

Retreat to the Future: Shaping the Post-Mining Era

Michael Drobniewski¹ · Claudia Karus¹  · Joachim Löchte¹

© Springer-Verlag GmbH Germany, part of Springer Nature 2018

Keywords Hard coal · Retreat · Mine drainage · Water rebound · Post-mining

After a history of more than 200 years, Germany is finally opting out of industrial hard coal mining at the end of 2018 (here, hard coal refers to coal that is harder than lignite). With this step, a formative element of Germany's success story in the heavy industries will terminate. Hard coal availability was not only a critical factor for the industrial revolution it was also the backbone of the postwar economic miracle that enabled Germany to become one of the most influential states and political economies in the world. Moreover, it fueled technological progress and provided the national foundation for Germany's economic, social, and cultural prosperity. Coal mining coined an industrial identity based on miner's values such as solidarity, commitment, and honor.

The RAG Aktiengesellschaft (RAG), which consolidated all of Germany's hard coal mines, never intended to abandon this deeply-rooted branch of industry. Nevertheless, its profitability was challenged on the international market ever since RAG's establishment in 1969, and hard coal mining was government-subsidized. In a long-standing political process, a socially acceptable course for the retreat from mining was developed, outlined in the legislation of the "Steinkohlefinanzierungsgesetz" in 2007. In 2007, this process also led to conclusion of a contract between RAG and the federal states North Rhine-Westphalia (NRW) and Saarland ("Erblastenvertrag") and the resulting establishment of the RAG Stiftung foundation.

By a contract with RAG ("Ewigkeitslastenvertrag"), the RAG Stiftung will bear the liabilities resulting from exploitation of coal deposits and its long-term consequences after 2018. Hence, the coal industry will pay for its legacy. Together, RAG and RAG Stiftung have accepted their responsibility and commit their resources to the appropriate handling of finite and perpetual post-mining duties. These include regulation of mining damage, rehabilitation of contaminated sites and, of vital importance, water handling (Fig. 1). In particular, mine water pumping (≈ 90 million m^3/a) and polder activities (> 1 billion m^3/a) have to be pursued eternally. All measures give top priority to the protection of drinking water, the environment, and population. The "Erblastenvertrag" binds RAG to the principles of legal necessity, economy, thriftiness, and efficiency. Consequently, as requested by the contract, optimized mine water concepts have been developed and partly await permission by the authorities.

Since complete mine drainage is no longer required, from a technical point of view, the possibilities of mine water rebound have been evaluated and optimized according to the local geological circumstances. Concepts for the Saarland and Ibbenbüren (NRW) favor a complete rebound of mine water to natural levels, enabling a pressureless spillover into larger surface waters, whereas the Ruhr district in NRW requires ongoing pumping. There, a minimum distance of 150 m between the mine water level and the groundwater of the "Halte Sande", which serve as major drinking water reservoirs for large parts of NRW, is required.

RAG aims for a controlled rebound (flooding process), aware of the natural and historical loads borne by the mine drainage. Since mine water is generated from rainwater, which slowly percolates down through the mine workings and the surrounding rock, it becomes enriched in dissolved minerals and salts. In addition, although all used operating supplies and introduced waste products were government-approved, mine water can still pick up potentially hazardous

✉ Joachim Löchte
joachim.loechte@rag.de

Michael Drobniewski
michael.drobniewski@rag.de

Claudia Karus
claudia.karus@rag.de

¹ RAG Aktiengesellschaft, Im Welterbe 10, 45141 Essen, Germany

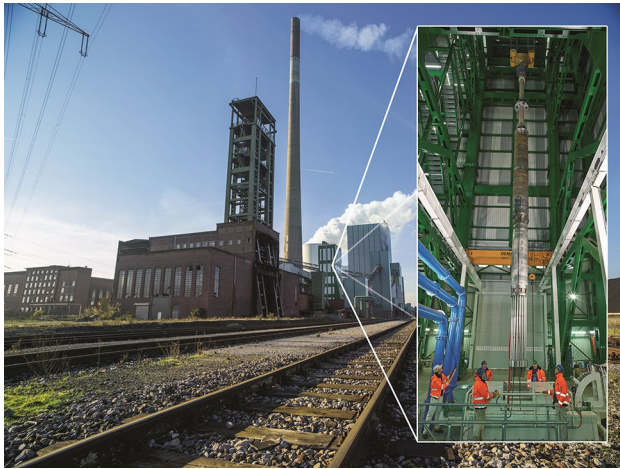


Fig. 1 Current situation of the former Walsum colliery in Duisburg, Germany. Walsum is one out of six mine drainage locations in NRW that have been selected to be operated perpetually. One of the two head frames (encased in green and white shell) and the corresponding shaft have been converted to operate powerful submersible pumps (cp. inset), which replace the previous pumps located deep underground. From there, mine water is discharged into the river Rhine (image: RAG 2016)

particles from material left behind (e.g. hydraulic oil and backfilling of voids). Accordingly, RAG, together with the authorities, conducts intense monitoring of the mine water and its effects on receiving water courses. This also includes pollutants, such as PCBs. Moreover, RAG supports academic research activities and conducts trials on possible treatment processes to improve the water quality and to meet the environmental quality standards outlined by authorities and EU legislation (EU water framework directive).

The environment will profit most from implementing these mine water concepts, since about 360 km of rivers will be protected from mine water (Fig. 2). In addition, there will be about 50% less energy consumption and reduced leakage of climate-wrecking natural gases. Still, in a highly risk-aware society, the mine operator comprehends the necessity for intense communication with both authorities and



Fig. 2 The river Ruhr with the head frame of the former colliery Heinrich in Essen, Germany in the background. The location will serve as mine water drainage location perpetually and discharge pumped water into the river Ruhr (image: RAG 2016)

stakeholders to raise acceptance for the concepts. Offering and participating in diverse events, this ensures representative participation of the stakeholders and considering their various interests, fears, and concerns in the process. RAG is convinced that the mine water concepts are in the common interest and is confident that it will be able to implement the measures outlined in the mine water concepts and to contribute to the future of the mining areas.