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ANALYSIS OF THE ENERGY SECTOR IN MACEDONIA

Abstract

Compared to other types of infrastructure (road, rail infrastructure), the energy sector is quite favorable. However, analysis shows that there is scope for improvement through increased investment in power generation through renewable sources and improving energy efficiency. Electricity is an important production input, whereby the price of electricity has significant impact on the overall level of prices in the economy. In this context, increasing production efficiency and productivity of electricity, reducing power consumption to GDP and increase efficiency in the transmission and distribution of electricity will make the economy more competitive.

The purpose of this paper an empirical analysis of the energy sector of the Republic of Macedonia in terms of the countries in the region in order to interpret the causal link between the quality of energy infrastructure, competitiveness and the country's GDP per capita. Parallel to this, the empirical analysis will detect potential deficiencies and bottlenecks which in the future should be a priority for the country and key entity in this sector, of course taking into account the role of the state.

The hypothesis above are interpreted to be analyzed using the database for approximative variables using multiple techniques and methods.

Keywords: energy efficiency, GDP per capita, production and consumption of electricity, correlation and regression analysis.

Analysis of the energy structure of the Republic of Macedonia

The Energy Infrastructure of the Republic of Macedonia allows exploitation of domestic primary energy consumption, imports and exports of primary energy, processing of primary energy and the final energy production, transport and distribution of energy. The Energy Infrastructure of the Republic of Macedonia is composed of power sector of coal, oil and oil products, natural gas and heat. In this paper our attention will be focused on the analysis the electricity power sector and its impact and importance to the national economy.

The structure of the power system (EPS) of Macedonia consists of hydro power plants (with a total installed capacity of 581 MW), thermal power plants and oil (1010 MW), transmission and distribution system of electricity. De facto power system consisting of generation, transmission and distribution of electricity. In that context, we try to analyze the correlation between electricity generation and transmission losses in the same distribution. Statistical analysis conducted on a group of CEE countries clearly indicates a negative correlation between energy production and electricity losses in transmission and distribution of the same. Those countries whose energy systems reduced the loss of electricity in transmission and distribution produce more (MWh) compared to those countries that experienced high losses due to various reasons. That is if we quantify the interdependence between these two important variables we see that any increase in loss of electricity would mean 0.71% decrease in the production of electricity by 1%. Statistical tests and results show that this relationship is highly statistical significant, which further highlights the negative impact of the loss of power in its transmission and distribution. This interdependence suggests that the countries in the construction of the energy system should invest equally in the increase and expansion of energy facilities, and at the same time investing in the distribution network to overcome the bottlenecks that exist that will de facto lead to reduction such losses. For illustration, the Republic of Macedonia in 2007 produced 3137 (kWh) per capita in the level of electricity losses during transmission and distribution of 23:22% of the total amount of produced electricity. Entering the Austrian company EVN electricity system made investments in the short term to improve the quality of the distribution system contributed to the drastic reduction of losses of 23:22% in 2007 to 17.62%, which correlated with a de facto increase in the production of electricity from 3137 to 3552 (kWh) per capita.

Variable	Obs	Mean	Std. Dev.	Min	Max
production	12	4193.341	1880.653	1533.688	7341.668
losses	12	14.19954	8.805896	5.404505	37.57923

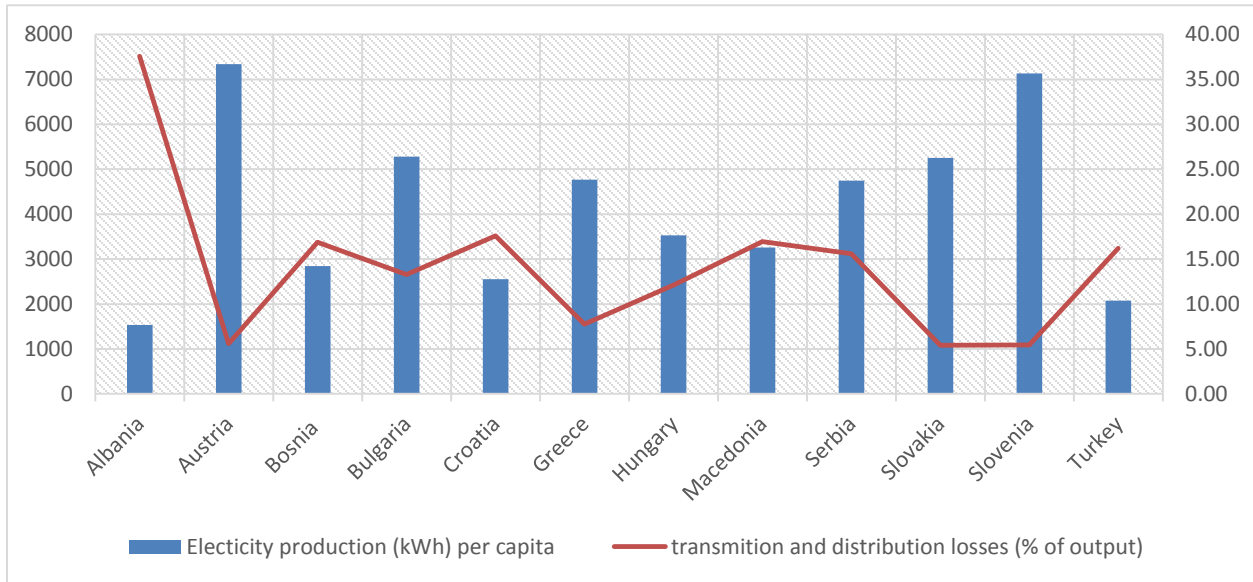
Table1. Regression matrix production and loss of power

Source	SS	df	MS	Number of obs = 12		
Model	1.99874211	1	1.99874211	F(1, 10) =	32.89	
Residual	.607670942	10	.060767094	Prob > F =	0.0002	
Total	2.60641305	11	.236946641	R-squared =	0.7669	
				Adj R-squared =	0.7435	
				Root MSE =	.24651	
Electricity						
production	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Electricity Losses						
(% of output)	-.7177644	.125152	-5.74	0.000	-.9966205	-.4389084
_cons	10.02921	.3200394	31.34	0.000	9.316116	10.7423

If we analyze the data presented by the graphic below, we will notice that the Republic of Macedonia on the average level of production of electricity and loss of electricity transmission and distribution in the period 1993-2012 is in a better position from Albania, Bosnia and Croatia, but in an inferior position in relation to Bulgaria, Greece, Serbia and Slovenia as a member of our immediate environment.

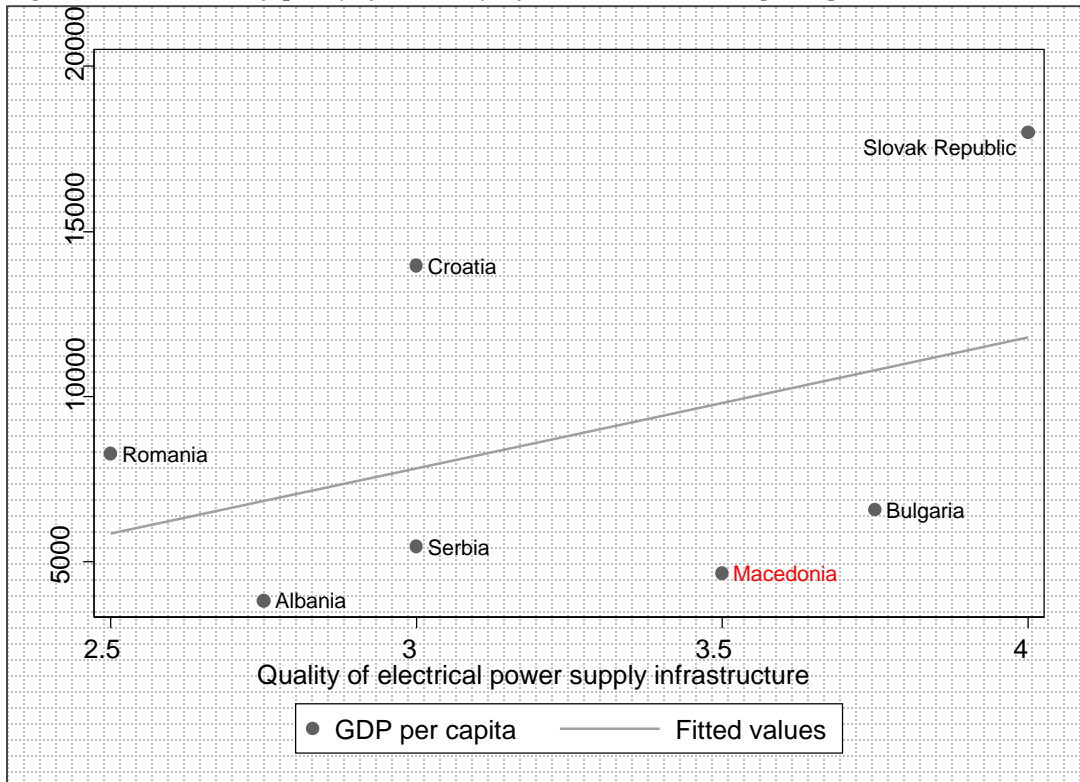
The general conclusion which we can interpret based on the analysis is the conclusion that Macedonia only through continuous investment in improving the quality of electricity infrastructure can hope in the future to improve this situation taking into account the increasing importance of the energy Sector for economic potential and capacity.

Figure 1. Production of electricity losses in transmission and distribution of electricity



In addition, we will try to analyze the importance of the quality of the electricity infrastructure on economic performance of the country through a graphical presentation that shows us the relationship between the quality of electricity infrastructure measured by the EBRD index of quality of electricity infrastructure and the average income of the country. Namely, those countries that have better quality electricity infrastructure enjoy higher living standards for its citizens. The only deviation from this statement is Romania and Croatia, as you may have noticed a higher standard of living despite the poor quality of the power system of the Republic of Macedonia the entrance of EVN Macedonia has improved its rating by EBRD index of quality of electricity infrastructure.

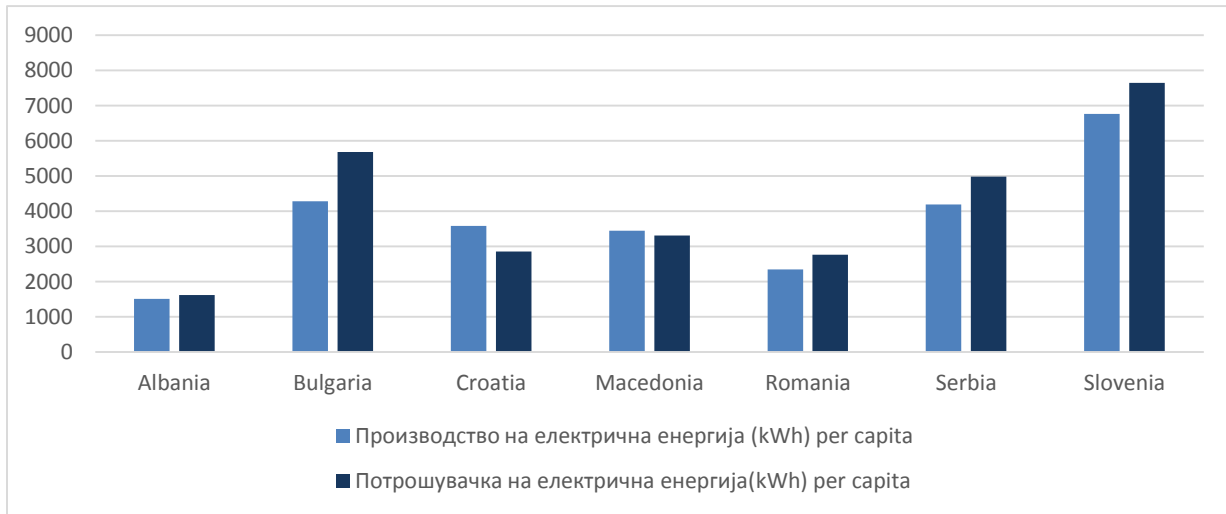
Figure 1. EBRD index of quality of electricity infrastructure and GDP per capita



Besides EBRD index of quality of electricity infrastructure other international institutions are trying to measure the quality of electricity infrastructure in order to analyze its significance for economic performance of countries. The time period required to obtain consent from energy companies, sustainable electricity production capacity, negative consequences for companies of energy interruptions and failures, the quality in the distribution of electricity, competitive prices on the electricity market, the relationship between production and power consumption are important indicators that determine the competitiveness of the private sector, and therefore the overall competitiveness of the national economy.

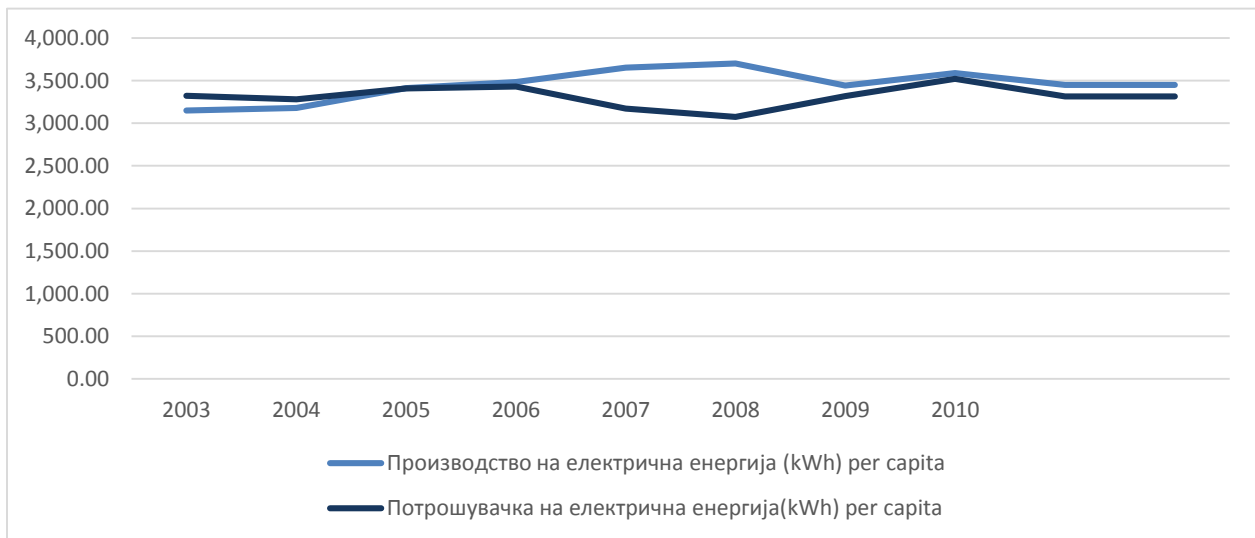
The comparison between the coverage of electricity consumption allows us to identify whether domestic production of electricity is enough to cover domestic consumption, or the state is forced to the lack of cover by importing electricity. Republic of Macedonia, according to the World Bank has full coverage of electricity consumption in the past.

Figure 2. Production and consumption of electricity (kWh) per capita



The analysis of the coverage of consumption with domestic production related to Republic of Macedonia after separate years only confirms the previous statement, with the exception of 2003 and 2004 where Republic of Macedonia had higher consumption in terms of producing electricity.

Chart 3. Production and consumption of electricity (kWh) per capita in Republic of Macedonia



What we need to keep in mind is that this is an annual data in which are not interpreted short-term trends in production and consumption, which makes the analysis less useful in two respects. The first aspect refers to the fact that the land in certain parts of the year may be facing a shortage of electricity because of the production of electricity is determined by the weather, and the second aspect refers to the fact that the price of electricity fluctuates throughout the course the calendar year, which also has a significant impact. However, this analysis gives us an overall picture of the quality of power system capacity through the domestic power system to meet domestic consumption of electric power system.

Conclusion

Electric power sector and quality of electricity infrastructure is extremely important for every economy in many ways. Electricity is an important resource to the industry, thus directly affect the competitiveness of industry and the private sector. Economic growth must be accompanied by an adequate enhancement of the electricity sector in order for it to meet the challenges of the economy. Republic of Macedonia compared to other countries in the region have a pretty good position when it comes to power sector keeping in mind the economic development of the country, however, there are many domains through continuous investment in production and distribution of electricity can significantly improve. If the example of EVN Macedonia for investment in improving the distribution network that contributed to the reduction in electricity transmission and distribution are properly followed by investments in improving and expanding the production capacity of electricity through the state investment in new power projects and by stimulating private investment including foreign investment here in the financing of such projects (investment in Chebrene and Galishte other investments in small hydropower plants that will adequately take advantage of the water potential of the country, investing in new unconventional sources of energy) will contribute significantly for improving the overall power sector in the country.

Literature review

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