

### Solutions for the Future

Project documentation is being prepared intensively and all preparatory works are being carried out in the eastern part of the deposit for the opening of the new coal mine Field “E”, which opens the way to around half a billion tons of coal located beneath the village of Vreoci.

In the western part, in addition to “Tamnava West” and the smaller replacement capacity Field “G”, all plans are directed towards the opening of the new mine “Radljevo”.

The technical study “Long-term program of coal mining in coal-bearing basins of ‘Electric Power Industry of Serbia’”, done by the consortium of the Open Cast Mining Center and the “Geoling Group” from Belgrade, is currently in the revision phase and its adoption is expected soon after the regular harmonization procedure. In this document, the most important issue was to define the direction in which the production in the Mining Basin “Kolubara” should continue, i.e., in particular, to solve the problem of the lack of dumping space for the new mines in this deposit, primarily for the Field “E”.

In March 2013, EPS made the decision to order a study which would offer solutions for the most important issues with respect to the coal mining challenges in the next five years, whereas the Bidder was selected on the last day of the same year. The extraordinary events that ensued, among them the most important being the May 2014 flooding, have led to significant changes of circumstances and affected the preparation of this document, which is now in the final phase and the detailed report on which is being prepared by the EPS Expert Council Rapporteur, Mr. Milan Jakovljević, director of the Sector for improving the efficiency of environmental protection in mining.

He has explained to us that, when it comes to the energy sector, all projections are complex because this matter is subject to constant and numerous changes, so it is almost impossible to fully anticipate developments. This is why, although there is always a general mining plan until the complete excavation of the deposit, projections and proposals are made for a much shorter period, as it has been in this particular case, too.

- When we talk about the general situation in Kolubara coal mines, it is important to note that, over the last ten years or so, the active mines have been operating at the edge of their production capacities, providing from 29 to 31 million tons of coal for thermal power plants annually. Theoretically, this is by around 20 percent less than the quantity which would be necessary if TPPNT operated constantly to its full capacity. The task of those in charge of open pit mines development strategy is to constantly strive towards reducing this difference and towards approaching the conditions in which coal mines would be completely capable of keeping up with the production capacities of TPPNT. In such conditions, preconditions

would be created for rationalization, efficiency increase and the reduction in coal production costs. This would be an ideal objective, but on the way to achieving it, there are countless obstacles that are by no means easy to overcome – says Jakovljević.

At this moment, four open pit mines are operating within the Mining Basin “Kolubara”, one of them, “Veliki Crljeni”, being at the very end of its lifecycle. Field “G”, its replacement capacity, has not been opened yet due to the complications in the preparatory phase which involved the relocation of a river, a main road and of numerous infrastructural facilities. Simultaneously, in Field “D”, there are still certain coal reserves in the northwestern part of the deposit, in the zone of the eastern part of the village of Vreoci, but in order to reach them, several more infrastructural facilities need to be relocated, the village school also among them. On the south side of this mine, the front of operations expands towards the village of Zeoke, but the facilities of the Auxiliary Mechanization are in the way of excavators and there are many difficulties related to drainage. Field “D” operates in difficult conditions, and the available coal quantities are constantly decreasing.

– The situation is quite complicated. However, at this moment, the main obstacle to the achievement of long-term secure production is providing an adequate dumping area for the disposal of overburden from the open pit mines in the eastern part of the basin – says Jakovljević. – Solving this problem occupies the key position in the terms of reference for preparing a long-term exploitation development program. It is well known that we have a problem with constant landslides in the internal dump site of Field “B”, which is why we were forced to relocate the dumping from the two ECS systems of this mine beyond its boundaries. This situation requires remediation and, within the framework of solving this acute problem, we wanted to find a long-term solution for the dumping of material which would show up in the following years with the opening of new open pit mines. In this phase of analysis, I believe that, with certain adjustments given in the revision, we will be able to offer a viable solution together with the designers.

In the continuation of exploitation of the eastern part of Kolubara deposit, the corridor that includes Ibarska main road, a part of the railroad Belgrade – Bar and the river Kolubara is planned to be relocated to the horst area, the dump site of the mine “Tamnava – East Field” and, to a smaller extent, to the territory of the village of Jabučje. The plan is to carry out this capital operation after 2030. In this way, all the coal located beneath the village of Vreoci would be made available, more precisely, it would be possible to also excavate the floor coal from the deposit Field “F”, which has the best quality. The front of operations within the area of the future mine Field “E” will go from east to west. This is a deposit in which coal is located at greater depth than in the Field “D” and the characteristics of which, among them

the most prominent being the large quantity of water, make the excavation process quite complicated technically. For now, although in a way, the mining machines have already "stepped" into this zone geographically, the preparatory activities have not been finished, so Field "E" is officially in the preparatory phase of opening and the activities carried out in this zone are defined in the project documentation of Field "D".

The optimal development of the front of operations in Field "E" is important in the context of the long-term plan because it opens the possibility for the continuation of operations in the zone of Field "F". In this part of the basin, coal is formed in three seams, of which the floor seam would be impossible to excavate if the opening was done from another direction – from the territory of the previously mentioned Field "G".

When it comes to the western part of Kolubara basin, in addition to Field "G", all efforts are directed towards the opening of the open pit mine "Radljevo". This mine is necessary so as to have three production "bases" active at any moment, by which the sufficient quantities of coal would be provided for thermal power plants even in case of delay or emergency.

- The stability of production and the capacity increase are big challenges for EPS in the conditions in which all energy companies operate currently, not only within the region, but also worldwide. In addition to fighting natural disasters, recovering and renewing the equipment, we are also forced to constantly face the pressure from the international energy regulatory institutions. As it is well known, as of 2005, Serbia has been a member of the Energy Community and although, formally, it is still not obliged to comply with all EU regulations, it definitely has to follow the direction laid out in this sense. There is also an increasing influence of the global environmental lobby which insists on the reduction of harmful gases emission. This has led to the fact that all large financial institutions are banned from investing, directly or indirectly, in energy projects related to electricity production from coal, as well as in coal production capacities.

Depending on the time schedule, the exploitation of coal from Kolubara will last at least until 2050, and even until the end of this century in a somewhat reduced volume.

#### Conditions

In addition to the general circumstances and the situation on the global economic market, which has changed dramatically in the last few years, EPS is also facing the fact of encountering the phase of exploitation in geologically much more unfavorable conditions than before.

- We are entering the portions of the deposit that are stratified, from which it will be much harder to provide coal of the required calorific value. The resettlement of large local communities, with many households, lies ahead of us, which is always a sensitive and

demanding task that also increases the costs – says Jakovljević.