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Research on Characteristics and Sustainable Development of Mineral Resources in China

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Abstract. China is rich in total mineral resources, but per capita possession of less, more poor ore, mineral resources supply is prominent, and there are problems such as resource waste and environmental pollution; Therefore, in order to achieve sustainable development of mineral resources, it is necessary to strengthen exploration, realize stable allocation of resources, increase strategic reserves, and improve the level of comprehensive utilization of mineral resources, so as to achieve sustainable and healthy development of mineral resources and bring benefits to future generations. On the basis of enumerating the characteristics of China's mineral resources, this paper analyzes the factors restricting the sustainable development of mineral resources, and puts forward measures to realize the sustainable development of mineral resources by strengthening the legal system and promoting management.

1. Characteristics of China's mineral resources

- (1) The total amount of resources is large and the per capita possession is small. China ranks 3rd in the world in total mineral resources, but only 58% of the world average per capita, ranking 53rd.
- (2) Less rich ore, more poor ore. China's mineral resources are both rich and poor, but rich ore, poor ore, most of the mineral grade is low, can directly for smelting and chemical utilization of less, in addition to mining rich abandoned poor, mineral reserves decline, less and less rich ore.
- (3) China's mineral resources are unevenly distributed. Processing and consumption areas of mineral products are concentrated in the southeast coastal areas, while the mineral resources are mainly concentrated in the central or western regions.



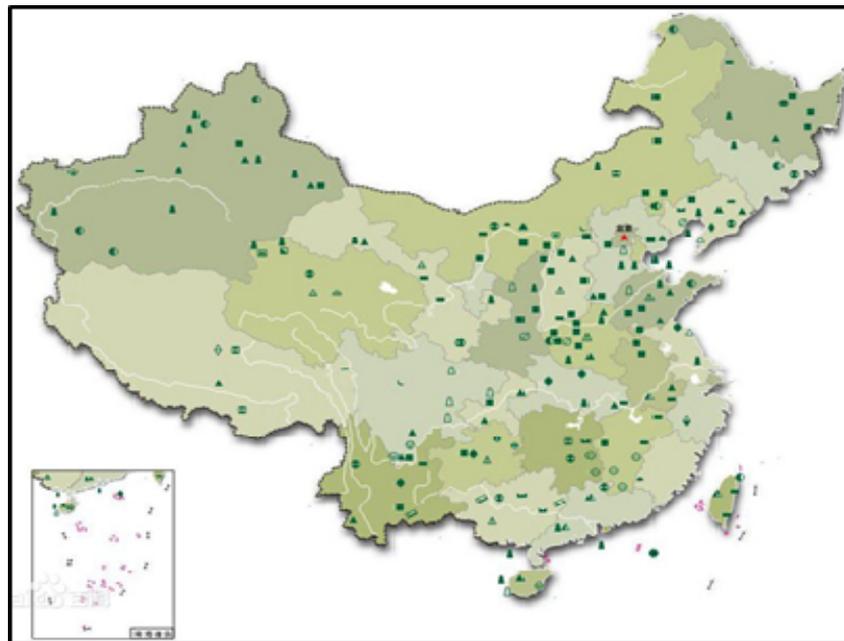


Fig.1 Map of mineral resources in China

(4) Small scale and low production efficiency. More than 20,000 ore deposits have been proved in China. Most of them are small and medium-sized ones, and there are only 800 large ones. China's coal reserves that can be mined in the open air account for only 7% of the total reserves, compared with 60% in the United States and 70% in Australia. China's current ranking in the world is shown in the chart:

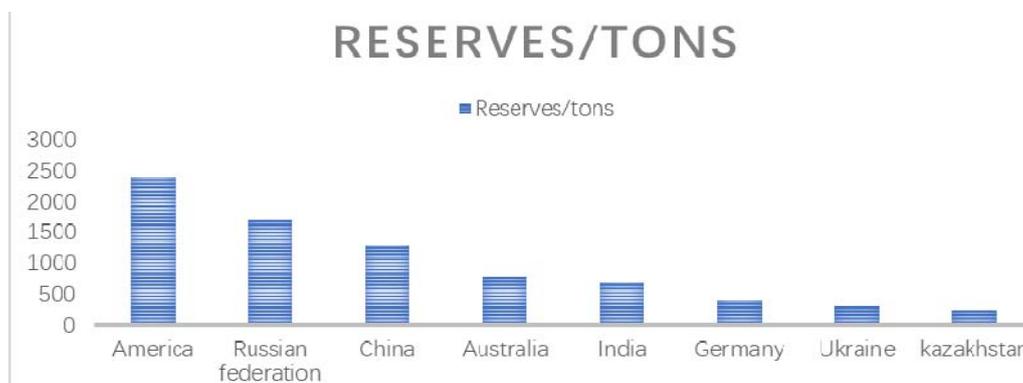


Fig.2 Mineral resource reserves ranking map of various countries

(5) Pay attention to the development and utilization of traditional mineral resources, the use of non-traditional mineral resources less. Non-traditional mineral resources refers to because of today's technology, the economic reason not for industrial use of the resources and not be regarded as minerals, did not find its USES the potential resources, or for the traditional mineral but extremely difficult to find for geological and geographical reasons of mineral resources in the traditional Chinese mineral resources research and development of large scale, has made less progress in non-traditional mineral resources, the western developed countries and some mining giants, the study of nontraditional mineral resources discovery and development seriously.

2. Problems in the utilization of mineral resources

With the rapid development of China's economy, the shortage of mineral resources is becoming more and more prominent. In addition, although China's mineral resources development and utilization has made great achievements, but also produce a greater waste of resources and environmental pollution.

2.1. The prospect of supply and demand of mineral resources is not optimistic

China has become a big country of mineral resources exploitation and utilization. In 2006, China's output of steel, coal and 10 kinds of non-ferrous metal, cement, fertilizer and other products ranked first in the world. Although China's total consumption of mineral resources is large, its per capita level is not high. Contrary to the rapid increase in demand, the degree of security of domestic mineral resources is declining. On the one hand, the country's economic construction need large pillar minerals, such as oil, iron ore, copper, chromite, potash, etc., the gap between supply and demand is growing, the import volume is increasing year by year.

2.2. Resource wastes

Although the state has made great efforts in resource conservation and mine environmental protection, it has made remarkable progress. However, due to the personnel quality, technical level and mechanical equipment of small mines, especially individual mines, the resource recovery rate is generally low. Mining of rich ore spoils or even destroys the poor ore, wastes or destroys the associated ore when the main ore is mined, and only USES a single element when the mining of various metals. The comprehensive utilization rate of the associated ore is less than 20%, 20-30 percentage points lower than the foreign average level of 40% ~ 50%. It can be seen that China's waste in the development and utilization of mineral resources is how amazing, at the same time to improve the efficiency of China's resources. The potential is huge!

2.3. Serious pollution problems

The problems of geological disasters and ecological environmental destruction caused by mining in China are also very serious. For example, strip mining directly damages the surface and natural vegetation; Wastes generated in mining, such as tailings, occupy a large amount of land and disturb and destroy the original surface ecosystem. At present, various types of waste rock and slag produced by mining in China have occupied more than 60,000 ha. These solid wastes contain acidic, alkaline, toxic, and radioactive and heavy metal components, which pollute the surrounding land, water and atmosphere through surface water body runoff and airborne dust, thus damaging the ecological environment around the mines. Burning coal produces a lot of harmful smoke and sulfur dioxide, causing serious air pollution. These phenomena are detrimental to China's international image as a responsible major country and we must take practical measures to solve them.

3. Thoughts on sustainable development of mineral resources

The target system of mineral resources strategy should be diversified. Through the optimal allocation of global resources, a stable, safe and economic supply system should be established to meet China's demand for mineral resources for building a well-off society in an all-round way. By increasing revenue and reducing expenditure, we cannot only meet the needs of the current generation, but also ensure the development needs of our future generations. Through efficient utilization, the advantage of mineral resources will be transformed into an economic advantage to drive regional development and promote the fairness of regional development. Through strategic reserve, reduce the impact of unexpected events and price fluctuations in the international market on China, and ensure national economic security; Improve the utilization efficiency and economic benefits of mineral resources through scientific and technological progress; We should attach importance to disaster prevention and environmental protection, and realize a virtuous circle between resources, environment and social and economic development.

3.1. Strengthen exploration and find out the family background

Geology and mineral resources are the cornerstone of economic life and play an irreplaceable role in national development. In order to find out the distribution of mineral resources, it takes a long time to summarize and accumulates data. The coming and going of "searching for oil" in the western region of our country is the evidence of people's cognition level deepening along with the progress of science and technology and the deepening of work. Therefore, at present the country should do the work is to strengthen the exploration and evaluation of mineral resources, find out the resources background; after the mineral resources are ascertained, the exploitation of mineral resources is decided according to the national development strategy and the economy of exploitation. China is a country with a large number of mineral resources, and should be able to achieve basic self-sufficiency. And basic autarky is to be in finding out the foundation of the family to go up.

3.2. Demand orientation, global allocation

China's resource supply strategy should be changed from "self-sufficiency" to domestic and global allocation. The first is based on domestic production. The relationship between the national economy and people's livelihood of strategic resources to achieve basic self-sufficiency. Basic self-sufficiency is not "self-sufficiency", but the optimal allocation of resources on a global scale to maximize the benefits. According to the needs of the changing situation, new problems should be studied and new ideas put forward to support the sustainable development of economy and society with the sustainable utilization and stable supply of mineral resources.

3.3. Reserve strategies with the purpose of ensuring supply

Strategic and commercial reserves shall be implemented for the important minerals that are urgently needed by the national economy but have risks in supply, such as petroleum, iron ore, copper ore and potash. In order to do a good job in the reserve of important strategic minerals, we should make a good plan and implement it steps by step. To reserve strategic resources, it is necessary to study relevant laws and regulations. To determine the management organization and promote it steps by step; Formulate investment and financing policies and solve capital sources; Form the technical support system of resource reserve. China's petroleum strategic reserve work has a preliminary framework, mineral reserves research should also be mentioned in the agenda. We will establish an early warning system for the safe supply of strategic minerals, establish a strategic mineral reserve system suited to China's national conditions, and strengthen our ability to withstand emergencies, turbulence in the international situation and risks in the international market.

3.4. Improve the comprehensive utilization rate of mineral resources

Optimizing the structure of mineral resources exploitation and utilization. The structure of mining scale, product structure and proportion of upstream and downstream should be optimized to adjust and optimize the mining structure. We will strengthen scientific planning, strengthen technical upgrading of small and medium-sized mines, promote the merger, combination or reorganization of mining enterprises through the market mechanism, reduce the total number of mining enterprises, and close down small mines that pollute or waste the environment, and strive to reduce the number of small and medium-sized mines considerably. Strive to make the total amount of mineral resources development and utilization in line with the level of social and economic development; we will guide the exploitation of marketable minerals and restrict the exploitation of minerals whose supply exceeds demand. Improve the efficiency of resource utilization and encourage the recycling of scrap metal and other resources. In addition, the development and utilization of non-metallic mineral resources should be strengthened. By implementing the strategy of balancing the total amount of dominant minerals, the product structure of China's dominant minerals is adjusted, and the production is limited and the price is guaranteed. The comprehensive utilization of mineral resources is inseparable from the progress of science and technology. Important impetus to the progress of science and technology is to improve the utilization efficiency of mineral, the research and development of new and high technology

industrialization, promote the development of geological exploration, new technology improved the earth observation and deep exploration ability, information processing and exchange capacity, experimental analysis and testing capability, efforts to build modern system of geological work, rely on scientific and technological innovation to improve mineral resources reserves.

3.5. Environmental protections and comprehensive management

From the perspective of management level, the competent departments of land and resources should strengthen coordination and division of labor with national macroeconomic departments, industrial departments and scientific research units. From solving practical and tactical problems to solve forward-looking and strategic problems to improve the level of geological work for the country's macro decision-making. From the perspective of management content, resources should be taken as the main line, the status of my environmental protection should be highlighted, and the clean production of the mining industry should be vigorously promoted. We will strengthen comprehensive and unified management of exploration and evaluation, development and utilization, environmental protection, reduction of geological disasters in mines, and major technological advances in geology. In the past, the service mainly focused on mineral exploration, but expanded to multiple targets such as mineral resource protection and rational utilization, geological disaster alleviation and ecological environment protection. To make overall planning and unified management, reduce the consumption of resources and energy in mineral exploitation, reduce the harm or impact on the mine environment, reduce the occurrence of mine disasters, and take the road of green mining development.

3.6. Security guarantees

Safety is the basic guarantee of mining sustainable development. It is to safeguard resource supply security, energy security above all, safeguard national economic security then. An important symbol of resource supply security is a secure and stable supply system, relatively stable price and market-oriented price formation mechanism. In order to realize sustainable utilization of mineral resources and sustainable development of the mining industry, it is necessary to have a solid knowledge reserve, important technical support, unobstructed information channel, development strategy conducive to social welfare improvement, and high service ability. All these, put forward higher requirement to the mineral industry.

4. Implement the strategy of sustainable development of mineral resources

The sustainable development of society and economy depends on the sustainable development of mineral resources. The sustainable development of mineral resources requires a good social and economic environment, and they are interdependent and interactive. Sustainable development and utilization of mineral resources is not only realistic and potential use of mineral resources, but also to meet social needs and adapt to changes in industrial structure. Therefore, it is very important to make a strategy suitable for the sustainable development of mineral resources, which are also of great significance to the sustainable development of society and economy.

(1) Strengthen the legal system and promote management. First of all, we should follow the legal path and strengthen the implementation of the law on mineral resources. It shall also formulate local laws and regulations with strong binding force and operability suitable for the characteristics of various local minerals, so as to protect mineral resources, prevent and crack down on units and individuals that have indiscriminately exploited and exploited resources, and combine prevention and control with prevention and control. Want to undertake lawfully next cast person, output business accounting. Investment accounting before mineral development includes human capital, artificial capital and natural capital (loss and damage of resources and environment). Output accounting includes economic benefits, social benefits and environmental benefits. If the relatively coordinated development of the consequences of the benefits greater than the former, the project is only feasible, otherwise the development should be suspended. Finally, management and supervision should be strengthened during and after mineral exploitation. Relying on management to improve mining and

dressing technology, changing extensive mode of production to intensive mode of production, developing and utilizing mineral resources scientifically and rationally, and promoting endogenous economic growth technically and administratively; At the same time, a complete management and supervision mechanism at all levels should be established so that the public has the right to participate in the supervision and report the abuse of mineral resources.

(2) Reform the system, adjustment measures to mine conditions, coordinate and control, and improve the comprehensive utilization rate. With rest for: 1. System reform, change enterprise separately. The government should stop directly intervening in and participating in the exploration and mining of the mining industry, so that enterprises can go to the market and give play to their enthusiasm, initiative and creativity in production and management. Enterprises can expand the scale of operation and improve the technical level and production efficiency by means of multi-channel financing, diversified investment and equity according to their own capabilities and market demands. 2. Due to mining, mining to make use of. According to the distribution characteristics, scale and quality of mineral resources in a country or region, the utilization mode and rate of mineral resources should be reasonably planned. And according to the mineral resources and social and economic development status and trend, the optimal allocation of mineral resources, to determine the direction of the use of each type of resources and the proportion of different resources, to achieve the best use of benefits. Coordinate control, reasonable use. To dynamically observe and dispatch the utilization status and activities of mineral resources, coordinate various contradictions and conflicts in the process of mineral resources development and utilization, find the best development path for the sustainable development and utilization system of mineral resources, and combine the development and utilization of resources with the planning and protection of mineral resources.

(3) Establish reasonable utilitarian and ecological values. The socialized large-scale production greatly increases the demand for mineral resources, while the traditional mining production mode and management mode lead to the destruction, destruction and shortage of mineral resources and the ecological destruction, which affect the sustainable development of mineral resources and hinder the sustainable development of society and economy. Therefore, people realize the importance and urgency of rational exploitation, utilization and protection of mineral resources. The establishment of the ecological values of "harmony between man and nature" will help expand the traditional ethics between people to the new values of harmonious development between man and nature, and guide people to respect the laws of nature, cherish resources, save resources, and develop and utilize mineral resources in a healthy and orderly way.

(4) Strengthen the development and utilization of non-traditional mineral resources. The development and utilization of non-traditional mineral resources are quite limited. And traditional mineral resource will gradually dry up with the constantly consumption. And the rise of emerging industries require a new mineral resources, it's urgently demand the discovery and development of new type, new areas, new USES of nontraditional mineral resources, to adapt to the change of industrial structure of resource structure change, strengthen the basis of nontraditional mineral resources theory and technology research, to improve its strength and scope of application.

(5) Recycling and economic utilization of mineral resources. The recycling of mineral resources is a new model of resource development that is kind to the earth. It requires that both resources and energy can be used in the most reasonable way in the continuous cycle so as to control the impact of human economic activities on the natural environment to the minimum extent possible. Recycling requires that the produced items can be turned back into usable resources rather than unrecoverable garbage after completing their functions. There are two kinds of recycling. One is the primary recycling, that is, the waste products are recycled to produce the same kind of new products. The other is the secondary cycle, which converts waste resources into raw materials for other products. The recycling rate of non-ferrous metal in China's iron and steel scra; p is only 30%, much lower than the 60% to 80% level in developed countries.

(6) Establish an evaluation system for the sustainable development of mineral resources. The establishment of sustainable development evaluation system of mineral resources can make it operable

through quantitative index, which is the way from theory to practice of sustainable development strategy of mineral resources. Apply scientific, systematic, dynamic and operable principles to establish the evaluation index system of sustainable development, and establish the corresponding evaluation model according to different goals.

5. Conclusion

Mineral resources are irreplaceable and the lifeblood of sustainable economic development. In order to realize the goal of China's sustainable development, the development of China's mineral resources has been put on the agenda. For the sustainable development of mineral resources, it is necessary to make full use of both domestic and international markets and carry out in-depth mineral development in China. At the same time, it is also necessary to give consideration to external markets, optimize the allocation of resources and maximize the benefits. The sustainable development of mineral resources should also take into account the comprehensive utilization of mineral resources, environmental protection and related safety measures, and take the green mining development path to benefit future generations.

References

- [1] Rui XiangSong. General thoughts on China's resources, environment and sustainable development strategy [J]. Environmental protection,1987,(7): 69-72.
- [2] ENERGY POLICY ACT OF 2005 [R].USA.2005, 8: 22.
- [3] Jianmin Ni. National energy security report [R]. Beijing: people's publishing house,2005,7:3-6.
- [4] Green Paper [R]. The Commission of European Communities.Brussels. 2006, 8: 3-6.
- [5] Lei Zhang. Discussion on energy security in China [J]. China soft science, 2002, (4):7-12.
Awerbuch, S. Portfolio-Based Electricity Generation Planning: Policy Implications For Renewables And Energy Security [J]. Mitigation and Adaptation Strategies for Global Change. 200611: 693-710.
- [6] Jansen J C,van ArkelWG,BootsMG.Designing indicators of long - term energy supply security [R]. ECN Policy Studies. 2004: 21
- [7] Robert K.Peet.The Measurement of Species Diversity[M]. Annual Review of Ecology and Systematics. 1974, 5: 285-307.
- [8] Fager EW. Diversity:A Sampling Study[J].The American Naturalist. 1972, 106: 293-310.
- [9] Yi Liu, Jiawen Peng, and Zhihao Yu. 2018. Big Data Platform Architecture under The Background of Financial Technology: In The Insurance Industry As An Example. In Proceedings of the 2018 International Conference on Big Data Engineering and Technology (BDET 2018). ACM, New York, NY, USA, 31-35.