Republika e Kosovës

Republika Kosova - Republic of Kosovo

Qeveria - Vlada – Government

Ministria e Zhvillimit Ekonomik

Ministarstvo Ekonomskog Razvoja - Ministry of Economic Development

BALANCA VJETORE E ENERGJISË E REPUBLIKËS SË KOSOVËS PËR VITIN 2016

GODIŠNJI ENERGETSKI BALANS REPUBLIKE KOSOVA ZA 2016. GODINU

ANNUAL ENERGY BALANCE OF REPUBLIC OF KOSOVO FOR THE YEAR 2016

Prishtinë, 2015

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This document was prepared by the Energy Policy Division of the MED. This document could not be prepared without the support and close cooperation with entities defined in the Administrative Instruction on Energy Balances.

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Abbreviations

MED	Ministry of Economic Development
KOSTT J.S.C	Transmission, System and Market Operator
KEK	Kosovo Energy Corporation
KES/CO	Electricity Supply Company
KEDS	Electricity Distribution Company
KSA	Kosovo Statistics Agency
ERO	Energy Regulatory Office
MF	Ministry of Finance
MAFRD	Ministry of Agriculture, Forestry and Rural Development
KFA	Kosovo Forest Agency
MESP	Ministry of Environment and Spatial Planning
EnCS	Energy Community Secretariat
REKOS	Census of Population, Households and Dwellings in Kosovo 2011
CRES	Center for Renewable Energy and Energy Savings, Athens, Greece
EUROSTAT	European Commission Statistics Agency
IEA	International Energy Agency
LPG	Liquefied Petroleum Gas
TPP	Thermal Power Plant
HPP	Hydro Power Plant
GWh	Giga watt hour
GW	Giga watt
MWh	Mega watt hour
MW	Mega watt
RES	Renewable Energy Sources
GDP	Gross Domestic Product

1. Introduction

The document "2016 Energy Balance of the Republic of Kosovo" is prepared based on Article 5 of Law on Energy No. 03/L-184 and Administrative Instruction on Rules for Energy Balances No. 07/2011. The purpose of this document is to inform all interested parties on energy demand forecasts for 2016.

The basic documents used for the drafting of this document were:

- Kosovo Energy Balances for years 2013, 2014 and 2015;
- Electricity Balance for 2016, drafted by KOSTT;
- Electricity Balance for 2016, drafted by KEK;
- Annual Balance 2015-2016, drafted by Termokos District Heating Company in Prishtina;
- Annual Balance 2015-2016, drafted by the District Heating Company in Gjakova;
- Periodic monthly information for 2015, provided by entities defined in AI 2007/11 on energy data reporting (energy enterprises, KSA, etc.)

The collected data was processed based on EUROSTAT format requirements. Electricity balances drafted by the Kosovo Transmission, System and Market Operator (KOSTT) and adopted by MED, have served for the forecasting of electricity demand and definition of manners to cover such demand. Annual balances of district heating companies in Prishtina and Gjakova have served to forecast heating demand and means for covering such demand. Annual balances drafted by MED have served as the basis for defining the trend of development of the demand for other energy sources (logwood, petroleum products, solar energy, etc.) for 2015.

Basic sections of the energy balance, as per the EUROSTAT format, are:

- The first section pertains to primary energy products, gained energy, imports, exports, and stocks of other energy products.
- The second second section presents transformation of primary into secondary products. This group includes transformations of energy in all plants utilized for transformation of energy products in electricity, facilities for the production of patented energy products or briquette, gasification plants, furnaces, district heating facilities, solar panels. This section also includes energy product exchanges and transfers.
- The third section presents energy losses in distribution and transmission (including all energy products).
- The fourth section presents own expenditure of energy by the energy sector, and the overall final consumption. Energy expenditure includes all expenditure related to the operational processes of energy facilities.
- The fifth section is related to final consumption of energy products. This group encompasses the consumption of all energy products used by the five economic sectors: household, industry, services, transport and agriculture.

It should be emphasized that energy consumption was forecasted in this document based on the energy consumption surveys conducted between 2009 and 2014. Energy consumption was studied from both economic sector (industry, household, services, transport and agricultural sectors) and energy product type aspects.

The basis for this was surveys conducted in 2009 on the consumption accrued in 2008 for all economic sectors, survey conducted in 2011 on biomass consumption in 2010 and 2009 in the household, services and industry sectors, conducted by CRES, contracted by the Energy Community Secretariat, and survey on energy consumption in the household sector, as well as surveys on the industry sector implemented in 2010 (by MPR Group), the household sector survey in 2011 (InTECH) and services sector survey in 2012 (Studio Links 4), agricultural sector survey in 2013 (InTECH), and transport sector in 2014 (InTECH).

2. Supply of energy products in the period 2013- 2015

The forecast of energy consumption for the following year (2016) is based on the trend noted in the last three years. Data from 2015 is based on the economic growth rate in Kosovo in 2015, and its comparison with 2014, nine-month data on imports and exports of coal and petroleum products in 2015, and extrapolations for the last three months of 2015, whereas data on electricity and heating was obtained from the 2014-2015 forecasts.

Table 1 presents data on quantities of primary energy products for the years 2013, 2014 and 2015.

Table 1. Overview of the quantity of primary energy products available for the period 2013-2015 (ktoe)

	2013	**2014**	**2015**
Coal	1552.16	1351.99	1586.32
Petroleum products	579.32	582.55	639.08
Biomass	247.65	252.88	255.73
Electricity	-28.82	42.21	-0.63
Hydro energy	12.32	12.99	11.02
Solar energy	0.76	0.33	0.40
Wind energy	0.00	0.03	0.27
Total	**2363.39**	**2242.97**	**2492.20**

Source: MED documents on energy balances

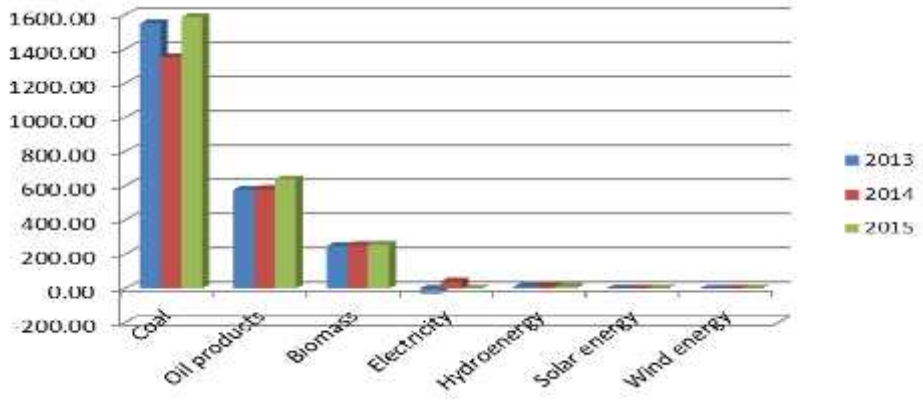

Figure 1. Overview of the quantities of primary energy products available in the period 2013-2015 (ktoe)

As presented in Table 1 and the chart presented in Figure 1, overall (gross) energy quantities available in 2015 amount to 2492.20 ktoe, whereas in 2014 they were 2242.97 ktoe. Based on this, in 2015 there was an 11% increase of available energy products, in comparison to the previous year.

It should be emphasized that this increase in primary energy products was a consequence of the increase of lignite production in comparison to the previous year, and due to the increase of petroleum imports.

3. Final energy consumption in the period 2013-2015

In the following, data on various energy products consumed during the period 2013-2015 will be presented. The aim of this presentation is to provide the basis supporting the analyses of energy demand forecasts for 2016.

Consumption in 2013 and 2014 is based on the research and surveys conducted throughout 2009, 2010, 2011, 2012 and 2013.

3.1. Consumption by energy product

Table 2 below presents the consumption of energy products in the period 2013-2015 for energy and on-energy purposes:

Table 2. Overview of the consumption of all energy products (ktoe) in the period 2013-2015

	2013	**2014**	**2015**
Coal	55.95	60.34	61.34
Petroleum products	573.58	575.87	629.84
Biomass	247.65	253.24	255.73
Electricity	399.57	402.09	451.01
Solar energy	0.76	0.33	0.40
Gained heat	3.67	4.06	9.21
Total	**1281.18**	**1295.94**	**1407.52**

Source: MED documents on energy balances

Table 2 reveals that petroleum products represent the energy product consumed most in the country, comprising 44.7% of the total of energy products consumed. Electricity ranks second with 32.0%, biomass comprises 18.2%, coal covers 4.4%, gained heat 0.7% and solar energy only 0.03%.

Figure 2 presents a graphical overview of the trend of energy consumption, by type of energy product in the period 2013-2015.

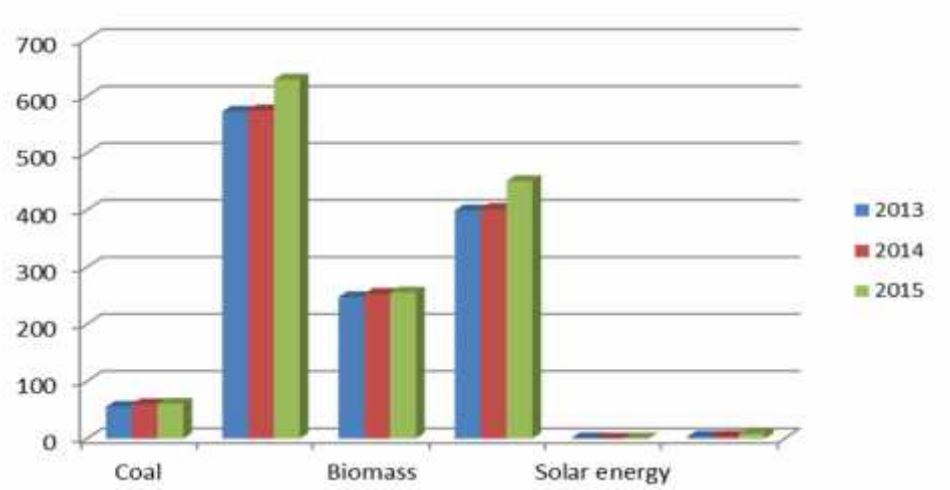

Figure 2. Overview of the consumption of energy sources in all energy sectors in the period 2013-2015 (ktoe)

3.2. Energy consumption by economic sector

Table 3 presents the consumption of different sectors for energy purposes. As presented, the household sector is the sector that consumed most energy in the last three years. This sector is followed by the transport sector. Industry sector ranks third in energy consumption, followed by the services sector. The agricultural sector constantly ranks as the sector that consumes least energy.

Table 3. Overview of the use of energy resources for energy purposes by sector (ktoe)

	2013	**2014**	**2015**
Industry sector	266.63	279.54	293.07
Household sector	495.52	482.38	530.58
Services sector	118.79	138.53	149.35
Agriculture sector	29.34	22.24	16.68
Transport sector	328.52	339.70	372.36
Total	**1238.8**	**1262.39**	**1362.05**

Source: Energy balances drafted by MED

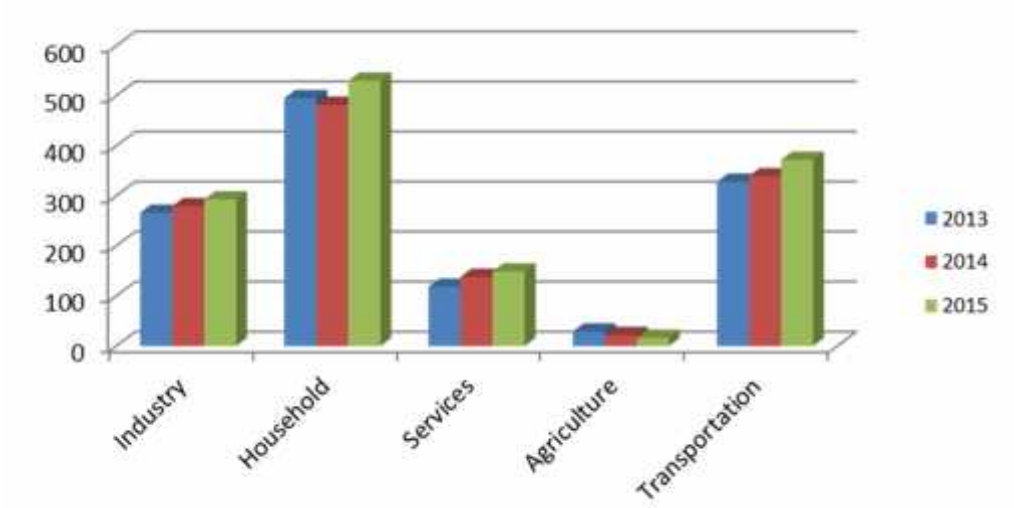

Figure 3. Overview of the use of energy resources for energy purposes by sector (ktoe)

Final consumption for non-energy use in 2015 amounted to 46.32 ktoe. Peat is the only type of coal used for non-energy purposes, in the chemical industry sector (0.85 ktoe). On the other hand, a petroleum byproduct – bitumen (largely used in road asphalting, is treated under construction industry), was used at the amount of 40.45 ktoe, whereas lubrificants used in the chemical industry amount to 5.02 ktoe.

Table 4 presents the situation regarding final consumption for non-energy use for the period 2013-2015.

Table 4. Final non-energy consumption by industrial sub-sector (ktoe)

Economic sector	**2013**	**2014**	**2015**
Chemical industry	0.44	0	0.85
Other industries	41.93	33.55	45.47
Total	**42.37**	**33.55**	**46.32**

3.2.1. Industry sector

The use of petroleum products in the industry sector covers the vast majority of energy products, comprising 53.9%, whereby 40.5% is consumed for energy purposes and 13.4% for non-energy purposes, followed by electricity which takes 35.9%, coal with 6.1%, of which 5.9% for energy sources, and biomass, which makes up for 4.2%, thus representing the least consumed energy source.

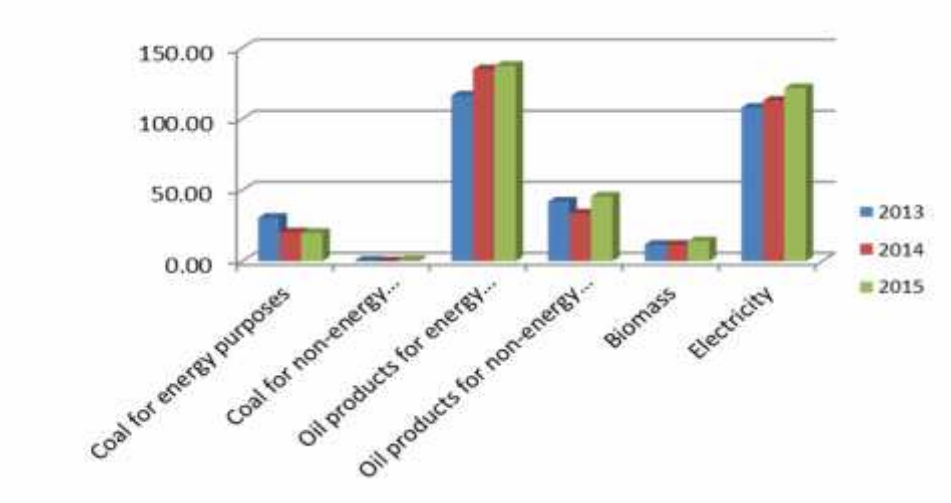

Figure 4. Overview of consumption of energy products in the industry sector, in the period 2013-2015 (ktoe)

3.2.2. Household sector

Electricity is the most consumed energy product, making up 48.4% of the total energy consumption in this sector, followed by biomass comprising 44.1%, petroleum products 3.7%, coal with 2.7%, gained heat with 1.1% and solar energy with 0.02%.

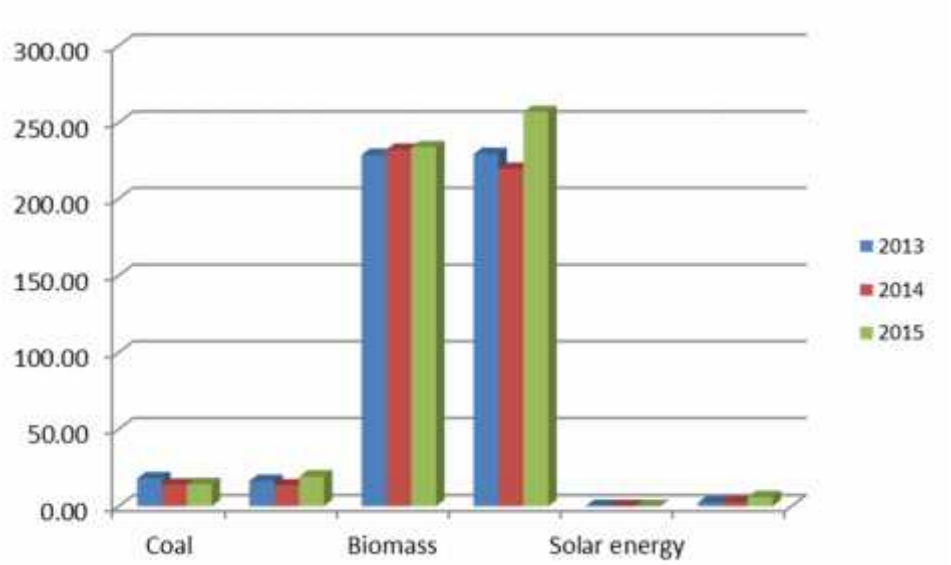

Figure 5. Overview of the consumption of energy products in the household sector in the period 2013-2015 (ktoe)

3.2.3. Services sector

Electricity is the most preferred source of energy consumed in the services sector, making up 47.4% of the overall energy used, followed by petroleum products which comprise 27.7%, coal 17.7%, biomass 4.8%, gained heat 2.2% and solar energy with 0.2%.

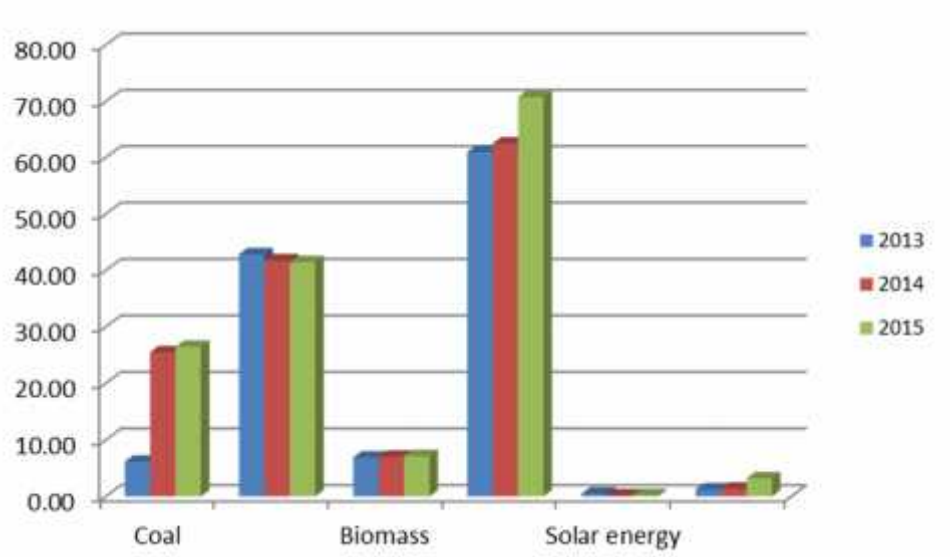

Figure 6. Overview of the consumption of energy products in the services sector for the period 2013-2015 (ktoe)

3.2.4. Agriculture sector

In the agriculture sector, petroleum and its products represent the most used energy product, making up 82.5% of the total energy consumption, followed by electricity with 10.2%, coal with 4% and biomass with 3.3%.

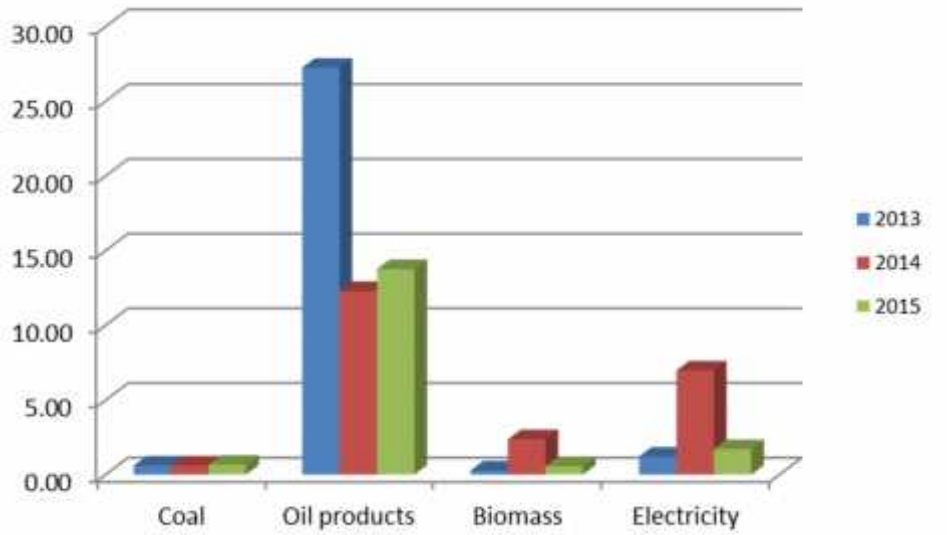

Figure 7. Overview of the consumption of energy sources in the agriculture sector for the period 2013-2015 (ktoe)

3.2.5. Transport sector

The transport sector consumes only petroleum products. Diesel is the energy product consumed most in this sector, comprising 78.9% of total energy products consumed, followed by petrol with 17.5%, LPG with 2.6% and kerosene with 1%.

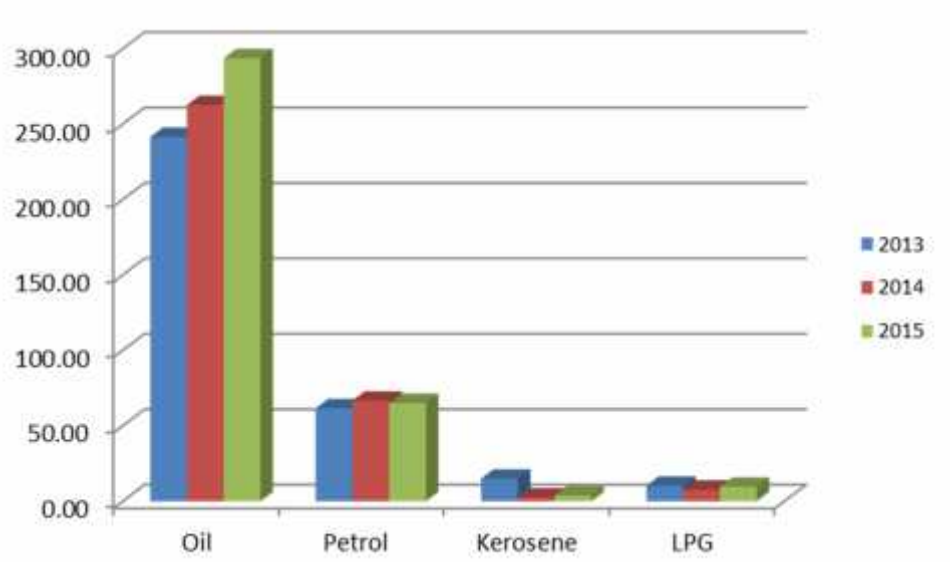

Figure 8. Overview of the consumption of petroleum products in the transport sector in the period 2013-2015 (ktoe)

4. Forecast of the energy demand for 2016

In forecasting the energy demand for the different sectors, the following was taken into consideration:

- Energy overview of 2013-2015 (taking into consideration the forecasted consumption for 2015, and the economic growth of Kosovo in 2015 in comparison to 2014, data obtained on import and export of fuel for the period January – September 2015, and extrapolations for the last quarter of 2015);
- Data on economic growth of 4.1%[1] of the GDP for year 2016;
- An increase of the number of households by 1%;
- Electricity balance for 2016, drafted by the Transmission, System and Market Operator and adopted by MED, which presents all data on electricity, including generation, import, export, transmission losses, distribution losses, coal and heavy duty oil production, and emission of pollutants in the environment;
- Data on the forecast of energy for heating purposes in the 2015/2016 season, obtained by district heating companies of Prishtina (Termokos) and Gjakova.

Therefore, in order to forecast the growth of energy consumption in Kosovo for 2016, the calculated economic growth of 4.1% was taken into consideration. The figure below presents economic growth in 2012, 2013 and 2014 and the economic growth forecasts for years 2015 and 2016.

[1] Based on the economic growth assumptions for years 2015 and 2016, as provided by the Ministry of Finance.

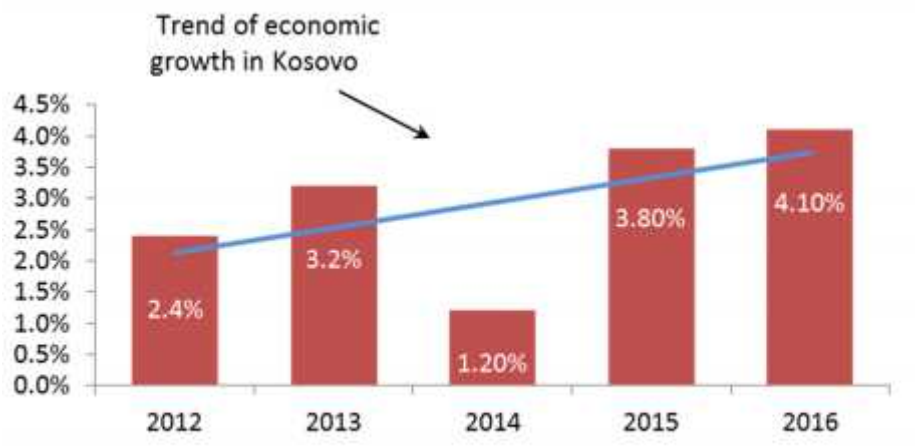

Figure 9. Trend of economic growth in Kosovo for the period 2012-2016

4.1. Energy demand forecast for the household sector

Size of the population is an important factor the calculation of the energy demand in the household sector.

Energy demand in the household sector is more directly dependent on the number of households, whereby one household can be home to more than one family, especially in the sense of logwood consumption, than with the size of the population. Therefore, assessments of the number of families comprises an important factor for the forecast of energy consumption in the household sector.

Table 5: Forecast of energy cosnumption in the household sector for the year 2016 (in ktoe)

Coal	Petroleum products	Biomass	Electricity	Solar energy	Gained heat	Total
14.46	20.02	236.27	230.45	0.13	12.58	513.90

In 2016, it is envisaged to have a decrease (of around 3%) in energy consumption in general, in comparison to 2015.

In 2016, compared to the trend witnessed in the last three years, it is envisaged to have an increase of coal consumption, from 14.31 ktoe to 14.46 ktoe, as well as biomass (from 233.93 ktoe to 236.27 ktoe), petroleum products (19.40 ktoe to 20.02 ktoe), gained heat (5.98 ktoe to 12.58 ktoe), whereas electricity consumption is expected to decrease from 256.84 ktoe to 230.45 ktoe.

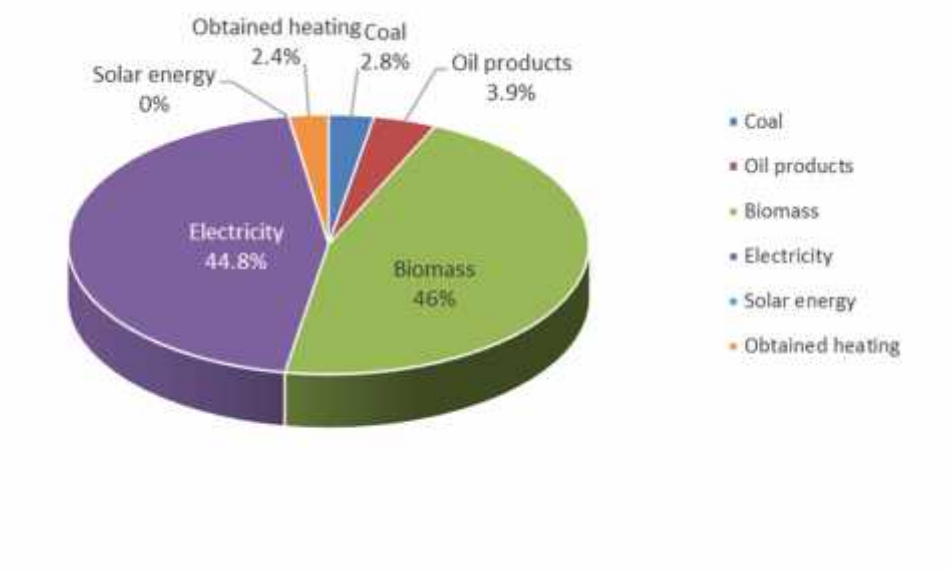

Figure 10. Participation of all energy products in the household sector

4.2. Forecast of the demand for energy in the services sector

Following is the forecast of energy sources' consumption in the services sector:

Table 6: Forecast of energy consumption in the services sector (in ktoe)

Coal	Petroleum products	Biomass	Electricity	Solar energy	Gained heat	Total
27.55	43.63	7.27	65.59	0.30	6.77	151.11

Electricity demand in the services sector for 2016 is envisaged to decrease from 70.77 ktoe in 2015 to 65.69 ktoe. Heat consumption is envisaged to increase from 3.22 ktoe in 2015 to 6.77 ktoe in 2016, coal consumption will increase from 26.46 ktoe to 27.55 ktoe, petroleum products from 41.47 ktoe to 43.63 ktoe, and consumption of logwood from 7.16 ktoe to 7.27 ktoe.

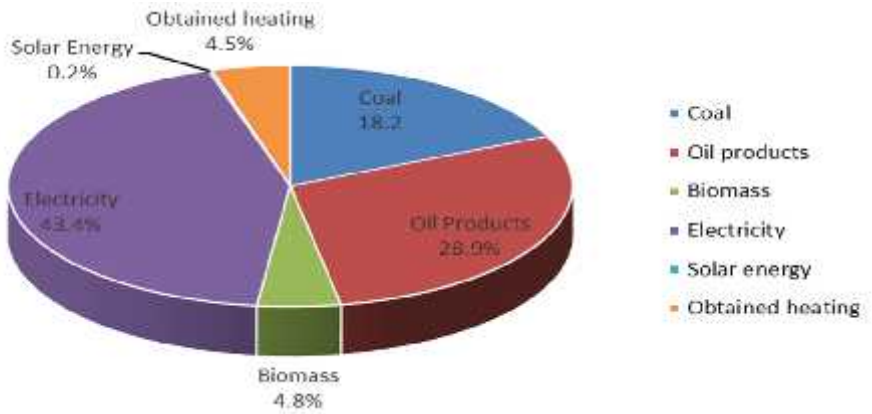

Figure 11. Ratio of energy products used in the services sector

4.3. Forecast of energy demand in the industry sector

Below are forecasts of the consumption of energy sources in the industry sector:

Table 7. Forecast of the consumption of energy sources in the industry sector (ktoe)

	Coal	Petroleum products	Biomass	Electricity	Total
Final overall energy consumption	21.52	197.62	14.81	118.34	352.29
Final consumption for energy purposes	20.64	148.09	14.81	118.34	301.88
Final consumption for non-energy consumption	0.88	49.53	0.00	0.00	50.41

Total energy consumption for energy and non-energy purposes in the industry sector in 2016 is envisaged to be 352.29 ktoe. Electricity in the industry sector is forecasted to decline from 121.70 ktoe in 2015 to 118.34 ktoe in 2016. Coal for energy purposes shall see an incline from 19.90 ktoe to 20.64 ktoe, while coal for non-energy purposes an incline from 0.85 ktoe to 0.88 ktoe, petroleum products for energy purposes are envisaged to increase from 137.39 ktoe to 148.09 ktoe, while those for non-energy purposes shall see an incline from 45.47ktoe to 49.53 ktoe, biomass from 14.09 ktoe to 14.81 ktoe.

4.4. Energy demand forecast in the transport sector

Table 8: Energy product consumption forecast for the transport sector (ktoe)

Oil	Petrol	Kerosene	LPG	Total
302.95	63.20	3.98	10.06	380.20

The transport sector is characterized by consumption of petroleum derivates. In the transport sector, for 2016, there is a forecasted incline of energy consumption for 2.1% from the 2015 consumption rate. Therefore, in total, the energy product consumption in the transport sector is forecasted to incline from 372.36 ktoe in 2015 to 380.20 ktoe in 2016.

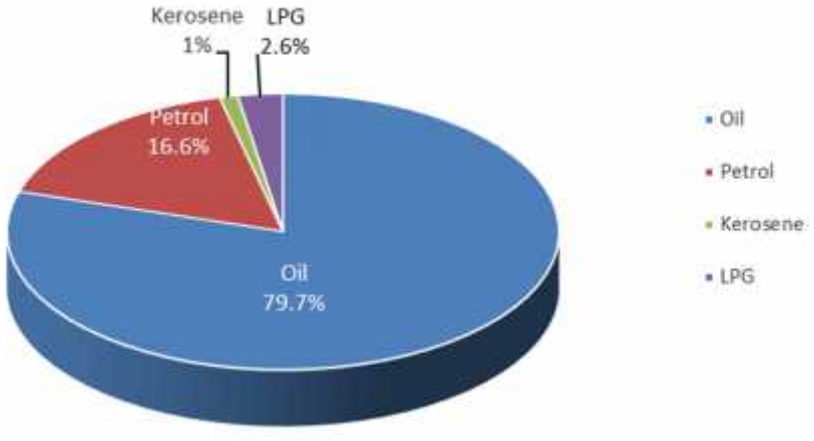

Figure 13. Shares of all energy products in the transport sector

4.5. Energy demand forecast for the agricultural sector

The following is a forecast of demand for energy product consumption in the agricultural sector: For 2016, the agricultural sector consumption is forecasted at 22.77 ktoe.

As one may see in the following table and graph, oil and its products represent the energy products mostly used in the agricultural sector, at an amount of 14.19 ktoe or 62.3% of total consumption, pursued by electricity with 7.31 ktoe or 32.1%, coal with 0.69 ktoe or 3%, and biomass with 0.58 ktoe or 2.5%

Table 9. Energy consumption forecast for the agricultural sector (ktoe)

Coal	Oil products	Biomass	Electricity	Total
0.69	14.19	0.58	7.31	22.77

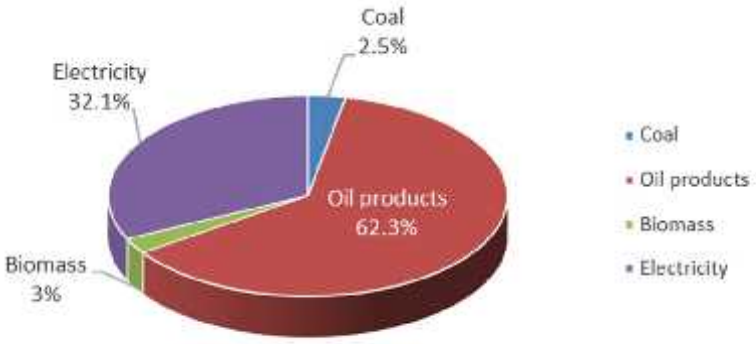

Figure 14. Shares of all energy products in the agriculture sector

4.6. Forecast of total demands for end-use consumption of energy products for 2016

The following are forecasted consumption rates for all energy products in 2016:

Table 10. Overview of forecasted consumption of all energy products for 2016 (ktoe)

Coal	Oil products	Biomass	Electricity	Heat gain	Solar energy	Total
64.21	655.65	258.93	421.69	19.35	0.43	1420.26

From all the records collected and analysis made, it follows that petroleum and its products shall continue to take the largest share in the total energy product consumption for energy and non-energy purposes, with 46.2% or 655.65 ktoe, while electricity takes 29.7% or 421.69 ktoe, biomass takes 18.2% or 258.93 ktoe, while coal takes part with 4.5% or 64.21 ktoe, heat gains with 1.4% or 19.35 ktoe, while solar energy takes a small share, 0.03% in energy consumption, respectively 0.43 ktoe.

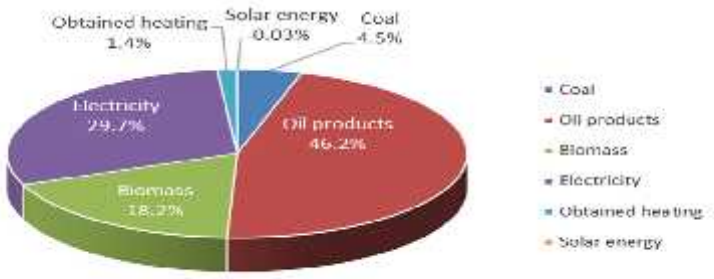

Figure 15. Shares of all energy products in total energy consumption

5. Forecast of energy loss for 2016

5.1. Electricity losses

Electricity losses are divided into:

- Transmission grid losses, which represent the difference between measured values of electricity at transmission entry point and those measured at transmission outgoing links. These include losses due to transit (metering points at 400, 220 dhe 110kV interconnection lines are transferred to boundary lines, using approved transfer coefficients).
- Distribution grid losses, which represent the difference between measured values of electricity received at points of border from transmission and entry from generators connected to distribution, and measured values of electricity sent to consumers.

The total loss planning in the transmission grid includes losses due to consumption loads in Kosovo and losses due to electricity in transit.

Electricity losses at transmission grid are planned at 1,78% of the total energy amount available (table in paragraph 4.8) (Transmission threshold production and planned imports), or **113** GWh.

Electricity losses in the distribution grid are planned at **1,114.3 GWh** or **24.15%** of total distribution demand. They include: technical losses, commercial losses, and unbilled energy in the northern area of Kosovo.

5.2. District heating losses

District heating losses in transmission and distribution networks shall be **50.8** GWh.

6. Electricity generation forecast for 2016

6.1. Electricity generation forecast for thermal power plants

The annual electricity generation at TPPs are planned to the optimal use of generation capacities.

Electricity delivered to the transmission boundary from TPPs Kosovo A and Kosovo B is planned at: **5,668,8** GWh, where:

- TPP Kosovo A = **1,983,4** GWh, at transmission boundary.
- TPP Kosovo B = **3,685,4** GWh, at transmission boundary.

6.2. Electricity generation forecast for hydro-power plants and renewable sources

Annual electricity generation from HPP Ujmani and HPP- Lumbardh series (HPP Lumbardh 1, HPP EGU Belaje and HPP EGU Deçan), all connected to the transmission level, is planned at:

- HPP Ujman **= 95 GWh**.
- HPP – Lumbardh Series = **63 GWh**

Annual electricity generation from hydro-power plants, wind energy sources, solar panels, LED LIGHT Technology, all connected to the distribution system, is planned at:

- HPP Radavc = 4,7 GWh,
- HPP Istog = 2,0 GWh,
- HPP Dikance = 12,4 GWh,
- HPP Brod 2 =21,1 GWh,
- HPP Hydroline-Albanik III = 20 GWh,
- HPP Restelica 1&2 =1,9 GWh, (expected to connect in October 2016)
- Led Light technology = 0,13 GWh
- Wind turbines = 1,7 GWh

Total electricity at transmission boundary generated from TPP Kosovo A, TPP Kosovo B and HPP Ujmani and HPP – Lumbardh series for 2016 is planned at **5 827,1 GWh.**

Meanwhile, the whole Kosovo generation, including Distribution HPPs and wind generation and photo-voltaic generation, is planned at **5 891,3 GWh.**

Table 11: Forecast of generation, imports, consumption, and transmission losses in the electro-energy system

	MWh	Total	January	February	March	April	May	June	July	August	eptember	October	November	December
1	Kosovo A - Generation before transmission	1,983,439	170,425	152,671	171,140	161,700	167,599	164,769	161,719	168,902	162,711	171,855	157,666	172,282
2	Kosova B - Generation before transmission	3,685,460	366,141	330,172	368,489	253,010	374,499	362,039	206,246	148,909	286,582	373,076	249,166	367,132
3	Ujmani + Lumbardhi Cascade	158,214	14,188	11,528	12,278	17,628	20,355	16,916	9,225	6,534	8,072	10,945	14,098	16,446
4	Generation of HPP, LLT and WP connected in Distributio	64,226	4,923	5,173	5,709	6,178	7,453	6,404	4,573	3,421	3,869	4,560	5,783	6,179
5	(1+2+3+4) National generation	5,891,339	555,676	499,544	557,616	438,516	569,907	550,129	381,763	327,765	461,234	560,436	426,714	562,039
6	(1+2+3) Generation (input in transmission)	5,827,113	550,754	494,371	551,907	432,337	562,453	543,725	377,189	324,345	457,365	555,876	420,930	555,861
5	Total distributive HPP	23,728	831	706	706	706	706	706	706	706	706	706	706	706
6	(4+5) Total national generation	4,701,828	440,653	397,642	397,642	397,642	397,642	397,642	397,642	397,642	397,642	397,642	397,642	397,642
7	Import\	541,320	81,720	46,950	26,800	73,320	0	0	47,040	79,940	14,950	5,600	90,480	74,520
8	(6+7) Available energy	6,368,433	632,474	541,321	578,707	505,657	562,453	543,725	424,229	404,285	472,315	561,476	511,410	630,381
9	Trepça	25,855	2,466	2,159	2,331	2,035	2,214	2,001	1,971	1,817	1,968	2,121	2,115	2,658
10	Sharrcemi sh.a	64,837	862	1,125	5,200	6,300	6,700	6,850	6,850	6,800	6,950	6,800	6,000	4,400
11	NewCo Ferronikeli sh.a	639,473	54,163	50,668	54,163	52,416	54,163	52,416	54,163	54,163	52,416	54,163	52,416	54,163
12	Mining	121,000	11,000	11,000	10,000	10,000	9,000	9,000	9,000	10,000	10,000	10,000	11,000	11,000
13	TPP consumption from transmission	151,930	12,168	11,329	12,399	11,725	11,998	12,188	9,284	13,742	13,473	14,147	14,537	14,940
14	Distribution demand	4,549,946	519,683	421,113	424,193	388,915	333,336	304,316	320,148	304,273	309,138	345,204	381,477	498,150
15	(9+10+11+12+13+14) Net demand	5,553,041	600,342	497,394	508,285	471,392	417,412	386,772	401,416	390,795	393,945	432,434	467,544	585,311
16	Losses in transmission	113,918	11,551	9,819	10,411	8,892	10,124	9,787	7,566	7,258	8,502	10,006	8,849	11,153
17	Shortage	0												
18	Surplus (export)	701,474	20,581	34,108	60,010	25,374	134,917	147,166	15,247	6,232	69,868	119,036	35,017	33,917
19	(15+16) Total demand	5,666,959	611,893	507,213	518,697	480,284	427,536	396,559	408,982	398,053	402,446	442,440	476,393	596,464
20	(17+18+19 -8) Balance	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Annual Electricity Balance 2016 – Kosovo Transmission and Market Operator (KOSST)

* Transmission costs of TPP Kosovo A and B are expenses taken from transmission for generation purposes.
** Gaps appear due to lack of load in certain winter months, and due to generation unit overhauls.
*** Redundancies (export) appear mainly in summer seasons, and as overhead generation during the night.

6.3. Energy imports forecast for 2016

From a total amount of demand forecasted for primary energy sources of 2495.78 ktoe for 2016 in Kosovo, a considerable part of such amount is to be imported. In reality, 29.2% of gross energy in Kosovo is imported. The main imports are petroleum products, electricity, coal and a small amount of biomass. Imported energy is planned at 729.72 ktoe.

Energy imports are mainly dominated by petroleum with 670.45 ktoe, representing 91.88% of total imported energy. Electricity is planned for imports at the rate of 46.55 ktoe or 6.38% of imported energy, and coal with 7.29 ktoe, which is 1% of imported energy, and biomass with 5.43 ktoe or 0.74%.

Table 12 presents the forecasted imports of energy sources for 2016:

Table 12: Overview of import forecasts for energy products in 2016 (ktoe)

Petroleum products	Electricity	Coal	Biomass	Total
670.45	46.55	7.29	5.43	729.72
91.88%	6.38%	1.00%	0.74%	100%

The following is a forecast of coal production, consumption and reserves for 2016 for existing power plants:

Table 13: Forecast of coal production, consumption and reserves for 2016

(ton)									Situation as of	31.12.15
KEK	Coal Production			Coal Consumption					Storage	Storage A	Storage B
	Sitnica	SJP	Total	TC A	TC B	TC A+B	Market *	Needs	500 000	200 000	300 000
1	0	700 000	700 000	277 345	501 633	**778 978**	**10 000**	**788 978**	**411 022**	164 409	246 613
2	0	660 000	660 000	248 325	450 619	**698 944**	**10 000**	**708 944**	**362 078**	144 831	217 247
3	0	720 000	720 000	278 588	501 633	**780 221**	**10 000**	**790 221**	**291 857**	116 743	175 114
4	0	710 000	710 000	263 664	340 090	**603 754**	**10 000**	**613 754**	**388 103**	155 241	232 862
5	0	730 000	730 000	273 614	501 633	**775 247**	**10 000**	**785 247**	**332 856**	133 142	199 714
6	0	700 000	700 000	268 639	484 628	**753 267**	**10 000**	**763 267**	**269 589**	107 836	161 753
7	0	700 000	700 000	268 639	274 177	**542 816**	**10 000**	**552 816**	**416 773**	166 709	250 064
8	0	600 000	600 000	273 614	196 590	**470 203**	**25 000**	**495 203**	**521 569**	208 628	312 942
9	0	650 000	650 000	263 664	382 170	**645 834**	**25 000**	**670 834**	**500 736**	200 294	300 441
10	0	730 000	730 000	278 588	501 633	**780 221**	**10 000**	**790 221**	**440 515**	176 206	264 309
11	0	750 000	750 000	253 714	340 090	**593 805**	**10 000**	**603 805**	**586 710**	234 684	352 026
12	0	750 000	750 000	278 588	501 633	**780 221**	**10 000**	**790 221**	**546 489**	218 595	327 893
Total	**0**	**8 400 000**	**8 400 000**	**3 226 982**	**4 976 529**	**8 203 511**	**150 000**	**8 353 511**			

7. Forecast of pollutant emissions from power plants

The main air pollutants from power plants are the following combustion products:
- ash (dust particles)
- SO2 gas
- NOx
- CO2

7.1. Specific TPP Kosovo A emissions

The following is a forecast of specific emissions from the Kosovo A power plant for 2016:

	A3+A4+A5					
Month	Production in generator (MWh)	Dust	SO2	NOx	CO2	Ash production
		kg/MWh				
		0.30	3.02	3.90	1470	
		Estimated emissions for 2016				
1	182 464	48 718	357 629	620 376	230 816 448	43 791 263
2	163 372	43 620	320 209	555 464	206 665 250	39 209 217
3	183 282	48 936	359 232	623 158	231 851 499	43 987 636
4	173 463	46 315	339 988	589 775	219 430 883	41 631 156
5	180 009	48 062	352 817	612 030	227 711 294	43 202 143
6	176 736	47 189	346 403	600 903	223 571 089	42 416 649
7	176 736	47 189	346 403	600 903	223 571 089	42 416 649
8	180 009	48 062	352 817	612 030	227 711 294	43 202 143
9	173 463	46 315	339 988	589 775	219 430 883	41 631 156
10	183 282	48 936	359 232	623 158	231 851 499	43 987 636
11	166 917	44 567	327 158	567 519	211 150 473	40 060 169
12	183 282	48 936	359 232	623 158	231 851 499	43 987 636
A3-A5	**2 123 014**	**566 845**	**4 161 108**	**7 218 249**	**2685 613 200**	**509 523 453**

Tab.14. Forecast of specific TPP Kosovo A emissions

7.2. Specific TPP Kosovo B emissions

The following is a forecast of specific emissions from the Kosovo B power plant for 2016:

	GJENERATOR B1+B2					
Month	Production in generator (MWh)	Dust	SO2	NOx	CO2	Ash production
		kg/MWh				
		3.92	2.64	3.40	1 050	
		Estimated emissions for 2015				
1	411 175	1 618 853	1 087 537	1 569 042	437 920 465	74 716 288
2	369 360	1 454 224	976 940	1 409 478	393 386 180	67 118 021
3	411 175	1 618 853	1 087 537	1 569 042	437 920 465	74 716 288
4	278 762	1 097 527	737 313	1 063 757	296 895 230	50 655 110
5	411 175	1 618 853	1 087 537	1 569 042	437 920 465	74 716 288
6	397 236	1 534 468	1 030 847	1 487 253	415 093 143	70 821 579
7	224 736	876 469	588 807	849 501	237 096 050	40 452 407
8	161 139	618 615	415 582	599 580	167 343 176	28 551 442
9	313 254	1 206 935	810 813	1 169 799	326 491 390	55 704 692
10	411 175	1 618 853	1 087 537	1 569 042	437 920 465	74 716 288
11	278 762	1 087 173	730 357	1 053 722	294 094 332	50 177 232
12	411 175	1 618 853	1 087 537	1 569 042	437 920 465	74 716 288
I - XII	**4 079 122**	**15 969 675**	**10 728 346**	**15 478 300**	**4 320 001 826**	**737 061 923**

Tab.13. Forecast of specific TPP Kosovo B emissions:

8. Power plants energy efficiency indicators

- Coal quality and quantity improvement
- Reduction of specific coal costs at TPP A and TPP B - tonne/MWh
- Reduction of own electricity consumption at TPP A, TPP B and mines
- Reduction of specific petroleum consumption, lit/MWh at TPP A and heavy oil/MWh at TPP B, by reducing unplanned failures
- Delivery of spare parts at adequate quality
- Maintenance and operation at a required technical level
- Timely and qualitative overhauls
- Mining coal content: low thermal capability 6700 – 9210 kJ/kg, projected value 7325.5 kJ/kg
- Ash content 14 – 21 %
- Moisture content 38 – 47 %
- Sulphur content in combustion is 0.3%.

Calculation of energy efficiency coefficient at boundary shall be:

- Calculating at low thermal efficiency of coal Kq=1863kcal/kg=7800 kJ/kg
- Specific coal consumption at TPP Kosovo A hsq=1.52 ton/MWh at generator
- Specific coal consumption at TPP Kosovo B hsq= 1.22 ton/MWh at generator

The calculation of energy efficiency coefficient for Kosovo A and B power plants:

TPP Kosovo A $\eta = 7800 * 1.52=11856$ kJ/kWh

$Ef = Ed / \eta * 100\% = 3600 / 11856 = 30.36\ \%$

Ed=3600 kcal/kWh- specific electricity
η – specific median coal energy at entry (thermal)

TPP Kosovo B $\eta = 7800 * 1.22 = 9515$ kJ/kWh

$Ef = Ed / \eta * 100\% = 3600 / 9516 = 37.83\ \%$

Annex. Annual Energy Balance for 2016

Annual energy balance for 2016 (ktoe)	Total of all products	Anthracites	Coal and other bituminous	Coking coal	Lignite / brown coal	Coke and semi-coke	Coal gas, water gas etc.	Translate from: Bulgarian Coke tar	Brown coal briquette	Tar	Peat	Total coal
Primary generation	**1844.81**				**1571.73**							**1571.73**
Obtained generation	**0.00**											**0.00**
Imports	**729.72**	**0.09**	**5.96**	**0.00**	**0.35**	**0.01**	**0.00**	**0.00**	**0.00**	**0.16**	**0.72**	**7.29**
Stock difference	**-8.65**				**-8.65**							**-8.65**
Exports	**70.11**	**0.00**	**0.00**	**0.00**	**8.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.10**
Bunkers	**0.00**											**0.00**
Gross internal consumption	**2495.78**	**0.09**	**5.96**	**0.00**	**1555.33**	**0.01**	**0.00**	**0.00**	**0.00**	**0.16**	**0.72**	**1562.27**
Entry in transformation	**1534.61**	**0.00**	**0.00**	**0.00**	**1525.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1525.85**
Power plants	**1532.16**				**1525.85**							**1525.85**
Power plants with automatic generation	**0.00**											**0.00**
Nuclear power plants	**0.00**											**0.00**
Patented fuel and bricket-fired plants	**0.00**											**0.00**
Coke oven plants	**0.00**											**0.00**
Blast furnace plants	**0.00**											**0.00**
Gasification stations	**0.00**											**0.00**
Rafineries	**0.00**											**0.00**
District heating plants	**2.01**											**0.00**
Solar panels	**0.43**											**0.00**
Output of transformation	**557.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Power plants	**533.38**											**0.00**
Power plants with automatic generation	**0.00**											**0.00**
Nuclear power plants	**0.00**											**0.00**
Patented fuel and bricket-fired plants	**0.00**											**0.00**
Coke oven plants	**0.00**											**0.00**
Blast furnace plants	**0.00**											**0.00**
Gasification stations	**0.00**											**0.00**
Rafineries	**0.00**											**0.00**
District heating plants	**23.79**											**0.00**
Solar panels	**0.43**											**0.00**
Exhcanges and transfers, returns	**0.01**	**0.00**										**0.00**
Middle-product transfers	**0.01**											**0.00**
Transfers products	**0.00**											**0.00**
Returns from the petrochemical industry	**0.00**											**0.00**
Losses in transformation	**0.00**	**0.00**										**0.00**
Consumption from energy branches (self-consumptio	**59.41**											**0.00**
Losses in transmission and distribution	**62.08**											**0.00**
Available for final consumption	**1397.30**	**0.09**	**5.96**	**0.00**	**29.48**	**0.01**	**0.00**	**0.00**	**0.00**	**0.16**	**0.72**	**36.42**
Final non-energy consumption	**50.41**	**0.00**								**0.16**	**0.72**	**0.88**
Chemical industry	**0.88**									**0.16**	**0.72**	**0.88**
Other sectors	**49.53**										**0.00**	**0.00**
Final energy consumption	**1369.86**	**0.00**	**5.99**	**0.00**	**57.34**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**63.33**
Industry	**301.88**	**0.00**	**5.94**	**0.00**	**14.69**	**0.01**						**20.64**
Steel and iron industry	**77.24**		**5.92**		**11.60**	**0.01**						**17.53**
Non-ferrous metals industry	**27.75**				**0.00**							**0.00**
Chemical industry	**1.55**				**0.00**							**0.00**
Glass, ceramic and construction materials	**88.61**				**0.24**							**0.24**
Mining	**2.19**				**0.00**							**0.00**
Food, beverages and tobacco	**59.88**		**0.02**		**2.83**							**2.85**
Textile, leather and clothing	**0.11**				**0.00**							**0.00**
Paper and printing	**0.30**				**0.00**							**0.00**
Engineering and other metal Industryes	**0.01**				**0.00**							**0.00**
Other Industryes	**44.24**				**0.01**							**0.01**
Transportation	**380.20**	**0.00**		**0.00**								**0.00**
Rail	**1.52**											**0.00**
Road	**374.70**											**0.00**
Water	**3.98**											**0.00**
Internal Navigation	**0.00**											**0.00**
Household	**513.90**	**0.00**		**0.00**	**14.46**				**0.00**			**14.46**
Agriculture	**22.77**	**0.00**		**0.00**	**0.69**							**0.69**
Services	**151.11**	**0.00**	0.05	**0.00**	**27.50**							**27.55**
Statistical difference	**-27.87**		0.00	**0.00**	**-27.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**-27.85**

Annual energy balance for 2016 (ktoe)	Petrol	Gasoil	Kerosene	Kerosene (Jet fuel)	Crude oil	Oil	LPG	Petroleum coke	Other oil products	Lubricating oils	Oil residue	Bitumen	Total oil products
Primary generation								0.00					0.00
Obtained generation													0.00
Imports	72.01			3.97	34.57	382.93	38.64	87.63	0.00	5.24	0.00	45.47	670.45
Stock difference													0.00
Exports	0.00			0.00	0.00	0.00	0.00	0.47	0.00	0.02	0.00	1.16	1.64
Bunkers													0.00
Gross internal consumption	72.01			3.97	34.57	382.93	38.64	87.16	0.00	5.21	0.00	44.31	668.81
Entry in transformation				0.00	6.16	2.16			0.00			0.00	8.33
Power plants					4.15	2.16							6.31
Power plants with automatic generation													0.00
Nuclear power plants													0.00
Patented fuel and bricket-fired plants													0.00
Coke oven plants													0.00
Blast furnace plants													0.00
Gasification stations													0.00
Rafineries													0.00
District heating plants					2.01								2.01
Solar panels													0.00
Output of transformation	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Power plants													0.00
Power plants with automatic generation													0.00
Nuclear power plants													0.00
Patented fuel and bricket-fired plants													0.00
Coke oven plants													0.00
Blast furnace plants													0.00
Gasification stations													0.00
Rafineries													0.00
District heating plants													0.00
Solar panels													0.00
Exhcanges and transfers, returns				0.00					0.00	0.00		0.00	0.00
Middle-product transfers													0.00
Transfers products													0.00
Returns from the petrochemical industry													0.00
Losses in transformation				0.00					0.00	0.00		0.00	0.00
Consumption from energy branches (self-consumption)													0.00
Losses in transmission and distribution													0.00
Available for final consumption	72.01			3.97	28.41	380.76	38.64	87.16	0.00	5.21	0.00	44.31	660.48
Final non-energy consumption	0.00			0.00	0.00	0.00	0.00	0.00	0.00	5.21	0.00	44.31	49.53
Chemical industry				0.00					0.00			0.00	0.00
Other sectors				0.00					0.00	5.21		44.31	49.53
Final energy consumption	67.10			3.98	28.40	380.77	38.71	87.16	0.00	0.00	0.00	0.00	606.12
Industry	0.53			0.00	19.80	30.98	9.62	87.16	0.00	0.00	0.00	0.00	148.09
Steel and iron industry	0.00				0.00	0.63	0.00	10.35	0.00			0.00	10.98
Non-ferrous metals industry	0.00				17.16	9.03	0.03	0.00	0.00			0.00	26.22
Chemical industry	0.03				0.00	0.05	1.17	0.00	0.00			0.00	1.25
Glass, ceramic and construction materials	0.33				1.78	15.03	5.95	58.66	0.00			0.00	81.75
Mining	0.01				0.36	0.46	0.00	0.00	0.00			0.00	0.82
Food, beverages and tobacco	0.13				0.27	4.29	2.36	0.00	0.00			0.00	7.04
Textile, leather and clothing	0.00				0.00	0.01	0.00	0.00	0.00			0.00	0.01
Paper and printing	0.00				0.02	0.09	0.01	0.00	0.00			0.00	0.12
Engineering and other metal Industryes	0.00				0.00	0.00	0.00	0.00	0.00			0.00	0.00
Other Industryes	0.03				0.21	1.40	0.10	18.15	0.00			0.00	19.90
Transportation	63.20			3.98	0.00	302.95	10.06	0.00	0.00	0.00	0.00	0.00	380.20
Rail	0.00			0.00	0.00	1.52	0.00	0.00	0.00			0.00	1.52
Road	63.20			0.00	0.00	301.43	10.06	0.00	0.00			0.00	374.70
Water	0.00			3.98	0.00		0.00	0.00	0.00			0.00	3.98
Internal Navigation	0.00			0.00	0.00		0.00	0.00	0.00			0.00	0.00
Household	1.11			0.00	0.00	10.61	8.30	0.00	0.00	0.00	0.00	0.00	20.02
Agriculture	0.94			0.00	0.00	13.25	0.01	0.00	0.00	0.00	0.00	0.00	14.19
Services	1.32			0.00	8.60	22.99	10.72	0.00	0.00	0.00	0.00	0.00	43.63
Statistical difference	0.00			-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual energy balance for 2016 (ktoe)	Biomass	Bio-fuel	Hydroenergy	Solar energy	Geothermal energy	Wind energy	Photovoltaic energy	Obtained heating	Electricity
Primary generation	253.54		18.97	0.43	0.00	0.150	0.012		
Obtained generation									
Imports	5.43	0.00	0.00						46.55
Stock difference									
Exports	0.04	0.00	0.00						60.33
Bunkers									
Gross internal consumption	258.92	0.00	18.97	0.43	0.00	0.15	0.01		-13.77
Entry in transformation	0.00	0.00	0.00	0.43		0.00	0.00		0.00
Power plants									
Power plants with automatic generation									
Nuclear power plants									
Patented fuel and bricket-fired plants									
Coke oven plants									
Blast furnace plants									
Gasification stations									
Rafineries									
District heating plants									
Solar panels				0.43					
Output of transformation	0.00	0.00	0.00	0.43	0.00	0.00	0.00	23.79	533.38
Power plants									533.38
Power plants with automatic generation									
Nuclear power plants									
Patented fuel and bricket-fired plants									
Coke oven plants									
Blast furnace plants									
Gasification stations									
Rafineries									
District heating plants								23.79	
Solar panels				0.43					
Exhcanges and transfers, returns	0.00		-18.97		0.00	-0.15	-0.01		19.13
Middle-product transfers			-18.97			-0.15	-0.01		19.13
Transfers products									
Returns from the petrochemical industry									
Losses in transformation	0.00								
Consumption from energy branches (self-consumption)								0.07	59.34
Losses in transmission and distribution								4.37	57.71
Available for final consumption	258.92	0.00	0.00	0.43	0.00	0.00		19.35	421.69
Final non-energy consumption	0.00								0.00
Chemical industry	0.00								
Other sectors	0.00								
Final energy consumption	258.93	0.00	0.00	0.43	0.00	0.00		19.35	421.69
Industry	14.81	0.00	0.00			0.00			118.34
Steel and iron industry	0.55								48.17
Non-ferrous metals industry	0.00								1.53
Chemical industry	0.04								0.26
Glass, ceramic and construction materials	0.82								5.79
Mining	0.05								1.32
Food, beverages and tobacco	5.72								44.27
Textile, leather and clothing	0.00								0.10
Paper and printing	0.01								0.18
Engineering and other metal Industryes	0.00								0.01
Other Industryes	7.62								16.72
Transportation	0.00	0.00	0.00			0.00			0.00
Rail									
Road		0.00							
Water									
Internal Navigation									
Household	236.27	0.00	0.00	0.13		0.00		12.58	230.45
Agriculture	0.58	0.00	0.00	0.00		0.00			7.31
Services	7.27	0.00	0.00	0.30	0.00	0.00		6.77	65.59
Statistical difference	-0.01	0.00	0.00	0.00	0.00	0.00		0.00	0.00