

Practice of green mine access management in China

Lixin Chen^a, Fan Yang^{b,*}, Yingxiang Sun^c

Chinese Academy of Natural Resources Economics, Beijing 101149, P.R.China

^alxchen1006@163.com, ^{b,*}fyang@canre.org.cn, ^csyx1201@163.com

Abstract: The National Green Mine Directory is an important starting point for the natural resource management department to promote the construction of green mines. Taking 1254 mines included in China's green mine directory database as the research object, combined with the construction practice of green mines around the country, this paper summarizes the selection requirements and processes, analyzes the problems existing in the third-party evaluation in the process of green mine selection, and puts forward suggestions on standardizing the access management of green mine directory and improving the third-party evaluation, so as to provide decision-making reference for improving the management level of green mine construction.

Keywords: green mine, access, directory, third-party evaluation

Since 2019, the Ministry of natural resources has issued the notice on doing a good job in the selection of green mines twice to carry out the selection of green mines. At present, a total of 1254 mines have been selected and included in the list of green mines. The national green mine directory is an administrative measure implemented by the natural resources management department in accordance with the law. Mining enterprises that will complete the task of green mine construction record through the specified procedures, implement incentive policies and urge them to fulfill their obligations, and make it public on the green mining development service platform [1]. This paper analyzes the advantageous factors of mine construction and green mine management in terms of mine location, location and practice, and focuses on the analysis of the number of mine types, mine management and other factors affecting the green mine construction in China. On this basis, it combs and summarizes the shortcomings of selection and access and third-party evaluation, so as to provide decision-making reference for further improving the access management of green mine construction and improving the level of green mine construction.

1. Access requirements and procedures

Access is the first important link of green mine directory management, which is completed in the way of "national, provincial, municipal and county level joint innovation, enterprise owner construction, third-party evaluation and social supervision[2]". According to the green mine construction standards, through the processes of enterprise self-assessment, declaration, third-party evaluation and review by the provincial department in charge of natural resources, the mines with good construction conditions, scientific resource development, good effect of mine environmental governance, strong scientific and technological innovation ability and standardized enterprise management are included in the green mountain list, leading and driving the green development direction of China's mining industry.

1.1 Access basis and requirements

According to the implementation opinions on accelerating the construction of green mines and nine industrial standards for green mine construction in non-metallic industry, the mines selected into the national green mine list must meet the requirements of third-party evaluation in terms of preconditions, mining area environment, resource development mode, comprehensive utilization of resources, energy conservation and emission reduction, scientific and technological innovation and intelligent mines, enterprise management and enterprise image.

1.2 Access process and method

Mining enterprises carry out self-assessment according to the relevant requirements of green mine construction and the green mine construction standards of their industry, and form a self-assessment report; Each provincial department in charge of natural resources entrusts a third-party assessment institution independent of mining enterprises and with independent legal personality to carry out on-site verification of mining enterprises and form a third-party assessment report by means of government purchase of services. All provinces organize material review and spot check, publicize the selection results and report to the Ministry of natural resources; The Ministry of natural resources will announce and include in the list after organizing the review of the selection and recommendation list of all provinces. All data involved in this process are filled in online in the national green mine directory management information system [3].

2. Characteristic analysis of green mine

2.1 The number of provinces varies greatly

From the perspective of provinces, the number of green mines listed in the national provinces ranges from 1 to 92 (Fig. 1), with obvious imbalance. There are more than 60 mines in the top 10 provinces: Henan, Shandong, Shanxi, Anhui, Hebei, Hubei, Inner Mongolia, Hunan, Zhejiang and Guangdong. Less than 10 provinces: Chongqing, Tibet, Hainan and Tianjin.

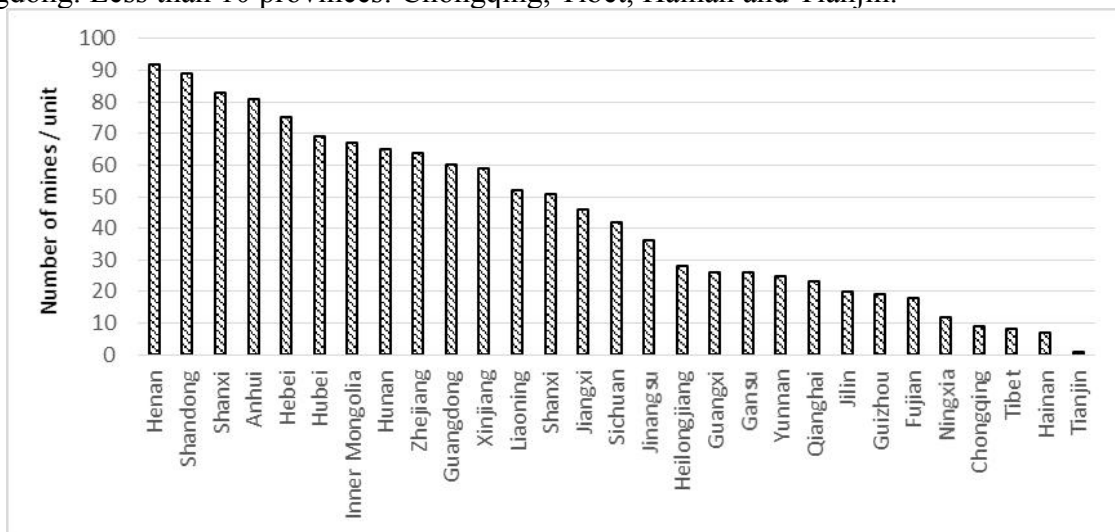


Fig.1 Number and distribution of mines in each province in the national green mine list

Further comparative analysis shows that among the 29 provinces, the proportion of the number of green mines in 14 provinces to the total number of green mines in China is higher than that in this province, and the proportion of the number of green mines in 15 provinces to the total number of green mines in China is lower than that in this province to the total number of mines in China (Fig. 2). On the whole, the construction progress of green mines in nearly half of the provinces in the list is relatively stable, The construction of green mines in more than half of the provinces has a long way to go.

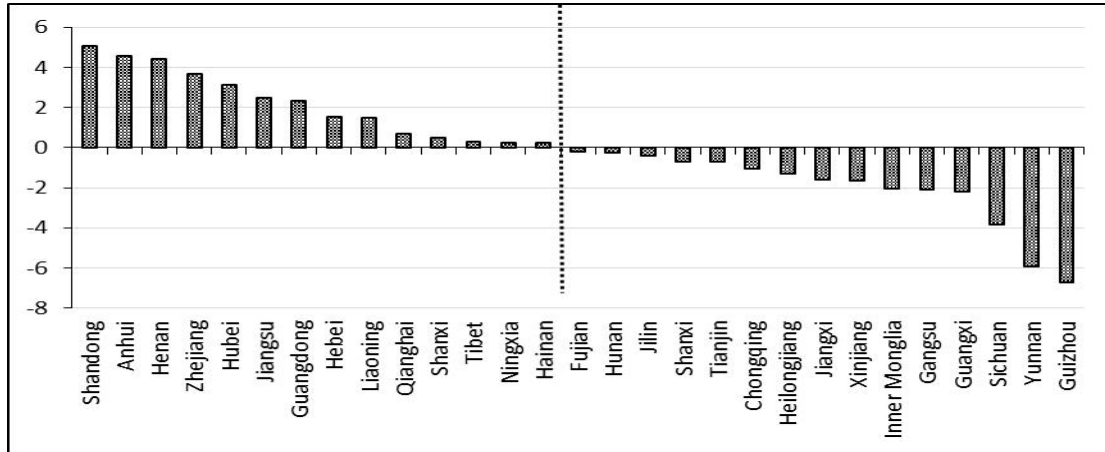


Figure 2 comparative analysis of the proportion of green mines in each province and that in the whole country in the list

2.2 The central region has obvious regional advantages

The provinces where the mines in the green mine list are located are divided into four regions1: eastern region, central region, western region and northeast region. From the regional analysis (Figure 3), there are 350 mines in the eastern region, accounting for 27.9%, 437 mines in the central region, accounting for 34.8%, 367 mines in the western region, accounting for 29.3%, and 100 mines in the northeast region, accounting for 8%. From the data analysis, the construction progress of green mines in the eastern region and the central region is relatively balanced. The number of green mines in the central region is the largest, the number of green mines in the western region and the eastern region is the same, and the least number is the northeast. The construction progress of green mines in the northeast region is slow, which is mainly restricted by climate, capital, talents and other factors.

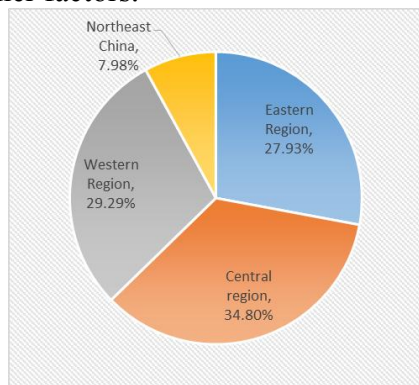


Figure 3 regional statistical analysis

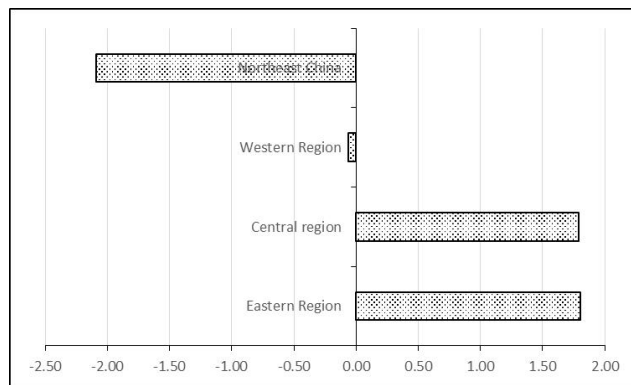


Figure 4 regional comparative analysis

2.3 Underground mining is slightly better than open-pit mining

From the analysis of mining methods (Figure 5), there are 669 underground mining mines, accounting for 53.6%; 507 open-pit mines, accounting for 40.2%; There are 78 open-pit and underground joint mining, accounting for 6.2%. In terms of quantity, green mines with open-pit mining are nearly 14 percentage points less than underground mining, which reflects the advantages of underground mining, such as high resource utilization efficiency and relatively small disturbance to the ecological environment.

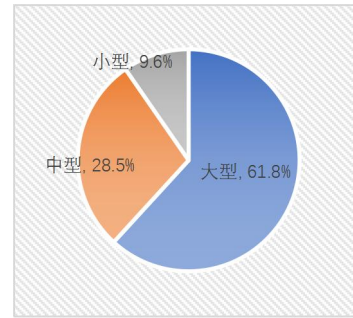
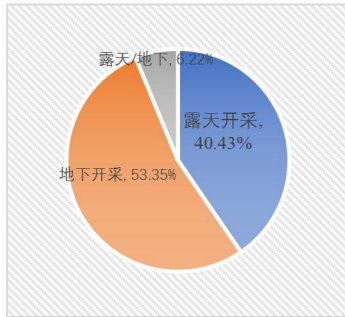


Fig. 5 Statistical analysis chart of development mode Fig. 6 Statistical analysis of mine scale

2.4 Large and medium-sized mines have an absolute advantage, and the construction of small mines is difficult

In terms of mine scale, there are 6798 large-scale mines and 9056 medium-sized mines in China's non oil and gas mines, accounting for 34.58%. The proportion of large and medium-sized mines in the list of green mines is 90.4% (Fig. 6), which is much higher than that of large and medium-sized mines in China. Among them, there are 775 large mines, accounting for 61.8%; 358 medium-sized mines, accounting for 28.5%; There are 121 small mines, accounting for 9.6%. The main reason is that large and medium-sized mines have relatively strong software and hardware strength such as capital, equipment, technology and talent team, so they can invest more in the construction of green mines, while small mines have limited funds for the construction of green mines due to the impact of economic strength. Therefore, for them, the construction of green mines is relatively difficult.

2.5 The construction of non-metallic green mines is difficult

In terms of minerals, the proportion of green mines of energy minerals, ferrous metals, nonferrous metals and precious metals is higher than that of the whole country (Table 1). The proportion of green mines of energy and precious metals exceeds 17.53% and 6.03% of the whole country respectively. The proportion of green mines of rare earth metals, nonmetals and water and gas minerals is lower than that of the whole country. The proportion of green mines of non-metallic minerals is far lower than that of the whole country, with a difference of nearly 30%. Compared with energy and metal minerals, the development and utilization of non-metallic minerals has a relatively greater and more intuitive impact on the ecological environment, but there are still shortcomings in development and utilization efficiency and scientific and technological innovation. We should increase technological innovation and management innovation.

Table 1 proportion of green mines and national mines in production by mineral category

Minerals		National mines		Green mine		Difference /%
General category	Subclass	Quantity / unit	Proportion /%	Quantity / unit	Proportion /%	
Energy minerals	—	5900(Non oil and gas bearing minerals)	12.83	380(Petroliferous minerals)	30.30	17.53
Metal mineral	—	7541	16.40	377	30.06	13.66
	Mineral black metal	3372	7.33	95	7.58	0.28
	Nonferrous metal minerals	2596	5.64	114	9.09	3.45
	Precious metal minerals	1442	3.14	115	9.17	6.03
	Rare earth and rare metal minerals	131	0.28	2	0.16	-0.12
Nonmetallic minerals	—	31890	69.34	495	39.47	-29.87
	Metallurgical auxiliary raw material minerals	1963	4.27	—	—	—
	Chemical raw materials and minerals	1322	2.87	—	—	—
	Building materials and other non-metallic minerals	28605	62.20	—	—	—
Water vapor mineral	Mineral water	656	1.43	2	0.16	-1.27
Total		45989	100		100	0.0

Data source: 2020 national statistical annual report on the development and utilization of non oil and gas mineral resources.

3. Problems in access management

3.1 The quality of third-party evaluation needs to be improved

Third party assessment is a crucial link in green mine access. Due to the great differences in the level, ability and sense of responsibility between assessment institutions and experts, there are still some problems in the third-party assessment of green mines, such as unclear access threshold, insufficient guarantee of assessment funds, insufficient independence of assessment institutions, low level of specialization, imperfect assessment mechanism, and ineffective establishment of retrospective accountability and supervision and management system, resulting in great differences between the assessment results and the real situation, Some local third-party assessment institutions simply turn the third-party assessment of green mines into a large-scale inspection of green mines. The large-scale inspection method is difficult to reflect the real situation of the systematic and complex project of green mines, and artificially reduce the access standards for green mine construction.

3.2 Some local governments fail to strictly check the audit

In the process of green mine construction, the government plays an extremely important role. In the green mine access stage, some local natural resources management departments did not conduct in-depth and detailed scientific demonstration and on-the-spot verification on the third-party evaluation conclusions, resulting in the selection of bad mines, while the real green mines were blocked out. Local governments should summarize the shortcomings of the government procurement service model, improve the third-party evaluation mechanism, and strengthen their own service supervision role.

3.3 The selection criteria focusing on mine scale need to be improved

Small and medium-sized mines account for less than 10% of the list of green mines. On the one hand, it reflects that there is a large gap in the comprehensive strength of China's large, medium and small mines, the management level of small and medium-sized enterprises is not high, the management mechanism is not perfect, the technical talents such as mining, beneficiation and metallurgy are not matched, and the allocation of efficient management talents is not complete. On the other hand, China's small and medium-sized mines account for more than 80% and are the main force of mines in China. However, small and medium-sized mines account for less than 10% in the list of green mines, which is not conducive to the overall promotion of national green mine construction and the overall improvement of China's mine green transformation and high-quality development.

4. Suggestions on improving the quality of access management

4.1 Improve the quality of third-party evaluation

The third-party evaluation should be based on 9 industry standards and combined with the requirements of the scoring table to evaluate whether a mine reaches the level of green mine. The assessment results should mainly reflect six aspects: first, the environment of the mining area should reflect the comfort of the production and living environment and the corporate image of the mining area; The way of resource development should reflect the level of environmental protection during resource development; Comprehensive utilization should reflect the ability and level of comprehensive utilization of resources; The evaluation results of energy conservation should reflect the level of energy management and the advanced level of equipment; Scientific and technological innovation should reflect the scientific and technological innovation ability of enterprises and the technical support ability for the construction of green mines; Enterprise management should be reflected in the guarantee ability of the enterprise's management system for the construction of green mines.

4.2 Clarify the government's positioning and strictly control the access audit

In the green mine access stage, the government should take effective measures to supervise and verify the third-party evaluation results. It is suggested that local green mine management departments should strengthen the supervision of third-party assessment institutions for green mine construction, establish and improve the responsibility mechanism of third-party assessment institutions, actively promote the specialization, standardization and standardization of third-party assessment work, improve disciplinary and supervision measures, increase the punishment of third parties who have violated laws and regulations, and ensure the fairness and justice of the dynamic management process of the directory [4].

4.3 Overall planning, classification and comprehensive promotion of green mine construction

Overall planning and classified management shall be carried out in combination with the differentiated current situation of green mine construction. On the basis of management and support, standardize the production management of small mines and improve the endogenous power through closing, rectification and other means. Focus on the training of mining enterprises with large mine scale, good construction foundation and basic conditions for green mine construction. It is suggested to further strengthen the guidance and support for the construction of green mines in the West and northeast in the future. We should not only actively explore and develop the development models of green mines and green mining with different characteristics according to local conditions, but also form the institutional mechanism to promote the green development of mining in the West from a macro perspective.

Acknowledgment

The project is funded by the department budget project of the Ministry of natural resources "organization, implementation and follow-up evaluation of the construction of green mines and green mining development demonstration areas" (No.: 121102000000180076).

References

- [1] Dong Yu, Hou Huali, sun Yingxiang Research on green mine directory management. *Economist* [J]. 2020 (9): 17-18.
- [2] Hou Huali, Liu Xiaojuan, Guo Dongyan, Wu Shangkun, Dong Yu. Analysis and suggestions on the national directory of green mines [J]. 2020 (6): 1-7.
- [3] Sun Yingxiang, Liu Xiaojuan, Wu Shangkun, Chen Lixin. A comparative study on national green mine pilot list and national green mine list[J]. 2020 (7): 63.
- [4] Chen Lixin, Hou Huali. Thoughts on promoting the standardization of third-party evaluation of green mine construction. *Natural Resources Economy of China*[J], 2019, 32 (11): 34-35.