

## COMPARATION OF ELECETICAL ENERGY PRICES IN REPUBLIC OF MACEDONIA AND IN EUROPEAN COUNTRIES

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### ABSTRACT

*Energy is the main factor for economical development of one country. Countries with development energy and rich with energy resources have bigger possibilities for faster and bigger economical development. Republic of Macedonia is one of the countries how are not reach with energy resources. Around 55% of total energy needs yearly are form import. The same is in the electric power sector. Electric power needs constantly grows, from 5000 GWh in year 1991, electric power needs in year 2011 were near 9000 GWh. But domestic generation capacities can't follow this trend. Today around 30% from electric power need in the Republic of Macedonia are from import. Biggest part of imported electrical energy is for the eligible consumers, which is purchased with bilateral contracts, with a contractual and not public available price. Part of the electrical energy Republic of Macedonia for the tariff consumers in the last years were indirectly imported by AD ELEM and the prices are public available. In this paper will be compared prices of electrical energy in Republic of Macedonia from purchased by AD ELEM and on some European energy exchanges and countries.*

### 1. INTRODUCTION

Supply and demand of electrical energy comprise the electrical energy market. During the 1990's in the European Electrical energy sector occurred significant changes in line with liberalization of electrical energy sector. Liberalization is short term means opening of the electrical energy sector for competition. Trading electricity means buying and selling electrical energy on the market. There are different markets for trading electrical energy:

- Bilateral trading (non organized, which means that the negotiations are carried out directly between the parties involved and the contracts are not regulated. (Macedonia)
- Organized trading, organized in Power Exchanges or Power Pools. In the organized markets the trading procedures and the structural conditions are established in the market rules. The difference from the power pools and power exchanges is that participations on the power pools is mandatory and all electrical energy must be traded on the pool, while the power exchanges encourage on the private basis and the participation is voluntary.

The most evident result of the liberalized process of the electricity industry in the Europe is creation of electrical energy power exchanges. They play an essential role in the new market structure and share the same goal: to facilitate electrical energy trade, foster competition, to ensure transparency and to develop liquidity and credibility of its price index. The figure below shows the existing electric power exchanges in the Europe.



Fig. 1 Electric power exchanges in the Europe

## 2. POWER EXCHANGES (EEX, OPCOM, LAGIE)

### **EEX – European Energy Exchange**

The European Energy Exchange (EEX) is the leading energy exchange in Europe. EEX operates a market platform for a broad range of energy and related products: power, natural gas, emission allowances and coal. In this paper for comparison is assumed base load European Electricity Index (ELIX) and Physical Electricity Index (Phelix) (period 01.01.2006 – 25.10.2010).

- The Physical Electricity Index (Phelix) is the reference price in European power wholesaling and is calculated and published every day as an index quantifying the delivery of base load power (base) and the delivery of peak load power (peak). The arithmetic mean of all prices in the hourly auction on the spot Market of EPEX Spot for the German/Austrian market area is referred to as the Phelix Day Base (hours 1 to 24, for each calendar day). The Phelix Day Peak comprises the hourly prices for the peak load times (from 8:00 am to 8:00 pm CET) from Monday to Friday, regardless of holidays.
- The European Electricity Index (ELIX) is calculated using the results of an integrated auction on the basis of the aggregated supply and demand curves for the EPEX Spot Market areas Germany/Austria, France and Switzerland. The ELIX corresponds to the market price (without congestion effects) for these market areas and, thus, represents the market price for power in an integrated single European market for the first time. As in the case of the existing Day-Ahead market results, the index is calculated for every hour of the delivery day. In addition, the average value for the base load hours (ELIX Day Base) and for the peak load hours (ELIX Day Peak) is calculated and published.

The table and figure below shows the base load prices of electrical energy on EEX in the period from 01.01.2006 till the end of 2011.

Table 1. Physical and European Electricity Index (Phelix and ELIX) – period 2006 – 2011

Physical and European Electricity Index (Phelix and ELIX) (€/MWh)													
	1	2	3	4	5	6	7	8	9	10	11	12	Avg.
2006	65	70.4	64.4	45.8	37	40.3	56.2	46.3	46.9	46.8	57.4	41	51.4
2007	36.1	34.8	26.8	29.4	31.1	37.2	32.4	29.7	33	50.6	64.1	51.6	38.1
2008	59.5	58.7	53.7	65.2	56.8	70.1	73.3	59.8	86.1	57.5	67.4	54.8	63.9
2009	57.2	50.5	37.3	33.2	31.3	33.7	35.7	34.2	38.8	44.6	39.2	36.4	39.3
2010	42.9	42.7	39	39.6	42.4	43.2	46.6	40.6	45.5	53.4	56.3	57.6	45.8
2011	52.4	53.6	54.6	50.7	56.8	56.7	43.5	46.5	51.9	52.6	57.3	44.7	51.8

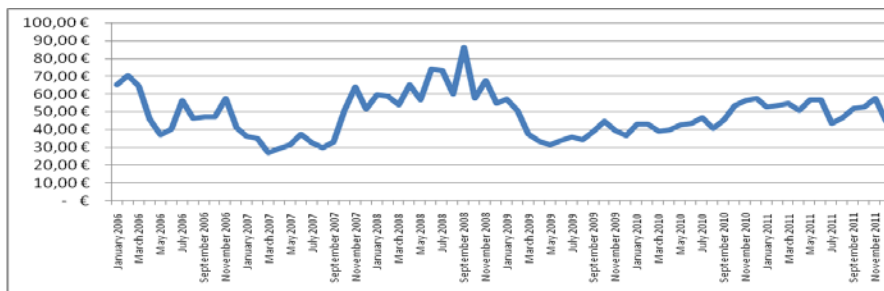


Fig. 2 Physical and European Electricity Index (Phelix and ELIX) – period 2006 – 2011

### OPCOM – Romania

In 2000 the Power Market Commercial Operator (OPCOM) was set up to manage the Day-ahead Market (DAM) in Romania. Till now some changes in order to improve the electric power market were introduced. Today Market Operator aggregates the sell and buys offers and obtains the Market Clearance Price (MCP). In this paper for comparison is assumed base load Market Clearance Price (MCP) on the Romanian Electrical energy market.

The table and figure below shows the base load prices of electrical energy in Romania in the period from 01.01.2006 till the end of 2011.

Table 2. Price of electrical energy in Romania OPCOM – period 2006 – 2011

Price of electrical energy in Romania OPCOM (€/MWh)													
	1	2	3	4	5	6	7	8	9	10	11	12	Avg.
2006	36.7	45.9	40.7	39.4	33.4	31.8	41.3	41	52.6	53.9	57.9	62.9	44.8
2007	47.1	45.7	42.5	38.9	46.7	55.4	67.4	55.4	46	50.8	40.2	37	47.8
2008	56.5	53.2	40.4	38.5	38.3	49.3	54.2	56.8	62.5	65	60.5	39.4	51.22
2009	32.2	32	30	23.3	33.7	39	36.3	36.6	42.1	45.9	28.3	37.7	34.8
2010	36.7	40.7	38.6	35	37.8	31.2	34.7	32.8	37.3	42	39.5	31.5	36.5
2011	44.2	45.7	46.1	45.5	55.1	49.3	51.2	50.7	59.2	56	62.7	59.8	52.1

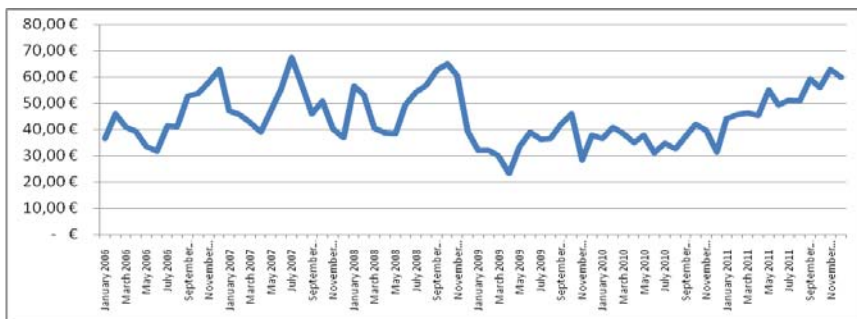


Fig. 3 Price of electrical energy in Romania OPCOM – period 2006 – 2011

### LAGIE – Greece

Greece electrical energy market is a pool system. From 1 of February 2012 the market operation functions of DESMIE were transformed into the firm Hellenic Electricity Market Operator S.A. (HEMO or LAGIE – in Greek). The table and figure below shows the base load prices of electrical energy in Greece in the period from 01.01.2006 till the end of 2011 according to the data from DESMIE and LAGIE.

Table 3. Price of electrical energy in Greece DESMIE and LAGIE – period 2006 – 2011

Price of electrical energy in Greece DESMIE and LAGIE (€/MWh)													
	1	2	3	4	5	6	7	8	9	10	11	12	Avg.
2006	49.6	60	49.1	48.8	60.7	66.7	65.5	73.5	70	72.9	77.3	75.3	64.1
2007	70.7	69.1	61.4	52.5	59.6	59.6	69.3	63.5	58.2	70.7	71.2	73.3	64.9
2008	79.7	79.1	82.5	70.4	78.1	87.6	104.1	97.5	93.7	91.4	94	88.1	87.2
2009	61.5	55.7	52	41.4	45.1	41.7	44.5	43	45	49.4	44.4	45.5	47.4
2010	46.5	47.4	44.6	58.5	55.8	50	55.2	60.7	51.3	56.5	51.6	49.2	52.3
2011	60.4	60.5	52.3	50.4	52.6	59.8	59.7	52	62.1	63	70.8	77.6	59.1

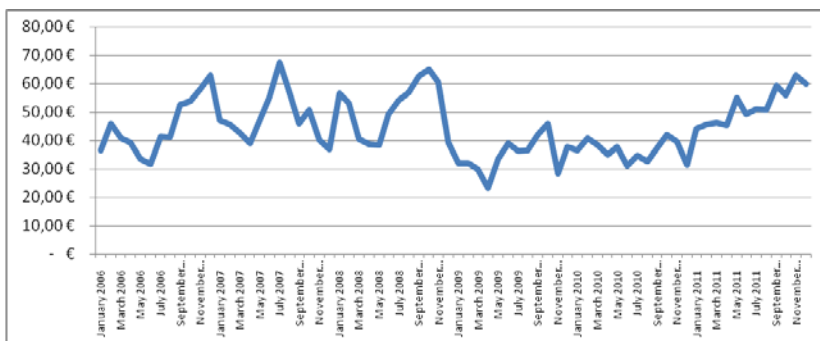


Fig. 4 Price of electrical energy in Greece DESMIE and LAGIE – period 2006 – 2011

In the table and the figure below are summarized the base load prices of electrical energy on EEX Exchange, Romania and LAGIE in the period from 01.01.2006 till the end of 2011.

Table 4. Price of electrical energy on EEX, OPCOM and LAGIE – period 2006 – 2011

	2006	2007	2008	2009	2010	2011
EEX	51,44 €	38,07 €	63,89 €	39,33 €	45,82 €	51,79 €
OPCOM	44,80 €	47,84 €	51,22 €	34,75 €	36,47 €	52,12 €
LAGIE	64,12 €	64,93 €	87,18 €	47,42 €	52,27 €	59,12 €

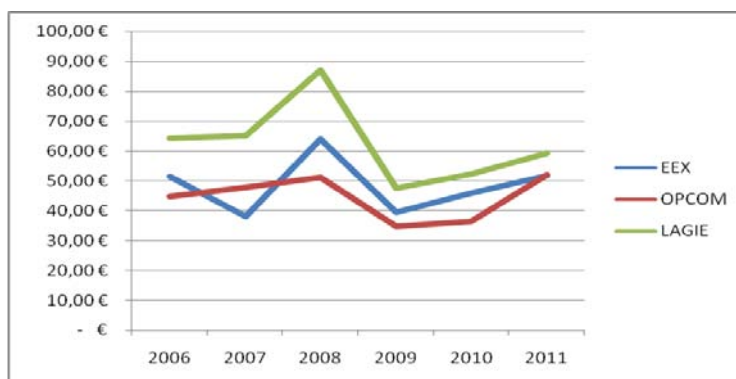


Fig. 5 Price of electrical energy on EEX, OPCOM and LAGIE – period 2006 – 2011

### 3. IMPORT PRICE OF ELECTRICAL ENERGY IN MACEDONIA

Today around 30% from electric power need in the Republic of Macedonia are from import. Biggest part of imported electrical energy is for the eligible consumers, which is purchased with bilateral contracts, with a contractual and not public available price. Part of the electrical energy Republic of Macedonia for the tariff consumers in the last years were indirectly imported by AD ELEM and the prices are public available. The table and figure below shows the prices of electrical energy in Macedonia imported for the tariff consumers.

Table 5. Price of imported electrical energy in Macedonia (for tariff consumers) – period 2006 – 2011

2006	2007	2008	2009	2010	2011
45,20 €	64,60 €	84,92 €	61,38 €	46,13 €	74,02 €

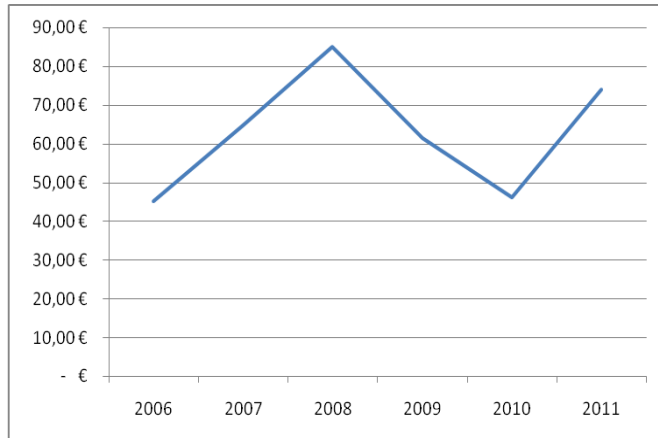


Fig. 6 Price of imported electrical energy in Macedonia (for tariff consumers) – period 2006 – 2011

If we compare the this price with the price of electrical energy on EEX and OPCOM, we can see that imported price of electrical enregy in Macedonia in the last 3 years is much bigger (around 40%) than the prices on EEX and OPCOM and around 20% bigger then the price in Greece. Table 6.

	2006	2007	2008	2009	2010	2011
Imported price of electrical energy in Macedonia (€/MWh)	45,20 €	64,60 €	84,92 €	61,38 €	46,13 €	74,02 €
EEX price of electrical energy (€/MWh)	51,44 €	38,07 €	63,89 €	39,33 €	45,82 €	51,79 €
Differences (%)	<b>-12%</b>	<b>70%</b>	<b>33%</b>	<b>56%</b>	<b>1%</b>	<b>43%</b>
	2006	2007	2008	2009	2010	2011
Imported price of electrical energy in Macedonia (€/MWh)	45,20 €	64,60 €	84,92 €	61,38 €	46,13 €	74,02 €
OPCOM price of electrical energy (€/MWh)	44,80 €	47,84 €	51,22 €	34,75 €	36,47 €	52,12 €
Differences (%)	<b>1%</b>	<b>35%</b>	<b>66%</b>	<b>77%</b>	<b>26%</b>	<b>42%</b>
	2006	2007	2008	2009	2010	2011
Imported price of electrical energy in Macedonia (€/MWh)	45,20 €	64,60 €	84,92 €	61,38 €	46,13 €	74,02 €
LAGIE price of electrical energy (€/MWh)	64,12 €	64,93 €	87,12 €	47,42 €	52,27 €	59,12 €
Differences (%)	<b>-30%</b>	<b>-1%</b>	<b>-3%</b>	<b>29%</b>	<b>-12%</b>	<b>25%</b>

#### 4. CONCLUSION

Electric power needs constantly grows, from 5000 GWh in year 1991, electric power needs in year 2011 were near 9000 GWh. But domestic generation capacities can't follow this trend. Today around 30% from electric power need in the Republic of Macedonia are from import. The electric energy market in Macedonia is with bilateral trading, the negotiations are carried out directly between the parties involved and the contracts are not regulated. Only small part of the imported electrical energy, for the tariff consumers, is purchased on a public tenders from AD ELEM and in some part is regulated.

In this text we compare prices of electrical energy in Macedonia (Bilateral trading), European Energy Exchange – EEX, OPCOM – Romanian Energy Exchange and LAGIE – Greece Energy market pools system. There is a very big difference between the import prices in Macedonia and in these countries. The difference is mainly due to the fact that the biggest part of the imported electrical energy in Macedonia for the tariff consumers is in Q1 and Q4 in the years, when the price is much bigger than the annual price of electrical energy in these countries. Also available transmission capacities for import of electrical energy from north-west European markets are limited and increase the price of electrical energy.

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