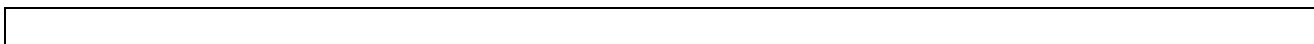




**STATEMENT ON SECURITY OF SUPPLY  
- REPUBLIC OF MACEDONIA -**



**Skopje, September 2013**

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## 1. LEGAL REGULATION ON SECURITY OF SUPPLY

### 1.1. ENERGY LAW

The Law on Energy (Official Gazette of Republic of Macedonia No. 16/2011, 136/2011 and 79/2013) governs: energy policy objectives and its enforcement; energy activities and manner of energy activities regulation; construction of energy facilities; the status and competences of the Energy Regulatory Commission of the Republic of Macedonia; electricity market, natural gas market, crude oil, oil derivatives and fuels for transport market, and heating energy market; energy efficiency requirements and promotion of the use of energy from renewable sources and other issues of importance in the energy field.

**Objective of this law is to ensure:**

- securing reliable, safe and quality energy and energy fuel supply to consumers;
- establishment of an efficient, competitive and financially sustainable energy sector;
- encouraging competition on energy markets with respect for the principles of non-discrimination, objectivity and transparency;
- integration of Republic of Macedonia's energy markets into the regional and international energy markets, pursuant to the commitments assumed under the ratified international treaties;
- increasing energy efficiency and promotion of the use of energy from renewable sources; and
- environmental protection from the adverse effects of particular activities in the energy field.

**The energy policy should secure:**

- reliable, safe and quality supply to consumers with all types of energy and energy fuels;
- establishment of transparent and stable terms and conditions for competitive and economically viable energy sector;
- promotion of market competition in energy services provision, based on the principles of non-discrimination and transparency;
- efficient service provision to consumers,
- integration of the Republic of Macedonia's energy markets into the regional and international energy markets;
- use of energy sources in a manner that provides sustainable energy development;
- promotion of energy efficiency;
- promotion of the use of renewable energy sources;
- environmental protection from the adverse effects of energy activities performance;
- fulfillment of commitments assumed under the ratified international documents; and
- measures aimed to protect citizens from energy poverty.

### 1.2. ENERGY REGULATORY COMMISSION

**Energy Regulatory Commission** is an independent body regarding the operation and decision taking process within the scope of its competencies. The Energy Regulatory Commission (ERC) was established by the Law for amending the Energy Law (Official Gazette 94/2002) and became operational in 2003. The ERC is composed of five members, one of which acts as its president. The members and the president of the ERC are appointed and dismissed by the Parliament of the Republic of Macedonia, upon proposal of the Government of the Republic of Macedonia, taking in consideration the adequate and just representation of all communities.

According to the Energy Law, for the purpose of securing efficient, competitive and uninterrupted operation of energy markets, ERC has the following competences:

- 1) monitor the operation of energy markets, for the purpose of securing reliable energy and energy fuel supply;
- 2) adopt regulations and tariff systems and adopt or approve tariff-setting methodologies for regulated energy activities;
- 3) adopt regulations, price-setting and tariff system methodologies on relevant energy type and/or energy fuel delivery to captive consumers;
- 4) adopt decisions on prices and tariffs, based on relevant regulations, methodologies and tariff systems;
- 5) adopt regulations on price-setting methodology for oil derivatives and fuels for transport and price-setting decisions for oil derivatives and fuels for transport, pursuant to the commitments assumed by the Republic of Macedonia;
- 6) approve the Grid Codes adopted by the energy system operators, by taking due consideration of their compliance with the commitments the Republic of Macedonia has assumed under the international treaties or the commitments of the energy system operators stemming from their membership in international associations;
- 7) on the proposal from the relevant energy system operators, approve the terms and conditions and connection and access charges for relevant transmission and distribution systems;
- 8) adopt Electricity Supply Rules, Heating Energy Supply Rules and Natural Gas Supply Rules;
- 9) adopt Rules on Electricity Supply of Last Resort and Natural Gas Supply of Last Resort;
- 10) adopt the Electricity Market Code and the Natural Gas Market Code;
- 11) when needed, request relevant system operators or electricity market operator to change terms and conditions, tariffs, rules, mechanisms and methodologies governing the connection to, access to, balancing or use of relevant systems or market;
- 12) take decisions upon applications submitted for exemption from the obligation on allowing third party access to energy systems or new interconnection gas pipelines;
- 13) keep the Registry of Preferential Generators and adopt decisions on awarding the status of preferential generator;
- 14) take due care for the protection and promotion of rights of energy and energy fuel consumers and of energy system users;
- 15) propose measures aimed to encourage competition on energy markets;
- 16) stipulate the terms and conditions, manner and procedure and adopt decisions on issuing, altering, transfer, suspension, revoking and termination of separate energy activity licenses and monitor the implementation of obligations stipulated in the energy activity licenses issued;
- 17) approve transmission and distribution grid development and construction plans and monitor their timely adoption and implementation;
- 18) approve and monitor the implementation of compliance programs adopted by relevant energy system operators, by means of which they secure full legal, financial, management and operational independence of operation from the vertically integrated energy companies to which they belong, as well as from related energy companies;
- 19) resolve disputes occurred between entities performing regulated energy activities and their users, including cross-border disputes;
- 20) cooperate with competent state authorities, local self-government unit bodies, entities performing energy activities, energy users and other organizations and institutions;
- 21) submit proposals to competent authorities on taking measures pursuant to their competences and in a procedure stipulated by law, against entities performing their activities in violation to the present law;
- 22) raise initiatives and propose adoption of new and amendments to existing laws and other regulations in the energy field;

- 23) participate in relevant regional and international organizations and cooperate with other regulatory bodies, for the purpose of contributing to development of regional energy markets, pursuant to the commitments assumed under the ratified international treaties;
- 24) adopt the Book of Operation and other internal acts related to its operation; and
- 25) perform other matters pursuant to a law.

For the purpose of securing efficient performance of its competences related to the operation of energy markets, ERC monitors in particular:

- 1) implementation of legally stipulated obligations of entities performing regulated energy activities related to securing reliability of electricity, natural gas and heating energy supply;
- 2) operation of energy markets, for the purpose of securing their promotion, as well as for the purpose of securing non-discrimination, effective competition, transparency and efficient operation of markets;
- 3) application of rules governing interconnection allocation and congestion management in the electricity and natural gas transmission systems, based on the commitments assumed by the Republic of Macedonia under the ratified international treaties;
- 4) use of income generated from congestion management in the electricity and natural gas transmission systems;
- 5) time needed by transmission and distribution system operators to perform connections and repairs;
- 6) timely announcement of relevant information held by transmission and distribution system operators related to interconnections, grid use and capacity allocation to interested parties, taking due consideration of the need for individual information to be treated as commercially confidential;
- 7) changes in the ownership structure of entities performing energy activities and submit proposals to competent state authorities on measures aimed to protect and promote competition on energy markets;
- 8) application of tariff systems and stipulated tariffs;
- 9) application of terms and conditions for connection of new generation facilities, taking due consideration of the costs and benefits related to different technologies on renewable energy sources, embedded generation and cogeneration of heating energy and electricity;
- 10) operation of license holders as regards their obligations stipulated in the licenses issued;
- 11) quality of services provided by license holders;
- 12) effective unbundling of accounting records pursuant to the present law, for the purpose of avoiding cross-subsidies between energy or natural gas generation, transmission, distribution and supply activities and for the purpose of eliminating cross-subsidies between consumer groups and transfer of income and costs for the performance of regulated and/or non-regulated energy activities;
- 13) implementation of compliance programs adopted by relevant energy system operators, by means of which they should secure full legal, financial, management and operational independence from the vertically integrated companies to which they belong, as well as from related energy companies, for the purpose of securing non-discrimination, transparency and objectivity in the operation of energy markets.

### **1.3. COMMISSION FOR PROTECTION OF COMPETITION (CPC)**

CPC is competent authority for implementation of the Law on Protection of Competition established in January 2005. From June 2006 CPC is competent authority for state aid control.

CPC is independent body composed of 5 members appointed by the Assembly of the Republic of Macedonia for the period of 5 years. The President and two members of the CPC are professionally engaged in the CPC's work. Within CPC the expert, normative legal, administrative, administrative-supervisory, financial, accounting, IT and other activities of the CPC are performed by supporting staff.

The main responsibilities of CPC are appraisal of concentrations according to the Law on Protection of Competition, appraisal of the compatibility of planned state aid according to Law on State Aid Control and conduct of infringement procedures and impositions of fines in cases of restrictive agreements and abuse of dominant position according to the Law on Protection of Competition.

Additionally CPC provides written opinions upon draft laws and other acts that regulate issues pertaining to the economic activity and which may influence the competition on the market and upon request of the Assembly, the Government of the Republic of Macedonia, other state authorities, undertakings, or *ex officio*, the CPC provides expert opinions on issues in the area of competition policy, protection of competition on the market and granting state aid.

#### **1.4. PUBLIC SERVICE OBLIGATION**

Obligation on Public service obligation is defined as one or more obligations imposed to the entities performing regulated energy activities for the purpose of public interest realization pursuant to the present law, and related to safety, including the reliability of supply, service affordability for users at all times, energy or energy fuel quality and price, services, as well as environmental protection, including energy efficiency and climate change protection. Regulated energy activity is energy activity by means of which the public service is provided and performed under terms and conditions, manner, prices and tariffs stipulated, i.e., approved by the Energy Regulatory Commission.

The following activities shall be regulated activities and the entities performing these activities shall have public service obligations imposed by the Energy Law: electricity transmission; electricity market organization and operation; electricity distribution; natural gas transmission; natural gas transmission system operation; natural gas distribution; heating energy distribution; electricity supply of last resort and natural gas supply of last resort. Also electricity generation for the needs of the electricity supplier of last resort shall be deemed regulated energy activity.

The entities performing regulated energy activities shall be obliged to comply with the obligations on public service provision. The Energy Regulatory Commission determines or approves the prices and terms and conditions for public service provision. The additional obligations on public service provision, imposed by the Energy Regulatory Commission, must be clearly stipulated, easily verifiable and non-discriminatory, while such additional obligations should be determined in the relevant license and published on the website of the Energy Regulatory Commission.

The services provided by entities performing regulated energy activities shall secure reliable, quality and uninterrupted energy and energy fuel delivery to consumers, under equal terms and conditions, prices and tariffs, taking due consideration of the need for energy efficiency improvements and environmental protection and promotion. The license on regulated energy activity performance shall indicate the volume and contents of services stipulated under the present law, the service area where public services are provided, as well as the duration of the obligation on public service provision.

Prices and tariffs which public services are provided should secure recovery of justifiable costs and reasonable return of capital for the entities performing regulated energy activities as regards their relevant public service provision, including the costs on efficient use of energy resources and environment protection and promotion.

When the entities performing energy activities and holding the obligation on public service provision are awarded financial reimbursement, other form of reimbursement and/or exclusive rights, for the purpose of implementing the obligations defined under the present law, this should be done in a transparent and non-discriminatory manner. The reimbursements awarded must not exceed the costs incurred for the public service provision, decreased by the income generated from the service provision.

The entities performing energy activities and holding the obligation on public service provision can be awarded state aid, pursuant to the State Aid Law. The legal entity performing one or more regulated energy activities cannot perform another energy activity or other activity, unless otherwise stipulated under the present law. In the cases when a legal entity performs one or more regulated energy activities or one or more energy activities and another energy activity or another activity, it shall be obliged to keep separate accounting for each regulated energy activity. For non-regulated energy activities or for other activities performed, the legal entity can keep consolidated accounting records.

The legal entity performing regulated energy activity shall be obliged to submit the Energy Regulatory Commission the audited annual financial reports and shall publish them on its website. The financial reports shall be submitted and published for each regulated energy activity separately, whereas for non-regulated

## 1.5. SUPPLIERS OF LAST RESORT

Energy Law defines Electricity Supplier of Last Resort and Natural Gas Supplier of Last Resort. **Electricity supplier of last resort** is an electricity supplier that provides the public service on electricity supply to households or small consumers in the cases stipulated under the law. **Natural gas supplier of last resort** is a natural gas supplier that provides the public service on natural gas supply to consumers connected to the natural gas system in the cases stipulated under the law.

The electricity supplier of last resort shall be obliged to secure supply to households and small consumers that have decided to be supplied by the supplier of last resort, for the purpose of exercising their right to electricity supply at all times, under reasonable and clearly comparable and transparent prices set by the Energy Regulatory Commission. The natural gas supplier of last resort shall be obliged to secure supply to consumers connected to the natural gas transmission or distribution system, for the purpose of exercising their right to natural gas supply at all times, under reasonable and clearly comparable and transparent prices set by the Energy Regulatory Commission.

The suppliers of last resort shall provide the public service and shall be obliged to secure electricity or natural gas supply to households or small consumers that have not signed contracts with any of the suppliers, or if their previous suppliers have discontinued the implementation of obligations assumed under the supply contracts.

In the case of electricity or natural gas supply of last resort to consumers, it shall be performed under approved and controlled prices that shall not prevent competition and normal operation of electricity and natural gas markets

## 1.6. ENERGY SECURITY AND ENERGY BALANCES

Reliability of relevant energy type or energy fuel supply shall be secured, in particular, by means of: achieving supply and demand balance on the relevant energy type market; forecasting the level of expected future demand for a particular energy type and the possibilities to address the forecasted demand with the available energy sources and facilities; undertaking measures to construct new energy facilities; quality and high level maintenance of relevant energy type transmission and distribution grids; and measures to address peak loads and contingency measures in the cases of failure to provide relevant energy type delivery.

State authorities and entities performing regulated energy activities, as part of their rights, obligations and competences stipulated under the present law, shall be obliged to propose and undertake measures aimed to secure reliability of energy supply, as stipulated in the present law.

The Energy Regulatory Commission shall supervise the compliance of entities performing regulated energy activities with the obligations on securing reliability of supply and in the annual report shall include data in particular related to:



- 1) reliability of the system operation;
- 2) five-year energy balance;
- 3) possibilities to secure reliable energy supply in the period of five to fifteen years after the year for which the report is prepared; and
- 4) possible investments in interconnection capacities for the next five years.

The Government of the Republic of Macedonia by means of the energy balance covering a period of five years in the function of an indicative planning document sets the total energy demand and demand for particular energy types, as well as the possibilities for their supply from in-country generation and from import. On the proposal from the Ministry and upon previously obtained opinion from the Energy Regulatory Commission, the Government of the Republic of Macedonia shall adopt the energy balance by the end of the calendar year.

The energy balance contains the detailed balance for the first year of the period covered, as well as a report on the implementation of the energy balance for the previous year and is prepared in compliance with the Rulebook on Energy Balances and Energy Statistics. The Ministry monitors the implementation of the detailed balance and in the case of energy shortage shall propose to the Government of the Republic of Macedonia measures aimed at more efficient use of energy available, additional import, more intensive use of available generation facilities and like.

On the request from the Ministry, the entities shall be obliged to submit data for the development and monitoring of energy balances and data required for the preparation of strategies, programs and reports on implementation programs whose adoption has been stipulated under the present law

#### **1.7. ACTS FOR DECLARATION OF CRISIS**

On the proposal from the Ministry, by means of an act, the Government of the Republic of Macedonia shall stipulate in detail the criteria and terms and conditions for declaring emergency, the manner of relevant energy type supply under such circumstances, measures to be taken in cases of emergency, as well as the rights and obligations of license holders on energy activity performance, pursuant to the Law on Emergency Situation Management. In order to protect energy systems and secure reliability of relevant energy type supply in the Republic of Macedonia, the relevant energy or energy fuel transmission and distribution system operators shall be obliged, pursuant to this act to develop contingency plans and submit them to the Ministry for approval.

Measures necessary to eliminate problems occurred and protect energy markets and energy systems of the Republic of Macedonia in emergency situations should be of temporary nature, should last until the end of the emergency and should cause the least possible distortion to the energy markets operation in the Republic of Macedonia and in the region. In compliance with the commitments assumed under the ratified international treaties, the Government of the Republic of Macedonia shall duly inform the neighboring and other countries that are or can be affected by the measures undertaken pursuant to the above mentioned, as well as the competent international institutions and bodies established under the ratified international treaties

Government according to the above mentioned article adopted Decree for criteria for announcing of electricity crisis, manner of supply with electricity in these conditions, and the rights and obligations of the license holder for performing energy activities (Official Gazette of Republic of Macedonia No. 53/2012). According to this Decree, the criteria on the basis of which the electricity crisis is declared are: elements of the energy balance of Republic of Macedonia; published data for the available transmission capacity of the cross-border lines with the neighboring countries; planned electricity needs in cooperation with the electricity market operator; forecasts for the electricity consumption; Grid code for transmission of electricity; Grid code for distribution of electricity; situation on the international electricity market, and the current situation of the generation and transmission facilities of the power system of Republic of Macedonia.

Also the Decree for criteria for announcing of natural gas crisis, manner of supply with natural gas in these conditions, and the rights and obligations of the license holder for performing

energy activities is in the final faze and it is expected to be adopted till October 2013. The Decree implements the provisions of the Directive 2003/55/EC concerning the specific customers (households) and protecting measures during the natural gas crisis.

## 2. STRATEGY FOR ENERGY DEVELOPMENT

Government of Republic of Macedonia in April 2010 adopted Strategy for Energy Development till 2030. The strategy for energy development of the Republic of Macedonia defines the most favorable long term development of the energy sector in the Republic with a view of providing a reliable and good quality energy supply to the consumers.

The following priorities have been taken into account for the realization of the above mentioned core objective:

- Maintenance, revitalization and modernization of the existing and construction of new, modern infrastructures for the purposes of energy production and utilization,
- Improvement of the energy efficiency in the production, transmission, and utilization of energy,
- Utilization of domestic resources (reserves of lignite, hydropower potential, wind and solar energy) for electricity production,
- Increase of natural gas utilization,
- Increase of the utilization of renewable energy sources,
- Establishment of economic prices on energy,
- Integrating the energy sector of the Republic of Macedonia in the regional and European market of electricity and natural gas by constructing new interconnections and by harmonizing the legislation with the existing *acquis communautaire* for energy, environment, competition and renewable energy sources.

Strategy for energy development elaborates:

- 1) long-term objectives on particular energy activities development, for the purpose of securing security of different energy types supply;
- 2) priorities to be developed;
- 3) identification and use of energy resources and facilities of strategic importance for the country;
- 4) long-term forecasting of investment needs in generation, transmission and distribution facilities, for the purpose of addressing energy demand and securing reliability of supply;
- 5) sources and manner for securing the required energy quantities;
- 6) financial means required to implement anticipated investments and manner of securing funds needed;
- 7) incentives to invest in energy facilities that use renewable energy sources;
- 8) incentives to increase energy efficiency;
- 9) terms and conditions and manners of securing environmental protection and protection implementation measures;
- 10) fulfillment of commitments assumed under international charters, agreements, treaties, conventions and other documents ratified and accessed to by the Republic of Macedonia;
- 11) encouraging energy market competition, based on the principles of objectiveness, transparency and unbiased treatment;
- 12) protection of energy consumers;
- 13) connection of the energy systems of the Republic of Macedonia or portions thereof to the energy systems of other countries;
- 14) other elements of importance for the development of the energy sector in the Republic of Macedonia.

## 2.1. PROGRAMME FOR REALIZATION OF STRATEGY FOR ENERGY DEVELOPMENT

The program for realization of the strategy for development of the energy for the period 2013 – 2017 was adopted by the Government of Republic of Macedonia on 26 of March 2013 and the same was published in the Official Gazette of Republic of Macedonia No. 50/2013. In the Program for realization of the Strategy for development of the energy is given review of the energy policy of Republic of Macedonia; plan is made for securing the necessary energy pursuant the basic scenario and the scenario with strengthened measures for improvement of the energy efficiency; scenario is made for realization of projects in the period 2013 – 2017 and also are explained the specific measures and activities that need to be implemented for the purpose to secure realization of the Program. Also, in the Program is made systematic review of each of the envisaged projects pursuant the financial means that are necessary, the manner of their securing and the carriers of the activities.

## 2.2. ENERGY CONSUMPTION IN THE PERIOD 2000-2011

According to the Strategy the annual growth of the total energy consumption in the past period was around 4,5%. The average growth of electricity was 3,5% and natural gas was around 10%.

	ktoe											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal	104	95	69	138	90	109	136	182	146	68	113	338
Petroleum Products	670	587	686	689	707	726	715	776	751	741	837	866
Natural gas	7	26	32	30	32	33	34	34	31	29	41	43
Geothermal	15	21	12	12	11	9	9	9	8	9	10	11
Biomass	204	143	141	165	166	151	163	138	169	191	198	189
Electricity	448	432	428	490	496	536	554	580	593	550	583	644
Heat	153	132	136	128	122	127	118	107	103	99	54	57

\* According the methodology of IEA and EUROSTAT the data for 2012 will be available in November 2013.

## 2.3. FINAL ENERGY NEEDS IN THE PERIOD 2012-2023

Until 2023 the total final energy consumption will grow with an average annual rate of 2.48%. The average growth of electricity is expected to be 2,11% and for natural gas the average growth is expected to be 9,8%.

	ktoe											
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Electricity	696	718	738	760	781	802	822	843	864	892	918	941
Heat	123	125	127	129	131	134	136	138	140	141	142	142
Petroleum Products	784	822	858	896	936	975	1014	1055	1093	1132	1170	1208
Natural gas	45	50	54	59	65	73	81	89	98	109	121	135
Coal	119	123	126	130	133	137	140	144	147	152	155	158
Biomass for combustion	223	225	227	228	230	231	233	234	236	236	235	234
Geothermal	11	12	14	15	18	20	24	28	34	39	41	43
Solar	1,6	1,9	2,2	2,6	3,1	3,5	4	4,6	5,2	5,6	5,9	6,2

### **3. MACEDONIAN POWER SYSTEM**

#### **3.1. REGULATORY FRAMEWORK IN ELECTRICITY SECTOR**

##### **3.1.1. Primary Legislation**

On February 3, 2011 the new Energy law was adopted (Official Gazette of Republic of Macedonia 16/2011) which regulates legal environment for performing energy activities. For the implementation of the Law additional secondary legislation is stipulated to be adopted. Most of the implementing acts are for determination of the regulatory framework. The Law has several updates (Official Gazette of Republic of Macedonia 136/2011 and 79/2013).

##### **3.1.2. Secondary Legislation**

###### ***Tariff system for sale of electricity to tariff customers***

On 30<sup>th</sup> of June 2011 ERC issued the Tariff system for sale of electricity to tariff customers and published in the "Official Gazette of the Republic of Macedonia", no. 88/2011. The Tariff system for sale of electricity to tariff customers, which implements provisions of the Directive 2003/54/EC, aims at creating rational and efficient generation, purchase, transmission, distribution and usage of electricity, as well as to provide realization of the regulated maximum revenue for performing the energy activity supply of electricity to tariff customers, determined in accordance with the Rulebook on electricity prices for tariff customers ("Official Gazette of Republic of Macedonia", no.21/2011). This Tariff system sets the criteria for determination of categories, group and subgroups of tariff customers, calculation elements for determination of the compensation for the delivered electricity, and basis for establishing prices for delivered electricity for the relevant calculation elements according to voltage level, time of delivery during the day and the type of metering. The Tariff system was amended in 2012.

###### ***Rules for electricity supply to tariff customers***

On 30<sup>th</sup> of June 2011 ERC issued the Rules for electricity supply to tariff customers and published in the "Official Gazette of the Republic of Macedonia", no. 88/2011. The Rules for electricity supply to tariff customers, which implements provisions of the Directive 2003/54/EC, determine the general conditions and the manner of electricity supply to tariff customers, as well as the mutual rights, obligations and responsibilities of the electricity supplier for tariff consumers, electricity tariff customers and the distribution system operator.

###### **Rules for electricity supply**

ERC brought this rulebook on 13.11.2012 and was published in the Official Gazette of Republic of Macedonia No. 144/2012 and changes were published in the Official Gazette of Republic of Macedonia No 91/2013. With these rules on supply with electricity are regulated general conditions and the manner of supply with electricity and as well as the relations, obligations and responsibilities of the suppliers of electricity, consumers of electricity, TSO and DSO.

###### **Rules for electricity supply for last resort**

ERC brought this rulebook on 13.11.2012 and was published in the Official Gazette of Republic of Macedonia No. 144/2012 and changes were published in the Official Gazette of Republic of Macedonia No 91/2013. With these rules on supply with last resort are regulated general conditions and the manner of supply with electricity for households and small consumers that decided to be supplied by the supplier of last resort and as well as the relations, obligations

and responsibilities of the supplier of last resort, households and small consumers of electricity and DSO.

### ***Rules on allocation of cross-border transmission capacities of JSC MEPSO Skopje***

AD MEPSO, as an electricity transmission system operator, prepared the Rules on allocation of cross-border transmission capacities. On 21<sup>st</sup> of July 2011 ERC brought Resolution for approval of the Rules on awarding the cross-border transmission capacities to AD MEPSO Skopje. The Rules on awarding the cross-border transmission capacities, ("Official Gazette of the Republic of Macedonia", no. 105/2011) which implements provisions of the Directive 2003/54/EC and Regulation 1228/2003, determine the manner of calculating available interconnection capacity, manner of interconnection transmission capacity awarding, by taking due consideration of electricity transmission system congestions, payment manner for the use of interconnection transmission capacities in cases of electricity transmission system and interconnection line congestions, and manner of data publishing.

### ***Electricity Market Rules***

According to Article 27 and Article 73 of the Energy Law, ERC prepared the draft text of the Electricity Market Rules, which implements provisions of the Directive 2003/54/EC. Several public debates and preparatory session were held, and on 07.05.2012 ERC issued the Electricity Market Rules ("Official Gazette of Republic of Macedonia", no.57/12). These rules shall stipulate the organization of the electricity market, obligations of the market operator and transmission and distribution system operators, conditions that should be fulfilled by the market participants, organization and control of the trading with electricity and ancillary services, including cross border trading, procedure and conditions for establishing of balancing groups, procedure for calculation of imbalances, etc.

### ***Rules for sale of excess electricity and power***

According to Article 66, paragraph 7 of the Energy Law ERC 07.03.2013 issued Resolution for approval of the Rules for sale of excess electricity and power. These rules stipulate the terms and conditions, manner and the procedure by which the electricity generator whose license also includes the obligation of public service provision, AD ELEM- Skopje, can sell the excess electricity and power on open, transparent and non-discriminatory manner, at market conditions.

### ***Tariff system for distribution of electricity for the customers connected to the distribution system in ownership of JSC ELEM - Skopje***

On 23.02.2012 ERC issued the Tariff system for distribution of electricity for the customers connected to the distribution system in ownership of AD ELEM – Skopje and published in the "Official Gazette of the Republic of Macedonia", no. 27/12. This Tariff system, which implements provisions of the Directive 2003/54/EC, stipulates the manner and conditions for establishment and approval of the tariffs for the calculation elements for distribution of electricity, by which the Distribution System Operator invoices the charge for the use of the distribution system. The tariffs for the calculation elements shall provide for the Distribution System Operator realization of the regulated maximum revenue determined by ERC's decision in accordance with the Rulebook on the manner and conditions for determination of regulated maximum revenue and regulated average tariffs for transmission, organization and operation of the electricity market and distribution of electricity ("Official Gazette of Republic of Macedonia", no.21/11 and 168/11).

### ***Grid code for distribution of electricity of EVN Macedonia SAC Skopje***

According to Article 77 and Article 193 of the Energy Law, EVN Macedonia AD Skopje, as Distribution System Operator, in April 2012 submitted the Grid code for distribution of electricity to ERC for approval. On 18.05.2012 ERC held public debate and on 31.05.2012 and on 29.06.2012 preparatory sessions were held. ERC approved the Grid code for distribution of electricity on 29.06.2012 ("Official Gazette of Republic of Macedonia", no.87/12).

### ***Tariff system for transmission of electricity***

According to Article 25, paragraph 1 of the Energy Law, ERC prepared the draft text of the Tariff system for transmission of electricity, which implements provisions of the Directive 2003/54/EC. Several public debates and preparatory session were held, and on 30.07.2012 ERC issued the Tariff system for transmission of electricity (“Official Gazette of Republic of Macedonia”, no.97/12). This Tariff system sets the criteria for determination of categories of customers, calculation elements and basis for establishing tariffs of the calculation elements for use of the transmission system. Tariff system was amended in 2013.

#### ***Tariff system for distribution of electricity***

According to Article 25, paragraph 1 of the Energy Law, ERC prepared the draft text of the Tariff system for distribution of electricity, which implements provisions of the Directive 2003/54/EC. Several public debates and preparatory session were held, and on 30.07.2012 ERC issued the Tariff system for distribution of electricity (“Official Gazette of Republic of Macedonia”, no.97/12). This Tariff system sets the criteria for determination of categories of customers, calculation elements and basis for establishing tariffs of the calculation elements for use of the distribution system. Tariff system was amended in 2013.

#### ***Tariff system amending the Tariff system for sale of electricity to tariff customers***

On 30.07.2012 ERC issued the Tariff system amending the Tariff system for sale of electricity to tariff customers (“Official Gazette of Republic of Macedonia”, no.88/11). With this Tariff system which is published at the “Official Gazette of Republic of Macedonia”, no.97/12, changes regarding the duration of the peak period were adopted.

#### ***Tariff system amending the Tariff system for sale of electricity to tariff customers connected on the distribution system in ownership of AD ELEM - Skopje***

On 30.07.2012 ERC issued the Tariff system amending Tariff system for sale of electricity to tariff customers connected on the distribution system in ownership of AD ELEM – Skopje (“Official Gazette of Republic of Macedonia”, no.27/12). With this Tariff system which is published at the “Official Gazette of Republic of Macedonia”, no.97/12, changes regarding the duration of the peak period were adopted.

#### ***Rulebook for prices of electricity for the supplier of last resort***

ERC prepared the Rulebook for prices of electricity for the supplier of last resort, which implements provisions of the Directive 2003/54/EC, and submitted it to the companies for comments and opinion, and on 19.07.2012 a preparatory session was held. On 30.07.2012 ERC issued the Rulebook for prices of electricity for the supplier of last resort (“Official Gazette of Republic of Macedonia”, no. 97/12). This Rulebook sets the manner and the conditions for establishment, approval and control of the prices by which the regulated maximum revenue necessary for the performing of the regulated energy activity: electricity supply of last resort is realized.

### **3.2. KEY MARKET PARTICIPANTS AND THEIR RESPONSIBILITIES (ELECTRICITY MARKET)**

The main objective of the Market Model in Macedonia is to provide sufficient flexibility to interface with market designs considered in the region and fit well in Regional Market and European Internal Market. The Electricity Market Design Plan proposes a gradual approach in the opening of the market in a way that each step allows to the consumers and to the electricity sector as a whole to capture the greatest gains with the least risk at the lowest implementation cost.

The essential attributes of the Key Market Participants are as follows:

**JSC ELEM** is electricity producer that has obligation to provide public service by means of electricity generation aimed to address the demand of households and small consumers supplied by the electricity supplier of last resort. By 30<sup>th</sup> November in the calendar year the latest, the producer and the electricity supplier of last resort shall be obliged to submit for approval to the

Energy Regulatory Commission the electricity purchase and sale contracts for the next year, whose duration cannot be shorter than one calendar year.

The above mentioned contract shall stipulate in particular:

- 1) the manner of harmonizing the planned electricity delivery by the generator and the demand of consumers supplied by the supplier of last resort for each month of the year, based on the annual forecasts developed by the supplier of last resort;
- 2) the manner of daily harmonization of the planned electricity delivery by the generator and the demand of consumers supplied by the supplier of last resort for each hour of the following day, based on the detailed forecasts developed by the supplier of last resort and taking due consideration of the availability and optimal use of generator's generation capacities;
- 3) the manner and procedure on exchange of data, changes to and harmonization of quantities agreed on monthly, daily and hourly level;
- 4) the price under which the supplier of last resort shall purchase the electricity, as approved by the Energy Regulatory Commission, and
- 5) mutual rights and obligations of the generator and the supplier in the case of the situation where there is an issue securing reliability of supply to households and small consumers.

Upon meeting the demand of small consumers and households, the producer can sell the excess electricity on the electricity market pursuant to the rules previously approved by the Energy Regulatory Commission. The producer is obliged:

- 1) to secure availability of agreed energy and/or ancillary services at the receipt point in the transmission or distribution system, pursuant to the license;
- 2) to operate in compliance with the laws, other regulations, as well as Transmission Grid Code or Distribution Grid Code, Market Code and terms and conditions stipulated in the licenses;
- 3) to submit reports, data and information to the Energy Regulatory Commission, pursuant to the terms and conditions stipulated in the license;
- 4) to submit reports, data and information to the electricity transmission system operator or distribution system operator, pursuant to the Transmission or Distribution Grid Code; and
- 5) to submit the electricity market operator and the electricity system operator data and information on electricity purchase and sale contracts, the availability of generation capacity and/or ancillary services, except for commercial and financial data, pursuant to the Market Code; and
- 6) to secure electricity for own consumption from its facilities or on the open market.

In addition to the obligation stipulated above, producer shall also be obliged:

- 1) to submit the Energy Regulatory Commission financial reports, pursuant to Article 5 from the present law; and
- 2) to keep separate accounting records for the sales made to the supplier of last resort and the sales of electricity and ancillary services on the market, as well as to maintain the entire documents and records and to enable access thereto, on the request from the Energy Regulatory Commission.

**JSC MEPSO** - The transmission system operator in Republic of Macedonia is owner of the complete equipment for transmission of electricity and keeps the maintenance, planning, expansion and construction of the transmission network, management of the electricity system as well as, organizing and management of the electricity market. JSC MEPSO as a market operator is responsible for the efficient functioning of the market, managing the system for electricity sale and purchase pursuant to the market-based principals and for development of the organized market pursuant to the principals for transparency, non-discrimination and competition, provide all services



pursuant to the conditions determined in the license, under regulated prices and conditions approved and published by the Energy Regulatory Commission.

As a transmission system operator, MEPSO is obliged:

- 1) to secure reliable and safe operation of the electricity transmission system of the Republic of Macedonia, pursuant to the applicable regulations that stipulate the technical rules,
- 2) to secure safe, reliable and quality electricity transmission through the transmission grid of the Republic of Macedonia, in a non-discriminatory and transparent manner and under stipulated quality;
- 3) to connect generators, consumers and distribution system operators to the transmission grid, as well as to allow third party access for electricity transmission system use, pursuant to the present law and the Transmission Grid Code, and based on the principles of objectivity, transparency and non-discrimination;
- 4) to construct new interconnection capacities with the neighboring countries, taking due consideration of the efficient use of existing interconnection capacities and the balance between investment costs and benefits for the consumers;
- 5) to provide cross-border electricity flow through the transmission grid of the Republic of Macedonia within the available transmission capacity;
- 6) to develop, upgrade and maintain the transmission system, for the purpose of safe and efficient system operation, pursuant to the applicable regulations that stipulate the technical rules and to provide long-term system ability to address the reasonable electricity transmission demand;
- 7) to develop the grid maintenance plan pursuant to the Transmission Grid Code, and submit it to the Energy Regulatory Commission and publish it on the operator's website;
- 8) to provide real-time management of electricity flows, by taking due consideration of electricity generation in the Republic of Macedonia, declared import, declared export and declared transit through the transmission system of the Republic of Macedonia, based on the nominations submitted by market participants to the electricity market operator, pursuant to the Electricity Market Code;
- 9) to provide concurrent operation of the electricity system of the Republic of Macedonia and the neighboring electricity systems, as well as exchange of data with the operators of other electricity transmission systems pursuant to the commitments the Republic of Macedonia has assumed under the international treaties or the commitments of the operator stemming from its membership in international associations;
- 10) to publish data on available transmission capacities at interconnection lines with the neighboring systems, for the purpose of securing non-discriminatory, objective and transparent access to and use of the electricity transmission system;
- 11) to install and maintain metering devices at all metering points on the receipt and delivery points in the transmission system;
- 12) to meter electricity at the receipt and delivery points in the transmission system and submit metered data to relevant transmission system users and to the market operator;
- 13) to purchase electricity to cover losses in the electricity transmission system, under market terms and conditions and in a transparent, non-discriminatory and competitive manner, pursuant to the Electricity Market Code;
- 14) to purchase ancillary services and relevant operation reserve, under market terms and conditions and in a transparent, non-discriminatory and competitive manner, pursuant to the Electricity Market Code;
- 15) to address peak loads in the transmission system, pursuant to the Transmission Grid Code;
- 16) to balance deviations between the actual and planned electricity consumption in real time, pursuant to the Electricity Transmission Grid Code;

- 17) to provide transparent and non-discriminatory application of balancing procedures to announced and realized electricity market transactions and service billing and collection;
- 18) to establish the required changes to the schedule and time of engagement of generation facilities and electricity purchase in cases of risks to the reliability of electricity supply, outages or major deviations in electricity consumption from the anticipated quantities;
- 19) to allow users access to metering devices owned by the operator, pursuant to the present law and Transmission Grid Code;
- 20) to secure confidentiality of commercial and business data of system service users; and
- 21) to cooperate with electricity transmission system operators and relevant associations, pursuant to the commitments assumed under the ratified international treaties or the commitments assumed by accessing to international organizations.

**JSC MEPSO** as an **electricity market operator** shall be responsible for the electricity market organization, efficient operation and development, pursuant to the principles on publicity, transparency, non-discrimination and competitiveness and shall be obliged to provide the services falling under its competences, pursuant to the law and the terms and conditions stipulated in the license. The electricity market operator shall prepare and submit to the electricity transmission system operator the information required for the development of dispatching schedules, pursuant to the Market Code. The electricity market operator shall keep the records on electricity physical transactions, based on the information on electricity purchase/sale and transit transactions submitted by electricity market users. The electricity market operator shall be obliged to secure confidentiality of commercial and business data which the electricity market participants are obliged to submit.

**JSC EVN Macedonia** as an **electricity supplier of last resort** purchases electricity to address the demand of households and small consumers that have decided to be supplied by the supplier of last resort. The purchase prices and relevant contracts with the producer that performs public service obligation shall be approved by the Energy Regulatory Commission.

For the purpose of addressing the demand of its consumers, the electricity supplier of last resort shall secure the necessary transmission and/or distribution capacity, as well as the services of the electricity market operator. The electricity supplier of last resort shall invoice its consumers for the electricity delivered and services provided pursuant to the Tariff System on electricity sale to households and small consumers. The electricity supplier of last resort can purchase electricity at the market and under market prices provided that:

- 1) market terms and conditions and market prices are more favorable compared to terms and conditions and prices set for the generator referred to in Article 66 from the present law; or
- 2) at given periods, the electricity generated by the generator referred to in Article 66 from the present law does not suffice to meet the electricity demand of households and small consumers.

To the extent necessary in the light of securing reliability of supply to households and small consumers, on the request from the supplier of last resort and by means of a decision the Energy Regulatory Commission can temporary charge another market participant that holds the obligation on public service provision to purchase electricity for the households and small consumers for a period determined in the decision. The supplier of last resort shall provide evidence in support of its inability to purchase electricity in a manner in which it secures reliability of supply. The Energy Regulatory Commission can revoke this decision as soon as it has determined that the reasons for its adoption do no longer exist.

**JSC EVN Macedonia** as a **distribution system operator** is responsible for the maintenance, upgrade, expansion and operation of the distribution system used to perform its activity, and shall be obliged to secure its connection to the electricity transmission system. The distribution system operator shall be responsible for the long-term electricity distribution system development planning in the area where it performs the activity. The electricity distribution system operator is obliged:

- 1) to secure safe and reliable operation of the distribution system, pursuant to the applicable regulations that stipulate the technical rules;
- 2) to secure reliable, safe and quality electricity distribution and delivery through the distribution system it operates, in a non-discriminatory and transparent manner and under stipulated quality;
- 3) to connect generators and consumers to the distribution system, as well as to allow third party access for distribution system use, pursuant to the present law and the Distribution Grid Code, and based on the principles of objectivity, transparency and non-discrimination;
- 4) to develop, upgrade and maintain the distribution system, pursuant to the applicable regulations that stipulate the technical rules, and to provide long-term system ability to address the reasonable electricity distribution demand;
- 5) to develop the grid maintenance plan pursuant to the Distribution Grid Code, and submit it to the Energy Regulatory Commission;
- 6) to harmonize operations in the distribution system with the electricity transmission system operator;
- 7) to purchase electricity and ancillary services to cover the losses in the distribution grid, under market terms and conditions and in a transparent, non-discriminatory and competitive manner, pursuant to the Electricity Market Code;
- 8) to meter electricity received from generators and the electricity transmission system and energy delivered to consumers connected to the distribution system, as well as to submit metered data to the generators or suppliers or traders, and to the market operator;
- 9) to allow users access to metering devices owned by the distribution system operator, pursuant to the present law and Distribution Grid Code;
- 10) to prepare reports on the financial and actual volume of planned and realized services and to submit them to the Energy Regulatory Commission in a manner and under terms and conditions and within deadlines stipulated in the license;
- 11) to keep the dispatch log, records on the communication systems reliability, data from the supervision and operation system, metered data and to keep such data, logs and records for at least ten years; and
- 12) to secure confidentiality of commercial and business data of distribution system users.

The distribution system use charge shall be settled by electricity consumers connected to the distribution grid. The electricity distribution system operator shall invoice the electricity distribution system use charge to consumers connected to the electricity distribution system, as well as the electricity transmission system use charge, pursuant to the published tariffs. As an exception from this, the electricity distribution system operator can sign contracts with electricity suppliers or traders by means of which it shall authorize them to collect the charges.

**JSC Negotino** is electricity producer that can sell electricity and/or ancillary services to domestic and foreign traders, electricity suppliers, electricity transmission system operator and electricity distribution system operators. The electricity generator shall be obliged:

- 7) to secure availability of agreed energy and/or ancillary services at the receipt point in the transmission or distribution system, pursuant to the license;
- 8) to operate in compliance with the laws, other regulations, as well as Transmission Grid Code or Distribution Grid Code, Market Code and terms and conditions stipulated in the licenses;
- 9) to submit reports, data and information to the Energy Regulatory Commission, pursuant to the terms and conditions stipulated in the license;
- 10) to submit reports, data and information to the electricity transmission system operator or distribution system operator, pursuant to the Transmission or Distribution Grid Code; and

- 11) to submit the electricity market operator and the electricity system operator data and information on electricity purchase and sale contracts, the availability of generation capacity and/or ancillary services, except for commercial and financial data, pursuant to the Market Code; and
- 12) to secure electricity for own consumption from its facilities or on the open market.

For the purpose of securing reliability of electricity supply, electricity generators that use mazut as fuel shall be obliged to dispose at all times with operation reserves of mazut in the quantity equal to at least fifteen-day operation demand under maximum operation capacity.

Currently JSC Negotino is engaged by JSC ELEM for electricity production, power and ancillary services and as a reserve in the power system.

The **electricity supplier** shall purchase electricity in the country and from abroad, for the purpose of selling it to consumers, traders, other suppliers, the electricity transmission system operator or the electricity distribution system operators, as well as to customers abroad.

The **electricity traders** purchase electricity in the country and from abroad, for the purpose of selling it to other traders, suppliers, the electricity transmission system operator and electricity distribution system operators, as well as for the purpose of selling it to customers abroad.

### 3.2.1. System Balancing Mechanism

The Energy Regulatory Commission of Republic of Macedonia in May 2012 adopted Market Electricity market rules. One of the novelties introduced with the Market Rules refers to the procedures for calculating of the differentiations of the agreed and realized transactions based on the data from the measurements made by the transmission system operator and the distribution system operators.

With the Market rules is envisaged:

- Every participant on the electricity market to have balance responsibility due to which is obliged to submit to the TSO sufficient information that are included in the bilateral transactions in order to enable reliable, secure and stable operation, work and balance of the power system of Republic of Macedonia.
- All of the participants on the electricity market have to undertake financial responsibility for the influence of their actions on the confident, safe and economic working, management and balance of the power system of Republic of Macedonia.

The duration of the trade interval and the interval of settlement presents 1 hour.

For the purpose the participants on the market to reduce the expenses that will occur due to imbalances on hour level, with the Market rules is envisaged for the participants on the electricity market to form balance groups freely on personal selection and based on personal bilateral or multilateral agreements. The balance group can be composed of only one participant on the electricity market. Every balance group has own balance responsible party (BRP) which represents the balance group and submits all of the necessary data to the corresponding operators. Every BRP submits physical schedules to the TSO (JSC MEPSO) and the electricity market operator (JSC MEPSO) so the generation and purchase, including the imports of electricity for the hour of the physical schedule correspond to the consumption and sale, including the export of electricity made by every member of the balance group and for which BRP undertook the balance responsibility. BRP has financial responsibility for every imbalances of its balance group that occurred as difference between the planned and realized generation, consumption, purchase, sale, import and export of electricity. The rights and financial obligations among the members of the balance group are regulated with mutual agreement.

BRP for its balance group submits physical schedules for every hour to the TSO and electricity market operator.

The submitted physical schedules can be changed at latest 1 hour to the real hour for which they refer which is another facilitating circumstance in the process of implementation of the calculation of imbalances on hour level. The submitted data of the physical schedules present base for calculation of the aberrations.

Pursuant Article 107 point 1 of the Market Code, the Operator of the electricity distribution system (EVN Macedonia JSC Skopje) is obliged to prepare standard daily load curves for the consumers that do not have installed meters with possibility for hour and remote reading with explanation for the preparation of the same and to submit them to the TSO and the electricity market operator upon previous approval of Energy Regulatory Commission.

The calculation of the imbalances is done pursuant the Methodology for calculation of the fee for the services for balance of the Market Code.

The imbalances of BRS ( $E_{IMB}$ ) are determined based on the difference between the aggregated (in absolute value) nominated (physical schedules) exchanges of electricity of BRS ( $E_{PN}$ ) and factual realized exchanges of electricity ( $E_{AR}$ ) of BRS.

### **3.2.2. Third Party Access Exemption**

In accordance to the Energy Law the electricity transmission system can ask the Energy Regulatory Commission an exemption from the obligation on allowing third party access when investment is made in new interconnection lines or the investment significantly increases the capacity of the existing interconnection lines, for the purpose of increasing the supply possibilities.

The Energy Regulatory Commission shall approve the applications provided the following requirements are met:

- 1) the investment results in increased competition in and reliability of electricity supply;
- 2) the investment risks are such so that the investment cannot be realized unless the exemption from the obligation on third party access is provided;
- 3) the interconnection line for which the exemption from the obligation on allowing third party access was requested must be owned by a natural person or legal entity which, at least in its legal form, is independent from the system operators where the line is to be constructed;
- 4) the interconnection line users will settle the charge on the line use;
- 5) not a single portion of investment made or of operation costs for the interconnection line can be recovered through the relevant system use charge for the systems connected by the interconnection line;
- 6) the exemption from the obligation on allowing third party access does not affect the electricity market competition and efficiency or the efficient operation of the regulated transmission system to which the line is connected.

## POWER BALANCE

The generation in the Macedonian power system is shared between thermal and hydro power plants. The Thermal power plants, with an installed capacity of 1260 MW, represent 70% of total installed capacity, and the Hydro power plants, with an installed capacity of 528,4 MW, represent approximately 30% of total.

The largest generation facility and the foundation in the whole system is TPP Bitola with 675 MW installed. TPP Bitola is located in the south-west of the country. It uses lignite for energy production from nearby located open pit mine. TPP Bitola, together with TPP Oslomej covers 80% of electricity consumption. The rest of the consumption is covered by TPP Negotino (heavy fuel fired), hydro power plants and import. The major hydro power plants are located in the west of Macedonia.

In addition to major power generating plants, various small generating units operate in the EPS. The total installed capacity of small thermal generation units owned by industrial consumers is about 50 MW. There is also dispersed generation on distribution level of ten (10) small hydro power plants with total capacity of 38 MW.

Total electricity consumption in 2012 was 8548 GWh, with power peak load of 1609 MW. Energy balance shows that TPP-s produced 4756 GWh, HPP-s produced 1051GWh and the rest of 2741GWh was covered by import.

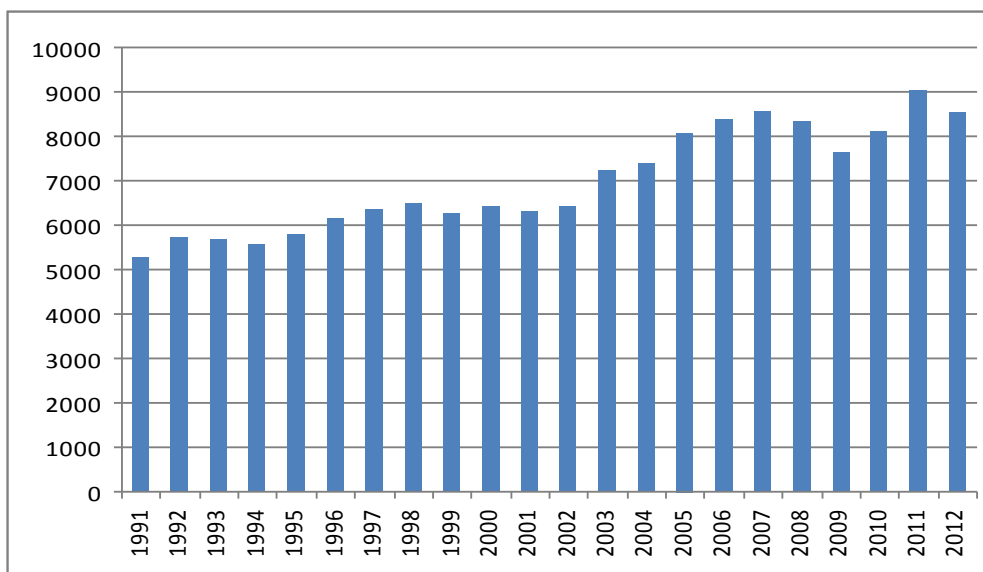
### 3.2.3. Electricity consumption & supply

Historical consumption of electricity for the last 20 years is given bellow.

**Table 1. Yearly electricity consumption (GWh) 1991 - 2012**

Year	Yearly Electricity Consumption (GWh)	Yearly increase	average increase		
			1992-2008	1997-2008	2001-2012
1991	5252				
1992	5720	8.91%	2.87%		
1993	5676	-0.77%			
1994	5559	-2.06%			
1995	5800	4.34%			
1996	6148	6.00%			
1997	6330	2.96%			
1998	6518	2.97%		2.70%	
1999	6285	-3.57%			
2000	6439	2.45%			
2001	6294	-2.25%			
2002	6410	1.84%	2.58%		
2003	7226	12.73%			
2004	7385	2.20%			
2005	8089	9.53%			
2006	8386	3.67%			
2007	8577	2.28%			
2008	8365	-2.47%			
2009	7669	-8.32%			
2010	8102	5.60%			
2011	9037	11.5%			
2012	8548	-5.41%			

In 2012, the decrease in consumption comparing with 2011 was 5.4% due to decreased consumption at industry. The consumption in the Table 1 is presented together with the losses in the distribution and transmission grids.



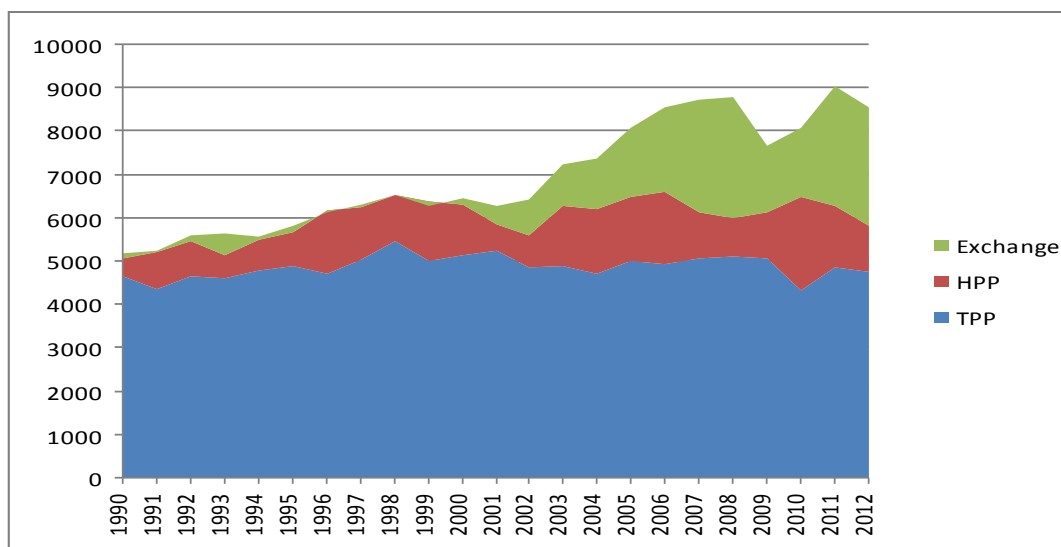
**Figure 1. Trend of electricity consumption, 1991 – 2012**

Power supply for the last 20 years is given bellow.

**Table 2. Electricity supply (GWh) 1991 - 2012**

Year	TPP	HPP	Exchange
1990	4634	427.4	115.3
1991	4378.2	845	29.3
1992	4650.8	822.4	138.6
1993	4612.2	521.6	509.5
1994	4794.6	695.8	73.2
1995	4888	797.2	117.2
1996	4731.6	1442.2	-26
1997	5035	1222	72.4
1998	5445.3	1077.5	-2
1999	5008.4	1384.6	-104
2000	5159	1170	112
2001	5241.4	621.5	431.3
2002	4863.4	755.4	791.2
2003	4902.5	1369.9	953.3
2004	4731.3	1476.9	1176.2
2005	4996.6	1478.3	1614
2006	4946.1	1646.2	1958.3
2007	5063.9	1057.3	2615.5
2008	5109.6	880.6	2801
2009	5068.7	1082.8	1518.2
2010	4332	2168.3	1602.3
2011	4852	1436	2748
2012	4756	1051	2741

Production of hydro power stations in 2010 was at max level within last 20 years due to the good hydro conditions. Production of fossil fuel power stations in 2012 was on the level of production in 2011



**Figure 2. Participation of different sources in electricity supply, 1991 - 2010**

Consumption forecast for the next period is shown in Table 3.

**Table 3. Consumption forecast up to 2023**

(GWh)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<b>Big consumers</b>	1527	1974	2072	2075	2075	2095	2115	2135	2156	2177	2198
<b>consumption in PPs and TSO</b>	132	136	136	136	136	136	137	137	137	137	137
<b>Consumption on distribution level</b>	6062	6371	6554	6775	6950	7020	7090	7160	7230	7300	7375
<b>Total Losses</b>	1308	1297	1245	1197	1135	1169	1184	1087	1192	1211	1225
<b>Total consumption</b>	9028	9779	10008	10183	10297	10400	10505	10610	10715	10825	10935

### 3.2.4. Peak Load

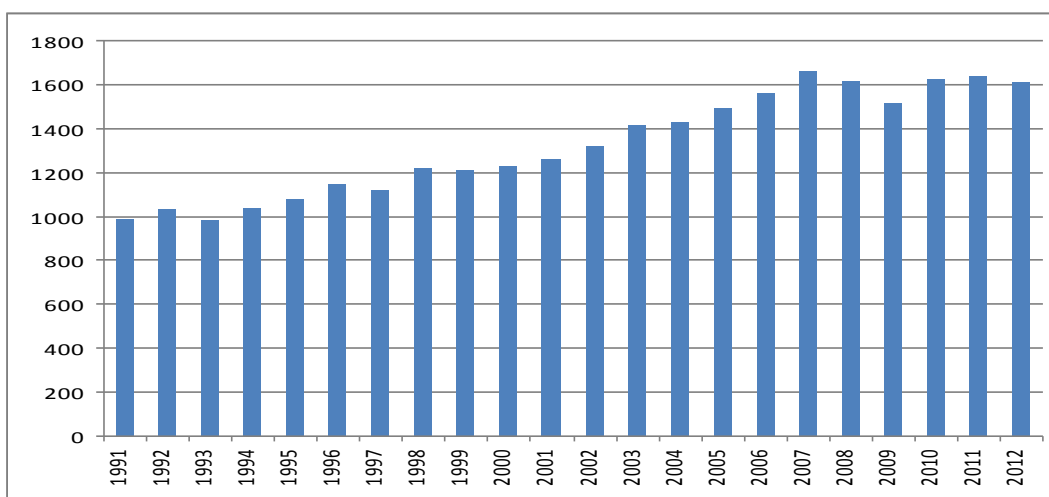
Peak load conditions in Macedonian power system are typical for the period December – January. The system peak load of 1609 MW occurred on 06.01.2012 at 15 :00 CET. Peak load strongly depends on temperature conditions.

No load reduction measures were taken at peak load.



**Table 4. Yearly peak load (MW) 1991 – 2012**

Year	Yearly Peak Load (MW)	Yearly increase			
			1992-2008	1997-2008	2001-2012
1991	989				
1992	1035	4.65%	3.01%		
1993	988	-4.54%			
1994	1041	5.36%			
1995	1081	3.84%			
1996	1149	6.29%			
1997	1121	-2.44%			
1998	1221	8.92%			
1999	1214	-0.57%			
2000	1233	1.57%			
2001	1261	2.27%			
2002	1320	4.68%			
2003	1417	7.35%			
2004	1432	1.06%			
2005	1491	4.12%			
2006	1565	4.96%			
2007	1664	6.33%			
2008	1618	-2.76%			
2009	1515	-6.37%			
2010	1627	7.39%			
2011	1642	-0.90%			
2012	1609	-2.00%			

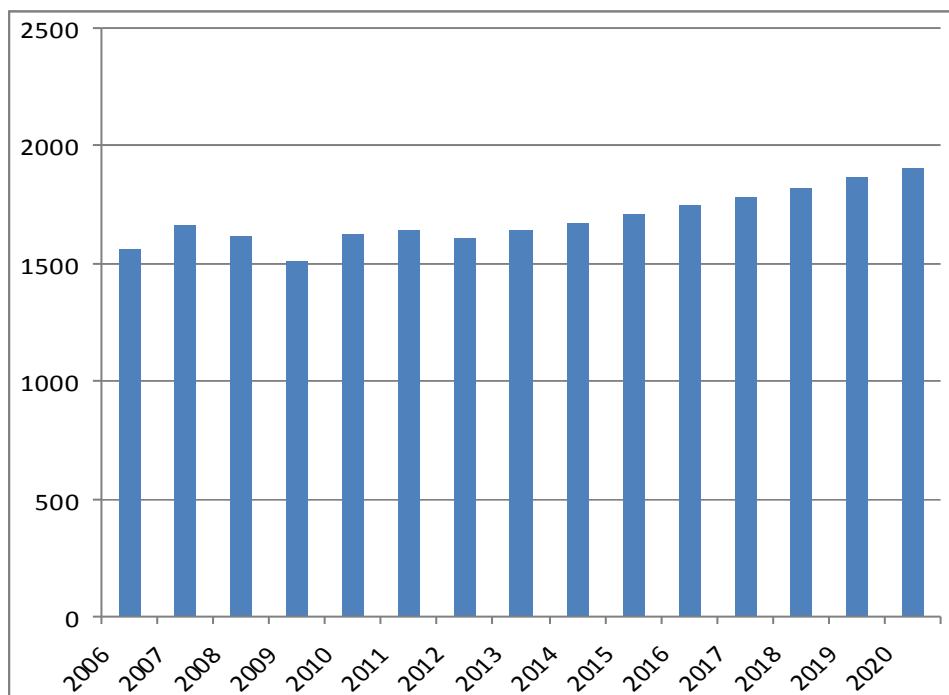


**Figure 3. Trend of peak load, 1991 – 2012**

In next period, peak load increased is forecasted with average 3%.

**Table 5. Peak load forecast up to 2020**

Year	Year Peak Demand (MW)
2006	1565
2007	1664
2008	1618
2009	1515
2010	1627
2011	1642
2012	1609
2013	1637
2014	1673
2015	1710
2016	1748
2017	1786
2018	1825
2019	1866
2020	1907



### 3.3. GENERATION

#### 3.3.1. Procedure for construction new generation facilities

According to the Energy Law, new generation facilities and cogeneration facilities can be constructed on the basis of **authorization** issued by the Government of Republic of Macedonia. The procedure on issuing the decision on the authorization for construction of electricity generation facilities and cogeneration facilities shall be based on the principles of objectivity, transparency and non-discrimination. The authorization decision shall be issued pursuant to criteria which refer to: reliability of relevant energy type supply; safety and reliability of the energy system, facilities and relevant equipment; protection of public health and safety; environmental protection; use of land and sites; use of public land; energy efficiency; primary energy type; specific characteristics of the applicant as regards its technical, financial and economic ability. The authorization shall not be necessary provided that: the energy generation facility has total installed electricity equal to or less than 10 MW; the expansion of the energy generation facility results in total installed electricity and/or heating energy capacity increase by up to 10 MW; the energy generated by the energy facility will be used only for own consumption.

The authorization for the construction of new electricity generation facilities and cogeneration facilities shall stipulate in detail:

- 1) type, features, installed capacity and expected annual energy output, fuel type and necessary quantity;
- 2) facility location, in compliance with the relevant urban planning documents;
- 3) authorization's validity period;
- 4) proceedings with the facility upon the termination of its operation;
- 5) manner of public infrastructure use;
- 6) environmental protection requirements to be fulfilled pursuant to the law;
- 7) efficiency requirements concerning the facility operation; and
- 8) other terms and conditions related to the facility construction

Should, based on the issued authorizations for construction of new electricity generation facilities and cogeneration facilities, in compliance with the Strategy on Energy Development of the Republic of Macedonia, the forecasts on electricity consumption, taking into account the measures on energy efficiency improvement and consumption management and the possibilities for address the said demand, it has been assessed that the reliability of energy supply is disturbed, the Government of the Republic of Macedonia, on the proposal from the Ministry, can adopt a decision and announce an **open call (tender)** for the construction of electricity generation facilities and cogeneration facilities. The open call referred to in paragraph (1) of this article shall contain in particular: type of energy facility for which the open call is announced; planned capacity; deadline for the initiation of facility construction works; location where the facility is to be constructed, determined on the basis of the excerpt from the existing urban planning documents, the state urban planning documents or the local urban planning documents; required economic, technical or operational ability of bidders; possible incentives offered, and manner and deadline for bid submission.

#### 3.3.2. Renewable energy Sources and Preferential producers

For the purpose of stimulating construction of new power plants using renewable energy sources or high-efficiency cogeneration plants, Energy Law prescribes that these facilities can obtain the status of preferential producer, and thereby the right to sell electricity under feed-in tariffs. The feed-in tariffs can be applied in a manner and under procedure stipulated in the Energy law and the by-laws adopted pursuant to the law.

In the previous period feed- in tariffs for sale of electricity produced and delivered from SHPP, wind energy, solar energy, biomass and biogas from biomass were determined, as follow:

<b>Power plant</b>	<b>Feed-in tariff for generation of electricity (€/kWh)</b>	<b>Duration of usage (years)</b>
<b>Hydro power plants (with installed capacity lower or equal to 10 MW)</b>	- monthly quantity of delivered electricity per blocks: I block: 12,00 ( $\leq 85.000$ kWh) II block: 8,00 ( $> 85.000$ and $\leq 170.000$ kWh) III block: 6,00 ( $> 170.000$ and $\leq 350.000$ kWh) IV block: 5,00 ( $> 350.000$ and $\leq 700.000$ kWh) V block: 4,50 ( $> 700.000$ kWh)	20
<b>Wind power plants (with installed capacity lower or equal to 50 MW)</b>	8,9	20
<b>Photovoltaic power plants (with installed capacity lower or equal to 1 MW)</b>	16 ( $\leq 0,050$ MW) 12 ( $> 0,050$ MW)	15
<b>Thermo power plants on biomass (with installed capacity less or equal to 3 MW and percentage share of the fossil fuels in the total energy values of the used fuels lower or equal to 15%)</b>	15	15
<b>Thermo power plants on biogas (with percentage share of the fossil fuels in the total energy values of the used fuels lower or equal to 10%)</b>	18	15

The electricity market operator is obliged to purchase the electricity generated by preferential electricity producers. On the request from the preferential producers, the electricity market operator is obliged to sign the electricity purchase contract in compliance with the law, the decision on the application of feed-in tariff issued by the Energy Regulatory Commission and the Market Code.

The Energy Regulatory Commission shall oblige the relevant energy system operator to cover the grid connection costs of preferential producers and recover the costs incurred as part of the regulated services price, when needed for the purpose of: providing incentives for electricity generation from renewable energy sources or at high-efficiency cogeneration plants; or attaining the targets set forth in the Strategy on Energy Development, Energy Efficiency Strategy and Strategy on Renewable Energy Sources.

Energy Law defines that the electricity transmission or distribution system operators, within the operational possibilities in the relevant system, shall provide priority access to electricity systems for the electricity generated from renewable sources

Also, Energy Law prescribes other supporting schemes as issuing of guarantees of origin, and administrative procedures regarding issuing of guarantee of origin will be precisely defined with sub legislation in accordance with Energy Law.

The possibilities for utilization of renewable energy sources are analyzed in the Strategy for utilization of the RES in Republic of Macedonia till 2020 adopted in September 2010 by the Government of Republic of Macedonia.

According to the Strategy there is a possibility for construction of 400 **small hydro power plants**. Till now Government has conducted 5 tenders for granting water concessions for construction of small hydro power plants and signed 70 Concession Agreements. The total installed capacity of the 70 SHPPs is 60 MW and envisaged investment of 100-120 mil. Euros. Also municipalities have signed 6 public private partnership agreements for construction of small hydro power plants with total installed capacity of 2,70 MW on the water management systems. All SHPPs up to 10 MW are eligible for feed-in tariffs.

The construction of the **wind power plants** would contribute in decrease of the imports dependence, quality electricity supply, local and regional development, increase of the participation of the renewable energy in the total electricity generation and as major benefit of this kind of energy is the environmental protection with lowering the CO<sub>2</sub> emissions, and in accordance with the Kyoto protocol. In this sector the most advanced project is JSC ELEM wind farm project with which shall be operational in the end of 2013. Project is constructed in the area of Bogdanci and Valandovo. According the complexity of project, implementation in two phases is planned, and it shall not violate technical functionality of facility. **The first phase** would include construction of access road, substation and 36.8 MW installed capacity of wind turbines of an individual turbine size of 2.3 MW. In this manner, facility would become operative with more than a half of the predicted capacity. In **second phase**, wind park Bogdanci would be finished with construction and assembly of remaining wind turbines reaching 50 MW of installed capacity.

Up to now 28 **photovoltaic systems** have been put into operation. The systems are with total installed capacity of 6,98 MW and 75 systems (9,32MW) that should be operational by August 2014.

One power plant on biogas derived from biomass is in the phase of construction and it is expected to be operational in 2014. This power plan is with installed capacity od 0,99 MW.

### 3.3.3. Existing generation capacities

#### 1. THERMAL POWER PLANTS

##### TPP BITOLA

The Mining Power Complex Bitola is located in the new municipality Novaci which was founded in 1975 year. The plant is located in the periphery of Pelagonija plain. The plant which basic activity is the production of electricity and coal is the biggest in the system of the Macedonian Industry and consists of two production units: Mine Suvodol and Thermal power plant and Working unit.

The production in the plant started in 1980, by mining the first overburden of waste land in the first BTO system (Excavator, Conveyor, Stacker) and the production of first kilowatt-hours of power in 1982, when the first of three units of the thermal power plant was put into operation. The production is ensured by three units, which power was increased by additional 15 MW per unit or total 45 MW new power with the reconstruction in 1994, so the installed capacity now is 225 MW per unit or total 675 MW. The gross electricity production of the plant is 4.600 GWh/year.

All this potential in MPC Bitola allows the plant to participate with more than 70 % in the total electricity production in EPS. When we talk about MPC Bitola, we should not neglect the fact that we mean a permanently high production, which compared to the power facilities of this kind, even compared to wider areas, deserves high respect. The constant exceeding of the yearly power supply demands proves this.

Unit 1 was modernized in 2010. The main Benefits from this project are additional 8,32MW and 120.000 hours lifetime extension Unit 2 is in the phase of modernization during 2011, and unit 3 during 2012. In the moment process of revitalization of Steam Boilers is in place and its expected to be finished in 2015.

Location	Novaci, Bitola
Number of units	3
Type of fuel	coal
Year commissioned	1982/1984/1988
Steam boiler	
Type	p-65
Supplier	ZIO-Podoljsk, Russia
Capacity	700t/h
Steam turbine	
Type	K-210-130-3
Supplier	LMZ, Russia
Rated power	225 MW
Generator	
Type	TVV-200-2AV3
Supplier	Elektrosila, Russia
Rated power	264.7 MVA
Cooling tower	3

## TPP OSLOMEJ

The majority production of electricity in the Republic of Macedonia, about 80%, is based on the thermal power plants. The smallest thermal capacity, within the power system, is the Mining Power Complex Oslomej near Kichevo, with an installed unit of 125 MW and net production of about 500 GWh/year. MPC Oslomej started the production in 1980, and until now it has achieved excellent production results. With installed capacity of 125 MW this power plant supplies about 10% of the total production of electricity in Macedonia. This power plant uses coal as a basic fuel with an average calorie amount of 7600 kJ/kg, and the coal consumption is 1,52 kg/Wh, while the crude oil consumption is 2,73 gr/Wh.

Location	Oslomej, Kicevo
Number of units	1
Type of fuel	coal
Year commissioned	1980
Steam boiler	
Type	OB-380
Supplier	Rafako, Poland
Capacity	380t/h

Steam turbine	
Type	13K-125
Supplier	Zameh, Poland
Rated power	120 MW
Generator	
Type	TGH-120
Supplier	Zameh, Poland
Rated power	125 MW
Cooling tower	1

### COMBINED CYCLE COGENERATION POWER PLANT TE-TO – SKOPJE

The availability of the natural gas in Skopje provides conditions for installation of combined cycle power plant for generation of electric and heating power with the use of the natural gas as fuel. The new 220 MW power plant with combined cycle was commissioned in the beginning of 2011 and it is private investment from SINTEZ GROUP – Russia and district heating company TOPLIFIKACIJA – Skopje, Republic of Macedonia.

The existing TE-TO – Skopje is power plant that operates on natural gas. The basic data for the power plant are below:

Parameter	Unit	Value
OPERATING HOURS OF THE FACILITY:		
1. Condensation regime of the facility (without heat)	h/yr	5 600
2. Combined regime of the facility (with heat)	h/yr	2 700
3. TOTAL OPERATING TIME IN BASIC LOAD	h/yr	8 300
AVAILABILITY OF THE FACILITY FOR OPERATION on annual level (depends on the facility's maintenance method)	%	90 - 95
NET PRODUCTION OF ELECTRICITY:		
- average annual capacity of the facility in general	MW	Nearly 220
- annual production of electricity	GWh	Nearly 1 800
NET PRODUCTION OF HEAT:		
- average annual capacity of the facility in general	MW	0 – 160
- annual production of heat	GWh	Nearly 270
CONSUMPTION OF NATURAL GAS:		
- consumption of natural gas at maximum load	nm <sup>3</sup> /h	57 000
- annual natural gas needs for the facility	nm <sup>3</sup> /yr	350–400 10 <sup>6</sup>

### ENERGETIKA Skopje

With the reconstruction and the modernization of the turbo generators in the AD ELEM subsidiary Energetika the electricity power system of Macedonia gained at its disposal 30MW of new installed power capacity and the anticipations are that Energetika will generate approximately 160 GW/h electricity power, with a possibility for production of up to 200 GW/h heating energy. The natural gas that is used as a fuel at the power plant will significantly influence the reduction of the pollution of the surroundings.

## 2. HYDRO POWER PLANTS

## MAVROVO SYSTEM

Taking the advantage of the fact that the water is energy resource from the point of its springs to the point where it is streaming in the sea, the Hydro Power System Mavrovo has been constructed, on the springs itself on the mountains Korab, Bistra and Sar Planina. The System is planned and constructed in a way that the water energy is used several times. The waters from the Korab river basins, through HPP Vrben, already used once are stored in the Mavrovo accumulation. The accumulated power is used second time in HPP Vrutok and after that in HPP Raven also.

The Mavrovo Hydro Power System with the three hydro power plants Vrutok, Raven and Vrben and with total accumulated water quantity of 277 million m<sup>3</sup> is one of the greatest and most complex systems in the Macedonian Hydro Power System. In the total installed hydro capacities in the country, this system participates with 42 %.

### - HPP Vrutok

HPP Vrutok is located on the North-West part of Republic of Macedonia and is the largest Hydro Power Plant in the country. With its large accumulation has major role in the regulation of the daily diagram of the consumption in the Electric Power System.

The Power Plant has been constructed the following phases:

- 1947 – start of construction
- 1952 – decision for founding HPP Mavrovo
- 1957/58 – putting in operation of two aggregates
- 1973 - putting in operation of two additional aggregates

HPP Vrutok is accumulation-derivative power plant and altogether with the entire electro-mechanic equipment is located in cavern built underground. The cavern itself is built in four levels where the four hydro aggregates and the control room are located.

**Transformer Chamber** This chamber is as well located underground and there are stationed four block transformers of 42 MVA each. The power from the transformer chamber in 110 kV voltage level is leaded to the 110 kV distribution plant.

**110 kV Plant** Typical for this plant is that it presents knot of two input and three output transmission lines of 110 kV, where one of the output lines leads to 220 kV distribution plant. As integral part of the plant, also is included the 35 kV distribution plant, on which HPP Vrben and HPP Raven are connected.

<b>HPP VRUTOK</b>	
Power Plant Type	accumulation-derivative
Location	Village of Vrutok
River Basin	River Mavrovska
Number of aggregates	4
Installed capacity	150 MW
Average yearly production	350 GWh
Put in operation	1957/1973
Net altitude of the fal	525 m
Installed inflow	32 (4x8) m <sup>3</sup> /sec



Turbine Type	Pelton with 4 injectors
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#### - HPP Vrben

Six kilometers in north of the Mavrovo accumulation is located HPP Vrben. The difference with the two other hydro power plants, this plant is of run-river type. It is set in a way that at first it uses the waters from Gorna Radika River basin before they are stored in the Mavrovo accumulation. The two aggregates were put in operation in 1959. In the mechanical building is located the control room, as well as 35 kV and 10 kV plant. From this plant through 35 kV transmission line, the power is transmitted to HPP Vrutok, from where it is released in the Electric Power System of Macedonia

HPP VRBEN	
Power Plant Type	run of river
Location	Village of Vrben
River Basin	Gorna Radika River
Number of aggregates	2
Installed capacity	12,8 MW
Average yearly production	45 GWh
Put in operation	1959
Net altitude of the fall	196 m
Installed inflow	8 (2x4) m <sup>3</sup> /sec
Turbine Type	Francis

#### - HPP Raven

HPP Raven is located about two kilometers downstream from HPP Vrutok and it uses the already used water from HPP Vrutok. This power plant does not have its own accumulation, and is directly dependent of the operation regime in HPP Vrutok. In the mechanical building are located three aggregates with power of 6,4 kW each, which were put in operation in phases, two in 1959 and one in 1973. In it besides the aggregates is located the control room and 35 kV distribution plant. In front of the

Power Plant itself are located three power block transformers 6,3/35kV.

The already used water, through underground tunnel is discharged in the regulated bed of the Vardar River, from where it is taken in purpose of irrigation the Polog Field.

HPP RAVEN	
Power Plant Type	run of river
Location	village Raven
River Basin	Mavrovska River
Number of aggregates	3
Installed capacity	19,2 MW
Average yearly production	40 GWh
Put in operation	1959/1973
Net altitude of the fall	74 m
Installed inflow	32 (3x10,6) m <sup>3</sup> /sec
Turbine Type	Francis

## HPP TIKVES

HPP Tikves is located at the River Crna, about 27 km upstream of its inflow in the Vardar Rver nearby Kavadarci. This hydrosystem is double purposed: irrigation of the Tikves Field, which is one of the most warm and most dry areas in Macedonia; and the second purpose, is generation of electric energy.

**Dam and Accumulation.** HPP Tikves has rock filled dam with height of 113,5 m, where is formed accumulation with total volume of 475 million m<sup>3</sup>, out of which the useful volume amounts to 309,6 million m<sup>3</sup>. The normal projected operational level of the accumulation is 265,00 meters above the sea level and the minimal level is 233,00 meters above the sea level.

**Hydro Power Plant.** The Hydro power plant Tikves is projected and constructed with installed capacity of 114 MW and annual generation of 184 GWh. The mechanical building is located in the underside of the dam. In the building are located four aggregates equipped with Frances turbines with vertical axis, as well as three phase sinchrone generators.

The three transformers are located outside the mechanical building.

The location of the switch gear is outside.

HPP TIKVES	
Power Plant Type	accumulation-nearby
Location	Kavadarci
River Basin	Crna River
Number of aggregates	4
Installed capacity	114 MW
Average yearly production	184 GWh
Put in operation	1966/1981
Net altitude of the fall	91,30 m
Installed inflow	120 (4x30) m <sup>3</sup> /sec
Turbine Type	Francis

## HPP SPILJE

The largest accumulative hydro power plant in the confluence area of the Crn Drim River is HPP Spilje, located nearby Debar. With the operation start in 1969, this hydro power plant is important source of electric power in the Electric Power System of Macedonia.

**HPP Spilje** has accumulation with volume of 520 million m<sup>3</sup>, out of which the useful volume is 223 million m<sup>3</sup>. The hydro power plant is located right at the connection of the Crn Drim and Radika Rivers, so the regime of inflows in the accumulation is in dependence of the regime of the both rivers. The inflow from Crn Drim during the year is mostly steady because of the existence of two upstream accumulations, the Ohrid Lake and the accumulation Globocica. The inflows from Radika are very variable, which is due to the natural factors in the confluence.

**Dam and Accumulation.** HPP Spilje has rock filled dam with height of 100 m, where is formed accumulation with total volume of 520 million m<sup>3</sup>, out of which the useful volume amounts to 223 million m<sup>3</sup>. The normal projected operational level of the accumulation is 580,00 meters above the sea level and the minimal level is 575,00 meters above the sea level, but in order to decrease the overflows during the exploitation, the level of the accumulation is decreased to level of 560,00 meters above the sea level.

**Hydro Power Plant.** The Hydro power plant Spilje is projected and constructed with installed capacity of 66 MW and annual generation of 384 GWh. With revitalization of the initial equipment of the Hydro power plant, which was performed from 1997 till 1999, the installed capacity of HPP Spilje is increased to 84 MW. The mechanical building is located about 70 m in the underside of the dam. In the building are located 3 aggregates equipped with Francis turbines with vertical axis, set at level of 485,75 meters, as well as three phase synchronous generators. The three transformers are located outside the mechanical building. The area between the fundament of the dam and the mechanical building is used as location for the switchgear plant 110 kV.

HPP SPILJE	
Power Plant Type	accumulation-nearby
Location	Debar
River Basin	River Crn Drim
Number of aggregates	3
Installed capacity	84 MW
Average yearly production	300 GWh
Put in operation	1969
Net altitude of the fall	91,30 m
Installed inflow	108 (3x36) m <sup>3</sup> /sec
Turbine Type	Francis

## HPP KOZJAK

The Dam and the hydro power plant Kozjak are located at the Treska River, at about 25 km upstream of its inflow in the Vardar River and at about 16 km upstream of the HPP Matka, nearby Skopje and is the first of the cascade of dams and hydro power plants on the Treska River. With the construction of this dam is formed large accumulation space and as front accumulation provides regulated water for the downstream hydro power plants as well as waters for irrigation of the Skopje agricultural field (Skopsko Pole). One of the basic purposes of this dam is retention of the flood impact of the Treska River where 100 million m<sup>3</sup> accumulation space are provided for this purpose.

**Dam and Accumulation** HPP Kozjak has rock filled dam with height of 126,1 m, where is formed accumulation with total volume of 550 million m<sup>3</sup>, out of which the useful volume amounts to 260 million m<sup>3</sup>. The maximal projected operational level of the accumulation is 459,00 meters above the sea level and the minimal level is 432,00 meters above the sea level.

**Hydro Power Plant** The Hydro power plant Kozjak is projected and constructed with installed capacity of 80 MW and annual generation of 150 GWh. The mechanical building is located in the underside of the dam. In the building are located 2 aggregates equipped with Francis turbines with vertical axis, as well as three phase synchronous generators. The three transformers are located outside the mechanical building. The location of the switchgear plant 110 kV is external.

HPP KOZJAK	
Power Plant Type	accumulation-nearby
Location	Skopje
River Basin	River Treska
Number of aggregates	2

Installed capacity	80 MW
Average yearly production	150 GWh
Put in operation	2004
Net altitude of the fall	92 m
Installed inflow	100 (2x50) m <sup>3</sup> /sec
Turbine Type	Francis

## HPP GLOBOCICA

HPP Globocica is located in the western part of Macedonia on the River Crn Drim, about 30 km in north of Struga. This derivative power plant that is locking the narrow profile of the River Crn Drim, with its accumulation performs weekly balancing of the diagram of consumption.

**Dam and accumulation.** HPP Globocica has rock filled dam with height of 94,5 meters , where is formed accumulation accumulation with volume of 58,4 million m<sup>3</sup>, out of which the useful volume amounts to 13,2 million m<sup>3</sup>. The normal projected perational level of the accumulation is 687,50 meters above the sea level and the minimal is 682,00 meters above the sea level. With separate inflow lines the waters from Jablanska and Selecka Rivers are brought to the Globocica accumulation. The last is connected in the surge tank and from there are brought to the accumulation.

**Hydro Power Plant.** The Hydro power plant Globocica is projected and constructed with installed capacity of 42 MW and annual generation of 191 GWh. The mechanical building is located at the right shore of the Crn Drim River, at 7,8 km downstream of the dam, nearby upstream from the inflow of Selecka River. In the building are located 2 aggregates equipped with Frances turbines with vertical axis, set at level of 576,75 meters, as well as three phase synchronous generators. The three transformers are located outside the power house.

The location of the 110 kV switchgear plant is external.

HPP GLOBOCICA	
Power Plant Type	accumulation-derivative
Location	Struga
River Basin	River Crn Drim
Number of aggregates	2
Installed capacity	42 MW
Average yearly production	191 GWh
Put in operation	1965
Net altitude of the fall	95,29 m
Installed inflow	50 (2x25) m <sup>3</sup> /sec
Turbine Type	Francis

## HPP SVETA PETKA

**Introduction.** HPP Sv. Petka (previously named Matka 2) is the missing link for the optimal utilization of the hydro potential of the Treska River. HPP Sveta Petka is located between the new built HPP Kozjak (about 16 km upstream of Sv. Petka) and HPP Matka located downstream. With parallel operation of HPP Kozjak and HPP Sv. Petka, additional available capacity of about 110

MW in the electric power system will be provided. The construction of HPP Sv. Petka has started 17<sup>th</sup> of June, 2005 and the is operational from 01.08.2012.f 2011.

### Project description

**Dam.** The dam will be double curve dam, with height of 69 meters, crown length of 118 m, crown level of 364 meters above the sea level and total dam volume of 27.325 m<sup>3</sup>.

**Accumulation.** The accumulation shall cover surface of 0,54 km<sup>2</sup> at minimal operational level of 355 meters above the sea level and maximal surface of 0,62 km<sup>2</sup>, at maximal level of 357,3 meters above the sea level. The total volume is 9,1 x 10<sup>6</sup> m<sup>3</sup>, with active volume of 1,1 x 10<sup>6</sup> m<sup>3</sup>. The length of the accumulation is 11 km along the Treska River.

**Turbine capacity.** The installed capacity of the power plant is 36,4 MW. Two Frances turbines, each with 18,2 MW are installed in the HPP. The projected discharge in the turbines is 2 x 50 m<sup>3</sup>/s.

HPP SVETA PETKA	
Power Plant Type	accumulation-derivative
Location	Skopje
River Basin	River Treska
Number of aggregates	2
Installed capacity	36,4 MW
Average yearly production	66 GWh
Put in operation	expected in end of 2011
Net altitude of the fall	40,00 m
Installed inflow	100 (2x50) m3/sec
Turbine Type	Francis

### 3.3.4. DEVELOPMENT OF NEW CAPACITIES

#### HPP CEBREN

**HPP Cebren** is predicted to be constructed on the river Crna Reka, near to village Manastir, 7 km upstream of the bridge Rasimbegov Most. With its huge accumulation area, this HPP is enabled for regulation of natural flows of river Crna Reka. This accumulation is the first of three energetic scales and is very important because it produce qualitative energy, not only to **HPP Cebren**, but also to other downstream HPPs, which have been already constructed or will be constructed (HPP Tikves and HPP Galiste).

**HPP Cebren** is settled in the river bad, close to the gravity arch dam. In the design documentation overflow is predicted to be over the dam, and foundation outlets are in the dam body a small dam, the **Orlov Kamen**, is intended as a bottom basin for HPP CEBREN, reversible units. This reservoir occupies the furthest upstream part of the Galiste reservoir and is separated by a concrete barrier; enables that the Galiste reservoir works independently from the upstream reversible units dam Cebren.

Technical documentation is on the level of primary design.

**Main characteristics of the HPP Cebren are:**

Average discharge	26,00 m <sup>3</sup> /s
Average production	840/786 GWh
Construction height of the dam	192,50 m
Surface height	180 m
Installed flow (turbine/pumps)	231/208 m <sup>3</sup> /s
Number of units	3
Installed capacity (turbine/pump)	333/347 MW
Gross head (max/min)	172/150 m
Turbine type	Francis reversible
Generator type	Synchrony Three Phase
Investment value	318.489.000 EURO
Construction period	6 years

Main characteristics of the Orlov Kamen dam are:	
Max. operating level (max. power pool)	400,00 maSL
Min. operating level	393,00 m
Active storage volume	14,9 million m <sup>3</sup>
Type of dam	arch dam
Dam height	55 m
Crest level	408 maSL
Investment value	19.892.000 EURO
Construction period	3 years

## HPP GALISTE

**HPP Galiste** The partition place (future dam) “Galište”, located in the middle part of the gorge (ravine) stretch of the r.Crna Reka, at the very front spot of the existing water storage “Tikveš”, i.e. 54 km. upstream of the r.Crna Reka emptying into the r.Vardar. It will be a dam site facility. The HPP includes the following structures: rockfill dam with a clay core, grouting curtain, upstream and downstream cofferdam which enters the dam body, a diversion tunnel which will serve as a foundation outlet, a spillway (overflow) organ - shaft overflow, supply organ, power house comprising of three generator sets as well as a 110 kV switchyard located in the area between the dam and the power house.

Design documentation is on the level of primary design.

Main characteristics of the Galiste dam are:	
Average discharge	28,90 m <sup>3</sup> /s
Average production	262,50 GWh
Construction height of the dam	141,50 m
Surface height of the dam	138,50 m
Installed flow	180,00 m <sup>3</sup> /s
Number of units	3
Installed capacity	193,50 MW
Gross head (max/min)	129,20/78,30 m
Turbine type	Francis
Generator type	Synchrony three phase
Investment value	200.241.000 EURO
Construction period	7 years

## HPP BOSKOV MOST

**HPP Boskov Most** is planned to be constructed on the river Mala Reka, near Debar and main road Skopje-Debar-Ohrid. It is predicted constructing of dam and accumulation with intake facilities on all streams of the river basin of Mala Reka, derivation channels, main intake-derivation tunnel, penstock and power house. At the end of the intake tunnel is cylindrical surge tank. The water from surge tank is transferred through pipeline to the power house. The design documentation is on the level of main design.

HPP Boskon Most project is in pre-contracting stage in the moment. Construction is expected to start early in 2014. HPP should be operational in late 2017 or early 2018.

<b>The main characteristics of the HPP Boskov Most are:</b>	
Average discharge	4,60 m <sup>3</sup> /s
Average production	118 GWh
Construction height of the dam	33,00 m
Surface height	33,80 m
Head race tunnel length	8987,30 m
Head race tunnel diameter	3,00 m
Rated flow	22,00 m <sup>3</sup> /s
Number of units	2
Installed capacity	68,0 MW
Design head	358,00 m
Turbine type	Francis
Generator type	Synchrony three phase
Investment value	84.000.000 EURO
Construction period	4 years

## STORAGE LUKOVO POLE

**The Project Dam Lukovo Pole and Intake of Korab Waters** entails the construction of a water reservoir with a useful storage capacity of ca. 38 Mill m<sup>3</sup> (total storage 39 Mill m<sup>3</sup>) located in the Korab Mountain Range in NW Macedonia at an altitude of about 1,500 m. The project would further entail the construction of a 20 km long water conveyor system consisting of a covered canal coupled with a service road, which would mostly run slope parallel but include two tunnels of 2,150 and 750 m length. Along the canal, 5 water intake structures would be located to harvest additional water from intersected mountain streams. The project would require substantial material sourcing (from quarries and / or borrow pits) for aggregates, dam fill material and (possibly, depending on dam type) fines for the clay core of the dam. The project is in development stage and tendering for construction is expected to start late 2013 or early 2014. Construction period is scheduled to be 4 years.

<b>The main characteristics of the Storage Lukovo Pole are:</b>	
Average inflow	4.17 m <sup>3</sup> /s
Height of dam construction	84.90m
Height of mirror surface	71.00m
Total storage volume	39.00 mil m <sup>3</sup>
Useful storage volume	38.00 mil m <sup>3</sup>
Normal level	1587.00 m.a.s.l.
Minimum level	1540.00 m.a.s.l.
Length of entrance part	19.84 km
Length of intake tunnel	2.90 km

Length of intake canal	16.93km
Construction period	4 years

## HPP IN VARDAR VALEY

The twelve **HPPs in Vardar Valey** are planned to be constructed in a purpose to use whole water potential of the river Vardar. For ten of these plants technical documentation is on the level of study, and for two plants (HPP Veles and HPP Gradec) are on the project design.

In February 2013 ELEM has submitted a pre-feasibility study for the project Vardar Valley to the Government of Republic of Macedonia. In a moment a pre-feasibility study is updated. After the update, ELEM will organize expert public debate for the Project "Vardar Valley".

Their basic characteristics are shown in the following table:

Main characteristics of the plants are:						
Plant	Qav[m3/s]	Qins[m3/s]	H[m]	P[MW]	W[GWh]	Cost[mil.\$]
Babuna	91,2	2x120	8,5	17,34	56,9	47,6
Veles	86,32	195	69,0	93,00	300,6	251,0
Zgropolci	91,2	2x120	8,5	16,93	55,5	51,7
Gradsko	112,4	2x120	8,3	16,93	66,6	57,6
Kukurecani	147,6	2x120	8,3	16,93	79,5	57,0
Krivolak	148,9	2x120	8,3	16,93	80,0	57,0
Dubrovo	149,6	2x120	8,3	16,93	80,2	68,2
Demir Kapija		2x120	12,0	24,48	116,4	80,4
Gradec	152,7	240	42,5	54,60	252,4	156,8
Miletkovo	157,2	2x120	8,2	16,72	80,3	70,0
Gavato	161,8	2x120	8,2	16,72	83,2	78,8
Gevgelija	164,4	2x120	8,3	16,93	85,1	63,0

**HPP Veles** is predicted to be constructed on the river Vardar near village Basino Selo upstream of Veles. The railway Skopje - Veles will be flooding out with future accumulation Veles. That's why it will be dislocated on the higher level and this scope of works must be predicted before dam construction. The access to the dam site is possible through highway Skopje-Veles. HPP Veles is dam site facility with concrete gravity dam. The power house is located close to the dam in the river bad. Design documentation is on the level of primary design for construction of the dam and for dislocation of the railway. The new (dislocated) railway is predicted as two way with construction speed of 160 km/h, much better than the existing one. The construction period for dislocation of the railway is 3 years and must be finished before starting of the dam construction.

**HPP Gradec** is predicted to be constructed on the river Vardar, 30.4 km from the Macedonia-Greek border. The access to HPP Gradec is possible through highway Skopje-Gevgelija directly to the dam crest. Power house is an integral part of the dam and there are predicted two units with Kaplan turbines. The railway Skopje - Gevgelija will be flood out with future accumulation Gradec. That's why it will be dislocated on the higher level and this scope of works must be predicted during the dam construction. Design documentation is on the level of main design for the overflow and power house part and on the level of primary design for the left and right part of the dam.



## **MINE BROD-GNEOTINO UNDER-STRATUM SERIES IN MINE SUVODOL – BITOLA**

Southern from Suvodol Mine, at distance of 10 km, respectively between the settlements Brod and Gneotino and the River Crna, on area of about 10 km<sup>2</sup> and altitude 570-650 maSL, is located the lignite deposit Brod-Gneotino. The deposit is researched in details with deep underground drillings in the period from 1974 till 2004. On base of the developed Feasibility Study that has elaborated the basic geological and mining technological parameters, it is stated that the Brod-Gneotino deposit from technical-technological point of view can operate.

Geological reserves of 108 million tons coal are determined in the deposit. Out of this quantities, 33 million are determined as exploitable, namely yearly will be produced 2 million tons of coal. With these coal quantities is provided continuity and security of supply of coal in the TPP Bitola for the following period of 16-19 years.

The lignite from Brod-Gneotino has qualitative characteristics that are very similar with the one of the lignite from the Suvodol Mine. Therefore, the combustion in TPP Bitola is expected not to cause any problems on the steam boilers and the auxiliary systems, which is confirmed in 1991 when certain quantity of coal from the deposit has been combusted in steam-boiler 1 of unit 1.

For this project underway is preparation of the tender documents for for supply of mine equipment for the needs of mines in Bitola.

<b>Technical parameters for mine Brod-Gneotino</b>	
Geological reserve	108.000.000 t
Exploitation reserve	33.000.000 t
Overburden coefficient	1:7,66(m <sup>3</sup> /t)
Low heating value	7.976 (7.198 for A+B reserves) (kJ/kg)
Low heating value	1.905 (1.747 for A+B reserves) (kcal/kg)
Humidity	47,40 (%)
Ash	17,10(%)

## **MINE MARIOVO AND TPP MARIOVO**

Mariovo pool is located in the southeastern part of the Republic of Macedonia, 46 km southeast of the town of Prilep, at an altitude of 700 ÷ 1000 m.

This area is the site "Mariovo" with a coal layer with variable power from 1,3 ÷ 14,9 meters, or average thickness of 7,0 m and relative depth of 7,7 ÷ 279 m. The deposit extends W-SW at 7 km long and 2 km wide, or a total of about 14 km<sup>2</sup> area limited between villages Monastery, Grinder, Vitoliste, Polchishte and Beshishte.

Geological reserves of 111 million tons coal are determined in the deposit. Out of this quantities, 62 million are determined as exploitable, namely yearly will be produced 2 million tons of coal. With these coal quantities is provided continuity and security of supply of coal in the TPP Bitola for the following period of 31 years.

The area investigated in Mariovo confirmed coal reserves of 111 million tons with lower calorific value 7536 kJ / kg. Coal reserves are large enough to provide us with the raw material for the production of electricity for an extended period of time, of course, along with the rest of our current facilities in other coal mines.

### 3.4. TRANSMISSION

#### 3.4.1. Basic data for transmission network

The 400 kV transmission lines are the backbone of the transmission grid in the Republic of Macedonia. They form a 400 kV ring comprised of three transmission lines connecting the largest consumption concentration located in the northern part of the country with the largest production facilities located in the south west part. The 400 kV transmission lines are used for interconnection to the neighboring power systems. The 110 kV transmission grid is the mostly outspread and developed one and connects the large hydro power plants, all of the larger populated places, as well as the industrial centers.

High voltage transmission system operates at two (2) voltage levels: 110 and 400 kV. The length of overhead transmission lines is about 507.2 km on 400 kV voltage level and 1544.7 km length OHTL-s on 110 kV voltage level.

The Macedonian power system has interconnection lines with Greece, Bulgaria and Serbia. The Macedonian power system is a net importer for electricity for the all year. The imports represent around 15% - 30 % total consumption in the system.

#### 3.4.2. Interconnections

The HV system is interconnected on 400 kV voltage level with Greece, Bulgaria and Serbia. The 400 kV line transmission line SS Skopje 5 – SS Kosovo B is operation in the northern part. The best connection of the Macedonian Power System is to its southern neighbor. The interconnections are realized via two 400 kV interconnecting transmission lines: SS Bitola 2 – SS Florina and SS Dubrovo – SS Thessaloniki. Since 2009 is in operation interconnection with Bulgaria, SS Shtip – SS Cervena Mogila. Basic data of existing interconnection lines can be found in the table 6.

**Table 6. Basic data of existing interconnections**

Node 1	Country	Node 2	Country	Voltage Level (kV)	Line Length (km)	Type of Circuit	Type of Conductor	Conductors per phase	Rated Current (kA)
Kriva Palanka	MKD	Skakavica	BUL	110	18.1	single	3xAl/Fe 240/40	1	0.647
Susica	MKD	Petric	BUL	110	32.6	single	3xAl/Fe 240/40	1	0.647
Bitola 2	MKD	Meliti	GRE	400	40	single	3xAl/Fe 490/65	2	1.92
Dubrovo	MKD	Tessaloniki	GRE	400	115.3	single	3xAl/Fe 490/65	2	1.92
Dubrovo	MKD	C. Mogila	BUL	400	150	single	3xAl/Fe 490/65	2	1.92
Skopje 5	MKD	Ferizaj 2	KOS	400	53.2	single	3xAl/Fe 490/65	2	1.92
Stip	MKD	C. Mogila	BUL	400	150	single	3xAl/Fe 490/65	2	1.92

Figure 4. Single-line diagram of Electric Power System of Macedonia, year 2012



MEPSO allocate cross-border transmission capacities on yearly, monthly and weekly level using NTC based mechanisms.

Due to strong interdependence among the transmission capacities for certain SEE borders, SEE TSOs through CMMI WG agreed on a regular procedure of making the monthly reference network model, in order to obtain compatible and comparable results in monthly binding NTC calculation. Most of TSOs use this model as a basis for the monthly NTC calculation. Modeled reference regime is 3rd Wednesday at 10:30 h of next month. The countries whose models are exchanged and merged into a common regional model within this procedure are: Albania, BiH, Bulgaria, Croatia, Greece, Hungary, Austria, Macedonia, Romania, Slovenia, Serbia, Montenegro, Ukraine (Burstyn) and Italy.

Since only bilateral allocation procedures exist in the region at present, the interdependence among these borders has been taken into account by calculating the composite, simultaneously feasible NTC values, which are then fractioned per individual borders, then again split 50:50 at each border and offered at the separate allocation procedures. When calculating Macedonian north and east border transmission capacity, simulations consider joint import of Macedonia, Greece and Albania from Bulgaria and Serbia. Considering capacity of south Macedonian border to Greece, export from north to Greece and Albania is simulated. In that manner, typical borders are “coupled” into a composite NTC calculation, assessing maximum bulk power flow from north and east to south and distributing NTC on (north and east) and south Macedonian border. Main idea of approach is to maximize the transmission capacities and level of security of supply at the same time.

#### *Macedonia – Serbia interconnection*

This border is congested in direction SR→MK. Capacity is evaluated and distributed yearly, monthly and weekly. Capacity is shared 50% between two TSOs in both directions. On Macedonian side there is a yearly, monthly and weekly procedure of allocation based on the explicit auction. On Serbian side there is a yearly and monthly procedure of allocation based on the auction. 50:50 method allocation of Macedonian part of capacity is applied.

#### *Macedonia – Greece interconnection*

This border is congested in direction MK→GR. There is ongoing activity for signing an agreement based on 50%/50% share and separate auctions in both directions. In mean time, capacity is shared 50% between two TSOs in both directions. On Macedonian side there is a monthly and weekly procedure of allocation based on the explicit auction. On Greek side there is a yearly, monthly and daily procedure of allocation based on the explicit auction.

#### *Macedonia – Bulgaria interconnection*

This border is congested in direction BG→MK. Capacity is shared 50% between two TSOs in both directions. On Macedonian side there is a yearly, monthly and weekly procedure of allocation based on the explicit auction. On Bulgarian side there is a yearly and monthly procedure of allocation based on the explicit auction.

In parallel with introducing and/or operating the bilateral allocation procedures, SEE TSOs keep on with joint investigation on the possibilities for implementing coordinated flow-based explicit auctions.

### **3.4.3. Development of transmission network**

In accordance with the Grid Code, MEPSO prepared Study of development of transmission network of the Republic of Macedonia for the period 2010-2020 in order to fulfill obligations for network maintenance, development and security of supply. This Study should be updated every year covering 10 year time horizon.

Study for development of electricity transmission network in Republic of Macedonia for period 2010-2020 comprises retrospective reports for years Y-1 and Y-2 and forecast reports concerning three levels of forecasts:

Short term forecast : years Y+1, Y+2 and Y+3.

Middle term forecast : year Y+5.

Long term forecast : year Y+10.

The Study for development of electricity transmission network in Republic of Macedonia for period 2010-2020 has to insure that the least cost development of the transmission system is able to cope with future demands and maintains a quality in compliance with the ENTSO-E reliability standards. This study is based on the forecast demand, the assessment of the generation adequacy (if generation can meet the demand for the following years with respect to the N-1 criterion), the assessment of the transmission capacity and transmission system adequacy and the need for interconnection with other power systems. The aim of this report is to propose a list for the construction of new transmission network elements and network enhancements. System Operator inside MEPSO is responsible for planning analyzes and completion of this Study.

The Study for development of electricity transmission network in Republic of Macedonia for period 2010-2020, after approval by the Regulatory Authority, was published and provided to ENTSO-E as the System Adequacy Forecast (i.e. Transmission Development Statement).

According to Energy Law, MEPSO prepares 5 years Development Plan (Transmission Investment Plans) and gives them for approval to the Energy Regulatory Commission. List of new investments in Development Plan is output of techno-economical analyzes worked out in Study for development of electricity transmission network in Republic of Macedonia for period 2010-2020.

Methodology and criteria for system planning are defined in the Grid Code.

Basic planning rule is N-1 criterion that covers loss of following elements (contingencies): single-circuit lines, double-circuit lines, transformers, generators.

Events that are not allowed to happen during normal regime and contingency check are: thermal overloading of branches (lines and transformers), voltage declination below permitted range, loss of stability, loss of load, interruption of power transits.

During transmission planning different kind of analyzes are applied: load flow, voltage and reactive power flow analyzes (OPF), short circuit analyzes, stability analyzes, economical evaluation of potential projects.

Uncertainties during transmission network planning are taking into account using deterministic multi-scenario approach. Following uncertainties are considered: uncertainties in new power plants size and location, uncertainties in generators engagement, uncertainties in hydrological conditions, uncertainties in country power balance.

Analyzes are carried out for the extreme system conditions represented by reference snapshots and forecasted regimes:

For Y+1 and Y-1, 3rd Wednesday for every month, 11:00h and 19:00h CET.

For Y+2, Y+3, Y+5 and Y+10, 3rd Wednesday in January and July, 11:00h and 19:00h CET,

LDC for typical working day and weekend.

Development plan is realized by Grid Owner inside MEPSO according its responsibility for maintenance, rehabilitation and construction of transmission network.

Main transmission projects are funded using loans from IFI's. Loans are serviced through transmission fee as part of the invoice of final customers.

Brief info for main transmission projects with both national and regional significance, planned for the next period, is given further in tables.

**Table 7. On-going projects for interconnections**

Node 1	Country	Node 2	Country	Voltage Level (kV)	Line Length (km)	Type of Circuit	Type of Conductor	Conductors per phase	Rated Current (kA)
Stip	MKD	Nis (Vranje)	SER	400	195.0	single	3 x 2 x Al/Fe 490/65	2	1.920

Forecasted completion of new 400 kV line for connection between Macedonia and Serbia is the end of 2014. Serbian part is commissioned, and Macedonian part is in realization phase.

**Table 8. Interconnections projects under investigation**

Node 1	Country	Node 2	Country	Voltage Level (kV)	Line Length (km)	Type of Circuit	Type of Conductor	Conductors per phase	Rated Current (kA)
Skopje 5	MKD	Kosovo B	SER	400	84.0	single	3 x 2 x Al/Fe 490/65	2	1.920
Bitola 2	MKD	Elbasan	ALB	400	160.0	single	3 x 2 x Al/Fe 490/65	2	1.920

New 400 kV line for connection between Macedonia and Albania is part of the project for establishing east – west electricity corridor. Feasibility study and ESIA are completed for this interconnection. The current status of the project is preparation of designs. The second project with Kosovo is under consideration and depends of the uncertainties in new investments TPP in Kosovo area.

**Table 9. New 400/110 kV substations**

Name	kV	Year of commissioning	Description
SS Ohrid	400	2018	400/110 kV/kV

#### 3.4.4. Security of Supply from operational aspects

MEPSO as a transmission system operator shall draw up a catalogue of measures for disturbance management according to the Defense Plan, in order to secure electricity supply to the customers.

MEPSO as a transmission system operator shall ensure that: it has at its disposal enough generating units with isolated operation and black-start capability; it can recognize, from changes in status variables supplemented by suitable signaling of status changes (from its own installations and those of the system users) the occurrence and the extent of disturbances, in order to determine based of such information the measures required for elimination of the disturbance or limitation of its effects.

To prevent voltage drop, MEPSO should include a provision for reduction of the voltage controller set point values and/or blocking of the voltage controllers on the substation transformers for the transmission and distribution systems in the Connection Agreement.

MEPSO reserves the right to perform load shedding (either manually or automatically according to the voltage). MEPSO shall make arrangements with distribution companies within the distribution network for controllable load shedding through voltage reduction and/or customer's disconnection.

Should limit values for system operation variables (e.g. voltage, short-circuit current) or equipment loading (e.g. current loading) continue to be violated following the performance of corrective measures or should a risk exist of the disturbance spreading, MEPSO may order disconnection of the sections of the installation in which the disturbance originated, in order to ensure reliable system operation and/or rapid restoration of the network subject to the disturbance.

If necessary, adjustments must be made to the generating units schedule for the purpose of overcoming congestion in the system.

A Load shedding plan shall apply for load shedding as a function of the frequency to avoid total blackouts. The amount of load to be shed at each stage shall be defined by MEPSO as a transmission system operator taking into account the technical requirements of the system users.

Every distribution operator and transmission system user must ensure automatic load shedding at low frequency or voltage according the requests of the transmission system operator.

MEPSO is responsible for monitoring and coordinating maintenance and for maintaining continuously adequate and reliable operation backup telecommunication facilities to assure coordinated control of operations during normal and contingency situations.

Restoration of the normal operation after a system-wide blackout in relation to already defined scenarios shall be conducted as fast as possible based on the Defense Plan where supply restoration measures are included.

MEPSO shall develop various scenarios to re-establish the power system in order to define further operation effectively and responsively. This plan must be verified and tested periodically under MEPSO authority. Telecommunication facilities used to implement the plan shall be periodically tested while MEPSO operators and the operating personnel of generating units involved in the process shall be trained in the implementation of the plan.

### 3.5. DISTRIBUTION

EVN Macedonia AD, Skopje, reorganized as a joint stock company, is 10% in the state ownership, with 90% of the shares sold to EVN AG (Austria). The following licenses have been issued to EVN Macedonia by the ERC of the Republic of Macedonia:

- For electricity distribution and operation of the distribution system;
  - For retail electricity supply to the tariff customers;
- EVN Macedonia has established a daughter company for producing of electricity EVN Makedonija Elektrani that posses a license:
- For power generation from small power stations connected to the distribution grid (distributed generation).

This company owns 187.7 km of distribution network at a voltage level of 110 kV, 860 km at 35 kV, 10.018 km at 10(20) kV and 14.956 km at 0.4 kV. EVN Macedonia AD supplies a total od 678 658 consumers with electricity. According to this source the company has 2.215 employees in 2012. EVN Macedonia AD, Skopje in 2012 has delivered 5.252 GWh to tariff customers. The tables bellow contain data for energy consumption and number of customers by customer group in 2012.

#### Energy Consumption by Customer Group

Customers Groups			2012
Middle Voltage Customers	35 kV direct consumers	kWh	4.027.845
	35 kV consumers	kWh	100.828.909
	10 (20) kV consumers	kWh	762.405.382
Low Voltage Customers	Households	kWh	3.257.489.461
	I Tariff group	kWh	328.354.443
	II Tariff group	kWh	693.391.966
	Public lightening	kWh	105.789.879
<b>TOTAL:</b>		<b>kWh</b>	<b>5.252.287.885</b>

#### Number of customers connected on distribution grid

Customers Groups		2012
Middle Voltage Customers	35 kV direct consumers	3
	35 kV consumers	44
	10 (20) kV consumers	1.122
Low Voltage Customers	Households	600.150
	I Tariff group	2.270
	II Tariff group	69.923
	Public lightening	5.146
<b>TOTAL:</b>		<b>678.658</b>



Recently EVN made a new reorganization whereby the distributive consumers were divided into 19 Electricity User Centers (EUC). A map with the division is provided below.



### 3.5.1. Investments and project for improvement of Security of supply

All investments and project that have been realized by EVN Macedonia aims to increase the security of supply, providing higher level of efficiency of electricity distribution, reduce the losses and improve of service to the customers.

In 2012, more than 120 km medium voltage network, 180 transformer stations and more than 210 km low voltage network were built or reconstructed. Investments are made with purpose of reducing electricity losses in the distribution network, improving voltage conditions and increasing of the level of services for the users, providing a reliable supply of end customers with electricity. At the same time, when planning investment in the network, the complaints of the consumers and their requirements were taken into account at the reconstruction and construction of new low voltage and medium voltage projects.

Representative network investments in modernization in 2012 were transformer stations upgraded with automatic voltage regulation and remote control, which lead to timely and more effective dealing with network failures and manipulations. At the same time, are invested resources in unloading TS 35/10kV, replacement of 110 kV equipment in four substations, replacement of condenser batteries in several substations etc., and preparation of documentation for new substations and lines that are planned for construction.

EVN Macedonia undertakes measures for reduction of losses. The program of replacing meters was prepared, which continues in the year 2012 resulting in 100,000 replaced meters. Dislocation of meters of the property boundary has continued. Until now, EVN Macedonia has implemented this measure in 14 regions that are located in 6 cities: Skopje, Bitola, Prilep, Kumanovo, Tetovo, Struga. These regions were selected because of the problem in the quality and reliability of supply, old and inadequate medium and low voltage network high electricity distribution losses and low collection rate. EVN installed SMART meters that allow to analyze the behavior of the consumers and their energy consumption, finally contributing to the reliability of the electricity supply for the consumers.

Another investment field is the IT sector, telecommunications, infrastructure and vehicles. Investments are made in rolling stock and infrastructure facilities, as well as the oil purification station in Butel. The projects are intended to improve communications and software and are considered to be very necessary, as the construction of our network for directed communication relay on it.

EVN Macedonia in the next years plans to continue with investments and projects for improvement of Security of supply. According to annually investment programs, the distribution grid will be upgraded with new distribution facilities in accordance with customer needs. Also current facilities will be reconstructed to meet the demand and standards for higher security of supply. EVN Macedonia continues to replace mechanical meters with new electronic meters. That is very important for reduction of losses and decreasing of unauthorized consumption of electricity that would reflect directly on reliable distribution of electricity and security of supply of electricity for final customers.

### **3.5.2. Improvement of service for increase of security of supply**

During the year 2012, EVN Macedonia has undertaken measures to improve service quality of the electricity supply. The company implemented several new modules that were upgraded, including modern software and hardware systems for better performance of the service. The application of these systems directly improving service to consumers, on the other hand increases efficiency in internal operations of the company. Increased efficiency in operations and improved internal organization of the company eventually result in better quality service to consumers.

In order for providing safe and reliable operation of the distribution system and increase of the operational reliability, EVN Macedonia established specific organizational structure in terms of introducing teams for handling defects, which are scheduled to operate 24/7. In this way it is possible to quickly and efficiently remove defects in the distribution network. The basic principles for organization of the teams are: number of failures, different regions, state of the network, the volume of the consumption, network length, the number of transformer stations etc. It is anticipated that teams for resolving failures will be engaged both, in time and outside working hours, on weekends and holidays.

In order to be more efficient, centralized records about the defects in EVN Macedonia during 2012 are fully implemented in OMS (Outage Management System). OMS is a software that is actively used since 2011 by the Call Center of EVN Macedonia and KEC Front Offices. The system provide electronic handover of information on defects, monitoring of received information and resolved defects, and documenting defects removed by competent technical services on field. The implementation of this software is of particular importance for keeping centralized records of all interruptions due to defects in the distribution network, preparation of reports, as well as monitoring.

Furthermore, billing system (KVASy) and the center for printing bills during 2012 were continually upgraded with new modules and features to further increase the level of service towards the customers and to make even better and more coordinated database that can be used in daily operations.

Within 2012, the calculation and payment of electricity EVN Macedonia is realized by applying kVASy system for reading, calculation, collection and distribution of bills for consumed electricity. The process improved the internal operations of the company, constantly improving the quality of service to the customers.

The way to achieve satisfactory levels of communication with the consumers in a way that suits their requirements is constantly developing. In this context, EVN Macedonia has established a system for evaluation of its service in order to take certain corrective measures.

Considering the importance given to the customers, and the continuous and constant improvement of internal processes and service to customers, EVN Macedonia in 2012 continued with the research on customer satisfaction through the project "Evaluation of customer's satisfaction."

To obtain a comprehensive picture in regards to the service, interviews with 11,000 consumers were carried out, making it possible to include two dimensions - perception from the outside and the quality inside. Analysis of the results will lead to establishing new and improving existing standards of operations, and thus fulfill the expectations of the customers in general.

### **3.5.3. Provisions for safe and secure dispatching of distribution system**

The management of the electricity distribution systems by EVN Macedonia is realized through the distribution dispatching center in Skopje, and with the assistance of:

- SCADA systems for remote guiding of the transformer stations;
- the crews in 110/x kV transformer stations and in specific 35/10 kV transformer stations, (there are crews in 32 110/x kV transformer stations of EVN Macedonia, and eight X/35 kV transformer stations of AD MEPSO and in 10 (ten) 35/10 kV transformer stations of EVN Macedonia); and the mobile teams on duty.

In EVN Macedonia has been adopted a concept of management with the distribution networks in the Republic of Macedonia through one Dispatch Center and this in Skopje. For that purpose with the plans for development of the system for remote guiding it was anticipated stage equipping of all 110/x kV and 35/x kV transformer stations with the necessary equipment for remote management.

In the year 2011, the Dispatching Center of EVN Macedonia AD manage ten 110 / x kV and eight 35/10 kV transformer stations in Skopje and four 110 / x kV transformer stations in other cities in Macedonia: Tetovo, Gostivar, Delchevo and Stip. Also from the Dispatching Center in Skopje, it manages middle voltage network in KEC Aerodrom, KEC Gorche Petrov, KEC Vasil Glavinov, KEC Delchevo, KEC Shtip and KEC Gostivar.

From its Dispatching Center, EVN Macedonia AD also tracks and monitors seven small hydro power plants: Babuna in Veles, Belica in Kichevo, Turija near Strumica and four small hydro plants in cascade within KEC Tetovo.

During the 2012, the Dispatching Center of EVN Macedonia AD planned to accept management of the 10 (20) kV network in KEC Tetovo, KEC Ohrid, KEC Veles, KEC Struga and Gevgelija, and to finalize activities the introduction of remote control in some substations.

EVN Macedonia AD has developed a concept to complete the radio network with new targeted radio links (RF network) in accordance with the concept of managing the distribution network in the Republic of Macedonia through a dispatch center, and during 2012 gradual conversion the project is planned. System for targeted radio relay network provides fast and efficient transfer of data and voice information, which is especially important for safe, secure and quality management system for distributing electricity.

In all the organizational structures – user energy centers of EVN Macedonia is installed a DMS (Distribution Management System), production of DMS GROUP – Novi

SAD, the software for management of the distribution systems from all the aspects (maintenance, management and development).

EVN Macedonia AD also owns 11 small hydropower plants with 25 generation units with a total power of 47.4 MW (table 3.2.3.1) which have generated 124.66 GWh in 2012.. The distribution network of EVN also includes the small hydropower plants owned by private generators, mainly water management organizations.

	Small HPPs	P <sub>inst</sub> [MW]
EVN	Sapunchica	2.9
	Kalimanci	13.8
	Zrnovci	1.6
	Doshnica	5.1
	Pesochani	2.9
	Matka*	9.6
	Pena	3.3
	Babuna	0.9
	Belica	0.25
	Turija	2.2
	Popova Shapka	4.8
<b>Total</b>	<b>EVN</b>	<b>47.35</b>
Other companies	Strezhevo	3.4
	Komunalec	1.2
	Standard	
<b>Total</b>	<b>Other</b>	<b>4.6</b>

## **4. MACEDONIAN NATURAL GAS SYSTEM**

### **4.1. REGULATORY FRAMEWORK IN GAS SECTOR**

On February 3, 2011 the Energy law was adopted (Official Gazette of Republic of Macedonia 16/2011) which regulates legal environment for performing energy activities. It has several updates (Official Gazette of Republic of Macedonia 136/2011 and 79/2013). For the implementation of the Law additional secondary legislation was adopted. Most of the implementing acts were for determination of the regulatory framework.

#### **4.1.1. Secondary Legislation**

According to the Article 88 of the Energy Law, the natural gas transmission system operator shall be obliged to adopt and upon previous approval from the Energy Regulatory Commission, to publish in the "Official Gazette of the Republic of Macedonia" and on its website the Natural Gas Transmission Grid Code, one year after the entry into force the Energy Law. Grid Code shall stipulate in particular:

- 1) technical and technological terms and conditions on connecting facilities, devices and plants to the natural gas transmission system;
- 2) terms and conditions, manner and methodology on setting the transmission grid connection charge, based on the principles of transparency and non-discrimination;
- 3) procedure on approving users' applications for connection to the transmission networks, as well as the cooperation and obligations of the transmission system operator and the transmission network operators;
- 4) manner of natural gas system use at electricity and heating energy generation facilities holding temporary operation license;
- 5) terms and conditions and manner of third party access to the transmission system, based on the principles of transparency and non-discrimination;
- 6) technical and other terms and conditions for reliable and safe transmission system operation;
- 7) transmission system maintenance and development planning;
- 8) contents of transmission system development and maintenance plans, as well as the manner and procedure under which system users shall submit data required for the preparation of the plans;
- 9) manner and procedure on natural gas demand forecasting, as well as the obligations of the natural gas transmission system users (natural gas suppliers and consumers directly connected to the natural gas transmission system) related to the submission of data required for preparing the demand forecasts;
- 10) measures, activities and procedures in cases of outages and emergencies;
- 11) operational requirements and accuracy class of metering devices, as well as the natural gas metering method;
- 12) criteria on ancillary services provision;

- 13) manner and procedure on announcing and allocation of available transmission capacity and on addressing peak loads in the transmission grid;
- 14) manner and procedure on access to installations and metering-regulation stations that are an integral part of the transmission grid and are owned by consumers or users;
- 15) quality of services provided by the operator for the users;
- 16) work of the operation systems;
- 17) manner of publishing information, which it is obliged to publish pursuant to the present law;
- 18) manner and procedure on information provision for system users; and
- 19) manner of cooperation between natural gas transmission system operators.

Because of the „status quo” with the transmission system operator of the natural gas in Republic of Macedonia, the existing Grid Code for transmission of natural gas was prepared by JSC GA-MA, transmission system operator of the natural gas, and after the approval of the Energy Regulatory Commission was published in Official Gazette of Republic of Macedonia No 45/2009.

Natural gas transmission grid code specifically governs:

- technical conditions for connecting natural gas distributors, direct customers of natural gas, and other natural gas transmission systems to the natural gas transmission system;
- technical and other conditions for secure and safe functioning of the natural gas transmission system;
- transmission system planning, maintenance and development;
- measures, activities and procedures in case of breakdown;
- terms and conditions for third party access to the natural gas transmission system;
- functional requirements and precision class of measuring devices,
- natural gas quality standards;
- criteria for providing system services;
- natural gas nomination and scheduling procedures;
- data collection and communications protocols; and
- supervision and control of operational management systems.

### ***Natural gas supply rules***

ERC prepared Natural gas supply rules, which implements provisions of the Directive 2003/55/EC, and submitted it to the companies and the Secretariat of the Energy Community for comments and opinion. ERC on 30.03.2012 had a preparatory session for the interested parties and on 07.05.2012 ERC issued the Natural gas supply rules ("Official Gazette of the Republic of Macedonia" no. 56/12). These Natural gas supply rules determine the general conditions for supply of natural gas, as well as the mutual rights, obligations and responsibilities of the supplier, customers and operator of transmission system, operators of the transmission network and distribution system operators of natural gas.

### ***Tariff system amending the Tariff system for sale of natural gas to tariff customers***

On 18.07.2012 ERC issued Tariff system amending the Tariff system for sale of natural gas to tariff customers ("Official Gazette of the Republic of Macedonia" no. 94/05, 43/10, 9/12 and 13/12). By this Tariff system published in the "Official Gazette of the Republic of Macedonia" no. 90/12 changes regarding the full recognition of the trade charge were adopted.

### ***Rules on natural gas supply of last resort***

ERC prepared the Rules on natural gas supply of last resort, which implements provisions of the Directive 2003/55/EC, and submitted it to the companies for comments and opinion. On 01.08.2012 ERC had a preparatory session for the interested parties and ERC shall issue these rules by end of August 2013. These Rules on natural gas supply of last resort determine the general conditions for natural gas supply of customers that have decided to be supplied by the natural gas supplier of last resort, as well as the mutual rights, obligations and responsibilities of the supplier of last resort, customers and operator of the transmission or distribution system of natural gas.

***Rulebook for prices of natural gas for the supplier of last resort***

ERC prepared the Rule book for prices of natural gas for the supplier of last resort, which implements provisions of the Directive 2003/55/EC, and submitted it to the companies for comments and opinion. ERC shall have a preparatory session by end of August 2013, and afterwards this Rulebook shall be approved. This Rulebook sets the manner and the conditions for establishment, approval and control of the prices by which the regulated maximum revenue necessary for the performing of the regulated energy activity: natural gas supply of last resort is realized.

***Rulebook on the manner and conditions for regulating tariffs for transmission, operation of transmission system and distribution of natural gas***

On 31.10.2011 ERC issued the Rulebook on the manner and conditions for regulating tariffs for transmission, operation of transmission system and distribution of natural gas and published it in the "Official Gazette of the Republic of Macedonia", no. 151/11. This Rulebook determines the manner and conditions for calculation, approval and control of the tariffs, by which the regulated maximum revenue needed to perform the following regulated activities is realized: transmission of natural gas, operation of the transmission system of natural gas and distribution of natural gas.

***Tariff system for transmission of natural gas***

Energy Regulatory Commission adopted the Tariff system for transmission of natural gas supply 11.01.2013 and published it in the Official Gazette of Republic of Macedonia No 19/2013)

***Tariff system for distribution of natural gas***

Energy Regulatory Commission adopted the Tariff system for distribution of natural gas supply 11.01.2013 and published it in the Official Gazette of Republic of Macedonia No 19/2013)

***Tariff system amending the Tariff system for sale of natural gas to tariff customers***

On 18.01.2012 ERC issued Tariff system amending the Tariff system for sale of natural gas to tariff customers ("Official Gazette of the Republic of Macedonia" no. 94/05 and 43/10). This Tariff system published in the "Official Gazette of the Republic of Macedonia" no. 9/12, determines the procedure for submitting request for approval of the natural gas sale price on monthly level for tariff customers directly connected to the natural gas transmission system. On 27.01.2012 ERC issued Tariff system amending the Tariff system for sale of natural gas to tariff customers, by which the words: "differences of the exchanging rates" were added ("Official Gazette of the Republic of Macedonia" no. 13/12).

**4.1.2. Cooperation measures**

In Article 13 of the Energy Law is defined that in compliance with the commitments assumed under the ratified international treaties, the Government of the Republic of Macedonia shall duly inform the neighboring and other countries that are or can be affected by the measures undertaken pursuant to paragraph (3) of this article, as

well as the competent international institutions and bodies established under the ratified international treaties.

#### **4.1.3. Measures to cover peak demand**

According to Article 7 of the Energy Law, the Reliability of relevant energy type or energy fuel supply shall be secured, in particular, by means of: measures to address peak loads and contingency measures in the cases of failure to provide relevant energy type delivery. Article 85 of the Energy Law defines that the transmission system operator shall be obliged: to award available transmission capacities and to address peak loads in the transmission network, pursuant to the Natural Gas Transmission Grid Code and Market Code. The existing Grid Code for transmission of natural gas was prepared by JSC GA-MA, transmission system operator of the natural gas, and the Market Code is in the final phase of its preparation by the Regulatory Commission.

#### **4.1.4. The regulatory incentives for new investment**

In Article 86 of the Energy Law is defined that the natural gas transmission system operator shall be responsible for the long-term transmission system development planning. The natural gas transmission system operator shall be obliged to adopt an annual plan on natural gas transmission system development it operates covering the period of the next ten years. By 31<sup>st</sup> October in the calendar year the latest, the operator shall submit the plan to the Energy Regulatory Commission and upon its approval by the Energy Regulatory Commission shall publish the plan on its website. The plan should contain the necessary information related to the system expansion and upgrade, as well as the obligations of natural gas transmission network operators in the plan's implementation.

The natural gas transmission system operator shall prepare the development plans referred to in paragraph (2) of this article in cooperation with the transmission network operators. As part of the development plans, the transmission system operator shall determine which network operator will be tasked to finance the necessary development investments. The transmission network operators shall be obliged to submit all data required for the planning process and shall fulfill their obligations stemming from the development plan.

Should the natural gas transmission network operator, except in cases beyond its control, fail to initiate the investment realization pursuant to the within the next three years, the transmission system operator shall request the Energy Regulatory Commission to task the natural gas transmission network operator with the following:

- 1) to initiate the realization of planned investments within a given deadline; or
- 2) to organize and implement an open call for the realization of planned investments by other investors, by applying the provisions from the law governing public procurement procedures; or
- 3) to accept funding of planned investments by increasing investment capital from other investors.

## **4.2. KEY MARKET PARTICIPANTS AND THEIR RESPONSIBILITIES**

Energy Law (Official Gazette of the Republic of Macedonia 16/2011, 136/2011 and 79/2013) created prerequisites for opening the natural gas market in the Republic of Macedonia through regulating the issue related to legal and financial division of the functions for performing transmission, transmission system operation, distribution and supply of natural gas.



The natural gas **transmission network operator** performs natural gas transmission through the natural gas transmission network in its ownership or through the network for which it has been granted right to use, and shall cooperate with the natural gas transmission system operator for the purpose of maintaining, upgrading and expanding the transmission network. The natural gas transmission network operator is obliged: to invest in the transmission network, pursuant to the transmission system development plan prepared by the natural gas transmission system operator and approved by the Energy Regulatory Commission; to maintain the network on the request of the natural gas transmission system operator, pursuant to the procedures set forth in the Transmission Grid Code; to construct connections and connect new transmission system users or other transmission network operators, based on the connection approval issued by the natural gas transmission system operator; to cooperate with other network operators and transmission system operator; to secure confidentiality of commercial and business data of users connected to the transmission network.

The **natural gas transmission system operator** is a public enterprise or company owned by the Republic of Macedonia or a company where the Republic of Macedonia is the dominant owner, and shall operate the natural gas transmission system and connect it to the transmission systems in the neighboring countries. Transmission system operator is obliged for operation of the transmission system, development of the system, to allow third party access, to prepare transmission grid code, to allocate available transmission capacity, to purchase natural gas for covering losses, to balance deviations from nominated quantities, prepare developments and investments plans, etc.

The natural **gas distribution system operator** shall maintain and when deemed cost-effective upgrade and expand the distribution system, shall operate the distribution system and secure its connection to the natural gas transmission system, for the area on the territory of the Republic of Macedonia where it performs the relevant activity. The natural gas distribution system operator shall be obliged: to secure reliable, safe, cost-effective and secure operation of the distribution system; to connect consumers to the distribution grid, as well as to allow third party access for distribution system use, based on the principles of objectivity, transparency and non-discrimination; to develop, reconstruct and maintain the distribution system; to develop grid maintenance plan; to purchase natural gas quantities required to perform its activities; to meter natural gas quantities delivered to consumers and submit metered data to suppliers; to keep the dispatch log, records on communication systems reliability; to secure confidentiality of commercial and business data of distribution system users. The natural gas distribution system operator shall be responsible for the long-term distribution system development planning in the service area where it performs the activity.

The **natural gas supplier** shall sell natural gas to consumers, traders, other suppliers, electricity and/or heating energy generators, natural gas transmission or distribution system operators, as well as to customers abroad. For the natural gas demand of consumers with whom it has signed supply contracts, the natural gas supplier shall supply natural gas in the country and from abroad. For the natural gas it has committed to deliver to its consumers, the natural gas supplier shall secure the relevant transmission and/or distribution capacity and regulated services pursuant to the applicable tariffs, Natural Gas Transmission Grid Code and Distribution Grid Code. The natural gas supplier, based on metering performed by the relevant grid operator, shall invoice consumers with whom it has signed supply contracts for the natural gas delivered, under agreed prices and transmission and/or distribution system use charges.

The **natural supplier of last resort** shall supply the consumers in the Republic of Macedonia connected to the natural gas transmission or distribution system who have not signed contracts with any natural gas supplier or whose previous supplier has discontinued the implementation of obligations from the supply contracts. The Energy Regulatory Commission shall approve the natural gas purchase rules prepared by the

natural gas supplier of last resort, which shall stipulate in detail the terms and conditions, manner and procedure for natural gas purchase, based on the principles of transparency and non-discrimination.

The **natural gas trader** shall purchase natural gas, for the purpose of selling it to other traders, suppliers, electricity and/or heating energy generators, natural gas transmission and distribution system operators, as well as customers abroad. The trader in the capacity of natural gas supplier can sell natural gas to consumers that fulfill the requirements for independent participation in the natural gas market, as stipulated under the Natural Gas Market Code. Mutual rights and obligations between the trader and consumer, as well as the obligations towards the transmission system operator and/or distribution system operators shall be stipulated by means of a contract. The natural gas trader shall be obliged to submit the natural gas transmission system operator information on the natural gas quantities and relevant time schedules related to all natural gas purchase/sale contracts which it has committed to deliver to its customers, as well as the related to the transit contracts through the transmission system. When performing natural gas export or transit, the natural gas trader shall be obliged to secure sufficient transmission capacity, pursuant to the applicable tariffs and the Transmission Grid Code.

All **natural gas customers** shall be deemed eligible natural gas customers. Natural gas consumers can sign natural gas supply contracts with natural gas suppliers pursuant to the terms and conditions stipulated in the Supply Rules. Consumers that meet the requirements for independent participation in the natural gas market, as stipulated under the Natural Gas Market Code, as well as electricity and/or heating energy generators can purchase natural gas from traders and from abroad. For the purpose of meeting their own demand, the natural gas customers shall secure relevant transmission and/or distribution capacity or shall transfer this obligation to their suppliers. The natural gas customers can be supplied with natural gas from direct lines as well.

#### 4.3. EXISTING NATURAL GAS SYSTEM

The constructed gas pipeline system which provides natural gas to Republic of Macedonia is connected to the Russian transmission gas pipeline which crosses Ukraine, Moldova, Romania and Bulgaria, and it is intended for the needs of Turkey, Greece, Serbia and Macedonia.

The connecting point of the gas pipeline with the Bulgarian one is on the east border of the Republic of Macedonia in the region called Deve Bair and the same extends in the direction of the Kriva Palanka, Kratovo, Kumanovo region all the way to the Skopje region.

The constructed main gas pipeline is with projected annual capacity of  $800 \times 10^6$  (Hm<sup>3</sup>) and working pressure of 54 (bars), supplies the following regions with natural gas: Kriva Palanka region, Kratovo region, Kumanovo region and Skopje region.

The entering pressure of the constructed main gas pipeline on the border crossing is 40 bars. The characteristics of the high pressure main gas pipeline with the distribution gas pipelines are as follows:

No	Facility	Length (km)	Nominal diameter (mm)
1.	Main gas pipeline from bulgarian border to Skopje	98.197	500
2.	Branches from main pipeline towards Kriva Palanka	1.521	100
3.	Branches from main pipeline towards Ginovci	1.692	100
4.	Branches from main pipeline towards	4.592	100

	Kratovo		
5.	Branches from main pipeline towards Kumanovo	6.972	200
6.	Branches from main pipeline towards Skopje - south	8.314	400
7.	Branches from main pipeline towards Skopje - north	1.859	300
8.	Branches from main pipeline towards TIDZ-Bunardzik	5.600	200

The local government of Kumanovo and Strumica have also constructed a primary distribution gas network in their cities with more than 30 km. The municipality Strumica established virtual distribution gas network, including platform for decompression of gas and tanks, where the compressed natural gas (CNG) is deployed by special tank trucks. Also there is distribution network in the technological-industrial development zone (TIRZ) in Skopje with length of around 3,8 km.

Additionally to the pipelines there are several constructed facilities as follows: 1 dispatching cleaning station on the main gas pipeline of 500mm; 1 receiving cleaning station on the main gas pipeline of 500 mm; 8 block stations on the main gas pipeline; 8 block stations on the distribution gas pipelines; 8 cathode station; 1 MMS (main measuring station) and 1 MMRS (main measuring regulation stations).

#### 4.4. NATURAL GAS NEEDS

The consumption of natural gas is presented under item 2.1 and 2.2.

#### 4.5. INVESTMENT IN FUTURE PROJECTS

The Feasibility study for the development of natural gas system in Republic of Macedonia with preliminary design was prepared in 2010. The Study gave technical and economical analysis for current situation of the gas system, regional, cross border and other conditions for development, proposals and manner for further construction of the excising pipeline according to the conditions in South East Europe. Also the Study provides possibilities for utilization of the natural gas from the sources of Russia, Caspian region in the period of 20-30 years.

The study defined strategic conditions and phases for timely realization of the gas system and the priorities directions for the fastest realization as well.

In 2012 EBRD gave a grant for technical services for the project “Gas Pipeline Macedonia Gap Analysis – Environmental and Social Impact Analysis” and Project “Technical Due Diligence” refer to all 5 sections (priority gas transmission routes) to the Ministry of transport and communications and Ministry of finance.

With aim for further development of the natural gas system in Republic of Macedonia, a tender for Services for preparation of a feasibility study for development of natural gas distribution networks in the Republic of Macedonia was conducted by the Ministry of transport and communications, where the elected economic operator was obligated to prepare the study in the next 8 months.

In order to introduce cheap and ecologically justified fuel in the energy structure of Republic of Macedonia, and at the same time to increase the security in the energy supply, realization of several concrete projects is planned in the near future period.

The Government of Republic of Macedonia has determined the Section Klecovce-Stip-Negotino, with a branch to TEC Negotino to be constructed with the funds from “Agreement between Government of Republic of Macedonia and Government of

Russian Federation regulating the obligation of the former USSR in the calculations related to trade exchange between the former USSR and the former SFRY”.

Taking into account initiated conversations at the highest level of implementation of the "Agreement" and the activities on the technical level between Macedonian and Russian representatives, from which signing of appropriate agreements to construct Section Klecovce-Stip-Negotino, with a branch to TEC Negotino is expected in the near future, Government of Republic of Macedonia decided following sections to be financed with funds provided by a loan from the EBRD and EIB, divided into two phases:

Phase I financed by EBRD:

1. TECNegotino - Kavadarci–Prilep–Bitola and REK Bitola–Kremenica-(Republic Greece border)
2. Hamzali-Stojakovo-Republic Greece border
3. Skopje-Tetovo-Gostivar

Phase II financed by EBRD and EIB:

1. Hamzali-Novo Selo-Republic of Bulgaria border
2. Gostivar-TEC Oslomej-Kicevo
3. The rest of the main pipeline from the National Gasification System in Republic of Macedonia

Government of Republic of Macedonia with the Government of Russian Federation on 23<sup>rd</sup> of July 2013 signed Agreement for cooperation during construction of gas pipe line-branch for delivery of natural gas to Republic of Macedonia from the Project South Stream.

## **5. OIL SECTOR**

### **5.1. LEGAL FRAMEWORK**

Within the framework of the Government of the Republic of Macedonia, the ministry responsible for the oil sector is the Ministry of Economy.

The strategic commitments of the Republic of Macedonia in the oil sector and the commitment to harmonize national legislation with the *acquis communautaire*, have been incorporated in the Law on Energy (Official Gazette No.16/2011, 136/2011 and 79/2013) and the Law on Compulsory Reserves of Oil and Oil Derivatives (Official Gazette No. 84/2008, 35/2011 and 84/2012).

The activities related to regulating specific issues related to the performance of oil activities specified in the Law on Energy are performed by the Energy Regulatory Commission (ERC) of the Republic of Macedonia. The Energy Regulatory Commission works and decides independently within the framework of the competences determined in the Law on Energy. According to the Law ERC adopts act and methodology for oil derivatives and fuels for transport, the Energy Regulatory Commission stipulates the manner of setting, approving and control or refinery and retail prices for petrol, diesel

fuels, light fuel oil and mazut, as well as retail prices for blends of fossil fuels and biofuels for transport.

The Law on Compulsory Reserves of Oil and Oil Derivatives regulates the formation, storing, renewal and use of the obligatory reserves of oil and oil derivatives, the jurisdiction of the Directorate for compulsory reserves of oil and oil derivatives and other issues of significance for the obligatory reserves of oil and petroleum products.

Macedonia has no domestic production of crude oil. Crude oil supply is sent by pipeline from the Thessaloniki refinery in Greece to the OKTA refinery which produces sufficient petroleum products for the domestic market.

## 5.2. KEY MARKET PLAYERS

The **wholesale trader** in fuels shall purchase crude oil, oil derivatives, biofuels and/or fuels for transport from the producers, trade with other wholesale traders in fuels and supply the retail traders in fuels and consumers. The wholesale trader in fuels should own or have the right to use the storage premises for crude oil, oil derivatives, biofuels and/or fuels for transport.

The wholesale trader in fuels shall be obliged to hold operational reserves in oil derivatives and fuels for transport at all times in the quantity sufficient to cover at least five-day average volume of trade, calculated on the basis of actual trade in each oil derivative separately for the previous year.

Consumers can purchase oil derivatives and fuels for transport also from abroad, provided that the oil derivatives or fuels for transport are used for own consumption, and this activity shall not require a license on wholesale trade in crude oil, oil derivatives, biofuels or fuels for transport.

The **retail trader** in fuels shall perform its activity at petrol stations or appropriate facilities that meet the requirements stipulated by law or other regulation. The retail trader in fuels can display or otherwise use the logo of fuel producers or of the wholesale trader in fuels pursuant to a mutual agreement, for the purpose of indicating the origin of the oil derivative or fuel for transport, thus guaranteeing the consumers reliable and uninterrupted supply in oil derivatives and fuels for transport under the quality guaranteed by the producer of wholesale trader.

## 5.3. CURRENT INFRASTRUCTURE

### 5.3.1. Oil refinery OKTA

The OKTA refinery was constricted in 1980 and started to work in 1982. The designed capacity is 2.5 million tons per year while the maximum capacity achieved is 1.36 million tons during 1988. In 1999 this company became a company with a privately owned majority shares package, owned by the strategic investor EL.P.ET Balkanika, Republic of Greece. The OKTA Refinery produces: 95 octane unleaded engine petrol with – Euro V, 98 octane unleaded engine petrol – Euro V, diesel fuel with 10 ppm sulfur – Euro V, jet engine fuel - JET A-1, liquid petrol gas (LPG) – mix of propane and butane gas and commercial butane. Combustion oils include: heavy fuel oil with 1% sulfur content and extra light fuel for the residential sector with 1000 ppm sulfur. The total capacity of the oil and petroleum products reservoirs is 382.000 m<sup>3</sup>. The OKTA refinery also has rented crude oil storage capacities in the Port of Thessaloniki (Greece) of 195,000 m<sup>3</sup>.

The oil pipeline Thessaloniki – Skopje started to work in 2002 (213 km) and has a capacity of 2.5 million tons of oil per year. The capacities of the OKTA refinery and the oil pipeline OKTA – Thessaloniki port fully satisfy the demand for petroleum products in

Macedonia, however the refinery needs to be modernized, primarily for the purposes of providing a more efficient environmental protection and improving the efficiency.

#### Crude Oil Import, 2010-2012

× 1000 t	2010	2011	2012
Crude oil	842	685	264

#### Total Refinery storage capacity (x1000 m<sup>3</sup>)

Crude oil OKTA depots	150
Intermediate	29
Fuel oil	80
Diesel	60
Gasoline	48
Kerosene and jet fuel	9
LPG	6
Total	382

### 5.3.2. Biodiesel Fuel production

The refinery for production of biodiesel fuel is owned by the company Makpetrol. This refinery began production in 2007 and its capacity is 20 thousand tons per year. The production of bio-diesel fuel uses unrefined beet oil. At this stage the unrefined oil is imported.

With the fulfillment of the obligations stipulated in the Directive for participation of biofuels at a level of at least 10% in the total petrol and diesel fuel consumption in traffic in 2020.

### 5.3.3. Petrol stations

In Macedonia there are currently about 280 petrol stations. In spite of the fact that today the ownership structure in the retail sector is significantly different, still Makpetrol is dominating both by the number of petrol stations (121), as well as by the scope of sale on those petrol stations. It is followed by OKTA Brend with 29 petrol stations and Lukoil Makedonija with 21 petrol stations. The remaining 109 petrol stations are privately owned by multiple domestic small companies.

### 5.3.4. Storage area

Having in mind the instable fuel flows in the world, it is very important to form oil and petroleum products reserves and therefore to have appropriate storage capacities available. The reservoir capacities in the Republic of Macedonia are sufficient to sustain 90 days of current average consumption of all types of petroleum products. These capacities comprise the storage reservoir area of the OKTA Refinery, the storage reservoir area of the Makpetrol Company, the reservoir storage area of the company Lukoil Macedonia, reservoir storage area of the state commodity reserves of the Republic of Macedonia and the reservoir storage area of smaller private and state owned companies. The capacities of the storage are presented bellow:

#### Petroleum Products Storage Capacities, x 1000 m<sup>3</sup>

	OKTA	MAKPETROL	LUKOIL	OTHERS	total
Products	203	150	5	80	438

Semi products	29				29
Crude oil	150				150
Total	382	150	5	80	617

### 5.3.5. Supply of oil and oil derivatives

Oil products are imported mostly by railroad and exported mostly by road transport.

Current railway transport is with length for about 700 km or 90 tank x 50 t

#### Crude Oil Import, 2010-2012

× 1000 t	2010	2011	2012
Crude oil	842	685	264

#### Petroleum Product Imports, 2010-2012

× 1000 t	2010	2011	2012
LPG	35.6	38.1	48.1
Motor gasoline	32.4	32.2	109.6
Kerosene and jet fuel	12.4	9.2	12.2
Diesel	157.3	287.4	461.6
Gas oil	21.2	32.6	45.1
Residual fuel oil	0	6.9	132.9
Total	258.9	436.4	809.5

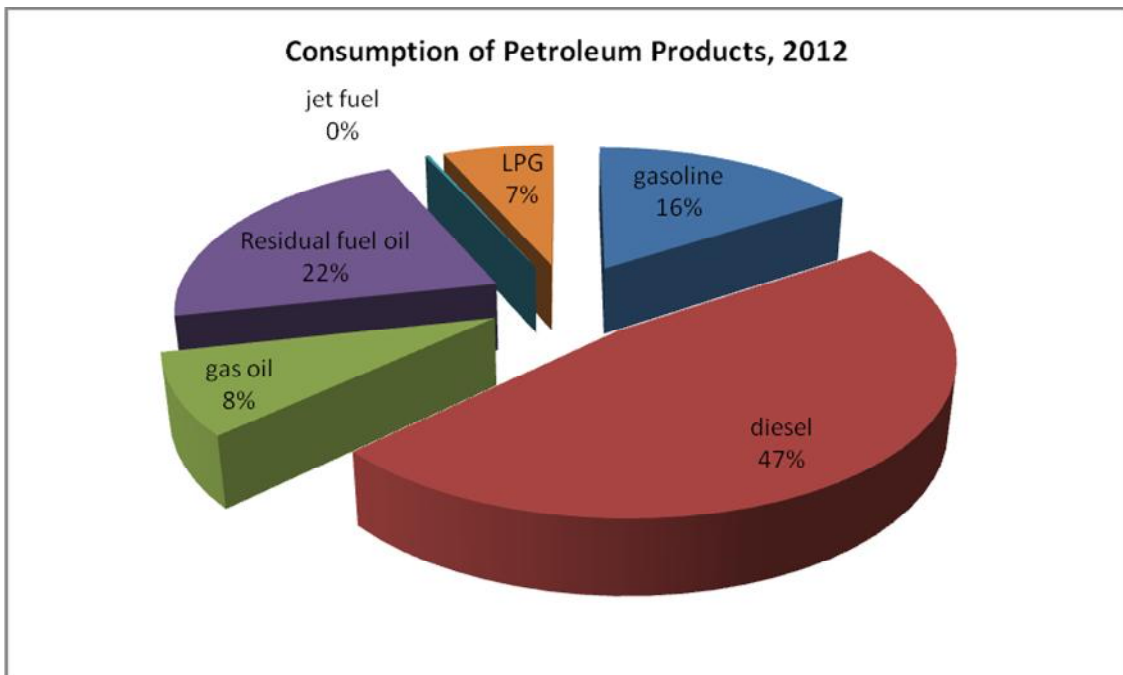
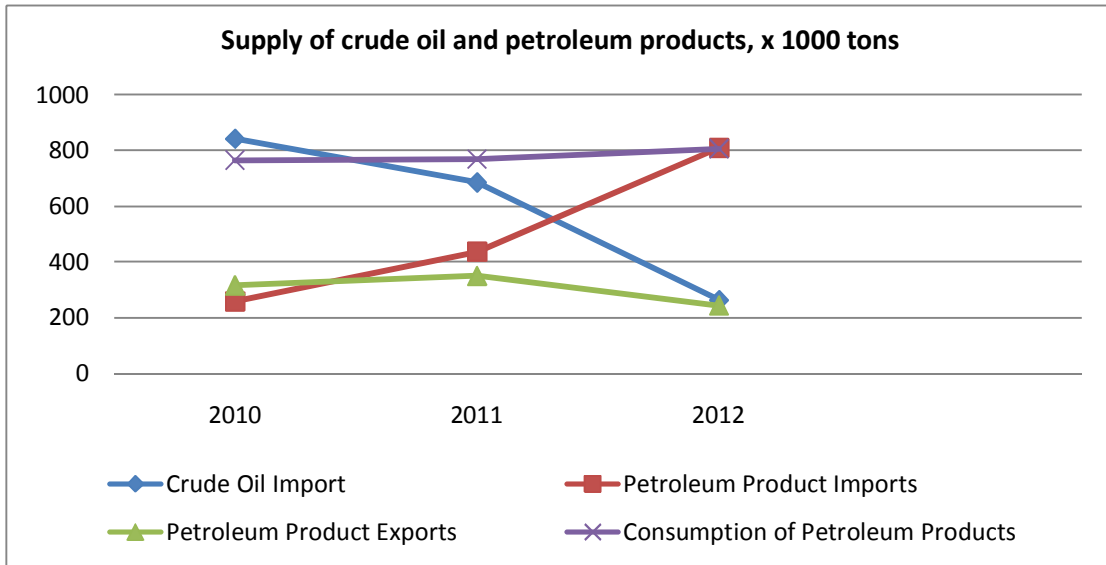
#### Petroleum Product Exports, 2010-2012

× 1000 t	2010	2011	2012
LPG	2.4	3.1	2.8
Motor gasoline	62.4	56.8	37.8
Kerosene and jet fuel	27.6	32.7	25.3
Diesel	166.9	183.0	153.9
Gas oil	0	1.3	0
Residual fuel oil	57.1	73.4	24.4
Total	316.4	350.3	244.2

#### Domestic Consumption of Petroleum Products, 2010-2012

× 1000 t	2010	2011	2012
LPG	57.9	53.5	53.2
Motor gasoline	123.1	127.6	127.3
Kerosene and jet fuel	3.8	2.0	1.9

Diesel	295.5	332.3	380.9
Gas oil	95.7	70.9	68.7
Residual fuel oil	188.9	181.5	174.3
Total	764.9	767.8	806.3



The planned consumption of petroleum products in 2020 is lower than the projected capacity of OKTA Oil Refinery which is 2.5 million tons per year and is also lower than the maximum achieved capacity of 1.36 million tons in 1988. Therefore no



problems from technical aspects (available processing capacity) are expected in the supply of petroleum products.

Since the import of petroleum products are free from custom duties starting from 2011, OKTA will have to maintain its competitiveness with additional investments in the improvement of the efficiency and environment protection.

#### **5.4. COMPULSORY OIL AND OIL DERIVATIVES**

The new Law for on Compulsory Reserves of Oil and Oil Derivatives will be harmonized the national legislation with EU Council Directive 2009/119/EC. In order to enhance the security of supply in the field of oil stocks, the Mid-term Programme for establishment of compulsory reserves of oil and oil derivatives, construction, maintenance and buying of storage capacities 2010-2015 has been adopted by the Government on 9 of March 2010. The Government of Republic of Macedonia on 12 of July 2012 adopted the Revised Programme for establishment of compulsory reserves of oil and oil derivatives for period 2010-2015.

The overall aim of the Programme is to ensuring the security of supply of oil derivatives, where the total quantities of compulsory reserves for each type of oil derivative should reach coverage of realised average daily consumption of that oil derivative for a period of 90 days in the previous calendar year (or 25% of the total realised consumption of the relevant type of oil derivative in the previous calendar year). The indicators for the realised average daily consumption of oil derivatives in 2010, for each derivative separately are applied for preparation of the emergency oil stocks management programme. According to the Mid-term Programme, in the 5 year period, the following will be settled:

- The type, quantity and value of oil derivatives
- The manner of storage and renewal and costs for storage and renewal of compulsory oil and oil derivatives reserves
- The funds needed for financing the Mid-term Programme

Directorate for compulsory reserves of oil and oil derivatives does not possess its own storage for petroleum products. The storage in Macedonia has a limited capacity to store the total quantities of compulsory reserves that should be established in accordance to requirements of the law for 90 days consumption. In order to overcome this, the Directorate can build its own capacity, store the reserves in rented capacity outside its national borders on the territory of EU member states by concluding bilateral agreements between the Macedonia and EU member states, or hold part of the stocks in the form of tickets.

The Directorate for Compulsory Reserves of Oil and Oil Derivatives makes agreements with authorised trading and storage companies that possess a license for storing oil or petroleum products and pursuant to the Law are obliged to store the compulsory reserves.

The Directorate is authorized to perform inspection of the compulsory reserves which are stored in the tankage of the licensed trade companies. Inspection shall be performed on the basis of Directorate's internal procedure in the form of compulsory controls.

The financing of the oil stocks is set by the Law on Compulsory Reserves of Oil and Oil Derivatives and shall be provided by the following:

- fee for compulsory reserves of oil and oil derivatives paid during both import of oil derivatives and production of oil derivatives
- funds realized on the basis of international cooperation of programmes and projects
- donations from domestic and foreign legal entities and natural persons

- foundations and gifts
- other sources

These funds shall represent income of the Directorate for compulsory reserves of oil and oil derivatives and are to be paid into a separate account, held with the treasury.

The realisation of the Mid-term Programme requires having 70% of the stockholding obligation in Macedonia and provision for the remaining 30% by tickets in other countries. Until the end of 2015 the required investments could be covered by the average fee paid by the importers and manufacturers of petroleum products per liter of gasoline, gas oil, residual fuel oil and LPG placed on the market.