Impact of Risk and Uncertainty on Sustainable Development of Kolubara Lignite Basin

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Abstract. The paper analyzes the various risks and uncertainties and their possible impact on the future development of the Kolubara lignite basin area (Belgrade metropolitan region). What has been examined are the risks caused by the global financial crisis to investments in coal exploitation and processing and the construction of new gas pipelines; the possible change in the preference of international actors for investing in the coal exploitation and processing in the Kolubara basin; the major strategic options in Serbia’s energy supply; “acquis communautaire” in the energy field and environmental protection and planning, The Energy Community Treaty of South East Europe, the Kyoto Protocol, the impact of price policies on coal and electric energy, restructuring and the privatization of the public enterprise „EPS“ and „Kolubara“, application of Operational Directive WB of Involuntary Resettlement and Operational Policy on Involuntary Resettlement. The basic findings have been pointed out: the new development pattern must adhere to all the standards that are prescribed by the international commitments that Serbia has undertaken and the new development model requests significant institutional and organizational adjustments in the field of development management of the Kolubara coal basin complex.

Key words: risks, uncertain, lignite coal basin, energy policy, privatisation, sustainable development

1 Introduction
In the area of the Kolubara lignite-energy basin (as well as in the entire sector of coal exploitation and processing and energy supply in Serbia) there is an ongoing transitional restructuring and determining of options for long-term development with the aim of competition growth. In the restructuring and future development of this sector in the area of the Kolubara basin (located in the Belgrade metropolitan area) apart from the still open questions, there are present various exogenous and endogenous risks and uncertainties as well. In the strategic development planning of this area, it is necessary to include risk and uncertainty assessments, especially because of the possible impacts of the global financial crisis. The possible impacts of key risks and uncertainties on the future development of the Kolubara basin have been presented in several groups.

2 Risks and uncertainties in the development of Mining and Energy Generation Basin “Kolubara”
The Mining and Energy Generation Basin “Kolubara” (in the sequel: MEGS “Kolubara”) is located approximately 40 km west and south-west of Belgrade, the capital city of Serbia. Its surface area covers some 547 km², while the production area proper encompasses ca. 134 km². Industrial and related facilities and installations cover some 62 km². Out of the total area, only 12.6 km² of the previously utilized spatial complexes and some dispersed spots have so far been recultivated. The total area composed of parts of four local communes. Total population of the area is 82,000 inhabitants. More than 30,000 people are employed, out of which some 10,500 in the mining and energy generation sector [1].
On average, the annual open cast extraction of lignite coal in the Basin surpasses 30 million tons, and the average annual energy generation by its power plants reaches some 1,161 Gwh. This makes 75% of the total annual lignite coal production in Serbia, and 3.1% of its total energy production [2]. Apart from a number of positive effects, the extensive extraction of lignite and energy generation have also caused many negative impacts, which have been only partly controlled and directed in the past [3]. In the following text, general assessments are given of various risks and uncertainties for the development of the Kolubara area and the operation of the mining-energy systems.

2.1 Strategic options for energy supply development

For the purpose of opening the domestic energy supply market and its harmonization with the EU market, the determined strategic directions of Serbia’s energy supply policy are the reform of the legislative and legal framework and structural, organizational and ownership changes [4]. The implementation of measures for environmental protection is projected, in accordance with the regulations of the Republic of Serbia [5] and harmonization with the EU practices by 2015/2018. [6,7]. In accordance with the proclaimed development of a low carbon economy in the EU, a similar trend is to be expected in Serbia as well. According to the The Development Strategy of Energy in the Republic of Serbia until the year 2015, [8] the principle direction in energy development and overcoming a possible energy deficiency is the modernization of current sources and the construction of new capacities, without a rigid policy of saving and an energy efficiency growth in all sectors of consumption. Judging by the implicit costs of such a concept, lack of financial means, the global financial crisis and the rise in the uncertainty of foreign investments in the development of the mining-energy sector in Serbia (in the Kolubara lignite basin and Kosovo lignite basin, which has the biggest lignite supply in Europe), such a strategic option is faced with certain risks for its realization. It is evident that the implementation of an economical policy and rational energy consumption in industry, households, transportation would reduce the need for the construction of new capacities.

Significant risks and uncertainties exist in view of the solutions for the longterm problem of defining the constitutional status of Serbia and its inherency over Kosovo and Metohija. From the viewpoint of Serbia’s energy sector development, the solutions regarding the possibilities of including the Kosovo coal exploitation and power-energy systems into Serbia’s state system are vital. There are cca 10.2 billion t of coal in Kosovo and Metohija (76% reserves of Serbia) [9], while in the Kolubara basin there are 1.8 billion t and in Kostolac-Kovin 0.46 billion t. Reserves of coal from Kosovo and Metohija isn’t included in Strategy of energy sector of the Republic Serbia 2015. because uncertainty of Kosovo’s status in Serbia.

The amount of extracted and processed coal in the Kolubara basin in 2008 was significant 30 million t. A further growth of exploitation of 36 million t is planned starting from 2015. [2]. In perspective, this plan could be corrected, depending on the outcome of the constitutional issue regarding the relations between Serbia and Kosovo, as well as the possibility of the so-called "co-firing") of coal and biomass as options that are more promising environmentally and spatially with much more favorable effects (considering that this implies a lesser extraction of coal).

2.2 Global financial crisis and investment uncertainties in coal exploitation and processing and the construction of a gas-pipeline

Before the global financial crisis, Serbia offered foreign investors participation in the finalization of TP Kolubara basin. Due to the global financial crisis, potential international actors could abandon investment into the mining-energy complex of Kolubara basin and/or redirect their interest to the resources on Kosovo. If foreign investors back out of financing the development of the Kolubara basin, it is estimated that the future direct and indirect effects of development would be reduced. The risks of the financial global crisis could be highlighted by the uncertainties regarding the finalization of the main gas and
oil pipeline in the region of South-East Europe, which should be constructed after 2012. The construction of the South Stream pipeline, which was agreed upon as part of a cooperation of one group of Balkan countries and Russia, is of great importance for Serbia and the perspective development of the Kolubara lignite basin. The possibility of using gas for the construction of a gas TPP, in the conditions of a regulated European energy market and uniform prices of electricity, opens up new uncertainties and development options for the Kolubara lignite basin.

2.3 Acquis communautaire in the field of energy supply and environmental protection, obligations stipulated in the Energy Community Treaty of South East Europe and the Kyoto Protocol

In the process of joining the European Union, the candidate countries and potential candidate countries (among which is Serbia) must fulfill several recommendations in the field of energy supply [6], of which from the point of the development planning of the Kolubara lignite basin it is particularly specified that attention should be payed to social, regional and environmental consequences of restructuring mines. Serbia has begun with the implementation of acquis communautaire from the Energy Community Treaty of SE Europe, regarding competition, renewable energy sources, energy efficiency, harmonization with the general EU standards, mechanisms of long-distance energy transmission, energy supply safety, harmonization of regulations, internal market et al, which refers to various directives, rulings and other regulations of the EU. By 2015, the public entreprise “Electric Power Industry of Serbia“must meet the EU standards in the field of environmental protection, which have been harmonized with the local regulations. By 2011, the Directives in accordance with Energy Community Treaty of South East Europe, which refer to the protection of the environment, should be implemented [10]. The coal and electric energy production complex in the Kolubara basin is the greatest pollutant of the environment in Serbia. It is estimated that in the field of energy supply 1.2 billion euros should be invested, of which 550 million euros in the period between 2006-2011 and this for introducing desulphurization and denitrification of exhaust fumes, replacing the technology of deashing in all TP, solving the problem of ash dump yards and related pollution, organizing lignite surface mining after exploitation, introducing an integral monitoring system of environmental protection and ISO 14001 in 2010, as well as the implementation of the Kyoto Protocol strategy.

The UN Protocol on Climate Changes [11], obliges the signatory countries to perform the activities in order to decrease energy consumption and use technologies for reducing the greenhouses emissions for 12% until 2012, in comparison to the situation in 1990; to do the inventory of the activities and measures for emission reduction. From the standpoint of energy policy, the spatial development should be founded on the future low-carbon development, i.e., an economy in which the share of low-carbon energy sources is ever larger.

The risks of postponing the implementation of the listed documents would postpone the passing of a new generation of development documents that are based on the principles and criteria of sustainable development, i.e., planning of a new development in the area of the Kolubara lignite basin on the bases of sustainability. The continuation of the previous development of the Kolubara basin, without the improvement of the environmental-spatial practice in accordance with the new standards, would open up new risks and uncertainties and it would act as a limiting factor in achieving a sustainable development in this area.

2.4 Price of coal and electric energy

In Serbia, there is no complete public insight into the structure and calculation of costs in the production of electric energy. Today, the production of electric energy is burdened with many expenses that are not directly linked to the production of electricity. The ratio between production, transmission and distribution is not transparent enough. Based on the available
data, transmission makes less than 4% of the price of electricity in Serbia, and in Europe, in average, 20%. The price of energy distribution in Serbia makes less than 10%, and in the EU countries, it makes over 40% of the price. The costs of production in Serbia make more than 70%, and in the EU up to 40% of the price. Simultaneously, the losses in distribution in Serbia are around 15%, and in the world, they are around 5%. In the period 2000-2004, the total losses reached 540 million euros, which is equal to the amount invested in the renewal of the electric energy system [1].

Mining Basin "Колубара" is one of the mainstays of the public enterprise “Electric Power Industry of Serbia”. According to the estimations (for example RWE), the current number of employees 10,400 is too high for the current level of production for which are necessary 8,700 people [1]. The surplus of manpower is largely a consequence of a practise of several decades, and because the enterprise PC MB “Kolubara” functioned less as a state firm and more as a local public utility enterprise that solved important local issues and in which the final decision was made by the local political authority. The implementation of the Energy Community Treaty of South East Europe implies the rules of market regulation, encouragement of competition, elimination of support for activities out of the electric power industry, benefits et al. For example, today such practices can be considered as a form and modality of a partnership between the state, local community and the private sector.

By reorganizing and restructuring the public enterprise “Electric Power Industry of Serbia”, MB“Kolubara” has become a private company, i.e, a sister company within the “Electric Power Industry of Serbia”.

It is clear that the costs of environmental protection will be greater in the future operation. The price of electric energy of 6 euro cents per kWh could provide rational, efficient and an eco-spatially more acceptable exploitation and processing of lignite. In addition, the price of electric energy still serves to maintain social peace in Serbia, because electricity is still cheaper than in the region. In this way, the value of the energy system is debased and in long term, its development is limited. The low price of electric energy cannot provide the financial means necessary for investments. On the other hand, the price of electric energy and coal should at least be on the level of the average price of a kWh in the region, which Serbia is obliged to have as well according to the Energy Community Treaty of South East Europe.

### 2.5 Restructuring and privatization of the public enterprise "Kolubara"

After restructuring and reorganizing the business operation, by separating the non-core activities from the parent complex PC MB “Kolubara”, there were 8080 employees in the new organizational form of PC MB “Kolubara” in 2007. The operation of PC MB “Kolubara” proceeds in complex circumstances, such as: regulated price of coal; market prices of maintenance and overhaul services for mining and energy capacities; necessity of overcoming the current deficit problems with skilled workforce and potential redundant labor; significantly run down mining equipment that requires greater financial means for investing and current maintenance; competence in decision-making regarding the management of company property (the Management Board of the public enterprise of the “Electric Power Industry of Serbia” in Belgrade); strict demands for environmental protection, EU standards in energy and mining activity; meeting the demands of the local environment in view of resettlement, ecological demands et al.

An uncertainty is evident concerning the manner of ownership restructuring of the energy sector – whether to undertake an absolutely complete and fast privatization of the public entreprise „Kolubara“ or a gradual and cautious one (with maintaining majority of state ownership). Generally, a reliable assessment of the effects of the privatization of public enterprises in Serbia is necessary for the following reasons: (a) They play a key role in the functioning of the industry; (b) They have an important input in the operation of other enterprises; (c) They behave as monopoly enterprises and control the greatest part of the domestic market; (d) The majority of these enterprises in Serbia are technologically outdated and with a surplus of manpower; (e) They are susceptible to price manipulations for
their products and services by the government (electricity), in order to maintain social peace and different political and party goals.

2.6 Risks of incomplete implementation of Operational Directive WB of Involuntary Resettlement

In the period until 2020, the exploited area within the Kolubara lignite basin will cover the area of 13 cadastre municipalities, i.e., settlements. A perspective expansion of the mining-energy complex requires the resettlement of around 1920 households, with cca 5670 inhabitants. The greatest number of households lies on the area of settlements Vreoci (1030), Zeoke (276), Little Borak (115), Radljevo (84), Sarbane (83) and Medosevac (122). The consequences of the expansion of mine pits on the total population of the areas covered can be even greater, if a number of the remaining households is either left without particular settlement services or without agricultural land, or they will suffer the consequences of environmental degradation.

For the displacement of settlements, a Program for Resettlement (2008) has been written. However, it is not completely harmonized with the practices and the Directive of the World Bank on Involuntary Resettlement due to the expansion of mining activities, especially because it does not envisage the constitution of institutions that would deal with relevant resettlement issues in various domains, collaboration with financial and insurance institutions, law institutions and other regulatory issues [12,13]. The absence of implementation of this directive and a positive practice from other countries could be an additional risk factor in the realization of the Resettlement Program of settlements Vreoci, Barosevac, Medosevac, Zeoke etc.

3 Conclusion

The evaluation of possible impacts of the some external and internal risks and uncertainties on future sustainable development of the Kolubara lignite basin demonstrates that there are more negative moments in many segments. Generally, the increase of competitiveness and energy efficiency in the Kolubara lignite basin is an integral part of the efforts for one territorial whole to increase its so-called “territorial capital”, because it represents the basis of its comparative advantages and competition capabilities. Thus, the increase of energy efficiency is imperative for different territorial entities in Europe [14], and so comprises an integral part of the new policy of sustainable European spatial development [15].

The primary results of the previous analysis are the following: (a) The new development pattern for the area of Kolubara lignite basin must respect European standards that Serbia has accepted or will in the near future; and (2) the new development model requests significant institutional and organizational adjustments, especially in the field of development management of the Mining and Energy Generation Basin “Kolubara”.

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