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## CUPRINS

<b>CONFERINTE PLENARE</b>	<b>11</b>
COMMUNICATION – A MAJOR SUSTAINABILITY ISSUE FOR THE INDUSTRY AND ACADEMIA IN DEVELOPING COUNTRIES SUSTAINABLE DEVELOPMENT INDICATORS Caner Zanbak	11
PREPARATE NATURALE DE ORIGINE VEGETALA PENTRU PROTECTIA ORGANISMULUI UMAN EXPUS AGRESIUNII CHIMICE Stefan Manea, Viorica Tamas, Florian Ionescu	18
<b>SECTIUNEA I</b>	<b>25</b>
<b>TENDINTE ACTUALE IN DOMENIUL TEHNOLOGIILOR DE MEDIU (APE POTABILE, UZATE INDUSTRIALE SI MUNICIPALE, NAMOLURI, AER, SOL, DESEURI, NAMOLURI)</b>	
<b>- prezentari orale -</b>	<b>27</b>
UTILIZATION OF METAL OXIDE ELECTRODES FOR TREATING INDUSTRIAL EFFLUENTS Monica Ilios, F. Manea, A. Iovi	27
APLICATII ALE ELECTRODEIONIZARII LA PURIFICAREA APEI Vasile Avadanei, Lidia Avadanei, Oana Crina Bujor	32
ECOLOGIZAREA APELOR UZATE IN DISPOZITIVUL MAGNETIC TRIDIMENSIONAL Zoltan Istvan Marosy	.45
RECOVERY OF SOME DRINKING WATER SOURCES WITH ORGANOCHLORINATED PESTICIDES AND ARSENIC POLLUTANT CONTENT BY DESTRUCTIVE/NONDESTRUCTIVE PHYSICAL-CHEMICAL METHODS Mihai Stefanescu, Sorin Florescu, Cristiana Cosma, Ines Nitoi	52
SORPTION MEANS OF CELLULOSE-LIGNIN TYPE OBTAINED FROM AGRICULTURAL WASTES Mykola T. Kartel, Alina A. Nikolaychuk	59
ADVANCED TREATMENT OF WASTEWATER CONTAINING ORGANIC MICROPOLLUTANTS FROM THE CATEGORY OF PHARMACEUTICAL PRODUCTS Oana Boboc, Cristiana Cosma, Costel Bumbac, Anca Popescu	65

CONSIDERATION REGARDING DEGRADATION OF SOME HERBICIDES FROM AQUEOUS SYSTEMS BY PHOTO-FENTON PROCESS Ines Nitoi, Aurelia Ballo, Sorin Ion Florescu, Oana Boboc, Audrey Bonzi	74
ENVIRONMENTAL AND TECHNOLOGICAL CONSIDERATIONS IN THE TREATMENT OF COMPLEX CHEMICAL WASTES Asher Brenner	83
PROCEDEU HIBRID DE EPURARE APLICAT PE O STATIE COMPACTA Bogdan Nasarimba-Grecescu, Gabriel Petrescu, Ioana Corina Mandis, Alina Porut	89
SOLUTII CADRU DE REDUCERE A EMISIILOR DE PULBERI SI GAZE LA EXTRACTIA SI PROCESAREA RESURSELOR MINERALE Ladislau Kovacs, Gheorghe Ghetie, Lorand Toth, Angelica Draghici, Marius Kovacs	94
COLECTOR PLUVIAL PENTRU IRIGAREA INDIVIDUALA A PLANTELOR IN CAMP SI SERA Florin Ontanu, Codrut Darie, Adrian Tanase	102
COMPOSTING OF SOLID WASTE FROM PAPER INDUSTRY – AN ACTIVE ENVIRONMENTAL PROTECTION SOLUTION Marina Irina Merticaru	112
TEHNOLOGIE DE INCHIDERE A DEPOZITULUI NECONFORM DE DESEURI ORASENESTI DIN ZONA PETRILA – HUNEDOARA Valeriu Plesea, Valentin Tomus	117
RECICLAREA DESEURILOR PENTRU UN MEDIU MAI CURAT Victor Andrei	124
FORMATION OF AEROBIC GRANULAR SLUDGE RECENT ADVANCES AND EXPERIMENTAL STUDIES Costel Bumbac, Anca Popescu, Elisabeta Pena Leonte, Diana Dobre, Ileana Ghita	132
ENHANCED SYNTHESIS OF EDIBLE FUNGAL BIOMASS BY SUBMERGED FERMENTATION OF CEREAL WASTES Marian Petre, Alexandru Teodorescu, Daniela Giosanu, Emanuela Stancu	140
TERMO- SI XEROSTABILITATEA VITAMINEI C IN TIMPUL PROCESULUI DE USCARE A EXTRACTULUI DIN FRUCTE DE MACES Gheorghita Jinescu, Gabriela Isopencu, Daniela Mihaela Mihailescu, Monica Mares, Carmen Tebrencu	145

CHROMIUM WASTES FROM LEATHER INDUSTRY EMBEDDED IN COLORED GLASSES Lucica Boroica, Carmen Gaidau , Dana Ursu, B. A. Sava, Adriana Diaconu, R. Medianu, M. Dinulescu	151
IN SITU CHEMICAL OXIDATION (ISCO): FUNDAMENTALS AND APPLICATIONS IN EUROPE Lorenzo Sacchetti	162
OIL BASED ENGINEERED CARBON SOURCES FOR ENHANCED NATURAL ATTENUATION (REDUCTIVE DECHLORINATION): CAP18 AND CAP18ME Lorenzo Sacchetti	167
SOME CONSIDERATIONS ON THE DISINFECTION OF WATER IN SWIMMING POOLS AND NATATORIUMS Ion Mirel, Doina Pentia, Irina Olaru	172
REMEDIATION OF THE HEXION SOKOLOV CHEMICAL PLANT, THE CZECH REPUBLIC Jan Vanek	179
PREVENTION OF THE GENERATION OF ACID DRAINAGE FROM MINING WASTES FROM A COPPER MINE Marina Nicolova, Irena Spasova, Stoyan Groudev	183
ASSESSING CD AND ZN BIOACCUMULATION INTO CORN CROP OBTAINED ON FERTILIZED BIOSOLIDS SOILS AMENDED WITH PILLARED VOLCANIC TUFF Valeria Rus, Smaranda Masu, L. Andres	189
EFFECTS OF CD AND ZN BIOACCUMULATION TO WHEAT GRAINS WHEN USING BIOSOLIDS FERTILIZER Smaranda Masu, Valeria Rus	195
CLEANER PRODUCTION ASSESSMENT IN ROMANIAN HOTELS. CASE STUDY SILVA HOTEL BUSTENI Lucian Constantin, Maria Teodorescu	201
METHODOLOGY FOR APPLYING INDUSTRIAL ECO-SYSTEMIC APPROACH TO LOCAL LEVEL Lucian Constantin, Maria Teodorescu, Mihai Stefanescu, Cristian Teodorescu	208
KNOWLEDGE-BASED SOCIETY – ROLE AND PLACE OF THE INDUSTRY-COMMUNITY PARTNERSHIP Cristian Theodorescu, Margareta Nicolau, Lucian Constantin	214

THE STRUCTURE AND EVALUATION OF TANGIBLE AND INTANGIBLE ENVIRONMENTAL COSTS Cristian Teodorescu, Aurelia Ballo, Margareta Nicolau, Lucian Constantin	220
MYCORRHIZAL PROCESSES – NEW ECO-TECHNOLOGIES AIMED TO REDUCE THE IMPACT ON THE ENVIRONMENT GENERATED BY THE DUMPS OF ASHES Daniela Popa, Cristina Babeanu	226
CALCULUL COMPARATIV AL COSTURILOR DE INCINERARE LA CAPACITATI DE LUCRU DE 3500 TONE/ AN, RESPECTIV 22.000 TONE/ AN Nicolae Strambeanu, Laurentiu Demetrovici, Marcel Lazarovici	232
SOLUTIONS FOR THE REDUCTION OF THE SULPHUR DIOXIDE FROM THE PAROSANI – JIU VALLEY THERMOCENTRAL Daniela Ionela Ciolea	235
WASTE-TO-ENERGY IN ROMANIA Alexei Atudorei, Luminita Gabriela Atudorei	242
HEAVY METALS ACCUMULATION IN GRASSLAND SPECIES ESTABLISHED ON WASTE DUMPS Smaranda Masu, D. Botau	254
CONSIDERATIONS ON THE TREATMENT OF LEACHATE FROM MUNICIPAL WASTE LANDFILLS I. Mirel, Olaru Irina Olaru, Breb Corina Breb, Izabella Szigyarto	259
<b>SECTIUNEA I</b>	
<b>TENDINTE ACTUALE IN DOMENIUL TEHNOLOGIILOR DE MEDIU (APE POTABILE, UZATE INDUSTRIALE SI MUNICIPALE, NAMOLURI, AER, SOL, DESEURI, NAMOLURI)</b>	
<b>- postere -</b>	<b>268</b>
USE OF CHITOSAN FOR ZINC REMOVAL FROM WASTEWATERS C. M. Simonescu, C. Capatina	268
THE SELECTIVITY STUDY OF NO <sub>3</sub> <sup>-</sup> IONS RETENTION FROM AQUEOUS SOLUTIONS BY ION EXCHANGE USING A 520E TYPE RESIN Daniela Simina Stefan, Carmen Iesan, Ion Untea, Cristina Orbeci, Madelene Dancila	275
PRELIMINARY RESEARCHES FOR BIOLOGICAL SULPHATE REMOVAL FROM MINE WATERS L. Dinu, Margareta Nicolau, V. Patroescu, C. Bumbac, Lucia Popa	281

SINTEZA SI APLICAREA ADSORBANTILOR CARBONICI DIN SIMBURI DE FRUCTE Raisa Nastas, Vasile Rusu, Tudor Lupascu	288
THE CHARACTERIZATION OF ACTIVE CARBON WITH OXYGEN AND NITROGEN SURFACE GROUPS Marina Tcaci, Raisa Nastas, Tudor Lupascu	294
ADSORBTIA COLORANTILOR DIN SOLUTII APOASE INDIVIDUALE SI DIN AMESTECURI BINARE PE DIFERITE TIPURI DE CARBUNI ACTIVI Nina Timbaliuc, Tudor Lupascu	299
REMOVAL OF ODOUR COMPOUNDS IN A BIOTRICKLING FILTER Luboš Zápotocký	306
EXPERIMENTS FOR ESTABLISHING THE POSSIBILITIES TO APPLY THE PRETREATMENT OF WASTEWATER INTO THE SEWAGE SYSTEM Ileana Ghita, Laurentiu Dinu, Costel Bumbac, Elisabeta Pena Leonte	311
LABORATORY BATCH EXPERIMENTS TO ESTABLISH THE OPTIMAL OPERATIONAL PARAMETERS FOR THE ANAEROBIC DIGESTION OF WASTEWATER RESULTED FROM ALCOHOL DISTILLERY Elisabeta Pena Leonte, Lucia Dumitru, Gabriela Popescu, Costel Bumbac, Ileana Ghita, Anca Popescu, Diana Dobre, Corina Vacaroiu	319
THE STUDY OF SAWDUST AND MARK FRUITS BIOMASS USING (CAPITALIZATION) BY BRIQUETTING Daniela Simina Stefan, Dumitru Turtoi, Anca-Ileana Penu, Cristina Costache, Cicerone Marinescu	326
THE MODELING OF THE ACTIVATED SLUDGE' BATCH DIGESTION Mihai Caramihai, Camelia Ungureanu, Elisabeta Pena Leonte, Lucia Dumitru, Ana Aurelia Chirvase	333
AEROBIC COMPOSTING EXPERIMENTS OF WWTPs RESIDUAL ORGANIC SLUDGE MIXED WITH VEGETABLE WASTES Viorel Patroescu, Elisabeta Pena Leonte, Laurentiu Dinu, Costel Bumbac, Ciprian Dumitrescu	340
WHY RECOMMENDING THE USE OF THE NATURAL BIOLOGICAL ACTIVE BORON COMPOUNDS? Florentina Badea, Daniela Popa	347

<b>SECTIUNEA II</b>	<b>353</b>
<b>EVALUARE POLUARE, MANAGEMENT DE MEDIU SI CALITATE</b>	
<b>- prezentari orale -</b>	<b>355</b>
MANAGEMENTUL REDEZVOLTARII FOSTELOR ZONE INDUSTRIALE Ioan Bica, Iulian Iancu, Alexandru Dimache	355
THE RESHAPING OF THE ENVIRONMENT UNDER THE SIGN OF THE ECOLOGIC POLICIES Mirela Mazilu	362
IMPACT OF RISK AND UNCERTAINTY ON SUSTAINABLE DEVELOPMENT OF KOLUBARA LIGNITE BASIN: SECTORAL AND SOME CONTEXTUAL ASPECTS Miodrag Vujošević, Slavka Zeković	368
MODIFICAREA CALITATII SOLULUI SUB INFLUENTA APELOR UZATE INDUSTRIALE ACUMULATE SI PASTRATE LA CAMPURILE DE FILTRARE Vasile Plamadeala	374
PROGRAME DE INSPECTIE SI DE EVALUARE A DURATEI REMANENTE DE EXPLOATARE A INSTALATIILOR DE SCHIMB IZOTOPIC ALE UZINEI DE APA GREA DIN DROBETA TURNU SEVERIN – COMPONENTA A ASIGURARII SECURITATII INDUSTRIALE Raluca Fako, Ioan Dorin Dancanet, Titus Borlan, Ion Avram	381
EVALUAREA GRADULUI DE POLUARE A APEI LACULUI ARTIFICIAL BRADISOR UTILIZAND MODELARI MATEMATICE SI SIMULARI NUMERICE Mihai Dinca	387
ECOLOGICAL ANALYSIS MODEL FOR A FLOW SHEET IN BUILDING INDUSTRY Adriana Pribeanu	394



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## IMPACT OF RISK AND UNCERTAINTY ON SUSTAINABLE DEVELOPMENT OF KOLUBARA LIGNITE BASIN: SECTORAL AND SOME CONTEXTUAL ASPECTS

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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. However, there is a number of obstacles that hinder more strategic research, thinking and governance to effect in this and other societal spheres, mostly pertaining to the poor planning and broader institutional culture in Serbia. This and some related issues are paid specific attention in the last part of this contribution.

**Keywords:** risks and uncertainties, lignite coal basin, energy policy, sustainable development, poor planning culture

### 1. Introduction

In the area of the Kolubara lignite-energy basin (located in the Belgrade metropolitan area) 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 the Kolubara basin 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. 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: MEGB “Kolubara”) is located approximately 40 km west and south-west of Belgrade. MEGB surface area covers some 547 km<sup>2</sup>, while the production area proper encompasses ca. 134 km<sup>2</sup>. Industrial and related facilities and installations cover some 62 km<sup>2</sup>. Out of the total area, only 12.6 km<sup>2</sup> 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 t (36 million t is planned starting from 2015.)[2]. 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. 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].

The Belgrade region, with its surface area of 3224 km<sup>2</sup>, and population of 1,576 124, generated on average some 40% of the national GDP. It absorbs one third of total economic activity of Serbia, takes up 48% of Serbia’s total imports, provides 22% of its total exports, and thus generates some 68% of its foreign trade deficit. In Belgrade metropolitan and administrative region, recently there has been a spontaneous move towards new spatial and urban patterns, mostly in the broader Sava-Danube development axis. New patterns assume various spatial forms, viz., new development axes, new economic, commercial, enterprise and other zones, business centres, logistic centres, techno-zones, etc. [4]. The intensive investments in the Belgrade Area helped the capital city improve its position in the regional environs, by making better use of at least some parts of its “territorial capital”.

### **a) 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 [5]. The implementation of measures for environmental protection is projected, in accordance with the regulations of the Republic of Serbia [6] and harmonization with the EU practices by 2015/2018. [7,8]. According to the *The Development Strategy of Energy in the Republic of Serbia until the year 2015*, [9] 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.

Serbia is a country with an extremely high energy intensity. As measured by total primary energy supply per 1,000 USD GDP generated, in 2002 the country spent six more times in relative terms than it was the average for the EU-15 [10]. The majority of existing production and consumption patterns are not sustainable, as the obsolete patterns of non-sustainable production and consumption dominate over those more sustainable. Consequently, a new, specific national strategy is needed, to direct the activities of the so-called "eco-eco" restructuring of economy.

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 Kolubara lignite basin. It is evident that the implementation of 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. In Kosovo there are 10,2 billion t of coal (76% reserves of Serbia) [11], in the Kolubara basin - 1,8 billion t.

***b) 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 opens new uncertainties and development options for the Kolubara lignite basin.

***c)Acquis communautaire in the energy supply and environmental protection, Energy Community Treaty of SE Europe, the Kyoto Protocol***

Serbia grossly missed the wave of "economic and ecological modernization", that largely took place in the EU, which left the country even more lagging behind the contemporary mainstream trends. Thus, Serbia "moored" even deeper in the periphery of Europe, that is, it became a part of new "inner peripheries" of Europe, namely, the regions that are characterized by rising enormous disparities in terms of economic and living standards between the metropolitan and their respective peripheries, as well as by regional fragmentation, as major elements of spatial development. This may well worsen in the future, unless the steps are undertaken promptly to redirect the course of its development and concomitant spatial pattern of development. In general, in terms of its development record, as from the beginning of the 1990s, Serbia has experienced the deterioration of all key social, economic and

environmental indicators. As a consequence of the retrogressive events of the 1990s, Serbia still finds itself in a deep social, political, economic and spatio-ecological crisis, recovering from it as only from recently, and slowly.

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 paid 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 [12]. 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 for introducing desulphurization and denitrification of exhaust fumes, replacing the technology of de-ashing 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 [13].

The risks of postponing the implementation of the listed documents would postpone the passing of a new development documents that are based on the principles of sustainable development, i.e, planning of a new development in the Kolubara lignite basin on the bases of sustainability.

**d) Price of coal and electric energy and restructuring of MEGB “Kolubara “**

In Serbia, there is no complete public insight into the structure and calculation of costs in the production of electric energy. 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% [1]. It is clear that the costs of environmental protection will be greater in the future operation. 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.

After restructuring and reorganizing the business operation, by separating the non-core activities from the parent complex MEGB “Kolubara”, there were 8000 employees in 2008. 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 enterprise „Kolubara“ or a gradual and cautious one (with maintaining majority of state ownership).

***e)The incomplete implementation of Directive WBof 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 1920 households, with 5670 inhabitants. 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, collaboration with financial, insurance and law institutions, and other regulatory issues [14,15].

**3. Transition reforms and poor ratings of strategic research, thinking and governance**

To a large extent, insufficient performance in the energy sector regarding energy efficiency, sustainability principles, was derivative of the course and contents of the post-socialist transition reforms that were deliberately chosen following the collapse of the former political system. As from then onwards, the new ideological and political dogmas and mantras have been dominating the public scene, viz., liberalization, privatization, marketization, destatization, and similar. The “architects of transition reforms”, mostly economists of neoliberal provenance, demonstrated an overt anti-development and anti-planning stance, and developed almost an aversion to more strategic thinking and research. Instead of strategic governance, a chaotic decision-making rules the scene, encompassing a strange combination of elements of the “crisis management”, “planning-supporting-privatization-and-marketization” and “project-led planning”. The direction and contents of the reforms were chosen without taking into account their respective development and spatio-ecological (environmental) implications and consequences [16]. Recently, a multitude of new development documents at the national and various sub-national levels has been elaborated. However, they still mostly ignore the sustainability cause, in effective terms, as they grossly lack both more analytical/operative concepts of sustainability.

Serbia, being still one of the most un-developed European countries, faces a vast number of very complex developmental problems, which brings forth many challenges. Serbia grossly missed the wave of the “economic and ecological modernization-restructuring” that took place in the EU, which left the country even more lagging behind the contemporary mainstream trends. Also, in parallel to the fact that the country still carries a number of eminently non-sustainable development patterns, its “territorial capital” has been heavily endangered, and its comparative advantages and competitiveness diminished [17]. Consequently, the country’s development prospects, at least over a mid-term period, are not bright. Perhaps, a more pessimistic development scenario (“Cassandra”) might prove more plausible, than a bright one (“Pollyanna”) [18].

#### 4. Conclusions

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 “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 [19], and so comprises an integral part of the new policy of sustainable European spatial development [20].

The key results 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 MEGB “Kolubara”. Also, it has also been pointed to the fact that a non-satisfactory performance in terms of energy sufficiency and other sustainability criteria resulted from the main direction the post-socialist transition reforms have been taking as from the end of 1980s. To revert this pattern in the future, a radical switch to more strategic thinking, research and governance would be needed.

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## **MODIFICAREA CALITATII SOLULUI SUB INFLUENTA APELOR UZATE INDUSTRIALE ACUMULATE SI PASTRATE LA CAMPURILE DE FILTRARE**

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### **Abstract.**

The content of sodium exceeds that of non polluted soil by 39-43 mg/100g, while that of sulphates by 31-84 mg/100g soil. In the impact zone of waste waters from filtering fields of sugar factory , the concentration of sodium and sulphates within the whole soil layer ( 0-100 cm ) was 18-73 mg/100 g soil for sodium and 12-44 mg/100 g soil for sulphates comparing to non polluted soils. The average concentration of toxic salts is 0,25-0,30 %. The impact zone suffers a salinisation process due to their pollution by waters from filtering fields. The concentration of sodium in the upper layers of soil was 4,3 me/100g soil in the first case and 2,5 me/100 f soil for second case. More affected by