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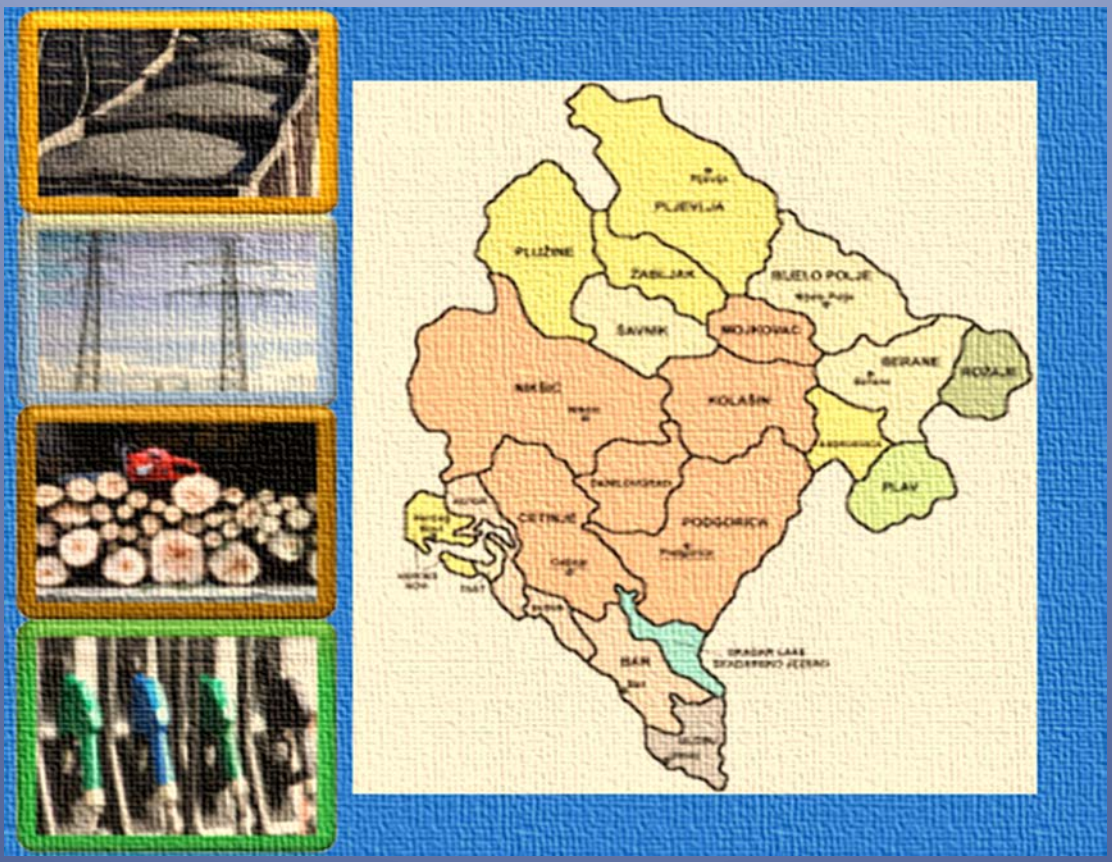


STATISTICAL ENERGY BALANCES

2011-2012

PODGORICA, DECEMBER 2013

Content:

1 Introductory notes

The Publication „Statistical Energy balances“ contains annual data about production, import, export, transformation, consumption and distribution of coal, electricity, oil products and firewood in Montenegro, for 2011-2012.

In Energy statistics overall energy balance is composed from annual report on production and consumption of electricity, balance of coal production and consumption, balance of export, import and consumption of oil products, and balance of production and consumption of firewood, which covers all manufacturers and all those involved in import and export of all energy commodities. Each energy data are given in the natural unit of measure and in TJ (tera joules).

Methodology for making of energy balances, defining and grouping of energents and types of energy , as well as statistical terminology, are harmonized with internationally established standards IEA/OECD and Eurostat.

All energy balances which were created for 2011 to 2012 are regular statistical surveys.

Data for 2011 are revised and published as part of the regular annual publication of data, according to the results of the research "Consumption of firewood in Montenegro" in the 2012th year by the Statistical Office of Montenegro. The publication of the methodology and results of this survey is available on the website of the Statistical Office of Montenegro.

Every suggestion referred from a data users will be accepted with pleasure.

2 Methodological explanations

2.1 Data sources

Data necessary for compilation of energy balances are provided from:

a) Regular statistical surveys from the field of energy statistics,
b) Regular statistical surveys of industry, transport, external trade, agriculture and forestry, and households.

2.2 Reporting units of energy statistics

Reporting units for energy balance sheets are companies engaged in the production, transformation, distribution and sale of energy commodities, regarding to appropriate activities in these divisions from Classification of activities NACE Rev.2.

2.3 Content of rows in energy balance sheet

Primary production is a form of energy that has not been converted or transformed (coal, oil, natural gas, biomass, firewood, hydro power energy, geothermal energy, wind energy and solar energy).

Recovered products are rare and they are present to cover sources of fuels which are recovered from fuels already produced but not counted or saved. For example, waste coal may be later recovered for use. Specifically, in this row can be found quantities of individual energy sources whose nature of production is not recognized by the EU methodology and standards, and are hereby incorporated here. For example. electricity produced by specific contracts with some countries in the region. For the purposes of international reporting this quantity is treated as an import / export.

Imports and exports cover quantities that crossed the national border.

Stock changes is the difference between stocks at the beginning of the year (initial stocks) and those at the end of the year (final stocks).

Marine bunkers cover the quantities delivered for international navigation purposes.

Statistical differences is a category that includes the sum of unknown statistical differences between the production and consumption of selected fuels.

Gross inland energy consumption is calculated as follows:
Primary production
+ Imports
– Exports
+ Stock changes

– Marine bunkers

Transformation - input is the consumption of fuels as raw materials for energy production in thermal power plants, CHP, auto producers, district heating plants, refineries, blast furnace plants and coal transformation.

Transformation - output covers the production of transformed energy forms (thermoelectricity, heat, petroleum products, blast furnace gas and oxygen steel furnace gas).

Exchange and transfers include inter product transferred (distillates), products transferred (hydro energy) and recycled products (naphtha, fuel oil and lubricants).

Own consumption in energy sector covers the energy used for energy sector running.

Distribution losses cover losses occurred:

- for electricity: during transmission and distribution;
- for solid fuels: during transport;
- for liquid fuels: during transport and distribution;
- for fire wood: during transport.

Energy available for final consumption is the energy intended for final consumers.

Final consumption for non-energy purposes covers final energy consumption as raw material for production of non-energy products in technological process, while consumption in chemical industry is separated from total consumption.

Final consumption for energy purposes covers final consumption of available energy for energy purposes in:

- industry (iron and steel, non-ferrous metal, chemical industry, non-metal minerals, mining and quarrying, food, drink and tobacco industry, textile, leather and clothing, paper and printing, engineering and other metal industry, other industries),
- transport (rail, road, air, inland, other),
- households, agriculture and other sectors (total households, included those with employees, agriculture and other consumers, e.g. education, health, administration, etc.).

2.4 Explanations of energy commodities

Electricity – generated in: hydroelectric power stations, auto producers and thermal power plants.

Coal:

- hard coal – refers to non-agglomeration coal of gross calorific value (GCV) greater than 23865 kJ/kg; comprises: coking coal, anthracite and other bituminous coal;
- sub-bituminous coal – refers to non-agglomeration coal with a GCV between 17435 kJ/kg and 23865 kJ/kg;
- brown coal / lignite – non-agglomeration coal with a GCV less than 17435 kJ/ kg.

***Oil products*:**

- Refinery gas includes a mixture of non-condensable gases mainly consisting of hydrogen, methane, ethane and olefins obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. This also includes gases which are returned from the petrochemical industry
- Liquefied Petroleum Gases (LPG) are light paraffinic hydrocarbons derived from the refinery processes, crude oil stabilization and natural gas processing plants. They consist mainly of propane (C3H8) and butane (C4Hl0) or a combination of the two.
- Motor gasoline consists of a mixture of light hydrocarbons distilling between 35°C and 215°C. It is used as a fuel for land based spark ignition engines.
- Kerosene Type Jet Fuel is a distillate used for aviation turbine power units. It has the same distillation characteristics between 150°C and 300°C (generally not above 250°C) and flash point as kerosene.
- Gas/diesel oil is primarily a medium distillate distilling between 180°C and 380°C. Several grades are available depending on:
    - Transport Diesel- on road diesel oil for diesel compression ignition (cars, trucks etc.), usually of low sulphur content, and
    - Heating and other - light heating oil for industrial and commercial uses, marine diesel and diesel used in rail traffic; other gas oil including heavy gas oils which distil between 380°C and 540°C
- Mazut: heavy fuel oil with sulphur content lower than 1% and of 1% or higher,
- Other Oil Products, like bitumen, petroleum coke, lubricants and other.

Fire-wood: Covers a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs, etc.

3 Conversion Equivalents between Units of Energy

Conversion factors for converting energy into various energy units are published in the Manual of Energy Statistics IEA / OECD / Eurostat.

Conversion refers to particular energy unit are shown in Table 1:

Table 1 Conversion factors

	TJ	Gcal	Mtoe	GWh
TJ	1	238,8	2,388 x 10-5	0.2778
Gcal	4,1868 x 10-3	1	10-7	1,163 x 10-3
Mtoe	4,1868 x 104	107	1	11630
GWh	3,6	860	8,6 x 10-5	1

Unit of measure:
TJ – terajoule
Gcal – gigacalorie
Mtoe – milion tones of oil equivalent
GWh – gigawatt - hour

4 Realized energy balance for 2012

In the gross domestic consumption of energy the largest share takes coal with 41% (15 952 TJ) of which about 98% is spent for producing electricity (15 611 TJ), and the rest for final consumers, for industry and households.

Final consumption of energy consists mainly from consumption of electricity (39%) and oil products (35%), followed by energy from firewood (25%) and coal (1%).

Table 2 shows the energy balance in TJ grouped by energy sources.

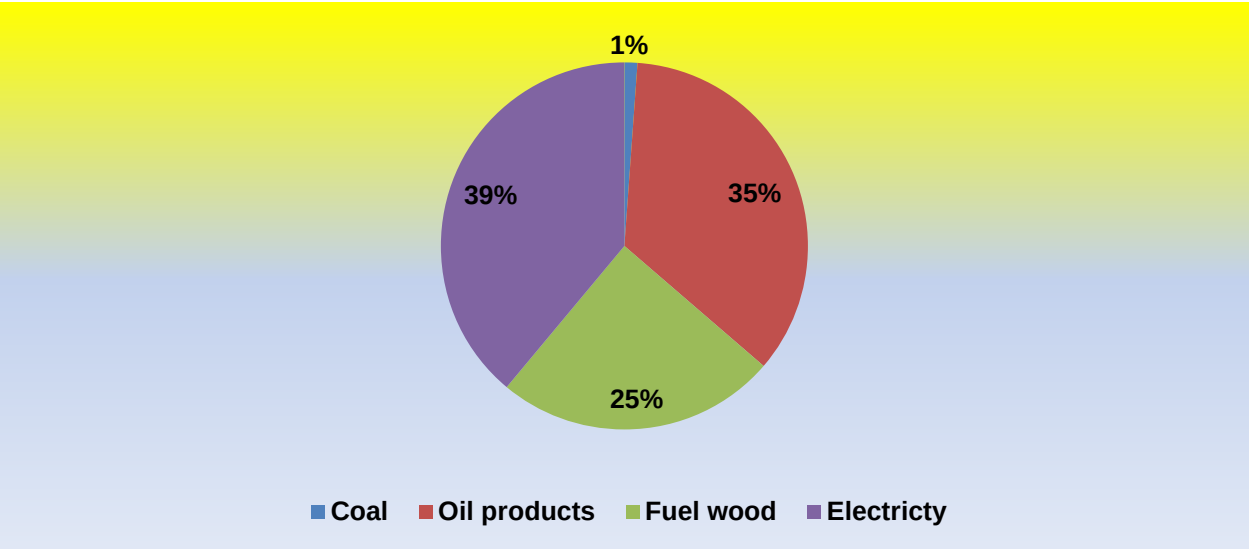
Table 2 Realized energy balance for 2012, in TJ

	Total energy	Coal	Oil products	Firewood	Electricity energy
Primary production	**23 324**	16 449	-	6 875	-
Recovered products	**1 714**	-	-	-	1 714
Import	**16 130**	9	12 615	35	3 470
Stock changes	**-**	-	-	-	-
Export	**- 2 217**	- 507	- 531	- 359	- 821
Gross inland energy consumption	**38 950**	**15 952**	**12 084**	**6 551**	**4 363**
Transformation - input	15 611	15 611	-	-	-
Transformation - output	4 921	-	-	-	4 921
Exchange and transfers	6 334	-	-	1 017	5 317
Own consumption in energy sector	548	-	40	-	508
Losses	2 502	-	-	-	2 502
Non-energy consumption	**1 769**	**-**	**1 567**	**202**	**-**
Final energy consumption	**29 775**	**341**	**10 476**	**7 366**	**11 592**
Industry	8 244	212	1 131	223	6 678
Transport	9 269	-	9 215	-	54
Households, trade and other sectors	12 262	129	130	7 143	4 860
Statistical differences	**-**	-	-	-	-

4.1 Available energy for final consumption

Final consumption compared to 2011th year (30 534 TJ), decreased by 2.5%. Coal consumption has increased by 28%, and firewood for the 1%. Consumption of oil products decreased by 2% and electricity by 6%.

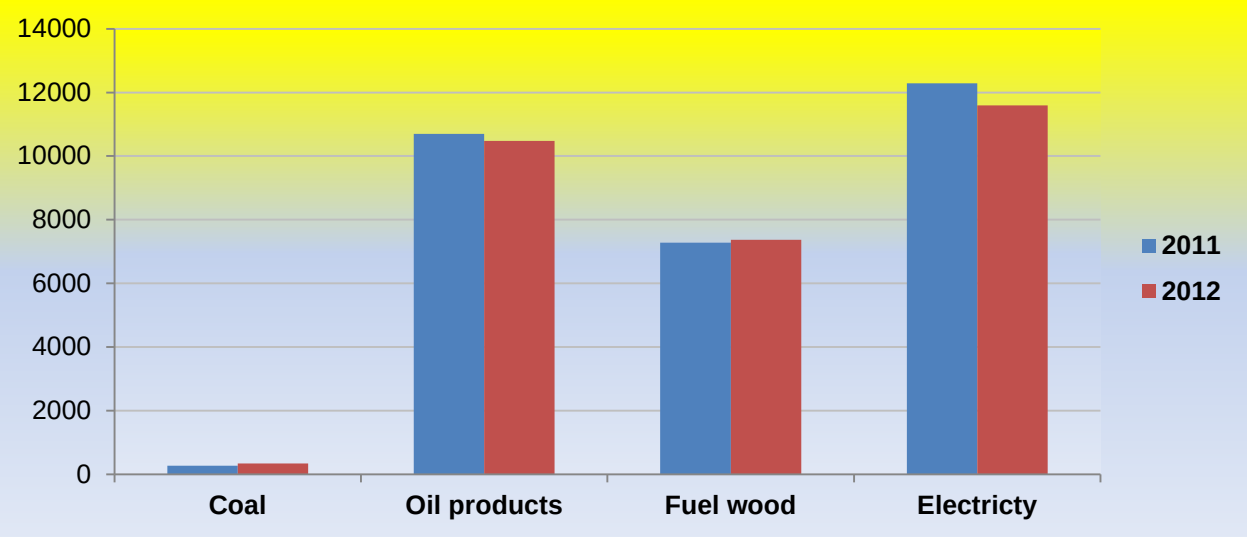
Figure 1 Share of energy sources in final consumption for 2012, in %



4.2 Final energy consumption, in TJ

The graph below shows the parallel energy consumption of individual groups in the 2012 and 2011 year.

Figure 2 Realized energy consumption for 2011 and 2012, in TJ



5 Balance of coal

5.1 Balance of coal, in TJ

Coal production in the 2012 compared to the 2011 decreased by 9% and the final consumption is 28% higher compared to the 2011 year.

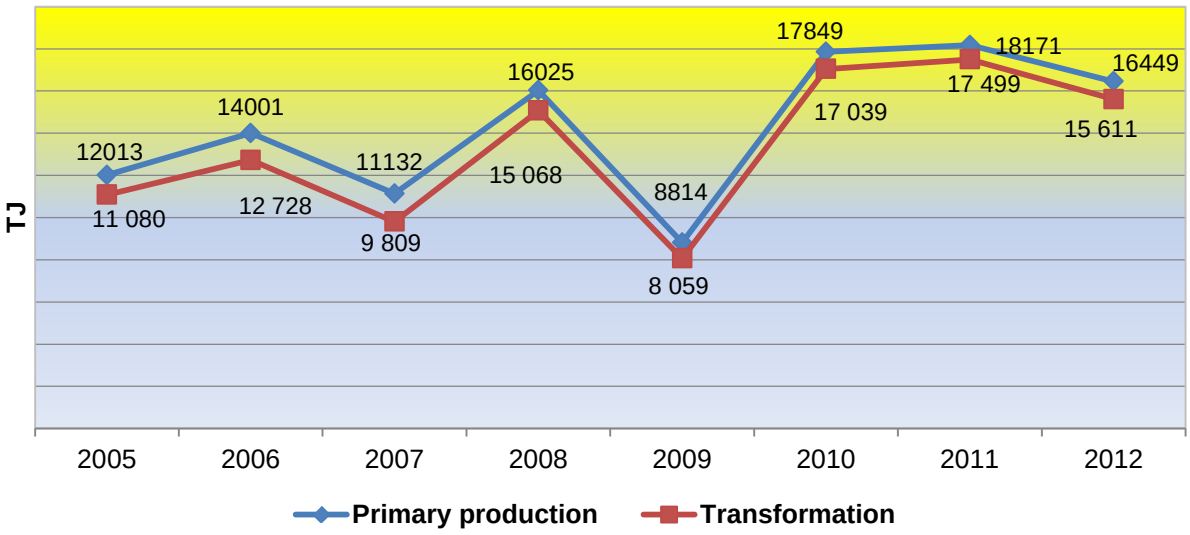
Table 3 Balance of coal, in 2012, in TJ

	2011	2012
Primary production	18 171	16 449
Recovered products	-	-
Import	-	9
Stock changes	83	-
Export	- 488	- 507
Gross inland energy consumption	**17 766**	**15 952**
Transformation - input	17 499	15 611
Transformation - output	-	-
Exchange and transfers	-	-
Final energy consumption	**267**	**341**
Industry	138	212
Transport	-	-
Households, trade and other sectors	129	129
Statistical differences	**-**	**-**

5.2 Production and transformation of coal

Share of consumption of coal in power plants for electricity production shows the trend over the period since 2005. – 2012, ranging between 92% to 95% of the gross domestic consumption. The remaining part is allocated to the final consumption of final consumers, and to industries and households.

Figure 3 Production and consumption of coal in transformation sector, in TJ



6 Balance of oil products

6.1 Balance of oil products

Gross domestic consumption of oil products refers to the amount imported, of which most is diesel fuel and motor gasoline. In respect of the year 2011 (13 535 TJ) it decreased by 4% (see Table 4).

In the final energy consumption diesel fuel make the highest part with 69%, gasoline with 16%, liquefied petroleum gas by 8%, jet fuel with 5% and 2% by fuel oil. The consumption of other oil product belongs to non-energy consumption, and it was realized in the industry (1 567 TJ).

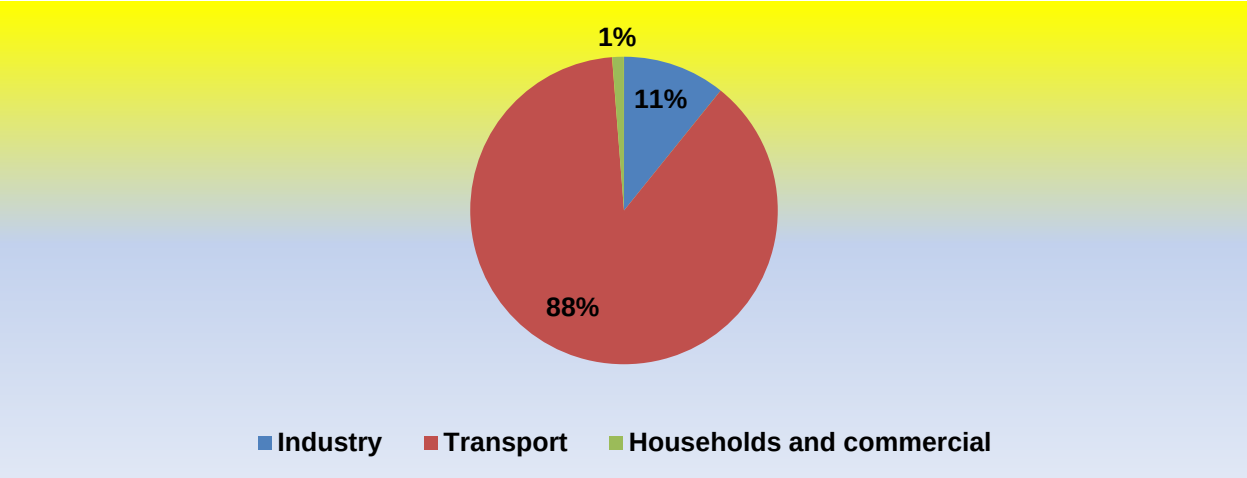
Table 4 Balance of oil products for 2012, in TJ

	Toatl oil products	LPG	Motor gasoline	Jet fuel	Gas/dies el oil	Fuel oil (mazut)	Other oil products
Primary production	-	-	-	-	-	-	-
Recovered products	-	-	-	-	-	-	-
Import	12 615	797	2 140	528	7 261	322	1 567
Stock changes	-	-	-	-	-	-	-
Export	- 531	-	- 490	-	-	- 40	-
Gross inland energy consumption	**12 084**	**797**	**1 650**	**528**	**7 261**	**281**	**1 567**
Own consumption in energy sector	40	-	-	-	-	40	-
Non-energy consumption	**1 567**	**-**	**-**	**-**	**-**	**-**	**1 567**
Final energy consumption	**10 476**	**797**	**1 650**	**528**	**7 261**	**241**	**-**
Industry	1 131	797	-	-	214	121	-
Transport	9 215	-	1 605	528	6 962	121	-
Rail	-	-	-	-	-	-	-
Road	8 350	-	1 516	-	6 834	-	-
Air	570	-	-	528	43	-	-
Inland navigations/ships	252	-	89	-	43	121	-
Other transport	43	-	-	-	43	-	-
Households, trade and other sectors	130	-	45	-	86	-	-
Statistical differences	**-**	**-**	**-**	**-**	**-**	**-**	**-**

6.2 Final consumption of oil products

From the total final consumption the highest part is consumed in the transport sector and for transport purposes (88%). Industry participates with 11%, while households and commercial and public sector participate with 1% of the total available oil products for energy purposes.

Figure 4 Share of consumption of oil products by sectors, in %



6.3 Balance of oil products for 2011 and 2012, in TJ

Final consumption of oil products in the 2012 was reduced by 18% compared to the 2011.

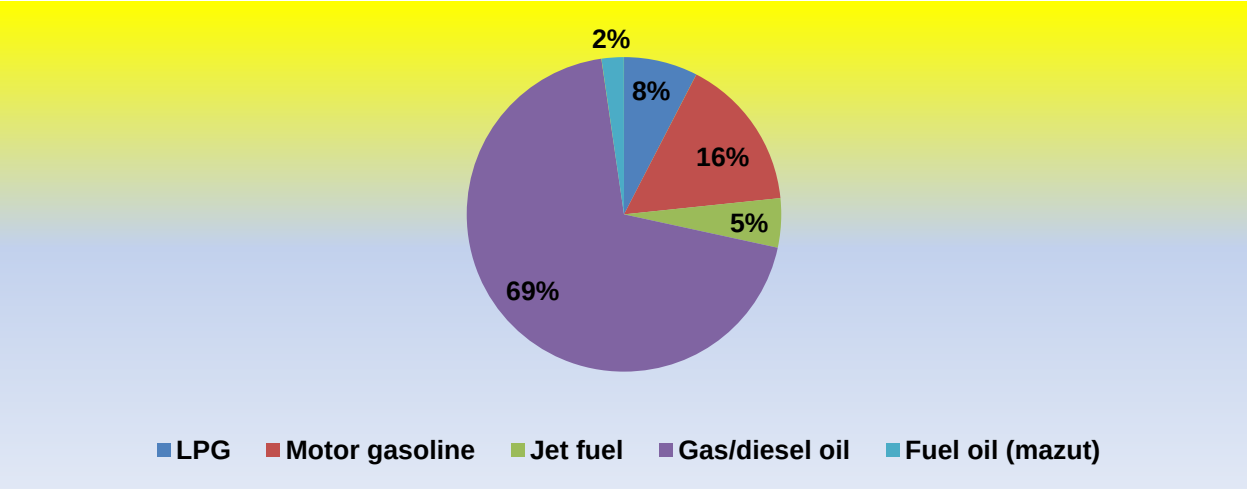
Table 5 Balance of oil products for 2011 and 2012, in TJ

	2011	2012
Primary production	-	-
Recovered products	-	-
Import	13 535	12 615
Stock changes	-	-
Export	- 663	- 531
Gross inland energy consumption	**12 872**	**12 084**
Own consumption in energy sector	40	40
Non-energy consumption	**2 130**	**1 567**
Final energy consumption	**12 832**	**10 476**
Industry	4 207	1 131
Transport	6 366	9 215
Rail	-	-
Road	5 841	8 350
Air	440	570
Inland navigations/ships	44	252
Other transport	41	43
Households, trade and other sectors	130	130
Statistical differences	**-**	**-**

6.4 Oil products available for final consupmtion

The structure of the distribution of the final energy consumption of oil products is shown in the following figure:

Figure 5 Final consumption of oil products, in %



The consumption of oil products was occupied with the largest share of diesel fuel (69%), followed by motor gasoline (16%) and liquefied petroleum gas (8%), while jet fuel participate with 5% of final consumption.

7 Balance of fuel wood

Balance of firewood refers to balance of production and consumption of fuel wood and its components.

Table 6 Balance of fuel wood, in TJ

	2011	2012
Primary poduction	6 807	6 875
Import	35	35
Export	- 460	- 359
Gross inland energy consumption	**6 382**	**6 551**
Transfers	**1 079**	**1 017**
Non-energy consumption	**186**	**202**
Final energy consumption	**7 275**	**7 366**
Industry	209	223
Transport	-	-
Households, trade and other sectors	7 066	7 143
Households	6 805	6 888
Agriculture	-	-
Other sectors	260	256
Statistical differences	-	-

The consumption of fuel wood has increased compared to 2011 year by 1%. The largest part of fuel wood is consumed by households..

8 Balance of electricity

The total available quantity of electricity for final consumption (11 592 TJ), compared to the year 2011 (12 290 TJ), decreased by 6%.

Production in TPP Pljevlja was 4 921 TJ, which is 6% less than last year.

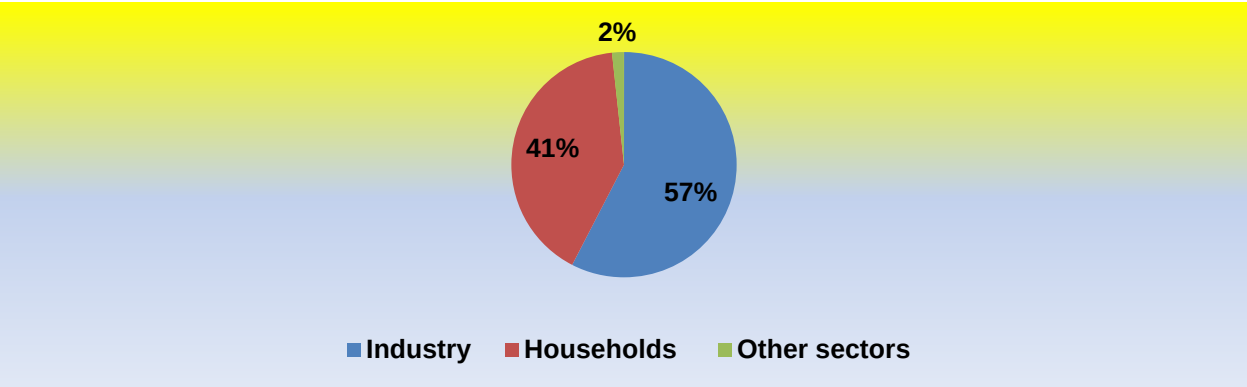
Due to favorable weather conditions, the production of hydroelectric power is significantly increased compared to the previous year. Achieving production in HE in 2012 amounted to 5 317 TJ, and in 2011 produced 4 334 TJ, which is 22% more in 2012.

Table 7 Balance of electricity, in TJ

	2011	2012
Primary production	-	-
Recovery products	2 196	1 714
Import	4 979	3 470
Export	- 1 552	- 821
Gross inland energy consumption	**5 623**	**4 363**
Transformation -input	-	-
Transformation -output	5 227	4 921
Exchange and transfers	4 334	5 317
Own consumption in energy sector	550	508
Losses	2 344	2 502
Final energy consumption	**12 290**	**11 592**
Industry	**7 783**	**6 678**
Iron and steel industry	310	169
Non-ferrous metal industry	5 245	4 000
Chemical industry	11	11
Non-metallic minerals	11	83
Mining and Quarrying	22	14
Food, drink & tobacco industry	1 501	436
Textile, leather & clothing industry	4	4
Paper, pulp and print	4	4
Engineering & other metal industry	11	7
Other industries	666	1 948
Transport	**72**	**54**
Households , trade and other sectors	**4 435**	**4 860**
Households	4 320	4 716
Agriculture	43	36
Other sectors	72	108
Statistical differences	-	-

Consumption level in the industrial sector in the 2012 was 6678 TJ, which is 14% less than last year. The share in the final consumption was 58%. The participation of other sectors in final energy consumption is shown in Figure 6:

Figure 6 Final consumption by sectors, in %



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