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Professional paper

STRATEGY FOR DEVELOPMENT AND RESTRUCTURING OF PUBLIC ENTERPRISE FOR UNDERGROUND COAL EXPLOITATION, RESAVICA

STRATEGIJA RAZVOJA I RESTRUKTURIRANJA JAVNOG PREDUZEĆA ZA PODZEMNU EKSPLOATACIJU UGLJA RESAVICA

Denić Miodrag[1], Vušović Nenad[1], Stojadinović Saša[1]

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Abstract: Underground coal mining in Serbia is currently in a specific and very unfavorable situation, because there is practically no strategy for future development direction of underground mines.

The company is characterized by large losses in business, and therefore high debt and a chronic lack of liquidity. PE UCE 'Resavica' in restructuring has no more capital, because, unfortunately, losses are higher than capital value.

It is necessary to urgently develope and adopt a Strategy of restructuring and privatization of the company, how would all economic useful resources during a certain period, be reorganized into a successful business enterprise, based on a combination of public and private investment, which would end the agony and the process of restructuring of the PE UCE 'Resavica'.

Key words: undergroung exploitation, geological reserves, strategic for development, restructuring

Apstrakt: Podzemna eksploatacija uglja u Srbiji je trenutno u jednoj specifičnoj i vrlo nepovoljnoj situaciji, jer praktično ne postoji strategija daljeg pravca razvoja rudnika sa podzemnom eksploatacijom.

Preduzeće karakterišu veliki gubici u poslovanju, pa stoga i visoka zaduženost i hronična nelikvidnost. JP PEU "Resavica" u restrukturiranju više nema kapital, jer su nažalost gubici iznad vrednosti kapitala.

Neophodno je hitno uraditi i usvojiti Strategiju restrukturiranja i privatizacije preduzeća, kako bi se svi ekonomski upotrebljivi resursi JP PEU tokom određenog perioda, reorganizovali u uspešna poslovna preduzeća, bazirana na kombinaciji javnog i privatnog ulaganja, čime bi se okončala agonija i proces restrukturiranja JP PEU.

Ključne reči: podzemna eksploatacija, geološke rezerve, strategija razvoja, restrukturiranje

[1] University of Belgrade - Technical Faculty in Bor, Vojske Jugoslavije 12, 19210 Bor, Serbia,
e-mails: miodrag.denic@yahoo.com; nvusovic@tf.bor.ac.rs; sstojadinovic@tf.bor.ac.rs

1. INTRODUCTION

Energy Development Strategy of the Republic of Serbia by 2015, defines the priority programs of the energy system in accordance with the objectives of the energy policy of Serbia. When it comes to underground coal mining, the Priority Program entitled 'Technological modernization of existing coal mines, with underground mining, new coal mines and other raw materials to the energy potential and the introduction of new environmentally friendly technologies' is provided and in the production of energy resources from underground mine coal in Serbia (Ministarstvo rudarstva i energetike Republike Srbije, 2007).

The anticipated period of active coal mines of the PE UCE 'Resavica', unfortunately, has not been realized. The reasons are several, and we can classify basic lack of funds for the improvement and modernization of the production process, as well as the lack of activity within the PE UCE in order to overcome the problems, because the organization of the PE UCE is very complex, where the professional staff has a secondary role.

Unfortunately, a large 'role' in this state of underground exploitation mines had a state, which is also its founder, because the mines were handed over to take care of themselves alone, allowing them to pay regular wages to workers from state subsidies for last 20 years, with no control over what is essentially happening within the PE UCE.

Because despite the salary provided for the workers from the state budget, PE UCE is still in a very difficult situation, coal production has stagnated at very low levels (average below 600,000 t), and the situation is not favorable when it comes to investment and technological development as well as financial operations of the mines.

The PE UCE is characterized by large losses in business, and therefore high debt and a chronic lack of liquidity. PE UCE 'Resavica' in restructuring is no longer capital, because, unfortunately, the loss in excess of capital.

When it comes to coal production, as an illustration, we give an example of success of the current 8 production mines which are operated within the PE UCE without Aleksinac Mine, in which were even produced 1,562,583 tons of coal in 1969.

The following table shows the maximum and average coal production for the period 1965 - 2003 year (since 2003 production has been stabilized and is moving at about 600,000 t, so there was no point in taking into account that data).

Table 1 - Maximal and average coal production in each Mine in the period 1965 - 2003 [t]

Mine production	Vrška Čuka	Ibarski rudnici	Rembas	Bogovina	Soko	Jasenovac	Štavalj	Lubnica	PE UCE total
Maximal	55,700	196,000	732,200	134,299	224,658	84,248	100,036	188,200	1,562,583
Year	1970	1975	1968	1975	1986	1992	1985	1969	1969
Average	31,205	119,095	390,750	128,502	139,263	43,948	59,510	83,043	995,349

2. COAL RESERVES AND TRENDS IN THE WORLD

Coal reserves in the world amount to nearly a billion tons (in 1991 reserves amounted to 984.3×10^9 tons, and production of 4.4×10^9 t, coal production is already in 2011 upgraded to 7.05×10^9 t (www.eia.gov, b).

The highest concentration of known coal reserves is located in five countries: USA 25%, Russia 16%, China 11%, India 10% and Australia 9%.

Although data on the global coal reserves are approximate, they are inexhaustible for a longer period of time, and at current production and available reserves, the service life is more than 120 years.

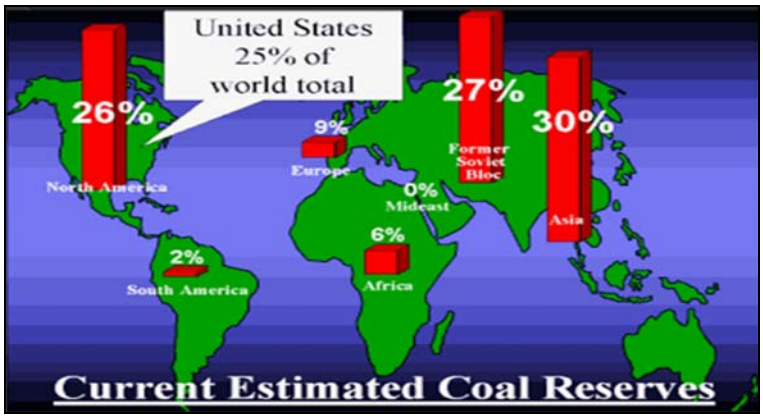

Figure 1 - Current estimated World coal reserves (www.eia.gov, a)

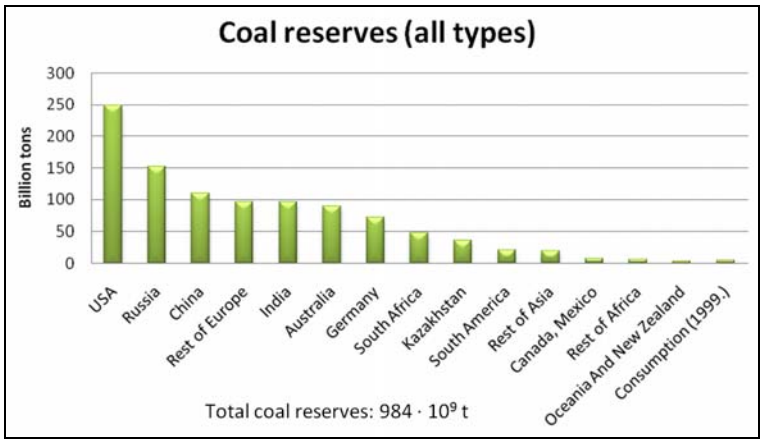

Figure 2 - World coal reserves (www.eia.gov, a)

Of the total coal production in the world (in 1991 was produced 4.4×10^9 t, and in 2011 7.05×10^9 t) almost 2/3 is obtained from underground mines, and the rest is obtained from open pit mines.

The following data illustrate the previous statement: Surface mining accounts for around 80% of production in Australia, the U.S. surface mining represented 67% of production, while in China, over 80% of coal is produced through underground exploitation.

Despite the growing number of built nuclear power plants and increased production of electricity from renewable energy sources, coal will for long period be the dominant raw material for the production of electrical energy in the world and in our country.

Figure 3 shows the situation and forecasts of growth in energy consumption, where we can see that the world coal consumption will be increased by 56% since 2010 till 2040 year (www.eia.gov, c).

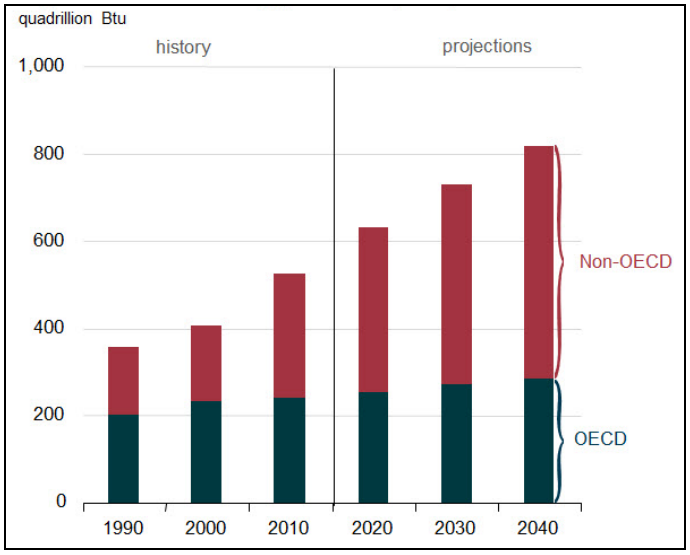

Figure 3 - Present situation and energy consumption growth forecast (www.eia.gov, c)

International Energy Outlook 2013 predicts that world coal consumption will increase by 56% since 2010 till 2040 (www.eia.gov, c). World total energy consumption rose from 524 quadrillion Btu, up to 620 quadrillion Btu in 2020 and to 820 quadrillion Btu in 2040.

Much of this growth is related to the member states of the Organization for Economic Cooperation and Development, where demands were increased by strong and long-term economic development. Energy consumption in countries that are not members of the OECD is growing in this period by 90% and in OECD member countries for only 17%.

Table 2 - World coal consumption by regions (2010-2020), referent unit (Quadrillion Btu)

Region/Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
OECD											
OECD America	**22,522**	**21,425**	**19,567**	**20,023**	**20,030**	**19,868**	**18,866**	**19,329**	**19,701**	**20,106**	**20,333**
USA	20,808	19,661	17,824	18,309	18,347	18,181	17,175	17,633	17,987	18,379	18,592
Canada	1,117	1,087	1,065	1,034	0,998	0,998	0,998	1,002	1,011	1,021	1,031
Mexico/Chile	0,597	0,677	0,678	0,681	0,684	0,688	0,693	0,694	0,703	0,706	0,709
OECD Europe	**12,163**	**12,483**	**12,260**	**12,176**	**12,148**	**12,156**	**12,097**	**12,038**	**11,978**	**11,958**	**11,904**
OECD Asia	**10,133**	**10,149**	**10,125**	**10,155**	**10,146**	**10,162**	**10,077**	**10,070**	**10,064**	**10,071**	**10,067**
Japan	4,823	4,882	4,897	4,925	4,912	4,913	4,827	4,823	4,812	4,814	4,809
South Korea	2,969	2,969	2,953	2,972	2,992	3,011	3,019	3,030	3,049	3,068	3,080
Australia/New Zealand	2,341	2,299	2,275	2,258	2,241	2,238	2,231	2,217	2,203	2,189	2,179
Total OECD	**44,817**	**44,057**	**41,952**	**42,354**	**42,323**	**42,185**	**41,041**	**41,437**	**41,743**	**42,136**	**42,304**
Non-OECD											
Non-OECD Europe & Euroasia	**8,917**	**8,736**	**8,589**	**8,629**	**8,806**	**8,940**	**9,060**	**9,222**	**9,268**	**9,420**	**9,496**
Russia	4,759	4,666	4,580	4,610	4,755	4,872	4,969	5,074	5,063	5,164	5,189
Others	4,158	4,070	4,009	4,019	4,050	4,068	4,091	4,149	4,205	4,256	4,307
Non-OECD Asia	**88,416**	**95,352**	**98,125**	**99,121**	**103,607**	**107,740**	**111,418**	**115,139**	**117,409**	**119,698**	**122,037**
China	69,421	76,115	79,245	79,909	83,828	87,446	90,727	94,081	96,046	97,830	99,574
India	12,586	12,723	12,585	12,813	13,8315	13,714	14,037	14,318	14,543	14,904	15,350
Others	6,409	6,513	6,296	6,399	6,464	6,580	6,654	6,740	6,820	6,963	7,113
Middle East	**0,057**	**0,059**	**0,062**	**0,063**	**0,065**	**0,067**	**0,069**	**0,070**	**0,072**	**0,073**	**0,075**
Africa	**4,360**	**4,361**	**4,324**	**4,352**	**4,488**	**4,623**	**4,655**	**4,799**	**4,949**	**5,096**	**5,244**
Central and South America	**0,882**	**0,917**	**0,904**	**0,950**	**1,019**	**1,033**	**1,053**	**1,068**	**1,084**	**1,103**	**1,113**
Brasil	0,479	0,506	0,498	0,541	0,609	0,620	0,635	0,648	0,660	0,673	0,682
Others	0,404	0,412	0,406	0,409	0,410	0,413	0,417	0,420	0,425	0,430	0,431
Total non-OECD	**102,631**	**109,425**	**112,004**	**113,114**	**117,985**	**122,403**	**126,255**	**130,299**	**132,782**	**135,391**	**137,964**
World total	**147,488**	**153,482**	**153,957**	**155,469**	**160,308**	**164,588**	**167,295**	**171,736**	**174,525**	**177,526**	**180,268**

3. CONDITIONS OF GEOLOGICAL AND MINEABLE COAL RESERVES IN SERBIA

Conditions of geological and mineable coal reserves in active underground mines in Serbia, is shown in Table 3.

Table 3 - Coal reserves in active underground mines in Serbia

Mine Deposit	Geological reserves (balance) [t]				Losses [%]	Mineable reserves [t]
	A	B	C1	A+B+C1		
Vrška Čuka	39,970	687,370	779,560	1,506,900	5	1,431,555
Ibarski rudnici		2,573,120		2,573,120		2,444,464
Rembas	181,250	1,426,281	4,928,268	6,535,799		4,590,857
Bogovina	93,600	1,364,940	575,200	2,033,740	20	1,626,992
Soko	517,780	15,617,060	41,887,590	58,022,430	34	38,294,804
Jasenovac	101,300	1,084,900		1,186,200	30	830,340
Lubnica	651,910	11,963,010	913,980	13,528,900	25	10,146,675
Štavalj (Central field)	265,000	9,805,000		10,070,000	37	6,344,100
TOTAL				**95,457,089**		**65,709,717**

Overview of mineable reserves and energy potential of coal deposits of the PE UCE, expressed in GJ and Mtoe, is given in Table 4 (one ton of oil equivalent (Mtoe) represents 41.868 GJ or 11.630 MWh of electricity and 2 t of stone coal and 5,586 t of raw lignite).

Table 4 - Mineable reserves and energetic potential of active mine layers

Mine/Deposit	Mineable reserves [t]	DTE [kJ/kg]	GJ	Mtoe 1 Mtoe = 41.868 GJ
Vrška Čuka	1,431,555	29,370	42,044,770	1,004,222
Ibarski rudnici	2,444,464		36,506,465	871,942
Rembas	4,590,857		76,773,967	1,833,715
Bogovina	1,626,992	19,026	30,955,150	739,351
Soko	38,294,804	18,239	698,458,927	16,682,405
Jasenovac	830,340	16,057	13,332,769	318,448
Lubnica	10,146,675	14,349	145,594,640	3,477,468
Štavalj (Central field)	6,344,100	12,541	79,561,358	1,900,290
TOTAL	**65,709,717**		**1,123,228,046**	**26,827,841**

The total energy value of the mineable coal reserves from active deposits is presented through GJ, multiplied by the unit price of coal, which is about 2.5 €/GJ, gives value of natural capital in active deposits, and calculated by this methodology is close to three billion euros.

It should be noted that the balance coal reserves in deposits in Serbia, which can be produced by underground mining, estimated at around 800 million tons, which can be seen from the Table 5.

Table 5 - Coal reserves in Serbian coal deposits

Deposit	Geological coal reserves [t]
Active mines	95,000,000
Štavalj (without Central field)	185,000,000
Ćirikovac (B and C1 without C2)	120,000,000
Small deposits	400,000,000
TOTAL	800,000,000

According to the previously applied methodology of calculating the total value of natural capital in deposits that can be produced by underground mining, is about 30 billion euros.

4. REVIEW OF COAL DEPOSITS IN SERBIA WHICH ARE SUITABLE FOR UNDERGROUND EXPLOITATION

Underground coal mining in Serbia is currently in a specific and very unfavorable situation, because there is no strategy for future development direction of underground mines. However, given the existence of coal deposits with significant potential, it must be considered in the future how to include those potentials in the energy sector and economic development of Serbia in best way.

In prospective coal deposits, which are predisposed for underground mining, which are now in operation, which have been in service and those that have not been exploited, following deposits can be classified:

- Sjenica - Štavalj coal basin;
- Sokobanja coal basin;
- Remaining reserves of Ćirikovac deposit;
- Coal deposit Melnica;
- Despotovac coal basin;
- Western Morava coal basin;
- Coal deposit Poljana.

In the following tables, for specified prospective deposits known coal reserves are given from existing studies and surveys that are sometimes developed for concrete reservoirs, from the literature and data from mine geological services.

4.1. Sjenica - Štavalj coal basin

Table 6 - Cola reserves of Sjenica - Štavalj coal basin (Evonic, 2007)

Deposit part	Balance [t]	Off-Balance [t]	Total [t]
Eastern field (A+B)	29,767,600	-	29,767,600
Central field (A+B+C1)	10,276,169	6,044,976	16,321,145
Western field (B+C1)	147,143,580	1,664,570	150,808,150
TOTAL			**194,896,895**

4.2. Soko coal basin

Exploration of Soko Mine is only about 10%, and the total geological reserves of coal are defined on the basis of the study on coal reserves as of December 31, 2012 and are shown in the Table 7 (RMU 'Soko', 2014).

Table 7 - Coal reserves of Soko coal basin

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
A	374,707	2,062,204
B	14,473,971	701,068
C1	41,887,592	-
A+B+C1	56,735,270	2,763,272
TOTAL	**59,498,542**	

4.3. Ćirikovac coal basin

Geological reserves of deposits Ćirikovac taken from the last calculation of reserves made by the Faculty of Mining and Geology, University of Belgrade, as of December 31, 2012 are given in the Table 8 (Univerzitet u Beogradu - Rudarsko-geološki fakultet, 2005).

Table 8 - Coal reserves of Ćirikovac coal basin

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
B	85,461,000	44,319,000
C1	33,537,000	42,710,000
B+C1	118,027,000	87,029,000
C2 - potential	206,027,000	823,000,000
TOTAL	**1,029,027,000**	

4.4. Melnica coal basin

Table 9 - Geological reserves in Melnica coal basin

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
A	-	-
B	21,021,761	-
C1	8,899,908	-
A+B+C1	29,921,669	-
TOTAL	**29,921,669**	

Deposit Melnica has approximately 29.9 million tons of geological reserves of brown coal. According to the study on the classification of coal reserves, as of

30.06.1984. which is confirmed by the Republican Commission for determination and evaluation of mineral reserves SRS No.310-83/89-02/1 from October 19, 1985, coal reserves of brown coal deposit Melnica are given in the Table 9.

4.5. Despotovac coal basin

Table 10 - Coal reserves of Despotovac coal basin (JP PEU 'Resavica', 2014)

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
A	-	-
B	22,402,000	430,000
C1	5,455,000	504,000
A+B+C1	28,642,000	934,000
TOTAL	**29,576,000**	

4.6. Western Morava coal basin

At the current level of research, it can be said that the Western Morava basin is not sufficiently explored. Based on previous research, the total reserves in the Western Morava basin are (Nikolić, 1990):

Table 11 - Coal reserves of Western Morava coal basin

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
A	10,111,992	720,473
B	47,560,803	5,550,100
C1	10,574,126	504,000
A+B+C1	68,248,921	6,340,537
TOTAL	**74,619,458**	

4.7. Poljana coal basin

The lower coal horizon contains one layer, while the upper is made up of two coal layers. The thickness of the layers is different, but does not exceed 7 m. Tectonics is relatively simple, inclined at an angle of 8°, with the mean value of 10,250 KJ DTE.

Table 12 - Coal reserves of Poljana coal basin (Nikolić, 1990)

Category	Geological reserves	
	Balance [t]	Off-Balance [t]
A	-	-
B	48,476,000	2,018,000
C1	10,528,000	1,166,000
A+B+C1	59,004,000	3,184,000
TOTAL	**62,188,000**	

5. STRATEGIC DIRECTION OF FUTURE DEVELOPMENT OF 'RESAVICA' PE UCE

By the conclusion from August 2, 2007 of Government of the Republic of Serbia it has adopted the Strategy of restructuirung and privatization of restructuiring 'Resavica' Public Enterprise for Underground Coal Exploitation. The main characteristic of this Strategy is to privatize PE UCE as the single enterprise, by selling the capital after maximally reducing it's liabilities.

Aforementioned Strategy hasn't been realized because the liabilities haven't been regulated towards state creditors and because the social programme hasn't been contracted with employees, so that there has been no announcement of a public tender for the privatization of the company.

At first a number of investitors has expressed the initial interest for buying individual PE UCE, but after all there was only one of them (Mini Trade Ltd. Sofia), and also for buying individual mines there has been the interest of only a few of them.

However, some energy companies has expressed the interest in strategic partnership with individual mines or groups of mines, through proposals for joint ventures of strategic partnerships. The interests of energy company is also confirmed by the fact that in August 8, 2008 the Ministry of Mines and Energy was sent a letter of intent to enter Energy Sector of the Republic of Serbia, or strategic venture in 'Resavica' PE UCE by J&T Group, Slovakia. There are also contacts with indications of possible strategic ventures in certain parts of 'Resavica' PE UCE by 'Promilians' the Russo-Austrian Company, then 'Premogovnik Velenje' Slovenia for strategic partnership and ventures in 'Soko' Mines, etc.

At the end of 2011 a new strategy was made that is based on the principle of strategic partnership, or joint ventures in new enterprises with combined state and private capital (Factis, 2011) The investment of strategic partners would refer to thermal-energetic capacities and increasing the technological levels of mines, while the state investments would be related to formed and natural resources, and also to the rights of coal exploitation.

The Strategy provides that the process of gradual closure will be initited for the mines and pits with small reserves and poor exploating conditions, in which a successful restrcturing and privatization could not be exspected, following the positive experiences of transit countries. These are 'Bogovina' Black Coal Mine, 'Vrška Čuka' Anthracite Mine, 'Senjski Rudnik' pit within 'Rembas' Black Coal Mine and 'Jarando' pit within 'Ibarski rudnici' Stone Cole Mine.

Instead of the starting process of closing aforementioned mines, it is possible to conserve mines or pits, in order to continue an eventual production of coal (or clay in 'Bogovina') or rearrange some of pits into a mining museum (as it is being done in 'Senjski rudnik') in some future time.

6. AN OVERVIEW OF JOINT VENTURE BETWEEN 'RESAVICA' PE UCE AND STRATEGIC PARTNERS IN ORDER TO RESTRUCTUIRING AND PRIVATIZATION OF THE COMPANY

- The core of the New Strategy is based on the principle of strategic partnership, or joint ventures and forming new enterprises with combined state and private capital. The investments of strategic partners. The investments of strategic partners would refer to increasing the technological level of mines and to thermoenergetic capacities, while the state investments would be related to formed and natural capital of mines and to rights of exploatation.
- The country extracts from the funds used by PE UCE certain property units, in which mines represent individual property units, in order to invest in new enterprises that would be founded along with strategic partners. Before joining a strategic partnership, the mines, as property units, are going to be separated from property that does not have a function of basic bussiness and it is going to be transferred to users (local communities, sport clubs etc.).
- The transparent procedure selects a strategic partner for a joint venture with the state. State in the new company, based on investment property entities extracted from PE UCE (including exploitation rights and land) has a significant share of at least 20%.
- Strategic partners for existing mines must be economic entities that have a positive experience in dealing with coal production.
- Strategic partner agrees to enter into a new company means the value determined in the public election of investors, on which base gains adequate participation in the capital of the company.
- Strategic partner is committed to provide loans for the implementation of investment projects to the new company.
- The new company, formed with a strategic partner, taking over from PE UCE staff who worked on the property units that are allocated and the number of which is optimal with respect to the needs of the new company.

The implementation of the Strategy for the restructuring and privatization of all economically useful resources to PE UCE, for a specific period, were allocated to successful business enterprises, based on a combination of public and private investment. It would (along with the closure of mines and pits above) meant an end to the restructuring and privatization of PE UCE.

7. EFFECTS OF STRATEGY FOR RESTRUCTURING AND PRIVATIZATION OF 'RESAVICA' PE UCE

Restructuring 'Resavica' PE UCE according to such a strategy would have the following general effects:

- Strategic partners are involved with simultaneous investing in the technological development of the mine;
- The Company is not exposed to economic and social shocks, but its resources are gradually allocated for productive purposes;

- Increase of coal production, by decreasing of energetic dependence, and increase of energetic stability;
- Keeping the population and preventing evictions from rural and "peripheral" zones of the Republic of Serbia;
- Sustainable development of the area;
- Realizing an economically sustainable production and reaching the competative coal rates;
- Connecting mines to the energetic sector;
- Achieving a higher level of work safety;
- Increasing of the technological level of production process;
- Solving incurred ecological problems;
- resolving the socio-economic status of redundancy, which determines that no employee of "Resavica" PE UCE lose their jobs or adequate social care.

8. CONCLUSION

The implementation of this kind of Restructuiring and Privatization Strategy, except mine development, would allow creating new job positions, balanced regional development, preventing evictions from areas with mines, keeping multiethnical structure on Pešter plateau, and a number of other possitive effects that would be resulted by increasing of population and living standard in areas with underground coal mines.

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