



Radoslav Vukas, Graduated engineer of geology

Local national consultant UNECE

geocompetentrv@gmail.com

*Coal industry in transition: state of affairs of coal mine closure in the selected UNECE member States - challenges, lessons learned, ongoing projects, perspectives for the future*

## **SERBIAN COAL DEPOSITS AND COAL MINES AT ACTUAL TRANSITION TO GREEN AGENDA**

7<sup>th</sup> meeting of the UNECE and Ember's Methane Mondays series  
Wednesday, 9 November at 15:45-17:45 CEST time

29th International Science and Technology Conference: Natural Mining Hazards 2022,  
8-10 November in Jaworze Poland

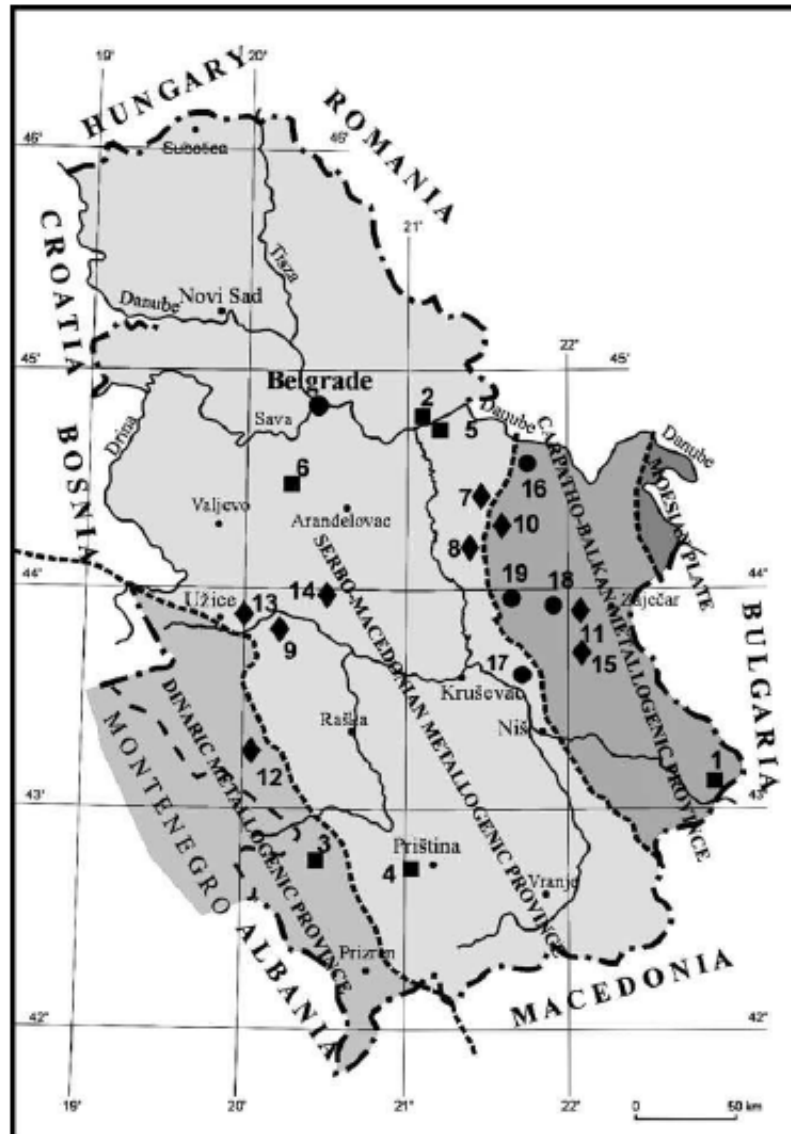
12th International Forum on Energy for Sustainable Development

# *THE DECLARATION ON THE GREEN AGENDA*

- ▶ SERBIA SIGNED THE DECLARATION ON THE GREEN AGENDA AT THE SUMMIT OF WESTERN BALKAN COUNTRIES IN SOFIA IN NOVEMBER 2020
- ▶ THE DECLARATION PREDICTS THAT THE CANDIDATE COUNTRIES FOR MEMBERSHIP IN THE EUROPEAN UNION, AS WELL AS THE MEMBERS OF THAT COMMUNITY, WILL REDUCE THE USE OF FOSSIL FUEL AND THE EMISSION OF HARMFUL GASES (DECARBONIZATION) BY 2050
- ▶ IN THE SOFIA DECLARATION IT IS STATED: "THE CONTRACTING PARTIES COMMITTED TO WORK TOGETHER WITH THE EUROPEAN UNION TO MAKE EUROPE CLIMATE NEUTRAL BY 2050"
- ▶ SERBIA COMMITTED TO INCREASE THE SHARE OF ENERGY FROM RENEWABLE SOURCES, AS WELL AS TO PROVIDE THE NECESSARY CONDITIONS FOR INVESTMENTS IN THAT AREA

# Genetic-industrial classification of brown coals in Serbia

Marko Ercegovac a,\*, Dragana Životić b, Aleksandar Kostić b *DISTRUBUTION COAL DEPOSTITS*



## LEGEND:

----- Boundary of Metallogenic units (modified, Dimitrijević, 2000)

### ■ Soft brown coal (Low-Rank C):

1. Mazgoš, 2. Kovin, 3. Metohija,
4. Kosovo, 5. Kostolac, 6. Kolubara.

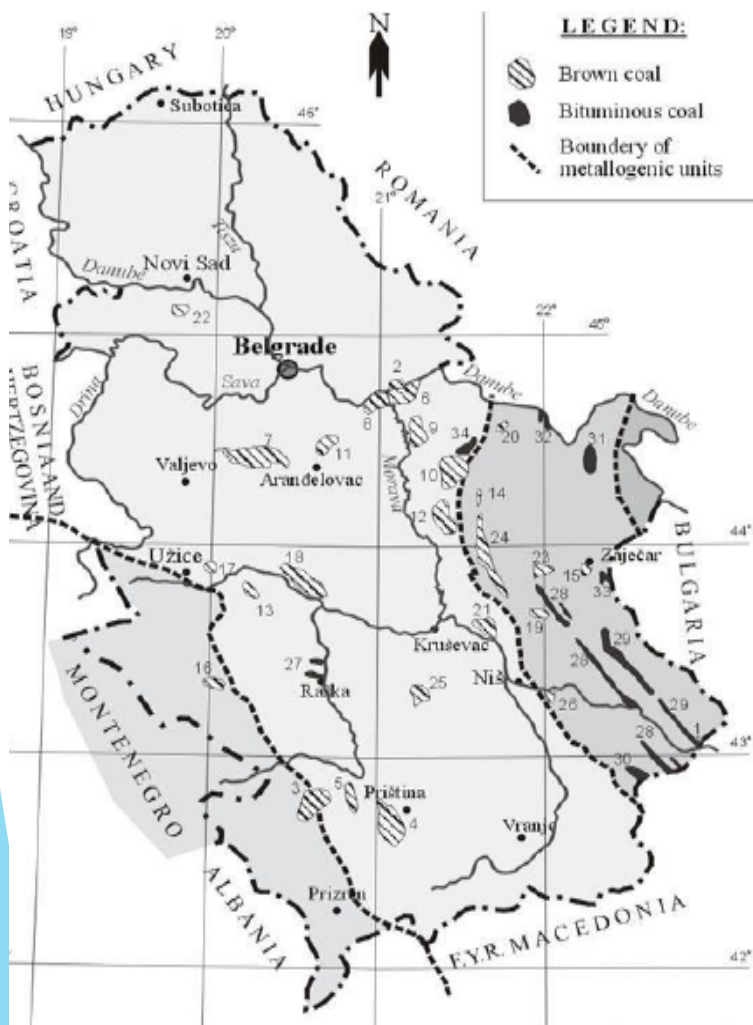
### ◆ Dull brown coal (Low-Rank B):

7. Mlava (Melnica deposit),
8. Despotovac,
9. Dragačevo (Tijanje deposit),
10. Krepoljin, 11. Lubnica,
12. Sjenica (Štavalj deposit),
13. Požega (Rasna deposit),
14. Zapadna Morava, 15. Soko Banja.

### ● Bright brown coal (Low-Rank A):

16. Zvižd (Derezna deposit),
17. Aleksinac,
18. Bogovina (East Field),
19. Senjc-Resavica.

# PUBLIC ENTERPRISE FOR UNDERGROUND EXPLOITATION (JP PEU) RESAVICA



1. Coal mine "VRŠKA ČUKA" (anthracite)
2. Coal mines "IBARSKI RUDNICI" (hard coal)
3. Coal mine "REMBAS" (brown coal)
4. Coal mine "SOKO" (brown coal)
5. Coal mine "ŠTAVALJ" (brown coal)
6. Coal mine "BOGOVINA" (brown coal)
7. Coal mine "JASENOVAC" (brown coal)
8. Coal mine "LUBNICA" (lignite)
9. Coal mines "ALEKSINAČKI RUDNICI"

In 1992, the Government of the RS made a Decision for the forming the temporary Management Board of "Elektroprivreda Srbije" on the establishment of Public Enterprises.

The commercial court in Kragujevac registered this company in the court register, which had 5,616 employees and nine mines in its composition (today 3,863).

(Source: [www.jppeu.rs](http://www.jppeu.rs))

# General production characteristics of the deposit/coal mine with underground exploitation (JPPEU RESAVICA)

(Source: 3 INFORMATION ON THE WORK OF JP PEU RESAVICA ([www.jppeu.rs](http://www.jppeu.rs)); R. Cvetičanin: Geology of coal, Faculty of Mining and Geology in Belgrade, 1972; Savic\_DSGM ([www.un.org](http://www.un.org)), 2015: [www.jppeu.rs](http://www.jppeu.rs))

Coal deposits/Mine	Type of coal	Geology	Coal reserves (A+B+C <sub>1</sub> ); (t)	Quality	Metan (Q <sub>rs</sub> -relative; Q <sub>as</sub> = absolute)	Explosive coal dust	Produce (t/year End 2017)	Employers End 2016
Vrška čuka	anthracite	Productive horizon in Lower Liassic sediments (shale sandstones, clayey and quartz sandstones and coal seams)	2.276.678	7% Volatiles, ash 14%, S about 1%, moisture 2-3%, DTE >7000 kCal	Q <sub>rs</sub> =8,93 m <sup>3</sup> CH <sub>4</sub> /t Q <sub>as</sub> =0,147m <sup>3</sup> CH <sub>4</sub> /min		5.002	125
Ibarski rudnici	Hard coal	Tertiary lacustrine coal basin, Miocene age, with three horizons (sandstones, conglomerates, argillites, clays, tuffs and coal beds)	1.211.588	-30% volatile, ash 12-40%, S 5-6%, DTE 6000 K/caj	Q <sub>rs</sub> =0,025-0,245 m <sup>3</sup> CH <sub>4</sub> /t Q <sub>as</sub> =0,008-0,079m <sup>3</sup> CH <sub>4</sub> /min	✓	69.135	486
Rembas	Brown coal	Senj-Resava Miocene, lake coal basin: conglomerates, sandstones and red clays and sandstones,	7.429.150	Moisture up to 18%, ash up to 18%, S below 1%, DTE about 4500 k/caj		✓	169.010	1.172
Soko	Brown coal	Freshwater Tertiary series of the Sokobani coal-bearing basin (conglomerates, sandstones and argillaceous sandstones overlying Upper Cretaceous limestone)	50.935.724	Moisture -23%, ash 18%, DTE 4000k/caj	Q <sub>rs</sub> =11,74 m <sup>3</sup> CH <sub>4</sub> /t Q <sub>as</sub> =2,71m <sup>3</sup> CH <sub>4</sub> /min	✓	83.277	539
Štavali	Brown coal	The Sienica-Staval basin represents a deep tectonic basin. The coal-bearing sediments are of Miocene age (M2,3) and consist of four characteristic lithological horizons.	185.001.495	Moisture 24.93%, S 0.98%, coke 51.26%, GTE 20638 kJ/kg		✓	85.125	460
Bogovina	Brown coal	Lake Oligocene; a narrow zone of tuffs, andesites and marls divided into the western and eastern part; one and two coal layer		Moisture 24.50%, ash 28%, S 2.23%, DTE 10948 kJ/kg			11.245	255
Jasenovac	Brown coal	Kučaj - Beljanica autochthonous, Jurassic, Miocene	176.744	Moisture 22.79%, ash 11.40%, S 1.01%, DTE 16 871 kJ/kg		✓	33.800	263
Lubiņa	Lignite	Freshwater tertiary basin formations: conglomerates, sandstones, argillaceous sandstones and clays: two layers	10.025.533	Moisture -35%, ash 14% TDe 3000 k/caj		✓	48.807	342
Aleksinac* * Not active		Lake basin of Miocene age (sandstones, clays, marls, shales)		Moisture -0%, ash 10%, S 3%, TDE 500-5500k/caj	Gas coal	5		268

## *Method of exploitation of coal reserves*

- ▶ Column and chamber-column excavation methods are applied in all mines Construction of pit rooms is carried out by drilling and mining operations with manual loading of demined material
- ▶ Coal mining is carried out by drilling and mining operations with manual loading of demined material
- ▶ Coal is exported in a combined way: by conveyor belts and pit wagons
- ▶ Coal seams of different thicknesses are excavated: from 1.5M to 10m

# RISK MANAGEMENT

## ❑ Mining geological conditions:

- ▶ Irregularities in the spread and occurrence of deposits, as well as fault zones in almost all the pits of our mines, often disrupt the realization of the planned production.
- ▶ The dangers of endogenous fires and submersion of underground production systems can also be classified here, as a result of which production can be interrupted for several months in certain parts and even in entire pits.

## ❑ Climatic conditions:

- ▶ Due to frequent and heavy rainfall (as was the case in the spring of 2014), it is not possible to organize production work at the Progorelica open pit, Ibarski coal mines

# INFORMATION ON THE WORK OF JPPEU RESAVICA

([www.jppeu.rs](http://www.jppeu.rs))

- Strategic goals and stages of implementation of the adopted consolidation program:
  - To continuously raise the level of production in the Soko, Štavalj, Rembas and Lubnica mines, from the current 395,000 t/year to 600,000 t/year after the introduction of mechanization;
  - To begin intensive construction work on the Poljana mine, with a production capacity of over 700,000 t/year;
  - **TO START A PROGRAM OF PLANNED CLOSURE OF MINES WHOSE COAL RESERVES ARE ABOUT TO BE EXHAUSTED,**
  - Increasing the volume of coal deliveries for TENT Obrenovac and TE Morava, up to the size of 80% of the quantities produced from underground mines;
  - To change the structure and reduce the number of employed non-production workers in the company to the optimal number;



*Mines with small remaining coal reserves Consolidation program in JPPEU (2018; adopted) investments-*  
**OBJECTIVES AND METHODS OF THEIR ACHIEVEMENT**

- ▶ For the mines with small remaining coal reserves: Tadenje, Jarando, Vrška Čuka, Bogovina and Senjski mine, concrete dynamic programs were created, which precisely defined: the remaining life of the mine, dynamic production plan, dynamics of labor movement and necessary funds until the end of exploitation, closure mines, and all in accordance with the Law on Mining and Geological Research ("Official Gazette of RS" number 101/15, 95/18 and 40/21).
- ▶ **PROGRAMS FOR THE CLOSURE OF THE MINES: VRŠKA ČUKA, BOGOVINA, JASENOVAC AND IBARSKI MINES HAVE BEEN COMPLETED.**
- ▶ After the adoption of the program, the development of the Main mining closure projects will be started, which will define in detail the activities, dynamics, deadlines and necessary funds for closure.

## Literature

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- ▶ [WWW.STAT.GOV.RS](http://www.stat.gov.rs)

*Thank you for your attention!*



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