

Development trend of mining economy in China

Daren Jia¹, Yue Yin^{2*}

¹ School of Economics and Management, Anhui University of Science & Technology, Huainan, CO 232001, China

² Marketing operation Department, Anhui Jiangnan Chemical Holding Co. LTD, Hefei, CO 230088, China

* Corresponding author: Yue Yin (Email: 1643649691@qq.com)

Abstract: In the past long period of time, China has achieved great and rapid development by relying on mineral resources. However, this development mode is extensive. In the process of mineral resources consumption, a large number of geological disasters have been caused, such as mining subsidence, landslides, etc. In addition, the emission of carbon dioxide and other pollutants has also caused environmental harm. In September 2020, China explicitly set the goal of peaking its carbon footprint by 2030 and becoming carbon neutral by 2060. Economic development needs the support of mineral resources, but also needs to ensure that the environment is not further damaged, to achieve sustainable and high-quality development is the only way. In this context, it is necessary to discuss the future development trend of China's mining economy. Based on relevant research and theoretical analysis, some suggestions on promoting sustainable development of mining economy are put forward.

Keywords: Mineral resources; Mining economy; Sustainable development.

1. Introduction

Mineral resources are important resources for the survival and development of human society, and also important auxiliary materials for industrial production. As a major country in mining resources and processing, China has not only promoted the rapid development of its national economy based on the support of mining, but also made important contributions to the development of the world economy. Although the world is undergoing the greatest change in a century, the economic situation is not optimistic enough, and the prices of mineral products are constantly changing, for China, the status of mineral resources will not change much for a long time in the future.

Mining resources play a fundamental role in the development of various industries, and their sustainable development concerns the overall situation of the national economy. Therefore, in recent years, China has issued a considerable number of policy documents to guide the development of the mining economy. At the Fifth Plenary Session of the 16th Communist Party of China Central Committee held in October 2006, the central government officially identified the construction of a resource-saving and environment-friendly society as a strategic task in the medium - and long-term plan for national economic and social development. In the National Mineral Resources Plan (2008-2015), it is clearly pointed out that the mining economy is developing towards sustainable and green direction. The Fifth Plenary Session of the 18th Central Committee of the Communist Party of China put forward the five development concepts of innovation, coordination, green, open and shared development. The 19th National Congress of the Communist Party of China further proposed that "green water and gold mountain is gold mountain and silver mountain", and green mining has gained more popular support.

2. Overview of mineral resources in China

China is located in the east of Asia, the west coast of the Pacific Ocean, a vast territory, mountains and rivers, lakes and

basins star Luo its spread. More mountains in the west, more hills in the east, plain. The vast expanse of earth and the complex and diverse geological landforms provide a broad space for the storage of rich and colorful mineral resources. In addition, on the vast land of China, all strata are well developed, distributed from Archaean to Cenozoic. During the three billion years from Archean eon to Cenozoic, the earth of China has experienced many periods of extensive and intense magmatic activity, forming various types of magmatic rocks, which are widely distributed throughout the country. As an important part of Eurasia, China is the product of global crustal movement and tectonic evolution. From the point of view of plate tectonics, China is located in the southeast of the Eurasian plate, with the Pacific plate and the Philippine plate on the east, and the Indian plate on the south. The mainland of China is located on the border of these plates, and is influenced by several different tectonic units, thus creating favorable geological conditions for the formation of diverse minerals. It is because of the above factors that China has become a country with a vast territory, superior met allogenic geological conditions, complete and complete set of minerals and abundant resources in the world. It is a country with its own characteristics of mineral resources.

According to the China Mineral Resources Report 2022, 173 kinds of minerals have been discovered in China by the end of 2021, of which 13 are energy minerals, 59 are metal minerals, 95 are non-metallic minerals and 6 are water-vapor minerals.

In 2021, China's major energy and mineral reserves will be 207.855 billion tons of coal, 3.689 billion tons of oil, 6,339.267 billion cubic meters of natural gas, 544.062 billion cubic meters of coal bed gas and 365.968 billion cubic meters of shale gas. The regions with rich energy and mineral reserves are mainly distributed in Sichuan, Gansu, Shaanxi and Shanxi provinces. Among the major metal mineral reserves, the reserves of iron ore are about 16.124 million tons, manganese ore is about 281,687,800 tons, copper ore is about 34,947,900 tons, gold ore is about 2,964.37 tons and silver ore is about 71,783.66 tons. The regions rich in metal minerals are mainly located in Liaoning, Sichuan, Tibet and Inner Mongolia Autonomous Regions. Among the main non-

metallic mineral reserves, there are 67.2513 million tons of fluorite, 2.125 billion tons of gypsum and 183.19 kg of diamond. Jiangxi Province, Zhejiang Province, Hunan Province and Yunnan Province are rich in non-metallic minerals. The remaining proved technical recoverable reserves of petroleum and natural gas in China have reached 3.689 billion tons and 6,339.267 billion cubic meters, and breakthroughs have been made in the exploration of new strata, new types and new zones in several basins, such as Ordos, Junggar, Tarim, Sichuan and Bohai Bay. Major progress was made in geological exploration of non-oil and gas minerals. In 2021, 95 new mineral deposits were discovered in China, including 38 large ones and 34 medium ones.

3. Exploitation and utilization of mineral resources in China

3.1. Fixed asset investment in mining industry

The fixed asset investment in China's mining industry in 2021 was 1.3 trillion yuan, an increase of 10.9% compared with 2020, and 6 percentage points higher than the national fixed asset investment growth rate of 4.9%, which has recovered to the level before the COVID-19 epidemic and maintained a good growth momentum.

3.2. Energy production

In 2021, China's energy production rate increased. Total primary energy production was 4.33 billion tons of standard coal, up 4.2 percent year on year. In the energy production structure, the proportion of non-renewable energy is about 79.7%, and that of renewable energy is about 20.3%. Coal production accounted for 67.0%, petroleum 6.6%, natural gas 6.1%, and wind power, nuclear power and hydropower accounted for 20.3%. The total energy consumption was 5.24 billion tons of standard coal, an increase of 5.2% year on year, and the energy self-sufficiency rate reached 82.6%, achieving a steady improvement after 2016.

3.3. Energy consumption

China's energy consumption structure improved in 2021. In 2021, coal consumption will account for 56.0 percent of total primary energy consumption, oil 18.5 percent, natural gas 8.9 percent, and non-fossil energy such as hydropower, nuclear power and wind power 16.6 percent. From 2011 to 2021, the share of coal consumption in energy consumption decreased by 1.42 percent annually, while renewable energy sources such as wind power and hydropower increased by 0.82 percent annually.

In 2021, the output of iron ore was 980 million tons, an increase of 9.4% over the previous year, and the apparent consumption (domestic production + net import) was 1.52 billion tons (60% of grade ore). Crude steel output was 1.04 billion tons, down 2.8%. Among the main non-ferrous ore products, the output of copper concentrate was 1.855 million tons, up by 10.9%; The output of lead concentrate was 1.554 million tons, up by 16.9%; The output of zinc concentrate was 3.159 million tons, up by 14.1%. The output of ten non-ferrous metals was 647.71 million tons, up 4.7%; Among them, 10.487,000 tons of refined copper, up 4.6%; Electrolytic aluminum reached 38.503,000 tons, an increase of 3.8 percent. Phosphate ore output 102.899 million tons (including 30% P₂O₅), an increase of 13.8% over the previous year; Cement was 2.38 billion tons, down 0.4%.

4. Literature References

On the development of mining economy, scholars have carried out a lot of research, and achieved a lot of research results. Dividing the development stage and grasping the best time to transition are significant for resource-based cities (RBCs) [1]. optimal outcomes of diversification policies on economic growth are found when policies combine regional, sectoral, and national strategies for small mineral economy development [2]. Value evaluation of mining right is an important driving force to realize the optimal allocation of resources and to promote the sustainable development of the mining economy, but the relevant theoretical methods are not yet perfect. The existing Discounted Cash Flow (DCF) method has the problems of ignoring uncertainty and decision-making rigidity in the evaluation of mining right, while the real option method is a suitable management method for solving large uncertainties and improving decision-making flexibility [3]. The mining industry (MI) has played a key role in ensuring a stable supply of minerals for industrial production and human survival. The Chinese government is implementing various policies to promote the MI and needs quantitative information on the economic role and effects of the MI [4]. Narrowly defined LCPs remain, in effect, mining centric creating a local economic system that is tailored to suit and become dependent on the mining industry [5].

5. Conclusion

5.1. The exploitation of mineral resources drives the development of economy and society

According to the data published by relevant authorities and existing studies, China's mineral resources development has driven the rapid development of mining economy and national economy. To maintain the appropriate and reasonable exploitation of mineral resources is a necessary means to promote economic growth.

5.2. The exploitation of mineral resources has caused environmental problems

Human society develops mineral resources based on its own development needs, but in the process of development, it often causes some environmental problems because of improper development. The problems caused by the exploitation of mineral resources are mainly manifested in the characteristics of large damage area, various forms and long time, which seriously harm the prosperity of the country and social stability.

5.3. The quantity of solid waste is large, and the environment bears great pressure

In the process of mineral resources exploitation, two kinds of solid wastes, tailings and waste rock, are often produced. With the needs of economic development, more and more mine development, resulting in more solid waste, some of which will often produce some harmful gases after wind, sun, rain, resulting in excessive environmental pressure.

5.4. The exploitation efficiency of mineral resources needs to be improved

It can be observed from the available data that China has

invested a lot of manpower and material resources in the development of mineral resources, which reflects the practical problem of low development efficiency and leads to a large amount of waste.

6. Suggestion

6.1. Formulate reasonable standards for the limits of mineral exploitation

In light of China's actual situation, it shall formulate standards for mining limits of mineral resources from the perspective of sustainable economic and ecological development, strictly abide by the already formulated standards and systems, and formulate relevant disciplinary measures. Only by exploiting related mineral resources strictly and appropriately can we achieve coordinated development of economy, society and ecological environment.

6.2. Attach importance to environmental protection

In the process of mineral resources development, waste mines, waste pits or waste stones are often ignored, which may not only cause serious geological disasters, but also cause toxic and harmful gases generated by waste in nature, which will affect people's lives and property safety and threaten social stability and economic development. Therefore, we should grasp from the Angle of environmental carrying capacity, pay attention to the development of mineral resources and mining economic development in the process of waste, to protect the environment.

6.3. Improve the application of advanced science and technology in mineral resources development

There is a problem of low efficiency in mineral resources exploitation. We can improve the efficiency of mineral resources exploitation by putting in advanced production lines and advanced production technology and introducing relevant high-tech talents. On the other hand, there are certain risks in the process of mineral development itself, especially in the mining of coal and gas, which are prone to accidents, resulting in injuries or even death of staff. This situation can be completely avoided through some advanced artificial intelligence technology to realize full machine operation in the most dangerous links. Therefore, we should attach importance to the application of science and technology in the process of mineral resources development.

6.4. Explore the integration of ecological restoration and other industries

It is suggested to strengthen the joint of mine repair enterprises and related industries, so as to improve the working force and repair intensity, promote the development of industrial economy and achieve a virtuous ecological cycle.

It can be combined with the tourism industry to classify, plan and design solid waste for the construction of mine parks and geoposic parks, etc., improve the treatment of solid waste, effectively promote the development of regional tourism economy, and realize the unity and win-win of ecological environment and economic benefits.

References

- [1] Lu Shuo,Zhang Wenzhong,Li Jiaming,Wang Shaohua. Resource-based cities: Spatial structure and evolutionary identification based on nighttime light images. *Frontiers in Earth Science*,2022.
- [2] Lufin Marcelo,Soto-Díaz Juan. Technology, geography, and diversification in a small mineral economy. *The Extractive Industries and Society*,2022,11.
- [3] Yang Wei,Fang Nan,Wang Yaping,Long Tao,Deng Sha,Xue Mengge,Deng Bo. Value evaluation of mining right based on fuzzy real options. *Resources Policy*,2022,78.
- [4] Zhang Binyuan,Yao Jinge,Lee Hyuck Jin. Economic Impacts and Challenges of Chinese Mining Industry: An Input–Output Analysis. *Frontiers in Energy Research*,2022.
- [5] Weldegiorgis Fitsum S.,Dietsche Evelyn,Franks Daniel M.. Building mining's economic linkages: A critical review of local content policy theory. *Resources Policy*,2021,74.
- [6] Mineral Research; Seoul National University of Science and Technology Researchers Discuss Findings in Mineral Research (An Input-Output Analysis of the Economic Role and Effects of the Mining Industry in South Korea). *Mining & Minerals*,2020.
- [7] Carl A Williams. SRK panel discusses mine closure at Canadian Mining Symposium. *The Northern Miner*,2020,106(15).
- [8] Global Views - Policy Research; Studies from School of Business Administration in the Area of Policy Research Reported (Revisiting the Link Between Resource Windfalls and Subnational Crowding Out for Local Mining Economies In Chile). *Politics & Government Business*,2020.
- [9] KALENGA John Ngoy,BALYAHAMWABO Christian Tulinabo. The economic impact of mining industries in the central African Copperbelt : Case study of Zambia and the Democratic Republic of Congo. *Hosei university faculty of economics*,2020,88(1?2).
- [10] J. Bohorquez. RIO DE JANEIRO AND THE SILVER MINING ECONOMY OF POTOSI: TRANS-IMPERIAL, GLOBAL, AND CONTRACTUAL APPROACHES TO SOUTH ATLANTIC MARKETS (18TH CENTURY). *Almanack*,2020(24).
- [11] Furnaro Andrea. Neoliberal energy transitions: The renewable energy boom in the Chilean mining economy. *Environment and Planning E: Nature and Space*,2019.
- [12] DING Yun. Brief Analysis on Industrial Restructuring and Diversified Development of Mineral Economy. *IOP Conference Series: Earth and Environmental Science*,2019,267(3).