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MINING WITHIN ROMANIA'S SUSTAINABLE DEVELOPMENT

Domain: Mineral Resource and Energy Engineering



In 2016 the Technical Sciences Academy of Romania published the paper "Mining within Romania's sustainable development" – authors Professor Dumitru Fodor, D. Eng. – paper coordinator, Professor Mircea Georgescu, D. Eng., Assoc. Prof. Viorica Ciocan, D. Eng., Gavril Baican, D. Eng., Ervin Robert Medveş, D. Eng., Ioan Călin Vedinaş, D. Eng., Ovidiu Gâlcă, D. Eng., Emil Huidu, D. Eng., Gheoghe Iordache, D. Eng., Tiberiu Trotea, D. Eng., Eng. Aurel Pantea Lazăr, Eng. Ioan Nicoară, Eng. Sorin Găman, Eng. Ştefan Ghioc

The paper was conceived by a group of specialists, knowing the real situation of Romanian mining, who made clear analyses and relevant suggestions for the recovery and revitalization of mining in Romania.

Starting from the statement that mining represents a key area for the economic revival and development of the country, the paper aim was to analyse the current situation of Romanian mining, after the reorganizations from the past decades and to name the mining objectives which should be kept active and the ones



which are closed but can be brought back to operation in the new economic conditions to satisfy the interests and needs of the economy. The paper is highly complex as it analyses the mining situations for all minerals in the mines in Romania.

The paper starts with presenting the country's mineral richness, the exploitation methods and work technologies used and the results in time of this work.

In the activity of capitalizing the Romanian mineral deposits, classic technologies were used both

for exploitation and for preparation at the level of those applied all over Europe and worldwide.

In the last few years the mining production capacity of Romania has diminished compared to the one before 1990.

Table 1 presents the productions of various mineral substances and rocks during 2010-2015. In general, we observe that now we produce below 100 million tons per year, while coal production, metal and non-metal minerals represent only 1/5 of the production of such minerals before 1990.

Table 1 The evolution of physical production for various minerals, period 2010 – 2015

(Reported production to ANRM)

Substance or mineral group	U.M.	2010	2011	2012	2013	2014	2015
Coal	(thousand t)	31.183,01	36.062,02	33.460,13	24.787,00	24.773,69	26.705,77
Non-iron ores	(thousand t)		33,42	31,70	38,51	40,26	21,77
Iron ores	(thousand t)	13,12	3,18	8,99	21,30	12,66	40,26
Non-metal ores	(thousand t)	1.052,33	1.056,47	981,79	1.234,23	1.024,10	1.222,48
Rock salt	(thousand t)	2.353,51	2.219,22	1.867,49	2.113,75	2.042,34	2.079,59
Liquid salt	(m ³)	97.626,00	98.416,00	69.637,00	45.980,00	14.435,00	13.333,00
Useful rocks, type:							
Sand and gravel	(thousand m ³)	25.132,05	31.358,49	32.369,57	26.753,77	26.689,12	38.830,33
others	(thousand t)	31.953,67	44.363,85	43.455,14	36.738,85	35.115,67	40.091,39
Ornamental rocks, of which:	(m ³)	25.229,67	22.674,00	19.296,00	37.295,00	18.398,00	26.929,00
Marble	(m ³)	11.920,15	12.726,12	8.887,96	8.363,80	7.138,30	7.189,31

In the first part of the paper I mentioned the background reorganization of the mining industry which consisted in:

- Technologic reorganization of the production in mining units which exploited lignite, black coal, copper and precious metals;
- Managerial reorganization of all mining units by detaching complementary basic or complementary activities and reorganizing them in distinct private units;
- Employee reorganization, mainly by massive reduction in numbers using two ways: retiring them through reducing the work period and dismissing them through compensations;
- Limiting or stopping the production in some mines or open pits with small deposits or in the ones with extremely high production costs.

We underline that there were taken out of the system more than 150,000 people working in mines and the 11 Government Decisions decided the closure of 556 mining and preparation units with their tailing ponds and sterile dumps, all over the country.

Furthermore, the paper analyses the activity of the Romanian mines which are currently operating. First, there was an analysis of the situation of the energy production substances (coal, uranium) and the way they may support, in time, the energy sector in Romania.

Today, the world goes through a transition period regarding the energy resources. It tries to use renewable resources as much as possible as an alternative to the classic resources – coal, oil, and gas.

Coal in Romania was and still is a main source for the energetic security of the country, but its use has two important problems needed to be solved:

- The cost of coal going to thermal power plant
- The need to reduce the carbon dioxide released into the atmosphere through gas burning.

These problems lead to the increased tendency to use renewable energy resources with low pollution degree which have also two problems needed to be solved:



- The continuity and inconsistency in energy production through the renewable system
- Building systems for long term storage of renewable energy generated by the renewable system.

As a result, we underline the following:

1. The transition to new energy resources should be regulated by using energy capacities of adjustment based on fossil fuels;
2. To maintain a constant national energy capacity, there comes the need of an energy compensation system which may be done also based only on fossil fuels;
3. The increase of the energy demand for the economy, on a short-term period, may be carried out only based on classic fuels and, as a result, there comes the need to keep the coal exploitations and thermal power plants in operation, in order to overcome these situations.

The conclusion is that the two systems should operate strongly connected to one another. We consider that irrespective of the results obtained in the fields of energy storage and carbon dioxide emissions reduction, coal will be used furthermore in thermal power plants, at least until the half of this century.

In the analysis of the mining sector, to support the electric and thermal energy production, we based on an energetic mix considering both coal and uranium. The energetic mix considered regards coal (25-30 %) and nuclear energy (20-25%).

The estimations are made until 2035-2050, as we don't know which the achievements in the fields of energy storage and reduction of carbon dioxide emissions from thermal power plants are going to be.

We forecast that in the future in Romania, the coal energy sector will give 6,500 MW, the hydro-energy sector will give 6,500 MW, and the nuclear sector will give 1,413 MW, while the other remaining will be given by hydro-carbs and renewable resources from the market.

From the analysis of this activity sector, the conclusions are the following:

- Keeping into operation three energy sectors of the thermal power plants in Paroşeni and Mintia (one group in Paroşeni of 150 MW and two groups in Mintia of 210 MW each) of the Black Coal Energy Complex – Hunedoara County;
- Keeping into operation four mines in the Jiu Valley (E.M. Lonea, E.M. Livezeni, E.M. Vulcan and E.M. Lupeni) to supply coal for the thermal power plants Paroşeni and Mintia;
- Keeping into operation 12 energy groups (considering the rehabilitation programs in development) of the four biggest thermal power plants: Rovinari, Turceni, Işalniţa and Craiova II, included in Oltenia Energy Complex whose

open pits will supply 20-23 million tons of lignite every year needed for their optimal operation;

- Keeping into operation groups 1 and 2 and building groups 3 and 4 of Cernavoda power plant, to ensure the production of electric energy based on fossil fuels and renewable resources (hydro, wind and photo-voltaic etc.) according to the suggestions for the development of the energy sector in Romania, considering that 20% of the electric energy should come from nuclear power plants.

To extract the supply of nuclear fuel from Romanian resources, they suggested the opening and exploitation of the deposits of Tulgheş-Grinţieş. Also, the secondary uranium resources from dumps and tailing ponds and those from underground waters with low uranium concentrations might be capitalized.

Furthermore, there is an analysis of the metal ore sector, underlining the deposits which can be taken into consideration for exploitation. For a series of better known deposits, there were calculated the metal amounts possible to be obtained in the current conditions of efficiency, as follows: 2,165,000 t copper, 150,000 t zinc, 102,000 t lead, 2,000 t silver, and 350 t gold.

Sustainable mining can be done through processing and exploiting mining wastes for retrieving useful substances from the existing dumps and tailing ponds, followed by the storage of future wastes in safe conditions in areas which no longer represent a threat for communities and without affecting the environment, enabling the rehabilitated areas where dumps were placed to carry out other activities that replace mining.

In the future, there is a need for a national program to observe and quantify the reserves of mineral ores possible to be retrieved from the dumps and tailing ponds in Romania. No country can afford not to take into consideration this potential of metal and mineral ores from such deposits.





The conclusions of metal ores issues are as follows:

1. The capitalization of deposits with small contents of substance but large reserves, possible to be exploited in open pits. We currently know several such deposits, such as: Roșia Poieni, Moldova Nouă, Valea Morii – Brad, Bolcana for copper and Aurum (Borzaș), Nistru (Galbena – Lăpușna), Certej, Roșia Montană etc. for gold and silver.
2. Processing the mining residues from dumps and tailing ponds with metal content, such as: Bozânta pond (Remin), Central Flotation pond – Vechi (Remin), Rovina pond – Brad, Ribița-Curteni pond – Brad and others.
3. Opening the deposits which may be capitalized economically through underground mining is welcomed, in conditions of economic efficiency (mines Cavnic, Baia Sprie, Turț-Ghezuri, Șuitor and others). For a series of mines they decided their termination, even if they had important amounts of usable reserves and the units held valid exploitation licenses.
4. Opening the deposits with rare mineral ore contents, which become highly interesting in the current technical-economic context and worth to be taken into consideration in the future.

Romania is a country rich in non-metal ores and useful rocks, a reason why this paper analyses the deposits having a high importance for the economy.

In the future, if required, they may increase the production of rock salt and solution salt, construction materials and non-metal ores needed for different industrial works.

In the case of non-energy products, Romania should develop complete cycles of exploitation – preparation – processing. A negative impact on the economy is that non-iron metal ores are capitalized by export as concentrates, not going through the complete cycles of metallic processing (i.e. copper, gold, silver etc.)

All the deposits that have to be exploited currently benefit from modern access ways to the work points, energy and drinkable or industrial water access and a surplus of workforce with possibilities of being employed in the mining field.

At the end of the paper, the authors display a series of concrete suggestions aimed to revive mining in Romania, as follows:

1. To revive the extraction activity and capitalize the mineral ore deposits, the ministry should ensure an adequate legislation and institutions able to operate the mining sector and to provide the financing sources.
2. The foundation of a national service of mining inspection to survey the rational exploitation of mineral ore deposits.
3. Resuming the activities of geologic prospection of the deposits in order to acknowledge the reserves.
4. National companies, mining companies and other economically interested / responsible entities should draw out feasibility studies to establish technical and financial conditions required to resume the mining activity to reopen and exploit the potential deposits.
5. The identification of new sale markets, especially for export, on energy and metal stock exchange.
6. The ministry together with ANRM should analyse the possibility of capitalizing the materials whose industrial use has grown substantially in the past few years; for example, graphite has turned into an important raw material in electronics and the world economic conditions are different compared to those at the time graphite exploitation was stopped in Romania.
7. The development of extractive activities in holdings exploitation – preparation / processing – use / capitalization, or in public – private partnerships.
8. The development of S.N.S. Salrom S.A. Bucharest towards other auxiliary activities generated by exploitation, especially the use of underground vacuums generated by salt extractions. These caverns may be used for the storage of resources such as natural gas, deposits for various products which demand certain temperature or humidity conditions.

The paper is important both theoretically and practically and can be applied to all the mining basins in Romania, being useful to specialists who regard the future of Romanian mining and to regional and national administrations connected to

the revival and sustainable development of the economy.

The paper was displayed and debated in the Presidium of the Romanian Technical Sciences Academy and the summary and conclusions were distributed to the central country administration – Parliament, Government, ministries, political parties, County Councils, Union Federations, etc.

The impact of the paper on the administration was positive, a lot of appreciation letters being received, while all the County Councils were interested in developing mining in Romania.

On the 6th of September 2017, the paper was presented and debated before the Commission of Industry and Services in the Deputy Chamber – Romanian Parliament. Senators and deputies, representatives of ministries, unions, national agencies, economic environment and high education took part in the debates.

All the speakers have appreciated the importance of mining for the national economy and expressed the availability to help the revival and development of this sector in Romania, in the years to come.

In the end, we consider that in the future period, in order to revive mining, it is necessary to elaborate a mining strategy and a Mining Law, which should match the current requirements, promote, and mainly consolidate the following aspects:

- The role of Romanian Government should be to control and promote mining, to exercise the position of owning mineral resources through organizing a stable, competitive and fair system of mining taxes and royalties;
- The role of private companies should be to promote projects, ensure funding and mining activity management and to hold the responsibilities concerning the getting of exploitation licenses.



The paper was part of AGIR competition and, on September 14th, 2017, during the General Meeting of AGIR it was given AGIR – 2017 prize, in the domain of "Natural resources and energy engineering".

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