- to medium-term, therefore, mechanisms should be developed that will channel funds to municipalities in other ways, for example through central government, via appropriate ministries.

Barrier PF2. Central government budgetary constraints prevent direct finance of EE projects.

The necessary budget discipline to overall public finance prevents government of Kosovo to provide funds for direct investments in energy efficiency and especially creation of the energy efficiency fund. From a macro point of view, this is understandable, but on the other hand energy efficiency projects will suffer from this and a positive long-term effect will be lost.

Therefore Government of Kosovo could approach international donors especially IFIs and try to organize international support for creation of an energy efficiency fund or support to some of the grant elements, which have been described in this section.

The position of Kosovo will be stronger if all ministries involved including MoF, MOD (KEEA) and Ministry of Foreign Relations back this approach. Responsible for the initiative could be MoF in cooperation with MOD.

11.7 Cross Sector Matrix

11.7.1 Economic Barriers

Barrier XE1: Underdeveloped local EE business infrastructure.

SMEs in Kosovo tend to operate individually and there are not many any trade or representative organizations. They focus on taking advantage of immediate opportunities and do not to work within the framework developed by the municipality, NGOs and international donors, except on an ad hoc basis when there is a perceived need[38].

The fragmented nature of the private sector prevents the development of strong private-public partnerships. Although credit lines and funds are available from IFIs via the banks, SMEs show little interest in the opportunities available as business development is their primary concern.

[38] ' Decentralization, power of local self-government and multi-level dynamics in Peja/Pec Municipality', Adrian Zeqiri, CeSPI, June 2010 (SeeNet Programme)

Awareness of EE is not sufficient to make it a high priority and the commercial sector has only taken up less than 20% of the loans available for EE projects.

This barrier results in the lack of a transparent and competitive EE market, with good quality (and preferably local) suppliers of EE related goods and services (equipment, materials, installation, repair, maintenance, energy auditing, commercial forestry, fuel efficient ovens, recycling, etc.) In Kosovo the EE industry is only slowly developing and does not yet display the characteristics associated with a vibrant and dynamic market.

The enhancement of commercial and professional expertise to implement EE measures should be encouraged by the KEEA and the Chambers of Commerce to support local businesses in identifying and developing EE market capabilities. An Energy Users forum at which SMEs can discuss EE and other related issues should be established. The forum could offer training in energy management and disseminate examples of best practice. Targeted campaigns could be launched, underlining the economic benefits of EE measures for small businesses and a website with good practice examples developed.

Barrier XE2: Absence of ESCOs and ESCO based schemes from the local market

The main benefit of ESCOs is that they finance EE investments, thus obviating the need for their clients to borrow up-front capital, as the ESCO recovers its costs by retaining a proportion of the client's energy savings that result from the EE investment undertaken. In the absence of ESCOs, energy consumers wishing to invest in EE have to borrow the necessary funds, which not all consumers are willing or able to do.

ESCO companies often develop out of other types of businesses that operate in the EE sector, as they become more comfortable with EE market. Hence to alleviate this barrier, it is necessary for the Government to create confidence in the future of this market. This requires the Government to take various proactive measures to demonstrate its commitment to EE, such as creating demand by funding investment programs, facilitating the development of affordable finance packages, removing legal barriers in areas such as public procurement (where least cost bidders have to be preferred) and allowing credit for bids which deliver environmental benefits, allowing municipalities to retain at least some of the energy savings they make, supporting the development of Monitoring and Verification programs and so on.

Section 13.3.1 reviews the main issues concerning the establishment of ESCOs in Kosovo and examines the experience of Croatia, where, HEP ESCO d.o.o. a utility based company financed by the World Bank, the GEF (Green Environmental Fund) and local banks is operating successfully.

11.7.2 Institutional Barriers

Barrier XI1: Inadequate data and institutional capacity to monitor evaluate and verify the impact of EE programs.

Once a decision has been made to invest in specific EE measures, there is a requirement to ensure that they are implemented correctly and then to monitor their performance. At present, the level of monitoring is inadequate and it is difficult to evaluate and verify the impact of the investments - and to use such information for evaluating the effectiveness of future investments. The commercial banks do undertake a degree of monitoring of the results of their 'Eko loans', but the data is not being centrally collected and analyzed. One of the tasks of the municipal energy offices is to follow up on the implementation of the KEEAP and to analyze the link between the overall action plan and detailed consumption at local level.

In addition to monitoring the impact of major investments, procedures need to be put in place to identify and monitor the results of EE measures undertaken privately by individuals and organizations, independently of any official schemes or programs.

A TA for KEEA and municipal energy offices to develop expertise in monitoring and evaluation needs to be put in place as a matter of urgency.

Barrier XI2:

- Lack of impartial and detailed technical information on EE markets and the goods and services they provide.
- Lack of surveys on the quality of EE services and products means that potential customers are not well positioned to make informed decisions. In order for the EE market to work well, participants must be fully informed about current and future prices - including future energy prices - technological options and developments and all other factors that might influence the economics of a particular investment. Clearly, these conditions can never be fully met in the energy services market and a number of significant information failures can be identified as inhibiting investments in energy efficiency: (1) the lack of information, (2) the cost of information, (3) the accuracy of information, and (4) the ability to use or act upon information.

The solutions could include local market surveys relating to building materials and services, and information on building materials explaining legal requirements could be published as a catalogue and on the web, with FQAs and most common solutions. Such catalogues have been developed in Denmark for selected solutions, such as windows, heat pumps etc. Responsibility for such a scheme could rest with KEEA in cooperation with DOC. Information should also be made available for the municipal energy offices. In Denmark, for example, an information office has been established at the Technological Institute for training professionals in how to carry out installation work. It consists of a section with 3-4 officials and the work is tendered out by the Energy Agency. A website is operational with information and examples on how to implement energy efficient measures.

GIZ is presently carrying out a survey of EE services and materials in three of the municipalities (Gjilan, Drenas and Istog) which will be available by the beginning of 2013.

Barrier XI3: Lack of a comprehensive and reliable EE data base for Kosovo

The EE data available on public sector buildings is very limited and there is no data at all relating to the residential and private building stock. There is no dependable data base of energy consumption for the residential/public/private building sectors for each energy service (space heating, space cooling, lighting, cooking, and water heating and electrical appliances) that would be sufficient to support the production of a reliable energy balance to be used for the evaluation of EE potential. Poor quality of data leads to poor decision making which in turn results in ineffective investments.

The KEEA, KEK and the Statistical Office of Kosovo should cooperate on a project to construct an energy efficiency database to define and then to implement an on-going program of data collection. The data collected would encompass appliance ownership, utilization patterns, energy consumption data according to building sector, fuel type and region, etc. - this would involve setting up metering schemes, customer surveys, questionnaires, regular, standardized reporting procedures, etc.

Barrier XI4: Lack of donor coordination on EE issues

In recent years there have been a number of separate EE projects in Kosovo covering similar activities and with similar objectives. There have been examples of replication of effort (different projects audited the same buildings), confusion among the beneficiaries as to the status of and relationship between projects, a lack of sharing of data in a national EE data base and disruptive competition for funding.

The establishment of a regular EE forum for all interested parties would help to reduce the impact of this significant barrier.

11.7.3 Legal and Regulatory Barriers

Barrier XLR1: The Kosovo Energy Efficiency Agency is inexperienced and under resourced relative to its responsibilities and obligations

According to Article 6 of the Law on Energy Efficiency, the KEEA is responsible for the following:

- Propose to the Minister the policies to promote the energy efficiency; Develop and maintain the database on energy efficiency;
- Develop the system of monitoring implementation of the National Energy Efficiency Plan and achievement of the indicative targets for energy saving;
- Propose to the Minister the National Energy Efficiency Plan;
- Prepare the Progress Report on the Implementation of the National Energy Efficiency Plan;
- Guide and support municipalities for preparation of the municipal energy efficiency plans and their progress reports;
- Promote energy efficiency through public awareness campaigns;
- Provide recommendations on necessary improvements to national and municipal energy efficiency plans;
- Prepare its Annual Work Report for the Minister;
- Co-operate with the Ministry and other relevant institutions in implementing energy efficiency plans;
- Support participation of interested parties in undertaking energy efficiency initiatives;
- Propose to the Ministry improvement and completion of legal and regulatory frameworks on energy efficiency, with a view of approximation with relevant European standards on energy efficiency;
- Support municipal energy offices on matters related to energy efficiency planning and promotion, and implementation of various energy efficiency programs at municipal levels;
- Promote information and education activities in the field of energy efficiency, in cooperation with ministries responsible for energy, construction and education.

An under-resourced KEEA increases the risk that Kosovo may fail to meet its obligations under the Energy Community Treaty and the Law on Energy Efficiency. As this barrier analysis indicates, the KEEA has a key role in eliminating or minimizing many of the barriers which impeded the implementation of EE measures. However with a staff of only 4 and a limited budget, the resources are minimal. MED should consider expansion of staff numbers - especially support staff for data processing (the introduction of student interns should be considered) - and an increase in the allocated budget for the unit.

Contacts with other regional energy efficiency agencies should be supported, possibly in the form of a regional cooperation supported by the EU, which already operates a number of internal programs for integration. An example is the EU *Interreg* program under which approximately 50% of the costs of a cross-border or regional program can be supported once a project proposal has been accepted.

Barrier XLR2: The Law on Energy Efficiency laid down procedures for setting up an EE fund to promote EE and RES projects. However such a fund is not permissible under existing legislation.

EE measures often require investments with a payback period that is longer than many consumers find acceptable. EE funds provide subsidies for implementing EE investments, shortening the payback period and helping to provide access to below-market rate financing where necessary. Often such funds operates with audits integrated for the client. The experiences of other countries (e.g Latvia, FYROM, Bulgaria) suggest that EE funds are a very effective mechanism for driving forward EE investments.

However, there is only provision for a single government fund in Kosovo from which all activities can be financed and since EE is not perceived to be the highest priority in Kosovo, the level of investment in EE measures will be lower than if there were a dedicated EE fund.

A detailed review of the situation must be carried out to assess whether a dedicated fund could be set up within the confines of the existing legislation or whether and how the existing legislation could be amended.

11.7.4 Financial Barriers

Barrier XF1: High level of transaction costs for (in terms of both money and time) for EE investments

This is a barrier that operates across all sectors, particularly where a new market is being established, where there are no established procedures and the players tend to be risk averse. Transaction costs encompass the entire process of planning for, implementing and monitoring EE investments. Transaction costs include the cost of obtaining an energy audit, getting expert advice on the correct technical specifications, securing finance, preparing investment plans for the lender, verifying the purchase of equipment, implementing the measures, reporting on performance and so on.

In the short-term the barriers can be eased by the main market participants taking actions to streamline processes and procedures, for example by offering comprehensive EE delivery mechanisms and programs, by providing standardized financing packages, by combining smaller projects (such as household and apartment block renovations) in one contract and so on. In the medium-term the situation will naturally improve with time, as existing players become more confident and reduce risk premiums and new players enter the market and compete with the incumbents.

Barrier XF2: Lack of funds for energy auditors and energy audits

The demand for energy auditors will increase in future as the number of EE projects in Kosovo grows, because all investment decisions will have to be analyzed and assessed by means of energy audit. This is particularly important in he case of the residential sector, which has the highest energy savings potential, but which is typified by a very large number of very small buildings.

The KEEA needs funds to pay for any energy audits that will have to be performed by the 52 existing local trained auditors. In the medium- to long-term, it is envisaged that all the energy auditors will be self-employed and working on commercially driven terms. In the short-term, however, the Agency will have to pay for the services of energy auditors to evaluate the projects it is interested in progressing. Support will therefore have to be requested from the MED/MoF to secure the finance needed to pay for the necessary audits. The current GIZ project is reviewing and progressing the training and certification of local energy auditors.

12 Drivers for Enhanced EE Programs

12.1 Estimated energy savings potential

Traditionally, EE measures have been evaluated on the basis of the economic benefit of an investment and the value of the energy savings that it brings about. Based on the analysis described in Chapter 10, Tables 12-1 and 12-2 below illustrate how the energy savings potential for each building sector and for each energy service is expected to increase over the period 2013 to 2020.

By Sector, GWh	2013	2014	2015	2016	2017	2018	2019	2020
Residential Buildings	236.4	481.9	733.6	996.7	1281.9	1590.6	1923.0	2279.9
Private/Commercial Buildings	54.7	110.6	168.4	228.1	291.8	359.8	432.1	508.9
Municipality Public Buildings	19.7	39.8	60.5	82.0	104.8	129.2	155.2	182.7
Central Public Buildings	5.5	11.1	17.0	23.0	29.4	36.2	43.4	51.1
TOTAL	**316.2**	**643.4**	**979.4**	**1329.7**	**1707.8**	**2115.8**	**2553.6**	**3022.6**

Table 12-1: Total energy savings for each building sector (GWh)

By Service, GWh	2013	2014	2015	2016	2017	2018	2019	2020
Space heating	244.28	499.44	763.91	1041.99	1344.78	1674.02	2030.22	2414.66
Water Heating	16.14	32.50	49.07	66.01	83.96	102.96	123.01	144.14
Cooking	6.73	13.45	20.11	26.80	33.79	41.07	48.62	56.44
Lighting	32.30	63.49	93.21	121.86	150.50	178.96	206.91	234.09
Electric appliances	12.45	25.51	39.13	53.51	69.22	86.38	105.00	125.19
Air Conditioning	4.31	8.97	14.02	19.49	25.59	32.37	39.87	48.14
TOTAL	**316.2**	**643.3**	**979.4**	**1329.6**	**1707.8**	**2115.7**	**2553.6**	**3022.6**

Table 12-2: Total energy savings for each energy service (GWh)

However, the impact of energy efficiency measures can go far beyond energy savings and EE improvements can contribute significantly to economic growth, employment, social development and environmental protection.

12.2 Other benefits

There is now a growing awareness that energy efficient buildings provide a range of benefits beyond simple financial savings, depending on the measures introduced and their occupancy and utilization patterns of the building involved

Hence, the implementation of EE measures in Kosovo is driven by a wide range of factors and can be expected to deliver a wide range of benefits, including the following:

12.2.1 Economic Benefits

Improving EE costs significantly less than investing in new generation and transmission equipment, so EE measures make energy more affordable for households and reduce operating costs for business.

EE programs can provide a stimulus to the local economy by creating job opportunities: for example, for equipment manufacturers, for providers of installation, maintenance and repair services, for energy auditors, for project managers and for financiers.

Energy efficient buildings also boost the local property market, as they enjoy higher resale and leasing values and are easier to market.

12.2.2 Environmental Benefits

On the demand-side, EE measures reduce energy consumption and therefore mitigate environmental damage by lowering emissions of greenhouse gases and other pollutants, as well as reducing water use.

On the supply-side, as a result of modern technologies that will be used in the plant, the 'Kosova e Re' power plant is forecast to increase energy efficiency in generation by nearly 5%, compared to the existing TPPs, Kosovo A and Kosovo B.

The deforestation of Kosovo could begin as early as 2014 and any measures which serve to reduce the demand for energy and/or result in firewood being used more efficiently, will alleviate the pressure on forests and woodlands.

12.2.3 Social Benefits

By enhancing the quality of a building's environment, EE measures bring about improved health, well-being and social development.

In the work place, an improved working environment results in productivity gains and reduced absenteeism.

In educational establishments, improved comfort levels in terms of heating and lighting are positively correlated with improved academic performance (and behavior) by students.

12.2.4 Power System Benefits

Shortage of generating capacity in Kosovo means that supply is falling short of demand, especially at peak hours and in winter. Even though KEK generation and imports increased in 2011, load shedding also increased. The cost of imports was €55 million, partially funded by €27 million received in grants from the GoK. The Government cannot afford to subsidize imports long-term and EE measures will alleviate the pressure on Kosovo's thermal power plants, reducing the need imports and load shedding.

When integrated into energy resource plans, EE can provide longer-term benefits by lowering base load and peak demand and reducing the need for additional generation and transmission assets.

13 Removing the Barriers

13.1 International Experience

The following section provides examples of financing arrangements for EE projects in the SEE region which have some relevance for the situation in Kosovo.

13.1.1 Bulgaria

13.1.1.1 Bulgaria Energy Efficiency Fund (BgEEF)

The Bulgarian Energy Efficiency Fund was established in 2004 and initially capitalized entirely through grants, the major donors being the Global Environment Facility (through the World Bank), the Government of Austria, the Government of Bulgaria and several private Bulgarian companies.

The underlying principle of the BgEEF's operations is a public-private partnership (PPP). The Fund pursues an agenda fully supported by the Government of Bulgaria, but it is structured as an independent legal entity, separate from any governmental agency or institution. The Fund is profit-oriented and is responsible for ensuring the financial sustainability of its own operation.

The Fund has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. The BgEEF is a revolving mechanism aimed at supporting the identification, development and financing of viable energy efficiency projects predominantly implemented by Bulgarian private enterprises and municipalities. These projects are intended to result in substantial reductions of greenhouse gas emissions (GHGs), which is the main environmental objective of BgEEF. The Fund also supports ESCOs with a guarantee scheme in case of failure by their clients.

Up to the end of 2012, the Fund had financed 143 projects at a cost of €30 million. The projects supported were street lighting, reconstruction of heating systems and insulation of buildings. Interest rates have ranged between 5-9% for municipalities and 6-10% for cooperatives and individuals. The loans are normally for 5 years with owners' participation of 10-25%. The Fund's the guarantee scheme was utilized for 32 contracts – 29 of which were with ESCO projects - at a value of €12 million.

13.1.1.2 Bulgarian Energetic and Energy Savings Fund (FEEI)

The European Bank for Reconstruction and Development enhanced its support for energy efficiency projects in Bulgaria in spring 2012 with a new €10 million loan to the Bulgarian Energetic and Energy Savings Fund (FEEI). The FEEI is the country's first private fund supporting energy-saving measures in public-owned buildings. The bank's loan will be used to develop energy performance-based projects, with the objective of attracting both financing and expertise from the private sector by engaging Energy Service Companies (ESCOs).

Enemona[39], a Bulgarian engineering and construction company specializing in energy efficiency improvements across a wide range of public buildings, will implement Energy Performance Contracts. Through this loan, FEEI will provide the resources and skills needed to

[39] http://enemona.bg/english/index.php?97

finance energy-saving initiatives for its clients, mainly Bulgarian municipalities and state-owned companies, at a time when local funding remains scarce.

According to the EBRD's Director for Bulgaria "The Fund will support sustainable energy projects based on energy performance contracts. This scheme can generate energy efficiency investments that municipalities operating under tight budgets would never be able to fund themselves. As a result, they can achieve improvements at no initial cost, while the investments are recovered from the obtained energy and cost savings".

The government of Bulgaria estimates that public building owners could save up to 50% of their annual energy bills by undertaking energy efficiency improvements. The Fund is helping to realize this savings potential with a strong pipeline of projects to be implemented over the coming years. The projects will range from installing energy efficient public lighting and introducing combined heat and power generation plants to boiler updates and thermal insulation of walls and windows replacement in the municipal sector. This is a practical example of how one EU member country is promoting the establishment of the ESCO concept.

13.1.1.3 Residential Energy Efficiency Fund (REECL)

The REECL facility aims to give households or Associations of Home Owners in Bulgaria an opportunity to realize the benefits of energy efficiency home improvements by providing loans and incentive grants through participating banks. A €40 million credit line has been established with local banks.

A household or a Home Owners Association, which takes up a loan, is entitled to receive an incentive payment of 20%-35% of the costs of the investment once the project has been successfully completed.

The following energy efficiency installations are eligible to receive loans and grants:

- *Energy Efficient windows*
- *Insulation of walls, roofs and floor*
- *Gas boilers*
- *Biomass fuelled room heaters, stoves and boiler systems*
- *Solar thermal systems*
- *Cooling and heating pump systems*
- *Integrated photovoltaic systems*
- *Heat-exchangers systems and building installations*
- *Gas-installations*
- *Mechanical ventilation systems with heat recovery*

Applicants need to use eligible products and materials to qualify for the incentive grants. A list of eligible installers is available as well as application materials. Four banks are providing the loans: ProCredit Bank, Raiffeisen Bank, DSK Bank and CIBANK. The loans carry interest rates of 10-11% per annum and to satisfy collateral requirements the following scheme is applied:

- *€0-€5,000: Personal responsibility*
- *€5,000-€10,000: personal + 1 other guarantee*
- *>€10,000: collateral in real estate.*

The grant is paid out following the submission of a detailed completion statement after the installation work has been completed. The value of the grant is dependent upon what kinds of materials have been used and is disbursed in accordance with a standard published list.

The credit line for the REECL is financed by the EBRD, with assistance from the EU and the Bulgarian Energy Efficiency Agency. The grant element comes from a national fund financed by EU as compensation to Bulgarian energy sector for the closure of the Kozloduy nuclear power plant. In spring 2012 the EBRD extended the credit line with €5 million, in addition to the €40 million made available in 2011. From 2006 to date, the REECL Program has committed to 36,061 energy efficiency loans totaling approximately €54 million and incentive grants amounting to approximately €10 million. With a subsidy of 20-35% combined with moderate interest rates, the scheme is considered quite attractive for participants. The scheme is planned to end in July 2014.

13.1.2 Poland

The Thermal Modernization Law and Fund were introduced in 1999 to support the energy efficient refurbishment of buildings in Poland. The conditions of the Fund state that refurbishment projects must meet certain technical and financial criteria, which need to be verified by an energy audit and a financial analysis. Energy savings after refurbishment need to achieve a rate of at least 25%.

The bank loan can amount to up to 80% of the total cost of a refurbishment project. If the loan (plus interest), are theoretically repayable on schedule (i.e. within 10 years, the maximum loan period), then the state owned "National Economy Bank" (BGK) can issue a bonus of 25% of the loan rate.

The procedure is that an investor (e.g. housing cooperative or homeowners' association) willing to modernize its building applies to the BGK for a 'thermal modernization bonus' via a lending bank. The results of an energy audit must accompany each application and if the refurbishment project is completed successfully, the bonus will be granted just after completion of the investment.

Until mid-2002, the Thermal Modernization Fund was not very successful, mainly due to the complicated application procedures and high interest rates. However, in 2003, the conditions were amended, massive promotional activities were introduced and the number of applications increased significantly. Now the size of the fund is insufficient and is not able to meet demand.

In 2001, modernization of public buildings also became eligible for the fund. The main incentive of the fund is the grant of 25% of the loan, paid out after the modernization work is completed. The premium is paid to the crediting bank directly from the premium fund, as a repayment of part of the credit installments, just after all the modernization work is completed. The replacement of a conventional heating system by another one using a renewable energy source is also included in the scope of the permitted investments described by the law. The scheme is available to all investors, such as owners or administrators of buildings, local heat providers and local heat distribution networks.

Support from the Thermal Modernization Fund has been available for public buildings since 2001. To be eligible, projects have to fulfill technical (minimum energy savings in physical terms) and financial criteria. The investment project should result in:

- *Reduction of consumption of energy for heating and hot water purposes;*
- *Reduction of heat losses in local distribution networks and local heat sources;*
- *Total or partial replacement of conventional energy sources with non-conventional ones, including RES.*

Eligible projects must deliver improvements resulting in the reduction of annual energy consumption for heating and hot water purposes:

- *in buildings where only the heating system is modernized by at least 10%;*
- *in buildings where the heating system has been already modernized by at least 15%;*
- *in other buildings by at least 25%;*
- *improvements resulting in the reduction of annual primary energy losses in local heat sources and local distribution networks by at least 20% per annum;*
- *installation of technical couplings to centralized heat sources aimed at reducing the cost of purchasing heat supplied to buildings by at least 20% per annum.*

The process for the scheme is as follows:

- *Conduct energy audit*
- *Loan application*
- *Approval of loan and obtaining the right to receive the premium*
- *Design*
- *Construction permit*
- *Construction/Implementation*
- *Verification of the design conformity with the results of the first audit*
- *Release of the premium to the financing bank*

The scheme is planned to run from 1999 to 2016. By 2009 17,887 applications had been received and the bonuses paid out amounted to some €250 million.

One reason why Poland has put so much emphasis on heating supply is because it has widespread district heating networks. Many are fuelled by coal, resulting in harmful emissions and as such are a burden in the CO_2 inventory. Therefore, the installation of new more efficient heating systems and improvement of existing ones are a top priority.

13.1.3 Armenia

There are some interesting similarities between the energy sectors of Kosovo and Armenia, such as the fact that the main sources of heat supply for households are electricity and firewood and prices for both these energy sources are below their cost of supply. In both countries a large proportion of households exist at low income levels that prevent them from participating in any commercially based financing schemes.

Another similarity is that there are housing association schemes in Armenia which operate with limited success, due to barriers in financing common projects. One reason for this is lies in significant differences in the financial capacities of households within the same building. The occupants of each apartment, therefore, have to make their own heating supply arrangements. Consequently, a wide range of individual solutions are implemented: electric heaters, wood fired stoves and ovens and gas ovens. There are many accidents caused by incorrect installation and very few examples of common solutions being established for a single apartment building. The widespread district heating systems collapsed in the early 1990s and refurbishments are unpopular because of bad experiences with failed repayments and subsidies having to be paid. Local grids and radiators exist, but they are not used.

To help address some of these issues, the Armenia Renewable Resources and Energy Efficiency Fund (known as R2E2) was established in November 2005 with US$2.95 million from the Global

Environment Facility and US$15 million from the World Bank/IDA[40]. In the loan agreements between the Armenian Ministry of Finance and the WB/GEF, a detailed budget for disbursement of the funds was agreed upon, with provision for information campaigns, consultancy advice on investments and operations of the fund. The direct disbursement for the funds was through credit lines from the fund to commercial banks. By 2010, 8000 households had entered into finance agreements and projects carried out in 120 schools.

With regard to energy efficiency, the focus was put on providing quality heating for schools and on developing household associations. One of the barriers addressed was the high percentage of poor households who are unable to participate in financing schemes. In order for such households to be able to participate in a common finance scheme for an apartment block, a certain proportion of the funds, US$4 million was set aside as a subsidy specifically to secure financing for the poorer households. 5,000 households have taken advantage of this assistance and a total of 12,000 applications had been received by 2011. One significant barrier for attracting home owner associations could therefore be managed.

13.1.4 Serbia

In 2003, under arrangements agreed with the Serbian government, the World Bank provided a loan of US$ 21 (€15.75) million for energy efficiency initiatives. This was supported by a further contribution of €3 million from the Serbian government and later on, the loan was supplemented with an additional €22.5 million provided by the IDA and the IBRD. In the first two years of operation 28 concrete projects were initiated. The loans were used to fund investment projects in energy efficiency in municipal buildings such as schools and hospitals and at the Clinical Centre in Belgrade. The Clinical Centre loan was administrated jointly by the hospital management and the World Bank, while the implementing agent for the municipality loans was the Serbian Energy Efficiency Agency, which handled the tenders for services and analysis in relation to specific projects.

The loans were used to fund improvements in the building envelope and energy supply services within the facilities. Funds were also set aside for preparation and design of the individual projects. At the Clinical Centre in Belgrade, where around 50 buildings were each heated by their own coal boilers, a system of gas fired central heating was installed. The program has completed a total of 80 different projects, realizing average energy savings of 40%. The program ended in April 2012 and at the beginning of 2012 80% of the allocated funds had been disbursed. One of the main reasons for the successful implementation of the overall program has been that it was it was initiated after a comprehensive analysis of the building sector of Serbia had been completed, which gave realistic estimates of rehabilitation costs and measures. The projects have only involved public buildings.

Data from the projects completed during the period 2006-2007 shows that energy savings of up to 45% were achieved in certain cases and that payback periods ranged from 2 years to 15 years with the median payback being around 5-7 years, which is a good outcome for building rehabilitation work.

In autumn 2012, the SEEA was restructured and moved from an independent status to the Ministry of Energy, Development and Environmental Protection to become an integrated part of this new Ministry.

[40] Development Credit Agreement (Urban Heating Project) between Government of Armenia and IDA. 2005 and web page of the fund (R2e2) 2012

13.1.5 Albania

Albania has established a project for increasing EE by implementing improvements in public buildings and private service facilities. The project is supported by a €5.6 million grant provided by the KfW. The arrangements of the fund for this project are that 85% of the costs for public buildings should be financed by KfW and 15% should come from government sources. Although initially it had been planned to include private sector buildings in the project this did not happen and all the funding is going to the Public Building Sector. Up until the end of 2012 three kindergartens had been rehabilitated at a cost of €0.3 million. 50 energy audits have been performed and 15 public buildings and industrial projects are planned.

The program will restart after June 2013 and is scheduled to continue till 2015, but with only 5% of the funds disbursed so far, the scheme has not yet fulfilled its objectives. Reasons for the low utilization include delays by government institutions, a lack of awareness due to insufficient promotion and barriers on the demand side, such as low energy prices – as is the case in Kosovo.

13.1.6 Lithuania

Between 1996 and2004, Lithuania developed a program for modernization of multi-family buildings using the Joint European Support for Sustainable Investment in City Areas (JESSICA) scheme, which supports sustainable urban development by supporting projects in certain areas, including EE improvements.

The Energy Efficiency Housing Pilot (EEHP) Project specifically addressed the lack of access to EE funding and the lack of project development capacity in Lithuania. During the course of the project, which was implemented by the Central Project Management Agency, more than 730 multi-family buildings were refurbished with energy-efficient measures such as heating system improvements and replacement windows. Preferential loans and subsidies amounting to 30% of the pre-tax cost of the rehabilitation work were made available by the project. The program success was considered to be moderate, but it helped to shape the Lithuanian Housing Strategy, which was developed as a direct result of the experience gained from the EEHP project.

In September 2009, a new grant program, the Program for the Modernization of Multi-family Buildings, was launched. This program addressed the same issues as the earlier EEHP, but with a special emphasis on low-income families. The scheme, which is still on-going, provides support in the form of grants for the preparation of technical documentation and supervision of works as well as for the EE improvements themselves. Up to 2014 the program will cover 100% of the documentation and supervision expenses and 50% after 2014. For EE measures, it covers up to 20% of the costs but for low income families the figure is 100% provided as long term credit at 3% interest. Participants in the program include apartment owners, the housing loans insurance company and the Housing and Urban Development Agency. About two thirds of the budget (€137.5 million) comes from the European Structural Fund and the remainder (€65 million) from the state budget.

13.1.7 Estonia

The Building Renovation Program in Estonia began in June 2009. The scheme is financed by a revolving fund provided jointly by the European Regional Development Fund (€17 million), the Council of Europe Development Bank (€29 million) and the State (€8 million). The program funds are managed by KredEx, an Estonian financing institution.

The objective of the program is to address the issue of access to EE finance for homeowners' associations, develop project management capacity and raise awareness on EE issues .The scheme provides low-interest loans to support the implementation of EE measures and renovation work. The homeowners' associations request loans from selected commercial banks and KredEx then steps in to support these loans. Grants of up to 35% are also made available for energy audits, expert evaluations and recommendations, design work and awareness raising among residents.

Between June 2009 and the end of 2011, 364 contracts worth €32 million were signed to pay for the refurbishment of multi-occupancy buildings. The program faced several problems during the course of its implementation, such difficulties with the preparation of the required documentation and the unwillingness of some of the potential beneficiaries involved to take on debt.

13.2 Financing and Delivery Mechanisms Issue

As described in the previous section, funding for the implementation of EE investments can be provided in various ways. The range of funding sources and schemes typically found in Central and SE European countries spans a number of possible arrangements.

- *Public Investment Programs, that draw on central government and/or municipal budget resources which are used specifically for improving national infrastructure through:*
  - *Subsidies targeted at specific groups or activities;*
  - *Special programs – such as 'green investment' schemes;*
  - *Special funds – established by state and/or municipality, to support, for example, investments in energy efficiency or environmental protection.*
- *Funding may be provided by IFIs and other international donors through bi-lateral or multi-lateral arrangements, in the form of loans, grants and technical assistance.*
- *Commercial banks can offer loans designed to support EE related activities.*
- *Individuals and organizations can finance EE projects from their own internal resources.*
- *Private investment channeled through companies such as ESCOs which exploit the opportunities presented by the implementation of EE schemes.*

This study has identified several specific financing needs which arise from the particular circumstances which apply in Kosovo.

13.2.1 Financing Needs

The difficulty of financing implementation of EE measures is one of the main challenges with regard to realizing the full energy saving potential of energy efficiency in buildings. The reasons usually given for the slow development of EE markets are high up-front costs, perceptions of disproportionate risk exposure, uncertainty surrounding the calculation of expected energy savings, the choice of appropriate discount factors and the tendency of commercial financing institutions to assess EE investments by means of traditional indicators.

To address the issue of prohibitive up-front costs, financing instruments such as preferential loans and energy efficiency funds are usually considered appropriate for countries at a similar stage of development to Kosovo. In essence, these financing schemes offer building owners or potential investors the opportunity to either get access to low interest loans and/or loans with reduced security/collateral requirements and/or to benefit from innovative loan repayment mechanisms. Moreover, as discussed in Section 11.7.1, by demonstrating the security and financial attractiveness of investments in EE projects, the implementation and evaluation of such programmes play an important role with regard to creating confidence and supporting market development.

Although these mechanisms provide effective policy instruments for addressing the initial cost barrier, it is important they should be part of an integrated approach to EE and be combined with additional financial, regulatory and informational tools. These include measures such as tax credits or grants for implementing EE projects, the introduction of minimum EE standards, provision of advice and assistance during design and construction and provision of training for financiers and they are an essential requirement if the objective is to achieve fundamental, long-term market transformation. As a general principle, in order to drive investments in EE measures, EE loans have to be economically priced and specifically tied to investment in EE measures loans. The following mechanisms and models reflect this general principle.

13.2.1.1 Preferential Loans

In preferential 'soft' loan schemes, the GoK, with the support of IFIs, would work through private financial institutions, to provide favorable loans at low (or even zero) interest rates and/or extended payback periods. The aim of such arrangements is to increase the attractiveness of energy efficiency investments and to leverage an increase in lending for EE projects. In some cases, such arrangements have implemented through PPPs, in which governments subsidize loans for the attainment of high levels of energy performance in new or refurbished buildings or for a specified range of energy conservation measures (e.g. window replacement, roof or wall insulation, replacement of boilers, etc.). The loan is usually subsidized by providing fiscal incentives, low or no interest loans and/or partial/full loan default guarantees to private financial institutions for offering low-interest loans to building owners or investors.

The Eko loan scheme backed by KfW was based on this model, but the rates of interest charged were not sufficiently discounted to allow for a significant degree of market penetration. The current emphasis that financial institutions are putting on the need to ensure that all borrowers are exposed to commercial discipline and fully repay any debts they incur means that very soft loans on a wide scale are unlikely to be an option in Kosovo in the near future.

13.2.1.2 Energy Efficiency Fund

Energy efficiency funds are entities that manage and distribute financial support to EE programmes and have proved to be a popular mechanism for supporting EE initiatives in Central and East European countries. Such entities can be government organizations, independent 'special purpose' funds, funds run as businesses by existing companies or partnerships between any of the above. Therefore a clear distinction needs to be made between budget-supported EE funds that provide grants on the one hand and incentivized schemes operated by commercially-oriented EE revolving funds, on the other.

Since in this region the financial assets for EE funds usually derive from public sources they are mostly set up by governments or other public entities. However, some funds have coordinated or implemented EE programs themselves and equally, there are no reasons why implementation could not be done in cooperation with energy companies, existing financial institutions or other private organizations - see Section 13.2.1.7.

EE fund supported programs typically combine information, motivation, financial incentives, financing, capacity building, RD&D promotion, and so on. The energy savings and the cost-effectiveness of EE funds is highly dependent on the programs that are supported, but the expectation is that EE funds will achieve gross energy savings which are cost-effective for consumers and for society as a whole.

EE funds can be funded from the central government budget, although funding through a special levy or tax is quite common and allows a more stable level of income than annual budget allocations, which are often subject to political fluctuations. Where it is possible to do so, emerging economies often support EE funds through 'climate' finance (e.g. under the Clean Development Mechanism).

Compared to implementation through government agencies or energy companies, EE funds offer the following advantages:

- coordinated use of the allocated budget which is specifically designated for EE investments;
- flexible allocation of assets, depending on the success of different programs;
- if funded by a special levy or tax, more stable and less dependent on annual budget allocations than normal government programs.

The main weakness of an EE fund is that its impact depends on the level of financial assets that is allocated to it and therefore if this is insufficient, the impact may be low. This weakness can be overcome by creating a revolving EE fund, which is a self-sustaining financial scheme that uses a one-off initial investment to establish a permanent financing structure for EE projects. When operated by the government, a common option is to provide the initial funding from dedicated revenues generated by energy taxes. Borrowers repay their loan to the fund with the extra cash released by the energy savings they make and the repayments then replenish the funding pool to enable additional lending. This is in contrast to the EE fund described above, which organizes and funds EE programs using an annual budget but normally requires no repayments.

The experiences of most countries in the region (e.g. Bulgaria, Latvia, Albania), suggest that (as long as it is managed efficiently and honestly) the revolving EE fund, or a variant of it, provides the most effective mechanism for channeling finance to both private and public sectors. The operational characteristics of an EE fund are that it functions as an independent body, with its own staff, fund manager and board of directors. The role of fund manager can be taken on by any financial or banking organization deemed to be appropriate, whether domestic or foreign. The board usually consists of representatives from both public and private sectors.

The purpose of the fund is to provide municipalities, households and businesses with loans – which have to be repaid - to finance the implementation of EE projects. Most funds operate in an analogous way to ESCOs, in that the energy cost savings resulting from investments are used to repay the loans. In most cases, for example in Bulgaria, the funds operate on a 'revolving' basis, with repayments used to finance additional projects.

Funds normally offer a number of financial products, to reflect the characteristics of the borrower. Larger and wealthier municipalities, which have dependable independent revenue streams, are dealt with under standard loan financing terms. The loans are treated as municipal debt, with fixed repayments (secured against revenue streams) over the period of the loan. Smaller and less financially viable municipalities – as well as households and small businesses - which cannot afford to take on debt, are sometimes given the option of contracting for turnkey energy services with the fund. Under these arrangements, the fund undertakes to deliver EE projects in return for fixed payments – usually related to energy savings - which, over the period of the agreement, will cover the funds costs and fees.

However, at present a national EE Fund as envisaged by the Law on Energy Efficiency is not a possibility in Kosovo unless there is a change in the primary legislation, since this only allows for a single all-purpose national investment fund. Also, the implications of the Law on Public Debt in respect of municipality borrowing capability need to be evaluated. The task of resolving how an EE fund – or a quasi-fund, which complies with the legal constraints - could be implemented in Kosovo should be undertaken as soon as possible.

13.2.1.3 Public Investment Program (PIP)

In order to support the development of the EE sector, it is essential to start implementing real projects as soon as possible. In the absence of a dedicated EE Fund, this process could have to be supported by the establishment of a Public Investment Program. The Program would consist of a set of EE investment projects included in a project list approved by the Government in accordance with its normal criteria (in order to ensure predictability and sustainability, PIP funding for investment projects is usually fixed as a set percentage of GDP).

In the case of Kosovo, one of the main Ministries should be responsible for overall coordination of the PIP and the KEEA should be responsible for EE projects and the following tasks:

- *Assessment of submitted project applications and preparation of potential projects list*
- *Overall coordination of EE sector program implementation*
- *Implementation supervision of projects*
- *Post-implementation supervision*

Alternatively, funding could be provided by IFIs or other donors through the responsible Ministry to lend to municipalities for implementation of EE projects. The borrowers would pay back the loans from the energy cost savings of the implemented EE projects, with repayments secured against future revenue. A typical co-financing scheme in the region might require at least 10 % of funding to be covered by municipalities, 30% by the state budget, 30 % by grants and 30 % by loans.

13.2.1.4 Access to borrowing

One explanation for the lack of available capital for low-income individuals and small businesses is that the costs of investigating the credit worthiness of such individuals or firms (acquiring the necessary information to establish an acceptable level of risk) may be sufficiently high to significantly diminish the economic viability of such loans. In other words, if the probability of a loan default rises as the income of the borrower decreases, the percentage of creditworthy investors out of the total pool of low-income individuals and small firms declines and the cost of acquiring the relevant information increases because a larger number of potential clients will need to be investigated per loan.

Certainly, there are low-income individuals and small business owners in Kosovo, who are unable to borrow from the commercial banks because of their economic status or lack of credit-worthiness. Whilst most IFIs take the position that grants, gifts create dependency and that all financial transactions should be carried out on a commercial basis, this requirement in effect precludes a significant part of the residential and commercial sectors from implementing EE measure in their properties. A mechanism for enabling this sector of the market to participate in the EE market is required. The example of Armenia, which has some similar characteristics to Kosovo, may provide a useful model. The Armenia Renewable Resources and Energy Efficiency Fund set aside US$4 million as a subsidy specifically to secure financing for the poorer households - 12,000 households had applied for such assistance by the end of 2011.

13.2.1.5 Pre EE funding

Before realizing energy savings that result from the implementation of EE measures, many public buildings must first achieve the comfort levels that are specified in the relevant Technical Regulation. Financial assistance could be provided to help municipalities attain these required comfort levels, after which point the building owners would be in a position to financially benefit from the potential energy savings that can be realized by investing in EE measures.

13.2.1.6 Credit Lines - Targeted funding and displaced loans

In 2011 KfW opened a credit-line a to finance the implementation of EE measures in public buildings, with disbursement of funds to be carried out by local banks and more recently the EBRD has been considering a similar arrangement. However, due to the liquidity of the market, the banks did not want to channel KfW funds - which were earmarked for EE initiatives - but preferred to loan out their own money.

Although the EKO loan concept is still being successfully promoted by the banks – for example, Raiffeisen Bank in its 2012 Annual Report stated that "The EKO loan portfolio has grown steadily, and reached EUR 8 million at year-end. A total of 863 EKO loans were disbursed in 2011, with a total volume of EUR 5 million", the EE focused KfW credit line has been displaced by the commercial banks' own loans (as has the potential EBRD fund).

13.2.1.7 Credit Lines - Routes to Market

In general, IFIs deal directly with government departments and do not have the necessary skills or resources to disburse funds directly to a large client base. Therefore they often rely on local banks to undertake this task. But given the present economic climate and the strategies being adopted by commercial banks, the international donors need to find other mechanisms for disbursing EE funds.

There are also other organizations operating in the energy market which can distribute funds to individuals and organizations wishing to invest in EE measures and whose interests run in parallel with those of the donors. Although such organizations are not necessarily specialized in channeling finance into a mass market, they can reduce the scale of the exercise by offering to serve as a single point of contact with a donor and then taking on the responsibility for managing a fund or credit line through the existing relationship they have with their clients, members or employees. For example:

- KEK/KEDS is a key player in the sector and has increasing expertise and credibility in the field of EE. The company has a financial relationship and is in close contact with its customers, has an extensive data base and knows them as well as a bank knows its customers. One option to consider is the possibility of an administrative relationship through which KEK/KEDS could distribute project funds to its customers. A further possibility to consider is whether the utility company could develop a variant to reward customers who pay their bills on time by providing discounted financial and technical help with EE projects.
- The task of legalizing buildings that have been constructed without the necessary permits is very onerous and time consuming one, but one which presents an opportunity for pushing through EE investments which might otherwise not be made. At one end of the spectrum the MESP can insist that a condition of obtaining legal status is that the owner must demonstrate a certain comfort level and standard of EE in the building in order for his/her application to be accepted. At a slightly less demanding approach would be to fast-track applications from owners of buildings who demonstrate that they have invested in a minimum level of EE measures. In both cases, there is a need for finance, in the first instance for energy audits and subsequently to purchase the

materials and services required. Providing the finance at an attractive rate would make the EE condition less demanding and at the same time bring buildings up to the standards that they should have achieved at the outset, had they complied with the regulations. The possibility of establishing an entity to administer funds for this purpose should be examined.

- At present a large number of apartment blocks in Kosovo are deteriorating because there are no effective mechanisms for getting the occupants to raise the necessary finance for repairs and refurbishment. There are two possibilities for dealing with this issue, either to work within the current constraints or to try and change them and create a better system. Despite a number of initiatives to strengthen civil society organizations in the past the essential problems remain: Housing Associations are run on a voluntary basis, there are no enforceable contractual agreements or obligations and there is rarely a consensus view on how to proceed, particularly with respect to financial issues. If funds were made available then, once their legal status is enhanced, Housing Associations could represent groups of apartment owners in securing improvement loans. In the meantime, the need to improve the fabric and efficiency of at least the poorest households and the most dilapidated apartment blocks is becoming increasingly urgent, A central fund could be set up, administered by a central unit and disbursed through teams of regional auditors, for example managed through the 5 Regional Development Agencies and operating at the municipal level. Meetings and negotiations with occupants would be organized and, where appropriate, certain individuals or families with proven financial constraints could be given grants to enable them to contribute to the costs of communal repair and improvement. Meanwhile the task of establishing effective Housing Associations would continue.
- As well as developing the framework of the energy sector, the Government of Kosovo has initiated a process of local government reform and decentralization. The process has involved ratification of new laws, reform of the local finance system, establishment of new municipalities and the transfer of competencies and resources from central to local government, supported by local capacity building to facilitate efficient self-government. In recognition of the fact that significant investment is required in the municipal infrastructure, the Law On Public Debt came into force in 2010, allowing local government to take up commercial loans and setting out the conditions under which municipalities can borrow money. Amongst the objectives of the KfW project 'Implementation of EE Measures in Public Buildings' were the need to reduce the dependency of municipalities on the central budget and to introduce some commercial discipline into their financial activities. However, because of the demanding conditions set out in the Law On Public Debt only two municipalities were actually eligible to actually borrow the money that was being channeled through the commercial banks and an alternative mechanism was proposed, namely to route the loans through the Ministry of Finance. Although it was not actually pursued, this mechanism represents another model for financing municipal projects. At this point it is necessary to review the contractual chain that would have to be set up, identify where the various risks involved would reside and agree what the source of any guarantees would be. Given the reluctance of the commercial banks to become involved in loan disbursement it is important to establish whether this alternative mechanism provides the donor agencies with a viable alternative to working through the banks.

13.3 Alternative Models

13.3.1 Energy Savings Companies

An Energy Services Company (ESCO) is a company that offers a total energy service package to clients who wish to implement EE measures. The package delivers technical, installation and operational services as well as financial support for an agreed period. The client (house owner or business) has no need for up-front capital as the ESCO recovers its costs by retaining a proportion of the client's energy savings generated as a result of the EE investment undertaken (see Figure 13-1 below). Repayment is normally spread over a period of 5-8 years and at the end of the contract the ESCO steps out of the agreement and leaves the installation to the owner. Such companies can be public or private organizations and often develop out of other types of businesses that operate in the energy sector.

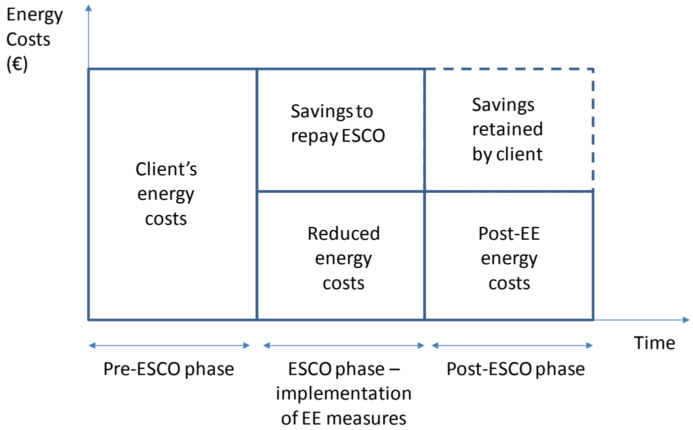


Figure 13-1: Basic economics of an ESCO scheme

There are many companies in Europe offering ESCO services and they vary in their structure - there are schemes, which cover the entire operation of a city's district heating system and others that involve only a single building. In general, all provide both technology services and access to capital for finance. At the heart of the arrangements is the performance contract, in which the baseline for energy consumption and costs is defined and it is from this baseline that the expected (and guaranteed) savings are calculated.

The most problematic aspect of the ESCO arrangements is the performance contract. The expected savings must be defined precisely and consideration given to how future energy price levels might affect the realized savings. Another complication arises when departures occur from the expected level of savings due to the introduction of increased comfort levels or significant changes in weather conditions. There is also a technical risk that the installed measures may not deliver according to expectation. All these uncertainties have to be addressed in the performance contract, making it rather complicated to tender for and compare offers.

In principle, an ESCO designed to cater for households that covers up-front costs and gets repaid by savings could be an attractive proposition. Typically, the major players in this market are utility companies, equipment manufacturers, suppliers, and contractors. However, if such an ESCO involves contracting with existing individual households inevitably transaction costs will be high and reduce the profitability of the scheme. Industrial and group-based contracts require less time to administer than household contracts and would normally be expected to generate a higher income.

Household contracts, on the other hand, require more collection agents – particularly in lower income communities - while the administrative system also needs to be more sophisticated to deal with a larger number of contracts and requires more support staff. In addition to higher staff costs, another factor that erodes profitability is the relatively inefficient nature of retrofit projects in comparison to new developments.

When considering the financial return of projects, it should be recognized that retrofit household projects suffer from significant inefficiencies. In the household context it is more expensive to put in or to insulate a ceiling after a house has been completed. And a large reduction in space heating expenses can often be achieved if the orientation of a house, the size of the windows and other key factors are optimized so as to contribute to improved comfort levels.

Furthermore, in a 'new development' situation, the client of the ESCO is more likely to be a single project developer rather than a collection of individual homeowners, which greatly reduces transaction costs.

In the majority of cases, ESCOs finance EE projects according to three models: guaranteed savings, shared savings and supplying energy services.

- *In guaranteed savings projects, the customer – and not the ESCO – borrows money to finance the intervention. The ESCO guarantees to deliver a certain level of savings and is paid an agreed sum to do so.*
- *Under a shared savings model the ESCO is paid a percentage of the costs they save for their client. The 'win-win' nature of this type of arrangement is particularly relevant for energy efficiency projects. In shared savings projects, the ESCO finances the investment and takes on the performance risk as well as the credit risk.*
- *The third model involves the sale of an actual energy service rather than of a product, i.e. hot water, space heating or lighting, rather than a boiler, roof insulation or a light bulb. Instead of buying an asset with a limited life, of which the customer has little knowledge, the asset is replaced with a service contract with another entity. The economic justification is that the provider of the service will deliver the service in the most efficient way. In this case the ESCO takes on the cost of investment and also responsibility for operations and maintenance over the project lifetime*

ESCOs have not yet become widely established in SE Europe. In Serbia there are about 10 companies offering quasi-ESCO solutions, but they cannot be considered 'true' ESCOs because there is no performance contracting involved and the finance is not part of an integrated service but a service to get customers into contact with local banks. As described in Section 13.1.1.2, the Bulgarian Energetic and Energy Savings Fund (FEEI) is planning to engage an ESCO in the near future which will be operated by a local engineering and construction company.

It has only been possible to identify one ESCO operating in the former Yugoslavia, HEP ESCO d.o.o.[41] a utility based company connected to Hrvatska Elektroprivreda, the electricity provider in Croatia. This ESCO is financed by the World Bank, the GEF (Green Environmental Fund) and local banks. The company has been active for 8 years and is involved in a broad spectrum of projects, ranging from €100,000 schemes to €2 million programs and covering public lighting, public and private buildings, industry and energy supply systems (e.g. CHP and DH). Typical financing arrangements run from 5 to 8 years. In a presentation last year[42] HEP noted that there were three main barriers encountered during the preparation phase of EE projects in Croatia: a lack of capacity and know-how because the market is still small, a lack of development and project financing, and finally, a lack of consumer demand - the incentives for energy saving projects are too limited.

41 http://www.hep.hr/esco/en/aboutus/default.aspx
42 Presentation by HEP ESCO at the Biosolesco Conference in London, May 2011

A number of other market barriers, which appear during the implementation of ESCO projects, were also identified:

- *unresolved property ownership issues,*
- *the treatment of long term EE contracts as a credit relationship and the creditworthiness of clients*
- *the continuing existence of both ESCO and client during the pay-back period*
- *the Public Procurement Law (a problem for public ESCOs)*
- *the Budget Law*

HEP's view is that the Croatian Budget Law needs to be modified to facilitate the repayment of EE investment costs and savings to municipalities, new book-keeping procedures for EE projects need to be agreed and the budget setting process, currently based on the previous year's costs, means that municipalities cannot benefit from EE investments in the longer term - as is the case in Kosovo. (See Barrier PLR1, described in Section 11.6.3).

HEP suggested that all the key players have to cooperate in order to remove these barriers – energy companies (utilities), ESCO Companies, municipalities, consultancy companies, equipment manufacturers. In addition, more and better education is needed in the area of EE.

Although there are no ESCOs operating in Kosovo at present, once a legal framework has been put in place and the economic conditions are appropriate, such companies could be established to finance EE projects on behalf of their clients and share the benefits of the resulting energy savings with them. In this respect it is important to start implementing energy saving projects as soon as possible, so that they can serve as demonstration projects for other EE initiatives in Kosovo. On the supply side, this will create opportunities for construction, heating and air conditioning companies to broaden and improve their skills and knowledge and to win more contracts in future. After completing a number of such projects successfully, some of these companies will continue to develop and evolve and will eventually transform themselves into ESCOs. In the meantime, the MED will prepare secondary legislation for the ESCO contracting framework, as it is obliged to do by the Law on Energy Efficiency.

The EBRD was in the process of reviewing the case for funding a project during winter 2012 to research the possibility of establishing a regional ESCO for SE Europe. This project would clearly be of interest to Kosovo and developments should be followed closely.

13.3.2 Public Private Partnerships

A public private partnership (PPP) is a form of co-operation between a public body and a private investor in a particular sphere of activity, for example airport management, research projects, hospitals, road construction, schools, bridges and airlines. There are several models for how a PPP can function. Some are close to the ESCO model, while others relate more closely to the concept of leasing.

Normally, the public entity and the private investor establish a shareholding company or a consortium, or agree a contractual relationship. For example, for EE projects, the payback of the initial investment could be secured through energy savings realized, as in the ESCO model described above. In Denmark, the establishment of PPPs at municipal level has proved to be complicated because of a conflicting regulatory framework and some projects have had to be abandoned. There is also a political barrier, because some politicians want to get profits from the deal, but expect the private business partner to assume all the risk. On the other hand, the public partner may want to avoid taking on any commercial risk, and therefore is not interested in participating in such projects.

At state level, PPPs are mainly established for major infrastructure projects. An example is the oil exploration and production sector, where the state will usually require a percentage share in the exploration license and participates on equal terms in the prospecting and production activities. An example is Norway, where the state has established a large fund built up from profits from North Sea activities. In the UK there are examples of PPPs in the health sector, where a private company takes care of the hospital building and associated services and the public sector provides the medical expertise.

The European Commission participates in a PPP for research in energy-efficient buildings – EEB PPP, whose aim is to come up with future energy efficient solutions for the building sector. The objective is to create CO_2 neutral buildings and the research involves technical experts, the construction sector and research institutes[43]. The fund comprises €1 billion and the first 60 projects were approved in 2009 with a budget of €65 million. Industry received around 48 % of the funding allocated to the selected projects, with SMEs representing 30 % of the funds.

PPPs in the building sector are common in the UK and in Germany. Contractual arrangements can vary, but the main principle is that a private contractor builds or renovates a building, which is to be used for public purposes. The contractor bears most of the risks in design and construction and will be repaid by the public partner during the years that the building is used[44]. The public entity is the owner of the real estate and the private company operates the building with all services for up to 25 years.

Several EU projects on research and development and energy savings include both public and private sector participants. In these cases, the inclusion of private experts can be either as an individual consultant or as a service provider. In other cases, public experts support private companies in areas where the public expertise is required. This is often seen in international development projects. There are at present no formal barriers to the introduction of such practices in Kosovo. The 52 local energy auditors are examples of this: they work as consultants for private enterprises, which require audits of public sector buildings. (In the medium term, it is expected that their operations will become purely commercially based.)

For Kosovo, individual households are probably too small scale for such schemes, but they could be considered for major public buildings and for research activities, for example in relation to standardized building rehabilitations and efficient household appliances, such as boilers, ovens, etc. A combination of public and private financing, potentially through a project financing approach may allow investors with a specific risk appetite to invest in low income housing energy efficiency projects. However, these projects would typically require considerable risk structuring.

With regard to EU requirements, it must be ensured that the public involvement does not create a favorable competitive position for a private company, as that would conflict with the rules for state aid to the commercial sector.

43 EE Buildings PPP. Multi annual roadmap & longer term strategy. DG for Research, Industrial Technologies Unit G2. 2010

44 Public Private Partnerships in the German Public Real Estate Sector. Hand Wilhelm Alfen, Germany Real Estate Yearbook 2007.

13.4 Recommendations on proposed options

In addition to the sectoral classification methodology described in Chapter 11, the barriers that have been identified in the course of this study can be further categorized in terms of whether they require local solutions or whether any lessons learned from international experience can be applied to help deal with them. In general, but certainly not in all cases, Institutional and Legal and Regulatory barriers tend to require local solutions, whilst economic and financial problems are more open to generic, internationally applicable solutions.

Table 13-1 of the next page contains a summary of those barriers which constrain the implementation of EE measures in Kosovo and which could be addressed by drawing on some of the international case studies described in Chapter 13, particularly in terms of financing and delivery mechanisms. The summary identifies the strengths and weaknesses of the various options considered and identifies those that would help to address key priority barriers in the context of present-day Kosovo. An in-depth analysis will be conducted in the second phase of the study.

Unsurprisingly, the above analysis suggests that none of the international schemes can be readily transplanted into Kosovo. The overall conclusion of the analysis is that the Kosovo EE sector is not yet fully prepared for innovative financial schemes and that much work has to be done in terms of preparing the Institutional and Legal and Regulatory framework, as well as the local business sector, before conditions are suitable for the introduction of private participation.

The Bulgarian Energy Efficiency Fund provides an attractive model in that it is based on a PPP that eases the financial burden on the central government budget by providing finance for EE projects, gives local companies an opportunity to develop their businesses and supports the emergence of ESCOs. However, it depends upon on the availability of a high level of financial expertise which may not be easy to find in Kosovo. However, this needs to be established and if the expertise exists, such a model could be gradually implemented in Kosovo. Similarly, the Bulgarian Energetic and Energy Saving Fund private offers an attractive model but it is not necessarily one which could be effectively applied in Kosovo at present. The scheme is implemented by a large local engineering company which interfaces with ESCOs and again, it is not clear whether there is any company in Kosovo that could undertake this role successfully. Moreover, at this time the legal and financial framework in Kosovo is not ready to support fully fledged Energy Performance Contracts, though there is potential to introduce such schemes on a small scale on a trial basis. The features of the Bulgarian Residential Energy Efficiency Credit Facility are very similar to those of the EkoLoan scheme that has operated in Kosovo and suffers from the same disadvantages.

The Armenian Renewable Resources and Energy Efficiency Fund provides a useful case study in that the energy sectors of Kosovo and Armenia share some common features. The main objective of the Armenian Fund was to provide subsidized funding to the large number of less well off households unable to participate in other types of financing schemes, but in the present economic climate the provision of subsidies does not represent a viable way forward.

Barriers	Scheme	Benefits	Disadvantages
RF1 – Finance **XE1** – Local business infrastructure	Bulgarian Energy Efficiency Fund (2004) – funded by GEF, Austrian Govt., Bulgarian Govt, private Bulgarian companies	• PPP scheme - independent legal entity, profit-oriented and responsible for ensuring its own financial sustainability • Run as a combined lending institution, credit guarantee facility and consulting company • Viable energy efficiency projects implemented by local private enterprises and municipalities • Provides guarantees for ESCOs	• The capacity to run a combined lending institution, a credit guarantee facility and a consulting company may not exist Kosovo • Kosovo private sector too small and too immature to benefit • Legal/financial framework in Kosovo not yet suitable for ESCOs
PF1 - Municipal funding **XE2** – ESCOs	Bulgarian Energetic and Energy Savings Fund (2012) - funded by EBRD	• Develops EPC projects by engaging ESCOs which bring private sector finance/expertise • EPCs implemented by Enemona, a local engineering and construction company • Generates EE investments that municipalities are unable to fund themselves • Improvements achieved at no initial cost, investment costs recovered from energy savings	• Legal/financial framework in Kosovo not yet suitable for ESCOs • There may be no equivalent to Enemona in Kosovo
RF1 – Finance **RLR2** - Homeowners' Associations	Bulgarian Residential Energy Efficiency Credit Facility – EBRD credit line and grant from EU disbursed by ProCredit Bank, Raiffeisen Bank, DSK Bank and CIBANK.	• Provides EE loans and grants through participating banks to households and Homeowners' Associations • Incentive payment (20%-35% of the investment) made once the project is completed • Applicants must use eligible products and materials to qualify. A list of eligible installers is available as well as application materials	• High interest rates (10-11% p.a.), onerous collateral requirements • Grant element from EU fund to compensate Bulgaria for the closure of Kozloduy nuclear power plant • Commercial banks in Kosovo currently unwilling to disburse funds through credit lines from donor agencies • Homeowners' Associations are ineffective in Kosovo
RF1 – Finance **RLR2** - Homeowners' Associations **PF1** - Municipal funding	Armenia Renewable Resources and Energy Efficiency Fund (2005) – funded by GEF and World Bank/IDA, disbursed through credit line to commercial banks	• Addresses the high % of poor households unable to participate in financing schemes • US$4 m. set aside as subsidy specifically to secure financing for poorer households • Targeted at heating for schools and household associations	• No political appetite for subsidies in Kosovo • Commercial banks in Kosovo currently unwilling to disburse funds through credit lines from donor agencies • Homeowners' Associations are ineffective in Kosovo

Barriers	Scheme	Benefits	Disadvantages
RF1 – Finance **XF1** – Transaction costs **XF2** – EA funds	Lithuania, Program for the Modernization of Multi-family Buildings (2009) - funded by the European Structural Fund and Govt. of Lithuania	• Emphasis on EE funding for low-income families • Grants for preparation of technical documentation, supervision of works and for EE improvements themselves • Up to 2014 100% of documentation and supervision expenses covered (50% after 2014) • Up to 20% of the cost of EE measures covered, 100% for low income families (long term credit at 3% interest)	• Participants include apartment owners, the housing loans insurance company and the Housing and Urban Development Agency – may not be possible in Kosovo
RF1 – Finance **RLR2** - Homeowners' Associations **XF1** – Transaction costs **XF2** – EA funds	Building Renovation Program in Estonia (2009) – funded by ERDF, the Council of Europe Development Bank (€29 million) and the Govt. Of Estonia	• The program funds are managed by KredEx, an Estonian financing institution • Homeowners' Associations request loans from selected commercial banks • KredEx steps in to support these loans • Grants of up to 35% made available for energy audits, expert evaluations/recommendations, design work and awareness raising	• There may be no financing company in Kosovo with the skills and experience of KredEx • This particular scheme requires the preparation of extensive documentation • All potential beneficiaries have to have a willing appetite to take on debt • Homeowners' Associations are ineffective in Kosovo

Table 13-1: Summary of international financing models potentially applicable in Kosovo

The fund set up in Serbia to finance EE measures was successful in terms of the average savings achieved (40%) and in terms of the uptake (over 80%). One important factor attributed to the successful implementation of the program was that it had been preceded by an extensive analysis of the Serbian building sector. The scheme provided an effective mechanism for directing funds to municipalities – which were not constrained by rigid borrowing limits – and was administered by the Serbian Energy Efficiency Agency. It is clear that the KEEA is not in a position to take on such a role in the near term and there is no other entity which could fulfill such a role.

The Lithuanian Program for the Modernization of Multi-family Buildings which began in 2009 evolved from an earlier scheme which had specifically tried to address the issue of lack of EE funding, but in this case particular emphasis was placed on assisting low-income households. The scheme addresses the problem of high transaction costs and also provides assistance with the administrative burden of applying for funds. In this respect it provides what could be a useful model for Kosovo, but it will be necessary to examine the extent to which the success of the scheme depends upon the participants involved - these include apartment owners, the housing loans insurance company and the Housing and Urban Development Agency. This mix may not be achievable in Kosovo, so the characteristics of the ideal participants – and potential candidates - have to be identified before deciding how to proceed.

Finally, the Building Renovation Program in Estonia also provides assistance with the financing of EE projects, but it channels most of its funding through Home Owners' Associations, which are not yet an established part of the EE market in Kosovo. Moreover, the scheme is managed and supported by KredEx, a large Estonian financing institution. The extent to which the role played by KredEx could be readily replaced by another kind of body in Kosovo requires careful consideration.

On the basis of this review of international case studies, the options which seem to be the most productive to investigate further in terms of their relevance and applicability to the Kosovan situation are the following:

- The Bulgarian Energy Efficiency Fund
- The Bulgarian Energetic and Energy Saving Fund
- The Lithuanian Program for the Modernization of Multi-family Buildings

However, there are aspects of all the schemes that have been reviewed which could be adapted to the Kosovan situation and piloted in order to develop an appropriate local model. For example, the existence of local partners to replicate the roles played by Enemona in Bulgaria, Kredex in Estonia, the SEEA in Serbia and the housing loans insurance company and the Housing and Urban Development Agency in Lithuania should be investigated. The willingness of local companies to take on an ESCO type role could be encouraged by piloting the use of simplified ESCO contracts within donor programs, thereby developing EE service providers while at the same time upgrading the building stock.

Specifically, the technical and financial capacity of local firms to facilitate and participate in schemes such as those in Bulgaria, for example, is insufficiently developed, whilst the KEEA is inadequately resourced to take on the role that the Serbian Energy Efficiency Agency did up to 2102, as the implementing agent for municipality loans. In the current environment of excess liquidity the commercial banks in Kosovo are unenthusiastic about providing a channel for the disbursement of funds and the rates of interest and other conditions that they offer for EE implementation loans are prohibitive for the majority of the population.

The institutional and contractual frameworks also need to be developed, for example, to encourage the formation of Houseowners' Associations which can take on loans to finance EE and other improvement projects and to make public procurement procedures more conducive to the establishment of ESCOs and similar companies.

The experience of the Serbian initiative highlights the importance of establishing a solid EE data base and of conducting a comprehensive analysis of the entire building sector of Kosovo.

Hence the recommended policy/program options that would work best in the case of Kosovo are those which channel donor agency funding directly to the public building sector. Whilst the public sector fulfils its 'demonstration' role, the mitigation of the remaining constraints to EE implementation must take priority.

- The first operational priority is to implement a program of EE measures (targeted at the public building sector), to demonstrate the commitment of the GoK, to demonstrate the benefits of EE, to demonstrate the capability of all those involved and to give confidence to the energy sector in general that EE is a well-run and serious business with potential rewards for all participants.

- Secondly, in order to tap into the potential savings that can be realized, it is necessary to remove, or at least minimize the barriers that restrict the implementation of EE measures.

- Third, steps must be taken to develop a favorable legal and regulatory framework in order to create a flexible supply side to the EE market, which features a large number of (preferably local) players, shows transparency in its transactions and provides accessible and readily understood information,

- Fourth, in parallel with this activity, in order to ensure there is a well-informed and robust demand side to the EE market, a constant EE awareness campaign has to be maintained, directed at all sub-sectors and customer groupings, not only to highlight the benefits of EE but to convince energy consumers that they should actually make the decision to apply for a loan and install EE equipment in their home or business.

- Finally, the study has identified a number of priority actions, but a prerequisite to their successful implementation is the efficient operation of the energy efficiency sector. This requires the establishment of a strong, independent and properly resourced KEEA, which can effectively manage and coordinate activities in the sector, meet its obligations to the GoK and to the ECT, maintain a reliable and comprehensive data base and play a central role in coordinating the work of donor agencies.

Section 5-Conclusions

14 Conclusions

Chapter 10 of this report has analyzed in detail all aspects of feasible EE initiatives that could be implemented in residential, municipal, central public and private/commercial buildings in Kosovo and the potential energy savings for each sub-sector are summarized in Table 14-1.

Energy saving potential, GWh	2012	2015	2020
Residential buildings	0.00	733.61	2279.92
Private and Commercial Buildings	0.00	168.37	508.87
Municipal Public Buildings	0.00	60.50	182.74
Central Government Public Buildings	0.00	16.96	51.12
TOTAL for Kosovo Building Stock	**0.00**	**979.44**	**3022.65**

Table 14-1: Energy saving potential for each sector (GWh)

Whilst the greatest potential for energy savings - almost 75% of the total - is in the Residential sector, followed by the Private/Commercial sector at 17%, those are the very areas where barriers to the implementation of EE measures are most strongly felt. In order to realize the potential of these sub-sectors, the priority must be to introduce initiatives that will relax or remove barriers. Therefore it is important that the KEEA continues to run targeted (rather than general) EE awareness campaigns with the support of various donors, that the commercial banks continue to develop EE loan products on better terms and that KEDS continues to improve its billing and collection rates.

Although the public services sector is relatively small, it is more open and receptive to the implementation of EE measures. The respective contributions of municipal and central government buildings amount to around 6% and 1.5% of the total savings target. But even though these contributions are small - because the number of buildings is small compared with the two other categories - it is very important to start the implementation of EE measures with the public sector and with central government buildings in particular, because they consume more energy than is needed to meet comfort levels and cost benefit analysis shows that they offer very profitable investments. Energy savings can therefore be readily achieved in such buildings. Furthermore, implementing EE measures in public buildings will demonstrate that the government is taking a lead role and working to improve EE in its own buildings (in accordance with the new EE Directive) and at the same time this initiative will help to reduce state energy expenses and create new jobs.

The municipal sector is more problematic, in that the portfolio of municipal buildings is slightly larger and more diverse than that of central government. There are still schools, clinics and local hospitals where comfort levels are not being achieved and where, as a consequence, energy savings cannot be realized in the short-term. Also there are some barriers which could hinder the introduction of EE measures, although in the main, these are legal and institutional barriers which can be overcome by appropriate planning measures.

The analysis in Chapter 10 also analyzed the savings according to energy service across the whole of the Kosovo Building Stock and the results of the analysis are shown in Table 14-2. The conclusion is that almost 80% of savings could be realized by the introduction of EE measures to reduce energy consumption for space heating purposes. The key measures in this context are thermal insulation of the external building envelope (which also will deliver energy savings due to reduced cooling energy demand) and the introduction of new or improved heating systems.

Energy saving potential, GWh	2012	2015	2020
Space Heating	0.00	763.91	2414.66
Water Heating	0.00	49.07	144.14
Cooking	0.00	20.11	56.44
Lighting	0.00	93.21	234.09
Elec. Appliances	0.00	39.13	125.19
Air Conditioning	0.00	14.02	48.14
TOTAL for Kosovo Building Stock	**0.00**	**979.44**	**3,022.65**

Table 14-2: Energy saving potential for each service (GWh)

The measure that offers the next highest level of savings is the installation of EE bulbs (compact fluorescent and LED fittings) - this is a measure which only needs to be supported by an awareness campaign, since EE bulbs are affordable to most energy users. The third most efficient set of measures involve the installation of EE electric hot water boilers and solar water heating systems.

Table 14-3 presents the annual investment requirement for each building sector and in Table 14-4 the cumulative investment needed to implement all the EE measures considered across all sectors, is given in € million. The highest level of investment is in the residential sector and the cumulative total required in 2020 is approximately €1.2 billion.

Annual Investment for each sector (€ million)	2012	2015	2020
Residential buildings	0.00	124.41	309.15
Private and Commercial Buildings	0.00	19.12	45.02
Municipal Public Buildings	0.00	7.23	15.40
Central Government Public Buildings	0.00	2.11	4.45
TOTAL for the whole Kosovo Building Stock	**0.00**	**152.86**	**374.02**

Table 14-3: Annual Investment for each sector (€ million)

Cumulative Investment for each sector (€ million)	2012	2015	2020
Residential Buildings	0,00	250.26	1195.16
Private and Commercial Buildings	0.00	45.16	184.48
Municipal Public Buildings	0.00	16.34	65.50
Central Government Public Buildings	0.00	4.54	18.77
TOTAL for the whole Kosovo Building Stock	**0.00**	**316.30**	**1463.92**

Table 14-4: Cumulative Investment for each sector (€ million)

A significant implication of these figures is that to achieve the full energy saving potential for the building stock of Kosovo, the required annual investment increases from 1.5% of forecast GDP in 2013 up to 5.3% in 2020.

Hence the recommended policy/program options that would work best in the case of Kosovo are those which channel donor agency funding directly to the public building sector. Whilst the public sector fulfils its 'demonstration' role, the mitigation of the remaining constraints to EE implementation must take priority.

- The first operational priority is to implement a program of EE measures (targeted at the public building sector), to demonstrate the commitment of the GoK, to demonstrate the benefits of EE, to demonstrate the capability of all those involved and to give confidence to the energy sector in general that EE is a well-run and serious business with potential rewards for all participants.

- Secondly, in order to tap into the potential savings that can be realized, it is necessary to remove, or at least minimize the barriers that restrict the implementation of EE measures.

- Third, steps must be taken to develop a favorable legal and regulatory framework in order to create a flexible supply side to the EE market, which features a large number of (preferably local) players, shows transparency in its transactions and provides accessible and readily understood information,

- Fourth, in parallel with this activity, in order to ensure there is a well-informed and robust demand side to the EE market, a constant EE awareness campaign has to be maintained, directed at all sub-sectors and customer groupings, not only to highlight the benefits of EE but to convince energy consumers that they should actually make the decision to apply for a loan and install EE equipment in their home or business.

- Finally, the study has identified a number of priority actions, but a prerequisite to their successful implementation is the efficient operation of the energy efficiency sector. This requires the establishment of a strong, independent and properly resourced KEEA, which can effectively manage and coordinate activities in the sector, meet its obligations to the GoK and to the ECT, maintain a reliable and comprehensive data base and play a central role in coordinating the work of donor agencies.

Annexes

Annex 1: Details of 42 buildings managed by the Ministry of Public Administration

Sipërfaqet dhe akomodimet e ndërtesave MAP-DSPIMNQ - 2012

	Ndërtesa e Qeverisë	Sipërfaqet e hapësirave të mbrendshme	Sipërfaqet e parkingjeve dhe shtigjeve	Sipërfaqet e gjelbruara	Sipërfaqer për tërë ndërtesën	Shfrytëzesit Aktual
		m²	m²	m²	m²	
1	Bankosi	14,457.00	4,289.00	2,305.00	21,051.00	Kryeministria, MF, MPJ dhe MI
2	Gërmia	9,074.97	5,606.99	868.48	15,550.44	MI, MPJ, MPB, MD, IKAP
3	Rilindja - Konteknerat	3,722.97	12,948.40	1,767.58	18,438.95	KGjK, MPMS,MPB-RRA dhe MD- SHSK
4	Arkivi i Kosovës	4,887.33	1,596.49	5,718.56	12,202.38	AKK, Arkivi i Kosovës dhe IH
5	Partit Politik	4,249.10	2,386.86	275.30	6,911.26	MBPZHR, MKRS, MD dhe DH në aneks
6	Ministria e Shëndetësisë	2,855.60	2,759.60	670.00	6,285.20	MSH
7	Administrata Tatimore e Kosovës	2,301.32	871.12	345.72	3,518.16	ATK
8	Ministria e Punës dhe Mirëqenjës Sociale	1,619.79	599.78		2,219.57	MPMS
9	Agjencioni i Kosovës për Produkte Medicinale	1,514.80	3,228.42	894.67	5,637.89	AKPM
10	Enti e Statistikës së Kosovës	1,750.55		350.00	2,100.55	ESK
11	Agjencioni Kundër Korrupconit dhe Ministria e Punës dhe Mirëqenjës Sociale	1,094.20	440.00	430.00	1,964.20	AKK, MPMS
12	Kosovarja	507.10	286.00	136.00	929.10	IPK
13	Qafa -1	454.31			454.31	MPMS
14	Qafa -2	402.00			402.00	MKRS
15	Departamenti i Menaxhimit të Eemergjencave	132.70	168.40	129.60	430.70	DME-MPB
16	Ministria e Arsimit -MASHT -2	520.00	551.80	1,111.40	2,183.20	MASHT
17	Inspektoriati i ATK-së -te santeja	153.27			153.27	ATK

	Ndërtesa e Qeverisë	Sipërfaqet e hapësirave të mbrendshme	Sipërfaqet e parkingjeve dhe shtigjeve	Sipërfaqet e gjelbruara	Sipërfaqer për tërë ndërtesën	Shfrytëzesit Aktual

		m²	m²	m²	m²	
18	Instituti Hidrometorolagjik Ndërtesa e Re	538.30	353.16	5,509.77	6,401.23	IHMK-MMPH
19	Instituti Hidrometorologjik ndërtesa e vjeter	144.77			144.77	IHMK-MMPH
20	Depo - Graqanicë	1,520.30	2,024.00	1,156.20	4,700.50	MAP
21	Agjencioni Pyjor I Kosovës - MBPZHR	283.77	266.96	173.33	724.06	APK
22	Stacioni i Autobusave- MI	813.90	782.22		1,596.12	Ministria e Infrastruktures - DPSH
23	Ndërtesa e Hekurudhave - Ministria për Komunitete dhe Kthim	1,610.94	1,049.35	659.59	3,319.88	MKK
24	Ndërtesa e Hekurudhave - ish Inspektoriati Policor i Kosovës	430.23	108.16	366.75	905.14	AKI
25	Menza e Re e Studentëve - Ministria e Tregtisë dhe Industrisë	2,568.54	1,533.55	1,770.22	5,872.31	MTI
26	Agjencioni për Promovimin e Investimeve Kapitale	354.28			354.28	APIK - MTI
27	Urata	828.10	1,403.50	2,290.10	4,521.70	IPK
28	Agjencioni i Veterinës dhe Ushqimit - Ndërtesa e administratës	1,623.14	4,200.00	4,770.00	10,593.14	MBPZHR-AVUK
29	Agjencioni i Veterinës dhe Ushqimit - Ndërtesa e Labaratorit	1,100.97			1,100.97	MBPZHR-AVUK
30	Labaratori i Gripit të Shpezve	630.68	2,437.30	2,515.50	5,583.48	MBPZHR-AVUK
31	Drejtoria e Minieave të Kishnicës - OSHP (Orgni Shqyrtues i Prokurimit)	259.69			259.69	OSHP
32	G ykata Kushtetuse	783.41	953.85	343.08	2,080.34	GJKK
33	Toskana	1,416.80			1,416.80	MZHE

	Ndërtesa e Qeverisë	Sipërfaqet e hapësirave të mbrendshme	Sipërfaqet e parkingjeve dhe shtigjeve	Sipërfaqet e gjelbruara	Sipërfaqer për tërë ndërtesën	Shfrytëzesit Aktual
		m²	m²	m²	m²	
34	Drejtorina e Rrugëve	474.54	364.74	62.00	901.28	Drejtoria e Rrugëve
35	Ministria e Forcës së Sigurisë së Kosovës	2,770.00	3,529.65	4,972.16	11,271.81	MFSK
36	Depoja Qendraor e Barnave - Rilindje	2,120.50			2,120.50	MSH
37	Kulla e Rilindjës	19,120.90	2,570.00	7,905.00	29,595.90	MAP, MD, MMPH, MAPL dhe UN- Habitati
38	Ministria e Arsimit Shkencës dhe Teknologisë - Objekti i Ri	10,789.31	367.12	856.61	12,013.04	MASHT 1
39	Akademia e Shkencës dhe Arteve të Kosovës	6,356.42	257.57	601.00	7,214.99	ASHAK
40	Ministria e Punëve të Brendshëme Objekti i Ri	3,879.14	5,091.26	352.36	9,322.76	MPB
41	AKI- Qendra	1,700.00			1,700.00	
42	Ish banka e Lublanës	6,798.03	394.81		7,192.84	KQZ, Prokurorija e Shtetit të Kosovës
		118,613.67	**63,420.06**	**49,305.98**	**231,339.71**	

Annex 2: Questionnaire to determine energy consumed in buildings

Energy Auditor:		Date of walk-through energy audit site visit:	

I. GENERAL INFORMATION	
1. To what sector does your organization belong: residential or private/commercial buildings?	
Residential Buildings ❒One-storey house ❒Two-storey villa with a surface with more than 100 m2/storey ❒Up to five-storey building constructed during 1960 - 1990 ❒Up to five-storey building constructed in 1970-1999 ❒ Up to Five-storey prefabricated building constructed during 1980 - 1999 ❒Above five-storey building constructed in 1999-2012	Private Service Buildings ❒ Motels with less than 10 roo ❒ Hotels with more than 20 rooms ❒ Private schools ❒ Restaurants
2. Activity duration in months for 2010 and 2011	2010❒❒ 2011❒❒
3. The activity of your building is:	❒ continuous ❒ seasonal
4.Was your building active in 2009?	Yes ❒ No ❒
5. How many administrative staff and inhabitants/clients/patients/children/students use the building?	
6.1 What is the total floor area of your building? (m2)	
6.2 What is the total window area of your building? (m2)	
6.3 What is the total outside door area of your building? (m2)	
7. What is the average height of each floor in the building? (m)	

II. ENERGY CONSUMED BY SOURCE													
8.1	Energy sources consumed in physical units (commercial) for 2010												
	Units	Jan	Fe	Ma	April	May	June	Jul	Aug	Sep	Oct	No	Dec
Electricity	kWh												
Diesel	Liter												
Gasoline	Liter												
HFO	Ton												
LPG	Kg												
Lignite	Ton												
Fire wood	m3 st												
8.2	Energy sources consumed in physical units (commercial) for 2011												
Electricity	KWh												
Diesel	Liter												
Gasoline	Liter												
HFO	Ton												
LPG	Kg												
Lignite	Ton												
Fire wood	m3 st												

III.: ENERGY CAPACITIES		
9. Is there a central heating system in the building or are electrical individual heaters used for each room? ❒ Yes ❒ No If individual heaters, what type are they?: ❒ electrical radiator ❒ conditioner ❒ individual stoves with wood ❒ individual stoves with LPG		
10. Is there a central water system in the building or is an individual electrical boiler used? ❒ Yes ❒ No ❒individual electrical boilers		
11. Is there a central air conditioning system in the building or is an individual split system used for each room? ❒ Yes ❒ No ❒ individual split systems for each room		
12. What kind of light bulbs are used in the building? ❒ incandescent bulbs ❒ fluorescent bulbs		
IV.: THE CAPACITIES OF THE BOILERS WHICH CONSUME ENERGY		
13. Please give the number of the boilers in the building		
14. What kind of fuel do they use?		
❒ Electricity ❒ Lignite Coal (domestic) ❒ Heavy fuel oil	❒ LPG ❒ Diesel ❒ Fire wood	
V.: CAPACITIES OF MELTING AND BAKING OVENS, WHICH CONSUME ENERGY SOURCES		
15. How many ovens are there in the building?		
16. What kind of energy source do they use?		
❒ Electricity ❒ Fire wood	❒ LPG ❒ Diesel	
17. What is the average capacity of the ovens (kW thermal)		
VI.: STATIONARY INTERNAL COMBUSTION ENGINE GROUP - ELECTRO GENERATOR		
18. Have many stationary internal combustion engine groups - electro generators are there inthe building?		
19. What is the installed power of the stationary internal combustion engine group - electro generator [kW]?		
20. For how many hours per day (on average) does the stationary internal combustion engine group - electro generator operates at full load?		

Annex 3: List of buildings audited by previous projects

(a) 65 Energy audits commissioned by the EU (ECLO), 2009/10

Building and town	Building and town
1. Vëllezërit Frashërti, Deçan	2. Jusuf Rexha, Kostovë , Mitrovicë
3. Gjergj Kastrioti Skënderbeu- Gllogovc	4. Hivzi Sulejmani, Kqiq i Madhë, Mitrovicë
5. 7 Marsi, Gllogovc	6. Migjeni, Mitrovic
7. Bajram c=Curri, Fushe Kosova	8. Ismet Rrahmani", Aaqarevë, Skenderaj
9. Selman Riza, Fushe Kosova	10. Migjeni", Kllodernicë, Skenderaj
11. Vëllezërit Frashëri, Lipjan	12. Ali Kelmendi", Vushtrri
13. Adem Glavica Lipjan	14. Mustaf Venhari, Vushtrri
15. Hasan Prishtina ", Llugaxhi, Lipjan	16. Isa Boletini", Zhazhë, Zveqan
17. Pandeli Sotiri", Obiliq	18. Ramiz Cërnica", Cërnicë, Gjila
19. Migjeni", Sibovc, Obiliq	20. Zejnel Hajdini, Gjilan
21. Fan Noli, Podujevë	22. Feriz Guri dhe Vëllzerit Ceku", Kaçanik
23. Afrim e Fahriu", Lluzhan, Podujevë	24. Abdullah Krashnica", Koretinë, Kamenicë
25. Emin Duraku", Stime	26. Skenderbeu", Hogosht-Kamenicë
27. Bajram Curri", Petrovë	28. Asdreni"Llabjane, Novo Brdo
29. Naim Frasheri, Shtime	30. P P Njegosh", Gorno Kufce, Novoberde
31. 28 Nëntori", Dragash	32. Gjon Serreqi", Mogille, Kllokot
33. Xhelal Hajda Toni, Rahovec	34. Marko Rajkovich", Vërbovec, Kllokot
35. Bajram Curri", Krusha e Madhe, Rahovec	36. Sveti Sava", Kllokot
37. Jeta e Re, Suhareke	38. Jovan Cvijic", Strpce
39. Kongresi i Manastirit", Gllamnik, Podujevë	40. Ramiz Cokli" Brod, Strpce
41. Gjerg Kastrioti Skenderbeu, Sallagrazhdë, Suhareke	42. Faik Konica", Ferizaj
43. Deshmoret e Geikocit, Greikoc, Suhareke	44. Gjon Serreqi", Ferizaj
45. Deshmoret e kombit ", Guncat, Malishevë	46. Pjeter Bogdani, Ferizaj
47. Emin Duraku ", Dragobil, Malishevë	48. 28 Nëntori, Viti
49. Trepca", Banjë, Istog	50. Atatürk Mamushë
51. Haxhi Zeka, Istog	52. Edmond Hoxha, Junik
53. Ante Shtjefen Gjegovi Zllakuqan, Klinë	54. Veli Ballazhi, Gorance, Hani Elezit
55. Emin Duraku", Sferrkë, Klinë	56. Knez Lazar, D. Gusterica, Gracanica
57. Zef Lush Marku", Brekoc, Gjakova	58. Veljko Dugoševic", Ranilug
59. Mustafa Bakija, Gjakove	60. Trajko Peric", Ranillug
61. Nexhmedin Nixha, Gjakove	62. Surgery Clinic At The University Clinical Center Prishtine
63. Ramiz Sadiku", Peje	64. Miladin Popoviq, Partesh
65. 8 Marsi", Peje	

(b) 48 Energy audits commissioned by the KEEA, completed December 2012

First Group

Nr	EMËRTIMI I NDËRTESËS	ADRESA	DESTINIMI I NDËRTESËS	KOMUNA
1	Emergjenca -Spitali Regjional	Mitrovice	Shëndetësi	Mitrovice
2	Ndertesa e Kuvendit Komunal	Mitrovice	Administrate Publike	Mitrovice
3	QKMF	Rahovec	Mj. Familjare	Rahovec
4	I.P."Gëzimi ynë"	Eqrem Çabej	Parashkollor	Prishtine
5	SH.M."Sami Frashëri"	Nazim Gafurri	Shkollë	Prishtine
6	SH.M."Eqrem Çabej"	Nazim Gafurri	Shkollë	Prishtine
7	SH.M.SH.M.Teknike 28 Nëntori"	Nazim Gafurri	Shkollë	Prishtine
8	SH.M."Shtjefën Gjeqovi"	Tirana	Shkollë	Prishtine
9	SH.M."Hoxhë Kadri Prishtina"	Lidha e Pejës	Shkollë	Prishtine
10	SH.M."Abdyl Frashëri"	Lidhja e Pejës	Shkollë	Prishtine
11	Ndertesa e Fakultetit te Bujqësisë	Prishtine	Objekt Universitar	Prishtine
12	Ndertesa e Fakultetit te Mjekësisë	Prishtine	Objekt Universitar	Prishtine

Second Group

Nr	EMËRTIMI I NDËRTESËS	ADRESA	DESTINIMI I NDËRTESËS	KOMUNA
1	Ndërtesa e Repartit Interno	Prizren	Shërbime mjekësore	Prizren
2	Ndërtesa e Repartit Infektiv	Prizren	Shërbime mjekësore	Prizren
3	Objekti i Administratës	Remzi Ademaj p.n.	Administratë	Prizren
4	Ndërtesa qendrore	Prizren	Administratë dhe Shërbime mjekësore	Prizren
5	Blloku Kirurgjik	Pejë	Shërbime mjekësore	Pejë
6	Blloku Internistik	Pejë	Shërbime mjekësore	Pejë
7	Amb.Special.	Pejë	Shërbime mjekësore	Pejë
8	Kirurgjia	Prishtinë	Shëndetësore	Prishtinë
9	KOGJ	Prishtinë	Shëndetësore	Prishtinë
10	Neurologjia	Prishtinë	Shëndetësore	Prishtinë
11	Infektologjia	Prishtinë	Shëndetësore	Prishtinë
12	Institutet	Prishtinë	Shëndetësore	Prishtinë

Third Group

Nr	EMËRTIMI I NDËRTESËS	ADRESA	DESTINIMI I NDËRTESËS	KOMUNA
1	Shtabi Regj. - Qendra - Prishtinë	Prishtinë	Policor	Prishtinë
2	QKMF	Drenas	Shërbime mjekësore	Drenas
3	Drejtoria	Dubravë	Administrate	Istog
4	Spitali Rajonal Ferizaj	Rr.,,R.Rexhepi"-Ferizaj	Shërbime shëndetësore	Ferizaj
5	Ndertesa e Fakultetit te Edukimit & Arteve	Prishtine	Objekt Universitar	Prishtine
6	Ndertesa e Fakultetit Filozofik	Prishtine	Objekt Universitar	Prishtine
7	Ndertesa e Fakultetit te Biznesit	Pejë	Objekt Universitar	Pejë
8	Ndertesa e Fakultetit te Edukimit	Gjakovë	Objekt Universitar	Gjakovë
9	Ndërtesa e administratës dhe Institutit Kombëtar	Prizren	Administratë dhe Shërbime mjekësore	Prizren
10	Ndërtesa e Hemodialises	Prizren	Shërbime mjekësore	Prizren
11	Reparti i Ortopedise	Prishtinë	Shëndetësore	Prishtinë
12	Konvikti i Studenteve nr.6	Prishtinë	Arsimore	Prishtinë

Fourth Group

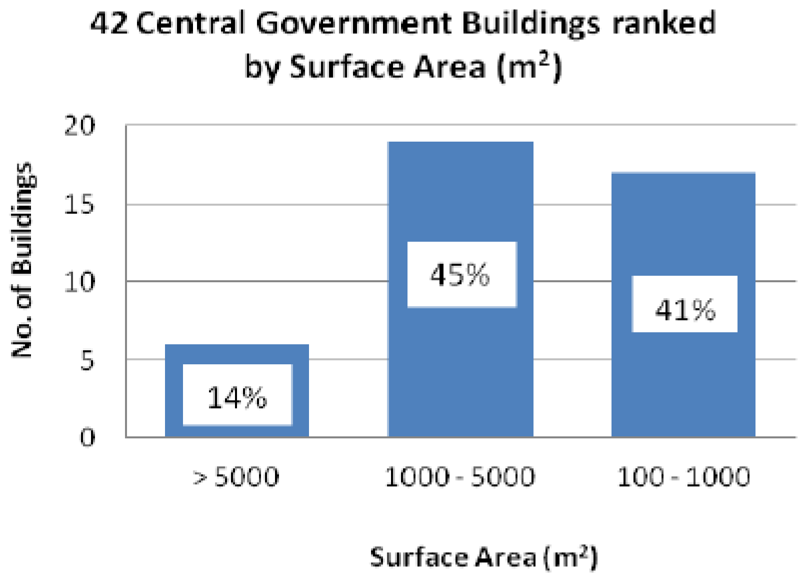
Nr	EMËRTIMI I NDËRTESËS	ADRESA	DESTINIMI I NDËRTESËS	KOMUNA
1	Ndertesa e stacionit policor-Komanda Rajonale	Mitrovicë	Policor	Mitrovicë
2	St. Policor DRP - Pejë	Pejë	Policor	Pejë
3	St. Policor - Ferizaj	Ferizaj	Policor	Ferizaj
4	SH.FILL. "Ismet Raci"	Klinë	Shkollë	Klinë
5	SH.FILL. "M.Qiriazi"	Klinë	Shkollë	Klinë
6	Ndertesa Administrative	Pejë	Administratë	Pejë
7	Ndertesa administrative(ndert. e ish-Komitetit)	Pejë	Administratë	Pejë
8	Nd. E Kadastrit	Pejë	Administratë	Pejë
9	Sh.fill."Rilindja "	Dritan	Shkollë	Drenas
10	Sh.fill."Abedin Bujupi"	Arllat	Shkollë	Drenas
11	Qendra Kryesore e Mjekësisë Familjare	Lipjan	Shërbime mjekësore	Lipjan
12	Instituti special	rr. Tirana p.n. Shtime	Shërbime mjekësore	Shtime

Annex 4: Selection Process of 5 Central Government Buildings for Energy Audit

Building Name	Surface Area (m^2)	Comments	Conclusion
1. Bankosi	14457.00	Includes the Prime Minister's Office, parts of the Ministries of Finance and of Foreign Affairs, Ministry of Integration. Security issues.	Exclude
2. Germia	9074.97	Built in 1972, renovated in 2002. Houses the Ministry of Infrastructure, part of the Tax Administration of Kosovo, part of the Ministry of Internal Affairs and other GoK offices	Include
3. Rilindja-Konteknerat	3722.97	Containers left over from UN days	Exclude
4. Arkivi i Kosoves – Kosovo Archive	4887.33	Check occupancy level	Include
5. Partit Politik – Political Party	4249.10	Building is occupied by the Ministries of Culture/Agriculture/Diaspora	Include
6. Ministria e Shendetesise – Health Ministry	2855.60	Former Health Centre, over 50 years old, renovated 7 or 8 years ago	Include
7. Administrata Tatimore e Kosoves – Tax Administration of Kosovo	2301.32	Superficially renovated by the Tax Administration. Not all building data is available.	Include
8. Ministria e Punes dhe Mireqenjes Sociale - Ministry of Labor and Social Welfare	1619.79	Recently renovated	Exclude
9. Agjencioni i Kosoves per Produkte Medicinale – Kosovo Agency for Medical Products	1514.80	Some storage facilities on the premises	Include
10. Enti e Statistikes se Kosoves – Kosovo Statistical Office	1750.55	Very old building to which some adjustments have been made, but not renovated	Include
11. Agjencioni Kunder Korrupconit dhe Ministria e Punes dhe Mireqenjes Sociale - Anti Corruption Agency and Ministry of Labor and Social Issues	1094.20	Security issues	Exclude
12. Kosovarja	507.10	Small building, houses part of the Ministry of Internal Affairs	Include
13. Qafa – 1	454.31	Part of the Ministry of Labour and Social Welfare	Include
14. Qafa – 2	402.00	Ministry of Culture, Youth and Sports, very small	Exclude
15. Departamenti i Menaxhimit te Eemergjencave – Department of Management of Emergencies	132.70	Security issues	Exclude
16. Ministria e Arsimit-MASHT-2 (Ministry of Education)	520.00	Small building, MPA do not consider it worth including	Exclude
17. Inspektoriati i ATK-se-te santeja (ATK Inspectorate)	153.27	Security issues. Very small building	Exclude
18. Instituti Hidrometorolagjik Ndertesa e Re - Institute of Hydrometeorology (New Building)	538.30	Partially used as a laboratory building	Exclude

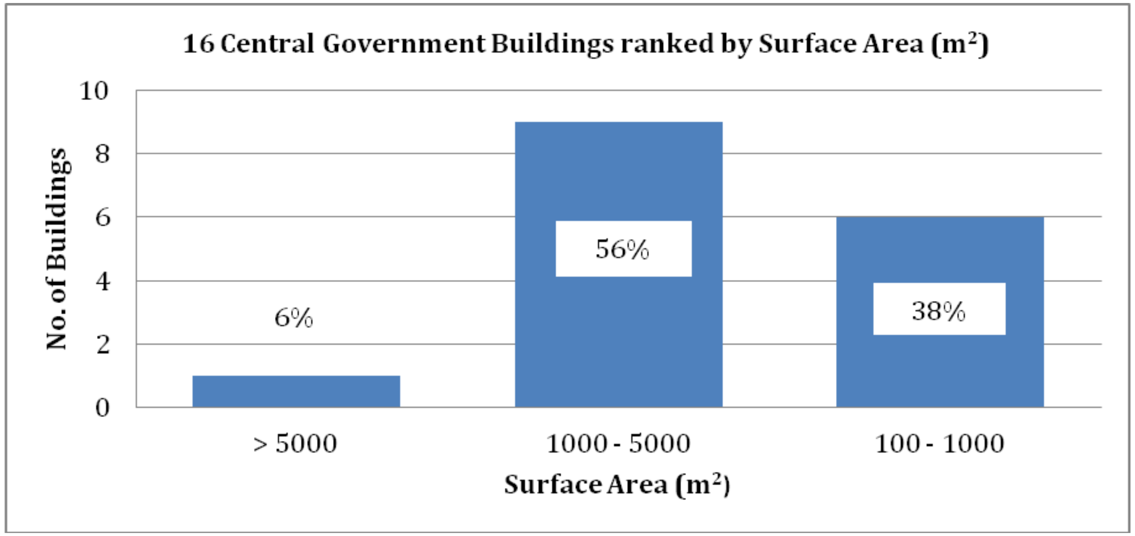
19. Instituti Hidrometorolagjik Ndertesa e vjeter Institute of Hydrometeorology (Old Building)	144.77	Very small, partially used as a laboratory building	Exclude
20. Depo – Graqanice – Storage Gracanica	1520.30	Storage facility	Exclude
21. Agjencioni Pyjor I Kosoves – MBPZHR – Forest Agency of Kosovo	283.77	Small building	Include
22. Stacioni i Autobusave – MI – Bus Station	813.90	Part of the Ministry of Infrastructure	Include
23. Ndertesa e Hekurudhave - Ministria per Komunitete dhe Kthim - Directory of Railway and Ministry of Returning Communities	1610.94	Old building, former HQ of railway system	Include
24. Ndertesa e Hekurudhave – ish Inspektoriati Policor i Kosoves - Directory of Railway and Police Inspectorate of Kosovo	430.23	May be security issues	Exclude
25. Menza e Re e Studenteve – Ministria e Tregtise dhe Industrise – Student Canteen and Ministry of Trade and Industry	2568.54	The Ministry has added annexes to the building on its own initiative, so not all documentation is with the MPA	Include
26. Agjencioni per Promovimin e Investimeve Kapitale - Promotion of Investment Agency	354.28	Small building which is simply an annexe to the Ministry of Trade and Industry	Include
27. Urata	828.10	Police Inspectorate of Kosovo. Security issues.	Exclude
28. Agjencioni i Veterines dhe Ushqimit- Ndertesa e administrates – Veterinarian and Food Agency – Administration Building	1623.14	The Administrative building of the Agency	Include
29. Agjencioni i Veterines dhe Ushqimit- Ndertesa e Labaratorit - Veterinarian and Food Agency – Lab Building	1100.97	Laboratory building	Exclude
30. Labaratori i Gripit te Shpezve – Lab of Bird Flues	630.68	Laboratory building	Exclude
31. Drejtoria e Minieave te Kishnices-OSHP (Orgni Shqyrtues i Prokurimit) – Kinishnica Mining Directorate	259.69	Small building, not typical	Exclude
32. Gykata Kushtetuse - Constitution Court	783.41	Security issues	Exclude
33. Toskana	1416.80	Old building designed as a hotel. Used by KEK till 2008 when it was renovated and taken over by MEM. Now houses MED, programme of further renovation is under way.	Exclude
34. Drejtorina e Rrugeve - Road Directorate	474.54	Quite a small building	Include
35. Ministria e Forces se Sigurise se Kosoves - Ministry of Security Forces of Kosovo	2770.00	Security issues	Exclude
36. Depoja Qendraor e Barnave-Rilindje (Central Storage of Medicine)	2120.50	Storage building	Exclude

37. Kulla e Rilindjes (Rilindja Tower)	19120.90	Extremely large building, built 1972-78, renovated 2009. Contains Ministry of Public Administration, Ministry of Justice, Ministry of Local Government Administration & Ministry of Environment and Spatial Planning. Size means it is not typical admin building.	Exclude
38. Ministria e Arsimit Shkences dhe Teknologise - Objekti i Ri (Ministry of Education – New Object)	10789.31	New building, not representative of the sector	Exclude
39. Akademia e Shkences dhe Arteve te Kosoves (Kosovo Academy of Science)	6356.42	New building, not representative of the sector	Exclude
40. Ministria e Puneve te Brendsheme Objekti i Ri (Ministry of Internal Affairs)	3879.14	Former UNMIK building, quite new with some renovation. Security issues	Exclude
41. AKI – Qendra – Intelligence Agency	1700.00	Security issues	Exclude
42. Ish banka e Lublanes	6798.03	Ex-Lubljana Banka housing State Prosecutor, County Prosecutor, Municipal Prosecutor, EULEX Prosecutor and the Judicial Council. Security issues.	Exclude



1. Revised proposed shortlist of 10 Central Government Buildings

A preliminary, high-level review of central government buildings, summarised in the table above, reduced the number of buildings to be considered for short-listing to 16.



A short-list of ten buildings considered to be representative of the overall list (i.e. not'outliers') was drawn up for review with the Ministry of Public Administration.

2. Final List of 5 Central Government Buildings selected for Walk-Through Energy Audits

At a meeting held between the Ministry of Public Administration and the World Bank Energy Efficiency Study team on 29.10.12, it was jointly agreed that in light of various practical issues (security, availability of documentation and energy consumption data, representativeness of given buildings, speed of arrangements, etc.) the following five buildings should be audited, all from the middle category, 1000 – 5000 m^2:

1) 4. Kosovo Archive (4887m^2)
2) 5. Political Party (Ministries of Culture, Agriculture, Diaspora) (4249m^2)
3) 6. Ministry of Health (2855m^2)
4) 10. Kosovo Statistical Office (1750m^2)
5) 23. Directory of Railways and Ministry of Returning Communities (1610m^2)

Annex 5: Outline Procedures for 'Walk Through' Audit

1. Establish Actual Situation
   1.1 Short General Description and summary of buildings from construction point of view
   1.2 Energy Consuming Devices
   1.3 Heating System
   1.4 Hot Water System
   1.5 Air conditioning
   1.6 Backup Generator System

2. Electricity Consumption

3. Fuel Consumption

4. Preliminary Proposed EE Measures

5. Other Interventions

6. Evaluation of approximate investment needed for each EE Measure

7. Evaluation of approximate energy savings for each EE Measure

8. Evaluation of specific energy consumption per m^2 before and after each EE Measure

9. Conclusions

Annex 6: Example of a 'Walk Through' Audit

Walk Through Energy Audit Report	
Building	**Private Building: Amazona Motel- Prishtina**
Owner	Name: Mr. Gani Ferizi; Mr. Arben Ferizi **Amazona Restorant** Address: K.K. Kastriot; Village Azizi (Milloshеve) Tel: +377 (0) 44 45 44 54 e-mail: beny-zonna@hotmail.com 
Date of walk through audit	**2.08.2012**
Date of Report	**3.08.2012**
Energy Auditor	**Besim ISLAMI**

1. Short general description

Building: **Private Building: Amazona Motel - Prishtina**
Year of construction.: during 1988's
Motel Amazona operates around the clock

On August 2, 2012 energy auditor conducted a walk through energy audit in **Motel Amazona** in Prishtina Municipality. During the site visit, was preformed a through visual inspection combined with several specific measurements to collect information about what are energy consumption appliances, how much energy is being used, and if this energy use can be reduced by introducing several cost effective measure. The short description of construction materials in presented in the table below.

Motel Amazona	**Volume: 2400** **Floor height: 3.0** **Useful floor area: 800** **Average number of clients is 30 for Amazona Motel**		
Element	**Structure**	**Insulation**	**Area (m²)**
External walls	Clay hollow blocks of 25cm thickness, plastered from outside and inner side	No insulation	172.8
Attics	Hollow prefabricated elements of 20cm thickness, plastered from inner side	No insulation	400
Slab above ground	Concrete	No insulation	400
Windows	Old PVC framed windows double glazed		60
Outside Doors	Old aluminium framed-double glazed		7.2

Building Envelope has not been a subject of any renovations since its first construction.

2. Energy consuming devices

Heating: **Motel Amazona** uses coal and fuel oil for space heating. Hot water is produces through four electrical

Electricity consumption is used for lighting, IT appliances, electric heaters, and recirculation pumps.

Energy Auditor examined these installations and found the following:

	Description	Details
2.1	**Central Heating System**  	• Central heating system installed with a 70kW capacity. • Installed steel radiators, are in good condition, in general all of them are in function, but heating quality is still a subject to be treated. • Entire pipeline is in good condition and partially insulated. • There are not thermo static valves so there is not possible to shut-on/off the system.
2.2	**Ventilation and air conditioning** 	• There is no any ventilation system in the hotel, so ventilation was done directly by open the doors
2.3	**Hot water Boiler** 	• 20 x 40 liters electric boiler installed on each room

2.4	**Lighting system** 	• Administration: Incandescent lamps (100W); • Toilets: Incandescent lamps (100W)
2.5	**Other appliances** 	• 1x50 kVA electric generators are installed to provide electricity for lighting, heating pumps during the blackouts. • Refrigerators 20 liters for each room • IT equipment (computers, printers, photocopy machines) • Washing machine

3. Electricity and fuel consumption

In the following table is shown monthly electricity and coal consumption for last two years.

Year	Energy source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2010	Electricity, kWh	10160	9440	8600	8800	8000	9200	9520	9600	8360	9280	9920	10720	111600
	Coal, kg	8200	8000	7500	3200	0	0	0	0	0	2000	5000	8800	42700
2011	Electricity, kWh	10668	9912	9030	9240	8400	9660	9996	10080	8778	9744	10416	11256	117180
	Coal, kg	8692	8480	7950	3392	0	0	0	0	0	2120	5300	9328	45262
2010	Electricity, kWh	12700	11800	10750	11000	10000	11500	12700	11800	10750	11000	10000	11500	12700
	Coal, kWh	30511	29767	27907	11907	0	0	30511	29767	27907	11907	0	0	30511
	Total, kWh	**43211**	**41567.11**	**38657**	**22907**	**10000**	**11500**	**43211**	**41567.11**	**38657**	**22907**	**10000**	**11500**	**43211**
2011	Electricity, kWh	12700	11800	10750	11000	10000	11500	12700	11800	10750	11000	10000	11500	12700
	Coal, kWh	32342	31553	29581	12621	0	0	32342	31553	29581	12621	0	0	32342
	Total, kWh	**45042**	**43353.14**	**40331**	**23621**	**10000**	**11500**	**45042**	**43353.14**	**40331**	**23621**	**10000**	**11500**	**45042**

Based on the power given by the manufacturers for each type of electrical equipment and by multiplying the respective electrical power of equipment with the number of hours worked during a year, is calculated electrical energy demand presented in the following section. Space heating and cooling energy demand is calculated based on the simplified thermodynamic model build for such building taking into consideration only outside envelope.

4. Electricity and Fuel Energy Demand without EE Measures

The energy consumption of the Amazona Motel is divided into six parts describe as much basic energy uses with widely differing characteristics: space heating, space cooling, water heating, cooking, lighting and electrical appliances. At the following section will be carried out the calculations of energy demand for base line scenario.

Space Heating

Estimating the ‘real’ energy demand for space heating, model prepared calculates the “real” thermal losses, the required heating components (boiler, burner, heating panel, etc.) and it is based on the preliminary calculations:

- Building volumes;
- Based on the existing general layout of the building, the thermal losses are calculated in the model. The structures of the walls, ceilings, windows and doors are taken into consideration.
- Based on average outside temperature are defined the heating degree days for Prishtina. The calculation of the additional thermal losses depends on the space heating system function, the average heat transfer coefficient from the building, and the building orientation. From the studies carried out such additional thermal losses are determined for types and activities in a building. Coefficient *r* =1–0.6, represents the coefficient which takes into consideration the space heating interruptions during the day and/or the weekends (for schools, institutions and etc.). Coefficient “*r*” has high value for hospitals, Motels and re-creative centres and low value for household’s buildings.
- Space heating energy demand is calculated based on fulfilling comfort condition according to Administrative Order issued from Ministry of Spatial Planning and Environment.

Water Heating

The hot water temperature is taken 40°C, hot water quantity for each person is taken for personal hygiene is taken 10 liters, and for dish washing is assumed 10 liters. Based on the average temperature of cold water for each month and on the number of persons for Amazona Motel are calculated the hot water needs for personal hygiene and dish washing.

Cooking

There is no energy consume for cooking because this process is actually carried out in the restaurant.

Lighting

The required lighting for the building can be realized according to international or national standards and in the case of this model are used the European standards. For a certain lighting intensity, the required power depends on the lighting equipment efficiency (types of lamps, incandescent or efficient etc.), the way the lighting system has been designed and its maintenance. The lighting hours are related to the space occupation, the day lighting, and the way of controlling the lighting equipment.

Electrical Appliances

The electric appliances include: radio, TV, videos, washing machines, refrigerators, tape recorder, computers and water pumps. Based in the above mentioned analyses the following assumption has been used to calculate electrical appliance energy demand on the main parameter: Energy Intensity for Electrical Appliances: 10-15 kWh/m^2. Based on the above mentioned method has been calculated electrical appliances energy demand for base line scenario.

Air Conditioning

There is no AC applied in any room of the motel.

5. Proposed EE measures

In most hotels it is possible to make some savings by using the existing building and equipment as efficient as possible. No financial investment is needed; instead, a check on how the building is being used may reveal areas where equipment can be turned off when it's not needed , or where the level of service can be reduced without affecting the comfort of guests. Some opportunities may be easy to identify and implement, such as altering thermostats and time clocks. Others, such as turning lights off when rooms are not being used, may require the cooperation of staff. Motivating staff to help is therefore important, although a long term task. In the following table are presented all possible EE measures which might be introduced in different building depending from their situation. Concretely for Amazona Motel only some of them are needed.

Nr	EE Measures for each energy service	Space Heating	Water Heating	Cooking	Lighting	Electrical Appliances	Air Conditioning
1	Introducing Thermal Insulation of Outside Walls	3456					
2	Introducing New EE Windows	9000					
3	Introducing New Hermetic Doors	3240					
4	Introducing Thermal Insulation of Roof	15400					
5	Introducing Thermal Insulation of Floor	NA					
6	Rehabilitation/Replacement of heating supply equipment	10629					
7	Replacement of water heating	NA					
8	Introducing Solar water heating		6667				
9	Replacement of cooking stoves			0			
10	Replacement or new installation of lamps				800		
11	Replacement of refrigeration appliances					400	
12	Replacement of washing machines						750
13	Installation or replacement of air conditioning system						6000
14	Other EE measure: please specify	NA	NA	NA	NA	NA	NA
15	Other EE measure: please specify	NA	NA	NA	NA	NA	NA
16	Other EE measure: please specify	NA	NA	NA	NA	NA	NA
17	Other non EE measure	NA	NA	NA	NA	NA	NA
18	Other non EE measure	NA	NA	NA	NA	NA	NA
19	Other non EE measure	NA	NA	NA	NA	NA	NA
20	Other non EE measure	NA	NA	NA	NA	NA	NA
	Total for each service	**41725**	**6667**	**0**	**800**	**400**	**6750**
	GRAND TOTAL	**56342**					

6. Evaluation of Baseline, Energy Efficiency Scenario and Energy Savings for each EE measure

Evaluation of energy efficiency measures has been carried out based on the simply thermodynamic calculations based on site measurements and visual inspection.

Energy services	Real Consumption, kWh/year	Base Line Energy Demand, kWh/year	EE, kWh Scenario, kWh/year	Energy Savings, kWh/year	Energy Savings, %
Space Heating		238961	95326	143635	60%
DHW		11025	6836	4190	38%
Cooking		11250	11250	0	0%
Lighting		21481	17185	4296	20%
El. Appliances		7857	4714	3143	40%
Cooling		27217	22318	4899	18%
TOTAL	307915	290574	157628	132946	46%
Energy for m2		299	119	180	60%

Energy services	Energy Efficiency Measures (kWh/year)												
	Space Heating						Water Heating		Cooking	Lighting	Electrical Appliances		Air Conditioning
	Thermal Insulation o Outside Walls	New EE Windows	New Hermetic Doors	Thermal Insulation o Roof	Thermal Insulation o Floor	eplacement of heatin supply equipment	Replacement of wate heating	Solar water heating	eplacement of cookir stoves	Replacement or new installation of lamps	refrigeration appliances	washing machines	Installation or replacement of air cond.
Space Heating	37483	33891	16572	31859	no	23831	NA						
DHW								4190					
Cooking									0				
Lighting										4296			
El. Appliances											1414	1729	
Cooling													4899

7. Financial and Economic Evaluation of each EE measure

Financial evaluation is based on the actual energy commodities prices and FIRR are presented in the following tables for each EE measure.

Energy services	Financial Internal Rate of Return (%)												
	Space Heating						Water Heating		Cooking	Lighting	Electrical Appliances		Air Condition.
	Thermal Insulation of Outside Walls	New EE Windows	New Hermetic Doors	Thermal Insulation of Roof	Thermal Insulation of Floor	Replacement of heating supply equipment	Replacement of water heating	Solar water heating	Replacement of cooking stoves	Replacement or new installation of lamps	refrigeration appliances	Washing machines	Installation or replacement of air cond.
Space Heating	32%	8%	12%	1%	NA	2%	NA						
DHW								14%					
Cooking									NA				
Lighting										42%			
El. Appliances											8%	3%	
Cooling													3%
TOTAL	**17%**												

Economic evaluation is based on the economic energy commodities prices (which covered all costs) and EIRR are presented in the following tables for each EE measure.

Energy services	Economic Internal Rate of Return (%)													
	Space Heating						Water Heating		Cooking	Lighting	Electrical Appliances		Air Condition.
	Thermal Insulation of Outside Walls	New EE Windows	New Hermetic Doors	Thermal Insulation of Roof	Thermal Insulation of Floor	Replacement of heating supply equipment	Replacement of water heating	Solar water heating	Replacement of cooking stoves	Replacement or new installation of lamps	refrigeration appliances	washing machines	Installation or replacement of air
Space Heating	49%	33%	48%	23%	NA	25%	NA						
DHW								17%					
Cooking									NA				
Lighting										53%			
El. Appliances											39%	26%	
Cooling													18%
TOTAL	**22%**												

8. Conclusions

Total energy consumption based on actual bills is almost equal energy consumption for the base line scenario, so this mean that comfort is almost reached in Amazona Motel. Energy consumption before introducing EE measures is 299 kWh/m2 year and after including all EE measures proposed is 119 kWh/m2. Energy saving including all EE measures is equal to 46%. Total investment needed to include all EE measures for Amazona Motel is equal 59342 Euro. Total FIRR for all EE measures is 17% based on actual prices and EIRR for all EE measures is 22% based on economical prices.

Annex 7: GIZ MMS Project Overview 2006-2012

GTZ-MMS, AKM, MEM & Municipalities
Small Scale Municipal Project Fund

Energy efficiency projects implemented in the period 2006 - 2011 in co-financing with municipalities and ministries

No	Municipality	Project Title
A	B	C
1	Drenas	Renovation of the annex in Health Care Centre
2		Rehabilitation and maintenance of street lighting phase I
3		Rehabilitation and maintenance of street lighting phase II
4	Mitrovica	Modernization of public street lighting
5	Prishtinë	Modernization of public street lighting
6	Ferizaj	Replacement of the windows in the secondary school "Pjeter Bogdani" Ferizaj.
7		Modernization of street lighting
8	Gjilan	Replacement of the windows in the building of Directorate for Geodesy, Cadastre, Property and Residence
9		Thermo insulation of the annex and external plastering of primary school "Rexhep Elamzi"
10		Renovation of the music School
11		Replacing doors and windows in primary school "Selami Hallaqi"
12		Renovation and thermoinsulation of primary school "Selami Hallaqi"
13		Modernization of public street lighting
14	Istog	Floor renovation of municipal building
15		Renovation of municipal building.
16		Replacing windows is secondary school "Haxhi Zeka"
17		Renovation of dispensary and hospital
18		Modernization of public street lighting system
19	Kamenica	Replacement of windows in the primary school building "Asllan Thaqi" Karaqevë të Poshtme - Phase I
20		Renovation of primary school "Asllan Thaqi" Karaqevë të Poshtme - Phase II
21		Renovation of primary school "Abdullah Krashnica" in Koretin
22	Malisheva	Replacement of windows in primary school "Ramadan Morina"
23		Renovation of primary school "Emin Duraku" Dragobil
24	Skenderaj	(*) Changing windows in high school "Anton Çetta"
25		Modernization of public street lighting
26	Obiliq	Partial roof renovation of the primary school "Pandeli Sotiri"
27		Changing boilers for central heating in primary school "Pandeli Sotiri"
28	Peja	Replacement of the windows in the primary school "Skenderbeu"in Treboviq.
29		Thermoinsulation and replacing doors and windows in primary School" Rilindja " in Terstenik

30	Podujeva	Replacement of the windows in the primary school building "Hyzriu dhe Samiu" in Letanc
31		Renovation of Municipal Building in city park phase I
32		Renovation of Municipal Building in city park- Phase II
33		Renovation of primary school "Shaban Shala"
34		Renovation and thermoinsulation of primary school "Naum Veqilharxhi"
35		Modernization of public street lighting
36	Prizren	Replacement of doors and windows in the Fire-Brigade building.
37		Renovation of primary school "Zenel Hajdini" Pirane
38		Renovation of primary school Annex "Zenel Hajdini" Pirane
39		Modernization of public street lighting
40		Modernization of public street lighting
41	Rahovec	Replacement of the doors and windows in the Secondary school "Xhelal Hajda -Toni" in Rahovec.
42	Shtime	Renovation of the walls around windows in the primary school "Abdullah Shabani" in Carraleva
43		Thermo insulation of primary school "Abdullah Shabani" in Caraleva
44		Modernization of public street lighting using photovoltaic panels
45	Viti	Replacement of the windows in primary school building "Nijazi Rexhepi" in Sllatine e Poshtme.
46		(*) Renovation of the primary School "Ahmet Hajdari " in Beguncë
47		Replacement of doors and windows in the family health care centre
48	Vushtrri	Replacement of the windows in the primary school "Avdyl Frasheri" Mihaliq.
49	Dragash	Renovation of the Central heating in the Family Health Care Centre
45	Gjakova	Renovation of central Heating in Municipal Building
51		Renovation of municipal assembly hall
52		Renovation of primary school " Yll Morina "
63		Modernization of public street lighting
54	Novo Berdo	Central heating installation in family health care centre
55		Central heating installation in primary school "Miladin Popovic"
56		Renovation of primary school "Minatori"
		(*) Projects no. 24 & 46 are implemented only up to the detail technical design phase due to the lack of funds from respective municipalities.

Annex 8: Project Factsheets, former EC Liaison Office to Kosovo

Project Name:	Training for Energy Auditors EuropeAid/127849/C/SER/KOS
Project Value:	€ 498,900.00
Duration:	15 September 2009 – 14 September 2010
Implementing Agency/ Contractor:	Agency: EC Liaison Office Contractor: Danish Management Consortium
Direct Beneficiary:	Ministry of Energy and Mining (MEM)
Partners:	
Target Area:	Energy efficiency/energy auditing
Overall Objective:	The overall objective is to support the implementation of the Energy Community Treaty requirements on energy efficiency.
Project Purposes:	The purpose of this contract is to support the Ministry of Energy and Mining (MEM) on establishing an energy auditing process through training energy auditors, in compliance with legal requirements and national plan for energy efficiency.
Project Strategy:	The Energy Community Treaty requires the contracting parties in SEE, including Kosovo, to implement the *acquis* on energy efficiency. Energy auditing is an instrument that encourages improvement of energy efficiency in public sector, industry, households sector etc. The project will put the foundations of the energy auditing process in Kosovo. It will train the first group of auditors who will be certified as trainers who will in future provide for training energy auditors. Amongst the trained trainers, and in consultation with MEM, the best 5 candidates will be nominated as members of the professional body for certifying energy auditors. The professional body will certify all other energy auditors that will be trained as part of this project. The trained energy auditors will perform audits in all energy consumers with consumption between 20 and 50 toe, and above 50 toe, as defined in the secondary legislation for energy auditing approved by MEM. The energy auditors will produce audit reports identifying cost effective measures to improve energy efficiency in the audited consumers. Then consumers will be required to implement those measures within a time period defined in the audit report. MEM is currently preparing the law on energy efficiency which will require for buildings' certification and also inception of boilers and air conditioning systems, aiming at improving the energy efficiency in buildings' sector as required by the Directive on Energy Performance of the Buildings.
Activities:	**Task 1: Design of the training program** The Consultant is required to specifically look at the existing environment (required bodies, institutions, legal acts) relevant to energy auditing. Based on assessment the Consultant shall design a training programme for 'train the trainers' and for 'energy auditors'. The training programme shall include introduction to energy auditing, institutional and economic issues, environmental benefits, auditing methods, instrumental measurements, data collection, auditing of electrical systems, HVAC[45] auditing, analysis and assessment of savings, calculation of costs and savings, undertaking energy audit pilot projects in various buildings, preparing audit reports etc. **Task 2: Implementation of Train the trainers' component** The training for trainers shall commence within three weeks after the selection of suitable candidates through an open call. The Consultant will organise the examination and certification of the trainers by an accredited body from countries covered by article 19 of IPA regulation[46]. The Consultant will identify the best candidates amongst the certified trainers and propose them for the members of the professional body for certification to be established in Kosovo. Additionally the Consultant will support MEM in the establishment of the professional body. **Task 3 Training for energy auditors provided by trainers** During the implementation of training for trainers the consultant shall conduct the selection process for energy auditors based on criteria approved by the Contracting Authority through an open invitation published in local newspapers. The training programme implementation for a group of energy auditors (up to 30) will be done by the 30 trained trainers under the supervision of the Consultant.
Results:	Energy auditing process is established; Completed design and delivery of a training program for 30 trainers on energy auditing; Certification of trained trainers; Established professional body for certifying energy auditors; Design and delivery of a training program for 30 energy auditors

45 Heat, ventilation and air conditioning
46 Council Regulation (EC) No 1085/2006 of 17 July 2006 establishing an Instrument for Pre-Accession Assistance (IPA).

Project Name:	Implementation of Energy Efficiency Measures in Public Buildings
Project Value:	Supervision: EUR 179,555.00 / Supply and Installation: EUR 1,163,713.00
Duration:	Supervision: 15.04.2009 – 15.10.2010 / Supply and Installation: 24.08.2009 – 24.02.2011
Implementing Agency/ Contractor:	Agency: ECLiaison Office Contractor Supervision: KANTOR Management Consultant Contractor Supply and Installation: RAFII sh.p.k.
Direct Beneficiary:	Regional Hospital Gjilan, "Emin Duraku" and "Selman Riza" schools in Gjakova, "Ismail Qemali" and "Gjin Gazulli" schools in Prishtina, Ministry of Energy and Mining (MEM)
Partners:	N/A
Target Area:	Energy efficiency
Overall Objective:	Support the Ministry of Energy and Mining (MEM) on the programme for energy efficiency and renewable energy resources.
Project Purposes:	Implement energy efficiency measures in five public buildings: Regional Hospital Gjilan, "Emin Duraku" and "Selman Riza" schools in Gjakova, "Ismail Qemali" and "Gjin Gazulli" schools in Prishtina
Project Strategy:	N/A
Activities:	Regional Hospital Gjilan: Insulation of side walls, water proof and thermal insulation of roof, installation of new PVC windows and external doors, overhaul of existing boiler system, and installation of solar collectors for hot water production. "Emin Duraku" school Gjakova: Insulation of side walls, water proof and thermal insulation of roof, overhaul of existing boiler system, installation of new PVC windows, installation of new lightning, and replacement of existing electrical distribution system. "Selman Riza" school Gjakova: Insulation of side walls, water proof and thermal insulation of existing roof, thermal insulation of roof of new annex, installation of new PVC windows and external doors, and overhaul of existing boiler system. "Ismail Qemali" school Prishtina: Water proof and thermal insulation of roof, overhaul of existing heating system, and installation of solar collectors for hot water production. "Gjin Gazulli" school Prishtina: Insulation of northern and western side walls, water proof and thermal insulation of roof, installation of new clay tile roof, overhaul of existing boiler system, and installation of solar collectors for hot water production.
Results:	Improved energy efficiency in the five selected public buildings.
To raise at KTV	Emin Duraku school in Gjakova: provisionally accepted in May 2010. Selman Riza school in Gjakova: to be provisionally accepted before end of July 2010. Gjilan hospital and two schools in Prishtina: to be provisionally accepted before 15 October 2010 (start of heating season).

Project Name:	Public Awareness Campaign for Energy Efficiency and Renewable Energy Sources EuropeAid/127848/C/SER/KOS
Project Value:	€ 295,500.00
Duration:	23 September 2009 – 23 December 2010
Implementing Agency/ Contractor:	Agency: ECLiaison Office Contractor: Energy Management and Information Technology Consultants S.A. (EXERGIA)
Direct Beneficiary:	Ministry of Energy and Mining (MEM)
Partners:	
Target Area:	Energy efficiency/ PR
Overall Objective:	The overall objective is to support the implementation of the Energy Community Treaty requirements on energy efficiency.
Project Purposes:	The purpose of this contract is to promote the efficient use of energy and related environmental benefits as well as the use of renewable energy sources.
Project Strategy:	As a signatory of the Energy Community Treaty and member of the Task Force on Energy Efficiency, Kosovo has to implement the *acquis* on energy efficiency and on renewable energy resources. The public awareness campaign on energy efficiency will run in parallel with the implementation of energy efficiency measures in public buildings (a supply project under IPA 2008). A campaign strategy will be prepared to promote energy saving measures and related potential benefits including environmental impacts. The campaign is intended to provide information for the general public on environmentally friendly energy production. The strategy will be followed up by the campaign design and implementation plan, which will provide detailed information on all activities (round table discussions with various stakeholders, preparation of TV and radio clips, the schedule of broadcasting clips, etc.) and materials (posters, leaflets, TV and radio clips, etc.) that will be used for the campaign.
Activities:	Task 1: Prepare a communication strategy and implementation plan. A customer survey was conducted in 2007 in an EU funded public awareness campaign for improving revenue collection and energy efficiency. The Consultant will be given a copy of the survey results which will be used in designing the communications strategy. In addition the Consultant will have to hold meetings with relevant stakeholders in order to collect information needed for the purpose of preparing the communications strategy. A communication strategy and a logo will be prepared and accepted for the campaign. The Consultant will prepare the implementation plan with detailed information about the media to be used during the campaign (national and local TV stations, radio stations, newspapers etc). The implementation plan has to ensure the media coverage of the whole Kosovo territory. The frequency of broadcasting video and radio clips will be at least five times a week in at least one national TV/radio station and in at least three local TV/radio stations. The plan shall include adverts in at least twenty billboard and distribution of posters in various cities of Kosovo. <u>Deliverable:</u> the communications strategy and logo should be submitted to the Contracting Authority for approval within two months after contract commencement date. The implementation plan shall be submitted within one month after approval of the strategy. Task 2: Design of the campaign The Consultant will design the products to be used during the campaign including any printed material (posters, billboards, inserts), broadcasted material (radio and TV advertising, advertising over interactive channels). <u>Deliverable:</u> the design proposals shall be submitted to the Contracting Authority within two weeks after the approval of the implementation plan. The Consultant must also observe the latest visibility guidelines concerning EC financing of the project. Task 3 Implementation of the Campaign Consultant should start the implementation of the public campaign as per approved plan within one month after approval of design. <u>Deliverable:</u> Brief monthly progress reports on the activities carried out and activities planned for next month. Task 4 Evaluation of results The Consultant should conduct a survey to evaluate and measure any changes in the attitude and behavior as a result of the campaign. <u>Deliverable:</u> An evaluation report has to be submitted as part of the Final Report. The report should demonstrate the effectiveness and the impact of the campaign in different target groups/community areas.
Results:	Prepared communications strategy raising public awareness on energy efficiency and renewable/green energy; Increased public awareness about the energy savings measures and related environmental benefits; Increased public awareness on advantages and potential of using renewable energy;

Annex 9: Catalogue of Typical Energy Efficiency Measures

This Annex provides a detailed overview of the measures available to make energy savings in public buildings and to raise comfort levels both in winter and in summer. The list of EE measures described in this Annex has been selected on the basis of international best practice.

1 Maintenance improvement

This measure implies bringing the building envelope up to, or even better than its designed state. (From a thermodynamic point of view, many public buildings were originally very poorly designed and constructed.) Maintenance improvement includes various investment measures and day-to-day maintenance, such as:

- Repairing insulation where it is damaged;
- Repairing hydro insulation of the roof;
- Repairing wooden windows and doors;
- Rehabilitation of damaged façades.

With regular, high quality maintenance of the building envelope, heat losses do not increase and the energy that would be needed for heating is saved.

1.1 Improvement of heat insulation

This involves improvement of the heat insulation of the building envelope (by putting in extra insulation material and installing insulation where it does not already exist). Different materials are used for heat insulation – demit facade (hard pressed Styrofoam with façade sheath), stone or mineral wool. Stone or mineral wool in panels or rolls is used for roof insulation, together with the installation of proper hydro insulation.

The measures for improving insulation can be classified as follows:

1. Roof and ceiling insulation

a. Heat insulation of a flat roof and its partial refurbishment
b. Heat insulation of the ceiling or of inclined roof surfaces (if a penthouse is involved)

2. Insulation of walls

a. Heat insulation of outside walls
b. Heat insulation of the basement walls above ground level
c. Heat insulation of the basement walls below ground level

Measures for floor insulation

The purpose of heat insulation of the building envelope is to make a permanent heat barrier in order to minimize heat transfer through the walls, roof or floor. This raises comfort levels within the object and reduces costs for heating and air-conditioning are reduced. This is one of the basic measures for increasing the energy efficiency of a public building. Certainly, the purpose of the public building needs to be taken into consideration in determining the optimal temperature, as well as the occupancy regime and the usage regime. Decisions on replacement, improvement or installation of insulation must be taken after detailed consideration of existing conditions and heat losses and comparing these with the predicted conditions that will exist after installing the new insulation.

1.2 Removal of redundant ventilation openings, windows and doors

This measure implies restructuring measures (dismantling existing openings, windows and doors and sealing them off) with the aim of removing redundant openings through which air enters and leaves the object. In this way, the energy required for heating can be reduced, so therefore this represents an effective way of increasing energy efficiency. Analysis on which openings are sufficient for maintaining quality ventilation within the object should precede the implementation of this measure, while at the same time, securing the necessary natural lighting of the premises.

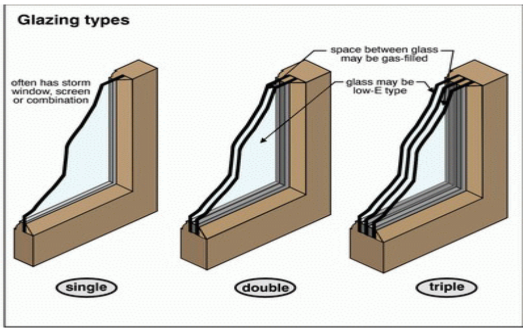
1.3 Replacement of outside windows and doors

This measure requires replacement of worn out windows-most frequently wooden framed with a single-pane and irregular geometry resulting from poor maintenance - with thermo pane windows (glass + 8-12 mm of air + glass) placed in aluminum (Al) or polyvinyl-chloride (PVC) frames using profiles with thermal barriers (as shown in the picture on the right), or in wooden frames. Secure sealing of the casements is achieved by using special sealing materials (EPDM rubber) and good sealing between the frames and the walls is provided by polyurethane (PU) foam.

Absolute sealing must be avoided, so as to secure the necessary minimal level of natural window ventilation. The minimal necessary natural ventilation is reached with special openings with shutters (automatic and manual) located in the PVC and Al profiles. Thermo pane windows can contain, on the inner side of the glass pane, a layer of special emulsion, which does not allow heat to flow from the room to the outside environment. The space between glass panes, besides being filled with air, can also be filled with argon (AR).

1.3.1 Refurbishment of existing windows

An efficient refurbishment measure with wooden windows is to build-in special sealing tapes in grooves of window frames and window panes (Al, EPDM and silicone tapes). In practice, wooden and metal single-paned windows are most commonly met. Wooden windows decay due to bad maintenance, they distort and lose geometry; therefore the losses caused by the breach of air become significant.



Sealing tapes are not regularly changed on metal windows which makes the losses increase. Refurbishment implies all the measures being taken targeting to bring the windows to their initial state, which may significantly reduce losses caused by air breach. This measure can increase the temperature in the room for 2-4° C, with energy consumption for heating remaining the same.

1.3.2 Building-in of a second glass pane (on existing single-paned windows)

This measure implies building-in of the second glass pane on single-paned windows. In this way, an air barrier is formed between the glass panes that are placed 6-10 mm one from another, which presents the barrier to the heat flow and in that way reduces the heat losses and respectively, the spending of energy for heating.

This measure implies building-in of double glass panes on existing windows, meaning, the dismantling of the existing single-paned glass and installing the new, double-paned one. Advantages of double glazing were discussed when describing the previous measure (C.1.6).

1.4 Construction of a light inclined roof with heat insulation

This measure implies making of an inclined roof with heat insulation, targeting at reduction of heat losses and reduction of the energy needed for space heating. On flat roof public buildings, the heat insulation is usually not installed or, if it is, it has lost its thermo-insulation properties due to worn out hydro insulation (as a consequence of wetting). In this case, an efficient measure is to build a light inclined roof with heat insulation placed on the attic floor or on leaning roof surfaces. In special cases, when the building burden is sufficient, this measure can be used also for the building of the classic attic.

1.5 EE measures for reducing energy consumption from heating systems

In this section, a brief overview of measures that can be taken for achieving energy savings in space heating system will be given.

1.5.1 Bringing existing equipment into designed state

For the boiler to work efficiently and reliably the formation of lime scale deposits and corrosion cannot be allowed and for that reason, planned blow-down of the boiler is being practiced. The aim of the blow-down is to keep the content of solids in the water that runs through the boiler within prescribed limits.

The blow-down can be carried out continuously at a predetermined rate, through a previously calibrated valve and tap at the bottom of the boiler, or manually, by opening the appropriate tap at the bottom of the boiler.

Transport of hot water to the consumers as well as the transport of the condensate back to the boiler is done by pipelines with heat insulation. After defining these basic concepts, a description of individual measures for improving energy efficiency in the system for heating and production of process hot water will be given. This measure implies bringing existing equipment (boiler, auxiliary equipment, pipelines) into initial state, namely various measures of investment maintenance and regular maintenance, like checking accuracy, repairing and adjusting of burners, repair and replacement of valves, repair of flue gas traps, various vessels, repairing the insulation, and alike.

1.5.2 Boiler replacement

This measure implies the replacement of boilers due to:

1. Spent working lifetime, deterioration, unprofitability of repair and alike;
2. Being over-dimensioned in regard to current needs (reduced in relation to previous state) and long-lasting operation at partial loads (lower than nominal that they were designed for);
3. Switching to another fuel; and
4. Poor condition and endangered safety of people and equipment, etc.

The burners, with liquid and gaseous fuels, essentially enable complete combustion (the minimal quantity of carbon monoxide in the flue gases) with maintaining combustion stability in a wide range of fuel flow rates (boiler power). From the burner operation range (fuel flow range) the operation range of the boiler also depends. With burners that have a wider range, load control is better, the number of switching on/off of the burner is smaller, the wear and tear is lower and smaller fuel consumption can be achieved.

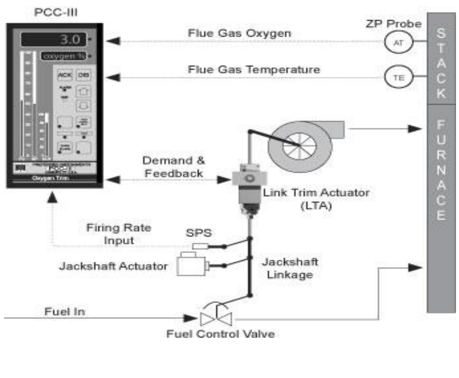
Modern burners automatically maintain an adequate fuel-to-air ratio in the mixture which combusts within a wide power (fuel flow) range, without constant manual adjustments. For these purposes, the most up-to date burner designs use servo motors, electronic control.

Replacement of existing burners is done in the case of: spent working lifetime, frequent switching on/off, unprofitability of repair, increase of fuel consumption comparing to the nominal one, and alike. By building-in of modern burners, the heat losses from the boiler facility are being reduced and positive effects, with regards to the environment, are being achieved. Mixing of fuel (liquid or gaseous) with the air needed for combustion occurs in burners. From the quality of this mixing, the combustion efficiency and boiler operation as a whole depend (boiler efficiency), and also the flue gas composition, namely the emission of harmful combustion products into the environment.

1.5.3 Boiler house modernization by installing operation control and automation systems

This measure implies automation of boiler operation, namely building-in of I&C systems (instrumentation and control) that can improve boiler operation, like:

1. Combustion control in accordance with the flue gas oxygen content (by the so-called lambda-probes, picture on the right);
2. VSD control of pumps and fans in the boiler house;
3. Automatic boiler blow-down; and
4. Build-in of the thermostatic mixing valves water temperature control, in combination with building-in of temperature measurement gauges for outside air, for the air in the boiler house and for warm/hot water in water boilers, as well as adequate control devices.



1.5.4 Placing/replacement of the heat insulation

Due to high combustion temperature in the boiler, the temperature of the boiler shell is also high, so the heat insulation is placed beneath the sheet-iron shell in order to reduce the heat losses into the environment.

This measure implies:
- Placing heat insulation of the boiler shell,
- Placing heat insulation of vessels at increased temperatures,
- Replacement of heat insulation of the equipment in the boiler house (pipelines, valves, boiler),
- Replacement of the heat insulation of steam pipelines and the steam tanks,
- Replacement of the heat insulation of warm/hot water pipelines and water tanks,
- Replacement of the heat insulation of the fuel oil tanks,
- Replacement of the heat insulation of other vessels at temperatures higher than ambient temperature,
- Replacement of the heat insulation of the equipment and pipelines (for water/steam/fuel oil/…) that are placed outside the boiler house but within the company.

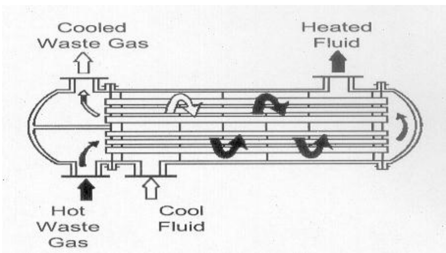
By replacing damaged insulation, the heat losses are reduced and hence the total energy efficiency of the company is increased

1.5.5 Flue gas waste heat recovery

Due to improper boiler operation and bad heat exchange, the temperature of the flue gases at the boiler exit is often higher than permitted, e.g. over 200°C. In that case, the heat of the gases can be used, for example, for heating of water or air for the purposes of heating.

The temperature of the gases at the boiler exit depends on fuel type, namely on the content of harmful elements in the fuel, like nitrogen or sulfur, that, in contact with the air (during fuel combustion in the boiler) combust completely or partially, producing harmful gases. These gases are condensed in contact with cooler surfaces near the boiler exit and the stack, so aggressive substances - acids are formed, like sulfuric and sulfide acids and others.

There is a minimal temperature of the flue gas at the boiler exit for each fuel that is for about 10°C higher than the condensation temperature (the so called dew point) of the acids. With natural gas, this temperature can be 95°C, with light fuel oil 140°C, with heavy fuel oil 160-180°C, etc.



This measure implies installation of heat exchangers in flue gas ducts in the boiler, immediately before flue gas enter the chimney, for heating the water or the air by the heat of the flue gases.

This significantly reduces boiler heat losses due to the discharge of hot gases into the atmosphere, increases the boiler efficiency and adds up to much better utilization of energy, therefore the increase of energy efficiency.

This is especially significant with boilers switched from the solid fuel (coal) to liquid fuel or natural gas, because in that case too high temperatures are reached at the boiler exit, which makes building-in of extra heat exchangers necessary. It should be emphasized that measuring of the flue gas temperature is obligatory by valid regulations.

1.5.6 Installing, reconstruction or modernization of condensate return systems

As already mentioned, the steam can be used in industrial facilities for production of electricity, if the facility is equipped with turbo generators, and supplying the heat for the needs of technological processes and heating.

By complete condensation of 1 kg of steam, 1 kg of condensate of the same pressure and temperature is obtained. In an efficient system for production and distribution of the steam, this condensate will be used again. Moreover, non-usage of condensate has no financial, technical or ecological sense. The majority of the heat is transferred from steam to a technological process and/or to hot water for heating in some way, with the steam being condensed at the same time (saturation – vaporization/condensation - heat). The rest of the heat remains in the condensate.

Apart from the fact that the condensate contains heat and that with its non-return into the system heat is being lost, an important aspect of condensate utilization is also that condensate is actually distilled water (purified from solids) and that it is ideal to be used for boiler feed water – by returning it to feed water tank and to the water treatment system. The condensate is not to be returned to the boiler only if there is a risk of it being contaminated, but even then condensate heat can be used in a way that the condensate is used as hot process water, or its heat is used in a heat exchanger prior to discharge into the drain.

From the condensate at higher pressure, by slight pressure reduction, steam of lower pressure is obtained which is then used by a lower pressure consumer. In this way, by gradient utilization of steam and condensate of a higher pressure for obtaining lower pressure steam, in the end, condensate of the lowest pressure is obtained. Heating requires the lowest steam pressure. By boiler feed pumps, the initial high pressure is provided again.

Therefore, a part of produced steam is spent within technological processes and practically lost, a part of the condensate is contaminated and must be thrown away, but the highest possible condensate return must be provided. For all mentioned reasons, it is obvious that the installation or repair/replacement/reconstruction of the condensate return system contributes to increasing energy efficiency in several ways.

1.5.7 Modernization/replacement of the water treatment system

This measure implies modernization of the system for chemical treatment of water that enters the boiler, by installing adequate equipment, filters and alike, or its complete replacement in case the working lifetime of the existing system for chemical treatment has expired, in case the existing system is worn out and alike.

A system for chemical water treatment operating properly enables continuous operation of the boiler facility and provides much less frequent boiler shutdowns.

1.5.8 Reconstruction of solid fuel-fired boilers, for switching to gaseous fuel

This measure implies all necessary reconstructions that need to be done on the boiler for switching from the solid fuel to gaseous fuel: installation of additional heating surfaces in the exit sections of the boiler (since natural gas is a fuel of much higher quality fuel– with much higher heating value – than coal), rarely changes in furnace design, etc.

1.5.9 Installation of water heat accumulators

Installation of water heat accumulators – large hot water tanks with heat insulation –is a measure that can increase energy efficiency, by steadier boiler operation. The working principle of water heat accumulators consists of the following: in the course of heating season/month/day, there are periods when the needs for heating are not significant (relatively high outside temperature, weak wind, and sufficient sunny weather). At those times, the boiler facility working at full power can accumulate the heat surplus that is not needed for heating at that moment, by means of heating the water in the accumulator. The water from the accumulator can be used in periods when the climate is extremely unfavorable – very low outside temperatures, strong winds, and short periods of sunny weather. In such conditions, it may happen that additional, extra heat is needed for heating, regardless of the boiler working at full capacity, and that can be achieved (compensated) by the heat stored in the accumulator during warmer periods. This type of use is of importance, for instance, in greenhouse heating, where maintaining optimal conditions for the growth of plants is of great importance.

Water heat accumulators can be combined with boiler facilities using any type of the fuel (gas, liquid fuel, biomass, coal) but also with solar heating systems. Installation of water heat accumulators can be a good solution in case when the boiler, at the time of its construction, was dimensioned for the consumption of that time and new objects have been connected to the heating network since. Water accumulators are suitable for installing in the case of boiler facilities on biomass, as a sort of a buffer-zone between the boiler and the consumer– the boiler can produce hot water and place it in the accumulator, and the water for heating is, using appropriate controls, taken from the accumulator as needed, depending on outside weather conditions. This way of installation also facilitates heating system control when biomass is used as fuel.

Water accumulators are used within industrial facilities coupled with cogeneration (CHP) facilities, in order to provide the highest efficiency of electricity production (by means of gas motors, most frequently being the case in industry). By default, industrial heating does not consume large amounts of energy, therefore it is more convenient to use low temperature process water for heating.

1.5.10 Improving insulation of heat distribution pipes

This measure implies repair, installing and replacing the insulation on pipelines for heat distribution placed in premises that are not heated. By replacing the damaged insulation, the heat losses are reduced therefore increasing energy efficiency.

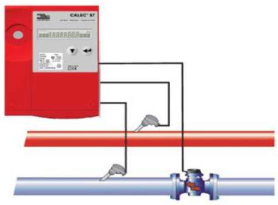
1.5.11 Applying zonal heating control within the company

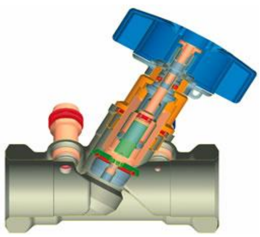
This measure implies applying heating by zones of industrial company, i.e. flow and/or temperature control of the heating fluids by zones, due to different usage of premises.

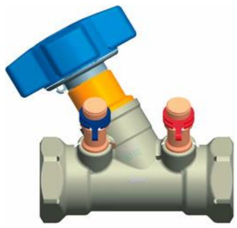
The following procedures fall into the description of this measure:

1. Building-in of thermostatic control, both in individual zones and working units of the company, as well as on individual radiators – building-in of radiator valves with thermostatic heads.
2. Building-in of temperature sensors, human presence sensors, heating regulators, contact temperature measurement devices, thermostats and executive apparatus (mixing valve, triple-armed and quadruple-armed faucet, fuel intake valves, etc.). These procedures are applied with the aim to control the heating according to outside conditions and the presence of people in the premises.

1.5.12 Modernization of systems for heating premises



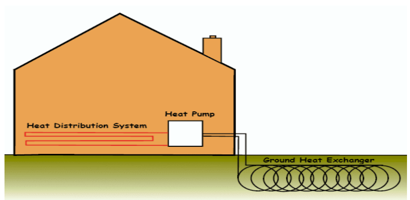




This measure implies different measures for improving heating system control that, as a direct consequence, have better usage of energy:

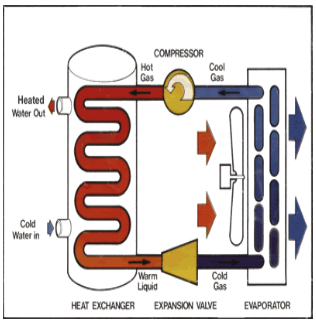
1. Installing/replacing valves and balancing of the pipe network. This measure implies installing (if non-existent) or replacement (if worn out) of the balance, radiator and other valves in the pipe network and balancing of the pipe network.
2. Installing heat meters – calorimeters. In order to determine the distribution of heat consumption more precisely, by individual consumers or by organizational units, objects, facilities, it is necessary to install heat meters, the so-called calorimeters. There are various types of calorimeters but, in principle, they all work on the basis of combination of measuring the flow (by ultrasound flow meters and alike) and fluid temperature (by thermocouples, resistance thermometers and alike) – of hot water in this case. This is important in case if heating costs are divided by production units or between companies.

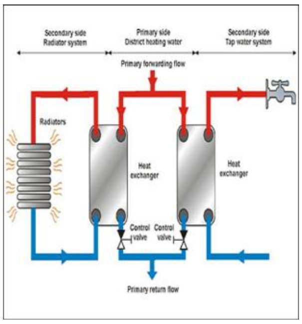
2. Modernization of convector heating

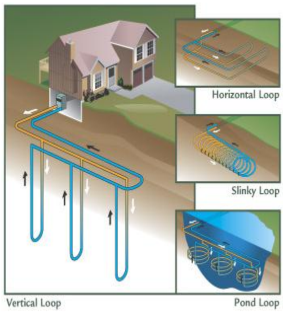


This measure implies various measures that improve control of convector heating by installing thermostats, turning on the heating only in premises where there are people, meaning where there is a need for heating, and alike.

2.1 Purchase and installing of heat pumps and auxiliary equipment







Heat pumps are devices that work on the same principle as cooling devices: the refrigerant vaporizes in the evaporator at a low temperature, cooling the environment where the evaporator is located. The temperature and the pressure of the refrigerant are increased by a compressor, which is then being cooled down and condensed in the condenser, at the same time warming the environment in which the condenser is located. While with refrigeration devices the vaporization heat is used for cooling the space, with heating pumps, the condensation heat is used for heating. As the heat source–the environment where the evaporator of the heat pump will be located–ground, water or air can serve. Heat pump with ground as its source consists of the following elements:

1. Pipe heat exchanger (loop) buried in the ground. A mixture of water and antifreeze flows through the loop and absorbs the heat from the ground where it's located.

2. Heat pump through which the refrigerant flows. The basic parts of the heat pump are:

- Evaporator that absorbs the heat from the liquid that flows through the loop;
- Compressor that transports compresses and by compressing, heats the refrigerant to needed temperature;
- Condenser in which the heat from the refrigerant is transferred to the water that heats the place.

2.2 Heat distribution systems (floor heating, radiators, hot water containers, etc.)

Heat pumps that use air as the heat source absorb the heat from the outside air for heating the premises. There are two different systems - the air-to-air systems that as a result give hot air for heating, and air-to-water systems, where the water that is used for floor or radiator heating is being heated. Heat pumps operate on electricity. The heat pumps with air as the source are more suitable than the ones with ground as the source, because it takes much less space to install them. The purpose of using the heat pumps is to raise the temperature potential of water (air) heat to the temperature that is needed for heating, with using external (brought) work, i.e. electricity. The heat pumps with air as the source work on the same principle as cooling devices and are composed of the following parts:

- Evaporator heat exchanger (loop) that absorbs the heat from the outside (ambient) air,
- Compressor by which the refrigerant is transported, compressed and by compressing heated to the needed temperature, and
- Heat exchanger through which the heat from the refrigerant is transferred to water or air.

Heat pumps heat the water to lower temperatures then the usual water for heating (35-45°C); therefore it is more suitable to place hot water distribution within the room inside the floor (floor heating). Heat pumps can be used even in a combination with other types of heating, e.g. the solar heating.

2.3 Reconstructions for reducing the consumption of electricity for heating

This measure implies various reconstructions targeting to reduce electricity consumption for heating – e.g. dividing the premises, to heat only the parts that are necessary to heat, and alike.

2.4 Switch from coal and liquid fuel to District Heating systems

This measure implies switching from heating with coal- and liquid fuel-fired boilers within the company itself to district heating, i.e. connecting some parts of the company or the company as a whole to District heating. This measure does not reduce the energy needs, but the negative effect to the environment is reduced.

2.5 Modernization of the heating sub-stations

The heating sub-stations represent the link between the steam/hot water network and heating installations within the objects. In the sub-stations, the heat from steam/hot water is transferred through exchanger to the water that is being heated, the parameters of which (temperature, pressure) are adjusted to the needs of the consumers (heating premises by radiators, production of sanitary hot water, etc.). This measure implies building-in of the equipment for control and instrumentation into heating sub-stations. With quality control equipment in the sub-station, the parameters of water for heating/sanitary water that comply with the current heating needs are achieved, meaning, the energy efficiency is improved in a way that the energy for heating is not being spent more than necessary. It is necessary to provide heating control at heating sub-stations in accordance with the outside temperature and the heat consumption within the object.

2.6 Replacement of heating sub-stations

This measure implies installing completely new sub-stations instead of existing ones in case of dilapidation, inadequate characteristics (e.g. if since installing the sub-station, there have been newly connected consumers to the heating system, that essentially influence the parameters of the water for heating) and alike.

2.7 Using the renewable energy sources

This measure implies all the measures of reconstruction of the existing heating system or purchase and installing of the new equipment for using renewable energy sources (solar radiation, biomass, wind, water, geothermal energy) for the needs of heating the space.

2.8 System for ventilation and air-conditioning

Natural ventilation implies using climatic conditions from the environment for cooling or heating of buildings, by proper set-up of the ventilation openings, doors and windows. Natural ventilation is to be used in combination with mechanical, where possible. Natural ventilation does not consume energy. Mechanical ventilation of the industrial space is achieved by fans that blow the outside air into the building. The air (fresh or warm) is spread throughout the object through ducts and blown into the premises through trussed openings–anemostats placed on the ceiling or on the walls. The heat is drawn out of the premises also by fans that pull out the warm air from the premises. Mechanical ventilation can often be a good replacement for air-conditioning and saves significant quantities of energy. Also, the air-conditioning system can also have the option of ventilating the space by outside air which practically represents mechanical ventilation. Significant savings can be achieved if systems for air-conditioning are properly dimensioned and installed. Also, an important prerequisite for making savings is proper management of the air-conditioning system, as well as its regular maintenance.

A wide range of air-conditioning devices is in use, from devices that have the possibility of inverting the cycle, namely cooling and heating, and small wall-type cooling units for purposes of air-conditioning of smaller spaces, offices and alike, all the way to large air-conditioning units that perform central heating/air-conditioning through ducts and openings positioned inside the object. There exist also very efficient systems, the so-called evaporative cooling systems that use outside air that circulates through wet filters, but their usage is limited to areas with low air humidity. On individual air-conditioning devices, technologically produced as split-systems, the outside unit consists of the condenser and the compressor and the evaporator is placed in the inside unit. Systems for centralized air-conditioning are more energy efficient than individual devices for air-conditioning of the premises, and they are frequently supplied with many options, like the operation by zones, the operation in the economical regime (usage of outside fresh air during morning hours in transition period, spring-autumn, when the outside temperature is still lower than the temperature inside the premises) and alike. With these devices, the compressor (or more compressors the case of air-conditioning of large objects), the evaporator and the condenser are placed inside the same unit, most often located on the roof or right next to the object. In centralized air-conditioning systems, air is circulated through the object through the system of inlet and outlet ducts, where the air is blown in/drawn out through trussed outlets – anemostats. Evaporative cooling systems can be of various dimensions and purposes, transferable, wall-mounted or central ones. They are suitable for air-conditioning of buildings with bad sealing, or objects/companies where outside doors must be open (e.g. sales objects). These systems are very efficient.

3. Bringing existing equipment into the designed state

This measure implies bringing existing equipment intended for ventilation and air-conditioning of the industrial space into the designed state, namely various measures of investment and current maintenance that have that purpose. Therefore, this implies cleaning and repairs of all the components of ventilation system, like ventilation outlets, fans, filters, aerostats and ducts, with the purpose of achieving maximal efficiency of operation. The more efficient the cooling is only by means of ventilation, the lesser is the need for air-conditioning. Apart from that, this measure implies measures of maintenance and repairs of the air-conditioning system, like:

- Rehabilitation/elimination of leakages of the refrigerant from the system or of air from ducts,
- Cleaning of filters,
- Cleaning of evaporator and condenser loops, and
- Repair of evaporator and condenser fins.

3.1 Installing systems for zone control of ventilation & air-conditioning.

This measure primarily implies installing modern air-conditioning systems that have the option of zone control, i.e. the possibility of system operation only in the zones/premises/ organizational units of the company where air-conditioning is actually necessary (because of the production process, or premises that are currently in use, or premises that are currently occupied, etc.). Also, this measure implies installing electronic equipment for zone control in existing air-conditioning systems.

3.2 Installation of heat recovery systems

This measure primarily implies measures for utilization of waste heat of the condenser of the air-conditioning system for heating of water (cooling of the condenser by water instead of air etc.), or for heating of the premises, by directing the air that cools the condenser to the ventilation ducts.

3.3 Installation of roof fans

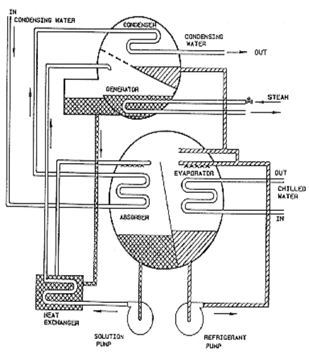
This measure implies installing re-circulation roof fans for ventilation of the production facilities. The needs for ventilation of industrial space often fluctuate in the course of day or year, depending on the outside temperature as well as on production processes in the objects themselves.

By installing re-circulation roof fans, several effects are achieved:

1. The fan can serve for removal of heat surplus, by pulling-out the air from the premises, which reduces the costs for cooling/air-conditioning of the premises.
2. The fan can solve the stratification problem – a well known phenomenon of differentiation of air by temperatures, where the hot air is in the upper zone of the object, closer to the ceiling, and colder air in the lower part, where people and the equipment are. The problem is solved by re-circulating the hot air, that is accumulated close to ceiling, and directing it below, which makes the temperature profile within the object more uniform, heats the part where the workers and the equipment are located, therefore savings in heating costs are made.
3. Some roof fan designs have the option of aspirating the outside air, i.e. supplying the premises with fresh air at times when the outside temperature is lower than the one in the object, which contributes to savings in the expenses for cooling the premises.
4. Some roof fan designs have the possibility of mixing hot air from the zone close to ceiling with outside air, and they direct such a mix below in order to achieve optimal conditions in the object.

3.4 Achieving natural ventilation of the premises

This method implies all the reconstructive measures aiming to achieve natural ventilation in industrial objects–installing ventilation openings and windows at appropriate places, and alike. The design of the industrial object itself should be such that natural climate conditions for ventilation of objects are used to maximum extent. Openings and windows need to be installed at optimal places for achieving natural ventilation. By achieving quality natural ventilation, the need for air-conditioning and even the need for mechanical ventilation, are reduced, and energy consumption for these purposes is reduced as well.



3.5 Installation of the Energy Management System (EMS) within the system for air-conditioning and ventilation

This measure implies all the reconstruction measures on existing systems, as well as installation of new ventilation and air-conditioning systems, with the aim of installing the equipment and software for energy management. Rational energy management might bring energy savings into public building from 10-30%.

3.6 Installation of absorption cooling systems

In order to achieve cooling, unlike usual refrigeration systems that use mechanical energy, absorption cooling devices use heat for these purposes. The role of compressor is here taken by the "heat compressor", that consists of several components–the absorber, the generator, the pump and pressure reduction valve. Water is most often used as the cooling fluid, combined with an absorbent–some salt, e.g. lithium-bromide, LiBr. The advantage of these devices is that as heat sources needed for the operation of the generator, the following can be used:

- Surplus of steam or hot water from industrial processes,
- Biomass boilers (because the temperature of water produced in these boilers is adequate for heating of the absorption system generator),
- CHP system that can produce more heat than necessary during the summer,
- Furnaces, driers, flue gases.

Their advantage is also in the fact that:

- There are no movable parts, therefore the working life is long (20-25 years) and maintenance expenses are low,
- They operate quietly and without vibrations,
- The refrigerant is environmentally more suitable than usual cooling fluids in classical devices and does not contribute to global warming,
- Depending on cooling needs, continuous change of power is possible, and
- Absorption cooling can be applied even in combination with the district heating systems (the water from the district heating system can be used as the heat source needed for the operation of the absorption system).

These devices are less efficient than usual refrigeration facilities–much greater cooling power is obtained per unit of power consumed in classic cooling devices (COP=2-5 in the case of classic, and 0.4-0.75 in the case of absorption devices; COP represents the ratio of the accomplished cooling effect and the energy needed for the compressor drive), but they are suitable since they can use any kind of waste or unused heat from a technological process or a boiler for its drive, and they represent a very efficient way for using waste heat. The fault of these systems is that they are relatively expensive, but there are multiple energy advantages from installing these systems in combination with various heat sources, therefore, the investment pays off relatively quickly.

4 Lighting

4.1 Bringing existing equipment up to the designed state

This measure implies bringing the existing equipment intended for lighting of the public buildings into the designed state, namely different measures of investment and current maintenance with that purpose.

4.2 Cleaning the luminaries (bulbs), shutters, spot-lights

When the luminary is installed, the light intensity, the intensity of radiation of that luminary, gradually declines with time because of the degradation of performances due to the working life of the luminary and due to the accumulation of dust and dirt coats on luminaries and their top covers (if any). Regular program of bulbs' maintenance includes cleaning of bulbs, windows, walls and ceilings, as well as planned replacement of luminaries before their intensity of light drops below allowed limits (allowed limit is up to 30% lower light intensity than declared by the manufacturer and, for determining this, lux meters are used). In the case of fluorescent bulbs with starters, for example, it would be economic to change the starter after two bulb replacements.

4.3 Installation of lighting control

One of the ways of saving energy is through the right lighting control. Adequate lighting control can bring to savings of energy that is used for lighting of public buildings, in average, 20 to 50%. Basically, these savings are achieved by using natural day lighting, when possible, as well as by controlling artificial lighting according to minimal necessary needs, depending on the occupancy of buildings. It is of a great importance that the system for lighting control is simple to use and can be used by anybody very easily. Manual switchers are important and necessary in the premises where a lot of people are residing, and especially where changeable levels of lighting are desirable, either because there are not always people present in some parts of the premises or because there is more natural lighting at some parts of premises. Systems for automatic lighting control can be sorted in three groups:

- Time-controlled systems, that switches off the lighting in accordance with predefined schedules but, with an option that people present in the room can switch on/off lighting as they please, independently from the system.
- Systems that work depending on whether there is someone present in the room or not, that use infrared, acoustic, ultrasonic or microwave sensors that detect movement or noise in the room. They switch the lighting on/off upon detection that there is/is not someone/anyone present in the room.
- Systems that work depending on the level of daylight, that measure daylight level by means of photoelectric sensors and, depending on the level of natural lighting, add artificial light.





Photoelectric sensors can be placed either centrally, in order to control the work of several bulbs or at every individual luminary in order to control only its operation. Local positioning of photoelectric sensors at every individual luminary is more desirable and, if possible, sensors are to be put at the side towards the daylight source, in that way giving precisely determined quantity of additional lighting to every luminary and in every part of the space, all that with maximal usage of natural lighting.

4.4 Installation of more efficient bulbs

Conventional bulbs with incandescent cords are still present in industry. The working principle is based on conduction of electricity through a wolfram wire, which is heated to incandescence thus emitting the light. In connection to that, huge losses occur, because the majority of the energy is converted to heat. These conventional bulbs are also called incandescent bulbs, and their efficiency is 5-7%, i.e. that is how much of consumed energy is converted to light.

Just one energy efficient bulb can achieve significant reduction of electricity consumption, therefore reduction of electricity bills. The working principle of energy efficient bulbs is based on passing of the electricity through gas that is positioned within the bulb. The consequent physical process emits the light. That means that there is no conductor through which the electricity is passing, hence no energy losses. The process described makes these light sources much more efficient and economically viable. Even with all the advantages they provide, they come upon resistance from users. Some of the most common ”reasons“ used against efficient bulbs are:

1. Design – the design and electronic structure of energy efficiency bulbs has progressed significantly over the last couple of years, and now, models that do not differ at all by size from classic bulb models can be found.
2. Energy efficient bulbs are more expensive. Although the prices of such light sources have been significantly lowered lately, they are still around 10 times more expensive than conventional bulbs. However, when purchasing, the attention needs to be paid to the consumption of such bulb. Energy, therefore financial saving will be noticed in the course of exploitation of an energy efficient bulb which makes it far more better choice in the long run. Energy consumption is 25-85% lower than that of classic bulbs and, apart from that, working life is 8000-10000 hours, in comparison with 500-1000 hours in the case of a plain bulb. That means that in the working lifetime of the efficient bulb, 10-15 plain bulbs need to be bought, so the investments are pretty equal (the only shortage of the efficient bulb is that the money is to be disbursed at once and, with plain bulbs, gradually).
3. Energy efficient bulbs need more time to start-up.

Present models have reached such a level that the mentioned problem no longer occurs. Thanks to the electronic structure, the so-called starter placed inside the bulb, the switch-on happens momentarily. This implies taking certain measures (adequate placing of working tables in offices, the windows of sufficient size, reconstructions of windows, doors and sunroofs, etc.) that add up to better luminance of the premise and better usage of natural lighting. In this way for additional light and energy consumption for lighting are reduced, as well as the costs, and the energy efficiency of the lighting system is increased.

Annex 10: Fuel Price Projections for Investment Appraisal

1. Base year (2011) prices

All 2011 prices have been converted to €/kWh. Because there are still many distortions in the local Kosovo market, the actual (or financial) prices of goods do not do always reflect their true value - for example, the price of fuel wood does not reflect the costs of producing and replacing it. As a result, the value of energy savings made by replacing fuel wood will be understated. These projections, therefore, cover both the financial analysis (i.e. actual prices) and the economic analysis (the estimated 'shadow' prices that would prevail if there were no market imperfections). After 2011, different annual growth rates, based on the assumptions described below have been applied to the financial and economic price streams, to give prices for the period 2011 – 2035. The assumptions are broadly consistent with those used in the USAID regional study on energy planning in the Balkans.

2. Diesel and HFO/Mazut

Diesel and HFO/Mazut are traded on the international market and so their financial and economic prices are considered to be equivalent. Moreover it is assumed that in the medium- to long-term all fuel prices will tend to converge towards the price of diesel, which therefore sets the ceiling price in the energy market – other fuels will tend to but not exceed the price of diesel. The price of both diesel and mazut is assumed to increase in line with the general level of market prices over the period, as shown in Table 1 below.

Years	2012 -2020	2021 -2035
Diesel	3%	5%
HFO/Mazut	3%	5%

Table 1: Forecast annual increases in the price of Diesel and HFO/Mazut

3. Fuel Wood

Fire wood is under-priced in Kosovo in the sense that its price does not reflect the costs of production. So while the local (financial) price is forecast to increase in line with market prices, the economic price is assumed to rise sharply over the next six to seven years to within a few cents of the diesel price and to increase in line with market prices thereafter.

Years	2012 -2020								2021 -2035	
Fuel Wood Financial	3%								5%	
Years	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019-2020**	**2021-2023**	**2024-2035**
Fuel Wood Economic	20%	30%	40%	60%	60%	20%	1%	3%	4%	5%

Table 2: Forecast annual increases in the price of Fuel Wood

4. Coal/Lignite

Coal/lignite in this context means the fuel used for heating schools and homes, not the fuel used for power generation. The financial price of lignite is assumed to increase in line with the general level of market prices over the period, as shown in Table 3 below. As with fuel wood, the economic price is assumed to rise sharply over the next six to seven years to within a few cents of the diesel price and to increase in line with market prices thereafter.

Years	2012 -2020								2021 -2035	
Fuel Wood Financial	3%								5%	
Years	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019-2020**	**2021-2023**	**2024-2035**
Fuel Wood Economic	20%	30%	40%	60%	60%	20%	10%	3%	4%	5%

Table 3: Annual increases in the price of Coal/Lignite

5. Brown Coal

Brown coal is imported coal (usually from neighboring countries) and used for heating purposes in some public buildings, particularly schools. It is has been assumed that the price of brown coal will show the same pattern of annual increase as coal/lignite. That is, its financial price is forecast to grow with the general level of market prices over the period, while the economic price is forecast to rise to within a few cents of the diesel price over the next six to seven years and then to increase in line with market prices.

Years	2012 -2020								2021 -2035	
Brown Coal Financial	3%								5%	
Years	2012	2013	2014	2015	2016	2017	2018	2019-2020	2021-2023	2024-2035
Brown Coal Economic	30%	30%	30%	40%	50%	20%	10%	3%	4%	5%

Table 4: Annual increases in the price of Brown Coal

6. Electricity

The price of electricity is based upon an estimate of the unit price of the tariff typically applied to public buildings. Based on the Energy Strategy (2009-2018) and KEK and KOSTT action plans, there is a five year plan (2011-2015) to achieve fully cost-reflective electricity tariffs for all categories of consumer.

As with the other financial fuel price projections, the financial price of electricity is forecast to increase with the general level of market prices between 2012 and 2035. Over the same period, the economic price reflects a short-term increase, as prices moves up to cost-reflective levels and follows a steady growth rate of 5% a year thereafter, as suggested by the ERO.

Years	2012-2020			2015-2035
Electricity - Financial	3%			5%
Years	2012	2013	2014	2015-2035
Brown Coal Economic	30%	30%	30%	5%

Table 5: Annual increases in the price of Electricity

7. District Heating (DH)

The price of district heating in 2011 was provided by the ERO. Table 6 shows that between 2012 and 2035, the financial price of district heating is forecast to rise in line with the general level of market prices. The economic price mirrors the profile of the projected short-term increase in the price of electricity, but at a higher rate (+3%) and a 5% annual growth rate thereafter, as for the equivalent electricity price. During the forecast period, the price relativity between DH and electricity has been maintained at between 40-45%.

Years	2012-2020			2015-2035
District Heating-Financial	3%			5%
Years	2012	2013	2014	2015-2035
District Heating-Economic	11%	10%	9%	5%

Table 6: Annual increases in the price of District Heating

8. Fuel price projections

The data and assumptions described above have been entered into the Excel spread sheet 'Financial & Economic Prices_110914_v3' to produce price streams from 2011 to 2035 that can be used for the investment appraisals that are part of the Deep Energy Audit process.

Annex 11: List of Stakeholders meetings July and August 2012

Inception Phase Meeting Schedule, July 2012

MEETING DETAILS	ATTENDEES
Monday, July 2	
Project 'kick-off' meeting 16:00 at WB Office, Prishtina	Samira Elkhamlici - WB Giuseppe Razza – EPTISA Ivo Veselinov – EPTISA Richard Tomiak – EPTISA Albana Hoxha - EPTISA
Tuesday, July 3	
Municipality of Prishtina 09.00 at Municipality of Prishtina, Dragodan	Agim Gashi – Director of Public Administration Jehona Mavraj – Chief of Environment Sector Samira Elkhamlici - WB Arsim Brucaj - EPTISA
GIZ and Association of Kosovo Municipalities 13.00 at GIZ Office, Prishtina	Gabriele Becker - GIZ Avni Sfishta – GIZ/AKM Samira Elkhamlici - WB Richard Tomiak – EPTISA
Wednesday, July 4	
Ministry of Environment and Spatial Planning 10.30 at New Government Building, 17th floor	Lirie Berisha - Director, Housing and Construction Department Samira Elkhamlici - WB Astrid Manroth – WB Richard Tomiak – EPTISA
UNDP 13:00 at UNDP Office, Prishtina	Steliana Nedera – Deputy Head Shkipe Deda-Gjurgjiali – Environment and Energy Analysis Samira Elkhamlici - WB Astrid Manroth – WB Arsim Brucaj - EPTISA
KEK 14:00 at Elektrokosova, 6th floor Prishtina	Njazi Thaci – Operations Director Salih Bytyci – Financial Director Samira Elkhamlici - WB Astrid Manroth – WB Arsim Brucaj - EPTISA
Ministry of Economic Development 17:00 at MED, Mother Theresa St., Prishtina	Luan Morina - Head of Dept., Energy and Mining Samira Elkhamlici - WB Astrid Manroth – WB Arsim Brucaj - EPTISA Nafije Gashi - EPTISA
Thursday, July 5	
USAID 11:30 at USAID Office, Prishtina	Roxanne Suratgar – Energy Sector Specialist Samira Elkhamlici - WB Astrid Manroth – WB
KfW 13.30 at KfW office, Prishtina	Bahrije Dibra – Coordinator for the Financial and Energy Sectors Samira Elkhamlici - WB Astrid Manroth – WB Richard Tomiak – EPTISA Arsim Brucaj - EPTISA
Friday, July 6	
EU Office in Kosovo 11:00 at EU building, Prishtina	Garcia Suarez Antonio Merita Govori – Task Manager Infrastructure Samira Elkhamlici - WB Astrid Manroth – WB Arsim Brucaj - EPTISA
EBRD 16:00 at EBRD Office, Prishtina	EBRD representative Samira Elkhamlici - WB Astrid Manroth – WB Arsim Brucaj - EPTISA
Tuesday, July 11	
Ministry of Economic Development 11:00 at MED, Mother Theresa St. Prishtina	Luan Morina - Head of Department for Energy and Mining Bedri Dragusha - CEO, Kosovo Energy Efficiency Agency Richard Tomiak – EPTISA Besim Islami – EPTISA

Annex 12: Grouping Municipality of Kosovo according Heating Degree Days Concept

Determination of calculating temperature during heating season as well as heating degree days for main cities of territory of Kosovo is necessary element to determine heating losses in building stock as well as to calculate energy demands for their heating. Determination of these parameters should be based on climacteric data measured for a certain number of the years as well as technical economic considerations which must take into considerations energy characteristics of buildings as well as level base temperature (which take into consideration internal energy gains). The temperature of outside air used for done calculating with formula (1) presents a parameter which is determined taking into considerations:

- Outside air temperature for a number of years based on measurement carried for Kosovo territory.
- Accumulating capability of buildings.
- Allowed deviation of inside surroundings temperature in extreme case of meteorology conditions during cold year period.

Outside air temperatures for a number of years are used for calculating average daily/monthly temperature of air and those air temperatures are taken from different publication of Hydro Meteorological Institute. Accumulating capability of buildings is taken into consideration and it is a function of thermo-physic characteristics of building materials and geometry (shape factor which is equal to Area/Volume).

Following table present average outside temperatures of main municipalities of Kosovo based on the publications of Kosovo Hydro Meteorology Institute. Consultant has carried out the calculation of HDD for each municipality based on those average outside temperatures and the below methodology.

Municipality	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Prizreni	0.18	2.89	6.46	11.87	16.67	20.23	22.27	22.09	17.99	12.08	7.36	2.46
Gjakovë	-0.56	1.77	5.4	10.7	15.4	18.77	20.54	20.4	16.48	10.63	6.41	1.72
Pejë	-0.33	2.05	5.93	11.32	15.85	19.12	21.16	21.37	17.19	11.69	6.6	1.91
Suharekë	0.18	2.91	6.49	11.93	16.76	20.34	22.39	22.21	18.09	12.14	7.40	2.47
Rahovec	0.18	2.92	6.52	11.98	16.82	20.41	22.47	22.29	18.15	12.19	7.43	2.48
Deçani	0.15	2.40	5.36	9.85	13.84	16.79	18.49	18.34	14.93	10.03	6.11	2.04
Junik(Deçan)	0.15	2.40	5.37	9.86	13.85	16.81	18.50	18.35	14.94	10.04	6.11	2.04
Prishtinë	-1.11	1.2	4.56	10.03	14.58	17.98	19.92	19.92	15.96	10.52	6.16	0.95
Ferizaj	-1.39	1.02	4.4	10.01	14.66	18.05	19.96	19.82	15.81	10.33	5.57	0.72
Gjilan	-0.94	1.35	4.67	10.21	14.71	18.04	20.04	19.14	15.77	10.69	5.87	1.126
Klinë	-0.52	1.77	5.52	10.36	14.57	17.64	19.30	18.78	15.35	10.29	6.09	0.18
Shtime	-1.09	1.18	4.47	9.82	14.28	17.61	19.51	19.51	15.63	10.30	6.03	0.93
Obiliq	-1.11	1.20	4.56	10.03	14.58	17.98	19.92	19.92	15.96	10.52	6.16	0.95
Graqanicë	-1.11	1.20	4.56	10.04	14.59	17.99	19.93	19.93	15.97	10.53	6.16	0.95
Novo Bërdë	-1.12	1.21	4.58	10.08	14.66	18.07	20.02	20.02	16.04	10.58	6.19	0.95
Mitrovicë	-0.95	1.33	4.37	9.13	13.30	16.25	18.12	17.88	14.23	8.30	4.72	0.25
Vushtrri	-0.97	1.36	4.45	9.31	13.57	16.58	18.48	18.24	14.51	8.46	4.81	0.25
Skenderaj	-0.97	1.35	4.44	9.28	13.52	16.52	18.41	18.18	14.46	8.43	4.80	0.25
Leposaviq	-0.92	1.29	4.23	8.84	12.88	15.74	17.54	17.31	13.78	8.03	4.57	0.24
Zubin Potok	-0.92	1.28	4.20	8.78	12.80	15.64	17.43	17.21	13.69	7.98	4.54	0.24

Table: Average monthly temperature (0C) for each month for the main Municipalities of Kosovo:

Heating Degree Days are main element to calculate energy consumption for meeting space heating energy demand. Heating Degree Days have been calculated based on the above mentioned monthly air temperatures. Determination of inside base temperature used in calculations is appreciated base on technical - economic considerations. Determination of Heating Degree Days *(HDD)* is done with formula:

$$HDD = HDD_1 + HDD_2 = Z*(t_b - t_{jn}) + Z*(t_{jn} - t_{jm}) = Z*(18-12) + Z*(12 - t_{jm})$$

Where: t_{jn} – is temperature of beginning of the heat

t_{jm} – average temperature of air in heating period

t_{jn} – is base temperature consider equal to 17. 5 0C

Z – Heating period expressed in days.

Following table presents average monthly and yearly heating degree days for the main municipalities of Kosovo. It is important to be mentioned that those are simple calculation and in the future MED together with Hydro Meteorological Institute should carry out more sophisticate calculation of defining HDD for 38 municipalities of Kosovo.

Municipality	Months												Year
	1	2	3	4	5	6	7	8	9	10	11	12	
Shtime	722	515	381	116	0	0	0	0	0	112	409	575	2830
Obiliq	737	526	389	118	0	0	0	0	0	114	418	587	2890
Graqanicë	738	526	389	118	0	0	0	0	0	115	418	588	2892
Novo Bërdë	733	523	387	118	0	0	0	0	0	114	416	584	2875
Suharekë	553	395	292	89	0	0	0	0	0	86	313	440	2168
Rahovec	555	396	293	89	0	0	0	0	0	86	315	442	2176
Deçani	663	473	350	106	0	0	0	0	0	103	376	528	2598
Junik(Deçan)	662	473	349	106	0	0	0	0	0	103	375	527	2596
Vushtrri	766	547	404	123	0	0	0	0	0	119	434	610	3004
Skenderaj	769	549	406	123	0	0	0	0	0	119	436	613	3015
Leposaviq	807	576	426	130	0	0	0	0	0	125	458	643	3165
Zubin Potok	812	580	429	130	0	0	0	0	0	126	460	647	3185
Prizreni	550	393	290	88	0	0	0	0	0	85	312	438	2157
Ferizaj	730	521	385	117	0	0	0	0	0	113	414	581	2862
Gjakovë	660	471	349	106	0	0	0	0	0	103	374	526	2589
Gjilan	722	515	381	116	0	0	0	0	0	112	409	575	2832
Peja	608	434	321	98	0	0	0	0	0	94	345	484	2384
Prishtinë	737	526	389	118	0	0	0	0	0	114	418	587	2890
Klinë	668	477	353	107	0	0	0	0	0	104	379	533	2621
Podujevë	740	528	390	119	0	0	0	0	0	115	419	589	2900
Mitrovicë	782	558	413	126	0	0	0	0	0	121	443	623	3064

Table: Average monthly HDD (0C) for each month for the main Municipalities of Kosovo:

Analyzing the above mentioned table will be possible to divide Kosovo into three regions:

Prishtinë Region: Prishtinë, Podujevë, Ferizaj, Gjilan, Lipjan, Gllogovc, Malishevë, Kamenicë, Viti, Klinë, Fushë Kosovë, Kaçanik, Shtime, Obiliq, Graqanicë, Novo Bërdë, Ranillug, Partesh (all these municipalities are with Heating Degree Days in the interval 2601-2900 0C and belong to Zone II (or Prishtina Region))

Prizren Region: Prizren, Gjakovë, Pejë, Suharekë, Rahovec, Deçani, Dragash, Shtërpcë, Hani I Elezit(Kaçanik), Junik(Deçan), Mamusha, Kllokot (all these municipalities are with Heating Degree Days in the interval 2100-2600 0C and belong to Zone I (or Prizren Region))

Mitrovicë Region: Mitrovicë, Vushtrri, Skenderaj, Istog, Leposaviq, Zveçan, Zubin Potok (all these municipalities are with Heating Degree Days in the interval 2901-3350 0C and belong to Zone III (or Mitrovica Region)).

Annex 13: List of all Building Audited for this study

Walk through Energy Audit has been carried out in the following buildings				Area of PB [m2]	N. of occupancy [-]
Nr	**Building Category**	**Region**	**Name of Public Building (name of the file)**		
1	Public Buildings	Prishtine	Prish_Shkolla fillore - Dardania_	5400	1800
2			Prish_QMF VI_	**1353**	**125**
3			Fer_ShF Deshmoret e Koshares - Koshare_	1100	475
4			Fer_ShF Besim Rexhepi - Komogllav	486	250
5			LIP_sh.f sllovi_	1800	701
6			LIP_Sh.Ibrahim Banushi - Shale	2100	524
7			Gjil_Qender Shendetesore_Bresalci_	210	700
8			Fer_ShF Naim Frasheri - Zaskok_	1430	820
9			Fer_ShF Deshmoret e Koshares - Koshare_	1100	475
10			Fer_ShF Besim Rexhepi - Komogllav	486	250
11		Prizreni	Priz_SHMTeknikePz	4230	1523
12			Priz_SHF_RecanPz_	1366	336
13			Priz_SHF_AbdylFrasheri	2910.6	1000
14			Priz_Amb_Vlashnje_	69.55	335
15			Priz_SHMTeknikePz_	4230	1523
16			Priz_SHF_RecanPz_	1366	336
17			Priz_SHF_AbdylFrash	2910.6	1000
18			Priz_Amb_Vlashnje	69.55	32
19			Gjak_Pyetesori per H.Dushi_	2646	1864
20			Gjak_Pyetesori per F.Agani_	2540	858
21			Peja_June 2011_July25-11_QMP-Fierzë_	1848	790
22			Peja_Shtëpia e Kulturës_	2400	60
23		Mitrovica	Vush_qerdhja e qytetit_	1250	150
24			Skend_school_Polaci	394	520
25			Skend_school_Vajniku_	1050	250
26			Skend_Qendra Mjeksise Familjare Skenderaj_	1584	800
27			Skend_school_Polaci_	394	520
28			Skend_school_Vajniku_	1050	250
29			Skend_Qendra Mjeksise Familjare Skenderaj_	1584	800
30			Vush_qerdhja e qytetit_	1250	150
31		Old and New Five Central Buildings in Prishtina /Prizren/ Mitrovica	Surgery Clinic – Prishtina	1353	270
32			Student Center – Prishtina	2567	512
33			Gjilan Regional Hospital	2232	446
34			Gjakova Regional Hospital	812	165
35			Mitrovica Regional Hospital	2030	405
36			Ministry of Health	2865	155
37			Kosovo Archive	3986	123
38			Kosovo Statistical Office	1876	92
39			Ministry of Culture, Sport and Youth	3250	250
40			Ministry of Returning Communities	1610	98
41	Private Buildings	Prishtina	Motel Amazona	800	30
42			Hotel Amazona	19200	100
43			Prishtina "Akademia Evolution" Private school	700	200
44			Restourant Amazona	560	150
45			Motel: Bingo Benz&Address: Prishtina	310	412
46			Kindergarden: Ardhmeria, Prishtine	155	600
47			Restourant: FishRestourant ''Hemingwey''	100	233
48		Prizreni	Motel "Oferta" Prizren	300	35
49			Hotel OK	3000	45
50			Kopshti Prespektiva	300	35
51			Restourant Cream	156	120

52			Motel: MotelFinlandia&Address: Lumbardhi River's Gorge (at first kilometer), Reqan	300	20
53		Mitrovica	Motel Safari - Nafija	220	300
54			Hotel Jaffa	1800	305
55			Education institution "Rroni"	87	44
56			Restaurant "Jaffa"	300	5000/Year
57			Motel: YlberZeka	648	350/m
58			Hotel: NexhmedinBahtiri	2400	55
59			Private school: Lidhja e Lezhës, Vushtrri	228	94
60			Restourant: HakifKolludra	240	2600/year
61	Household Buildings	Prishtina	One-storey house - Halil Fetahu	115	2
62			Two-storey villa with a surface with more than 100 m2/storey _Vahide Hoxha	204	8
63			Five-storey building constructed during 1960 – 1990 - Fakete Hoxha	95	4
64			Five-storey building constructed in 1970-1999 - Guxim Osmani	95	4
65			Five-storey prefabricated building constructed during 1980 – 1999 - Sali Krasniqi	85	6
66			Above five-storey building constructed in 1999-2011 -Nuhi Simnica	63	4
67			One-storey house:BujarFetahu	100	7
68			Two-storey villa with a surface with more than 100 m2/storey: Mr.FatosBaraku	240	3
69			Five-storey building constructed during 1960 – 1990: Faruk Kastrati	95	2
70			Five-storey building constructed in 1970-1999:Mrs ZyhraBakalli	91	2
71			Above five-storey building constructed in 1999-2011: Faton Lila	54	2
72			One-storey house: Agim Selimi &Address: village ORLLAN, Podujeve	105	6
73			Two-storey villa with a surface with more than 100 m2/storey: MuharremGashi	180	
74			Five-storey building constructed during 1960 – 1990:Shaban Shabani	98	5
75			Five-storey building constructed in 1970-1999:Mr.GazamenZajmi	83	4
76			Above five-storey building constructed in 1999-2011: KasimSyla	76	4
77		Prizreni	One-storey house -Adnan Beqiri	64	2
78			Two-storey villa with a surface with more than 100 m2/storey –Mr. Orhan Halko	240	5
79			Five-storey building constructed during 1960 – 1991 - Alihajdar Bujari	66	3
80			Five-storey building constructed in 1970-2000 - Valbon Zurnagjiu	60	4
81			Five-storey prefabricated building constructed during 1980 – 2000 - Besfort Tasha	64	4
82			Above five-storey building constructed in 1999-2012 - Zenel Ramshaj	44	2
83			One-storey house: Mr. AfrimTorqipeni	81	4
84			Two-storey villa with a surface with more than 100 m2/storey: Mr. Ramadan Grazhdo	172	4
85			Five-storey building constructed during 1960 – 1990: Mrs.ShadaneNallbani	67	2
86			One-storey house: Mr.LulzimBilurdagu&Address:Rr.QerimBerisha	80	4
87			Two-storey villa with a surface with more than 100 m2/storey: Mr.Shpend Beqiri	240	4
88			Five-storey building constructed during 1960 – 1990 &Mr.ShpendBushati	64	4
89		Mitrovica	One-storey house - Ahmet Jashari	94	4
90			Two-storey villa with a surface with more than 100 m2/storey - Sabit Behrami	148	6
91			Five-storey building constructed during 1960 – 1992 - Agim Korenica	73	3
92			Five-storey building constructed in 1970-2001 - Milazim Ibra	57	11
93			Five-storey prefabricated building constructed during 1980 – 2001 - Rexhep Peci	57	3
94			Above five-storey building constructed in 1999-2011 - Drita Mustafe Ibishaj	53	3
95			One-storey house:Gazmend Rexhepi&Address:Arsim Tahiri, Vushtrri	124	8
96			Two-storey villa with a surface with more than 100 m2/storey: Xhevahire Karaça	220	5
97			Five-storey building constructed during 1960 – 1990: JëllmazSunguri	80	5
98			Five-storey building constructed in 1970-1999: Name:GaniRrustolli	70	4
99			Five-storey prefabricated building constructed during 1980 – 1999: Name:FadilZeqiri	74	6
100			Above five-storey building constructed in 1999-2011: Mustafe Saraci	74	6
101			One-storey house: Mehdi Selaqi	110	5
102			Two-storey villa with a surface with more than 100 m2/storey: AfrimKutllovci	188	10
103			Five-storey building constructed during 1960 – 1990: NexhatShosha	47	4
104			Five-storey building constructed in 1970-1999: AdemAhmeti	51	7
105			Five-storey prefabricated building constructed during 1980 – 1999: Name:Ejup Gjergjeku	68	4
106			Above five-storey building constructed in 1999-2011: Pranvere Cecelia	72	5

Annex 14: Calculating Methodology for different Energy Saving Measures

The basic formula used in each energy audit for calculating the unitary energy saving resulting from the implementation of thermal insulation of outside walls is as follows:

$$UFES = \frac{SHD_{init}}{\eta_{init}} - \frac{SHD_{new}}{\eta_{new}} \quad [kWh/m^2 \; of \; useful \; floor \; area \cdot year] \quad (A14-1)$$

Where:

SHDinit = Specific heating demand before the implementation of thermal insulation of outside walls [kWh/m², year];

SHDnew = Specific heating demand after the implementation thermal insulation of outside walls [kWh/m², year]

η_{init}, η_{new} *= Energy efficiency of the heating system before (init) and after (new) the refurbishment measure.*

The same formula as above was used for each energy audit for calculating unitary energy savings by implementing roof thermal insulation measures, as follows:

$$UFES = \frac{SHD_{init}}{\eta_{init}} - \frac{SHD_{new}}{\eta_{new}} \quad [kWh/m^2 \; of \; useful \; floor \; area \cdot year] \quad (A14-2)$$

Where:

SHDinit = Specific heating demand before the implementation of roof insulation [kWh/m², year];

SHDnew = Specific heating demand after the implementation of roof insulation [kWh/m², year]

η_{init}, η_{new} *= Energy efficiency of the heating system before (init) and after (new) the refurbishment measure (seasonal)*

The basic formula for calculating unitary energy saving by implementing introduction of EE double/triple glass windows used in the WTA process was as follows:

$$UFES = \frac{(Uvalue_{init} - Uvalue_{new}) \cdot HDD \cdot 24 \cdot a \cdot b \cdot c}{1000} \quad [kWh/m^2 \; of \; HH \cdot year](A14-3)$$

Where:

$Uvalue_{init}$ and $Uvalue_{new}$ *= U-value before (init – old windows) and after (new – new windows) the refurbishment (W/m²*K]; a, b, c are coefficients dependent on the type of the building and the heat ventilating energy demand.*

Rapid growth of electricity consumption in all economic sectors, especially in the residential sector, made necessary the introduction of measures for energy saving in general and electricity saving in particular and the promotion of alternative energy sources, especially for heating purposes. For this reason, the Government of Kosovo approved the "Technical Norms of Heat Conservation in Buildings', which are mandatory for all new construction in all sectors (i.e. residential, public and private buildings).

The basic formula for calculating unitary energy saving by constructing new buildings based on new energy building code is as follows:

$$UFES = \frac{SHD_{inicode}}{\eta_{initcode}} - \frac{SHD_{newcode}}{\eta_{newcode}} \quad [kWh/m^2 \cdot year]\ (A14-4)$$

Where:

*$SHD_{inicode}$ = Specific heating demand of the building according to the initial building code in place [kWh/m²*year] - since there has been no building code in Kosovo up till now, this number will be equal to the specific number used in the baseline scenario for each building category.*

*$SHD_{newcode}$ = Specific heating demand of the building according to the new building code which has been approved recently by the Ministry of Environment and Spatial Planning and is to be duly implemented [kWh/m²*year]*

$\eta_{inicode}$, $\eta_{newcode}$ = Energy efficiency of the heating system in the building according to the existing average situation (inicode) - since there was no building code in Kosovo previously - and the new building code (newcode).

It is very important to be mentioned that this measure has not been quantified for the time being because Ministry of Spatial Planning and Environmental in collaboration with Ministry of Economic Development will prepare New Energy Building Code at the end of the year based on the request of New EU Directive of the Energy Performance of the Building. After this Code will be prepared with the above mentioned methodology will be easy for the KEEA to include also this EE measure for New Stock of Buildings.

The basic formula used in the energy audit process for calculating unitary energy saving resulting from the introduction of new heating systems for each building, is as following:

$$UFES = \left(\frac{1}{\eta_{init}} - \frac{1}{\eta_{new}}\right) \cdot SHD \cdot A \quad [kWh/unit \cdot year] \quad (A14-5)$$

Where:

η_{init} = Energy efficiency of the old heating supply system before the replacement (seasonal)

η_{new} = Energy efficiency of the new heating supply system

*SHD = Specific heating demand [kWh/m²*yr]*

A = Average area of the space heated by the heating supply equipments (household, office etc.) [m²]

The basic formula for calculating the unitary energy savings that can be made by replacement of old water heating electrical boilers with efficient ones in residential buildings is as follows:

$$UFES = \left(\frac{1}{\eta_{init}} - \frac{1}{\eta_{new}}\right) \cdot SWD \quad [kWh/households \cdot year]\ (A14-6.1)$$

$$SWD = \frac{C_{hot\_water\_daily} \cdot 365 \cdot n_{persons/hholds} \cdot (t_{hot\_water} - t_{cold\_water}) \cdot c_{water} \cdot c_f}{1000}$$

$$[kWh/households \cdot year]\ (A14-6.2)$$

η_{init}, η_{new} = Energy efficiency of the old and the new water heating equipment

*SWD =Specific hot water demand [kWh/household*year]*

$C_{hot\_water\_daily}$ = Average hot water daily consumption per person

$n_{persons/hhds}$ = Average number of persons in one household

t_{hot_water} = Hot water temperature (usually 40^0C)

t_{cold_water} = Cold water temperature (usually 15^0C)

*c_{water}= Specific heat of water =1kcal/kg*0C*

c_f = Conversion factor 0.001163 kWh/kcal with 1 litre of water = 1 kg

The basic formula used in the energy audits of buildings for calculating unitary energy saving through the introduction of solar water heating systems is as follows:

$$UFES = \left(\frac{USAVE}{\eta_{stock\_average\_heating\_system}} \right) \qquad [kWh/m^2 \cdot year] \quad (A14-7)$$

USAVE = Average yearly savings per m² of solar panel, representing the average heat production per m² of solar panel [kWh/m²]

$\eta_{systemheatingaveragestock}$ *= Efficiency of the average stock of water heating systems*

The absolute value of the saving potential calculated above will be secured by the introduction of efficient cooking stoves used on energy audit process is the following:

$$UFES = AEC_{referenceyear\,stockaverag} \cdot AEC_{referencemarket\,promotedenergyclass} \; [kWh/m^2 \cdot year](A14-8)$$

Where:

AEC $_{reference\ year\ stock\ cooking\ stoves\ average}$ = Annual energy consumption of the stock of cooking stoves in the reference year (2010) [kWh/unit, year]

AEC $_{reference\ market\ promoted\ cooking\ stoves\ energy\ class}$ = Annual energy consumption of new cooking devices, which are present in the Kosovo market.

The basic formula used in the energy auditing process to calculate unitary energy savings by installing efficient lighting was as follows:

$$UFES = \left(\frac{P_{STOCK\_AVERAGE} - P_{BEST\_MARKET\_PROMOTED}}{1000} \right) \cdot n_h \; [kWh/unit \cdot year](A14-9)$$

Where:

$P_{STOCK\_AVERAGE}$ = Average power of existing light bulbs in households [W]

$P_{BEST\_MARKET\_PROMOTED}$ = Power of the energy efficient light bulbs [W]

n_h = Number of operating hours

The basic formula used in the model for calculating the unitary energy savings resulting from the implementation of EE electrical equipment is as follows:

$$UFES = AEC_{referenceyear\,stockaverag} \cdot AEC_{referencemarket\,promotedenergyclass} \; [kWh/m^2 \cdot year](A14-10)$$

Where:

AEC $_{reference\ year\ stock\ average}$ = Annual energy consumption of the stock of appliances in the reference year (2010) [kWh/unit, year]

AEC $_{reference\ market\ promoted\ energyclass}$ = Annual energy consumption of the appliances introduced by the measures taken.

The formula used in the model for calculating the unitary energy saving made by implementing EE AC split unitised on energy audits is as follows:

$$UFES = \left(\frac{1}{COP_{average}} - \frac{1}{COP_{best\_perf\_on\_market}} \right) \cdot P_{fn} \cdot n_h \quad [kWh/unit \cdot year](A14-11)$$

With:

$$n_h = n_{sh} \cdot f_u$$

Where:

COP = Coefficient of Performance ratio of the equipment: (supplied cooling power) / (electric power of the equipment)

P_{fn} = Nominal cooling power of the equipment [kW]

n_h = Annual operation, hours at full power

n_{sh} = Annual switch-on hours

u_f = Part-load factor (suggested default value: 58%)

Annex 15: Methodology of Calibration and Extrapolation

First step: Calculation of calibration coefficient using the following formula:

$$k_{\text{sector}} = \frac{TFEC_{\text{sector}}}{WASEC^{energy\ service}_{actual\ from\ WTA} \cdot TNFA_{\text{sector}}}$$

Where:

$WASEC^{energy\ service}_{actual\ from\ WTA}$ - Weighted Average Specific Energy Consumption (kWh/m[2], year) obtained from the WTAs for each energy service for each sector (calculated and presented in Sections 7.5-7.7)

$TNFA_{\text{sector}}$ - Total National Floor Area for each sector (m[2]) (calculated and presented in Sections 9.1.1, 9.1.2 and 9.1.3) in the base year (2010)

$TFEC_{\text{sector}}$ - Total Final Energy Consumption for each sector in the base year (2010), (converted from ktoe intokWh)

Second step: The Calibrated Weighted Average Specific Energy Consumption is calculated based on the following formula:

$$WASEC^{energy\,service}_{calibrated} = k_{\text{sector}} \cdot WASEC^{energy\,service}_{actual\ from\ WTA} \qquad [\frac{kWh}{m^2 \cdot year}]$$

Where:

$WASEC^{energy\,service}_{calibrated}$ - Calibrated Weighted Average Specific Energy Consumption (kWh/m[2], year) for each sector

Third step: The Final Energy Demand for each Service is calculated based on the following formula:

$$FED^{energy\ service}_{\text{sector}} = WASEC^{energy\,service}_{calibrated} \cdot TNFA_{\text{sector}} \qquad [kWh/\,year]$$

Where:

$FED^{energy\ service}_{\text{sector}}$ - Final Energy Demand for each Service (kWh/year) for each sector

In this way, an annual energy demand forecast for each sector and for each service is obtained (kWh/year), whilst at the same time ensuring that the sectoral and the overall total energy demand are equal to the KEEAP annual forecast (for each year up to 2018).

Annex 16: Total Existing and Future Residential Building Stock

Table A16-1 below shows the projected increase in the number of apartments up to 2020, taking account of the fact that the Kosovo Energy Efficiency Action Plan forecasts an annual growth rate to 2020 of 1.97% - 2.30%. The higher growth rate was assumed to apply in the Prishtina area, the average rate in the Prizren area and the lower rate was used for the Mitrovica region.

REGION	2010	2015	2020
Mitrovica	65,382	68,548	71,065
Prishtina	145,530	164,645	180,021
Prizren	97,522	107,200	115,870
Kosovo	308,434	340,393	366,957

Table A16-1: Total number of residential buildings
Source: KEEAP

Based on the KEEAP analysis, the following three tables show the number of residential buildings broken down by category of building for the three defined regions of Kosovo.

REGION/Mitrovica	2010	2015	2020
One story house	28,782	30,206	31,339
Two storey villa>100m²/storey	22,884	23,992	24,873
Up to five storey building 1960-1990	5,231	5,484	5,685
Up to five storey building 1970-1999	3,269	3,427	3,553
Up to five storey building 1980-1999	640	640	640
Up to five storey building 1999-2011	4,577	4,798	4,975
Total	65,382	68,548	71,065

Table A16-2: Number of residential buildings, by category for the Mitrovica region
Source: KEEAP

REGION/Prishtina	2010	2015	2020
One story house	54,108	61,859	68,077
Two storey villa>100m²/storey	45,114	51,040	55,807
Up to five storey building 1960-1990	16,008	18,111	19,802
Up to five storey building 1970-1999	10,187	11,525	12,601
Up to five storey building 1980-1999	4,832	4,832	4,832
Up to five storey building 1999-2011	15,281	17,288	18,902
Total	145,530	164,645	180,021

Table A16-3: Number of residential buildings, by category for the Prishtina Region
Source: KEEAP

REGION/Prizreni	2010	2015	2020
One story house	43,905	48,308	52,253
Two storey villa>100m²/storey	35,108	38,592	41,713
Up to five storey building 1960-1990	9,752	10,720	11,587
Up to five storey building 1970-1999	3,901	4,288	4,635
Up to five storey building 1980-1999	468	468	468
Up to five storey building 1999-2011	4,388	4,824	5,214
Total	97,522	107,200	115,870

Table A16-4: Number of residential buildings, by category for the Prizren Region
Source: KEEAP

The total living area is forecast to increase from 34.7million m² (and 112.6m²/household) in 2010to 34.7million m² (and 102.4m²/household) in 2020(KEEAP). The reduction in average living area (m²/family) is not unexpected, taking into consideration the trend towards increased construction costs and smaller but more numerous family units. The 'CENSUS 2011' data has been used to calibrate the KEEAP data on the number of residential buildings and the total area of households, as presented in Tables 1 **A16**-5 to **A16**-8 below.

REGION	2010	2015	2020
Mitrovica	8.393	8.613	8.786
Prishtina	15591	16.534	17.368
Prizren	10.734	11.122	11.416
Total	34.718	36.269	37.570

Table A16-5: Total area of residential buildings (million m²)
Source: KEEAP/'CENSUS 2011'

REGION/Mitrovica	2010	2015	2020
One story house	3.693	3.790	3.866
Two storey villa>100m²/storey	2.938	3.014	3.075
Up to five storey building 1960-1990	0.671	0.689	0.703
Up to five storey building 1970-1999	0.420	0.431	0.439
Up to five storey building 1980-1999	0.084	0.086	0.088
Up to five storey building 1999-2011	0.588	0.603	0.615
Total	8.393	8.613	8.786

Table A16-6:Total area of residential buildings (million m²) in the Mitrovica Region
Source: KEEAP/'CENSUS 2011'

REGION/Prishtina	2010	2015	2020
One story house	5.769	6.118	6.426
Two storey villa>100m²/storey	4.833	5.126	5.384
Up to five storey building 1960-1990	1.715	1.819	1.910
Up to five storey building 1970-1999	1.091	1.157	1.216
Up to five storey building 1980-1999	0.546	0.579	0.608
Up to five storey building 1999-2011	1.637	1.736	1.824
Total	15.591	16.534	17.368

Table A16-7: Total area of residential buildings (million m²) in the Prishtina Region
Source: KEEAP/'CENSUS 2011'

REGION/Prizren	2010	2015	2020
One story house	4.830	5.005	5.137
Two storey villa>100m²/storey	3.864	4.004	4.110
Up to five storey building 1960-1990	1.073	1.112	1.142
Up to five storey building 1970-1999	0.429	0.445	0.457
Up to five storey building 1980-1999	0.054	0.056	0.057
Up to five storey building 1999-2011	0.483	0.500	0.514
Total	10.734	11.122	11.416

Table A16-8: Total area of residential buildings (million m²) in the Prizren Region
Source: KEEAP/'CENSUS 2011'

Annex 17: Total Existing and Future Increase Public Building Stock

According to preliminary data provided by the Statistical Office of Kosovo, the total Public and Private/Commercial Service Building Stock for the year 2010 was approximately 59,000, covering an area of 10.55 million m².

REGION	2010	2015	2020
Mitrovica	382	409	437
Prishtina	873	953	1025
Prizren	565	598	631
Total	1820	1960	2093

Table A17-1: Total number of public buildings (central and municipal), 2010-2020
Source: KEEAP and Statistical Office of Kosovo

Based on adjusted data from the KEEAP analysis, the following three tables present the number of public buildings broken down according to category of building for the three defined regions of Kosovo.

REGION/Mitrovica	2010	2015	2020
Elementary School	76	75	75
High School	39	55	73
Health Care Centre	106	112	116
Kindergarten	56	55	55
Dormitory	51	50	50
Administrative Central Governmental Public Buildings	10	12	14
Administrative and Other (not included above) Municipal Public Buildings	44	49	54
Total	382	409	437

Table A17-2: Total number of public buildings in the Mitrovica Region, 2010-2020
Source: KEEAP

REGION/Prishtina	2010	2015	2020
Elementary School	166	168	169
High School	106	152	202
Health Care Centre	232	250	261
Kindergarten	133	135	135
Dormitory	122	123	124
Administrative Central Governmental Public Buildings	60	68	75
Administrative and Other (not included above) Municipal Public Buildings	54	57	60
Total	873	953	1,025

Table A17-3: Total number of public buildings in the Prishtina Region, 2010-2020
Source: KEEAP

REGION/Prizreni	2010	2015	2020
Elementary School	112	111	111
High School	48	69	92
Health Care Centre	156	165	171
Kindergarten	97	96	96
Dormitory	75	74	74
Administrative Central Governmental Public Buildings	15	18	22
Administrative and Other (not included above) Municipal Public Buildings	62	64	66
Total	565	598	631

Table A17-4: Total number of public buildings in the Prizren Region, 2010-2020
Source: KEEAP

These numbers are used for calibrating the number of public service buildings in the following tables.

REGION	2010	2015	2020
Mitrovica	0.529	0.551	0.564
Prishtina	1.222	1.319	1.366
Prizren	0.792	0.838	0.858
Total	2.543	2.708	2.789

Table A17-5: Total area of public buildings (million m^2), 2010-2020
Source: KEEAP

REGION/Mitrovica	2010	2015	2020
Elementary School	0.123	0.119	0.115
High School	0.062	0.088	0.112
Health Care Centre	0.092	0.086	0.073
Kindergarten	0.090	0.088	0.084
Dormitory	0.082	0.080	0.076
Administrative Central Governmental Public Buildings	0.018	0.022	0.026
Administrative and Other (not included above) Municipal Public Buildings	0.061	0.070	0.078
Total	0.529	0.551	0.564

Table A17-6: Total area of public buildings (million m^2) in the Mitrovica Region, 2010-2020
Source: KEEAP

REGION/Prishtina	2010	2015	2020
Elementary School	0.268	0.268	0.259
High School	0.171	0.242	0.309
Health Care Centre	0.172	0.175	0.155
Kindergarten	0.214	0.214	0.207
Dormitory	0.196	0.197	0.190
Administrative Central Governmental Public Buildings	0.131	0.151	0.169
Administrative and Other (not included above) Municipal Public Buildings	0.070	0.072	0.076
Total	1.222	1.319	1.366

Table A17-7: Total area of public buildings (million m^2) in the Prishtina Region, 2010-2020
Source: KEEAP

REGION/Prizreni	2010	2015	2020
Elementary School	0.183	0.182	0.176
High School	0.079	0.113	0.146
Health Care Centre	0.133	0.138	0.128
Kindergarten	0.159	0.158	0.153
Dormitory	0.122	0.121	0.118
Administrative Central Governmental Public Buildings	0.034	0.041	0.051
Administrative and Others (not included above) Municipal Public Buildings	0.082	0.085	0.086
Total	0.792	0.838	0.858

Table A17-8: Total area of public buildings (million m^2) in the Prizren Region, 2010-2020
Source: KEEAP

Annex 18: Total Existing and Future Private Building Stock

Using data from the KEEAP it is possible to breakdown the stock of private buildings by region, as presented in Tables A18-1 below.

REGION	2010	2015	2020
Mitrovica	12,511	13,163	13,628
Prishtina	27,258	29,402	30,632
Prizren	18,368	19,451	20,101
Total	58,137	62,016	64,361

Table A18-1: Total number of private buildings in Kosovo, 2010-2020
Source: KEEAP

Based on the KEEAP analysis, the following tables **A18, 2-4** present the number of private service buildings in each of the three defined regions of Kosovo.

Region/Mitrovica	2010	2015	2020
Motels/Hotels<10 rooms	76	84	93
Hotels > 20 rooms	19	21	23
Private Schools	11	13	15
Restaurants/Shops/Other	12,404	13,045	13,498
Total	12,511	13,163	13,628

Table A18-2: Total number of private buildings in the Mitrovica Region, 2010-2020
Source: KEEAP

Region/Prishtina	2010	2015	2020
Motels/Hotels<10 rooms	173	175	176
Hotels > 20 rooms	43	44	44
Private Schools	55	64	74
Restaurants/Shops/Others	26,987	29,119	30,338
Total	27,258	29,402	30,632

Table A18-3: Total number of private buildings in the Prishtina Region, 2010-2020
Source: KEEAP

Region/Prizreni	2010	2015	2020
Motels/Hotels<10 rooms	126	125	125
Hotels > 20 rooms	32	31	31
Private Schools	16	18	20
Restaurants/Shops/Others	18,194	19,276	19,925
Total	18,368	19,451	20,101

Table A18-4: Total number of private buildings in the Prizren Region, 2010-2020
Source: KEEAP

These numbers are used to calibrate the number and the total area of private sector buildings, as presented in the following tables **A18, 5-8**.

REGION	2010	2015	2020
Mitrovica	1.683	1.771	1.827
Prishtina	3.703	3.998	4.142
Prizren	2.478	2.625	2.699
Total	7.864	8.394	8.668

Table A18-5: Total area of the private service building stock (million m^2), 2010-2020
Source: KEEAP

Region/Mitrovica	2010	2015	2020
Motels/Hotels<10 rooms	0.010	0.011	0.012
Hotels > 20 rooms	0.003	0.003	0.003
Private Schools	0.002	0.002	0.002
Restaurants/Shops/Others	1.669	1.755	1.809
Total	1.683	1.771	1.827

Table A18-6: Total area of the private service building stock (million m²), in the Mitrovica Region, by category of building, 2010-2020

Source: KEEAP

Region/Prishtina	2010	2015	2020
Motels/Hotels<10 rooms	0.024	0.024	0.024
Hotels > 20 rooms	0.006	0.006	0.006
Private Schools	0.007	0.009	0.010
Restaurants/Shops/Others	3.666	3.959	4.102
Total	3.703	3.998	4.142

Table A18-7: Total area of the private service building stock (million m²), in the Prishtina Region, by category of building, 2010-2020

Source: KEEAP

Region/Prizreni	2010	2015	2020
Motels/Hotels<10 rooms	0.017	0.017	0.017
Hotels > 20 rooms	0.004	0.004	0.004
Private Schools	0.002	0.002	0.003
Restaurants/Shops/Others	2.455	2.602	2.675
Total	2.478	2.625	2.699

Table A18-8:Total area of the private service building stock (million m²), in the Prizren Region, by category of building, 2010-2020

Source: KEEAP

Annex 19: Forecast of Baseline Energy Demand for Cooking, Lighting, Electrical Appliances and Space Cooling for the Residential Building Stock

Cooking

Based on the methodology described in the main report cooking energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A19-1 (ktoe) and A19-2 (GWh) below.

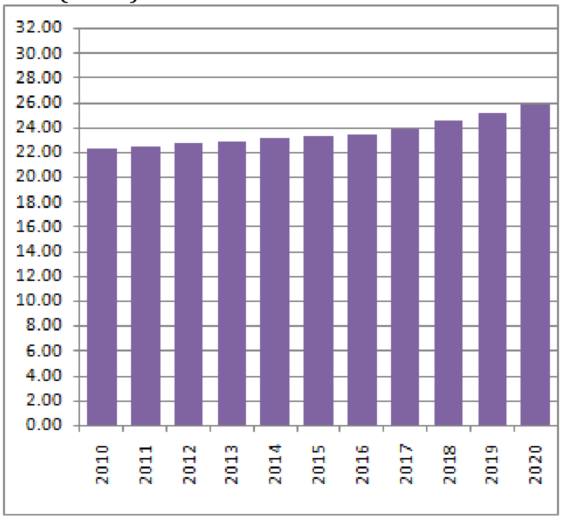


Figure A19-1:Cooking Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

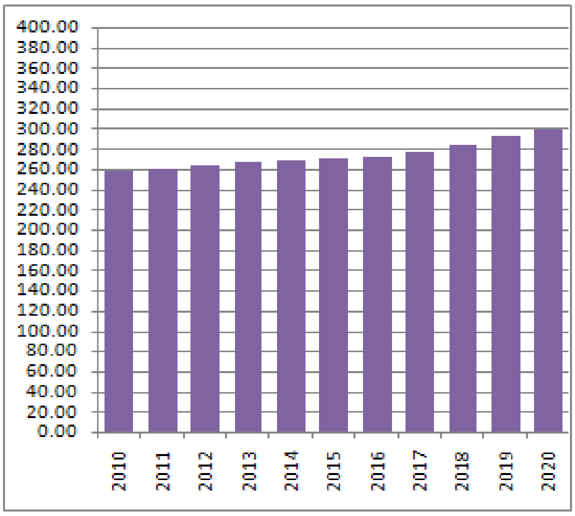


Figure A19-2:Cooking Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

Lighting

Based on the above-mentioned methodology and data on the residential building stock of Kosovo, the lighting energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A19-3 and A19-4, in ktoe and GWh respectively.

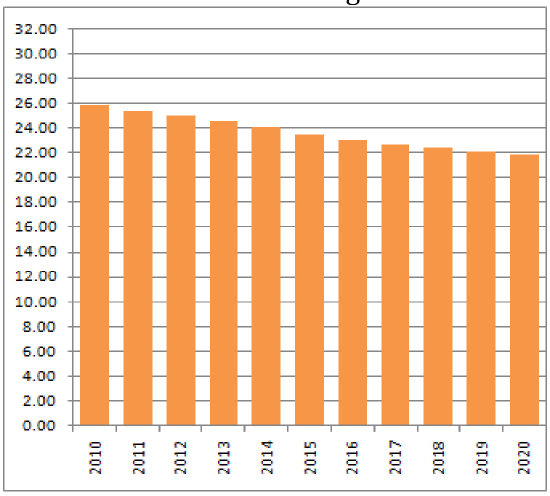


Figure A19-3: Lighting Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

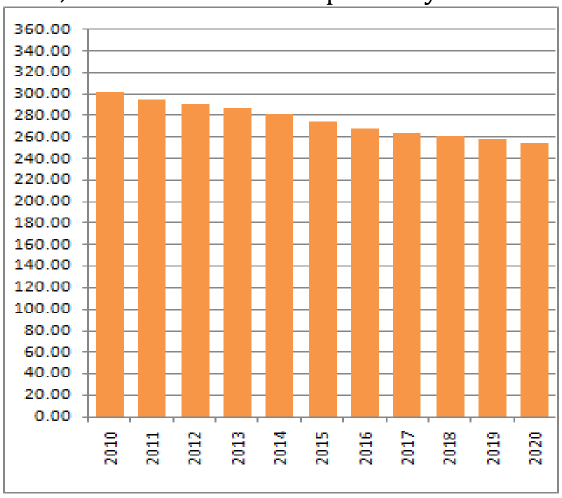


Figure A19-4: Lighting Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

Electrical Appliances

Based on the methodology used for other energy services and using data on the household building stock, the electrical appliances energy demand for the baseline scenario up to 2020 has been calculated and the results are presented in Figures A19-5 (ktoe) and A19-6 (GWh).

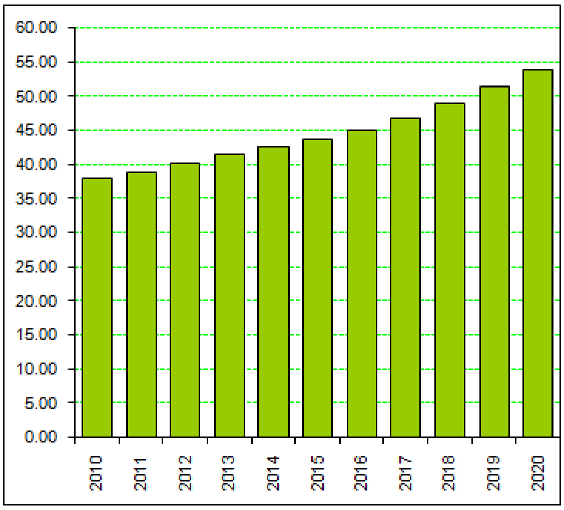


Figure A19-5: Electrical Appliances Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

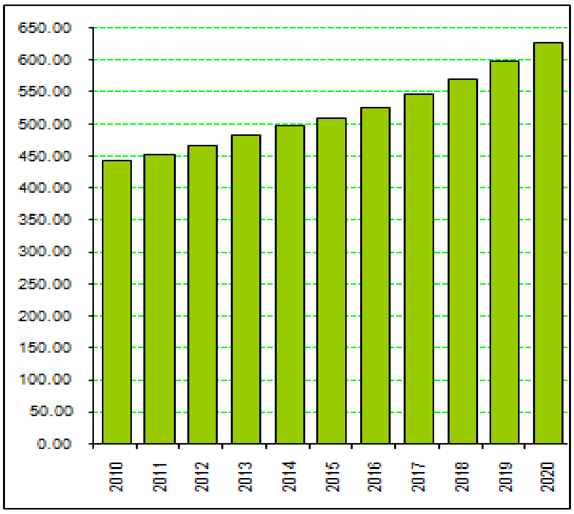


Figure A19-6: Electrical Appliances Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

Space Cooling

Energy demand for space cooling is shown in Figures A19-7 (ktoe) and A19-8 (GWh).

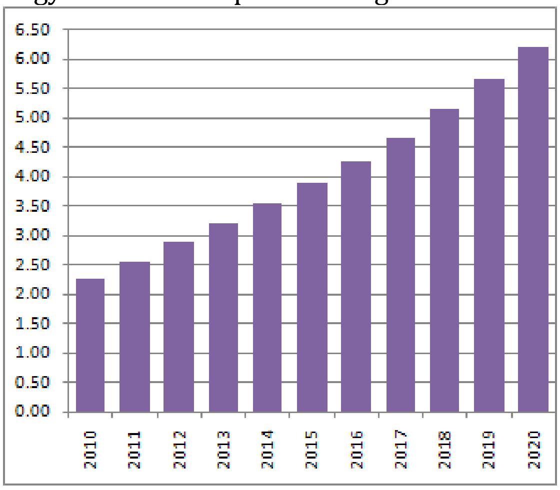


Figure A19-7: Air conditioning Energy Demand of Residential Building Stock according to Baseline Scenario (ktoe)

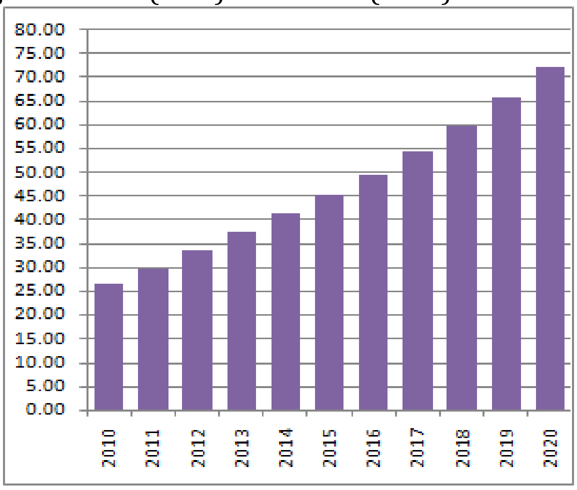


Figure A19-8: Air conditioning Energy Demand of Residential Building Stock according to Baseline Scenario (GWh)

Annex 20: Forecast of Baseline Energy Demand for Cooking, Lighting, Electrical Appliances and Space Cooling for the Public Building Stock

Cooking

Based on the service shares in Table 10-8 and data on the public building stock, the cooking energy demand for the baseline scenario up to 2020 has been calculated and the results are shown both in ktoe and GWh in Figures A20-1 and A20-2.

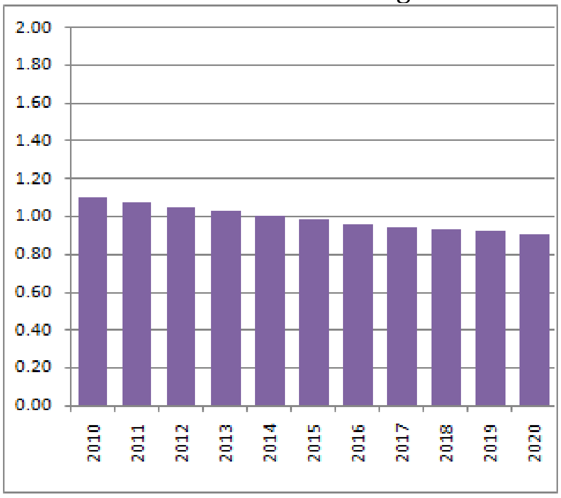


Figure A20-1: Cooking Energy Demand of Public Building Stock according to Baseline Scenario (ktoe)

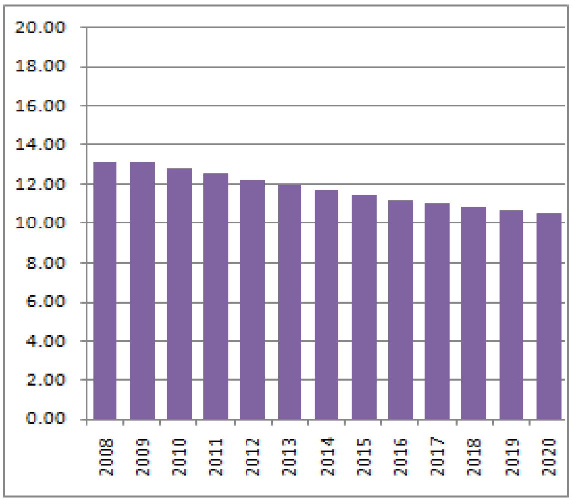


Figure A20-2: Cooking Energy Demand of Public Building Stock according to Baseline Scenario (GWh)

Lighting

The lighting energy demand for the baseline scenario for the Public Building Stock up to 2020 has been calculated and the results are shown both in Figures **A20-3** (ktoe) and **A20-4** (GWh).

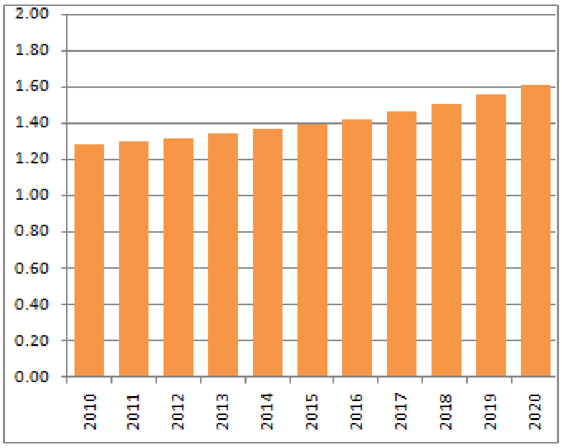


Figure A20-3: Lighting Energy Demand of Public Building Stock according to Baseline Scenario (ktoe)

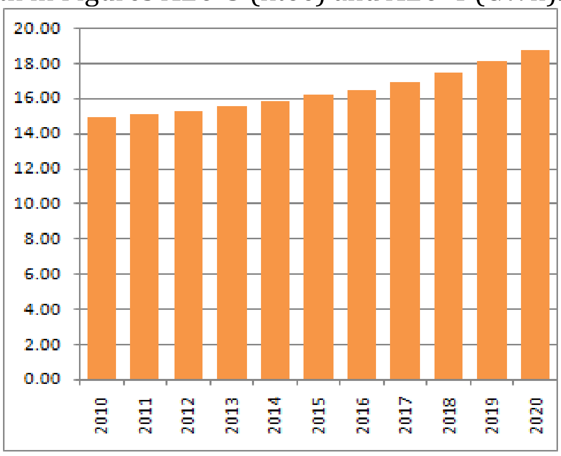


Figure A20-4: Lighting Energy Demand of Public Building Stock according to Baseline Scenario (GWh)

Electrical Appliances

Based on the above-mentioned methodology and data on the public building stock of Kosovo, the electrical appliances energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A20-5 and A20-5, in ktoe and GWh respectively.

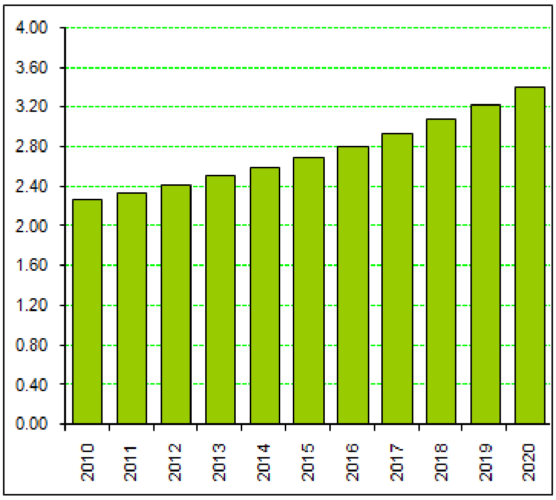


Figure A20-5: Electrical Appliances Energy Demand of Public Building Stock according to Baseline Scenario (ktoe)

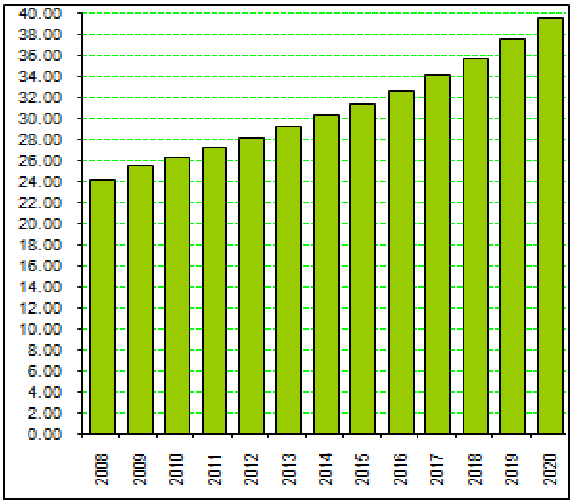


Figure A20-6: Electrical Appliances Energy Demand of Public Building Stock according to Baseline Scenario (GWh)

Air Conditioning

The cooling energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A20-7 (ktoe) and A20-8 (GWh).

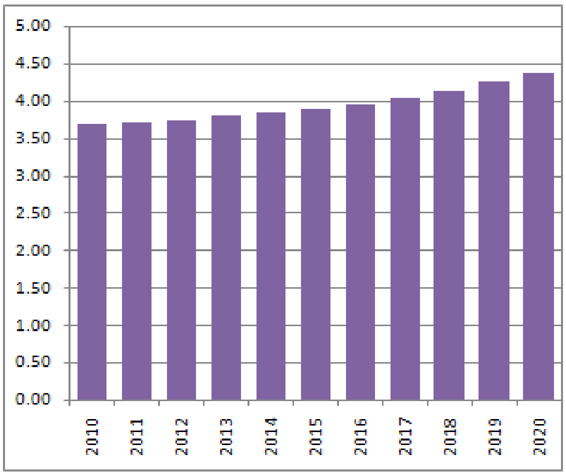


Figure A20-7: Air conditioning Energy Demand of Residential Public Stock of Kosovo according to Baseline Scenario (ktoe)

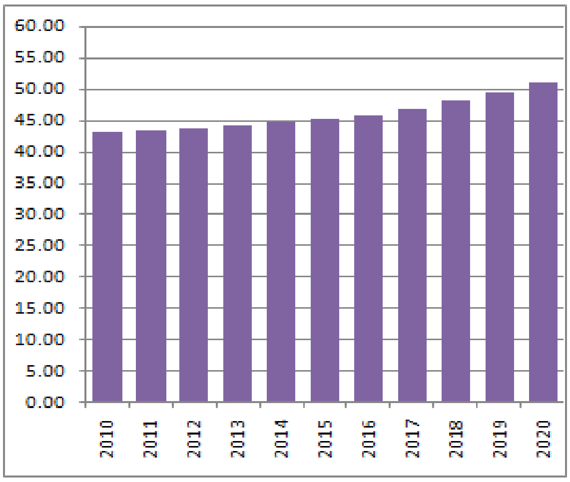


Figure A20-8: Air conditioning Energy Demand of Residential Public Stock of Kosovo according to Baseline Scenario (GWh)

Annex 21: Forecast of Baseline Energy Demand for Cooking, Lighting, Electrical Appliances and Space Cooling for the Private and Commercial Building Stock

Cooking

Based on the cooking energy share defined in Table 10-30 above and details of the private building stock, the energy demand for this service for the baseline scenario up to 2020 has been calculated and the results are shown in Figure A21-1 (ktoe) and Figure A21-2 (GWh).

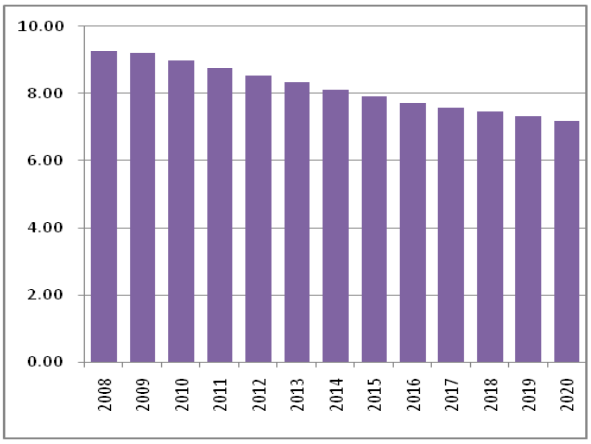


Figure A21-3: Cooking Energy Demand of Private Building Stock according to Baseline Scenario (ktoe)

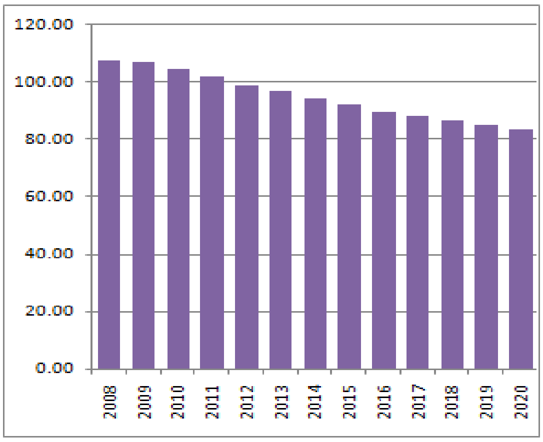


Figure A21-4: Cooking Energy Demand of Private Building Stock according to Baseline Scenario (GWh)

Lighting

The calculations relating to electricity demand for lighting were based on the share of the service identified above and the private building stock. The cooking energy demand for the baseline scenario for the Private Building Stock up to 2020 has been calculated and the results are shown both in Figures A21-3 (ktoe) and A21-4 (GWh).

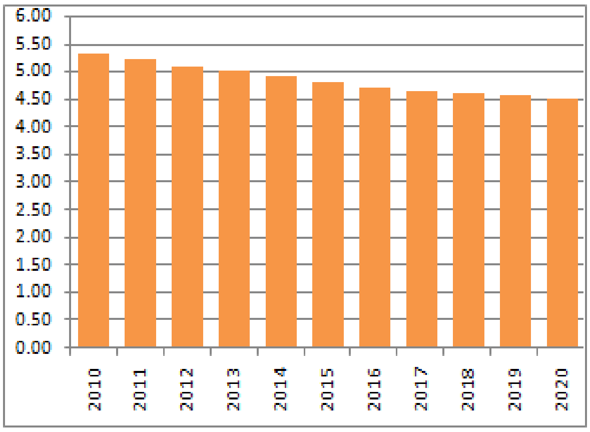


Figure A21-3: Lighting Energy Demand of Private Building Stock according to Baseline Scenario (ktoe)

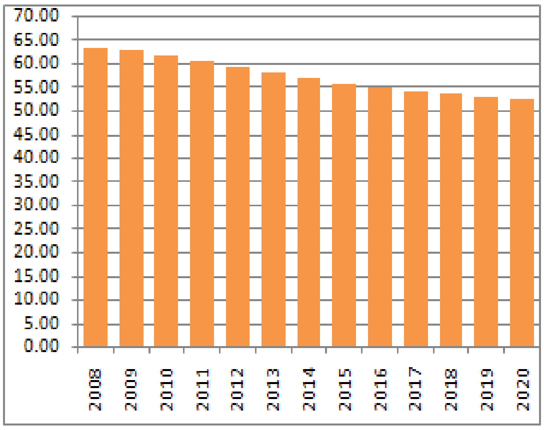


Figure A21-4: Lighting Energy Demand of Private Building Stock according to Baseline Scenario (GWh)

Electrical Appliances

The calculations relating to electricity consumption on electrical appliances were based on the share of total energy consumption for this service derived from an analysis of the whole portfolio of private buildings audited. Based on the above-mentioned methodology and data on the private building stock of Kosovo, the electrical appliances energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A21-5 and A21-6, in ktoe and GWh respectively.

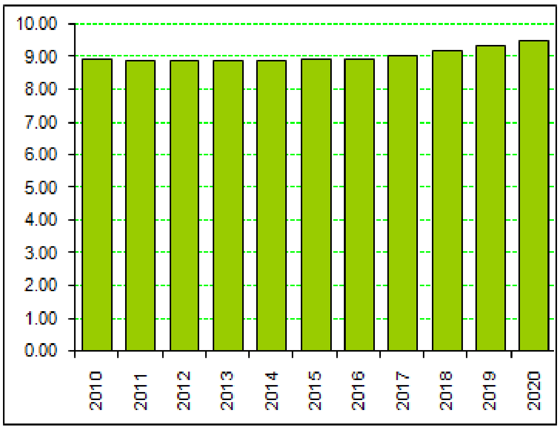


Figure A21-5: Electrical Appliances Energy Demand of Private Building Stock according to Baseline Scenario (ktoe)

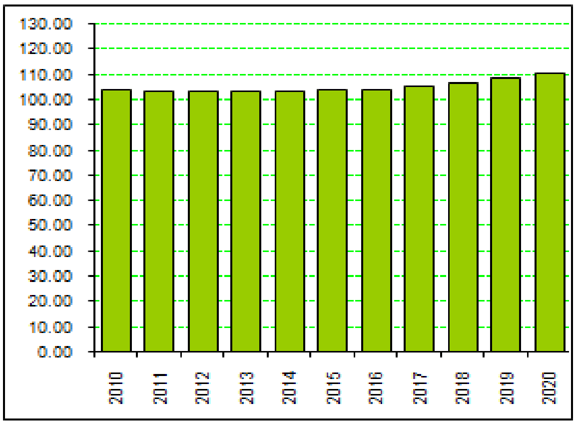


Figure A21-6: Electrical Appliances Energy Demand of Private Building Stock according to Baseline Scenario (GWh)

Air Conditioning

The energy demand for cooling purposes was calculated based on the share of the service, identified after processing the 20private building energy audits. The cooling energy demand for the baseline scenario up to 2020 has been calculated and the results are shown in Figures A21-7 (ktoe) and A21-8 (GWh).

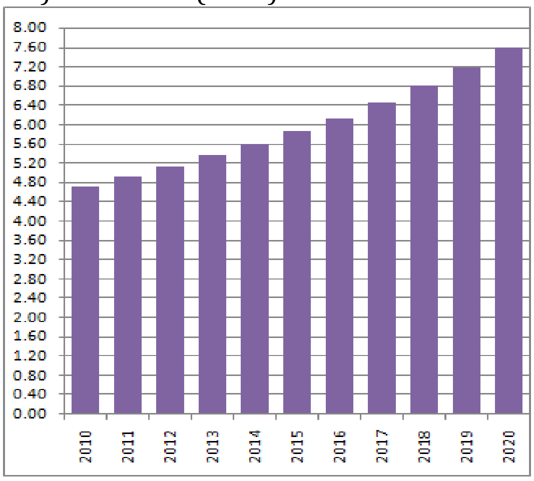


Figure A21-7: Air conditioning Energy Demand of Private Stock of Kosovo according to Baseline Scenario (ktoe)

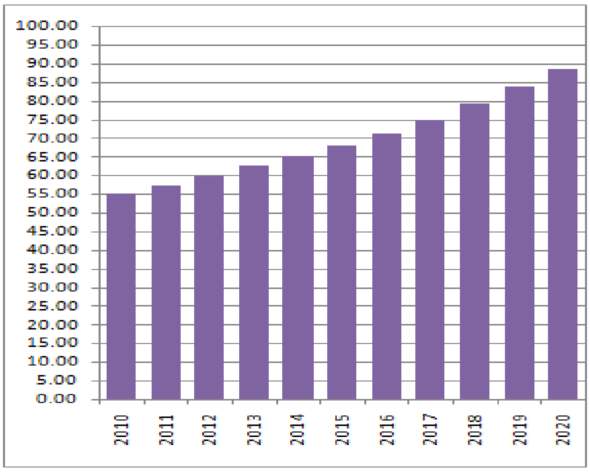


Figure A21-8: Air conditioning Energy Demand of Private Stock of Kosovo according to Baseline Scenario (GWh)

Annex 22: Calculation of Energy Savings Potential for Cooking, Lighting, Electrical Appliances and Space Cooling for the Residential Building Stock

Cooking

The energy efficiency potential for cooking service for the residential sector has been calculated for each of the 46 buildings that were audited and Table A22-1 presents the results for each region as well as the weighted average for the entire residential building stock of Kosovo.

Region	Energy efficiency potential for cooking for residential sector
Prishtina	15.50%
Prizren	15.00%
Mitrovica	9.99%
Kosovo	**14.16%**

Table A22-1: Energy efficiency potential for cooking energy service for residential sector

An energy efficiency scenario based on the above-mentioned EE potential figures for each region was established on the assumption that the potential will be realised in 2020. The results of the calculations are illustrated in Figure A22-1.

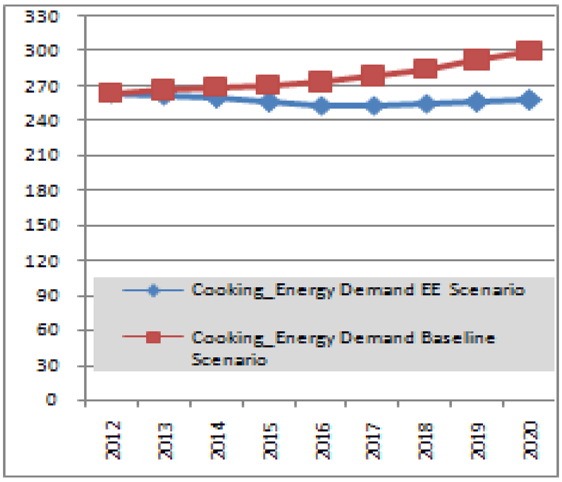


Figure A22-1: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The energy saving for one household is 367 kWh/year and to reach absolute savings of 42.55 GWh in 2020, EE cooking stoves must be introduced into 115,712 households. On the Kosovo market, the average cost of a new EE cooking stove is approximately €350/boiler. This value is used in calculating the total investment required to reach the saving potential mentioned above. Figures A22-2 and A22-3 show graphically the number of households where new EE cooking stoves have to be introduced and the respective investment needed.

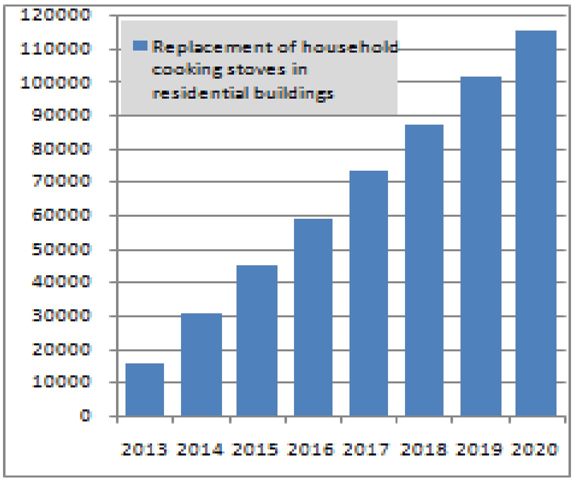


Figure A22-2: Cumulative number of households where EE stoves will be introduced to realise cooking service energy saving potential

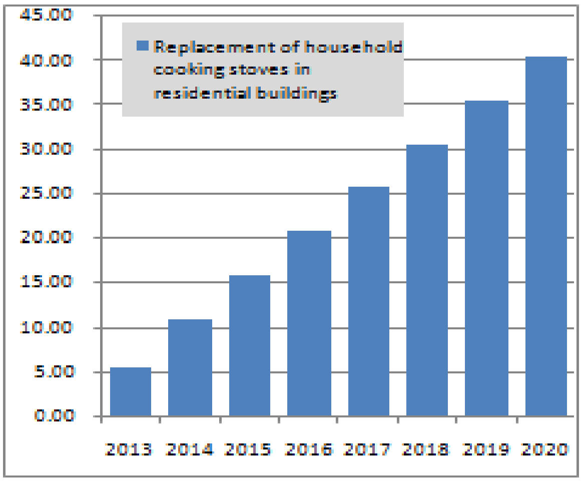


Figure A22-3: Cumulative investment (€million) required to finance the introduction of EE stoves to realise cooking service energy saving potential

Lighting

Energy efficiency potential for lighting in the residential sector has been calculated for each of the 46 buildings that were audited, the results for each region are presented in Table A22-2, and the weighted average has been calculated for the total residential building stock.

Region	Energy efficiency potential for lighting for residential sector
Prishtina	72.39%
Prizren	76.02%
Mitrovica	73.25%
Kosovo	**73.72%**

Table A22-2: Energy efficiency potential for lighting energy service for the residential sector

An energy efficiency scenario was established based on the above-mentioned potential EE figures for each region and on the assumption that this potential will be reached in 2020. The results of the calculations are shown in Figure A22-4.

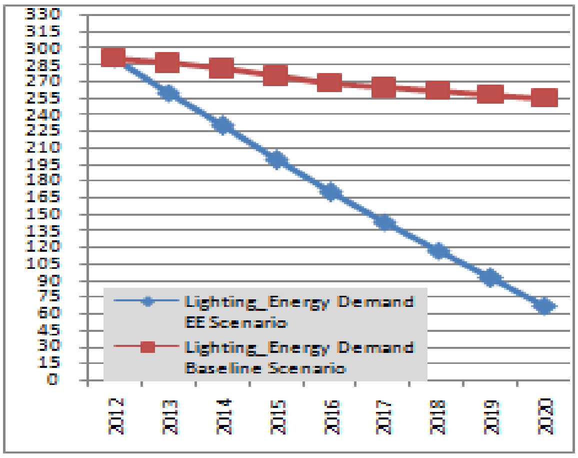


Figure A22-4: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The total energy saving achieved by the introduction of EE lighting is calculated because for the average living area of 108 m^2, the average number of bulbs needed for 'comfort lighting' is 8. Energy saving for one household is 997 kWh/year and to reach absolute savings of 187.5 GWh in 2020, EE lighting has to be installed in 187,976households. In the Kosovo market, the average cost of EE light bulbs is approximately €5/bulb (European production). This value is used for calculation of the investment required to reach the potential level of savings. Figures A22-5 and A22-6 show the number of households where new EE bulbs have to be installed and the total investment cost.

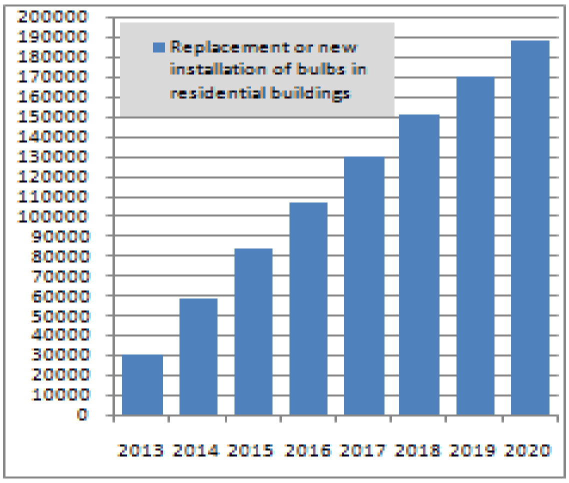


Figure A22-5: Cumulative number of unit/HH where respective EE measures will be introduce to reach lighting service energy saving potential

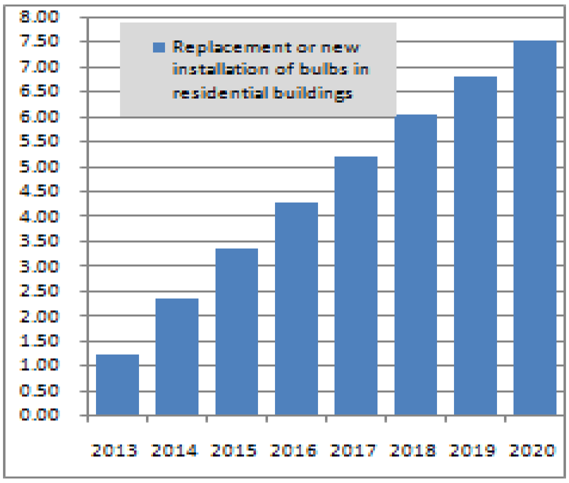


Figure A22-6: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach lighting service energy saving potential

Electrical Appliances

The energy efficiency potential for electrical appliances for the residential sector has been calculated for each of 46 buildings audited and Table A22-3 shows the results for each region and the weighted average for the whole residential building stock.

Region	Energy efficiency potential for electrical appliances for residential sector
Prishtina	20.21%
Prizren	13.88%
Mitrovica	5.4%
Kosovo	**14.66%**

Table A22-3: Energy efficiency potential for electrical appliances for residential sector

An energy efficiency scenario has been established based on the above-mentioned potential Figures for each region and on the assumption that this potential will be reached on 2020 and those calculations are presented in the Figure A22-7.

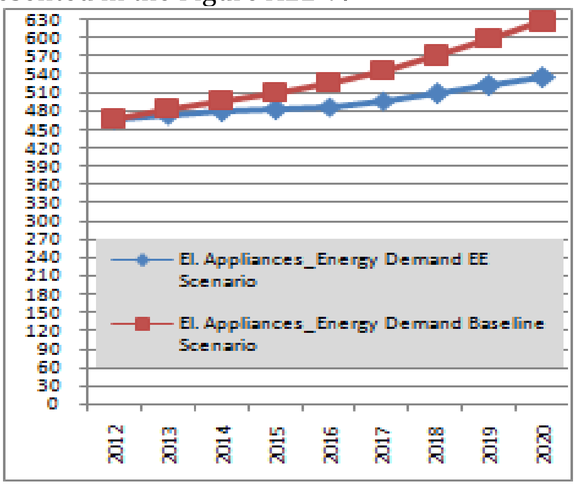


Figure A22-7: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

Absolute value saving potential calculated above will be secure from introduction of two the most important EE measures above mentioned and their shares are presented in the table A22-4.

EE Measure	Introducing EE Washing Machine with A label category	Introducing EE Refrigerator with A label category
Shares	65%	35%

Table A22-4: Contribution/shares of each EE measure in %

The energy saving made by one household introducing a new washing machine ('A category' label) is 436 kWh/year and to reach absolute savings for 2020 of 59.8 GWh, "A category" washing machines have to be installed in 137,046 households. The energy saving for one household resulting from the installation of a new refrigerator ('A category' label) is 244 kWh/year and to reach absolute savings of 32.2 GWh by 2020 category A refrigerators need to be installed in 131,643 households.

The average cost of a new "A category" washing machine and refrigerator is approximately €450 and €300 respectively. These values are used to calculate the total investment needed to reach the above-mentioned potential savings Figure. Figures A22-8 and A22-9 show graphically the number of households where the new appliances have to be installed and the total cost of the investment.

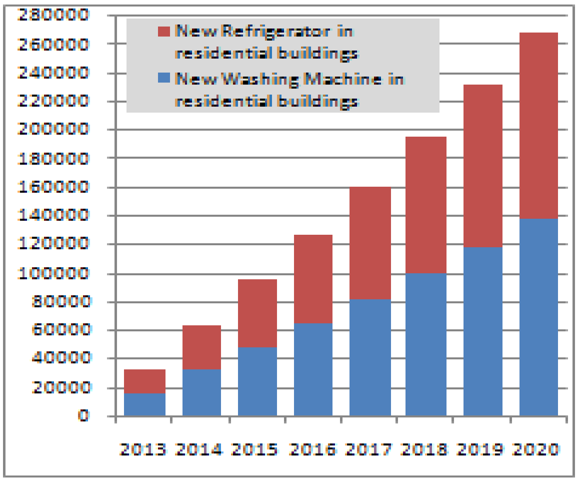


Figure A22-8: Cumulative number of households where electrical appliances have to be introduced to realise energy saving potential

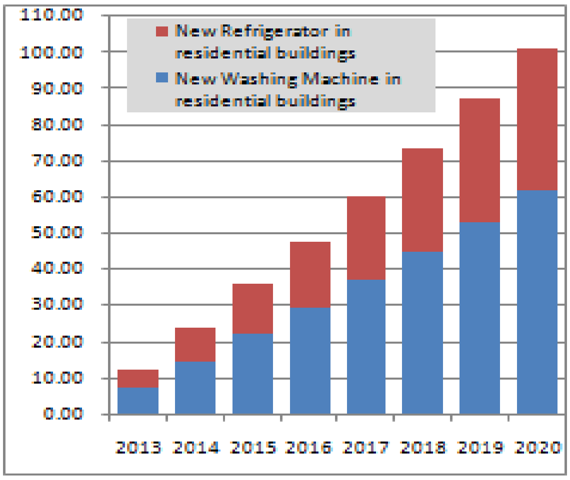


Figure A22-9: Cumulative investment (€million) in new electrical appliances required to realise energy saving potential

Air Conditioning

The energy efficiency potential for air conditioning (space cooling) for the residential sector has been calculated for each of 46 buildings and Table A22-5 presents the results for each of the regions and the weighted average figures for the whole residential building stock.

Region	Energy efficiency potential for electrical appliances for residential sector
Prishtina	15%
Prizren	15%
Mitrovica	15%
Kosovo	**15%**

Table A22-5: Energy efficiency potential for air conditioning for residential sector

An energy efficiency scenario has been established based on the above-mentioned potential Figures for each region and on the assumption that this potential will be reached in 2020 and those calculations are presented in Figure A22-10.

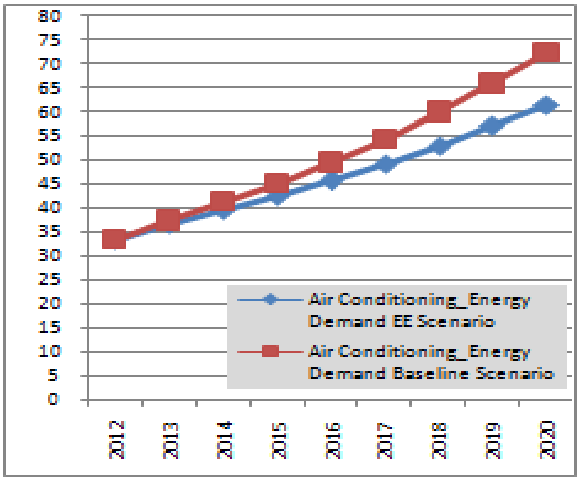


Figure A22-10: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

The energy saving for one household of a new AC system ('A category' label) is 282 kWh/year and to reach absolute savings 72.26 GWh in 2020, EE AC Split Unit "A label" are needed in38,364 households. In Kosovo, the average cost of an "A category" new AC system is approximately €700. These values are used for calculating the necessary investment to reach the stated energy saving potential. Figures A22-11 and A22-12 show graphically the number of households where this technology needs to be introduced and the investment funds needed.

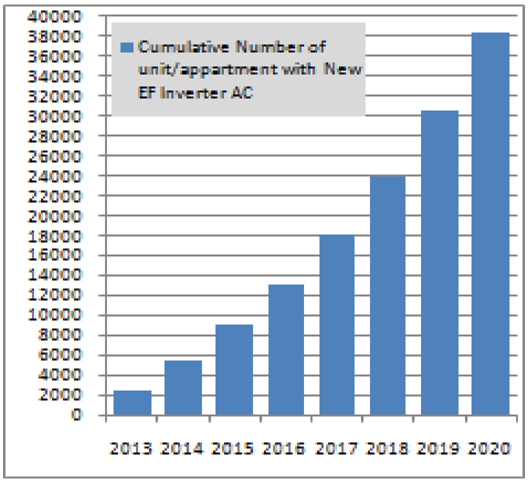


Figure A22-11: Cumulative number of household where EE electrical appliances that have to be introduced to achieve the energy saving potential

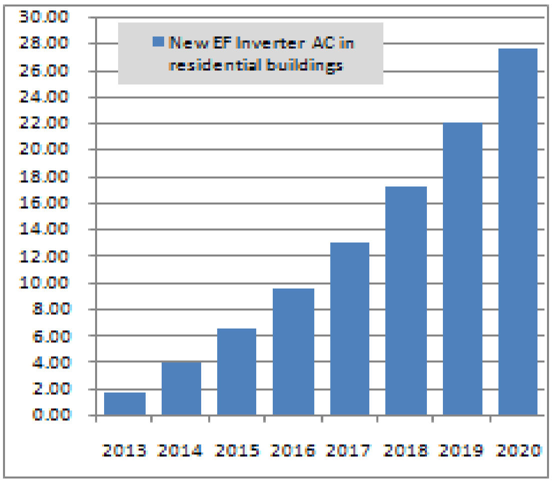


Figure A22-12: Cumulative investment (€million) for EE electrical appliances that have to be introduced to achieve the energy saving potential

Annex 23: Calculation of Energy Savings Potential for Cooking, Lighting, Electrical Appliances and Space Cooling for the Municipality Public Building Stock

Cooking

Energy efficiency potential for cooking service for MPBs has been calculated for each of 20 buildings and in the table A23-1 are presented results for each of the region and for the this building stock based in the weighted average concept.

REGION	Energy efficiency potential for cooking for MPBs
Prishtina	15.50%
Prizren	15.00%
Mitrovica	9.99%
Kosovo	**14.16%**

Table A23-1: Energy efficiency potential for cooking energy service for residential sector

Energy efficiency scenario has been established based on the above-mentioned potential Figures for each region and with main assumption that this potential will be reached on 2020 and those calculations are presented in the Figure A23-1.

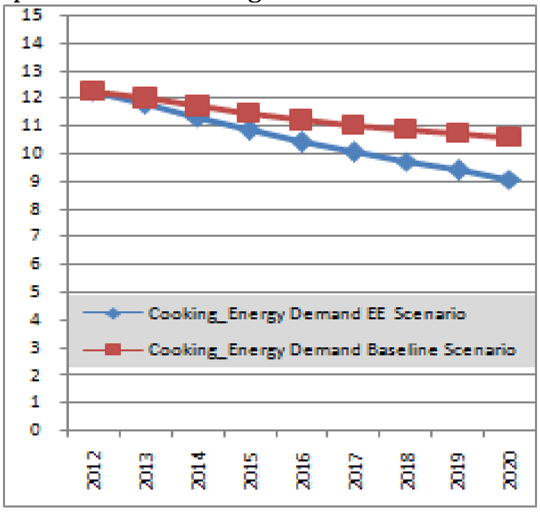


Figure A23-1: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE cooking stoves for MPB will be the same as it is presented in Annex 14. Energy saving for one unit/MPB is 1098 kWh/year and to reach absolute savings for 2020 equal to 10.55 GWh are needed to introduce EE cooking stoves into 817 MPBs. Also based on Kosovo market new efficient average cost for EE cooking stove is approximately 4000 Euro. Figures A23-2 and A23-3 graphically MPB where introduction of this technology and the respective investment needed.

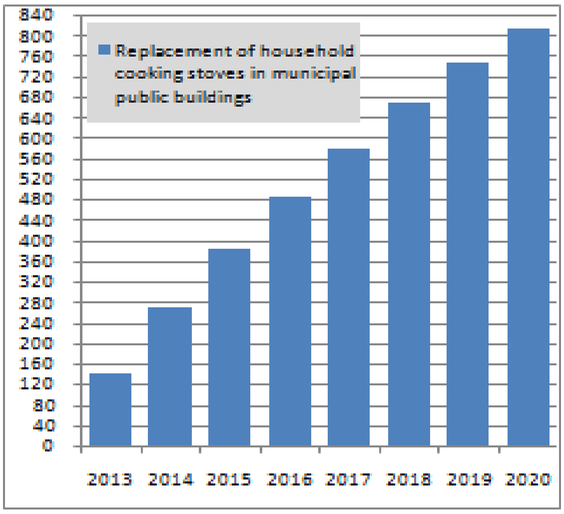


Figure A23-2: Cumulative number of unit/HH where respective EE measures will be introduced to reach energy saving potential into cooking service

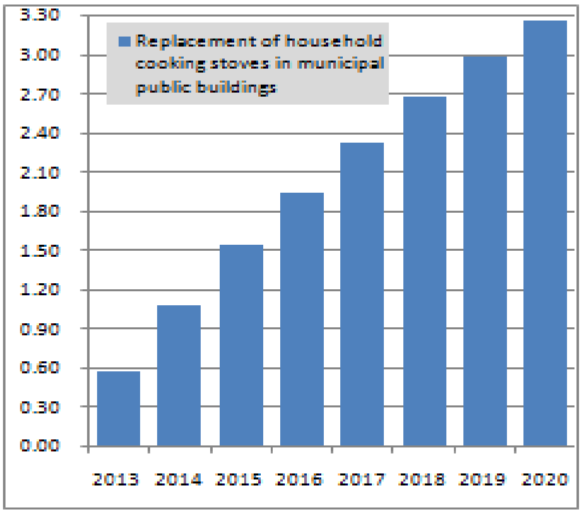


Figure A23-3: Cumulative investment (€million) for respective EE measures to be introduced to reach energy saving potential into cooking service

Lighting

Energy efficiency potential for lighting for MPBs has been calculated for each of 20MPBs and Table A23-2 presents results for each region and the weighted average for the whole of Kosovo.

Region	Energy efficiency potential for lighting for MPBs
Prishtina	58.18%
Prizren	34.12%
Mitrovica	27.26%
Kosovo	**43.76%**

Table A23-2: Energy efficiency potential for lighting energy service for MPB

An energy efficiency scenario has been established based on the above-mentioned EE potential figures and calculations are presented in the Figures A23-4.

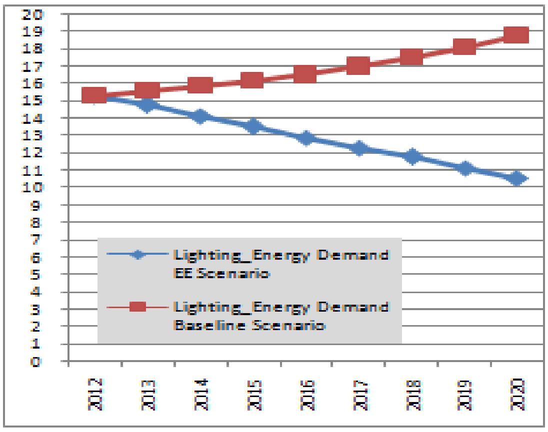


Figure A23-4: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE Lighting Bulbs for MPB will be the same as presented in Annex 14. Energy saving for one unit/MPB is 4907 kWh/year and to reach absolute savings for 2020 equal to 8.21 GWh are needed to introduce EE lighting into 1674 MPBs. Figures A23-5 and A23-6 show graphically MPBs where introduction of efficient bulbs and the respective investment needed.

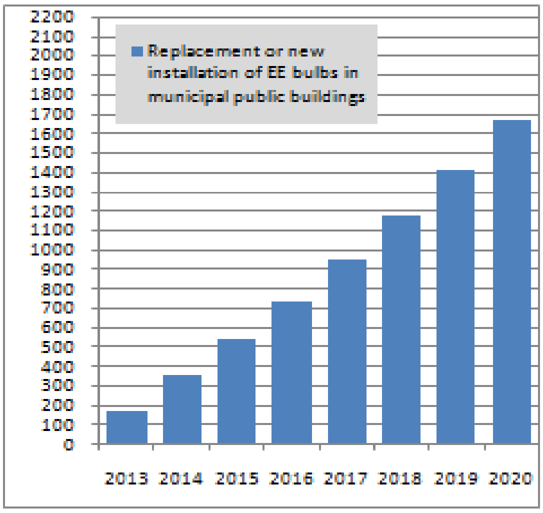


Figure A23-5: Cumulative number of unit/HH where respective EE measures will be introduce to reach energy saving potential into lighting service

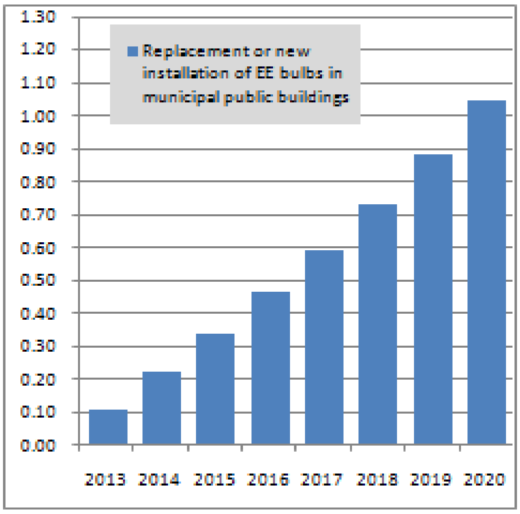


Figure A23-6: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into lighting service

Electrical Appliances

Methodology used in energy audits for calculation of energy saving from introduction of EE Electrical Appliances for MPB will be the same as it is presented in Annex 14. Energy efficiency potential for electrical appliances for MPBs has been calculated for each of 20 buildings and in the table A23-3 is presented results for each of the region and for the whole country based in the weighted average concept.

REGION	Energy efficiency potential for electrical appliances for MPBs
Prishtina	25.18%
Prizren	24.12%
Mitrovica	21.26%
Kosovo	**23.99%**

Table A23-3: Energy efficiency potential for electrical appliances for PBPs

Energy efficiency scenario has been established based on the above-mentioned potential Figures for each region and with main assumption that this potential will be reached on 2020 and those calculations are presented in the Figure A23-7.

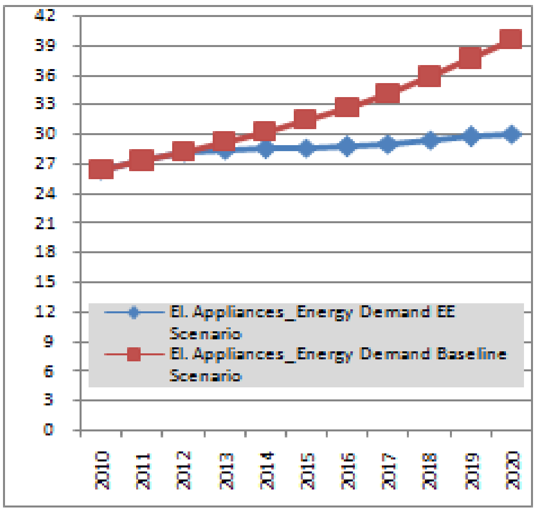


Figure A23-7: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

Absolute value saving potential calculated above will be secure from introduction of two the most important EE measures above mentioned and their shares are presented in the table A23-4.

EE Measure	Introducing EE Washing Machine with Category A label	Introducing EE Refrigerator with Category A label
Shares	50%	50%

Table A23-4: Contribution/shares of each EE measure in percentage

Methodology used in energy audits for calculation of energy saving from introduction of EE electrical equipment for MPB will be the same as it is presented in Annex 14. Energy saving for one unit/MPB of New Washing Machine (A label category) is 4715 kWh/year and to reach absolute savings for 2020 equal to 4.74 GWh are needed to introduce EE WM "A label" into 201 MPBs. Energy saving for one unit/MPBs of New Refrigerator (A label category) is 2634 kWh/year and to reach absolute savings for 2020 equal to 4.74 GWh are needed to introduce EE Refrigerator "A label" into 360 MPBs. Also based on Kosovo market new efficient average cost for "A label category" new Washing Machine and new Refrigerator for MPBs for is approximately €4500 and €3500. These values are used for calculation of investment requested to reach the above-mentioned potential. Figures A23-8 and A23-9 show graphically MPBs where introduction of this technology and the respective investment needed.

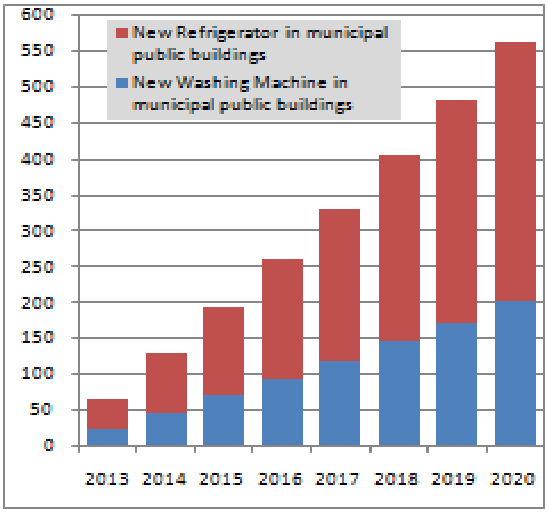


Figure A23-8: Cumulative number of unit/HH where respective EE measures will be introduce to reach energy saving potential into electrical appliances

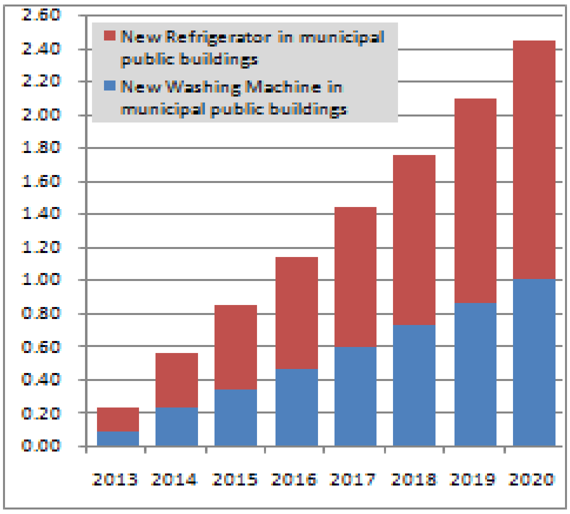


Figure A23-9: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into electrical appliances

Air Conditioning

Energy efficiency potential for air conditioning (space cooling) for MPB has been calculated for each of 20 buildings and in the table A23-5 are presented results for each of the region and for the whole residential building stock based in the weighted average concept.

REGION	Energy efficiency potential for Air Conditioning for MPBs
Prishtina	21.94%
Prizren	21.94%
Mitrovica	21.88%
Kosovo	**21.92%**

Table 10-49: Energy efficiency potential for air conditioning for MPBs

Energy efficiency scenario has been established based on the above-mentioned potential Figures for each region and with main assumption that this potential will be reached on 2020 and those calculations are presented in the Figure A23-10.

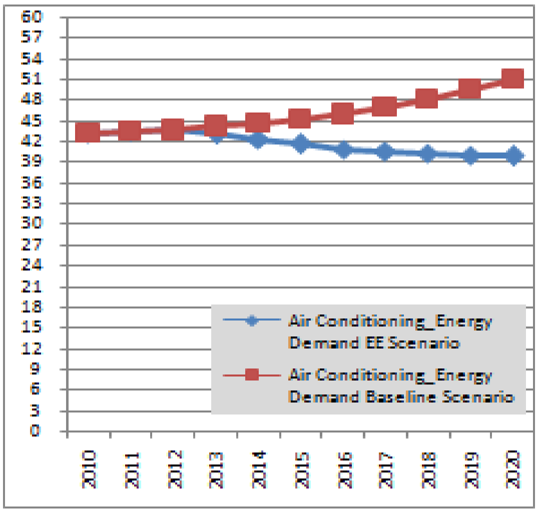


Figure A23-10: Energy Demand for BL, EE Scenarios (without and with EE measures) for Kosovo (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE AC for MPB will be the same as it is presented in Annex 14. Energy saving for one unit/MPB of New AC (A label category) is 2489 kWh/year and to reach absolute savings for 2020 equal to 1.58 GWh are needed to introduce EE AC into 138 MPBs. Also based on Kosovo market new efficient average cost for “A label category” new AC for MPB with 1297 m² is approximately €10,000. These values are used for calculation of investment requested to reach the above-mentioned potential. Figures A23-11 and A23-12 show graphically HH where introduction of this technology and the respective investment needed.

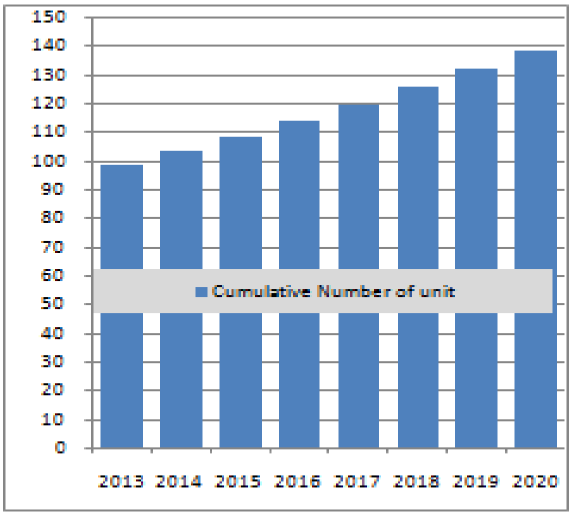


Figure A23-11: Cumulative number of unit/HH where respective EE measures will be introduce to reach energy saving potential into AC service

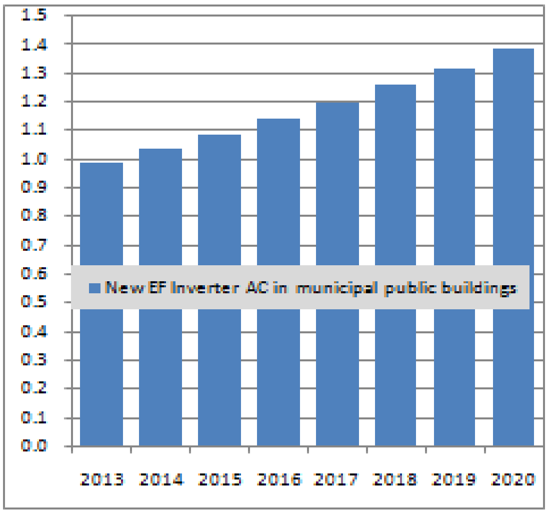


Figure A23-12: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into AC service

Annex 24: Calculation of Energy Savings Potential for Cooking, Lighting, Electrical Appliances and Space Cooling for the Central Public Building Stock

Cooking

The energy efficiency potential for space heating for CPBs has been calculated for each of 10 buildings and the result shows that the average value is about 26.2%. An energy efficiency scenario has been established based on the main assumption that this potential will be reached on 2020 and those calculations are presented in Figure A24-1, 2 and 3.

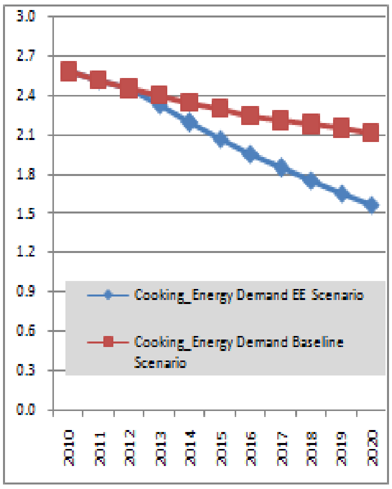


Figure A24-1: Energy Demand for BL, EE Scenarios (without and with EE measures) for whole Kosovo (GWh)

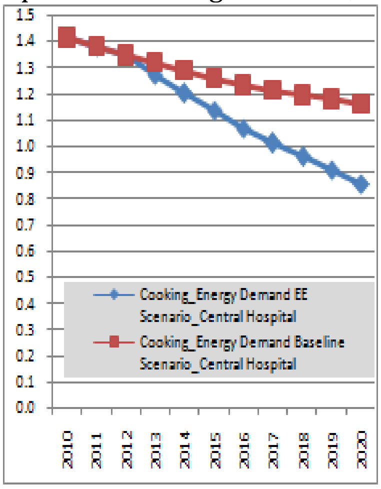


Figure A24-2: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Hospitals of Kosovo (GWh)

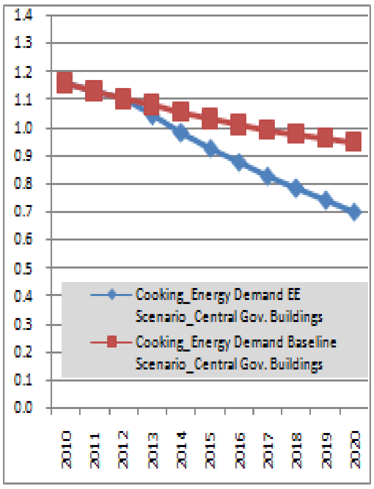


Figure A24-3: Energy Demand for BL, EE Scenarios (without and with EE measures) for Central Gov. Buildings of Kosovo (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE cooking stoves for CPB will be the same as it is presented in Annex 14. Energy saving for one CPBs is 2,170 kWh/year and to reach absolute savings for 2020 equal to 0.55 GWh are needed to introduce EE cooking stoves into 51 CPBs. Also based on Kosovo market new efficient average cost for EE cooking stove is approximately 10000 Euro. Figures A24-4, 5, 6, 7, 8 and 9 shows graphically the number of CPBs that need to install this technology and the respective investment needed.

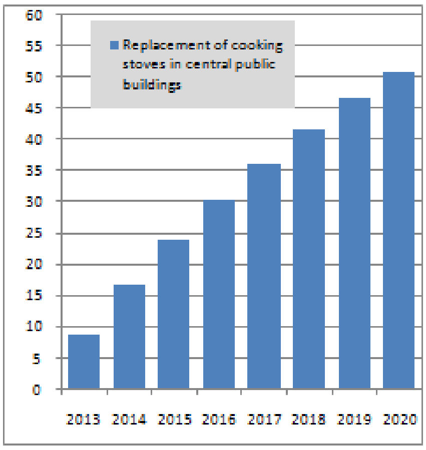


Figure A24-4: Cumulative number of CPBs where EE cooking service measures must be introduced to reach energy saving potential

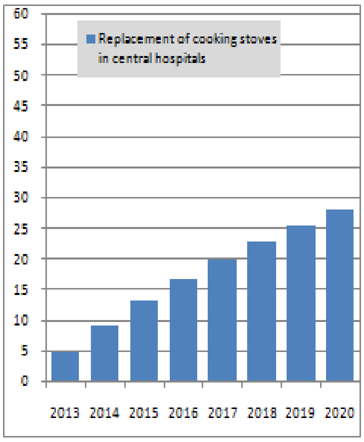


Figure A24-5: Cumulative number of central hospitals where EE cooking service measures must be introduced to reach energy saving potential

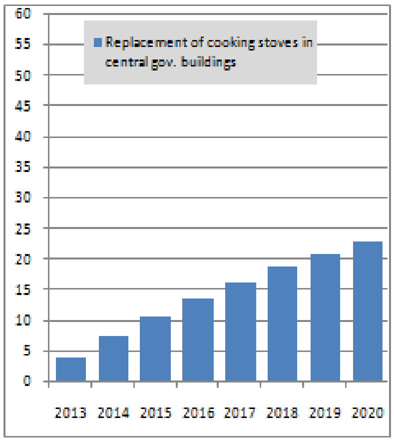


Figure A24-6: Cumulative number of central Gov. buildings where EE cooking service measures must be introduced to reach energy saving potential

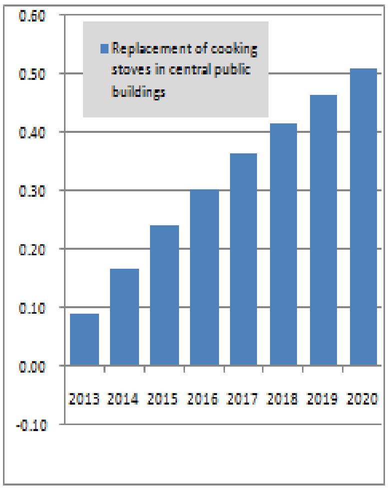


Figure A24-7: Cumulative investment (€ million) required for respective EE cooking service measures to reach energy saving potential

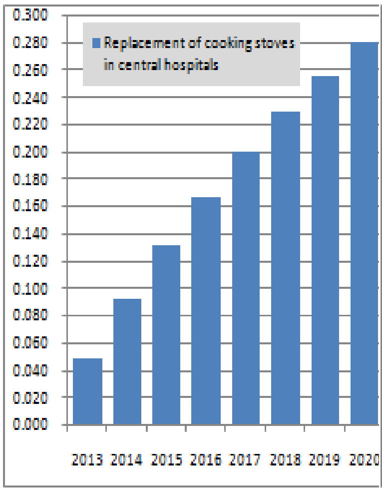


Figure A24-8: Cumulative investment (€ million) of central hospitals required for respective EE cooking service measures to reach energy saving potential

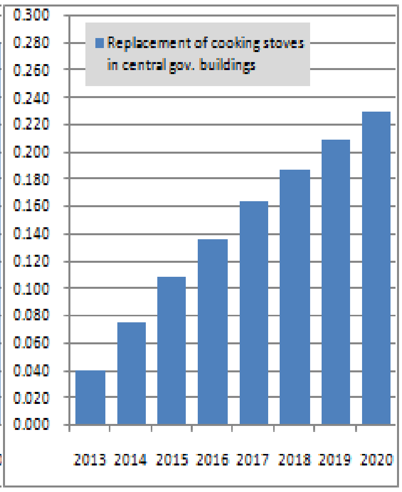


Figure A24-9: Cumulative investment (€ million) of central Gov. buildings required for respective EE cooking service measures to reach energy saving potential

Lighting

Energy efficiency potential for Lighting for CPBs has been calculated for each of 10 buildings and the result shows that average value is about 42.11%. Energy efficiency scenario has been established based on the above-mentioned methodology and calculations are presented in Figure A24-10, 11 and 12.

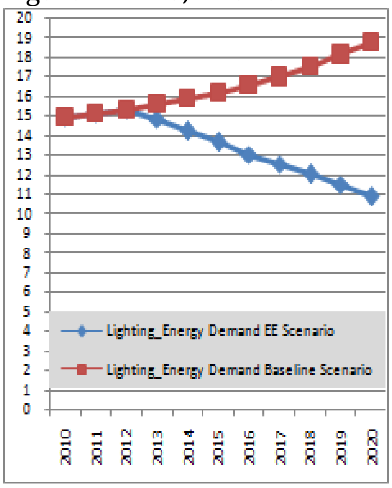


Figure A24-10: Energy Demand for BL, EE Scenarios (without and with EE measures) for whole Kosovo (GWh)

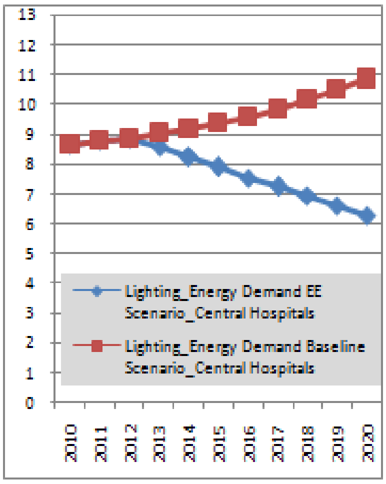


Figure A24-11: Energy Demand for BL, EE Scenarios (without and with EE measures) for central hospitals (GWh)

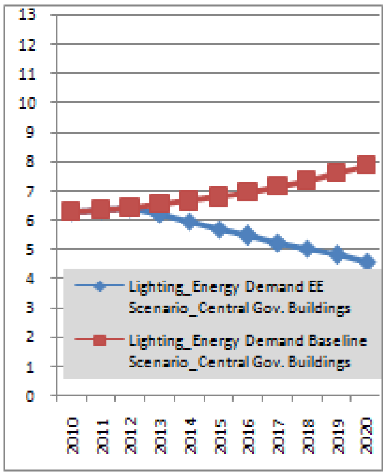


Figure A24-12: Energy Demand for BL, EE Scenarios (without and with EE measures) for central Gov. buildings (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE Lighting Bulbs for CPBs will be the same as it is presented in Annex 14. Energy saving for one unit/CPB is 14761 kWh/year and to reach absolute savings for 2020 equal to 7.91 GWh are needed to introduce EE lighting into 81 CPBs. Figures A24-13,14,15,16,17 and 18 show graphically CPBs where introduction of efficient bulbs and the respective investment needed.

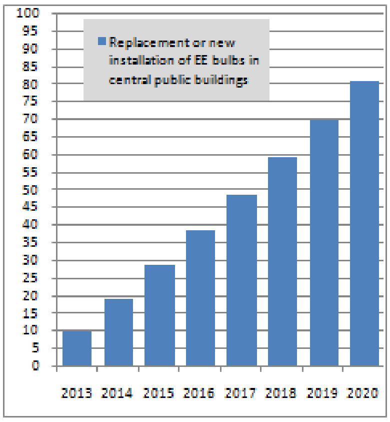


Figure A24-13: Cumulative number of CPBs where respective EE measures will be introduce to reach energy saving potential into lighting service

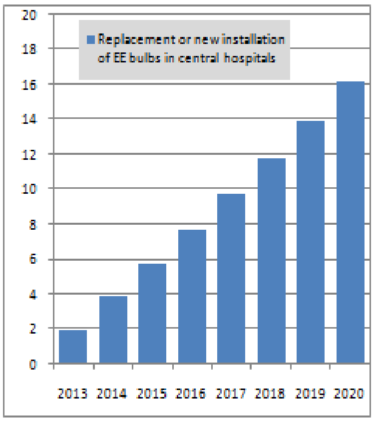


Figure A24-14: Cumulative number of central hospitals where respective EE measures will be introduce to reach energy saving potential

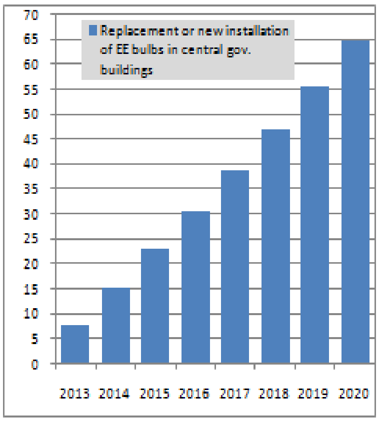


Figure A24-15: Cumulative number of central Gov. buildings where respective EE measures will be introduce to reach energy saving potential

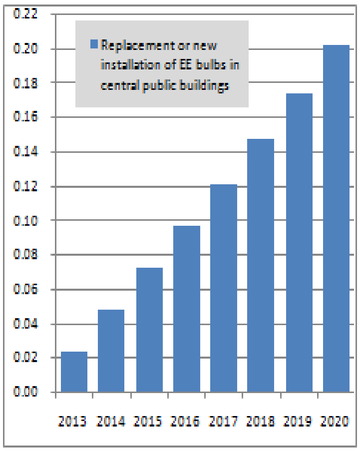


Figure A24-16: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into lighting service

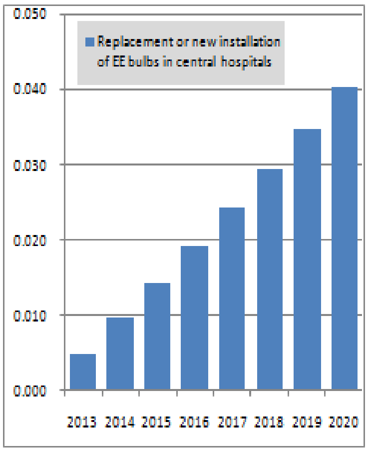


Figure A24-17: Cumulative investment (Million Euro) of central hospitals for respective EE measures to be introduce to reach energy saving potential

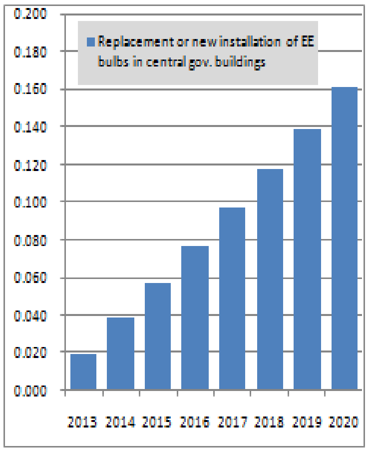


Figure A24-18: Cumulative investment (Million Euro) of central Gov. buildings for EE measures to be introduce to reach energy saving potential into lighting service

Electrical Appliances

Energy efficiency potential for Electrical Appliances for CPBs has been calculated for each of 10 buildings and the result shows that average value is about 26.19%. Energy efficiency scenario has been established based on the main assumption that this potential will be reached on 2020 and those calculations are presented in the Figures A24-19, 20 and 21.

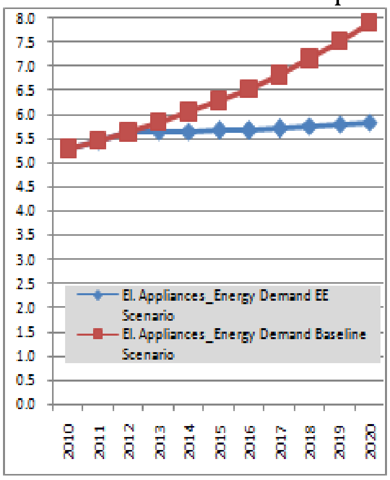


Figure A24-19: Energy Demand for BL, EE Scenarios (without and with EE measures) for whole Kosovo (GWh)

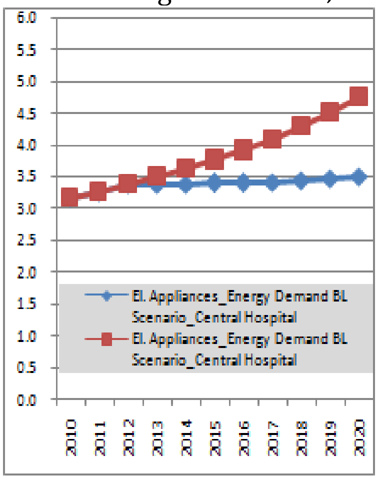


Figure A24-20: Energy Demand for BL, EE Scenarios (without and with EE measures) for central hospital (GWh)

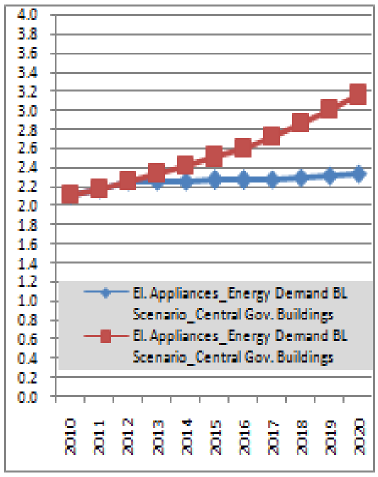


Figure A24-21: Energy Demand for BL, EE Scenarios (without and with EE) central Gov. buildings (GWh)

Absolute value saving potential calculated above will be secure from introduction of two the most important EE measures above mentioned and their shares will be 50% for each of them. Methodology used in energy audits for calculation of energy saving from introduction of EE electrical equipment for CPBs will be the same as it is presented in Annex 14. Energy saving for one unit/CPBs of New Washing Machine (A label category) is 10478 kWh/year and to reach absolute savings for 2020 equal to 1.035 GWh are needed to introduce EE WM "A label" into 20 CPBs. Energy saving for one unit/CPBs of New Refrigerator (A label category) is 5854 kWh/year and to reach absolute savings for 2020 equal to 1.035 GWh are needed to introduce EE Refrigerator "A label" into 35 CPBs. Figures A24-22,23,24,25,26,27 show graphically the number of CPBs where this technology should be introduced and the total investment funding needed.

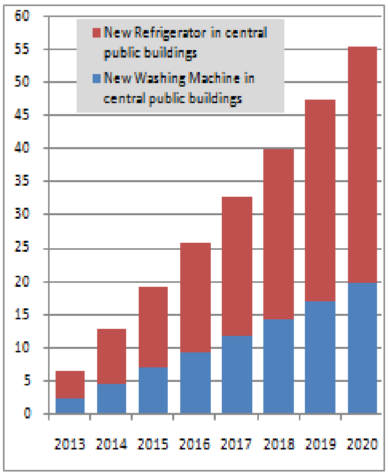


Figure A24-22: Cumulative number of CPBs where respective EE measures will be introduce to reach energy saving potential into electrical appliances

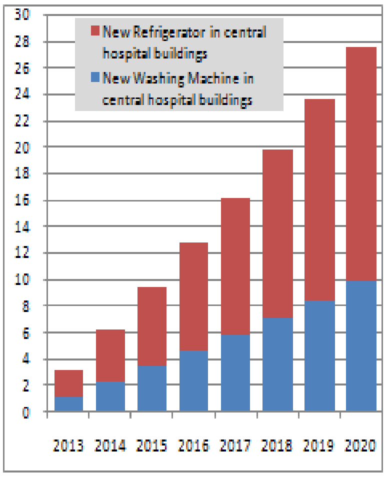


Figure A24-23: Cumulative number of central hospitals where respective EE measures will be introduce to reach energy saving potential

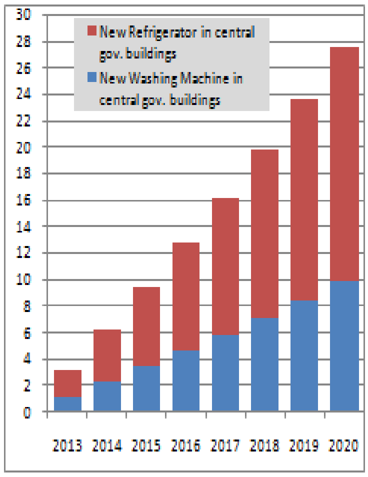


Figure A24-24: Cumulative number of central Gov. buildings where respective EE measures will be introduce to reach energy saving potential

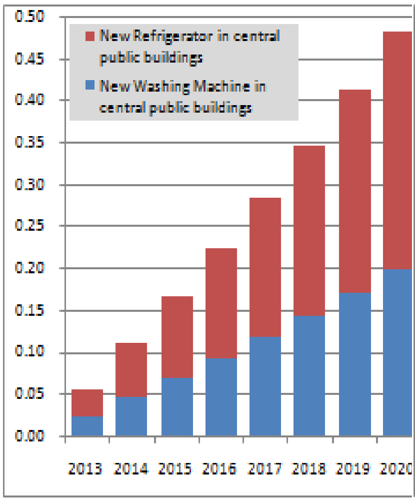


Figure A24-25: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into electrical appliances

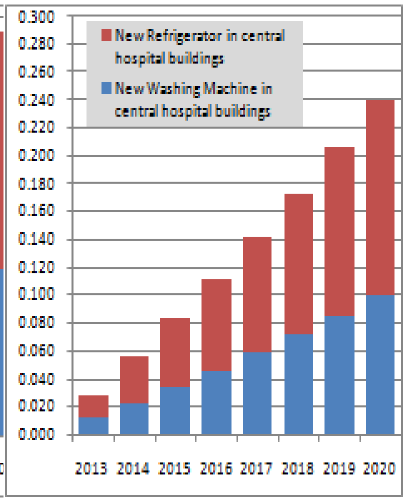


Figure A24-26: Cumulative investment (Million Euro) of central hospitals for respective EE measures to be introduce to reach energy saving potential

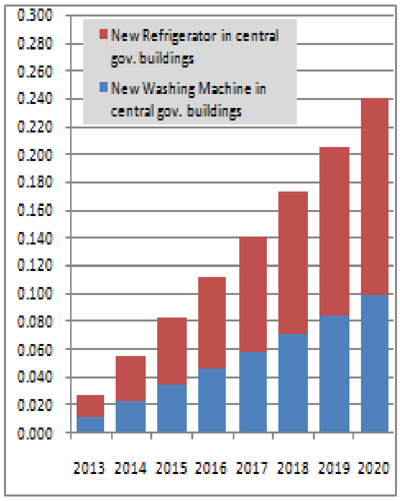


Figure A24-27: Cumulative investment (Million Euro) of central Gov. buildings for respective EE measures to be introduce to reach energy saving potential

Air Conditioning

Energy efficiency potential for Air Conditioning for CPBs has been calculated for each of 10 buildings and the result shows that average value is about 45.98%. Energy efficiency scenario has been established based on the main assumption that this potential will be reached on 2020 and those calculations are presented in the Figures A24-28, 29 and 30.

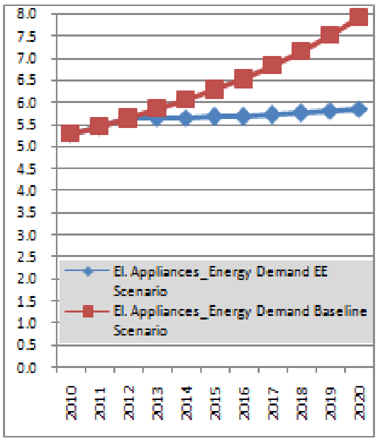


Figure A24-28: Energy Demand for BL, EE Scenarios (without and with EE measures) for whole Kosovo (GWh)

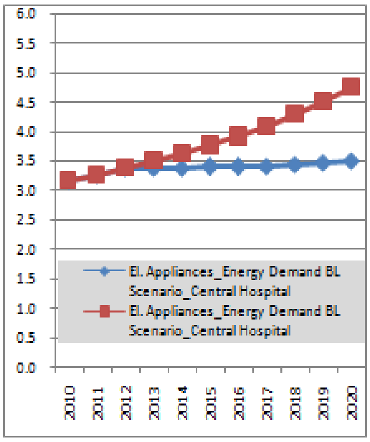


Figure A24-29: Energy Demand for BL, EE Scenarios (without and with EE measures) for central hospital (GWh)

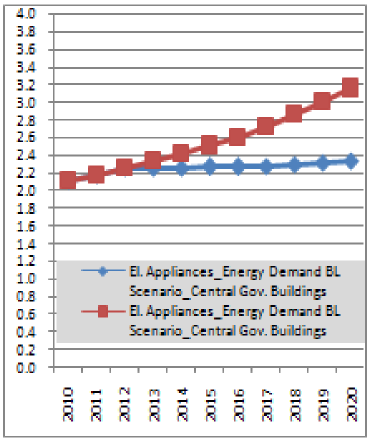


Figure A24-30: Energy Demand for BL, EE Scenarios (without and with EE measures) for central governmental buildings (GWh)

Methodology used in energy audits for calculation of energy saving from introduction of EE AC for MPB will be the same as it is presented in Annex 14. Energy saving for one unit/CPB of New AC (A label category) is 8,005 kWh/year and to reach absolute savings for 2020 equal to 4.69 GWh are needed to introduce EE AC into 76 CPBs. Figures A24-31,32,33,34,35,36 show graphically CPBs where introduction of this technology and the respective investment needed.

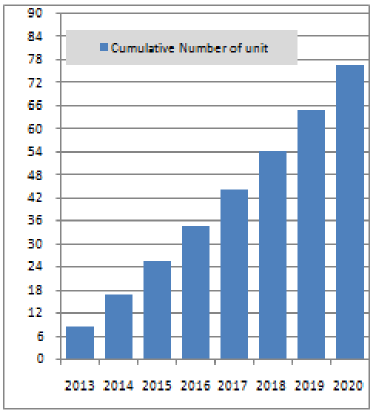


Figure A24-31: Cumulative number of CPBs where respective EE measures will be introduce to reach energy saving potential into AC service

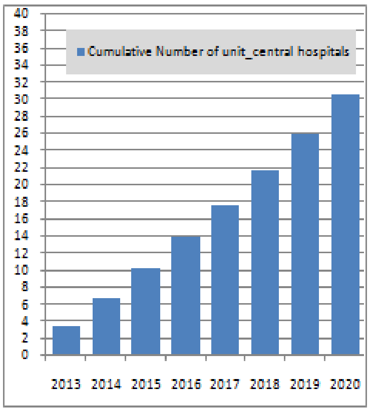


Figure A24-32: Cumulative number of central buildings where respective EE measures will be introduce to reach energy saving potential into AC service

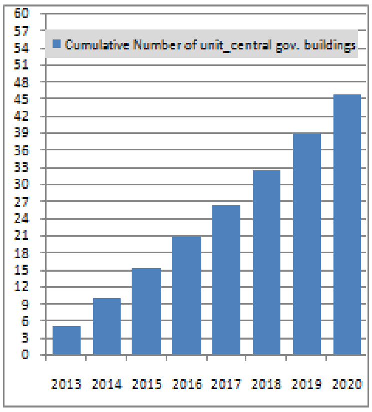


Figure A24-33: Cumulative number of central Gov. buildings where respective EE measures will be introduce to reach energy saving potential into AC service

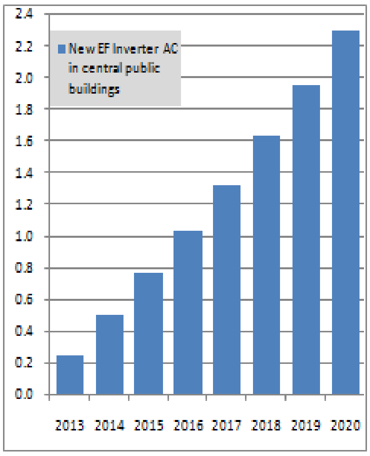


Figure A24-34: Cumulative investment (Million Euro) for respective EE measures to be introduce to reach energy saving potential into AC service for whole Kosovo

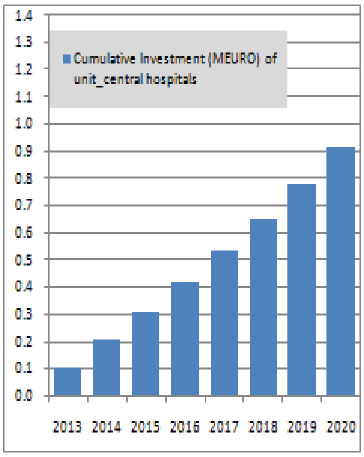


Figure A24-35: Cumulative investment (Million Euro) of central buildings for respective EE measures to be introduce to reach energy saving potential into AC service

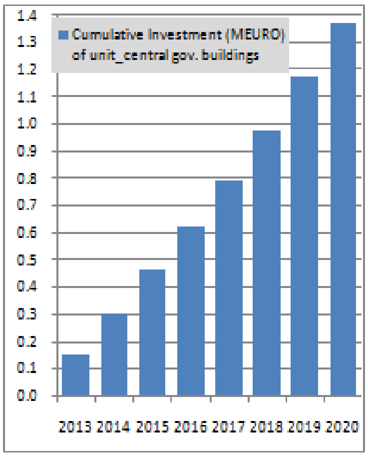


Figure A24-36: Cumulative investment (Million Euro) of central Gov. buildings for respective EE measures to be introduce to reach energy saving potential into AC service

Annex 25: Meeting Schedule August-October 2012

MEETING DETAILS	ATTENDEES
Monday, August 20	
"Kick-off" meeting 10:00 at EPTISA Office, Prishtina	Richard Tomiak – EPTISA Vagn Jorgensen– EPTISA Arsim Brucaj - EPTISA
Tuesday, August 21	
ProCredit Bank 10:00 at the bank	Vagn Jorgensen – EPTISA Arsim Brucaj – EPTISA Nora Arifi, ProCredit Bank
KfW 13.30 at KfW office, Prishtina	Bahrije Dibra – Coordinator for the Financial and Energy Sectors Vagn Jorgensen – EPTISA Arsim Brucaj - EPTISA
Wednesday, August 22	
Kosovo Energy Efficiency Agency 11.00 at KEEA office at MED	
GiZ 15.00 at GiZ office, Prishtina	Vagn Jorgensen – EPTISA Arsim Brucaj – EPTISA Avni Sfishta - GiZ
Thursday, August 23	
10.00 Energy Regulator	Vagn Jorgensen – EPTISA Arsim Brucaj – EPTISA Adrian Berisha - ERO
14.00 EBRD office	Vagn Jorgensen – EPTISA Arsim Brucaj – EPTISA Adrian Berisha – EBRD, Pristina office
17.00 Project progress meeting	Richard Tomiak - EPTISA Vagn Jorgensen – EPTISA Arsim Brucaj – EPTISA
Monday, August 27	
15.00 Meeting with KEK	Arsim Brucaj - EPTISA Vagn Jorgensen – EPTISA Salih Bytyqi - KEK
Tuesday, August 28	
10.30 Meeting with Ministry of Environment and Spatial Planning. Housing and Construction Department.	Lirie Bereisha – Housing and Construction Department Arsim Brucaj - EPTISA Vagn Jorgensen – EPTISA
Thursday, August 30	
Meeting with UNDP, Kosovo	Shkipe Deda-Gjurgjiali – UNDP Arsim Brucaj - EPTISA Vagn Jorgensen – EPTISA
Friday, August 31	
Meeting with Auditor General of Kosovo	Lars Lage Olofson – Auditor General Arsim Brucaj - EPTISA Vagn Jorgensen – EPTISA
Monday, September 24	
Meeting with EU Representation	Merita Govori, taskmanager, EU office in Kosovo Arsim Brucal - EPTISA
Friday, October 5	
Meeting with GiZ on market study	Arsim Brucaj – EPTISA Avni Sfishta - GiZ

Monday, October 18	
Meeting with Ministry of Finance	Mr. Agim Krasniqi - Head of Budgeting Depatment, Ministry of Finance Emine Telaku - Analyst Samira Elkhamlici - WB Astrid Manroth – WB Rhedon Begolli – WB Richard Tomiak – GIZ
Meeting with Ministry of Public Administration	Veton Abdullahu – Manager, Construction Projects Samira Elkhamlici - WB Astrid Manroth – WB Rhedon Begolli – WB Richard Tomiak – GIZ
Monday, October 19	
Review Meeting with Ministry of Economic Development	Luan Morina – Head of Energy Dept Bedri Dragusha – CEO, KEAA Samira Elkhamlici - WB Astrid Manroth – WB Rhedon Begolli – WB Richard Tomiak – GIZ
Monday, October 24	
Meeting with Ministry of Public Administration	Veton Abdullahu – Manager, Construction Projects Valdet Gashi – Project Leader, Electrical Works Rhedon Begolli – WB Richard Tomiak – GIZ
Monday, October 29	
Meeting with Ministry of Public Administration on selection of 5 Central Government Buildings	Veton Abdullahu – Manager, Construction Projects Valdet Gashi – Project Leader, Electrical Works Rhedon Begolli – WB Richard Tomiak – GIZ

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