ENERGY

MK - NI 027

FINAL ENERGY CONSUMPTION BY SECTOR

Definition

Final energy consumption is energy supplied to meet the demand of the final consumers and is calculated as the sum of final energy consumption from all sectors, namely industry, transport, agriculture, households, and other sectors.

The indicator «Final energy consumption by sector» is expressed in thousand tonnes of oil equivalent (ktoe) and in percentage as a ratio between final energy consumption by each sector and final energy consumption by all sectors.

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [1]
- Strategy for Energy Development in the Republic of Maceodnia by 2030. [2]

[1] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf
[2] http://www.economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply.

Key question

Is final energy consumption increasing and in which sector it is the highest?

Key message

Policies in energy sector should favour measures aimed at rational and efficient energy consumption, especially by households and industry.

Between 2002 and 2011, final energy consumption in the Republic of Macedonia increased by 7,3%, with an annual average rate of 0,7%. Industry is the sector with the most rapid growth in energy consumption noting an increase by 47%. During the same period, final energy consumption in transport increased by around 27%, while final energy consumption in households increased by 20%. Significant fall in final energy consumption was recorded in the sector agriculture (-18,7%) and other sectors (-55,6%).

The highest share in the total final energy consumption was recorded in the sectors industry and households.

Figure 1. Final energy consumption by sector

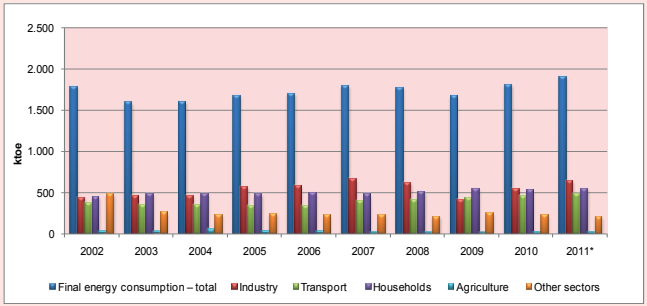
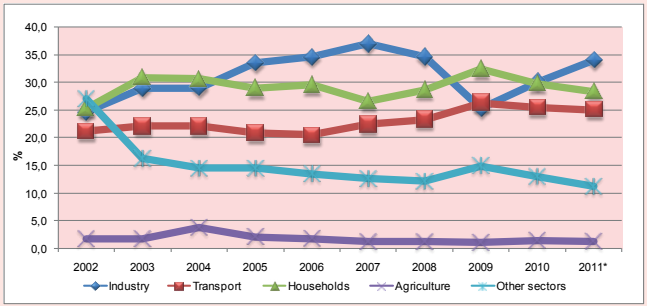


Figure 2. Share of individual sectors in final energy consumption



Assessment

Depending on the characteristics of economies and the extent of efficiency in energy consumption, diverse structure of energy consumption can be found in individual sectors.

Final energy consumption in the Republic of Macedonia correlates closely with the dynamics of industrial production, due to the high share of industry in the total energy consumption.

Between 2002 and 2011, final energy consumption in the Republic of Macedonia increased by 7,3%, with an annual average rate of 0,7%. Industry is the sector with the most rapid growth in energy consumption noting an increase by 47%. Upon the analysis of data on final energy consumption in 2009 we may note fall in industry resulting from economic crisis, while the highest increase in final energy consumption in industry wqas recorded in 2007. During the same period, final energy consumption in transport increased constantly by around 27%. Final energy consumption in households increased by 20% in the period from 2002 to 2011, with a notable growth in the period from 2008 to 2011. Significant fall in final energy consumption was recorded in the sector agriculture (-18,7%) and other

sectors (-55,6%).

The highest share in the total final energy consumption in agricultural sector was recorded in 2004, followed by continuous fall in consumption in the period from 2005 to 2011.

The highest share in the total final energy consumption was recorded in the sectors industry and households.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008).
- „Energy Statistics Methodology Eurostat F4, 1998"
- National classification of activities, Rev.2 (Official Gazette of the Republic of Macedonia no. 147/2008)

Data specification

Title of the indicator	Source	Reporting obligation
Final energy consumption by sector	– State Statistical Office	– Eurostat, – ECE/UN – IEA/OECD.

Data coverage:

Table 1: Final energy consumption by sector

ktoe	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Final energy consumption	1.780	1.593	1.600	1.678	1.702	1.793	1.771	1.671	1.802	1.910
Industry	438	460	462	562	589	664	613	422	543	648
Transport	376	353	353	350	349	401	413	440	460	479
Households	452	493	490	486	503	478	508	542	537	542
Agriculture	32	29	63	36	31	23	23	19	27	26
Other sectors	482	260	232	244	230	227	215	249	235	214

* Previous data

Table 2: Final energy consumption by sector (%)

(%)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Final energy consumption	100	100	100	100	100	100	100	100	100	100
Industry	24,6	28,9	28,9	33,5	34,6	37,0	34,6	25.5	30,1	34,0
Transport	21,1	22,1	22,1	20,9	20,5	22,4	23,3	26,3	25,5	25,1
Households	25,4	30,9	30,6	29,0	29,6	26,7	28,7	32,4	29,8	28,4
Agriculture	1,8	1,8	3,9	2,2	1,8	1,3	1,3	1,1	1,5	1,3
Other sectors	27,1	16,3	14,5	14,5	13,5	12,7	12,1	14,9	13,0	11,2

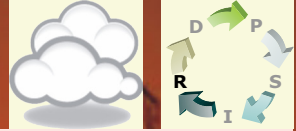
* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 027	Final energy consumption by sector	CSI 027 EE 18	Final energy consumption by sector	D	A	Energy	annualy

MK - NI 028

TOTAL ENERGY INTENSITY



Definition

Total energy intensity is the ratio between the total energy demand (or total energy consumption) and the Gross Domestic Product.

The total energy consumption is calculated as the sum of the total energy demand from solid fuels, oil, natural gas and renewable sources.

The Gross Domestic Product (GDP) is converted by the Price Adjusted Rate of Exchange (PARE) method, applying the OUN Methodology (2000 database).

The total energy demanded (or total energy consumption) is expressed in thousand tonnes oil equivalent, and Gross Domestic Product in million EUR.

The indicator «Total energy intensity» is expressed in kilograms oil equivalent per 1000 EUR (kgoe/1000 EUR).

The indicator is also calculated in indexes with 2000 as base year (2000=100).

Units

- million EUR
- thousand tonnes oil equivalent (ktoe)
- kilograms oil equivalent (kgoe)
- indexes (2000=100)

Policy relevance of the indicator

List of relevant policy documents:

- Strategy for Energy Efficiency of the Republic of Macedonia [3]
- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [4]
- Strategic Plan for Work of the Ministry of Economy for the period 2010 – 2012 [5]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[6]

[3] http://www.economy.gov.mk/WBStorage/Files/Strategija%20za%20energetska%20efikasnost%20na%20Republika%20Makedonija.pdf

[4] Taken over fro the Ministry of Economy http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[5] http://www.economy.gov.mk/WBStorage/Files/STRATESKI_PLAN_NA_ME_2010_2012.pdf

[6] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

Target to be achieved in EU is spending tonnes oil equivalent per 1.000 US$ GDP, while the target in the Republic of Macedonia is 0,75 tonnes oil equivalent. The implementation of measures under the Strategy for Energy Efficiency Promotion, this should drop down to 0,45 to 0,49 into 2020.

Key question

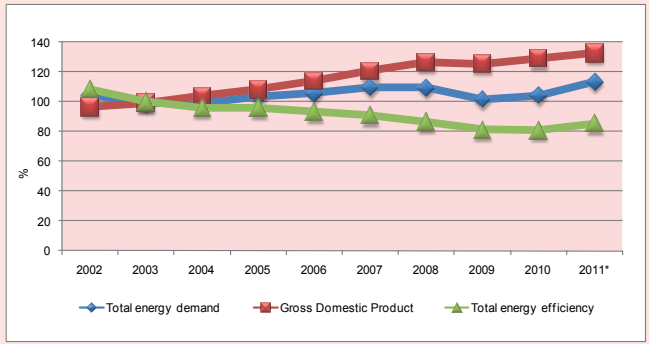
What will be the dynamics of strategic targets implementation and achievement?

Key message

The trend in Energy intensity in the Republic of Macedonia recorded decline by 21,3% in the period from 2002 to 2011, mainly due to the trend of growth in GDP for the same past period.

At this moment, the ratio of energy intensity is by four times higher compared to the European one, i.e. energy efficiency measured by GDP is by four times lower than the energy efficiency in the European Union.

Figure 1. Total energy intensity



Assessment

Constant change in the trend of total energy intensity was notable in the period from 2002 to 2011. The trend of decline by 21,3% of total energy intensity was specific for the same period.

Comparative analysis of energy consumption relative to GDP, so called indicator of energy intensity, has shown that the Republic of Macedonia belongs to

the group of countries with relatively high energy consumption levels, due to the high energy intensity of the facilities that lead the economic growth. Also, due to the long-lasting treatment of the electricity price as a social category, the residential sector uses significant quantities of electricity for heating.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),,
- „Energy Statistics Methodology Eurostat F4, 1998"
- National classification of activities NCA Rev.2 (Official Gazette of the Republic of Macedonia no. 147/2008)..

Data specification

Title of the indicator	Source	Reporting obligation
Total energy intensity	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Total energy intensity

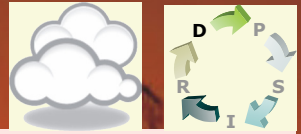
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Total energy demand (ktoe)	2892	2740	2749	2863	2925	3033	3023	2810	2879	3133
Total energy intensity (kgoe/'000 EUR)	771,4	710,9	681,6	680,3	661,9	646,5	613,9	575,7	573,3	607,1
	Index 2000=100									
Total energy demand	104,6	99,1	99,4	103,5	105,8	109,7	109,3	101,6	104,1	113,3
Gross Domestic Product	96,3	99,0	103,6	108,1	113,5	120,5	126,5	125,4	129,0	132,6
Total energy intensity	108,6	100,1	96,0	95,8	93,2	91,0	86,4	81,1	80,7	85,5

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 028	Total energy intensity	CSI 028 EE 23	Total energy intensity	R	B	energy	annualy

MK - NI 029 TOTAL ENERGY CONSUMPTION BY FUEL (GROSS INLAND CONSUMPTION)



Definition

Total energy consumption or gross inland consumption represents the total quantity of energy necessary to satisfy the total national needs for energy for energy transformations, all types of consumption by energy sector and final energy and non-energy consumption.

The total energy consumption is calculated as sum of the total energy consumption originating from solid fuels, oil, natural gas and renewable sources.

The indicator «Total energy consumption by fuel» is expressed in thousand tonnes of oil equivalent (ktoe) and in percentage as ratio between the total energy consumption per fuel and the total energy consumption of all fuels.

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- National Strategy for Sustainable Development in the Republic of Macedonia 2009 – 2030[7]
- Strategy for Energy Efficiency in the Republic of Macedonia by 2020[8]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[9]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

Reduction in the dependence on imported fuels and reduction in inefficient energy consumption;

Modernization of energy infrastructure and diversification of energy supply (extension of the network for natural gas is an important essential element for the implementation of all measures envisaged towards energy efficiency);

Participation in of regional cooperation and compliance with the legislation of the Energy Community;

[7] http://www.moepp.gov.mk/WBStorage/Files/Nacionalna%20Strategija%20za%20Odrzliv%20Razvoj%20vo%20RM-NSSD%20Del%201.pdf

[8] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[9] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Key question

What are the trends conserning the share of fuels in the total energy consumption?

Key message

In the period between 2002 and 2011, the total energy consumption by fuel increased by 8.3%. The highest share in the total energy consumption belongs to solid fuels ranging from 45% to 51.6%. For the period 2002 to 2011, there was significant increase in the amounts of natural gas used as one of the fuels with cleaner ecological footprint, noting increase by 48.64%. Use of oil shows obviously constant values, except in 2002 (1173 ktoe) and 2007 (1173 ktoe), when increase in the use of oil was recorded.

Significant change in the trend of solid fuels use and gradual structural saubstitution with cleaner or renewable energy sources is necessary.

Figure 1. Total energy consumption by fuel

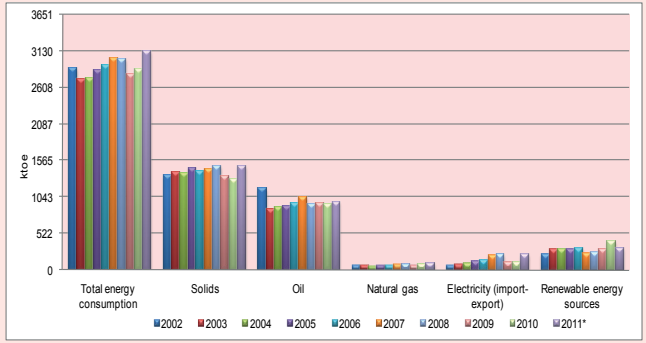
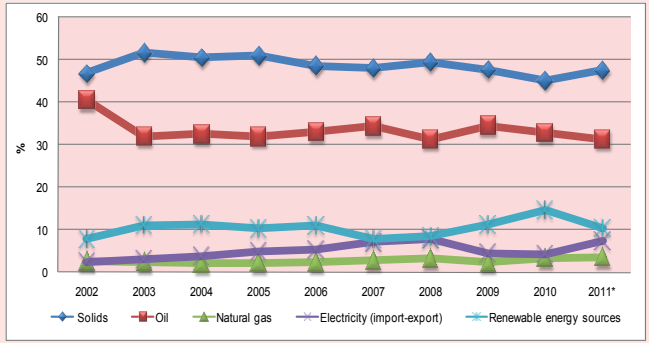


Figure 2. Share by fuel in the total energy consumption



Assessment

In tha past period, dominant energy sources in the Republic of Macedonia have been coal, oil and oil derivatives. The share of solid fuels in the total energy consumption for the period between 2002 and 2011 was significantly higher compared to other energy sources. Reduction of ecological footprint of electricity production in thermal power plants fueld by low calorific coal – lignite is among the greatest challenges in the attempt to reduce the effects of gas emissions in the production process. Renewable energy sources have negligible share, except for wood which is mostly used in individual households without adequate filters for combustion gas emissions.

Increase in the share of renewable energy sources in total energy consumption would be at the same time a possibility for economy restructuring in several sectors, energy efficiency in households and industry, as well as jobs creation.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Total energy consumption by fuel	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Total energy consumption by fuel

	2002	2003	2004	2005	2006	2007	2008	2009 *	2010	2011 *
Gross inland consumption (ktoe)	2892	2740	2749	2863	2925	3033	3023	2810	2879	3133
- Solids	1352	1415	1385	1459	1419	1455	1492	1338	1296	1488
- Oil	1173	876	895	912	968	1042	945	970	946	980
- Natural gas	74	65	57	62	66	85	96	64	95	110
- Electricity (import-export)	68	82	101	137	154	214	235	124	122	230
- Renewable energy sources	225	302	310	293	318	237	254	314	420	325

*Previous data

Table 2: Percentage of the total energy consumption by fuel

	2002	2003	2004	2005	2006	2007	2008	2009 *	2010	2011 *
Gross inland consumption (%)	100	100	100	100	100	100	100	100	100	100
- Solids	46,8	51,6	50,4	51,0	48,5	48,0	49,4	47,6	45,0	47,5
- Oil	40,6	32,0	32,6	31,8	33,1	34,4	31,3	34,5	32,8	31,3
- Natural gas	2,6	2,4	2,1	2,2	2,3	2,8	3,2	2,3	3,3	3,5
- Electricity (import-export)	2,4	3,0	3,7	4,8	5,3	7,1	7,8	4,4	4,2	7,3
- Renewable energy sources	7,8	11,0	11,3	10,2	10,9	7,8	8,4	11,2	14,6	10,4

*Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 029	Total energy consumption by fuel	CSI 029 EE 24	Total energy consumption by fuel	D	A	energy	annualy

MK - NI 030

RENEWABLE ENERGY CONSUMPTION

Definition

Renewable energy sources are defined as renewable non-fossil energy sources: hydropower, geothermal, solar and wind power; solid biomass; biogas, liquid biofuels, etc.

The indicator «Renewable energy consumption» is expressed as ratio of total renewable energy consumption and the total energy consumption originating from all fuels (in percentage).

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- Strategy for Energy Efficiency in the Republic of Macedonia by 2020[10]
- Strategic Plan for Work of the Ministry of Economy for the period 2010 – 2012
- Strategy for Energy Development in the Republic of Macedonia by 2030[11]
- Strategy for Utilization of Renewable Energy Sources (RES) in the Republic of Macedonia by 2020[12]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Key question

How fast is the share of renewable energy in the total energy consumption?

Key message

Policies in energy sector should favour measures for greater use of renewable energy sources.

Relatively low share of renewable energy in the total energy consumption (10,35% at an average) indicates dominant use of fossile fuels which is unfavourable in terms of both depletion of energy resources and environmental pollution.

[10] Taken over from the Ministry of Economy http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[11] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

[12] http://www.economy.gov.mk/WBStorage/Files/Strategija_za_OIE_28_juni_2010.pdf

Biomass has the highest share of renewable energy in the total energy consumption and ranges from 4,63% to 6,90%, while the lowest share belongs to solar electric energy with 0,003%. Hydro electricity has a share in the range between 2,3 and 7,3%.

Targets

Reduction in the dependence on imported fuels and reduction in inefficient energy consumption;

Modernization of energy infrastructure and diversification of energy supply;

Participation in of regional cooperation and compliance with the legislation of the Energy Community.

Figure 1. Share of renewable energy in the total energy consumption by energy source (%)

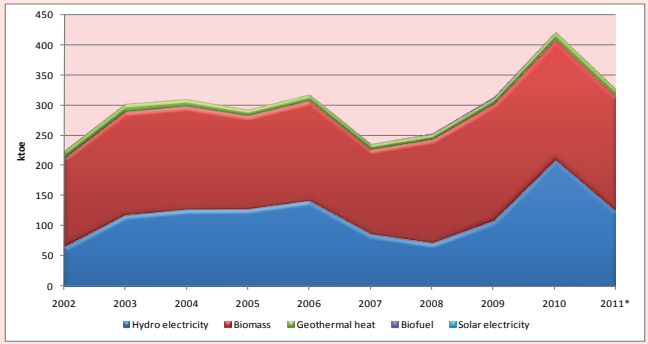
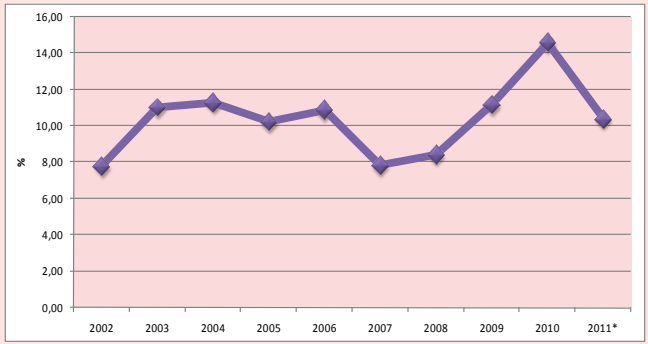


Figure 2. Total share of renewable energy in the total energy consumption (%)



Assessment

Relatively low share of renewable energy in the total energy consumption (10,35% at an average) indicates the dominant use of fossile fuels which is unfavorable in terms of both energy resources depletion and environment pollution.

In the period from 2002 to 2006, there was growth by 41,3 % in the share of renewable energy in the total energy consumption, followed by decline in 2007 by 25,4%, and then growth again in the period from 2008 to 2010 of 77,13%, and significant decline in 2011 amounting 77,13%.

Biomass has the highest share of renewable energy in the total energy consumption and ranges from 4,63% to 6,90%, while the lowest share belongs to solar electric energy with 0,003%. Hydro electricity has a share in the range between 2,3 and 7,3%.

The minimal share of renewable energy sources in the share of the total energy production and consumption in the Republic of Macedonia indicates that the available resources (e.g.geothermal, hydro, solar power) are insufficiently utilized, but also the aspects of energy security, in terms of all steps that need to be undertaken by the state to prevent threats in relation to planned demands for energy by the national economy. Energy security or threat to economy and social welfare the factors of which are minimized with reduction of dependence on energy and energy resources import, indicate the importance of social resources streamlining towards maximum utilization of natural renewable sources.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Renewable energy consumption	▪ State Statistical Office	▪ Eurostat ▪ ECE/UN ▪ IEA/OECD

Data coverage:

Table 1: Share of renewable energy in the total energy consumption by energy resources type

	Total energy consumption	Hydro electricity		Biomass		Geothermal heat		Biofuel		Solar electricity		Total share
year	ktoe	ktoe	%	ktoe	%	ktoe	%	ktoe	%	ktoe	%	%
2002	2.892	65	2,3	147	5,08	13	0,45					7,78
2003	2.740	118	4,3	171	6,24	13	0,48					11,03
2004	2.749	127	4,6	171	6,22	12	0,43					11,28
2005	2.863	128	4,5	154	5,39	10	0,35					10,22
2006	2.925	142	4,8	166	5,66	10	0,35					10,86
2007	3.033	87	2,9	140	4,63	10	0,32					7,82
2008	3.023	72	2,4	172	5,68	9	0,30	1	0,04			8,41
2009	2.810	109	3,9	193	6,86	10	0,35	2	0,07			11,16
2010	2.879	209	7,3	199	6,90	12	0,41	0	0,02	0,00	0,000	14,59
2011*	3.133	123	3,9	189	6,04	12	0,40	0	0,01	0,10	0,003	10,38

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 030	Renewable energy consumption	CSI 030 EE 26	Renewable energy consumption	R	B	energy	annualy

MK - NI 031

RENEWABLE ELECTRICITY

Definition

Renewable electricity sources are defined as renewable non-fossil sources of energy, such as: hydropower, geothermal, solar and wind power; solid biomass; biogas, liquid biofuels, etc.

The indicator «Renewable electricity» measures the share of electricity produced from renewable sources in gross national electricity production (in percentage).

The gross national electricity consumption is a sum of the total gross production and import of electricity minus electricity exported.

Units

- GWh
- percentage

Policy relevance of the indicator

- National Strategy for Sustainable Development in the Republic of Macedonia 2009 – 2030[13]
- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [14]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[15]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

To achieve the required increase in order to reach the EU indicative target of 21% share by 2020.

Key question

What is the share of electrcity originating from renewable sources in the gross electricity consumption in the Republic of Macedonia?

Key message

In the context of the indicative goal of 21% of gross consumption of electricity originating from renewable energy sources in EU-25, as specified by the EU in

[13] http://www.moepp.gov.mk/WBStorage/Files/Nacionalna%20Strategija%20za%20Odrzliv%20Razvoj%20vo%20RM-NSSD%20Del%201.pdf
[14] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf
[15] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

its Directive No. 2001/77/EC, the need for greater utilization of renewable energy sources in the Republic of Macedonia is in line with the practices in developed countries and their efforts to reduce pollutants emission and support the sustainable development. Republic of Macedonia needs to set the national target for renewable energy share in line with the potential of the available renewable energy sources.

The share of electrcity originating from renewable sources in the gross electricity consumption in the Republic of Macedonia is rather low. It makes relatively high annual fluctuation depending on hydrological conditions.

In 2010, resulting from favourable hydrological conditions, the share of renewable electricity in the total gross electricity consumption was 28%, while in 2011 it noted a fall to 15%.

Figure 1. Trend in gross electricity and renewable electricity consumption

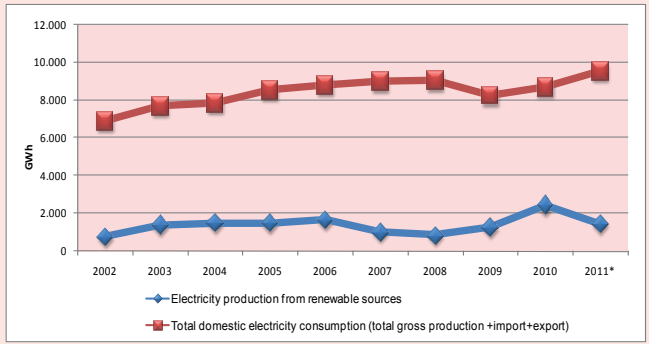
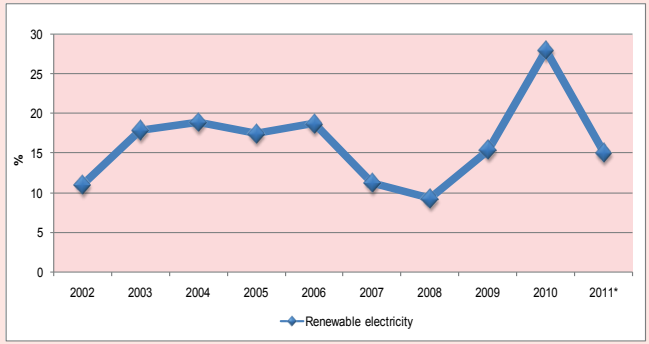


Figure 2. Electricity production from renewable sources (%)



Assessment

The production of electricity from renewable sources in the Republic of Macedonia is based on the hydropower, while minor contribution has been noted by solar electricity for the last couple of years. Production in large hydropower plants is predominant.

At present, the share of renewable electricity in the overall electricity consumption is very important and depends on hydrological conditions during the year. Variable hydrological conditions result in variations in the production of hydro energy due to lower quantities of precipitation. This indicates the fact that there is a need for investments in installations to enable utilization of other renewable energy sources as well, such as geothermal, solar and wind power and increase in the share of the total electricity production.

During the observed period 2002 - 2011, and according to available data, the trend was even. The highest share of renewable electricity was recorded in 2010, amounting 28 %.

Methodology

■ Methodology for the indicator calculation

Statistical methodology for calculation:

- Common surveys for coal, oil, natural gas, electricity and heat, renewable energy for 2005 by Eurostat, ECE/UN and IEA/OECD
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Renewable electricity	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Trend in gross electricity consumption and renewable electricity consumption

GWh	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Electricity produced from renewable energy sources	1.170	626	757	1.374	1.482	1.492	1.650	1.010	840	1.270
Gross national electricity consumption (Total gross production+Import-Export)	6.923	6.792	6.881	7.690	7.841	8.541	8.801	8.990	9.044	8.266

* Previous data

Table 2: Renewable electricity production in %

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Electricity produced from renewable sources	16,9	9,2	11,0	17,9	18,9	17,5	18,7	11,2	9,3	15,4

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 031	Renewable electricity	CSI 031 EE 27	Renewable electricity	R	B	energy	annualy