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Republic of Kosovo Heating Strategy
2011 – 2018

August 2011

Contents

Contents	1
Abbreviations	3
1. Introduction	4
2. Heating sector policies, legal framework and institutions	4
2.1 Legal and regulatory framework	4
2.2 Heating sector institutions and enterprises	5
2.2.1 Institutions	5
2.2.2 Enterprises	6
3. Heating sector analysis	6
3.1 General situation	7
3.2 Building stock	7
3.2.1 Residential building stock	7
3.2.2 Commercial/industrial building stock	8
3.2.3 Public building stock	8
3.3 Heating demand forecast	8
3.4 Heating supply possibilities	9
3.4.1 Electricity	9
3.4.2 Lignite	10
3.4.3 Imported Coal	11
3.4.4 Liquid fuels	11
3.4.5 Natural gas, waste gas and biomass	11
3.4.6 Renewable Energy Sources	12
3.4.7 Central heating	13
3.5 Energy Efficiency	15
3.6 Assessment of heating supply options	15
3.7 Environment protection	16
(CO ₂)	17
3.8 Budgetary support and tariffs	17
4. Heating demand forecasts for the period 2011-2018	17
4.1 Development projections without active intervention of policies	18
4.3 Heating sector development projections, based on cost-effective measures	21
5. Summary of the SWOT analysis for the heating sector	22
6. Heating Strategy Vision and Mission	23

7. Strategic Objectives	24
7.1 Strategic Objectives for the Heating Sector	24
7.1.1. Reduction of the use of electricity for heating, developing district heating systems.....	25
7.1.2. Creation of conditions for the use of alternative energy sources and RES for heating, with a positive impact in environment protection and a sustainable development of the sector.....	26
7.1.3. Creating conditions for the use of efficient heating appliances, and building the thermal performance of the building stock	27
8. Measures to implement the Heating Strategy	30

Abbreviations

EU	European Union
RES	Renewable Energy Sources
DSM	Demand Site Management
EE	Energy Efficiency
GDP	Gross Domestic Product
LPG	Liquefied Petroleum Gas
GWh	Giga-watt/hour
KEK J.S.C.	Kosovo Energy Corporation J.S.C.
MEM	Ministry of Energy and Mining
MED	Ministry of Economic Development
MESP	Ministry of Environment and Spatial Planning
POE	Publicly Owned Enterprises
DH	District Heating
KEEP	Kosovo Energy Efficiency Plan
GoK	Government of Kosovo
EnCT	Energy Community Treaty
ERO	Energy Regulator's Office

1. Introduction

This heating strategy aims to achieve effective management of existing energy resources and preservation of the environment. This strategy is focused on the improvement of security of heating supply, in accordance with European standards, and on the diversification of energy resources utilized. Other significant purposes of this strategy include: stimulation of rational use of energy, promotion of energy efficiency, promotion of renewable energy sources and introduction of new technologies that do not cause irreparable environmental damage, while respecting the application of environmental standards.

This strategy describes strategic objectives, policies and priority developments of the heating subsector. It also identifies key policies and measures to be undertaken in the advancement towards the accomplishment of the energy sector objectives and priorities and the enticement of private investments in energy efficiency improvement, demand side management and utilization of renewable energy sources (RES).

This strategy is founded on comprehensive analyses and reflects on the current situation of the heating sector. It identifies the challenges faced by the heating sector, and sets the guidelines for the development of the most suitable sectoral policies that support further transformation of this sector to a more sustainable sector that provides quality heating services for all consumers, while respecting the relevant EU Directives on energy and environment, as well as the provisions of the Energy Community Treaty.

The objectives and measures stipulated in this document provide for a clear vision on certain key aspects of great significance for the development of the heating sector between 2011 and 2018.

2. Heating sector policies, legal framework and institutions

Policy development, organization, regulation and management of the heating sector in the Republic of Kosovo is based on the energy laws and strategic documents compiled by former MEM – now MED.

2.1 Legal and regulatory framework

Below are the laws that comprise the legal framework for the organization and management of the Heating Sector:

- Law on Energy No. 03/L-184
- Law on Central Heating No. 03-L-116
- Law on Energy Regulator No. 03/L-185
- Law on Electricity No. 03/L-201
- Law on Energy Efficiency No. 04/L-016
- Law on Natural Gas No. 03-L-133
- Law on Publicly Owned Enterprises No. 03-L-087

- Law on Spatial Planning No. 2003-14
- Law on Environmental Protection, No.03-L-025
- Law on Trade of Petroleum and Petroleum Products No. 2004/5
- Law on Foreign Investments No. 02-L-33
- Law on Competition No. 36
- Law on Expropriation of Immovable Property No. 03-L-139
- Law on Public-Private Partnerships and Concessions No. 2009/03-L-090

Law on Central Heating No. 03-L-116, stipulates the conditions and standards for cogeneration, distribution and supply of heating, conditions of operation with other central heating facilities and access to networks and heating market organization, as well as the rights and obligations of legal entities conducting such activities in accordance with this law.

Law on Publicly Owned Enterprises places central heating enterprises under municipal administration. Central heating systems are owned and operated by municipal vertically integrated companies, operating under the legal and property status of Publicly Owned Enterprises (POEs).

2.2 Heating sector institutions and enterprises

The main institutions include MED and ERO, whereas the main energy enterprises are Kosovo Energy Corporation (KEK J.S.C.) and the central heating companies.

2.2.1 Institutions

1. Ministry of Economic Development (MED), is established by Resolution No. 218 of the Assembly of the Republic of Kosovo, of 24.02.2011, and Government Regulation no. 02/2011 on areas of Administrative Responsibility of the Office of Prime Minister and Ministries.

MED is responsible for the development of policies and strategies pertaining to the overall economic development; monitoring of publicly owned enterprises; preparation and implementation of strategic policies/documents on the energy sector, mines, postal services, telecommunication sector and information technology sector, energy balance documents, energy efficiency and renewable energy sources, in accordance with the applicable legislation. It cooperates the business community and business associations towards the establishment of an attractive business environment.

Further, MED bears all other responsibilities pertaining to the energy and mining sectors, held before by the Ministry of Energy and Mining.

2. Energy Regulator's Office (ERO), was established in 2004 through the Law on Energy Regulator No. 2004/09, as an independent regulatory authority for the electricity, central heating and natural gas sectors. ERO is responsible for tariff adoption, provision of authorizations for the development of new generation

capacities, monitoring of energy markets and preparation and/or adoption of energy sector regulations, including respective codes and rules. ERO ensures transparency and accountability of energy market stakeholders and is committed to the improvement of their economic, social and environmental performance.

3. Other government institutions, such as the Ministry of Environment and Spatial planning and Ministry of Labour and Social Welfare, play significant roles in the oversight of other economic, social and environmental aspects of the energy industry.

2.2.2 Enterprises

1. Kosovo Energy Corporation (KEK J.S.C), is a publicly owned enterprise, which operates electricity generation and distribution assets as well as the lignite mines. KEK J.S.C. is responsible for electricity consumption control and management.

2. Central heating companies, exist in Prishtina, Gjakova and Mitrovica. They commonly generate thermal energy of around 130 GWh_{th}/year, or around 3% of Kosovo heating demand. City heating facilities supply the densest parts of respective cities as well as public facilities, such as hospitals, schools and administrative buildings¹. Prishtina district heating comprises over 80% of the overall heating capacities in Kosovo. The three systems face great commercial losses caused by failure to collect heating payments. All central heating systems provide only spatial heating. As a result, heating services are only provided during the heating season.

3. Heating sector analysis

The analysis of the heating sector was compiled mostly based on a World Bank funded study titled “Heating Market Study” in March 2007. Data on the period 2006-2009 was calculated based on the “Heating Market Study”, and arranged by total energy consumption development, registered in the “Energy Balance in the Republic of Kosovo for 2009”, compiled by MEM.

Table 1 shows consumption during the period 2006-2009.

	2006	2007	2008	2009
Final energy consumption, in GWh	15.468	15.090	15.923	16.605
Difference in percentage from 2006	-	-2.45	2.94	7.35

Table 1. Annual energy consumption in Kosovo between 2006 and 2009, and the difference in percentage since 2006.

For the period 2009-2018 an assumed annual heating consumption increase of 2.4% is envisaged².

¹All central heating systems offer only spatial heating and not water heating for household purposes. As a result, these systems function only during the heating season.

²Calculated by combining 1) the average annual increase in electricity consumption, according to the “energy demand forecast and its coverage during 2009-2018”, compiled by MEM; and 2) Annual

3.1 General situation

Main energy resources used for heating and production of warm water in Kosovo are biomass (mainly logwood) and electricity, with each covering around 40% of the consumption³. The high level of logwood consumption causes a reduction of forest reserves and has critical impacts on health and environment. At the same time, utilization of lignite-powered electricity is connected with poor efficiency and causes a significant seasonal difference in electricity demand, which results in significant shedding of electricity supply and increase of electricity imports.

3.2 Building stock

Buildings constructed prior to 1999, especially public buildings, are generally characterised by poor thermal insulation.

Below is a short description of the building stock, based on the 2007 World Bank study and the 2010 EC funded study “Energy Assessment in the Building Stock Report”.

3.2.1 Residential building stock

Residential building stock of Kosovo⁴ comprises around 370,000 families. The main characteristics of the residential building stock are presented below:

- Living environments for individual families consists of around 115 m², ranging from 130 m² in houses, 108 m² in lower apartment buildings (up to three stories) to 67 m² in higher apartment buildings. However, only around 40% of these surfaces are actually heated.
- Construction characteristics of the building units, in the aspect of insulation materials and window quality, are expected to significantly improve in time, since the buildings constructed after 1998 are considered to be not compliant with respective standards.
- 75% of the building units, especially houses, use logwood as their ‘primary fuel’ for heating purposes, whereas electricity, solar energy and central heating represent some of the other primary heating facilities. Electricity is the predominating ‘secondary heating’ mean, used as a supplement to the primary fuel, in certain climatic conditions or certain parts of the residence.

energy savings, according to the Kosovo Energy Efficiency Plan (KEEP), compiled by MEM, according to the assumptions of which energy and heating consumption will have similar development trends.

³World Bank “Heating Market Study, 2007”

⁴Ibid, (page1)

3.2.2 Commercial/industrial building stock

*Commercial/industrial building stock*⁵ consists of around 54,000 units, with an average surface of 143 m², of which 91% are heated. From the aspect of construction characteristics, this category does not significantly differ from the residential building stock, whereas there are clear differences in relation to the fuel used for heating. Electricity, solar and LPG energy are the predominant fuels (representing over 80% of total heat), while logwood plays a rather marginal role (12%), with central heating and lignite covering the remainder.

3.2.3 Public building stock

*Public building stock*⁶ (schools, universities, hospitals/healthcare centres and government buildings) cover an overall surface of around 2,500,000 m². most of the public buildings are heated. This category corresponds with 9% of the total of surfaces heated in the country. The stock belongs mainly to the period prior to 1999 and most of it is not thermally insulated. The stock of public buildings mainly used the following fuels: diesel, logwood, coal, central heating, electricity.

3.3 Heating demand forecast

Total space heating demand is forecasted based on the surface held by different building unit categories, considering only the parts currently heated, and the parameters of heating consumption, and taking into consideration the country's climate, building unit geometry and their current state (insulation), and the aimed temperature of 18-20°C. Total heated water demand was calculated on the basis of the residing population and the assumption of average daily consumption of 15 litres per person/per day. Pursuant to the above criteria, the total annual heating demand is forecasted at 4.494 GWh. Table 2 shows disaggregated consumption by heating energy use, updated in 2009, with an increase of 2.4%.

HEATING ENERGY USE	NET CONSUMPTION GWh	%
Residential space heating	2.427	54
Commercial/industrial space heating	944	21
Public space heating	449	10
Water heating	674	15
Total	4.494	100

Table 2: Disaggregated consumption, by heating energy use

Based on the available statistics and the space heating demand and the difference in electricity consumption during summer and winter, the total amount of electricity

⁵World Bank "Heating Market Study, 2007", page 2.

⁶ Ibid

consumption attributed to space heating is assumed to have been 1,000 GWh in 2006. In 2009, peak load was 1.072 MW, whereby around 320 MW can be directly attributed to space heating.

Based on the total annual consumption distribution by different fuels and on the efficiency of fuel used, as assessed in the WB study and verified by the ‘Energy demand forecast and its coverage in the period 2009-2018 (Table 8.1)’, final use of fuels for space and water heating can be assumed to be that presented in Table 3.

	EFFICIENCY FUEL USE	CONSUMPTION (GROSS) GWh /YEAR	CONSUMPTION (NET) GWh /YEAR	% (NET)
Coal/Lignite	0,4	225	90	2
Logwood	0,6	3145	1.887	42
Petroleum and LPG	0,7	963	674	15
Electricity	0,9-1	1.798	1.708	38
Central Heating	0.9	150	135	3
Total		6281	4.494	100

Table 3: Gross consumption of fuels and electricity and efficiency of use of the main fuels used for heating purposes in 2009.

It is assumed that electricity consumed for heating purposes is almost entirely generated in the thermal power plants ‘Kosova A’ and ‘Kosova B’.

3.4 Heating supply possibilities

In the following, all heating supply options are analyzed, based on a series of criteria, including efficiency, provision of fuel from domestic resources and import, technical aspects, environmental and social impact, and economic and financial feasibility.

3.4.1 Electricity

Electricity is mainly produced by local lignite, with average efficiency of utilization of around 30%. There is no cogeneration of heating and electricity. Electricity use for heating is mostly consumed by electric heaters, which have a high consumption and low transformation rate. These problems can be overcome by a wider application of demand side management measures, such as the introduction of heat accumulators, which accumulate heat during off-peak hours, or thermal pumps/air conditioners – with an efficiency rate two or three times higher than standard electrical heaters. Such measures are highly effective in comparison to the investments in the expansion of electricity generation and distribution systems, especially the installation of electrical

heat accumulation appliances, which are applied to many building units and can significantly contribute to the reduction of peak demand.

Installation of (intelligent) remotely and digitally controlled meters and a better application of the structure of electricity tariffs during peak periods, would further allow for peak consumption load side management, without infringing consumers' comfort. A pilot-installation of such meters is already implemented among 2,000 households in Prishtina.

There is potential to replace electrical heating with alternative heating from logwood or lignite powered furnaces and ovens, and with central heating through existing and new systems.

Electricity remains one of the most significant heating sources, however, its utilization should be further optimized, by replacing peak load consumption with low-peak periods (load management) and utilization of efficient electrical heating appliances.

Demand side management measures have to be implemented as soon as possible, in order to prevent the frequent overload of the electricity generation, transmission and distribution systems, as well as the need for load-shedding and supply interruptions. Electrical heating should gradually be replaced by other alternative heating sources.

The application of load side management measures and gradual replacement of heating electricity with alternative heating sources should be supported by changes in the electricity tariff structure, namely the introduction of double electricity tariffs (peak/off-peak) and a general increase of the tariff level to reflect on the actual electricity generation and distribution expenses.

3.4.2 Lignite

Kosovo has vast lignite resources, which represent the most significant source of electricity generation. Lignite resources in Kosovo amount to 12.5 billion tons, of which 8.6 billion tons are economically exploitable reserves, with rather favourable utilization conditions.

The lignite humidity level is around 35%. Many families use lignite as fuel for their needs, in combination with logwood, as it is largely available directly from the mines and at affordable prices. Lignite use in domestic stoves has a negative medical impact, as it pollutes the air and the local environment.

These problems can be overcome, to a certain extent, through lignite dehumidifying. Data from the KEK J.S.C. Coal Dehumidifying facility, which operates as a lignite dehumidification plant, show an ever growing interest of consumers to use dehumidified lignite.

Lignite will continue to be the main electricity generation source, whereas, its direct use as heating fuel, in its humid form, is expected to be reduced because of the severe environmental impacts.

3.4.3 Imported Coal

In comparison to lignite, imported coal is more expensive and has similar negative impacts on the environment. In 2010, the import of 124 275 tons of coal was reported. Its consumption is larger in the industrial sector, while it is little used in the household sector.

3.4.4 Liquid fuels

Liquid fuels: Petroleum, Heavy Duty Oil, Liquefied Petroleum Gas (LPG) are imported and expensive, but provide good heating commodity. LPG represents an efficient and environmentally friendly source. There is a relatively good supply market run by the private sector, with an increasing tendency.

Petroleum and petroleum products are likely to play a key role as heating fuels in the future. Increased use of LPG would be achieved if the excise taxes or custom taxes for LPG imports are decreased, as this would diminish the purchase price for consumers. Increased use of LPG will result in diminished utilization of electricity and, potentially, in decreased imports (which are usually very costly during the heating season). Furthermore, LPG could replace the rather high use of logwood for heating purposes.

3.4.5 Natural gas, waste gas and biomass

Natural gas is a rather environmentally friendly and ecological fuel and currently has a very competitive price in its application for heating purposes.

Future natural gas supply in Kosovo depends on the gas infrastructure in the Balkans region – namely on the development of the gas ring of the Energy Community in Southeast Europe, which represents the option adopted and approved by the SEE EnCT. Currently, Kosovo has no functional natural gas distribution and transmission infrastructure. However, there is an underline pipeline, which supplied gas to the smelter in Skopje, Ferronikel, Trepca, Llamkos and Termokos from the lignite gasification facilities of former Kosovo Electro-Economy Enterprise's Working Unit "Energy and Chemistry". The designed operative pressure of this gas pipeline was 25 bar, with annual capacities of 480 million Nm³. The gas pipeline is severely damaged in certain sections; however, its general state was never assessed in more detail⁷. Nevertheless, the existing pipeline trajectory can be considered as an option to be exploited in the future.

It is the Government's policy to promote and support Kosovo's connection to regional gas supply projects, such as the project of the Gas Ring for Southeast Europe. Depending on regional gas project perspectives for the Southeast Region adopted by EnCT, the Government will remain committed to the development of the legal and regulatory framework aiming the development of the gas sector through private investments.

⁷Report: "Clarification of the existing gas trajectory in Kosovo", December 2010, MEM.

Natural gas, waste gas and biomass represent clean fuels that are very suitable for use as heating fuels in district heating companies, direct heating and sanitary water heating, which would significantly substitute the use of electricity for such purposes.

The development of the natural gas network is necessary, as is the development of local gas production based on waste and biomass.

3.4.6 Renewable Energy Sources

In relation to the development of renewable energy, MEM through its funds from the Kosovo Budget, implemented a number of pilot exemplary projects for sanitary water heating through solar energy in public buildings. In 2008, an assessment of solar, wind, biomass and other geo-thermal heating potentials was conducted. In addition, solar energy was promoted through a number of demonstrating projects (installation of solar panes in the Kosovo Clinical University Centre and Student's Centre in Prishtina). Solar energy can become a source of water heating supply, regardless of the high cost of the equipment and the scarcely developed market.

Agricultural biomass has high energetic potentials, however, the agricultural sector in Kosovo is insufficiently prepared to develop this commercial potential. The 2008 assessment study on RES potentials concludes that there are no sub-terrestrial geo-thermal sources that could be used as energy sources, however, no measurement was ever conducted to this end.

Electricity and thermal energy generated by waste is considered renewable, subject to the waste not being recyclable for other purposes. However, the construction of waste incineration plants for cogeneration purposes is very costly. In addition, such plants require a well developed central heating supply system, in order to ensure that the heating generated from the plant can be sold throughout the year. Existing CH systems in Kosovo are not appropriate to provide for waste-powered heating, as they are rather small in size and inactive in non-heating periods for around 6 months per year.

A new waste-treatment technology is being developed, based on household waste gasification. This technology provides a good and more flexible solution for greater energy generation, compared to the conventional waste incineration.

Renewable energy will likely be more competitive in all forms, due to the technological developments and supporting policy mechanisms, resulting with an increased portion of energy being generated through renewable sources.

3.4.6.1 Logwood

Logwood should be considered renewable energy for as long as its consumption is maintained at a sustainable level. The consumption of logwood to date exceeds the sustainable levels for Kosovo circumstances. Average efficiency of fuel utilization is currently very low and requires improvements, in the sense of logwood dehumidification prior to its use, as is the use of highly efficient furnaces and ovens. Environmental impacts the level of comfort can be improved through the utilization wood products, such as wood pallets.

Many wood industries in Kosovo (furniture, etc) produce large amounts of wood waste, which currently remains unused. In addition, if forest management is improved, wood waste from its use for energy generation purposes can be improved. Wood waste can be reprocessed into pallets/particles and be used for heating purposes.

Logwood will remain a significant heating source in the future; however, its utilization can be rationalized and improved through better forest management. By introducing more efficient wood incineration technologies and utilizing wood-waste for heating, logwood consumption can be reduced to a sustainable level, whereas, the heating generation by logwood and other biomass can be increased to meet the 2020 targets on CO2 reduction, energy efficiency and renewable energy.

3.4.7 Central heating

Central heating systems (CH) in Kosovo are relatively new and limited to only three geographical areas (Prishtinë, Gjakovë and Mitrovicë). The inability of these central heating systems to supply warm sanitary water further limits their potential markets.

CHs currently cover only 3% of the total heating demand in Kosovo. The sector is challenged by the old technology and the low level of billing and collection of energy produced. Another challenge is the poor management of the introduction of thermal energy consumption meters for individual households in apartment buildings.

The World Bank study on the heating market in 2007 recommended the expansion of the CH market. The government is supporting the development of CHs.

Existing CH plants supply the densest parts of cities and public facilities such as hospitals, schools and administrative buildings. All three systems incur great thermal losses.

CH plans use heavy duty oil as their running fuel. This is a very polluting and expensive fuel, when compared to lignite. Use of resources other than heavy duty oil, such as lignite, natural gas, biomass or cogeneration will significantly improve the economic state of CH operators.

The installed generation capacities of CH systems in Prishtinë, Gjakovë and Mitrovicë are presented in Table 4 below.

TERMOKOS-PRISHTINË		DISTRICT HEATING GJAKOVË		TERMOMIT-MITROVICË	
Installed capacity		Installed capacity		Installed capacity	
2X58 MW	116 MW	1X18.6 MW	18 MW	1X8.3 MW	8.3 MW
2X7.5 MW	15 MW	1X20 MW	20 MW		
1X4 MW	4 MW				
2X0.8 MW	1.6 MW				
Totali	136.6 MW		38.6		8.3 MW

Table 4: Generation capacities of CH companies in Kosovo

Distribution networks (primary grid) supply heating from the central furnace plants to heating substations, from where, heating is distributed through the buildings' internal installations (secondary grid).

The state of the three existing CH companies is described briefly below:

CH PRISHTINË (Company "Termokos J.S.C.") – supplies around 10.000 consumers in the services and household sectors, providing heating for 1.073.121 m². The total length of the distribution grid is 63 km. Around 50% of the network comprises old pipeline technology, while the other 50% represents pre-insulated pipelines of newer technologies.

CH GJAKOVË (Central Heating Company) – supplies 1.100 consumers, mainly from the household sector, providing heating for 158.009 m². The total length of the distribution grid is 23,5 km.

CH MITROVICË ("Termomit" Company) – supplies 160 consumers, mainly from the household sector, providing heating for 8.500 m². The total length of the distribution grid is 6 km.

There is a co-generation project to connect the existing CH Termokos J.S.C. in Prishtina with Thermal Power Plant 'Kosova B', the implementation of which is envisaged for the upcoming years.

CH systems are currently not financially viable. More investments are required in the expansion of existing capacities and introduction of new equipment in the heating companies. The implementation of the cogeneration project TPP Kosova B – Termokos J.S.C. will improve the current supply of heating in Prishtina and provide a possibility for supplying heating to other towns of Prishtina region, primarily Obiliq.

3.4.7.1 Individual central heating arrangements

Individual central heating for space and sanitary water heating in houses and apartments greatly improves the level of efficiency. Individual central heating provides for automatic temperature control for each room individually. This provides better comfort of living, combined with considerable energy savings. In addition, individual central heating systems offer better flexibility in selecting the heating fuel, better opportunities for alternative reserve supplies, and better possibilities for efficient implementation of wood furnaces, thermal pumps and heating solar systems.

Currently, a small number of households have individual central heating, whereas such systems are more common in apartment buildings, especially in higher buildings/skyscrapers. Almost all public buildings and a large portion of commercial/industrial buildings also have central heating.

It would be useful to determine construction codes and standards for the use of central heating in newer buildings, including apartment buildings, as a prerequisite for comfort, higher energy efficiency and greater utilization of renewable energy sources.

3.5 Energy Efficiency

As signatory parties of the Energy Community Treaty (ECT), Kosovo is member of the ECT Task Force on Energy Efficiency. MEM has developed the Kosovo Energy Efficiency Plan (KEEP). This Plan outlines the national targets on energy savings for the period 2010-2018.

A number of projects are under implementation, as part of Kosovo's three-year program for Energy Efficiency and Renewable Energy Sources (RES).

The highest potential for EE improvement is in heating and electricity generation, where the current use efficiency is much under that determined by the EU Directive IPPC 96/61/EC (Directive 2008/1/EC the codified version of LCP) and current technological standards in the EU on furnaces and small heating equipment. For home appliances there is a possibility to increase the EE average for up to 100%, whereas the current thermal energy generation can improve for up to 40% with new lignite combustion generation technologies. Further improvements can be done by introducing cogeneration of electricity and heating.

The potential of EE improvements in the general buildings stock is smaller and more costly to be achieved.

According to a World Bank study, the application of insulation materials and double glassed windows would bring a reduction of energy consumption for heating up to an estimated 35% in individual households. Kosovo wide, this would bring potential savings of heating to 500-600 GWh/year, around 12 - 14% of the current demand for heating.

Some EE "pilot-projects" should be implemented, serving as a model for more extensive similar interventions. Some priority interventions have been identified, and pilot-projects have been implemented or are ready to be implemented in the near future. Three most promising energy savings projects identified by the World Bank study for the Heating Market are:

- New windows for 65% of hospitals and healthcare centers;
- New windows for 85% of schools;
- New windows for 10% of apartment buildings of over three stories (built between 1960 and 1998).

Full implementation of these energy savings projects is expected to bring savings of 72 GWh/year.

Energy efficiency improvement in electricity and heating generation should be implemented as soon as possible. On the contrary, the current electricity prices are generally low to encourage energy savings investments. In addition, it must be noted that a significant improvement of electricity billing and an increase in collection rates is critical to support the implementation of energy savings measures.

3.6 Assessment of heating supply options

Costs per household, in current market values, for different options of heating supply for indoor areas, and sanitary water, taking into account the annual energy

consumption, efficient use, heating value, fuel costs (including taxes), investment costs for heating equipment, are significantly different. Different options of supply are separated into three different categories of costs, as shown in Tables 5 and 6 below. Current District Heating tariffs are fully cost reflective. At full cost reflective prices, DC would fall under high cost category. The analysis is based on the World Bank funded “Heating Market Study” in 2007, updated in 2010.

INDOOR HEATING		
Low cost option	Medium cost option	High cost option
<ul style="list-style-type: none"> - Lignite - Firewood 	<ul style="list-style-type: none"> - Heating pumps - Accumulating electrical heaters - Electrical heaters (direct) - District Heating - LPG - Natural gas 	<ul style="list-style-type: none"> - Wood palette - Heavy oil

Table 5: Different heating options for households according to cost categories (low, medium, high)

SANITARY WATER HEATING		
Low cost option	Medium cost option	High cost option
<ul style="list-style-type: none"> - Firewood 	<ul style="list-style-type: none"> - Electrical furnaces - Thermal solar furnaces (collective use) - Central Heating - LPG - Natural gas 	<ul style="list-style-type: none"> - Individual thermal solar heating

Table 6: Different heating options of sanitary water for households according to cost categories (low, medium, high)

3.7 Environment protection

Environment protection is under the mandate of the Ministry of Environment and Spatial Planning (MESP). This strategy, however, doesn't address environmental aspects from a heating sector perspective. Currently, due to obsolete technologies and inappropriate functioning of equipment and buildings, gas and dust emissions, and wastewater discharges from the existing energy plants, are over the allowed levels outlined in respective EU Directives. Reduction of energy consumed for heating would facilitate the mitigation of such negative impacts in the environment.

The extensive use of poorly designed and inefficient wooden stoves, and furnaces frequently heated with firewood and wet lignite, leads to a high level of local pollution and emissions of particles which may cause cancer and asthmatic reactions. From an environmental perspective, it is critical to replace old stoves and furnaces

new units in order to provide a higher efficiency and less pollution. In addition, it is important to inform the population on the potential risks and benefits of using dry firewood and lignite, both in terms of improved efficiency, and in reducing pollution. An awareness raising campaign on the efficiency wood stoves and furnaces would also be useful to save fuel and mitigate pollution.

3.7.1 (CO₂) emissions

Kosovo strives to develop a legal and regulatory framework on the environment and its protection, in line with the environment acquis.

The heating sector is responsible for a significant share of CO₂ emissions in Kosovo, mainly through the large portion of electricity used for heating generated from lignite power plants, fossil fuels for individual heating with furnaces, and from District Heating utilities which emit CO₂.

3.8 Budgetary support and tariffs

The Government of the Republic of Kosovo has continuously supported district heating utilities by subsidizing the purchase of heavy oil and supporting capital investments.

Heating tariffs from District Heating utilities are defined by the Energy Regulatory Office, and they are generally not reflective of real costs, taking into account the continuous increases of heavy oil prices, which is used as an energy resource in such utilities.

Despite the budgetary support for District Heating utilities, and low heating tariffs, many households spend over 10% of their annual incomes for heating, be that for District Heating or other heating sources. Appropriate support schemes are required to enable poorer households to consume the necessary amount of heating in order to maintain the minimal living conditions.

Although heating tariffs DC Utilities are not cost reflective, collection rates are very low.

4. Heating demand forecasts for the period 2011-2018

MEM has developed the energy demand forecast for the period 2009-2018. Such forecast is not inclusive of the heating sector separately.

Contrary to the electrical energy balance, the heating energy balance has not accurate assessments as to the amount of energy consumed. This is due to the lack of measurements of the heating consumption (with the exception of district heating customers) and the lack of accurate information on the electricity used for heating,

firewood consumption, etc. This has also led to the lack of accurate data on the annual increase of heating consumption.

Several factors impact the increase of the national heating consumption, including population growth, living space requirement increase, the urgent need to heat a larger living area, and economic growth allowing a higher level of comfort for the population.

Other factors such as policy measures to improve the energy efficiency, the phased removal of subsidies of energy/increased electricity tariffs, improvement of thermal insulation in new buildings, etc., would also affect the development. In addition, the continuous economic crisis would also have an impact in the slowdown of growth.

Forecasts for different fuels are based on the heating consumption data, shown in the World Bank "Heating Market Study". Data for the period 2006-2009 have been calculated according to the data of the World Bank study adjusted according to the total energy consumption recorded in the Energy Balance of the Republic of Kosovo 2009, drafted by the Ministry of Energy and Mining (MEM).

4.1 Development projections without active intervention of policies

Without an active intervention of EE, ERS promotion, and Demand Management policies, each key individual source of heating would likely to retain its general heating market share, with an incremental trend of 3.4% per year.

Kosovo has approved its indicative target of 9% energy savings by the end of 2018. This is also included in the Kosovo Energy Efficiency Plan 2010-2018 (KEEP 2010-2018), as compared to the do nothing option. Calculating the projected reduction of 9% into the KEEP, the growth level will be 2.4% per year.

Such a development would prevent Kosovo from meeting its obligations as per the Energy Community Treaty, and the fulfillment of future requests related to EE, RES, and green gas emissions.

In addition to the KEEP, the following improvements have already been planned:

- As of 2016, a better use of lignite generation electricity fuels, as a portion of electricity will be generated from the "Kosova e Re" Power Plant, which will be more efficient compared to the existing plants, and
- Implementation of the cogeneration project TPP Kosovo B – Termokos J.S.C.

Figures 1 and 2 below show the consumption development in case major improvements are not applied. Nevertheless, there are planned interventions such as the "Kosova e Re" Power Plant and Cogeneration of heating and electricity from Power Plant Kosovo B.

Figure 1 indicates the net annual consumption for heating and hot water for any supply option (type of fuel or heating source) for 2011-2018.

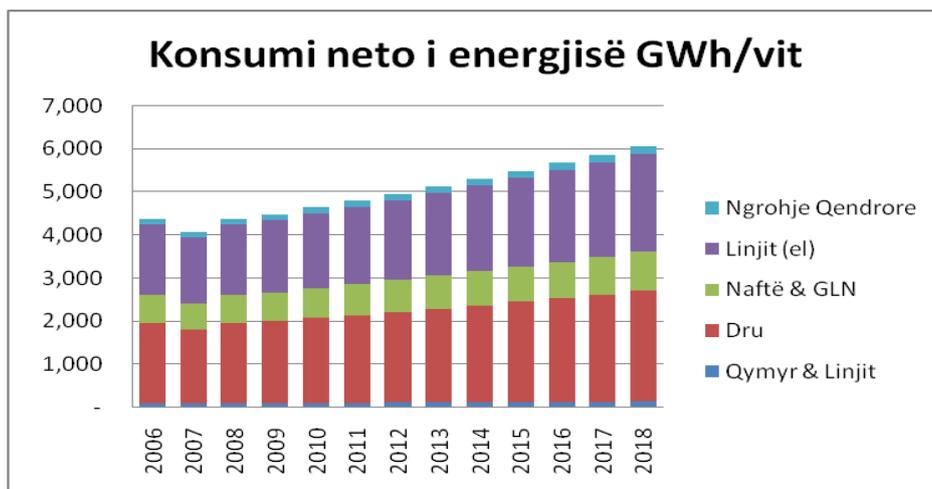


Figure 1: Net annual consumption of energy for heating and hot water for types of fuels/energy sources.

Figure 2 shows the gross consumption of energy for heating and hot water (type of fuel or energy source) for the period 2011-2018, assuming that efficient use of fuels remain in the current low level.

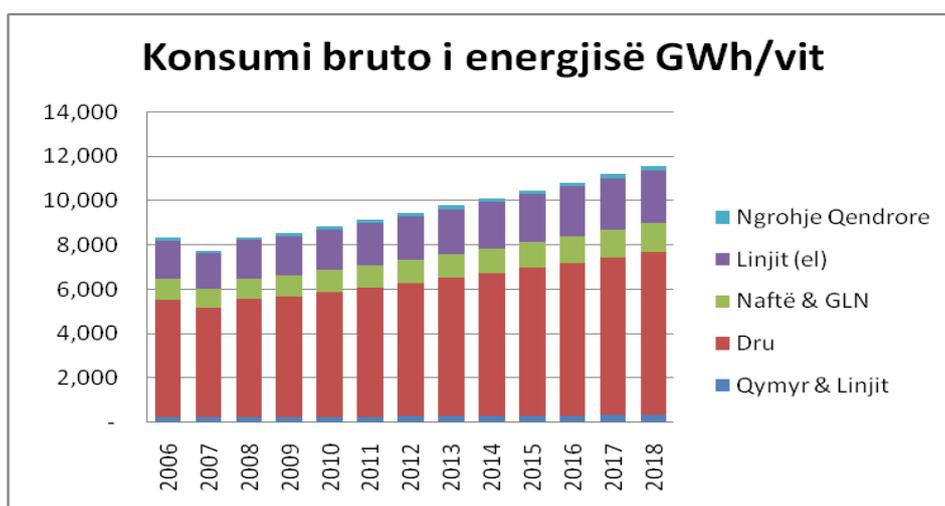


Figure 2: Gross annual consumption of energy for heating and hot water for types of fuels/energy sources

4.2 Cost-effective measures to meet the indicative targets

Development of measures and policies should be based on a multiple option analysis of development in order to identify cost-effective measures to meet the local energy demand.

When developing measures and policies, consideration should be given to the contribution of the sector in meeting policy targets, in a balanced manner, with the contribution of other sectors such as industry and transport. This means similar levels of energy savings and contributions in mitigating negative environmental effects, and

the use of renewable energy sources. General EU targets for the energy sector are (excluding transport) are:

- 1) Reduction of green-gas CO₂ emissions to 20%;
- 2) To increase the portion of renewable energy sources in the final energy consumption for 20%, and
- 3) To improve the energy efficiency for 20% prior to 2020, which is the year when all EU countries should meet such targets. The contribution of individual member countries in general targets varies on their current situation of factors such as the energy intensity, GDP, access and use of RES, and their possibility to contribute in the general targets.

Taking into account the current situation in Kosovo, and the rapid increase of heating and energy demand, Kosovo will not be ready to reach the 20% reduction target CO₂ green gas emissions prior to 2020.

Kosovo is currently using RES, including Hydro Power Plants and biomass (mainly firewood), and has a growth potential in electricity and heating generation from biomass, and the further development of energy generation from small Hydro Power Plants. It is realistic to aim the share of 20% RES from the total end consumption by 2020, provided that the Government is capable of attracting sufficient investments from the private sector. The current consumption share of RES in the final energy consumption is approximately 18%.

The current level of energy efficiency in Kosovo is low, and is entirely realistic to aim an increase of 20% in EE by 2020. “Kosova e Re” Power Plant will result with an increase of energy efficiency in generation of nearly 5%, as a result of modern technologies used in the plant, compared to TPP Kosovo A and TPP Kosovo B ^[1].

Cost effective and technological measures include:

- Use of efficient firewood stoves and furnaces;
- Use of more efficient electrical heating appliances;
- Replacement of electricity used for heating with other sources;
- Replacement of fuels from wood to dry lignite;
- Reprocessing of wood residues from industry and forests for fuels;
- Expansion of the DC supply in Prishtina, and the implementation of the cogeneration project with TPP Kosovo B.

Firewood stoves and modern furnaces operate with 80-85% efficiency, whereas stoves and furnaces using wood palette can reach an efficiency of up to 95%. Replacement costs of firewood stoves and furnaces with new efficient ones are low compared to other investments in improving energy efficiency.

^[1]Calculated based on the assessed volumes of generation in Power Plants Kosovo A and Kosovo B, and Kosova e Re, and efficiencies assessed in the use of 3 plants, as presented in the “Energy demand forecast, and its coverage for the period 2009-2018” (Table No. 10.2) drafted by the Ministry of Energy and Mining (MEM).

Wood residues from the wood industry can be processed and used as a fuel for furnaces. In addition, wood residues from forests can be used for energy, improving forestry management.

Modern air conditioners are equipped with a thermal pump that can be used both for cooling and heating. They generate at least twice more energy in form of heating than what they would consume in electricity. Purchase and installation costs of air conditioners for heating is low compared to other investments in energy efficiency improvement.

Direct electricity heating can be replaced with other sources, such as firewood or lignite stoves and furnaces, using the existing or new stoves and furnaces. The implementation of this measure can also be imposed, among other, by the significant increase of electricity tariffs for households and services.

Stoves and furnaces can be modified to burn dry lignite with low, or no costs, provided that the lignite is available with a competitive price.

The Prishtina DC market can be expanded with a relatively low cost, connecting large existing or new buildings with district heating, which is located near the existing DC distribution network, in the DC system. Taking into account the cost of heating from cogeneration with the Power Plant "Kosovo B", full generation cost tariffs for DC could finally be competitive compared to alternative heating supply possibilities.

The following improvements can be achieved during the planned period until 2018 with appropriate policy measures and various forms of direct financial support, labeling or certification schemes, and electricity increase tariffs/improved level of collections:

- Replacement of firewood stoves and furnaces with more efficient ones;
- Replacement of electrical heating appliances with equipment with a high transformation level;
- Enhancement of the use of dry lignite in the country instead of firewood;
- Reduction of electricity consumption for heating and meeting this demand with heating energy from biomass (firewood) and DC;
- Expansion of the Prishtina DC network, which corresponds with 4% of needs met with electricity.

Only with small investments in energy efficiency improvement of heating consumers, such as insulation or window improvements which have been introduced, and the first effects of minor improvements in EE are visible. The general consumption of heating is predicted to increase with approximately 3.4% per year, if no energy efficiency measures are implemented, and every single major source of heating supply is likely to retain its market share, with the exception of changes resulting from the implementation of measures proposed above.

4.3 Heating sector development projections, based on cost-effective measures

Figures 3 and 4 represent the development if the cost-effective strategy is implemented (including Power Plant ‘Kosova e Re’, envisaging the commissioning date of 2016, and heating and electricity cogeneration in Power Plant ‘Kosova B’ starting from 2012). Annual amounts have been calculated with the assumption that the proposed changes will be applied equally every year.

Annual energy consumption for heating and hot water for types of fuels/heating sources for 2006-2018 is shown in Figure 3.

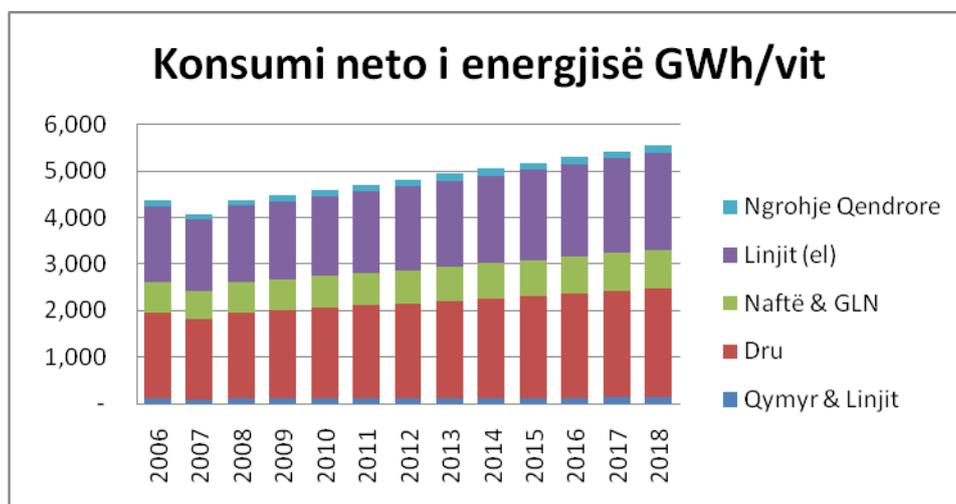


Figure 3: Net annual consumption of energy for heating and hot water for types of fuels/energy sources.

Annual gross consumption of energy for heating and hot water for types of fuel/heating sources for the period 2006-2018 is shown in Figure 4.

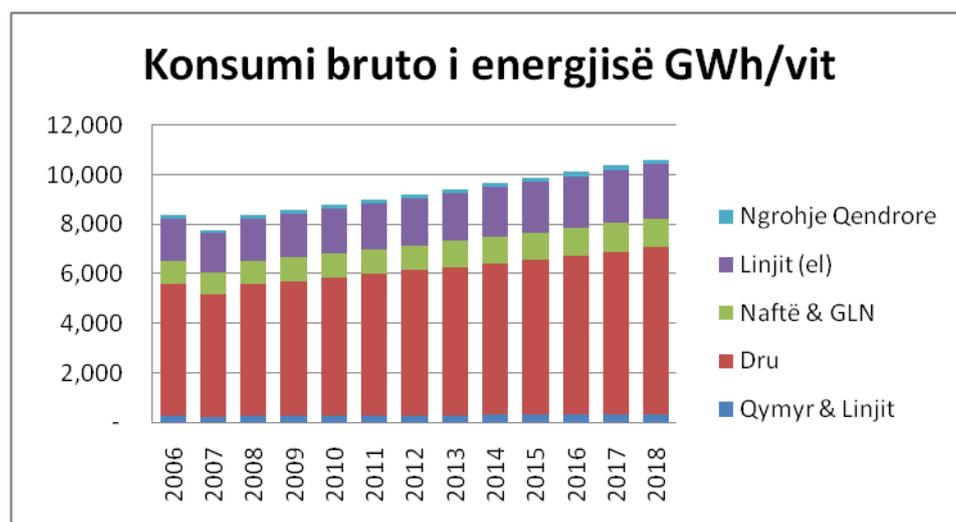


Figure 4: Gross annual consumption of energy for heating and hot water for types of fuels/energy sources

5. Summary of the SWOT analysis for the heating sector

SWOT analysis summarizes the competitive situation of the heating sector taking into account identified strengths, weaknesses, opportunities, and risks. Further, identified strategic objectives in the Strategy will be focused in overcoming the sector's weaknesses, predicting and mitigating possible risks. Their implementation would facilitate the use of existing strengths and opportunities for a rapid development of the heating sector. Table 7 shows a summary of the SWOT analysis of the heating sector.

Strengths:	Weaknesses:
<ul style="list-style-type: none"> • District Heating utilities in three cities (Prishtina, Mitrovica and Gjakova) • Competent human resources • Modern legislative framework in line with international standards • Adequate institutional mechanisms for the heating sector functioning • Conducive conditions for solar heating • Use of RES and dry lignite for heating and hot sanitary water 	<ul style="list-style-type: none"> • Central heating systems are obsolete and depreciated, which results in large technical losses • Inability of DCs to procure fuel in summer • Low collection rates of DCs • Nonfunctioning of relevant mechanisms to collect debts of heating energy • Lack of a district heating system in other cities • Poor thermal insulation of the building stock • Insufficient studies on RES which could be used for heating • Lack of domestically manufactured efficient heating appliances • Insufficient incentives for EE improvement and the use of RES • High inefficient use of firewood which leads to an unstable consumption • High electricity consumption used for heating • Inability to attract soft loans • Pollution from lignite and lignite furnaces for heating of individual buildings
Opportunities:	Risks:
<ul style="list-style-type: none"> • Reforms in existing district heating utilities • Attracting strategic investors for RES development and EE improvement • Realization of the project for cogenerated heating supply from the Power Plant Kosovo B – Termokos in Prishtina • Construction of new cogeneration plants • Development of district heating systems in other Kosovo centers • Use of accumulation electricity heaters to reduce peak loads • Use of high efficiency heating appliances (firewood, stoves, furnaces and air conditioners) • Construction of waste-combustion and other RES heating plants • Further professional capacity building 	<ul style="list-style-type: none"> • Unexpected interruptions of liquid fuel supply • Increase of import prices of liquid fuels • Lack of investors in the heating sector as a result of low electricity tariffs • Non-implementation of the cogeneration project of Power Plant Kosovo B – Termokos in Prishtina • Social dissatisfaction with the heating sector reforms • Dependency in imports of firewood, oil, heavy oil, LPG and electricity

Table 7: Summary of the SWOT analysis for the heating sector

6. Heating Strategy Vision and Mission

Addressing the heating sector is of special importance because of its negative impact in the electricity supply performance, and its impact in the national and municipal budgets because of electricity and DC subsidy needs. The heating sector also comprises a significant portion of consumption in the overall Kosovo energy balance. Kosovo is committed to fulfill all relevant EU directives, norms and standards on energy and environment, and the provisions of the Energy Community Treaty, which require investments in improving EE and enhancing the use of RES in the heating sector.

Vision

The heating sector shall meet the indoor and water heating demands taking into account the use of RES, alternative energy sources, and efficient appliances, with a view to preserving the environment.

Mission

The mission of the Strategy is to contribute the sustainable development of the heating sector, in line with European standards, based on the rational and efficient use of energy, with special emphasis to local natural energy sources, in order to achieve a stable and quality supply of heating for indoor areas and sanitary water for customers, with a view to protecting the environment.

7. Strategic Objectives

An accelerated and sustainable economic development of Kosovo will significantly depend on the implementation of appropriate economic and structural reforms which would provide for a rational use of human and natural resources of Kosovo. The Kosovo Government supports a sustainable development of the heating sector, in line with the European approach and standards, mainly based on the rational and effective use of local natural heating sources.

Kosovo aims EU integration, which also requires the implementation of the EU 20-20-20 targets for the energy sector applicable for member countries by 2020, in order to:

- Reduce CO₂ green gas emissions for 20%,
- Increase the percentage of renewable energy sources in the final energy consumption for 20% , and
- Improve energy efficiency for 20%.

Strategic objectives presented in this heating strategy are based on a comprehensive analysis of: a) the situation of the energy and heating sector, b) Energy Strategy of the Republic of Kosovo 2009-2018, c) Government Program, and d) Commitment of Kosovo in meeting all obligations within ECT and EU integrations.

7.1 Strategic Objectives for the Heating Sector

Identified strategic objectives are:

- 1. Reduction of the electricity used for heating, by developing district heating systems;**
- 2. Creating conditions for the use of alternative energy sources and RES for heating, thereby having a positive impact in environment protection and a sustainable development of the sector;**
- 3. Creating the conditions to use efficient heating appliances, and to increase the thermal performance of the building stock.**

7.1.1. Reduction of the use of electricity for heating, developing district heating systems

Application of investments in plants and the existing district heating infrastructure, and in expanding their capacities is a precondition for a rational use of heating and a good opportunity to reduce electricity used for heating. Implementation of cogeneration of heating and electricity will result with an energy efficiency and reduction of CO₂ emissions. The implementation of the cogeneration project from TPP Kosovo B – Termokos j.s.c. is of utmost importance, including the expansion of new district heating systems in other cities of Kosovo, with a priority in the cogeneration systems.

There is a need to draft bylaws deriving from the Law on District Heating, in order to regulate the district heating market, and strengthen the relation between the district heating providers and household consumers.

District Heating utilities supply heat to consumers in three cities, but such heat is predominantly not paid by consumers. This requires the enforcement of measures through relevant mechanisms.

The lack of hot sanitary water supply from district heating utilities makes them less efficient, as the heating supply is limited to only 6 months.

Policies to be implemented

- Issuance of an administrative instruction which allows Municipalities to submit an “energy zone” concept, describing the use of district heating in the city zones from the District Heating Utilities with cogeneration or district heating from biomass and waste. In such cases, the owner of a supplied building with district heating would not be allowed to create alternative means of heating inside the apartment, including permanent installations for heating individual rooms with electricity or electrical central heating in apartments (a recent phenomenon in new collective buildings);
- Issuance of an administrative instruction defining the use of district heating for hot sanitary water in buildings connected to the district heating system, which uses heating from cogeneration, biomass or waste;
- Drafting a support scheme to cover the documented costs of replacing existing electrical installations for heating sanitary water with fittings to supply hot sanitary water from district heating, with donor support;

- Drafting the secondary legislation as per the Law on Urban Planning, which would require new medium and large buildings, including apartment buildings, to use district heating systems, including for hot sanitary water.

Measures to be undertaken

Measures to be undertaken for the development of the existing and new DC systems include:

- Completing the legislation in line with the European Directives;
- Realizing investments in expanding the existing DC distribution network;
- Implementation of a study on the possibility of the use of other fuels instead of heavy oil with a focus in the use of lignite by existing DCs;
- To review the possibility to introduce the private sector, or partnerships in the existing DC utilities;
- Development of detailed plans and identification of mechanisms for debt collection and to increase the collection rates of DCs;
- Implementation of the cogeneration heating project for DC Termokos from the TPP Kosovo B;
- Instruction of municipalities towards an involvement of the private sector in the development and operation/functioning of District Heating Utilities;
- Kosovo wide promotion of a combined scheme of heating and energy generation, and wood residue, biomass, and potential household waste heating generation schemes, with a potential co-financing from International Financial Institutions or through the joint implementation “as per the Kyoto protocol”;
- Strengthening of the role of Apartment Building Councils in relations with the DC;
- Implementation of the study on the possibilities to expand district heating in other cities of Kosovo.

7.1.2. Creation of conditions for the use of alternative energy sources and RES for heating, with a positive impact in environment protection and a sustainable development of the sector

In order to decrease the use of electricity for heating, reduce the unstable use of firewood for heating, and changing the current practices for the use of such energy sources, appropriate schemes and plans should be developed encouraging the use of other heating sources.

Current practices of using wet lignite for heating should be changed into the use of dry lignite. There is a need to promote the use of dry lignite for heating in rural areas, in order to replace important fuels, and to reduce the unsustainable consumption of wood. Although the use LPG has marked an increase, further promotion is required through public awareness campaigns. Natural gas is another clean and environment

friendly source, but is yet to penetrate Kosovo. This requires appropriate plans, studies and completion of the legal framework, in order for the natural gas, in the near future, to become a major source of heating for the building stock, in full partnership with the private sector.

Policies to be implemented

- To Increase the use of LPG, solar energy and wood residue;
- Promotion and participation in regional natural gas supply projects;
- Development of regional plans to address waste, and convert them in energy.

Measure to be undertaken

Measures to be undertaken to encourage alternative energy and RES include :

- Implementation of a study on the possibility to expand the natural gas transmission/distribution system in all main centers of Kosovo and industrial areas;
- Promotion and use of LPG, solar energy and wood residue for heating and hot sanitary water;
- Setting a incentive scheme for a financial support to purchase industrial and forestry wood residue processing equipment, which could be used as a replacement of firewood used for heating;
- Setting an incentive scheme to ensure a competitive price for dry lignite compared to firewood and wet lignite;
- Creating the conditions for potential investors to install modern technology for dry lignite generation;
- Encouraging potential investors in projects of waste management and converting waste to energy;
- Encouraging municipalities in implementing regional plans with the involvement of the private sector (partnerships) in developing plants and the required infrastructure for waste management and converting waste in energy, and the use of electrical, heating or biomass generated energy.

7.1.3. Creating conditions for the use of efficient heating appliances, and building the thermal performance of the building stock

Currently there is no domestic legislation regulating the use of electrical heating appliances. There is an initiative to draft and implement a Demand Side Management (DSM) Program. The objectives of the DSM Program should, inter alia, include:

- (i) Load reduction;
- (ii) Load displacement;

- (iii) Peak reduction (reduction of the peak demand levels), and
- (iv) Load increase control.

Secondary legislation deriving from the Kosovo Energy Efficiency Plan, and the Law on Energy Efficiency, should ensure that all new heating equipment (firewood, biomass, wood waste, lignite, coal, oil or gas stoves and furnaces) meet the minimal standards of energy efficiency in use and environmental performance.

The largest part of the existing building stock is in a very poor situation in terms of thermal insulation, and collective buildings, which are being constructed, are applying a thermal insulation, but there is no accurate analysis whether this insulation is in line with the rules as per the climatic conditions in such settlements. The current low prices of electricity, and the low collection rates, it is not profitable to invest in improving the thermal insulation of buildings.

Increasing the performance of the building stock should be done in line with the relevant EU Directive (2010/31/EU) on the energy performance of buildings. According to this directive, minimal criteria should be applied in terms of the energy performance of new and existing buildings, including the issuance of their respective energy performance certification, and the requirement of regular inspection of furnaces and air conditioning systems in such buildings.

Policies to be implemented

To meet the requirements for a sustainable consumption of firewood, energy efficiency, and environment protection, there is a need to apply appropriate policies:

- Development of the Demand Side Management Program;
- Awareness raising campaigns on the need to improve DSM, use of efficient heating appliances and possible economic savings for households. Incentive scheme for purchasing efficient heating appliances, meeting the minimal energy efficiency, and environment protection standards;
- Completing the construction law with other bylaws, including on thermal performance of the buildings stock;
- Drafting and adopting the required EE bylaws and acts on thermal insulation/energy performance in buildings;
- Incentive schemes to encourage investments in improving the thermal insulation in the existing buildings, with a potential support from donors, and through soft loans.

Measures to be undertaken

- Implementation of the Demand Side Management Program;
- Adjusting the electricity tariff structure to incentivize: i) the replacement of existing home appliances with new technologies – thermal pumps for heating/cooling ii) replacement of electrical appliances for heating with equipment with accumulation capacity;

- Setting up a labeling system for heating appliances, assessing every equipment according to the energy efficiency level;
- Setting up an inspection system, ensuring that there are no providers of furnaces and heating equipment in Kosovo which are not in line with the energy efficiency standards, and environment protection, as determined with the law;
- Implementation of the Construction Law by relevant institutions such as Municipalities, MESP, in cases of new building construction, thermal insulation in line with standards;
- Increasing the efficiency by applying the Technical Regulation on Thermal Energy Savings, and Thermal Protection in buildings and the European directive of energy performance of buildings, based on the concrete conditions in Kosovo;
- Encouraging schemes to replace the windows in existing residential buildings with double or triple glass windows, and water heating systems with the Solar Systems in residential buildings.

8. Measures to implement the Heating Strategy

For the implementation of this Strategy, MED shall develop a Heating Strategy Implementation Program (HSIP) for the period 2011-2014. This program shall include:

- Measures and projects which the Heating Strategy deems necessary and with a high;
- Concrete proposals on the funding ways of every program or project measure.