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Realities and Perspectives concerning Mining Energy Sector in Romania

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Abstract
Our country has been blessed with a great variety of mineral resources (ferrous and nonferrous), and energy resources (coal, oil, natural gas, radioactive elements). The abundant natural resources have been exploited for thousands of years, being in certain periods of time one of the main reasons for economic and social development. In our country, the period after 1990 was marked by a radical restructuring of the national development strategy, which led to a dramatic reduction of financing the geological and mining exploration, possibly triggering the collapse of the mining industry and research related to this activities. For this reason, the reform of the mining sector highlights, both important advantages, as well as persistent opportunities and challenges.
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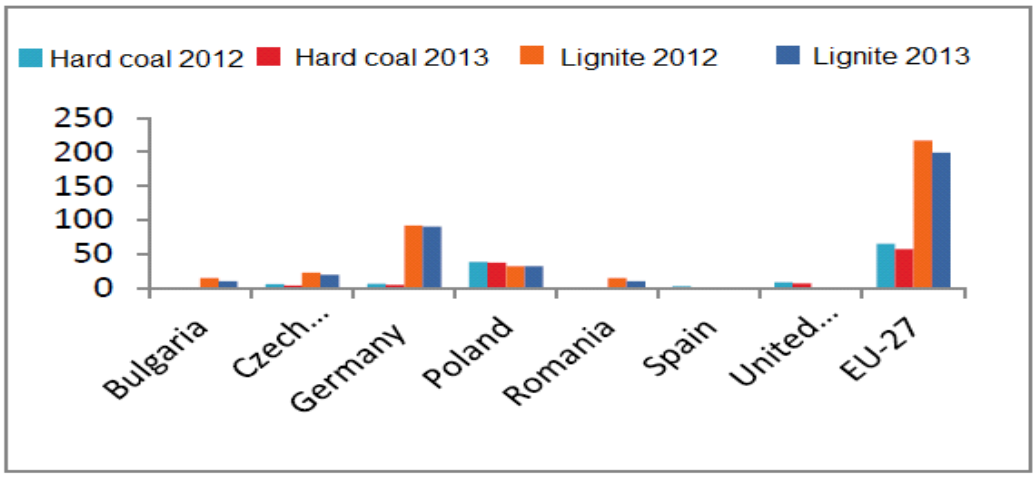
JEL Classification: E23, E66, L52, L71

1. Introduction

Romania has a long tradition in mining industry and holds significant reserves of coal that can ensure the continuity of production for more than 150 years. Coal reserves and resources have been estimated at about 2.446 billion tons, of which 252.5 million tonnes are commercially exploited in leased premises.
Also, known reserves of coal represent about 280 million tons to about 9.64 billion tons of resources. Coal has counted in 2013 about 30% of the energy mix (one fifth of burning hard

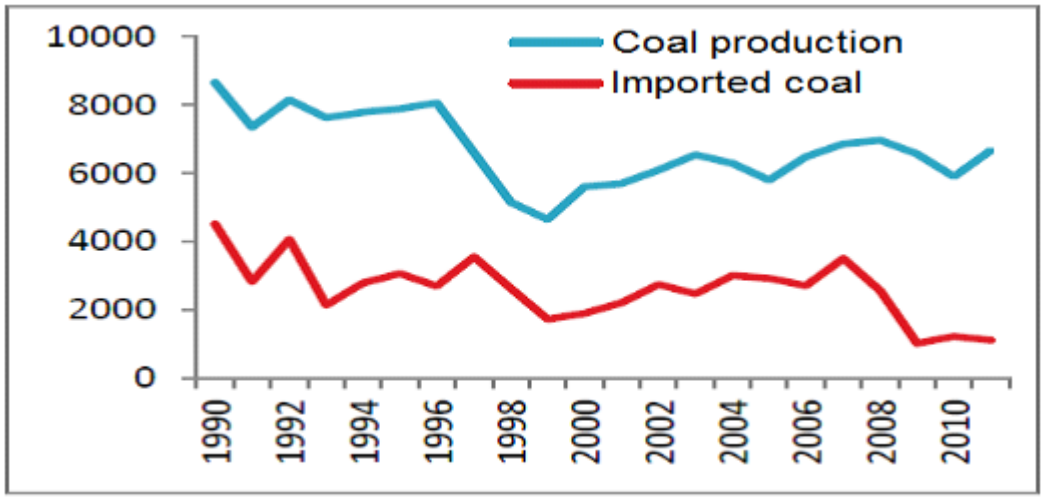
coal, and the rest of the combustion of lignite), followed by 28% of hydro, 20% of nuclear and wind about 7%. Over the years, the coal has counted an average of 30-40% of the energy mix, Romania being among the most important hard coal producers in Europe, after Poland, Britain, Germany and the Czech Republic and one of the largest lignite producers after Germany Poland and the Czech Republic (Figure 1). According to data provided by the International Energy Association (IEA), Romania is ranked on seventeenth place in the world in terms of coal production.



Source: EURACOAL

Figure 1. Hard coal and lignite production in the EU (million of tones)

Throughout the last 20 years, our country's hard coal production has nearly halved, the situation is mainly caused by the decrease of mining and reduction of hard coal consumption (both the iron and steel manufacturing industry, as well as households, for the heat produced by coal-fired power plants). As a consequence, Romania imports mainly hard coal, but the share of imported coal has been reduced to 1/4 as compared to 1990 (Figure 2).



Source: EURACOAL

Figure 2. Hard coal and lignite production and import of coal per tonne, (oil equivalent to net caloric value, 1990-2011)

2. The current context of energy mining industry in Romania

Until the 2012, 6 companies have been active in the coal sector in Romania.
These were as follows:

- National Company of Lignite Oltenia ("SNLO");
- Ploiesti National Coal Company ("SNC");
- National Hard Coal Company Petrosani ("CNH");
- Rovinari, Turceni, Craiova - 3 Energy Complexes.

The first two companies have managed to cover about 65% of the demand from their own coal mining activities, and the rest of supply was purchased from SNLO. CE Craiova has covered from its own production only 10% of the supply and mainly relying on coal purchased from SNLO, which has significantly diminished its competitiveness.

In 2012, according to the conditions negotiated with the (FMI), the coal sector has undergone a major process of restructuring. The vertical integration into the EC Oltenia of the lignite mines and power plants it was decided. A solution has been chosen in an attempt to "manufacture" a national leader, who would have been partially or fully privatized, in the subsequent period.

Hard coal sector restructuring, supposed initially the establishment of two separate entities subordinated to the National Hard Coal Company. To this context, one of the entities is meant to control the closure of three unsustainable coal mines located in the Jiu Valley, until 2018 (it still sells 40,000 tons of hard coal to the EC Hunedoara per month). The other entity, supervises the four coal mines, considered "sustainable" from where two coal power plants belonging to EC Hunedoara will supply and later will become its branch.

The entire production of hard coal and lignite of our country is used to product heat and to generate power (Table 1). Over 90% of the total lignite reserves of Romania can be found in Oltenia region, which is why, this area, is given a particular attention in ensuring the country's coal resources. Approximately 90% of annual production is mined from 17 pits, functioning in the basins of: Rovinari Motru, Jilt, County and Berbeşti-Alunu.

Romanian hard coal has a caloric average content of 3650 kcal/kg, and lignite varies between 1650 and 1950 kcal/kg.

Romanian lignite has a relative low caloric value as compared with the Czech Republic's and Germany's and the fact that both, (the coal and the ortho-lignite) tend to crumble, when removed from the surface, makes the transport unsustainable on long-distances, from the economic point of view. This is why the coal power plants are located very close by the extraction sites.

Table 1. The representative coal power plants, with an installed capacity of over 100MW

Complex	Power plant	Installed capacity
OLTENIA	CE Turceni (commissioned during 1978 - 1987)	1.980
	CE Rovinari (commissioned during 1972 - 1979)	1.320

	CE Craiova (commissioned during 1965 - 1976)	300
	CET Işalniţa	630
HUNEDOARA	CET Mintia (commissioned during 1969 - 1980)	1.050
	CET Paroşeni (commissioned during 1956 - 1964)	150

***Source*:** ANRE

The complexity of geo-mining conditions and mineralogical features of the deposits in our country must be highlighted, but the qualitative parameters related to the quality of similar deposits currently exploited worldwide are at the lower limit, new technologies are used abroad a basis for recording productivities of 5-12 times higher.

Therefore, given the characteristics of coal extracted in Romania (hard coal energy with a caloric value of 3650 kcal/kg and the lignite with a caloric value between 1650-1950 kcal/kg), the use thereof can be achieved only in power plants equipped for this type of fuel and located as close as possible by the lignite suppliers.

Hard coal is mined by EC Hunedoara, which has kept four viable mines and continues to acquire about 40,000 tons of hard coal from the National Hard Coal Company, which shall be fully closed by 2018.

Coal production is used for domestic full production of electricity and heat, especially in the two coal power plants within the EC Hunedoara with a total installed capacity of 1,200 MW, providing long-term fuel supply for these plants. Plant power from Mintia-Deva is actually bankrupt, but survived through cross-subsidies by efficient energy power plants andco-generation bonuses, but requires significant environment investments. Romania holds about 350 million tons of reserves and produces 3 million tons/year of bituminous coal.

However, taking into consideration the Mintia-Deva will be closed due to inefficiencies in the coming years (and replaced with gas units), one mine is sufficient to supply of hard coal the energy power plant of Paroşeni.

In 2011 Romanian Government analyzed the seven mines and decided to close 3 of them:

- Petrila coal mine - the Production Unit, until 31 December 2015;
- Uricani coal mine - the Production Unit, until 31 December 2017;
- Paroşeni coal mine - the Production Unit, until December 31, 2017.

The National Company of Lignite Oltenia has five major mining basins: Rovinari (14.9 mil. tons/year), Jilt (7.6 mil. tons/year), Motru (6.6 mil. tons/year), Berbeşti (2.6 mil. tons/year) and Husnicioara (3.1 mil. tons/year). It has reserves of about 2 billion tons and produces 35 million tons of lignite.

The lignite reserves are concentrated in an area of about 250 square kilometers, about 95% of the lignite deposits are located in the mining basin of Oltenia and more than 80% of these are surface mines. The left deposits are not feasible, commercially. The most important customers are the neighbouring plants namely, former energy complexes of Turceni, Rovinari, Craiova, which are now part of the EC Oltenia. Power plants have been renovated in the last six years in order to comply with the environmental standards. Since January 2007, the lignite is no longer entitled to any operational grant or welfare. It has benefited by reduced state intervention and some grants for the underground mines. Since the low energy content of Romanian lignite it is more expensive than the Czech lignite, and a cheaper one than in

Germany. Low price of Romanian lignite compared to Germany is due to low operating costs in Romania, including more stringent environmental standards.

3. Development perspectives of mining energy

In Romania there is now a program of power plants modernization, which involves the closing of old unprofitable plants and will be fully implemented in the near future. It is hoped that the modernization of power plants will improve the production indicators, primarily at a competitive price of electricity produced based on coal. New energy group of 500 MW, coal-dust furnace installation and overcritical parameters, using lignite as fuel base, on the Rovinari site, is an objective of sustainable developing.

The share of coal consumption will be increasingly higher, year by year and if there are no amendments in energy policies, coal will catch up oil in less than a decade. According to the International Energy Association (IEA), coal will dethrone oil until 2017 and will become the main energy resource of mankind.

Coal becomes a cheaper alternative to oil, a resource working-out of deposits and coming at a price ever higher. Yet, despite the efforts to reduce pollution involved in the use of coal.

4. Vision of European energy policy

The large volume of existing coal reserves in the world makes this raw material to be considered as an important resource and sustainable future energy, which could make possible the:

- long-term planning to use coal in the future, meaning its use over several generations;
- the recovery of the invested capital by entrepreneurs: in thermal and power plants, metallurgical plants, transport infrastructure, logistics etc. and achieving long-term profits;
- carrying out researches, concerning the use and the economy of coal resources, not only in the area of interest of applied sciences, but also in the basic sciences.

Coal beds are spread over 100 countries around the world and therefore the geographical locations of large coal deposits in different continents and regions of the world land protects importers and users of coal, against any monopolization of provision of this raw material.

One of the major challenges for the European Union refers to the way; we can ensure the energy security with competitive and "clean" energy, taking into account the limitation of climate changes, escalation of global energy demand and the uncertain future of access to energy resources.

Vision of energy policy today corresponds to the concept of sustainable development and covers the following aspects: consumer access to affordable and stable energy sources, sustainable development of production, transport and consumption of energy, security of energy supply and limitation of greenhouse gas emissions.

The EU draws up an ambitious energy policy, which covers all energy sources from fossil fuels (oil, gas and coal) to nuclear and renewable energy (solar, wind, geothermal, hydroelectric etc.) in an attempt to trigger a new industrial revolution, leading to an economy of low-energy consumption and limiting the climate changes, ensuring that the energy we consume will be cleaner, safer, more competitive and sustainable.

Since the renewable energies are not sufficient to meet the needs of the Old Continent, the European countries are turning to fuel, the oldest and the most profitable, although it pollutes the most. Coal, as energy resource is crucial for Europe. Holding almost 5% of global reserves of coal, it can be said, the Europe has enough coal to cover the main needs. Many EU countries hold both, superior reserves of coal - anthracite and hard coal, as well as inferior

reserves of coal - brown coal and lignite. In the European Union, the superior coal is produced in Czech Republic, Germany, Poland, Romania, Spain, and Britain.
With a total demand of about 750 million tons of equivalent coal, Europe including Russia is the third largest consumer of coal in the world, after North America and China. From the data available to us it appears that Europe bears over 15% of global consumption of coal.
In the so called Europe of 27 countries it is hoped that in the future coal will count a fifth of primary energy demand. Poland and Germany are the leaders in the EU, when speaking of coal production. Together accomplishes two thirds of the production the European Union. Czech Republic, Greece, Spain and the UK figure also as large coal producers in the European Union.
Currently the EU imports almost half of power generation resources. The European Commission estimates that over the next 20 to 30 years, raw materials imports for energy will increase by almost 70% per total, up to 80% for natural gas and up to 95% for oil. Therefore, fossil fuels will still be the purchase basis of energy in the United Europe in the coming decades.

5. Conclusions

Thereby, the coal available on European territory limits the Europe's dependence on energy imports. Also, the coal reduces the vulnerability of Europe against the energy crisis, due to its own coal reserves and proper functioning of the global market for this raw material.
Today, more than 90% of lignite and 67% of the superior coal is used in power plants within the European Union to produce heat and electricity. Future demand for electricity in the European Union will be certainly growing. There are many countries in the European Union with a strong material base for electricity production based on coal, which contributes to security of supply and competitiveness, including to stable energy prices in Europe. EU foresees that it will require all available energy resources in the coming decades. This gives the coal a significant role in the production of electricity and heat.

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